Advanced Civ

Mod for BtS 3.19   version 0.94   4 Dec 2018

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User Manual

AdvCiv is a modpack for advanced players, building on karadoc's "K-Mod: Far Beyond the Sword". AdvCiv does not add content, and, so far, makes few balance changes apart from changes to the AI. Multiplayer mode hasn't been tested properly. For questions, comments and current activities, please visit the development [thread](#) on CivFanatics.

Installation

To install AdvCiv, copy the unzipped AdvCiv folder into `Beyond the Sword\Mods` under `Program Files`. When the mod is loaded for the first time, it creates a folder `My Games\ Beyond the Sword\AdvCiv` for the [BUG](#) settings. You'll have to remove this folder manually to fully uninstall AdvCiv.

The above assumes a BtS installation from optical disc on Windows 8 or earlier, though I understand that it works the same way with the GOG.com edition and on Windows 10. Steam users may have to [revert](#) to the Game Spy version in order to run any mods, and the `Mods` folder should be in `Steamapps\Common\Sid Meier's Civilization IV Beyond the Sword\Beyond the Sword`. There is no way to play this mod on macOS except through a Windows emulator ([this](#) guide might help with that, but I haven't tried it).

To start the mod through a Windows shortcut, create a shortcut to `Civ4BeyondSword.exe`, open the shortcut's file properties, and add a space and `mod=\AdvCiv` to the `Target` field.

Contents

To start playing, it should suffice to read through the list of included mod components below. The other chapters describe the major changes in more detail. Most of the AI and UI changes are low-key though, and only covered by the (extensive) changelog after the last chapter. I've assigned a numeric id to each batch of changes; when an id is mentioned, there's always a link to further details and rationales in the changelog.

- UWAI: Utility-Based War AI. Rewrite of the AI parts dealing with decisions on war and peace. The new AI is better at anticipating the course of a war. Conditions that rule out war categorically in BtS (e.g. attitude or being occupied with another war) are factored into an overall utility value and can be outweighed by factors that favor war. UWAI can be disabled through the "Aggressive AI" game option.

- DDiplo: Dynamic Diplomacy. Makes some relations bonuses harder to get, particularly "mutual struggle", "open borders" and "supplied resources". All AI memory decays, including "You declared war on us". Two new modifiers: "We oppose your ruthless expansionism" and "You agreed to come to our aid in wartime". +4 relations is required for "pleased" attitude and -1 for "cautious", but this is evened out by changes to the "first impression" modifier.

- BBarb: Better Barbarians. Barbarian activity increases gradually until 67% of a continent is settled; fewer Barbarians on poor-yield tiles; creation rate adjusted to game speed; land units can spawn aboard Galleys; fogbusting nerfed; Great Wall reworked; goodies from Tribal Villages adjusted to game progress; Scout and Explorer buffed; more plausible development on all-Barbarian continents (e.g. Terra map).

- Immortal Culture: Culture of dead civs stays in the game and can cause anger and revolts. Revolts can occur in any cities, not just near a border. Shortened occupation countdown in conquered cities, but the countdown decreases only probabilistically based on the strength of the occupying force.

- K-Mod by karadoc: substantial AI improvements (incl. BBAI); usability improvements (incl. BUG, which in turn includes Civ4lerts, reminder, Exotic Foreign Advisor and several optional advisor screens); bugfixes (incl. the unofficial patch); improved developer tools (AIAutoPlay, Civ Changer); performance tweaks; minor balance changes (several from PIG, incl. Lead From Behind; especially noteworthy: Serfdom, Scientific Method and cargo ships buffed); practically no flavor changes other than Actual Quotes. To my knowledge, the main BBAI contributors are jdog, EmperorFool, Afforess, Fuyu and LunarMongoose. For credits for BUG, see the BUG help file (Alt + Ctrl + O in game).

- Kek-Mod, a K-Mod fork by DarkLunaPhantom, partly included (mostly bugfixes)

- Show Hidden Attitude Mod by DaveMcW

- Various changes in the spirit of K-Mod, especially to rules and AI behaviors that are easy to exploit in BtS; e.g. can't steal Workers.

- SPaH: Start Points as Handicap. Game option that gives an Advanced Start to the AI civs, but not to the human civs. Start points can also be assigned unequally to the AI civs; the mod then places the civs with the most points the farthest away from the human civs initially.

- R&F: Rise and Fall. Game option that divides the game into chapters; you take control of a different civ in each chapter. A score is awarded after each chapter based on how

the standing of your civ has changed. The overall objective is to maximize the total of the awarded scores.

- [PerfectMongoose](#) map script (v3.2; main authors: Cephalo and LunarMongoose)
- Blue Marble "light": Altered terrain textures that are easier on the eyes; based on Kai Fiebach's [Blue Marble](#), but closer to the original textures. ([screenshots](#))

Utility-Based War AI

UWAI is enabled by default, but players who prefer the K-Mod AI, can use the "Aggressive AI (Legacy)" option on the Custom Game screen to disable UWAI; that option also enables the Aggressive AI mode. There aren't separate options for UWAI and Aggressive AI because UWAI doesn't have an aggressive or non-aggressive mode (see also change [019](#)), and the K-Mod AI is notoriously belligerent with and without Aggressive AI. (K-Mod without Aggressive AI can still be configured in `GlobalDefines_advc.xml`.)

The major differences between UWAI and BtS/K-Mod:

UWAI	*BtS/K-Mod*
Military analysis: UWAI predicts how ongoing and hypothetical wars might develop in the medium-term, i.e. over the next 25 to 50 turns. The projection is based on power ratings for various military branches, namely the army (land and air units available for offensives), home guard (only available for defense), fleet (sea units), logistics (cargo ships) and nukes. Simulates military build-up (based on estimated per-turn production), clashes of army stacks, naval landings and attempted conquests of specific cities. The outcomes include cities lost and conquered by the various war parties, invested production and lost military power. These predictions aren't intended to be accurate; they only need to be plausible enough to result in plausible AI behavior.	The BtS military analysis simply compares present power ratings. Each civ has a single power rating, i.e. land and sea units aren't distinguished. K-Mod adds a projection of military build-up.
Power: Power ratings are based on per-unit military power values that are, essentially, computed as combat strength raised to the power of 1.7. E.g. Swordsman has about 21 power and Cuirassier 93; this value also accounts for the faster movement and other useful abilities of Cuirassiers. Caveat: The power graph on the Info screen is still based on BtS power ratings.	Power values are usually equal to combat strength values; e.g. two Swordsmen count as much as one Cuirassier. That is, BtS underestimates the power of technologically advanced units.

The **evaluation** of the expected military outcomes is broken down into 26 aspects, each dealing with one specific reason for war (e.g. gaining more cities or loathing for a war opponent) or against (e.g. diplomatic ill will or invested production). The result of the evaluation is a utility value indicating how worthwhile the war (plan) in question is.	The AI considers attitude, military power, geographical proximity and victory strategies. These factors are combined in an arcane manner by a function called `startWarVal`. Peace is evaluated separately by the `endWarVal` function, which is based on war successes, finances and the tactical situation, i.e. very different from `startWarVal`. K-Mod has expanded `startWarVal`, but it's still inconsistent with `endWarVal`, leading to war-peace oscillation, and too ad hoc for this important part of the AI.
War plans are fully **re-evaluated** each turn while in preparation, and canceled if they no longer appear worthwhile. The target of a war plan can change during preparations.	War plans in prepration are only canceled in exceptional circumstances. The target can't change.
The only necessary condition for beginning (and continuing) war preparations is a **positive war utility**. Attitude, power and proximity are all covered by the war utility computation and no longer work as hard requirements. That said, attitude has a particularly strong impact on war utility, so that a relatively peaceful leader like Saladin doesn't go to war against a civ that he is pleased with unless there are unusually strong reasons for the war. Once preparations are concluded and war is imminent, it's too late for a change in attitude to stop the war.	Thresholds for attitude, power ratio and shared borders serve as necessary conditions for war; in particular, many AI leaders never start war preparations against civs they're pleased with. (K-Mod ignores this restriction in some cases during the endgame.)
If war utility is positive, the AI begins war preparations with a per-turn probability based on personality and the utility value. As a result, the AI can be **quick to declare war** in response to another declaration of war or some rapid shift in power (e.g. after upgrading to Riflemen).	The per-turn probability is based only on personality and attitude.
The AI **makes peace** if and only if war utility is negative or outweighed by reparations.	Apart from an `endWarVal` check, there are some special conditions for peace, such as having fought to a long draw or being alone in what had started as a dogpile war.

After a declaration of war, the AI **refuses to talk** for just one turn. After that, the AI can be contacted unless the price for peace would be more than the other side could pay. Exception: If war was declared at the request of a third party or through a defensive pact or a vote, the attacked AI civ refuses to talk to its war enemies for the same duration as in BtS.	The refuse-to-talk duration is based on AI personality and war success. Possible reparations don't play a role.
The AI can start a war **while already in another war**. It's possible, in principle, to hire an AI civ for war even if that AI civ is already preparing or fighting a war, but the price is usually prohibitive.	The AI doesn't consider war preparations when it's already in a war; K-Mod relaxes this restriction in the endgame. In both BtS and K-Mod, the AI can't be hired for war while already conducting or planning war.
The AI refuses requests for starting a war regardless of war utility if either its attitude toward the proposed target is too high, or its attitude toward the sponsor is too low. (Such plans are too sensitive to even discuss with anyone who isn't a trusted partner.) Otherwise, the necessary payment is computed based on war utility. If the result exceeds a threshold, the AI refuses to declare war, stating "We are afraid of their military might" if the power ratio is highly unfavorable, and "**We have enough on our hands right now**" otherwise. Thus, "enough on our hands" doesn't imply that the AI is already preparing another war. When an AI leader becomes willing to discuss a sponsored war, the player is notified through an alert message (change 210a) and the Glance tab of the Foreign Advisor screen shows a fist icon (152).	Same: "We couldn't betray close friends" or "We don't like you enough". The AI also refuses categorically if the power ratio is too unfavorable or when already preparing or fighting a war. In BtS, if the trade screen says "enough on our hands," then the AI is definitely preparing a war. In K-Mod, other reasons for not wanting to start a war can block the enough-on-hands tell. For the player's convenience, the BUG mod shows a fist icon on the scoreboard next to any AI civ that will give the "enough on our hand" response. (AdvCiv disables this.)
While the utility of a war plan against a human player is positive but small, and the AI hasn't begun war preparations yet, there's an increased chance of demands for **tribute** or a gift.	Tribute demands are made randomly against any disliked and militarily weaker human civ. Whether the AI is currently ready to start a war doesn't play a role.
UWAI continues to use almost all of the AI **personality** values from BtS. Many work differently, but, in most cases, to a similar effect. For example, in UWAI, a high `MaxWarNearbyPowerRatio` leads to an optimistically biased military analysis, which can make an AI leader willing to start wars that he or she may well lose.	Each AI leader has some 20 personality values affecting war and peace, set in `CIV4LeaderHeadInfos.xml`. `MaxWarNearbyPowerRatio` is a threshold that rules out war if the military power ratio is too unfavorable.

Hiring war allies, granting or denying tribute, UN peacekeeping and some **other decisions** that imply war or peace are made based on war utility. Decisions about vassal agreements are still largely made by the K-Mod AI (with many adjustments; change 112); ditto defensive pacts.	Separate heuristics for these decisions, based on some combination of power ratio and attitude.
Unless a city is clearly about to fall, the AI is *less* inclined to make peace when there are **enemy units near** its cities. This does not apply to capitulation; the AI capitulates only when faced with a threatening number of hostile units inside its borders (change 112b). This is the only part of UWAI that cares about positions of units on the map. UWAI does not control *how* war is conducted, only *if*.	The AI is *more* willing to make peace when there are hostile units near its cities, but can't evaluate if these units actually pose a threat. This can be exploited for better peace deals. Positions of units have no bearing on whether the AI is willing to capitulate.

Dynamic Diplomacy (DDiplo)

One very noticeable change is in the mapping from relations values to AI attitude:

Relations	≥ 10	≥ 4	≤ 3	≤ -2	≤ -8
AI attitude	Friendly	Pleased	Cautious	Annoyed	Furious

For comparison, in BtS, Cautious begins at -2, Pleased at +3 and Friendly at +10. However, DDiplo also removes the (hidden) -1 relations penalty on Noble difficulty and above, meaning that, in effect, the thresholds for Pleased and Cautious stay the same and the threshold for Friendly is one lower than in BtS. To win an AI civ's vote for a Diplomacy victory, Friendly attitude is now required. (In BtS, +8 relations suffice.) Change id: 148.

The following changes to relations modifiers should make diplomacy more consistent, more dynamic and less exploitable. Changes to vassal agreements are described at the end of the chapter.

– "Our mutual military struggle ...": A bonus of more than 1 now requires getting involved in the war, that is, to inflict or incur losses. The bonus decays over time and is reduced when there is a non-mutual war. (In BtS, it's sufficient to be formally at war, and, once accumulated, the bonus stays for the rest of the game.) Fighting inside an ally's borders is especially effective at increasing the diplo bonus. Fighting Barbarians inside another civ's borders counts too, even when there is no shared war. 130m

– "You agreed to come to our aid in wartime": Joining a war at the request of an AI civ results in a +1 relations bonus that is remembered for 100 turns on average. 130s

– When a war ally is brought in, the two allies automatically sign a 10-turn peace treaty. 146

– "Years of peace" only start to count once a civ is met. 130a

– "You stopped trading with us": It's no longer possible to propose an embargo against one's own trade partner; will first have to cancel those trades. The target of the embargo refuses to talk with both the civ that proposed the embargo, and the one that agreed to

it. (Except when a master asks its vassal to stop trading.) The embargo severs even recent deals that couldn't otherwise be canceled. [130f](#)

– "You made an arrogant demand" now only applies when a tribute demand is granted; no diplo penalty if the AI refuses to pay. However, if a player declares war on an AI civ that remembers having paid tribute, that civ and all AI civs it has met refuse tribute and help requests by the player for (on average) 80 turns. When an AI civ declares war, it forgets all tribute demands, i.e. it can be attacked without repercussions. [130o](#)

– "You press us too hard": There is always a chance that the AI refuses a request for a gift for no particular reason. A refused request is therefore not a reliable way to determine if the AI is preparing war against the player who makes the request. The AI is willing to grant a gift about every 30 turns (20 in BtS). [144](#)

– "You're getting ahead of us": AI civs dislike civs that are ranked slightly higher on the scoreboard, but not those ranked much higher. These rank-based modifiers work differently in BtS (and BtS hides them from the player). [130c](#)

– "A first impression is a lasting one": Another hidden BtS modifier; this one remains static for the entire game. It is based on leader personalities and affects mostly relations between AI civs. DDiplo reduces the modifier a bit, specifically the impact of "peace weight", to make diplomacy less preordained. [130b](#)

– "We oppose your ruthless expansionism": Having a high number of cities with foreign majority culture results in relations penalties from everyone. These penalties complement the ones for having vassals ("worried about our rivals being vassals to your empire"). [130w](#)

– "We would have nothing to gain": AI leaders are reluctant to sign Open Borders with civs that they haven't located yet (not a single revealed land tile). When pleased, most AI leaders sign Open Borders regardless of revealed tiles. [124](#)

– "Our Open Borders have brought our peoples together": The time that it takes to attain and increase this bonus depends on the distance and trade routes between the two peoples' cities. [130i](#)

– "All the years you have supplied us with resources": This can take many, many years if the recipient already has many resources. [149](#)

– All AI memory decays. For example, memory about how "you razed our cities" decays by one city every 75 turns on average ([130r](#)). The other decay times (no decay in BtS):

Memory type	Turns	Memory type	Turns
"You razed our cities"	75	"You nuked us"	120
"You razed a holy city"	150	"You nuked our friends"	80
"Your spy was caught"	40	"You negotiated a trade embargo"	60
"You made an arrogant demand"	30	"You declared war on our friends"	120
"You liberated our cities"	150	"You brought in a war ally"	75
"You granted us independence"	10x30	"You declared war on us"	150

– "You declared war on us" penalty reduced to -2 if the declaration of war is triggered by a defensive pact. [130y](#)

– "We are upset that you have signed Defensive Pacts with our rivals": Not if we like

these rivals, or have our own defensive pacts with them, or if we're too weak to attack them anyway. Also no penalty for voluntary vassals ("our rivals being vassals to your empire") if we like those vassals. 130t

– The AI refuses to sign a Defensive Pact if it was recently canceled (same mechanism as for canceled Open Borders). Defensive Pacts aren't canceled when triggered, i.e. when a third party declares war on one of the signatories. 130p/ dlph.3

– "We care for our brothers and sisters of the faith"/ "You have wisely chosen your civics": If many civs share a religion or civic (e.g. Hereditary Rule), the relations bonuses are reduced. Conversely, the AI is more tolerant toward different religions if its own religion is shared by few. The AI only gets upset about another religion once it encounters a city with that religion. 130x/ 130n

– "You accepted our state religion/ favorite civic": The bonus applies only so long as the player keeps running that religion or civic. 145

– "Our trade relations have been fair and forthright": No longer based (primarily) on how recently a civ was met; more difficult to max out; and trades that are indeed "fair" contribute to the bonus. (In BtS, only what the AI gets on top of a fair deal counts.) 130p

– "You have traded with our worst enemy": The penalty is reduced when the worst enemy changes. Trade with a war enemy counts (partially) even if that enemy is not *the worst* enemy. Open Borders contribute to the enemy trade penalty. 130p

– The AI forgets actions of other civs, like "You gave us help", a little less randomly, whereas the tracking of e.g. "years of peace" or years of supplied resources is now a bit randomized. (In BtS, e.g. "years of peace" pay off after exactly 60 turns.) 130k/ 130j

AdvCiv eliminates most of the diplomatic drawbacks associated with **capitulated vassals** (change 130v). They have Friendly attitude toward the master, share the master's attitude toward rivals (but no better than Cautious), can't be anyone's worst enemy and are ineligible as war targets and for elections (014). The master civ is held responsible for grievances caused by its capitulated vassals – penalties for razed cities, border troubles and trades with a worst enemy are partially added to the master's relations modifiers –, but the master is not blamed for things that the vassal civ did prior to the vassal agreement, nor for the vassal's religion.

Peacefully acquired vassals still work as in BtS, i.e. as largely independent. I've tweaked the conditions under which an AI agrees to a vassal agreement though: civs only look for a master if they feel threatened – having fallen behind isn't reason enough (112). If a master civ fails to protect its voluntary vassal (35% territorial loss or nuked repeatedly), the vassal cancels the agreement (143). A vassal that gets close to a victory condition also cancels the vassal agreement (112).

The following changes (130h) should make it easier to have productive relations with former vassals after **helping them break free**: Civs in a vassal-master relationship don't consider each other "friends" as far as the "you declared war on our friends" penalty is concerned. When a vassal makes peace or breaks free, its memory about past declarations of war is decreased. When a capitulated vassal is freed because its master capitulates, the freed vassal gives +2 "You granted us independence" to the master of its former master. Freed vassals and their liberator automatically cease fire. 130y

Happiness from vassals ("We influence other civilizations") is now only gained from voluntary vassals, and it's capped at +1. 142

Better Barbarians

I've revised most aspects of Barbarians, mainly for improved game balance.

Barbarian activity increases gradually: The activity peak is reached when two thirds of a continent is claimed by cultural borders. This happens typically by the early Medieval era, which fits historically with the Migration Period in Europe and the Sixteen Kingdoms in China. In contrast, BtS Barbarians peak shortly after they first appear.

Fewer Barbarians on low-yield tiles: The number of Barbarians that appear on a continent is based on the number of (culturally) owned and unowned tiles; in BtS, all land tiles count equally. AdvCiv disregards tiles with 0 food yield, but adds 50% of the number of coastal tiles surrounding the continent. Thus, continents with large (arctic) deserts produce fewer Barbarians than in BtS, whereas snaky continents with long coasts produce more.

Barbarians can no longer appear on tiles with 0 food. They're less likely to appear on tiles with a total yield of 1, i.e. jungle and tundra, and more likely on all other tiles. The aim of this change is to help civs that are surrounded by poor land, and to disadvantage civs that have much good land to settle.

"Fogbusting" nerfed: In BtS, Barbarians can't appear within two tiles of any unit. This makes it easy to keep Barbarians at bay with just a few Warriors. AdvCiv removes this 2-tile restriction. That said, Barbarians still can't appear on tiles visible to any civ. So, fogbusting remains a useful tactic (ideally from hills for extra visibility), but covering the entire frontier is often infeasible.

Adjustment for game speed: The rate at which defeated Barbarians are replaced is now adjusted to the game speed setting. In BtS, Barbarians tend to be much more dangerous on slow settings than on fast ones; this should not be the case in AdvCiv.

The Great Wall reworked: TGW now has two out of the three following abilities depending on whether Barbarians are raging (RB), standard or disabled (no Barbarians, NB):

- +1 trade route in cities on the same continent except when playing with RB;
- prevents Barbarians from entering your borders on this continent except with NB;
- +100% emergence of Great Generals inside your cultural borders if RB or NB.

To match the flavor of the trade route ability, TGW generates **Great Merchant** points instead of Great Spy points. TGW now **requires Archery**, costs **300 production** instead of 150 and requires **two Walls** (i.e. Masonry is still required indirectly). The prerequisite Walls can be in arbitrary cities (like the Monuments for Statue of Zeus). The new abilities should be reasonably balanced for all Barbarian settings. As for the increased cost, bear in mind that Barbarians don't become a major threat until the Classical era in AdvCiv, so there is no need to build this wonder very early.

A high number of extra trade routes can incentivize city spam, therefore, TGW goes **obsolete with Corporation**, and I've taken this opportunity to weaken The **Great Lighthouse** (GLH): Now obsolete with Astronomy instead of Corporation, whereas the **Colossus** goes obsolete with Chemistry instead of Astronomy (and K-Mod increases its cost by 100).

Barbarian naval assaults: Barbarian land units can appear aboard Barbarian Galleys in the fog of war. Once a Galley has cargo, it moves toward some nearby city for a naval assault. The units can also be dropped along the way, randomly, or in order to attack an unprotected non-combat unit. The intention is to make Barbarian Galleys harder to ignore,

especially for civs without seafood at stake.

Great General points (GGP) from Barbarians: In BtS, up to 10 XP per unit can be gained from combat with Barbarians, but that XP doesn't translate into GGP. This is probably to disincentivize "farming" of Barbarians in tiles that are deliberately left unobserved. AdvCiv counts 50% of XP from Barbarians as GGP, rounded down. To avoid farming, XP from attacks on Barbarians is reduced to 75%. This results e.g. in only 1 XP and 0 GGP from a successful attack at 90% odds – no risk, no GGP.

Scouts & Animals: Scouts can now attack animals – after all, Hunting is a requirement for training Scouts – and Scouts get a combat bonus against all Barbarians, not just against animals. A "No Animals" option has been added to the Custom Game screen, taking the place of the poorly implemented "No Espionage" option (see change 309 about restoring that option). "No Barbarians" still means that no animals appear. On Emperor difficulty, the AI starts with one free Scout instead of two; this leaves more Tribal Villages to humans.

Explorers & Tribal Villages: Explorers get the ability to attack Barbarians, but they can't capture cities and no longer receive free promotions. This allows Explorers to enter Tribal Villages guarded by a Barbarian unit.

Starting after turn 50 (on Normal speed; speed-adjusted), most of the Tribal Village effects become gradually stronger and reach their maximal impact on turn 250.

- Gold: By turn 250, the gold is increased tenfold.
- Tech: Initially about 55 progress toward a random pre-Industrial tech, and about 550 by turn 250.
- Map, XP, Heal: These have a chance of triggering an additional positive outcome. The chance reaches 100% around turn 160.
- Scout: Can be replaced by a Worker; same probability as above.
- Warrior and Hostiles: May create Warriors, Archers, Longbows, Musketmen, depending on the tech known to the Barbarians. A friendly unit can start with some free promotions.

Most of these changes are customizable through XML; see *Config* under 314 and 315.

New World Barbarians: These changes only really affect maps like Terra that have initially unsettled continents.

- Barbarian cities begin to appear on continents without any civs earlier than they do in BtS. This way, a patchy network of Barbarian cities tends to be cover the New World by the time it is discovered; reminiscent of Sid Meier's Colonization. Since these cities produce lots of units by themselves, I've disabled the placement of (free) Barbarian units on continents without civs, and I've added a mechanism that disbands Barbarian units when an area becomes too crowded. Barbarians act relatively peacefully so long as their cities on a continent outnumber those of all civs taken together. This gives civs settling the New World time to establish themselves before the Barbarians undertake concerted attacks.

- The technological progress of Barbarians slows down once they stop sharing a continent with any civ. Once the New World is colonized, Barbarian research catches up quickly, allowing the New World Barbarians to train Musketmen.

- To reinforce the notion that each Barbarian city represents a separate tribe or city state, I've made sure that the borders of Barbarian cities don't meet. Barbarians can no longer build any cultural buildings, and they don't build culture directly either. Consequently, their borders don't expand beyond the inner city ring. When Barbarian cities are created, the city site is chosen only based on the inner ring. This is for plausibility, but

also to make conquered Barbarian cities a bit less useful. Barbarian Workers only improve their home cities and don't build roads to other cities.

For more details, see change ids 300 et seq. in the changelog. On a related note, AdvCiv makes the AI civs more willing to settle on unclaimed continents. (change 040).

Immortal Culture

– Eliminating a civ no longer removes that civ's tile culture. The remaining culture can cause anger, now listed as "We resent being ruled by a foreign culture" instead of "We yearn to join our motherland". 099

– Revolts can occur in any cities, not just those close to foreign borders, and culture of dead civs can cause revolts. However, only border cities can flip. Cities can never flip from a master to its vassal. If a city can't flip, it loses one population on the third revolt and on subsequent revolts. 099c

– The occupation timer after conquest or revolt decreases only with a per-turn probability. That probability is computed based on the city's revolt probability. The nationality bar on the city screen shows both probabilities. The occupation timer after conquest starts at no more than 3 turns (in BtS: 3 + 50% population).

Revolts can happen during occupation unless the city owner is at war with the owner of the foreign culture.

Damage makes units less effective at suppressing revolts, and occupying units heal only as fast as in a friendly non-city tile. 023

– "Cruel oppression" anger in a city makes revolts considerably harder to suppress. (Otherwise, Slavery would be a too obvious answer for anger from foreign culture.) 101

– An alert message is shown when a city's revolt chance becomes positive. 210b

– Flipping-after-conquest is enabled by default. (The game option is now called "No City Flipping after Conquest" and it's unchecked by default.) 101

– When a tile is culturally contested between two civs and only one of them has a city close enough to work the tile, then the other civ's tile culture is affected by a decay rate. This gives the civ that is able to work the tile an edge (especially on Epic and Marathon game speed as the decay rate isn't speed-adjusted). 099b

– K-Mod also makes changes to culture and revolts. AdvCiv keeps some of these changes – see the first few bullets in the next chapter –, and reverses others:

  • Revolt chance is again proportional to the percentage of foreign culture, as in BtS; K-Mod sometimes required infeasibly large garrisons to bring the revolt chance down all the way to 0. 101

  • AdvCiv disables culture from trade routes (still optional via XML). 125

K-Mod

See also the K-Mod thread on CFC.

BUG (Better Unaltered Gameplay): Many BUG options are disabled in K-Mod, but can be enabled from the in-game menu. K-Mod does not include BULL, meaning that some help text and unit actions added by BULL are unavailable; cf. this Git Issue. I've merged the

Show Hidden Attitude Mod (included in BULL but not BUG; change advc.sha) and added Sentry behavior to Fortify-Heal (change 004l). The decay of invested worker turns (Misc. changes; 011) should make BULL's pre-chop action dispensable. So, I don't think there's anything crucial in BULL that isn't in AdvCiv.

For players who aren't familiar with K-Mod, I'm listing the major gameplay changes. For players who *are* familiar with K-Mod, I'm also listing the K-Mod changes that I've reverted (end of this chapter).

– Culture system: Culture levels (e.g. "Influential") matter less in culture wars, and specific city culture values matter more. Moreover, the range at which the culture of a city affects borders has been increased, meaning that the number of border cities and their culture are less decisive. The output of some culture sources has been reduced:

  • Cathedrals, Mosques etc. increase culture by 40% instead of 50% and cost only 240 instead of 300.

  • Free Speech increases culture by 50% instead of 100%.

  • Culture from Great Works ("culture bomb") is adjusted to the game era.

  • Sid's Sushi Co. provides less culture per resource.

  • About a dozen Great Wonders have their culture output reduced a bit.

  • The Spread Culture mission only affects tile culture, i.e. can no longer be exploited for an "espionage victory".

– City flipping: Revolts happen faster, but cities don't flip until the third revolt. "The net effect of these changes is that (...) it's a bit more predictable and less dependent on luck." (from the K-Mod changelog)

  The revolt probability is halved if a unit with the Leadership promotion is present.

– Vassal agreements: Can instruct vassals to start war preparations via "Let's discuss something else". The impact of vassals on number-of-cities maintenance is more noticeable than in BtS.

– The number-of-cities maintenance cost is no longer capped, meaning that very large empires can incur very high city maintenance.

– Expendable units are chosen as defenders when no defender has favorable odds.
  (Lead From Behind mod component)

– Buffed considerably:

  • Serfdom +1 commerce on farms and plantations; -1 on towns

  • All cargo ships +1 capacity

  • XP from Great Warlord increased based on the number of units in the tile

– Production overflow: In the late game, cities can produce two or more units of a kind within the same turn. (BtS discards the overflow in these cases, the Unofficial Patch turns it into gold.)

– When a religion spreads, one of the older religions is sometimes (randomly) removed.

– The AI never agrees to Cease Fire.

– Trades offered by the AI can come with a discount. The discount is foregone if the

player makes a counter-proposal. (In AdvCiv, the offer can also include more gold than the AI would normally consider; change 026.)

– Cities that the AI isn't willing to trade aren't shown in the trade screen, and unrevealed AI cities are treated as secret. No BUG alerts about cities founded on unrevealed tiles.

– The AI uses a greater variety of spy missions.

– Nerfed slightly:

- War Elephant +10 cost

- The Colossus +100 cost

– Buffed slightly:

- Vassalage -25% number-of-cities maintenance

- Mercantilism upkeep Low

- Grenadier +10% city attack

- Machine Gun +10% vs. Mounted units

- Watermill +1 commerce initially, but only another +1 from Electricity

- Drill I -15% collateral damage

- Protective trait production bonus to Security Bureau

- Aggressive trait production bonus to Jail; Jail gets -2 espionage (regardless of trait)

- Industrial Park +1 free Engineer (i.e. 2 in total), +50 cost

- Nuclear Plant meltdowns less disastrous

- Guided Missile +1 range

- Space Elevator another +50% production to spaceship parts

- Forest Preserve +1 commerce

- Environmentalism doesn't penalize corporations, yields +1 happiness from Public Transportation, but has High upkeep. Environmentalism and Public Transportation both reduce bad health from population instead of granting good health.

(These two lists aren't complete.)

Some that I couldn't put better, quoted from the K-Mod thread:

– "Barbarian Galleys get -10% strength"

– "Tech requirements for corporations changed: (...) Sushi Co: Refrigeration, Cereal Mills: Medicine, Creative Constructions: Steel, Standard Ethanol: Combustion"

– "Mining Inc now uses Aluminium and Uranium instead of Gold and Silver (this should make Mining Inc slightly weaker, and Civ Jewelers more viable)"

– "Cereal Mills also has +0.25 food output"

– "In the diplomacy screen, pressing 'Lets stop this fighting...' will now bring up the trade screen with the AI's suggested peace terms. (Originally, it just made peace instantly without any trades – it was a horrible button.)"

– "Tech trades in which the receiving player is more than 2/3 of the way through

researching the tech or when the tech is two eras behind the 'game era' [the recipient's era in AdvCiv; 550e] no longer count toward tech trade memory; i.e. they don't contribute to causing 'We fear you are becoming too advanced'."

– "Global warming has less of an impact on the map, but (in long games) causes unhappiness to those civs contributing to pollution. There's a new advisor screen [Environment tab on the Economics Advisor] about this."

Revised by AdvCiv:

– Changes made in order to smoothen or reinforce K-Mod balance changes:

- Forest Preserve at Biology instead of Scientific Method. 901
- Watermill takes 4 turns to build, and Lumbermill 5 (instead of 8 both). 902
- Serfdom has Medium upkeep instead of Low. 912a
- Pacifism costs 1 gold per military unit, not 0.5. 912b
- Colossus is obsolete with Chemistry. 310
- Great Lighthouse obsolete with Astronomy; cost 250 (300 in K-Mod, 200 in BtS). 310
- Ship of the Line strength 10 (as in K-Mod), +25% against Frigate (K-Mod 20, BtS 50), req. Iron (as in BtS), +1 speed with Coal, increased bombard rate, cost -10. 905b
- Ironclad at Steam Power (no Steel required), +25 % defense on Coast. 905b

– Changes kept from K-Mod versions prior to 1.45:

- Scientific Method +1 research per specialist (1.45 moves this to Computers and has Scientific Method provide +10% commerce)
- Lumbermill at Guilds with +1 commerce (902: regardless of river), but no production bonus until Replaceable Parts (1.45 gives them +1 production already at Guilds)

– Fixed AI issues introduced by BBAI and K-Mod:

- AI razes fewer cities and less randomly; 116
- uses Slavery and Drafting less aggressively; 121, 017
- uses malicious espionage only against civs it dislikes; 120

Reverted by AdvCiv:

– See Immortal Culture about reverted changes to culture and revolts.

– Gifting Great People to the AI does not provide a relations bonus. 141

– No impact of global research on inflation; instead, adjusted tech costs based on difficulty for a more historically accurate tech pace, and Immortal games now start on turn 10 and Deity games on turn 20. 251

– Some minor balance changes undone that weren't pulling their weight in terms of added complexity (change 200):

- Colosseum back at cost 80, no culture boost
- 2 culture from Monastery, not 1; 4 culture from Madrassa, not 3
- Eiffel Tower back at Radio

- Civilized Jewelers back at Mass Media (not Corporation)

- 1 Artist from Hippodrome (K-Mod 2, originally 0)

- Drill does not lead to additional promotions

- No change to maintenance of individual corporations (all at 100% as in BtS)

Important miscellaneous changes in AdvCiv

– Attacking a Worker or Settler no longer yields a captured Worker; the attacked unit just dies. I.e. no more Worker stealing. 010

– Trade routes can only come from revealed cities, and the paths to those cities need to be revealed as well. Cities are temporarily unavailable for trade when in disorder. Trade along rivers doesn't require any tech (as in Warlords/ Vanilla; BtS demands Sailing). When borders of a war enemy block trade, a naval blockade can override this. 124

– When mountain peaks block off part of a landmass, the parts are treated as separate continents. This is relevant for the placement of Barbarians, colony maintenance and wonders that affect only one continent; though the main point is to make things easier for the AI. 030

– Map generation: Clusters of Gold or Gems made less common. No Flood Plains on the corners of rivers. Hidden resources are disregarded when assigning starting locations, meaning that resources are no more likely to be revealed near a starting plot than anywhere else. Starting locations worsened a bit overall. 108, 129

– When a plot with unfinished Worker builds is left alone for more than four turns, the invested Worker turns begin to decay. This is mainly to disincentivize pre-chopping. 011

– Forest and Jungle provide only 25% defense, and none if the tile is owned by the attacker. 012

– Workers can no longer chop Forests and Jungles on unowned tiles. 119

– AI evacuates land units that can't defend well from cities that are about to be attacked and untenable. 139

– When the AI has more happiness or health than it needs, it may refuse to accept resources in trade or may trade away its only copy of a resource. 036

– Hereditary Rule grants 1 happiness per every 2 military units and +25% happiness from resources. 912c

– Granary stores only 40% food, but provides food also after starvation. 160

– Financial trait grants +1 commerce only on tiles with a natural yield of at least 2 commerce or a total yield of at least 3 commerce. 908a

– Praetorian strength reduced from 8 to 7, cost from 45 to 40, starts with March, still no city attack bonus, and renamed to "Legionary". 907a

– Quechua has no bonus against Archers; cost is 15 (was 20 in K-Mod). 907b

– East Indiamen is a unique Frigate with 3 cargo spaces and +1 speed. Increased bombard rate of Frigate. 905b

- Galley, Trireme and Caravel +1 move. Cost of Galley and Trireme reduced from 50 to 45. Cost of Transport reduced from 125 to 100 and can't attack. Trireme has strength 3, but gets no bonus vs. Galley. 905

- Attack Submarine and Submarine (now called "Nuclear Submarine") switch places in the tech tree. Both units get 6 first strikes, which should make them more dangerous for Battleship, and Destroyer gets to ignore first strikes. Battleship costs 250 instead of 225. Stealth Destroyer receives the same anti-air and anti-submarine abilities as Destroyer and 1 cargo space for missiles, but also a cost increase from 220 to 270. 906

- When playing with "Minimize Pop-Ups" (recommended): If more than 3 messages would be displayed at the beginning of a turn, the Event Log is opened instead. In the Event Log, a special entry "Older messages" marks the end of the unread messages. Great Person births in faraway lands are no longer reported. 106

- "Show friendly moves" and "Show enemy moves" (player options) cause much less delay during AI turns: I've disabled most of the pointless AI patrols and excluded Worker moves from being shown to the player. 102

- Espionage slider not shown on the main interface if it's at 0. Can adjust the slider on the Espionage screen. 120c

    About other minor user interface changes, see 004.

- The Spy unit can investigate rival cities as in Vanilla/Warlords. 103

- Get to choose from more civics and religions when using the "Change civics/religion" Spy mission, or when negotiating peace or trading with a vassal. 132

- Wonders that have been removed from the production queue generate no "fail gold". Also no gold from Missionaries, Executives or when a teammate finishes a wonder. 123f

- Can no longer bypass the Theocracy restriction by gifting missionaries. 123a/ dlph.4

- Switched the no-war-probability of Roosevelt and Darius, meaning that Darius can start wars when pleased, and Roosevelt – normally – cannot. 005a

- "No Slavery" option that prevents human players from adopting the Slavery civic. 912d

Start Points as Handicap (SPaH)

The SPaH game option gives Advanced Starts only to the AI civs. You might want to use this option if:

- You find the game too easy on moderate difficulty, and dislike the crass ongoing AI bonuses on the high difficulty settings, perhaps for reasons of immersion. A big head start for the AI can be taken to mean that the AI civilizations emerged earlier than yours, like how the Romans appeared later than the Egyptians, whereas the ongoing AI bonuses on Immortal are hard to explain or overlook.

    A big AI head start can narrow down the viable strategies in the early game though. It helps to assign start points unequally to the AI civs because this leaves some targets for early warfare, and a few far-ahead AI civs can't build all the early wonders.

- You find the game too easy on moderate difficulty, and dislike the big AI head start on the high difficulty settings (e.g. a free Settler and Worker on Deity), perhaps because it makes the early game too tense and narrow (see above). Since Advanced Start

replaces the AI freebies from the difficulty setting, you can reduce the AI head start by setting a modest amount of AI start points, e.g. Deity with 400 start points.

- You don't want every AI civ to receive the exact same freebies because this creates some distortions; for example, the Zulu get one additional tech (Archery) on Immortal instead of three because they start with Hunting and Agriculture in any case.

Usage:

Not entirely intuitive because, sadly, the Custom Game screen can't be modified apart from adding checkboxes. You'll need to check the "Advanced Start" option in order to unlock the "Base Points" box; without Advanced Start, the SPaH option has no effect. If you enter at most 9999 Base Points, then each AI civ simply receives the amount of points entered.

If you enter a five- or six-digit number, SPaH assigns start points unequally. The box is then assumed to contain two distinct numbers: a percentage in the two digits to the right and an integer in the three or four digits to the left. E.g. 80050 means 800 and 50%. The left number says how many start points the bottommost AI civ receives, i.e. the civ in the bottommost AI slot. The topmost AI civ (topmost AI slot) receives a *fraction* of the bottommost's points equal to the percentage. In the example, that's 50% of 800 = 400. The remaining AI civs receive values in between those two bounds. (Combined with Monarch difficulty, the 800/50% setting should be a challenge close to Immortal.)

SPaH never gives an Advanced Start to human civs, i.e. they start as normal with a Settler and Warrior or Scout. Humans receive starting locations based on the difficulty setting, i.e. the best ones on Settler and the (almost) worst ones on Deity. Then, if an unequal point distribution is used, the AI civs with the fewest points (top AI slots) are placed in the locations closest to the human civs, and the AI civs with the most points (bottom AI slots) are placed the farthest away.

Once the game has started, the start point distribution is shown on the Settings tab of the Victory screen. You'll also notice that the game doesn't start on turn 0. This is done to reinforce the notion that the human civs are late arrivals, and to have the game year match the overall development of the world.

An AI civ with a small number of points may have difficulties repelling a human Warrior rush, so I'd recommend against going far below 300. AI civs receive at least the 150 start points needed for a city, even if fewer points are entered. Unequal distributions are incompatible with team games, which is to say, they should technically work, but the assignment algorithm makes no effort to balance the teams' start points and locations. See 250b about how to enable Advanced Start and SPaH in scenarios.

General changes to Advanced Start (250c):

BtS allows start points to be converted 1:1 into production, which is usually far better than a 1:1 conversion into research. In order to make technologies a bit more attractive in Advanced Start, I've changed the conversion rate to 1:1.5 for production, meaning that cities, units and buildings now cost 50% more. Improvements, visibility and culture still seemed overcosted in comparison, so I've lowered the costs of these a bit.

Advanced Start costs are no longer adjusted to the game speed setting. This makes it unnecessary to manually adjust the start points entered on the Custom Game screen to match the game speed. When playing without SPaH and on a difficulty higher than Noble, the AI receives more start points than entered. This was apparently intended by the BtS developers but not correctly implemented. Conversely, human start points are no longer

adjusted based on difficulty (this was working in BtS); humans get exactly as many points as entered.

For reference, the AI freebies for each difficulty setting, and the number of start points that would be needed in order to buy those freebies given the above changes to Advanced Start costs and assuming Standard map size (tech is more expensive on larger maps):

Difficulty	Prince	Monarch	Emperor	Immortal	Deity
Free initial items per AI civ	1 Settler 1 Warrior	1 Settler 1 Archer 1 Warrior Archery	1 Settler 2 Archers 1 Scout[see 250e] Archery Hunting	1 Settler 1 Worker 3 Archers 2 Scouts Archery Hunting Agriculture	2 Settlers 1 Worker 4 Archers 2 Scouts Archery Hunting Agriculture The Wheel
Worth in pts.	187	298	406	629	890

Includes 15 extra points for the 10 free initial production that the AI civs receive on all difficulty settings. In AdvCiv, the AI civs do not receive this free production after an Advanced Start.
On Monarch and below, if an AI civ starts with Hunting, the Warrior becomes a Scout.

Rise and Fall (R&F)

If the R&F game option is enabled on the Custom Game screen, the game gets divided into several *chapters* (of history). During the first chapter, you play as the leader and civ set on the Custom Game screen (random also works). Once a chapter ends, you're asked to select one of the other civs in the game. During the next chapter, you control the selected civ, while your previous civ is controlled by the AI. After each chapter, a score is awarded that measures how much your civ has improved since the start of the chapter. If you manage to fulfill a victory condition, the game ends, and you score a premium, which is, again, based on the standing of your civ at the start of the chapter. To maximize the total score, you need to pick civs that are doing badly, but have the potential for improvement. If you play well, civs will "rise" under you control, and begin to decline after AI control resumes – this is the "fall" part. That is, unlike in the Rhye's and Fall mod, there is no special collapse mechanism. There is no connection with the "Rise & Fall" expansion for Civ 6. The High to Low challenge in Kael's Assimilation mod has been an inspiration.

Supported and recommended game settings: Single-player only, no teams or Permanent Alliances. The number of chapters is 6 on Quick speed, 7 on Normal, 8 on Epic and 9 on Marathon, provided that there are enough civs in the game. Since a different civ is supposed to be played in each chapter and some are usually eliminated before the final chapter, it's advisable to configure at least 1.5 times as many civs as chapters. If you dislike playing on Huge maps, you can fit enough civs on a Large map (up to 16 I'd say) or even a Normal map (up to 12) if you set the sea level to Low (assuming a standard map script like Fractal or Continents). You may want to take a look at the "Score" tab of the Victory screen at game start in order to verify that the number and length of chapters is as intended.

I haven't tested unusual settings much, but R&F should, in principle, work with any map script and any scenario where the civs start without cities. Advanced Start should be fine too, but not SPaH. Later-era start results in fewer chapters.

R&F is intended to be played at a difficulty that makes it challenging to take a civ from a

rank near the bottom to a rank near the top over the course of a chapter. That's going to be about three difficulty levels lower than what would normally pose a challenge.

Objective: The objective is to maximize what I'm calling the *Rise* score. When the game ends, that score is computed as the sum of the *chapter* scores plus a premium for victory. What the scoreboard on the main interface shows are scores based on population, technology etc.; this score is computed as in BtS, and I'm calling it *CIV* score to distinguish it from the chapter score. Chapter score is based on the change(!) in CIV score

Current Chapter Score	
+27	from rank (9.)
-9	from initial rank (11. of 12)
+104	from Civ score (104% of rank 10)
-97	from initial Civ score (97% of rank 10)
+6	if retiring this turn (51% time unspent)
31	in total

Rise Score at game end	
+164	from sum of scored chapters
+154	from finished but unscored chapters
+600	from victory, compensating for 3 missed chapters
+51	for 51% time unspent in current chapter
+233	(+25%) from Prince difficulty
1166	in total

The CIV score from the scoreboard on the lower right feeds into the chapter score on the left of the Score tab, which feeds into the Rise score on the right of the Score tab.

and rank since the beginning of a chapter. Once the game ends, the final rank between "Dan Quayle" and "Augustus Caesar" is computed from the Rise score. (In non-R&F games, the rank is computed from the CIV score and game end turn.)

Delayed scoring, AI changes: A chapter isn't scored right after it ends, but during the subsequent chapter. This is done to disincentivize shortsighted plays toward the end of a chapter, e.g. conquering cities that aren't tenable in the long run. The first chapter is scored in the middle of the second chapter. With each chapter, the scoring delay decreases a little; the penultimate chapter is scored one quarter into the final chapter. The exact turns on which scoring happens are shown on the upper half of the Score tab. On those turns, a popup with a breakdown of the chapter score appears.

A side-effect of delayed scoring is that you have a stake in two civs during the first portion of each chapter: the one you're currently playing and the one from the previous chapter. This creates an awkward incentive for helping the civ from the previous chapter. Similarly, toward the end of a chapter, there can be an incentive for helping whichever civ you're going to take control of in the next chapter. In order to limit such collusive help, I've made the following changes to the AI:

– Doesn't accept unsolicited gifts, and asks for gifts less frequently than normal. No units can be gifted.

– Rejects offers that are heavily lopsided in favor of the AI. This can also mean that the AI refuses to make peace in exchange for a valuable technology.

– Is reluctant to get paid for things of questionable value to the player: civics and religion changes, embargoes, sponsored war and brokered peace.

These restrictions don't apply: to civs that have already been scored; to vassals of the player; nor to any civs that outrank the player on the scoreboard. During the final chapter, the restrictions only apply to the civ from the penultimate chapter (until that civ is scored).

Intermediate periods: In between every two consecutive chapters, there is an "intermediate" period of 5 to 10 turns (depending on game speed) during which you control no civ. During an intermediate period, most elements of the user interface aren't updated, meaning that you have practically no vision and agency. A countdown on the upper right

shows how many turns remain until the start of the next chapter. The main purpose of the intermediate periods is to prevent military cooperation between the civs played in two consecutive chapters.

Civ selection: When an intermediate period ends, you're prompted to select a civ for the upcoming chapter. Each civ should be played for at most one chapter. Sometimes, this is impossible because too many civs have been eliminated already; therefore, it's allowed to play the same civ repeatedly, but the chapter score is halved then. Playing the same civ for two chapters in a row is not possible, and any vassals of the most recently played civ are off-limits too.

The selection popup lists civs in order of recommendation: First, non-vassals not previously played, inversely ordered by rank, then, vassals not previously played and, last, civs previously played. Civs

Popup for civ selection

known to any previously played civ are listed by name, the others as "unknown". Hovering over an entry shows the civ's current CIV score, whether it's a vassal, and if so, if capitulated or voluntary and the identity of the master, and lists any war enemies. A victory stage between 1 and 4 is shown if the civ is close (at least stage 3) to fulfilling a victory condition. All this information is provided even if the name of the civ is unknown. It's often unwise to take over a civ that is at war with a stronger opponent. If you select a voluntary vassal, you'll be able to cancel the vassal agreement at any time. As a capitulated vassal, you'll have to acquire enough land and population in order to break free.

Chapter scoring function: The computation of the chapter score isn't entirely simple, but it should suffice to know that the more the CIV score has increased between the start of the chapter and scoring, the higher the chapter score.

Chapter score breakdown (Score tab)

- When a chapter is scored, 0 to 100 points are awarded based on the rank *r* of the scored civ on the CIV scoreboard at the time of scoring:

100 * (worst rank – *r*) / (worst rank – 1)

That's 100 when ranked first (*r*=1) and 0 when ranked last. In this context, the civ currently controlled is always considered to be ranked behind the civ that is being scored; this way, success in the current chapter can't hurt the score for the previous one. A score for the *initial* rank, i.e. the rank at the time that the scored civ came under human control, is computed in the same way, and subtracted from the score for the current rank. Thus, the total score from rank is maximized (100 points) by starting in the last place and climbing all the way to first. A civ that starts in rank 1 can at best gain 0 points from rank by staying in rank 1, and otherwise loses points.

- Points are also awarded directly for CIV score; otherwise, it would be pointless to continue a chapter when it's clear that the current civ can't climb another rank. The CIV

score of the next best rank is used as a point of reference. In the example on the right, Rome is currently fourth, so its score of 929 is divided by that of the fifth rank (Ethiopia, 922), and the resulting percentage (101) is added to the chapter score. At the start of the chapter, Rome's score of 352 was 65% of the fifth rank (Charlemagne, 541), and that percentage is subtracted, resulting in a net gain of 36 points from CIV score.

- If the chapter was ended prematurely through retirement (see "End of chapter" below), the chapter score from rank and CIV score is increased by half the percentage of the turns remaining at the time of retirement. For example, if 14 out of 65 turns remain, the portion of unspent time is 22%, so the chapter score is increased by 11%.

963 Justinian	648 Justinian
962 Shaka	597 Zara Yaqob
949 Charlemagne	582 Shaka
929 [Augustus']	562 Elizabeth
383 · Frederick	541 Charlemagne
922 Zara Yaqob	498 Willem
853 Elizabeth	477 Ragnar
852 Ragnar	466 Cyrus
796 Cyrus	446 Roosevelt
792 Hammurabi	408 Hammurabi
739 Roosevelt	380 Louis XIV
730 Louis XIV	357 Brennus
727 Montezuma	356 Montezuma
671 Brennus	352 [Augustus']
587 Willem	291 Frederick

Example: Current scoreboard (left) and scoreboard at the start of the current chapter

If the bottom line is -10 or worse, a square root is applied in order to reduce the loss of points. This is done so that a single failed chapter can't ruin the total Rise score.

End of chapter: All chapters have the same length except for the last one, which can be a bit longer or shorter than the others. The chapter length depends on the number of chapters and the game speed. To see how many turns remain, hover the mouse over your civ's flag on the main interface. During the last three turns of a chapter, a countdown is shown directly on the main interface, and at the beginning of the final turn, there is a popup reminder.

As the end of a chapter approaches, you should try to put your civ in a state that its AI leader can work with because the civ comes under AI control for some time before scoring happens. E.g. Gandhi might not continue your war of conquest. Don't rely on pre-programming decisions for the AI: When the AI takes over, the mod clears your slider positions, governor settings and the queues for city production, research and unit missions.

You can end a chapter early by selecting "Retire" from the main menu. This button, which normally concedes the entire game, works very differently with R&F. By retiring early, you earn a bonus to your chapter score (see "Chapter scoring function" above) and the chapter continues on AI Auto Play until its regular end turn. One situation in which retiring makes sense is when your civ is getting so far ahead of the others that the AI might run away with the game once the chapter ends.

Chapters

1	Zululand	Turn 0 to 64 (1440 BC)	57 points	Scored on Turn 118
2	England	Turn 73 to 137 (540 AD)	107 points	Scored on Turn 191
3	Rome	Turn 146 to 210 (1500 AD)	154 points	Scored on Turn 264
4	**Aztec**	**Turn 219 to 283** (1826 AD)	31 points (**turns remaining: 34**)	Scored on Turn 337
5	?	Turn 292 to 356 (1936 AD)	?	Scored on Turn 410
6	?	Turn 365 to 429 (2009 AD)	?	Scored on Turn 483
7	?	Turn 438 to 499 (2049 AD)	?	Scored on Turn 499
		Total so far:	349	

List of chapters on the Score tab, showing start and end turn (with end year), chapter score and scoring turn for past chapters, the current chapter and future chapters. The chapters with score values in bold have already been scored; score values not shown in bold indicate the score that would be awarded if the chapter were scored right now.

Game end: The game ends immediately when one of the BtS victory conditions is fulfilled by any civ. If the previous chapter hasn't been scored yet, it is scored now. If an AI civ wins, then the current chapter is scored as well and the Rise score is simply the sum of the

chapter scores. If the human civ wins, then the current chapter is not scored, i.e. rank and CIV score don't matter. Instead, a victory premium is added to the total score of the earlier chapters. This is, once again, a bit complicated; in short, the incentive is to win as early as possible if it can be done from a poor position, but not to win a quick victory by picking a civ that is already about to win.

- Premium *P:* 150 points plus 150 for each chapter that hasn't started yet.

- The premium above is reduced based on the rank r_0 at the start of the chapter (initial rank) by subtracting

$$(P/1.5) * (\text{worst rank} - r_0) / (\text{worst rank} - 1).$$

However, even when the initial rank is 1, the premium is never reduced below a lower bound of *P*/3.

Rise Score at game end

+164	from sum of scored chapters
+154	from finished but unscored chapters
+600	from victory, compensating for 3 missed chapters
-36	from initial rank (11. of 12)
+51	for 51% time unspent in current chapter
+233	(+25%) from Prince difficulty
1166	in total

Rise score breakdown (Score tab)

- In the endgame, score isn't a good measure of a civ's standing. Therefore, whenever R&F considers ranks, those civs close to a victory condition (stage 3 or 4) are considered to be ranked higher than those not close to any victory, and civs at stage 4 outrank those at stage 3. (Victory stages were introduced by the BBAI mod as an AI-internal heuristic.)

- Regardless of the initial rank, the percentage of turns remaining in the chapter in which victory has been achieved is added.

- Finally, the Rise score is multiplied by a factor based on the difficulty setting.

On the Hall of Fame screen, the Rise score is shown in the "final score" column. Use the "score victory" filter in order to display only results of R&F games.

A defeat of the human civ does not cause the game to end unless it happens in the final chapter. Instead, human defeat causes the game to continue on Auto Play until the chapter ends, and then a new civ is selected as normal. A defeated civ is scored immediately and is treated as having 0 CIV points.

PerfectMongoose (PM)

The PM map script is based cephalo's [PerfectWorld3](#) (PW3), which employs models of plate tectonics, wind patterns and hydrology. The basic ideas are best described in the old CFC [thread](#) for PerfectWorld2 (PW2). LunarMongoose ported PW2's successor PW3 from Civ 5 to Civ 4, incorporated changes by AIAndy and Fuyu, and made changes of his own, which are listed in the PM [thread](#) on CFC.

- PM vs. Tectonics: LDiCesare's Tectonics script, which is included in BtS, also models plate tectonics and wind, but, as far as I can tell, in simpler ways. PM has about three times as many lines of code as Tectonics does if that's any indication. An updated version of Tectonics is also included with AdvCiv (change id [021a](#)).

- PM vs. Totestra: [Totestra](#) is a PW2 fork by vktj. Totestra offers more custom map options than PM, but PM has a more advanced terrain generator.

I've customized PM (change [021b](#)) because I felt that the starting locations were too un-balanced and it played too differently from the standard map scripts. In particular, there was too little arable land and too much dense forest. [Civ 4 Reimagined](#) has changed Totestra in similar ways, and I've adopted some of those changes.

In many ways, PM can supersede the Fractal map script, but since PM tends to generate more continents and more chokepoints than Fractal, the space available for expansion tends to be distributed less evenly. Other caveats:

- Huge maps might take a couple of minutes to compute.
- The Old World Start option doesn't always manage to create multiple continents. If you get just one continent, the map is still playable – just be aware that a New World isn't guaranteed to exist.

I've removed the custom map options for using the (legacy) PW2 land generator and climate system, and the option to "break Pangaea with meteors". Instead, the script tries to break Pangaea if and only if the Old World Start option is set.

All-AI games

An all-AI game can be a quick way to to get an impression of the AI behavior in AdvCiv or to check how well the mod handles certain game settings. The procedure is as follows:

1. Make sure that cheats are enabled (`CheatCode = chipotle` in `My Games\Beyond the Sword\CivilizationIV.ini`). This is a prerequisite for Debug mode and AI Auto Play.

2. On turn 0, press Ctrl + Z to switch into Debug mode. This makes the entire map visible.

3. Unless the game is set to Noble or Prince difficulty, if you want your own civ to have the same starting conditions as the other AI civs, you'll have to use the WorldBuilder to give additional techs and units to your civ (if the difficulty is higher than Prince; see the table above the [Rise & Fall](#) chapter), or to all other civs (if the difficulty is lower than Noble).

4. Press Ctrl + Shift + X to have the AI take control of your civ. A popup lets you choose the number of turns to be spent on AI Auto Play. (A mnemonic for the shortcut: control is shifted to the AI for X turns.) AI Auto Play can also be interrupted through Ctrl + Shift + X, though you may have to press these keys repeatedly because key presses are not received reliably during AI Auto Play.

AdvCiv makes a few improvements to the AI Auto Play mod component (change id [127](#)):

- The player's civ plays by the same rules as the AI civs; in particular it plays on the same difficulty level.

- While both AI Auto Play and Debug mode are enabled, messages about major game events such as declarations of war and conquered cities are shown as if the player's civ had perfect knowledge of the game state.

- Unless interrupted, AI Auto Play ends at the start of a human turn. This means that no diplo popups can occur on that turn. (That said, it can still happen that the player is prompted to vote on a UN resolution right after AI Auto Play ends.)

Known issues

– No known serious bugs. It can't hurt to set a narrow `AutoSaveInterval` in `My Games\ Beyond the Sword\CivilizationIV.ini`. If [UWAI](#) (which contains the bulk of the new code) causes an error, that component can be disabled even in a running game by saving, exiting and setting either `UWAI_IN_BACKGROUND` or `DISABLE_UWAI` in `Assets\ XML\GlobalDefines_devel.xml`, and then restarting and reloading.

– Networked multiplayer has only been tested through AI Auto Play. K-Mod is known to be a stable multiplayer mod, it's just my additions that I'm concerned about, particularly the use of floating point numbers (cf. [003g](#)). I've never tried PBEM and PitBoss. Hotseat has been tested a little.

– Some of the Custom Game settings have been tested only superficially through AI Auto Play, and, of course, I haven't been able to test every combination of settings.

– If the mod folder "AdvCiv" is renamed, the name also has to be changed in `Assets\ XML\Art\CIV4ArtDefines_Misc.xml` and (twice) in `Resource\Civ4.thm`. Otherwise, the mod will crash while loading: "Failed to initialize the primary control theme". This is a side effect of change [002b](#). This change is also the reason why AdvCiv can't be installed in `My Games\Beyond the Sword\Mods`.

– The current version of the mod can load savegames from earlier versions, but no save-games from other mods, nor from unmodded BtS.

– Translations: German translations are complete (I think), though hardly tested. I don't recommend playing in one of the Romance languages as I've only translated parts of the new game text and the Civilopedia wouldn't reflect the gameplay changes in AdvCiv.

– One player has reported a potential issue with AdvCiv and Windows 7 user account control, so I've listed some steps that might help: [link](#)

For developers

The modified source code files are available on [GitHub](#). In all modified files, changes and additions are labeled in-line with "`advc.id`" or enclosed in XML style: `<advc.id> ... </advc.id>`, where `id` is one of several three-digit numbers that I've (somewhat arbitrarily) assigned to sets of related changes. In retrospect, I should've used a version control system from the beginning; I've been using GitHub only since the first release (v0.8).

Changes from [K-Mod-Extended](#) are instead marked with `kmodx` (these are also in K-Mod 1.45, but I had merged them into AdvCiv before 1.45 was released), and those adopted from DarkLunaPhantom (Kek-Mod) with `dlph`. AI changes from the [LoR SDK ModMod](#) are tagged with `cdtw`.

I've gathered bugfixes and UI tweaks that other mods could easily adopt *from* AdvCiv in [this](#) CFC post. Multiplayer mods may want to avoid adopting any AdvCiv code that uses floating point numbers (cf. [003g](#)).

Developer documentation for UWAI is not included in this file; the changelog (id [104](#)) only describes the integration of UWAI into BtS. Parts of UWAI are adjustable through `AI_Variables_GlobalDefines.xml`. If you've enabled logging (`LoggingEnabled = 1` in `My Files/My Games/Beyond The Sword/CivilizationIV.ini`), you can change `REPORT_INTERVAL` in `GlobalDefines_devel.xml` in order to have UWAI log AI internals to `My Files/.../Logs/uwai.log`. The logs are formatted in [Textile](#). I've been using Borgar Þorsteinsson's Textile-JS to parse it ([free web interface](#)). In Debug mode (Ctrl + Z), AI war plans can be checked in-game by holding down the `Alt` key and hovering over the AI leaders on the scoreboard; same as in the BBAI mod. If `UWAI_SPECTATOR_ENABLED` is set to 1 in `GlobalDefines_devel.xml` and Debug mode is enabled, then announcements about AI war preparations are shown during AI Auto Play. Debug mode, WorldBuilder and AI Auto Play can be enabled in multiplayer through XML; see [135c](#) for details.

If you compile a DLL allowing more than 18 civs (`MAX_CIV_PLAYERS` in `CvDefines.h`), be aware that AI turns may become prohibitively slow. In my latest test (v0.94) with just 18 civs, the first 250 turns of an all-AI game took about 17 minutes. This is faster than unmodded BtS (23 minutes), but slower than K-Mod (12 minutes). The difference from K-Mod is almost entirely due to the UWAI component and may increase steeply if more civs are added. I'm hoping to improve scalability in a future version by ruling out some potential war targets through simpler heuristics.

Changelog

Not a chronological record; the change ids are assigned pretty arbitrarily. Changes since v0.8 are also tracked through Git: commit history.

001	Minor bugfixes (not a complete list)
See also	Fixes merged from other mods: kmodx, dlph. 104z fixes a bug in `CvPlayerAI::AI_eventValue`.

Corrected the city culture output shown during disorder by K-Mod/BUG with enabled Building-Actual-Effects option.

AI refuse-to-talk duration was lowered purely based on war success ratio in BtS, not absolute war success. This way, killing a single stray unit before stack combat could make the AI willing to talk. Added a lower bound for enemy war successes.

Barbarians no longer spare a single target city per continent from pillaging. In BtS, they apparently try to conquer that city intact. (`CvUnitAI::AI_pillageRange`)

And Barbarians don't target cities protected by the Great Wall. (`CvPlayerAI::AI_findTargetCity`)

Reduced the chance for building a "priority fort" from 80% to 20%, which, I suspect, was intended. (No clue if it's wise.)

Since K-Mod 1.44, Gunship had been able to capture cities if they contained a visible non-combat unit. Reported by Zholef here. Also fixed in K-Mod 1.45, but I've kept my own fix instead.

Eliminated AI civs can no longer do diplomacy. In BtS, there is a slim chance for this to happen right after an AI is eliminated by another AI.

AI no longer trades for resources needed only for obsolete units (merged from Better BUG AI).

Integer overflow when a large amount of culture is added through WorldBuilder. Thanks to xaster for pointing out the issue on CFC. Also fixed in K-Mod 1.46.

Attitude cache updated when the ranks on the scoreboard are updated.

The strategy overlay (dot map) shows up correctly after loading. Bugfix by EmperorFool: source *Tbd.*: Strategy overlay isn't cleared when regenerating the map. And stays disabled after AI Auto Play. And doesn't store the most recently selected color in savegames.

Cottages, Hamlets and Villages don't grow during disorder.

When enemy units and neutral unit are together in a tile, the unit model shown on the map is guaranteed to be an enemy unit. (K-Mod bug in `CvPlot::updateCenterUnit`)

A resolution for mutual defensive pacts can't be signed if all non-vassal members already have signed defensive pacts. (`CvGame::isValidVoteSelection`)

001b	Can't build air units in cities already filled with air units.
Rationale	A bit of a judgment call; could argue that the cap should only matter when construction finishes, but this isn't practical.

001c	Displayed GP birth probabilities computed based on current GPP per turn	
AdvCiv		*BtS*
Corrected the birth probabilities shown on the GP bar (city screen and BUG GP progress bar). Now project the city's current per-turn GPP into the future.		Birth probabilities are based on the GPP collected so far; no projection. The probabilities adjust only gradually when a specialist is reassigned.

Tbd.	Should perhaps take into account a foreseeable increase of the GP threshold due to other cities finishing their GP earlier. And Golden Age length if currently in a Golden Age. That said, I might at some point change the way the threshold increases; better to leave the UI-side alone for now. `calcPercentages` in BUG's `GPUtil.py` still causes the GP type with the highest progress to be shown as a label on the GP bar.
001d	In Debug mode, the Top 5 Cities and Wonders tab and Religion, Civics and Espionage screens were not properly switching to the perspective of another civ because of some errors in the Vanilla Civ 4 and BtS Python code.
See also	[007](#) deals with other changes to Debug mode

Unrevealed cities are shown as "Unknown" on Top 5 cities (K-Mod: "Unknown" only if owner not met). Only revealed cities are considered for the list of high-culture cities on the Victory screen.	
Rationale	Not really a bugfix on second thought, but consistent with the K-Mod rule that unrevealed cities are secret.
001e	No more stop-trading requests about a civ that has just stopped being worst enemy; and no offers for Defensive Pact from a civ that has just been attacked.
Rationale	Because the AI can't immediately contact human players, the conditions for AI requests need to be checked again at the start of the human turn. This is handled outside the SDK and mostly works, but, apparently, some checks had been missing.
001f	Foreign cities no longer become unrevealed upon conquest by a third party

When a city is conquered, it remains revealed to all civs that knew the city prior to conquest.	When a city is conquered, it is treated as a new city, revealed only to the new and former owner, and any third parties that happen to have visibility of the city at the time that it is conquered.

Rationale	Hard to say if this is really unintentional. The BtS code explicitly sets the city to be revealed to the former owner. Were third parties not considered? Doesn't make sense to me that third parties learn about the conquest, but not about the aftermath.
001g	Deleted duplicate `MemoryAttitude` entries about Suleiman and all leaders after him in `Civ4LeaderHeadInfos.xml` (it's ordered alphabetically); used the mean when two values contradicted each other. Those before Suleiman didn't have duplicates.

001h	Industrial bad health
AdvCiv	*BtS*
When a building leads to bad health with certain strategic resources (Factory, Coal Plant, Industrial Park with Coal or Oil), the AI assumes that the city already has these resources when evaluating the effect of bad health.	Only bad health that the city will suffer directly, i.e. from currently available resources, is taken into account. E.g. Factory counts as just 1 bad health so long as Coal/ Oil aren't available.
Starting in the Industrial era, so long as a city doesn't have power yet, the AI treats the city's current health as 1 less when evaluating the effect of bad health.	The AI does not aim at keeping a health surplus available; just aims at balanced health given the immediate effect of the building.
Increased the (negative) weights of bad health and food deficit in building evaluation.	

Hopefully no more (or only minor) population loss from bad health in Industrial AI cities.	AI ends up building Factories and Coal Plants before getting Oil and Coal. If health is just balanced at that point, once Coal and Oil are connected, the city is at -8 health. The AI then shrinks the population gradually by 8 to avoid wasted food (more with Industrial Park, not to mention Poisoned Water).
	BBAI and K-Mod have largely rewritten the building evaluation code, but this bit works as in BtS.
Rationale	Treating health as one less should lead to some leeway for later bad health, especially from power.
See also	160 makes Poisoned Water less dangerous, and 120e improves the AI response to that mission.
Tbd.	The bad health effects are badly balanced. Too much at once, bad health for no reward (Factory doesn't actually get better with Coal or Oil), punishing for tall strategies. Shouldn't even be possible to build a Coal Plant without Coal.

001i	Replaced a couple of `isOpenBorders` calls with `isFriendlyTerritory` – had apparently been missed when BtS introduced vassal agreements (which allow passage even without an OB agreement). AI evaluation of Missionaries should be improved now.
001j	Deleted two (K-Mod) calls to `CvPlayerAI::AI_getNumTrainAIUnits` because `CvPlayerAI::AI_totalAreaUnitAIs` already counts those units.
See also	017 fixes a bug that also has to do with confusing these two function.

001k	AI plot-danger no longer (indirectly) checks `isMadeAttack`
AdvCiv	*BtS*
When the AI checks whether a plot is in danger of being attacked by a unit, it doesn't check whether that unit has already attacked this round. As a side effect, the AI may not be able to tell that shelf ice plots are in no danger from non-submarine ships.	Vanilla Civ 4 did not check for an earlier attack; BtS added this clause.
Rationale	Plot danger is only checked during AI turns, and the active AI civ then wants know if another civ will be able to attack on that other civ's next turn; it doesn't matter if the unit could *immediately* attack. Perhaps the BtS developers hadn't realized that the `MadeAttack` flag persists for an entire round of turns.
	Hard to say how significant this bug is; the `plotDanger` functions are called in dozens of contexts. I don't remember how I noticed it; some situation in which the AI clearly underestimated plot danger.
See also	Using the `canBeEntered` function from change 030 since v0.90.

001l	Fixed an inconsistency in the AI trade value modifier for gold

See also	Obsoleted by [036](). Financial trouble no longer affects the trade value of gold.
AdvCiv	*K-Mod*
The AI uses the same modifier for computing the trade value of gold regardless of whether a human proposal is put before the AI, or if the AI proposes a trade involving gold.	When one side is in financial trouble and the other isn't, the AI can be brought to propose deals that it won't accept if the player proposes them.

001m	Scoreboard gets updated when a leader name changes
AdvCiv	*BtS*
When the player enters a different leader name (Alt + D), the name is immediately updated on the scoreboard after clicking "OK".	The scoreboard isn't updated until end of turn unless the player manually closes and reopens the scoreboard.

001n	Potential OOS bugs (just 2 so far)

The usual causes of out-of-sync errors in networked multiplayer are these:

(a) Local code (invoked by user input) modifies the game state. All uses of the sync'd PRNG (`SorenRandNum`) modify the game state. Some AI functions have a `bAsync` parameter that causes them to use the asynchronous PRNG (`ASyncRand`) instead. Also tricky: Functions that cache their return value. There are only a few of these (`AI_baseBonusVal`, `AI_localDefenceStrength`, `AI_techBuildingValue` and `AI_obsoleteBuildingPenalty`, all at `CvPlayerAI`, `CvPlot::getFoundValue`, `CvCityAI::AI_buildingValue` and maybe a few others) and most have a `bConstCache` parameter to prevent the cache write. I think the cache writes wouldn't actually be a problem if the caches were reliably invalidated, but the formulas depend on so many variables that this is impossible to do.

(b) Uninitialized memory

(c) Use of `getActivePlayer` in global code (not invoked by user input)

(a) and (b) are also problematic in singleplayer.

Comprehensive guide by Gerikes about avoiding and debugging OOS errors: [CFC thread]()
CFC post by karadoc on the subject of OOS errors: [link]()
Some posts by EmperorFool: [link]()
By Nightinggale: [link]()

I've disabled some Debug text in multiplayer that was calling `CvPlot::getFoundValue` because that function doesn't look safe (see (a)).

See also	See [007]() (logging), [135c]() (Debug mode) and [127]() (AI Auto Play) about multiplayer debugging. See [003g]() about issues with floating point arithmetic. Open K-Mod issue concerning (a): [link](). I think [036]() addresses this.
Tbd.	I guess I should merge the debug tool by Nightinggale (see his guide linked above).

001o	Military happiness only from units of the same team or vassal/master
AdvCiv	*BtS*
A city that fears for its safety or that is under Hereditary Rule can receive happiness from	Any (non-hostile) units cause military happiness.

military units only if those units belong to the same team as the city or to a vassal or master of that team.	
Rationale	Comes up rarely, but highly counterintuitive when it does.

001p	Crash when loading a smaller game from inside a larger game	
AdvCiv		*BtS*
Reset the data of all cities early in the loading process.		The logic for loading savegames is partly outside the SDK, but the issue appears to be this:
		Cities remain untouched during the first stages of the loading process. As general game data and civs are being reset, the UI keeps getting updated, based on data about cities that are no longer consistent with the other data. This can result in a crash when the camera is near a city of a civ with an id greater than the highest civ id in the game that is being loaded (`CvCity::getMusicScriptId`), but apparently also in other circumstances (`CvCity::isVisible`).
Tbd.	Was going to add the bugfix to my [list](#) of easy-to-adopt AdvCiv changes, but can't seem to reproduce the error anymore in unmodded BtS. Also still needs to be tested in multiplayer.	
See also	[This](#) CFC thread seems to describe the bug. (No one posted a fix.)	

001q	The price charged by the AI for an embargo was counting all deals of the AI, not just those with the embargo target. (bug in vanilla Civ 4)

001r	Corrected AI computation of anarchy length in `CvPlayerAI::AI_doCivics`. (K-Mod bug)
See also	[131](#) makes further changes to the switch-civics AI. I've posted about this bug on the K-Mod subforum: [link](#) (under No. 1, "Update")

001s	Some code that uses `canDefend` doesn't seem to take into account that all non-land units are defenseless against land units (yet `canDefend` returns true for all ships except Work Boat). One such oversight (in K-Mod code) causes the AI to ignore hostile units when stationing idle ships.
See also	[139](#) further improves the AI code for keeping ships safe from land units.

001t	Preliminary fix for the following issue in K-Mod: After declaring war, an AI stack may decide to use a different path, even one for which no DoW would've been necessary. If this occurs, the AI now sticks to the original path (if it's legal) for at least one more

	turn so that a stack that triggers a DoW will immediately enter an enemy tile.
Rationale	The fix is more about concealing the problem than making the AI smarter; a DoW without crossing a border is a clear mistake, sticking to a suboptimal path isn't.
Tbd.	I don't see how the DoW affects the best path; perhaps something in the pathCost function (`CvGameCoreUtils.cpp`).Whatever it is, the pathfinder should anticipate that effect.
And a fix for a related bug: K-Mod sometimes lets stacks of attackers move to an enemy city when war is imminent. Since these stacks aren't supposed to start the war, this doesn't normally make sense.	

001u	Fixed: K-Mod code had failed to recognize units as obsolete when evaluating a strategic resource that it didn't have access to yet. This had sometimes led the AI to cancel and renew trades for strategic resources (especially Horse) every 10 turns.

001v	Bugs reported by CFC user vedg.
See also	[046](#) and [905b](#) address other issues (not bugs, strictly speaking) reported by vedg.

AdvCiv	*BtS* (presumably also broken in Vanilla Civ 4)
When a civ agrees to change both its civics and its religion in a single trade, all changes are applied immediately in a single revolution. The anarchy adds up.	Same if the religion change is added to the trade before the civics changes. Otherwise, only the civics changes are applied.

Rationale	See my reply to [this](#) post.
K-Mod bug: When a city finished a unit whose national limit was reached, overflow gold equal to that unit's production cost was paid.	
See also	[Thread](#) with the bug report.

001w	UI updates ("dirty" bits)

AdvCiv	*BtS*
When the happy or healthy status of a city changes through a resource trade, the indicators on the city billboards are updated.	Usually works – I guess the trade screen (not part of the SDK) does this? But not always. E.g., at least one time, an unhappy indicator appeared due to trades canceled by the AI and was not removed in response to subsequent trades during my own turn.
After a declaration of war, cached waypoint markers are updated.	After declaring war on a civ that the player didn't have Open Borders with, the cursor is shown in red when plotting a move into an enemy non-border tile. (At peacetime, this is correct – a move into a border tile triggers the declare-war popup.)

002	Cosmetic changes

Credits	Merged a few non-functional changes from Roamty's Unofficial Patch 1.7 (link). Not marked in-line because the changes are too minor.
002a	Minimap shows lighter player colors than in BtS on water tiles (like in Military Advisor), and slightly more opaque colors on land tiles. No units are shown on the minimap.
Rationale	CFC forum post (also with screenshots).
	When Desert and Forest shine through too much, player colors can become hard to distinguish.
	Units: Can't make them out properly anyway, and can't tell how many there are because each stack is shown as a single blob.
Config	Switch in `GlobalDefines_advc.xml`. Also allows uncolored water tiles like in Civ 3.
See also	dlph.21 shows Barbarian territory on the minimap.
002b	Increased font sizes.
	Shortened some leader names, e.g. "Augustus Caesar"→"Augustus" when used outside of Civilopedia.
	Shortened "Native American Empire" to "Amerindian Empire".
Rationale	People play on rather high resolutions nowadays, and the fonts don't scale properly.
	Long leader names take up (even) more room with the larger fonts. This is a problem for Native America because the text covers up the civics icons during diplo (at least on my 5:4 display). Would be better to use only short descriptions there, but that seems to be programmed outside the SDK.
Config	The font-size change can be reverted by removing the `Resource` folder and `Assets\XML\Art\CIV4ArtDefines_Misc.xml`.
Credits	Inspired by [VIP](VIP) mod and I also took a look at vincentz's setup. This tutorial was helpful, although neither the downloadable package nor the code in the tutorial actually worked for me.
	This post by CFC user hagnat helped me fix some Vanilla Civ 4 and BtS errors in the theme files, though I don't think these errors were actually causing any problems. They did lead to confusing log output. See also this conversation on CFC.
Tbd.	Can't seem to change font sizes without defining a custom theme, which appears to mandate copying 25 thm text files. I was at least able to avoid copying all the tga files, which make up 15-30 MB – this would've been prohibitive for distribution.
	I think there may be a way to make this work by copying just one or two files, but I can't figure it out (and I don't think other modders have).
	Had to hardcode the mod folder name in `Assets\XML\Art\CIV4ArtDefines_Misc.xml` in order to plug in the custom theme.
	Several boxes are now a little too small for their text and could use some adjustment. The help text area should be a little wider; has some stupid linebreaks for units with many promotions. Perhaps not possible outside the EXE; `HELP_TEXT_MINIMUM_WIDTH` doesn't do the trick.
002c	Added a couple of translations for K-Mod game text entries.
Credits	Also merged translations by Zholef. I haven't marked these changes in the XML files.
002d	Changed the icon of the specialist-commerce ability introduced by K-Mod 1.45 to show a Scientist; was Citizen. (Depending on which commerce type gets increased, the icon could also show a different specialist, e.g. Engineer for production.)
002e	Disabled glow effect on units ready for promotion except for the currently selected unit and foreign units.
Rationale	Too obtrusive. Players don't select units just to assign promotions; they select them in

	order to move or heal, and assign promotions at that opportunity. No need to constantly indicate unassigned promotions on the world map.
	The glow is needed on foreign units because there is no other way of telling that a foreign unit has unassigned promotions. Shouldn't be a secret either. (Rarely relevant in singleplayer as the AI always assigns promotions right away.)
Config	Can be toggled in `GlobalDefines_advc.xml`
002f	Changes to city icons: Defense icon moved behind the defense modifier; city network icon removed.
Rationale	Should be easier to guess now that the tower icon isn't some status indicator, but just stands for the word "defense". The city network icon is at best helpful in the early game, though probably not at all for experienced players (and inexperienced players may be unaware of the icon). Can always look at the list of trade routes on the city screen or consult the Trade layer.
002g	Changes to Main Menu (the one that opens right after launching BtS)

AdvCiv		*BtS*
In-game main menu called "Game Menu".		Called "Main Menu", same name as the menu where you go after "Exit to Main Menu".
Shown grayed out: "BtS Content", "Check for Updates" (in the "Advanced" submenu).		"BtS Content" leads to an empty screen. The Update site has long been disabled – hangs for some seconds, then reports that the game is up to date.
Rationale	Can't remove the dead items (handled by the EXE), so it seems that the best I can do is show the text in gray.	
	I had "Play Now! and "Play Scenario" grayed out at first, but "Play Now" shows descriptions of map scripts that aren't visible elsewhere and there's a preview screen for some map types and scenarios (though a pretty bad one).	
	Could rename "Custom Game" to "New Game (Randomized Map)", "Play Now" to something like "World Picker" and "Custom Scenario" to "New Game (Scenario)", but I think players are so used to selecting "Custom Game" that this would be an inconvenience.	

002h	Changes to textures	
Credits	I've worked from textures in the [Blue Marble](#) (BM) design.	

AdvCiv	*BtS*	*BM*
Changed the brightness, saturation and color balance of all terrain textures except Hill, Snow and Peak, aiming at a middle ground between BtS and BM. I think my colors are less saturated than either BtS and BM. Coast is quite a bit brighter than Ocean. I've also adopted the water-related non-terrain textures from BM to my color scheme.	The BtS textures have bright colors. They're easy to distinguish except perhaps Coast and Ocean.	Much darker colors than in BtS; Coast and Ocean somewhat hard to distinguish. Also changes several non-terrain textures that depict water (e.g. irrigated farm) to match the new color of water.

Dark green Forests, medium green Jungle, light green Grassland.	Bilious green Grassland and Jungle, medium to dark green Forest.	Dark green Forest and Jungle, medium green Grassland that contrasts very strongly with river banks.
No changes to the texture detail, though reliefs might be more visible due to the lower color saturation.		More detailed texture reliefs. Makes Grassland in the fog of war and non-fogged Jungle a bit hard to distinguish.
Clouds disabled.	When zooming out far, passing clouds are shown; these clouds also cast shadows.	No shadows; denser, more realistic clouds.
No change to textures outside the map.

Adopted the BM resource textures, and also toned down Corn, Wheat and Silk. | Some textures resembling those on the map are shown in Civilopedia and the "Play Now!" World Picker screens for illustration. | Adjusts these textures to match the BM style. (Compressed size: 6 MB)

Less garish textures for Banana, Rice, Gems and Uranium. |
| Roads light brown. Railroads from BM, but with increased contrast for a dotted look. | Roads dark beige, Railroads light gray, difficult to tell apart. | Darker Railroads, no change to Roads. |
| *Rationale* | I mostly wanted something that's easier on the eyes. Blue Marble is pretty good in that regard, but has some other issues (see above) and looks more different from BtS than it has to. I've also gotten the (compressed) file size down to 5 MB from 15 MB. The BM reliefs look kind of nice, but more crayon-like grainy than detailed.

All three versions let Coast bleed far into adjacent Ocean, which can make it hard to tell where the Coast ends. Probably can't be helped because the player is – apparently – supposed to be able to tell when there is an unrevealed Coast next to a revealed Ocean. | |
| *Config* | Remove `Assets\BML.fpk` (renaming the file doesn't help) in order to use the BtS textures, or put a different `fpk` file in Assets (e.g. Blue Marble). If BtS textures are used, clouds should probably be re-enabled through `RENDER_GLOBEVIEW_CLOUDS` in `GlobalDefines_advc.xml` because that switch can't remove the shadows.

To modify my textures, `BML.fpk` has to be unpacked first, using [PakBuild](). | |

002i	Player color palette revised

See table below. The BtS palette is on top and the AdvCiv palette on the bottom. The empty cells happened by accident. The colors labeled as unused are only used as secondary colors (when multiple leaders of the same civ are in one game), and light black (lower right corner) is entirely unused. I've been less careful about making these colors distinct than about the primary colors.

Made a few colors like the Aztec's green (upper left) and the Persian's blue (top center) less saturated and thus hopefully less painful to look at.

Most colors shifted a little bit to make them easier to distinguish. All player text colors changed to be simply a lighter version of the player color. The darker the player color was, the more I've lightened the text color. (I think most of the BtS player text colors had been chosen in this way too, but some weren't, and now I can be sure it's consistent.)

Barbarians	America	Mongolia	Persia	France	Korea	Ottoman
		Portugal	China	Rome	Russia	Inca
Germany		Carthage	Mali	Spain	India	Japan
England		Arabia	Greece	Zulu		Celtia
Babylon	(unused)	Byzantium	Ethiopia	Holy Roman	Khmer	Maya
(unused)	Native America	Netherlands	(unused)	Sumeria	(unused)	(unused)

Barbarians	America	Mongolia	Persia	France	Korea	Ottoman
		Portugal	China	Rome	Russia	
Germany	Aztec	Carthage	Mali	Spain	India	Japan
England	Egypt		Greece	Zulu	Viking	Celtia
Babylon	(unused)	Byzantium	Ethiopia	Holy Roman	Khmer	Maya
(unused)	Native America	Netherlands	(unused)	Sumeria	(unused)	(unused)

Config	Remove `Assets\XML\Interface\CIV4ColorVals.xml` to restore the original colors.
Credits	Andy Langton's Hex RGB Colour Converter came in handy.
See also	002a: Increased opacity on the minimap makes the colors a bit easier to distinguish there. duckstab's btsColorEditor with its "Adjust" button could've been useful if I had known about it.

002j	Changed the sizes of a few 3D models, especially ships.
Rationale	The sizes had already been scaled by hand, but a few units appeared oversized, especially Modern Work Boat. (Of course, all units are kind of oversized, and I've tried making them all 20% smaller, but that made them significantly harder to distinguish.)
Config	Through `Art\Civ4ArtDefines_Unit.xml`
Credits	Inspired by Elhoim's Better Ship Scale mod, though that mod makes the sailing ships look like nutshells, and the modern ships poke across the tile boundaries.
See also	905b increases the size of East Indiaman a bit because it's supposed to be bigger than Frigate.

002k	Put "AD" (Anno Domini) before the year number in all game text
Rationale	I understand that "1500 AD" is acceptable, but "AD 1500" is more proper. Not fond of CE/BCE (the abbreviations are too similar to each other).
Config	Through `CIV4GameText_advc.xml`

002l	Play combat audio based on player's era rather than game era.
Rationale	I haven't checked, but, <u>apparently</u>, the sound differs for each era, and I think all era-based visuals depend on the (human) player's era, so it seems inconsistent to base the audio on the game era.

002m	Shortened combat animations	
AdvCiv		*K-Mod*
The base number of animated combat rounds decreases slightly with each era. As a result, the animated units die after fewer hits in the late game than in the early game, and combat animations per battle take about 30-50% less time in the late game. Moreover, on the defense, starting in the Renaissance era, combat animations are cut short, meaning that they usually stop before one side has been defeated. In addition to the above, when playing with the "Single Unit Graphics" option (SUG) in single-player mode, the base number of combat rounds is halved.		From the K-Mod changelog (v1.29b): "*Combat animations are now orchestrated to roughly correspond to the events from the actual combat mechanics. (It still isn't a blow-for-blow representation of the actual battle, but events in the animation will at least occur in the same order as the events in the combat log.)*" That is, the number of animated combat rounds is based on the number of entries in the combat log. In addition, it's multiplied by an XML-configurable base value. Looks like SUG doesn't affect the number of rounds, meaning that the two men are shown hitting each other for about 10 seconds.
Config	`GlobalDefinesAlt.xml` (because that's where K-Mod's `STANDARD_BATTLE_ANIMATION_ROUNDS` is defined)	
Rationale	For attacks by the player, there's the "Quick Combat (Offense)" option is, but "Quick Combat (Defense)" makes attacks against the player difficult to follow, and animating them takes too long in the late game. Sadly, the speed at which the animations are played can, apparently, not be modified. I think the EXE consults functions like `getSecsPerTurn` in `CvDLLUtilityIFaceBase.h` for this. (`CvUnit::getAnimationMaxSpeed` is called during combat but doesn't make any appreciable difference.) Can only speed animations up by making units die after fewer hits or by ending animations before one side has been defeated. The latter doesn't look nice, but the former just isn't enough when large AI stacks attack in the late game. And players still have the option to see fully animated combat on the attack. Fewer hits per kill as the game progresses could be interpreted as weapons becoming deadlier. SUG: It looks goofy when a single Rifleman takes bullet after bullet without going down. I'm applying my change only to singleplayer mode because I'm not sure if basing the combat rounds on player options could lead to synchronization problems in (Pitboss) multiplayer games.	
See also	Similar arguments in <u>this</u> CFC thread. Two users claim that SUG speeds up combat – perhaps it does in BtS; not in K-Mod though.	

002n	Flashing end-turn message disabled	
AdvCiv		*BtS*

No flashing message is shown at the end of a turn. No change to the animation of the end-turn button, and no change to flashing reminder messages.	Once all units have orders and all popups have been dealth with, the end-turn button starts to pulsate and a flashing message "Press enter ..." is shown until the player ends the turn. The Reminders mod component (Alt+M) replaces the press-enter message with the reminder message set by the player.
Config	Through `Civ4GameText_advc.xml`
Rationale	Helpful for first-time players, but a little annoying in regular games, and quite annoying when taking screenshots. Newbies should still be able to notice the (subtly) animated end turn button eventually.
See also	106 suppresses the Autosave message (also through `Civ4GameText_advc.xml`).

003	Minor refactoring, utility functions, comments about unused or otherwise dubious code; in particular:

Macros `TEAMREF` and `TEAMID` that I use a lot to shorten code. E.g.
`GET_TEAM(GET_PLAYER(ePlayer).getTeam())`
becomes
`TEAMREF(ePlayer)`
 	
I've also added an inline wrapper `CvCity::AI` for casting CvCity pointers to CvCityAI references, and one for casting CvGame to CvGameAI – though that one is pretty much only useful inside `CvGame.cpp` as all other classes obtain CvGameAI references through `GC.getGame`.	

See also	003g: Floating point arithmetic 003e (private copy-constructors) makes the cast to CvCityAI safer to use.
Credits	CFC user Nightinggale suggested the inline wrapper here.

003b	Misc. performance tweaks
See also	003d: Faster Quick Load 003f: Function inlining 045: Rival buildings hidden on main interface.
Tbd.	I can't figure out why these two (seemingly unrelated) functions are called much more frequently in K-Mod than in AdvCiv according to profiler logs: `CvPlayer::canBuild` – took up 3 out of 14 seconds in K-Mod; more than 2 mio. calls, and virtually no time in AdvCiv. `CvCityAI::AI_updateRouteToCity` – took up more than half of K-Mod's time, called at least 4 times as often than in AdvCiv, and took 62 ms per call in K-Mod compared with 1 ms in AdvCiv. Is AdvCiv somehow paying elsewhere for the time saved on these calls? Is it using simpler but incorrect results? Why is AdvCiv (with UWAI disabled) still not noticeably faster than K-Mod? Or just an artifact?

003c	Added an assertion that checks if XML data loaded through `GC.getDefineINT` actually exists. Found just one (unimportant) error this way and corrected it. Had to change

	some calls that happened before XML was even loaded; no functional change.

003d	Faster loading of savegames	
AdvCiv		*BtS*
When using Shift+F8 to Quick Load in fullscreen mode, the game exits to the main menu for a second before loading the Quick Save slot.		When loading any savegame while playing in fullscreen mode, the game hangs on "Initializing" (doing who-knows-what) for a period of time that appears to depend on the complexity of the game state. Can easily be 30 seconds. This delay does not occur when loading from the main menu (nor when exiting to the main menu).
Rationale	This (apparent) bug has been long known, though these three CFC threads are the only web sources I can find that mention it. It's possible that it only occurs on some systems.	
	My fix only covers Quick Load. Since the "Load Game" menu is outside the SDK this is probably all I can do. Workarounds:	
	a) manually exit to the main menu before loading; or	
	b) play in windowed mode; or	
	c) press Alt+Tab two times when the delay begins. This seems to finish the "Initializing" stage immediately.	
	Could easily replace the "Initializing" text with a recommendation to minimize the game if loading is taking long. I've tested this and found it quite helpful because I keep forgetting about this. But the recommendation would also show up when generating a map, and this is misleading because Alt+Tab does not speed up the map script. The replacement text also needs to be very short; no room to explain that it only applies when loading a savegame. Had to leave it at a regular loading screen hint (008d) that shows up randomly.	
See also	009 is a prerequisite because it repairs BUG code for finding the `My Games` directory where savegames are located.	
	004m enables resource bubbles at game start. They normally stay enabled when loading a savegame, but not when it's done via the main menu. Therefore, 004m, keeps track of the status of resource bubbles, and 003d restores that status after loading.	

003e	Prevent accidental copying of objects	
AdvCiv		*BtS*
CvPlayer, CvTeam, CvGame, CvMap, CvEntity (base class of CvCity and CvUnit) and their subclasses are non-copyable, meaning that a line like `CvPlayerAI kPlayer = GET_PLAYER(ePlayer)` leads to a compile-time error.		Calls to the (macro) functions `GET_PLAYER`, `GET_TEAM`, `getGame` and `getMap` are extremely common in the code base, and new code has to call them all the time too. Such a line only leads to a runtime error, and one that is usually difficult to debug.
Rationale	Accidental copies are just something that comes with references as return values in C++, and I'm not going to make every class non-copyable that is returned as a	

	reference somehwere, but securing these frequently used functions seems prudent.
Credits	Git commit by CFC user Nightinggale (We The People mod). He does it only for `CvInfoBase`, a class which is also very often returned by reference (`get...Info`). However, this also requires a change to each of the many `CvInfoBase` subclasses, which seems a bit excessive and makes it harder to extend `CvInfoBase` further.

003f	Function inlining

Adopted from the We The People mod (Swati-007, Nightinggale). So far just for the `CvArea` class (Git commit, related Git issue). I don't think this is going to be a substantial improvement, even once it's done for more classes, but it's easy enough to do. My release DLL actually got smaller as a result, which might suggest that the functions were already being inlined.

003g	Floating point arithmetic

I've added utility functions for dealing with floating point numbers, and I'm using floating point arithmetic for most of the new code that involves divisions. It's easier to read and less error-prone than the iSomethingPercent stuff. I also try to round values as late as possible in order to avoid rounding artifacts.

When I decided to use floating point operations, to my embarassment, I was not aware that this can lead to synchronization problems in networked multiplayer. That said, the `std::pow` function returns floating point numbers, and, in a game that's all about growth, exponentiation with fractional (subquadratic) exponents seems indispensable to me for the AI code. So going back to integer arithmetic isn't really an option. (Although: I guess one could write a pow function for integer percentages that supports only a small set of exponents and returns results from hardcoded tables.)

Tbd.	I'll have to see how big the problems in multiplayer are. My old notebook (32-bit AMD processor, Win XP) and desktop PC (64 bit, also AMD, Win 8) have produced the same game states in (singleplayer) tests on AI Auto Play. If Intel processors produce different results, I could experiment with Microsoft's `_controlfp` function (or possibly the `/fp:precise` compiler flag): "At app startup time we call: _controlfp(_PC_24, _MCW_PC) _controlfp(_RC_NEAR, _MCW_RC) Also, every tick we assert that these fpu settings are still set: gpAssert((_controlfp(0, 0) & _MCW_PC) == _PC_24); gpAssert((_controlfp(0, 0) & _MCW_RC) == _RC_NEAR); There are some MS API functions that can change the fpu model on you so you need to manually enforce the fpu mode after those calls to ensure the fpu stays the same across machines. The assert is there to catch if anyone has buggered the fpu mode. FYI We have the compiler floating point model set to Fast /fp:fast (but its not a requirement)" source, similar advice, cf. MS library These numbers could serve as a test.

004	Minor usability improvements
See also	101 adds help text to the Nationality bar (city screen). 120c hides the espionage slider when it's at 0. 210 adds BUG-style alerts. 151 shows the previous religion or civic in messages about changed civics/ religions. 152 shows currently offered war trades on the Glance tab. 060 suppresses the add-to-spaceship popup. 048: combat odds help text
Misc:	

Misc:
Show the turns-left countdown only when at most 30 turns away from time victory (instead of 100);

inspired by [RFCEurope](#).

Health from trait shown on city screen as "from Trait" instead of "from Civilization".

Settings tab (Victory screen) shows the initial number of civs and disabled victory conditions.

Announce when a tech that grants a free Great Person is first discovered. Credit: Civ 4 Reimagined [1.4](#).

The trade table no longer shows "you must be joking" resources, i.e. resources that the other side already has (and doesn't need for a corporation). Can still find those resources on the Resources tab of the Foreign Advisor. K-Mod already excluded "cold, dead hands" cities.

BUG wonder list with color coding enabled by default.

BUG Glance tab (Foreign advisor) shows relations values by default, not Smilies. Reduced the column width in games with 18 civs a bit.

Upon closing the Military Advsior screen, the game forgets which players were selected. (BtS: Remembers which players were selected and selects the active human player in addition when re-opening the screen.)

ALT key doesn't show combat odds when hovering over one's own units.

Peace treaties are canceled at the start of a round – players never have to do it manually.

004a	UI support for the Discover ("bulb") ability	
AdvCiv		*K-Mod/BUG*
The help text for the bulb button of a GP unit shows all techs that the GP will be able to discover if an additional tech is researched, e.g. "next tech: Astronomy (with Printing Press)".		The help text only says which tech the GP can discover right now.
GP Research on the Tech Advisor disabled by default.		BUG's "GP Research" option shows bulb paths on the Tech Advisor. Enabled by default.
Rationale	For players who don't plan their bulbs (long) in advance, the added help text should usually suffice. I'd like to show only the tech tree on the Tech Advisor.	
Config	GP Research can be enabled on the Advisors tab of the in-game BUG menu.	
If GP Research is enabled, info about techs that a GP could currently discover is shown in the footer area of the Tech Advisor.		Shown to the left of the tech tree, overlapping with the first column of techs. This looks like a bug; the whole tech tree is probably supposed to move to the right a bit.
Credits	Idea from [RFC: Dawn of Civilization](#)	
Rationale	Want to give the tech tree as much room as possible. Some Advisor screens use the footer for tabs, but since the Tech Advisor has no tabs, it's unused space.	
For each type of GP, the following info is shown if applicable: • Preference order: All techs that the GP could possibly discover, sorted by priority. • Current tech: Tech that the GP would currently be able to discover. • Missing requirements: Techs that have a higher priority than the current tech and don't require the current tech. These are techs that will replace the current tech if their prereqs		• (same) • (same) • Techs with lower priority than the current tech for which all tech requirements are met. These are techs that the GP could discover if the requirements for the current tech weren't

are researched. • After research: The tech that the GP would be able to discover if all techs currently queued for research were already discovered. Improved the help text a bit, though it's still a bit difficult to understand I think.		met. • (same) • Techs with lower priority than the current tech for which all tech requirements will be met after finishing all queued research. Difficult to guess from the help text (and layout) how all this works. E.g. the "after research" techs are just called "Future Technologies".	

Rationale	For optimal bulb paths, it can be necessary to avoid certain techs (example). I'm guessing that's why the BUG mod shows the lower-priority techs. Or the idea was to show which tech the GP would get if its current tech was discovered, but that's not always true (because the current tech could unlock another high-priority tech). So the BUG info is complicated and misleading. I don't think tech avoidance matters very often, and players that use this tactic probably have their bulb paths memorized or know how to figure them out from the preference order. The missing-requirements list should make the player aware of techs that the GP will be able to discover if one more tech is researched through other means. Example: If the current tech for a Great Scientist (GSc) is Compass, the player can switch his/her research to Compass to find out that the GSc will be able to discover Aesthetics once Compass is finished. This works the same way in BUG as in AdvCiv. But how to tell in BUG that the GSc could also discover Philosophy if Meditation was researched? AdvCiv lists Philosophy (and Paper) under "requirements missing".
Config	Implemented mostly in `CvTechChooser.py`.

AdvCiv	*BtS*
No "can be researched by a (e.g.) Great Scientist" help text on technologies.	Help text on a technology says whether that technology could currently be discovered by a particular GP.

Rationale	If the player does have such a GP, then the player can consult the Discover button of the GP to find out which techs it can discover. If the player doesn't have the GP, then, by the time a GP is born, the information may no longer be accurate. Most of the time, the help text is just distracting. If the player needs to know about bulb paths, he/she should consult the BUG Tech Advisor.
004b	Found button shows projected health, city tile yield and increase in city costs
Tbd.	Should also show free initial buildings (Palace, more with Medieval start or later).

AdvCiv	*BtS*
The help text for the found ("Build City") button shows how much the Total Expenses (Economics Advisor) will increase if a city is founded on the current tile. Does *not* project the gold income of the new city, e.g. from trade routes. The increase is computed as inflation times + maintenance for the new city, including State Property, vassal cities etc. + increased maintenance in other cities, including those temporarily exempt because of disorder or celebrations + increased civic upkeep + decrease in unit cost (from the +1 population) + decrease in unit supply and cost from the lost Settler	No such projection. Can only quicksave and found to see how costs will increase.

Tbd.	There's a small (rounding?) error of apparently at most 1 gold that I can't figure out.
The help text on the found button shows health from features, traits (Expansive) and freshwater. All features revealed in the (full) city radius count. While a Settler is selected, the help text of any tile shows health effects. Found-button help text shows the projected city tile yield.	Forests provide +0.5 health, Jungles -0.25, Flood Plains -0.4 and Fallout -0.5. City tile yield only shown once a city has been founded. Usually just 2 food, 1 production, 1 commerce, but occasionally more.
See also	[016](#) changes the effect of extra yields from random events on city tiles.
004c	Changes to bombardment
Can bombard at 0 defense in order to prevent city defense from recovering. Air units and siege units with the ability to ignore defensive buildings have their bomb(ard) rate increased to match the building defense. For example, when a city that has 100% defense from a Castle, but just 60% from culture, is bombarded by a Cannon (bombard rate 12), city defense is reduced by 20 percentage points. Units that ignore defensive buildings see 48% defense, the others 80%.	Can't bombard cities with 0 defense. If a city isn't bombarded for a turn, its defense begins to recover on the next turn. The ability of Wall and Castle says "+... defense (except vs. Gunpowder-based units)" and those Gunpowder-based units have the XML tag `IgnoreBuildingDefense`. However, Siege units with the tag don't actually ignore defensive buildings; they only ignore the bombardment reduction effect that Wall and Castle also have. In the example on the left, the Cannon player would see 60% before bombardment, and 52% after.
Rationale	I wouldn't mind Walls and Castles having defensive abilities against post-Medieval units, but the implementation is unacceptable from a UI pov. By the Modern era, stacks often consist entirely of units that ignore building defense, and then the player only gets to see the defense from culture, which somehow doesn't decrease as fast as it should. An alternative solution would be to show city defense including buildings when a siege unit is selected; in the example, the player would then see defense decrease from 100% to 88%. Not trivial to implement (can't just take away `IgnoreBuildingDefense` because siege units still need to ignore bombardment reduction), and my solution is conceptually simpler: post-Medieval siege units entirely ignore defensive buildings.
Tbd.	Would be nice to have the help text for the Bombard button state the bombard rate. And, clearly, Walls and Castles could use a buff.
004d	AI says "not right now" to peace when war is recent
AdvCiv	*K-Mod*
When a player tries to broker peace, the Trade Screen says "not right now ..." if the war is still too recent. The AI will agree to brokered peace with a third civ as part of a peace treaty with the human even if the AI would normally still refuse to talk to that third civ.	Says "we'd love to, but you'd have to ask them" instead. Often, both sides say this. (As far as I recall, peace could be brokered even when a war was recent in BtS.)
004e	Leads-to info added to promotion buttons
AdvCiv	*BtS*
The help text for promotion buttons lists the promotions enabled by the current promotion.	Can only look this up in Civilopedia.

E.g. "Flanking I Leads to Flanking II, Navigation, Sentry"		
004f	Disabled celebrations	
No celebrations (We-Love-The-King Day) ever.		If a city has at least 8 population, no anger and no bad health, celebrations happen with a probability of population / 1000. The reward is 0 maintenance for 1 turn.
Rationale	Celebrations grant just -3% maintenance on average in a size 30 city, which is insignificant. I'm not even listing this as a balance change. Celebrations were potent in Civ 2, but already irrelevant in Civ 3. They've only confused players. Something no one will miss who doesn't know it's disabled.	
004g	Misc. changes of confusing help text (not a complete list)	
"Our shared borders spark tensions"		"Our close borders spark tensions" Too similar to "closed", and doesn't imply that they're touching.
"We don't like you enough"		"We just don't like you enough" Sounds like this is the only obstacle, but often isn't.
"Your x has attacked a y: 22% damage." Removed the minus sign.		"Your x has attacked a y: -22% damage"
"Your x has died attacking a y."		"Your x has died trying to attack a y."
"Some wonders on this continent are making us happy" for the Notre Dame ability. (Only changed in English and German)		"Some buildings are making us happy", listed twice when there is also e.g. a Colosseum.
Financial Advisor says commerce from "Trade" Credit to Th334		"Foreign trade" in K-Mod (but it's actually all trade)
"The anarchy is over" in white letters		In red letters, like it's a bad thing.
"We are afraid of their military might" when sponsored war refused on account of nukes		"Surely, you must be joking."
Polar desert called "Snow" instead of "Ice".		Both polar desert and shelf ice are called "Ice".
"Show City Radii" (Graphics option) + better explanation text		"Show City Radius" (but doesn't actually show the radius around a selected Settler)
004h	Highlight full city radius when Settler selected; no yield icons	
When a Settler is selected, the full city radius is highlighted.		Only the inner radius, i.e. the adjacent tiles are highlighted.
No yield icons are shown (unless they're always shown through "Display Yields"). To implement this, `CvDLLInterfaceIFaceBase:: toggleYieldVisibleMode` was no help. I had to replace `CvUnit::isFound` so that the EXE doesn't even know whether a Settler is selected. A hack like this could have undesirable side-effects, but, so far, everything seems fine.		Even if "Display Yields" (button above the mini-map) is disabled, yield icons are shown when a Settler is selected.
Nothing is highlighted if any non-Settler unit is selected along with a Settler.		The highlighting is based on whether at least one Settler is selected (`CvDLLInterfaceIFaceBase:: canSelectionListFound`).

Rationale	Highlighting the adjacent tiles isn't helpful at all; it's not even a reliable projection of the borders right after founding because some of the highlighted tiles could already be owned by another civ.
	The yield icons are useless to me personally, but I know some players always keep them enabled, perhaps, in part, because icons on worked tiles are highlighted, making it easier to tell which tiles are being worked. I'm not sure if anyone wants to see the icons only when a Settler is selected – I normally choose my city sites before even training a Settler. So hopefully an XML switch for this is sufficient; could also add it as a BUG option to the Map tab (using `::getBugOptionBOOL` in the DLL).
Config	Two settings in `GlobalDefines_advc.xml`
Tbd.	When settling o a tile marked with a dot on the Strategy layer, it would be nice to remove that marker automatically.

004i	Message about gold stolen by enemy spies says how much was stolen
Credits	Idea from Civ 4 Reimagined [1.2]
See also	[120d]: The Espionage shows the amount of gold to be stolen in advance.

004j	Changes to "Regenerate Map"

~~In singleplayer games, the map can be regenerated until (incl.) turn 3. Exception: Can't regenerate after any civ has met another civ.~~	Can only regenerate the map on turn 0 (unless civs meet each other already on turn 0).
Rationale	More convenient for testing, but, on second thought, regeneration past turn 0 might not be entirely clean. Regeneration does not reset the game, player and team objects; just destroys all units and cities. Also, it's not such an inconvenience to reload the initial autosave.
Tbd.	Perhaps a full reset wouldn't be so hard to implement.
	At least I should try to get rid of the have-met exception on turn 0. Resetting the has-met flags is simple. Years-of-peace and perhaps other AI memory starts to count when another civ is met, but that's not a problem on turn 0, and resetting memory counts is also easy enough. A human civ could immediately declare war, so I at-war flags would have to be reset. When starting in a later era though, various trades could be made on turn 0 ...
After regenerating the map, the Dawn of Man (DoM) screen is shown again, and the camera centers on the player's active unit.	The DoM screen isn't shown after regenerating, and the game tries to center the camera on the player's starting plot, but somehow this has no effect; camera stays at the previous starting plot.
Rationale	I don't really have an opinion on whether the DoM screen should appear after regenerating, but, somehow, DoM allows the camera to move (though the line that wants to center it on the starting plot still seems to have no effect).
See also	[704]: Other changes to the Dawn of Man screen.

004k	Removed Sea Patrol mission
Rationale	No one seems to use it; leaner interface is better.
Tbd.	Would prefer to leave the mission available via its keyboard shortcut. That's not so easy to implement. (Shortcuts are handled in `handleAction`, which checks, ultimately, `canDoMission`, which is also responsible for the displayed mission buttons.)

004l	Fortify-Heal works like Sentry-Heal outside cities

When a unit is fortified "until healed" outside a city, that unit will ask for orders when a hostile	Units that are fortified until healed only ask for

unit approaches. Forts behave like cities in this context, i.e. units healing in Forts don't wake up until fully healed.	orders once they're healed.

Rationale	BULL has a separate Sentry-Heal mission that is missing from K-Mod. My change to Fortify-Heal should result in the desired behavior in most cases. Units already have so many rarely used buttons; don't want to add another.
Tbd.	The help text should say "Sentry until Healed" when not in a city. I've written the help text (`Civ4GameText_advc.xml`), but showing it dynamically based on whether a unit is in a city isn't straightforward. Will have to implement a separate Sentry-Heal mission, and disable Fortify-Heal outside of cities (and disable Sentry-Heal inside cities). And make sure that it works in networked multiplayer; the current implementation should be fine, but new action buttons can introduce OOS bugs.
004m	Increased initial camera distance, decreased field of view and enabled resource bubbles by default.
Rationale	I always zoom out a bit at game start, and I recall reading somewhere that customer research (on Civ 4?) had shown that most players play from rather far away.
	Field of view: The lower the value, the smaller the field of view, i.e. fewer tiles are shown on the main interface and the city screen. If fewer tiles are shown, one has to zoom out farther to get an overview. This, in turn, means that the camera angle becomes more top-down, which is what I want. At the current value (35), I'm seeing just the city radius on the city screen, which is fine, but this depends on the screen resolution; mine is 1280x1024. There's code in `CvMainInterface.py` that adjusts the field-of-view value set in XML to the screen resolution, but I'm not sure how well that works; players may have to adjust the field of view manually; see below. The initial camera distance may then also have to be adjusted.
	Due to the smaller field of view, I had to make changes in `Civ4DetailManager.xml` to keep the camera distance at which textures become blurred the same as in BtS.
Config	Set in `GlobalDefines_advc`. Field of view can also be changed from within the game by enabling the field-of-view slider from the Map tab of the BUG menu. If "Remember Field of View" is checked, the value on the slider is stored in `My Games\Beyond the Sword\AdvCiv\Settings\BUG Main Interface.ini`, and the value set in `GlobalDefines_advc` is ignored. "Field of View" can then be unchecked again in order to hide the slider.
Tbd.	Would be better to (re-)store the status of resource bubbles through one of BUG's ini files. The SDK doesn't even say whether the layer is enabled, but I've worked around this (function `CvGame::isResourceLayer`) for change [003d](003d).
See als	[002h](002h) disables the passing clouds.
004n	Arrow button on city screen shows all local units

One normal click on the right-arrow button on the city screen shows icons for all local units.	One full row of unit icons is shown when opening the city screen. If there are more units in the city tile than fit in one row, each click on the right arrow next to the unit icons shows one additional unit. If Ctrl is held when clicking, 10 more units are shown.

Rationale	At least at 1280x1024 resolution – and I think most players have that much –, even 100 units don't really obstruct the city screen. Showing them one by one is needlessly slow and complicated.
004o	No start-revolution button on the new-civic popup

The change-civic popup only has the buttons "No, the old ways are best" and "Let's see the big picture". Exception: When there is only one civic that the player can change to, the start-revolution button is shown in addition. This usually happens when the player discovers Bronze Working.	"Let's get this revolution started" directly starts a revolution.
Rationale	Players sometimes forget other civic changes that could be made along with the one suggested by the game (especially if more than one civic becomes available at a time). This is frustrating and happens easily.
004p	No commerce breakdown in city screen if slider at 0
When showing help text for any of the four commerce types on the city screen, a breakdown of raw commerce is shown only when the slider position is above 0.	Raw commerce is shown even when the slider is 0. E.g. "Culture: 1000 ==== Base commerce: 50 +50% for Capital ------- 0% of 75 = 0"
Rationale	Makes the culture-bar help text harder to read, and could be confusing for new or returning players since the culture slider isn't even available at the start of a game.
Don't show the player's total culture output on the main interface.	Total culture output (sum of the culture rates in all cities) shown next to the culture slider.
Rationale	Not an important statistic; not worth being constantly on display. Even a bit confusing as total culture doesn't have any effect of its own.
See also	120c hides the espionage slider when it's at 0
004q	Sum of the relations modifiers shown along with diplo breakdown
See also	This would make less sense if some modifiers were hidden; but sha reveals them all.
e.g. Pleased **(+7)** towards Gandhi +1: "Years of peace ...	Players have to sum up the modifiers by themselves to find out the total relations value: Pleased towards Gandhi +1: "Years of peace ...
004r	Report resources discovered on unclaimed tiles
When a tech reveals a resource, sources in unowned and Barbarian territory are reported as well, and there's a special message when no source was discovered or only on tiles owned by rival teams. Resources on the territory of the player's vassals are also reported.	Only resources on the player's current territory are reported.
Rationale	All sources could be interesting to the player, including those owned by other teams, but mustn't flood the screen with messages. The warning about no source probably matters most for Animal Husbandry; easy to forget to check whether Horses have been revealed anywhere.
004s	Economy ("GNP") curve doesn't count culture and espionage; yield curves show moving average
AdvCiv	*K-Mod*

AdvCiv	BtS
The Economy graph on the Info screen is named "GNP (Gold+Research)" and shows the net sum of the gold generated by all cities plus the sum of the research generated by all cities. This sum doesn't include any costs (e.g. city maintenance or civic upkeep). It does include (no change) all gold and research modifiers (e.g. Bank, Library) and commerce from trade routes, buildings (Shrine) and specialists.	Called "GNP (Gold)" and shows the sum of all commerce produced by cities, including culture and espionage. (So far, as in BtS.) Gold is reduced by the sum of all gold costs, including inflation. Research is increased based on modifiers that apply to the currently researched tech: from tech diffusion and from knowing multiple prerequisite techs.
All the yield curves show moving averages based on three samples.	All curves show the game state at a given turn, not an average.
Economy and Industry ("goods produced") curves show a (very short) straight line for revolution turns.	When a revolution turn is sampled for one of the curves, a sharp, brief decline is shown.

Rationale	Culture and Espionage have their own curves. Both can reach far higher rates than research and gold normally do; e.g. a settled Great Spy produces 12 espionage per turn, a settled Great Scientist only 6 research. This makes it hard to tell from the Economy curve if a civ has a strong economy or if it's merely focusing on culture or espionage. A single curve for gold and research is OK; they're on the same scale.
	By including costs, the curve would essentially become a research curve, which is probably more useful than some commerce curve, but then it would seem like a "Gold" curve is missing. Excluding costs is also consistent with the Agriculture curve ("crop yield"), which doesn't include food consumption.
	As for research modifiers: Any modifiers that apply only to the currently researched tech (which can change any turn) are misleading. (That said, perhaps tech diffusion should be included; if they're behind on the current tech, they may well be behind on the next one ...)
	Moving average: The Economy and Industry curve fluctuate a lot in BtS, to the point of being hard to read, and removing culture and espionage (which rarely fluctuate) from the Economy curve makes it worse. The fluctuation is caused by AI juggling of citizens. Apart from usability, the average is also supposed to obscure the changes from one turn to the next a bit. I can't make much sense of them, but it might be possible to derive some specific information, e.g. about AI war planning or wonder building, that the player isn't supposed to have. The power curve has that issue too; however, it might be confusing if the enemy power curve doesn't immediately drop after defeating an enemy stack.
	Revolution turns: The negative spikes are confusing because revolution turns aren't always sampled when drawing the curves.
Tbd.	"GNP" is a bad name because "Goods produced" would have to be included in a GNP. Showing yield icons instead of the words "production", "culture" etc. would be nice, but it seems that the Python drop-down menus don't support icons in their labels.
See also	038 uses the GNP curve to determine which civs are "wealthy". 132 uses the GNP curve to predict the cost of anarchy. UWAI uses the GNP curve for converting war utility into trade value and vice versa, and the production curve for estimating military build-up.

004t	Cick-to-exit-city-screen disabled
AdvCiv	BtS
The city screen can't be (accidentally or	The city screen can always be exited through

deliberately) exited through a left-click on a non-workable tile. All other methods for exiting the city screen work as before.	middle-click, left-click on the mini-map, Esc, Enter, Space, by selecting a garrisoned unit or by accessing an Advisor screen through a function key. Left-click on a non-workable tile also exits the screen; since the BtS expansion, there is an XML switch to disable this.
The flashing text "Press <Esc> to return" is no longer shown on the city screen.	
Rationale	Happens too easily by accident. Especially annoying when the city has just been given production orders because, then, the next popup will appear before the player gets a chance to re-enter the proper city screen.
	Apparently, the original developers wanted the game to be playable without a keyboard and with just one or two mouse buttons, and I agree with that – fortunately, one can still exit the city screen by clicking on the mini-map. Not very intuitive, but neither is clicking on an unworkable tile.
Config	`GlobalDefines_advc.xml`

004u	More info in message about Great General (GG) death	
AdvCiv		*BtS*
The message about the death of a GG states the owner of the GG and the owner of the unit that killed the GG, and indicates the location of the battle between the two on the map (if it is revealed).		The player only learns the name of the GG. Can only search the Event Log for the birth message (if it hasn't expired) to find out the GG's owner.
Show the message only to players who have met the owner of the Great General.		Shown to all players.
Rationale	Debatable if the location should be indicated; more flavorful this way.	
The regular message about a unit killed in an attack doesn't mentioned an attached Great Warlord by name, i.e. might just say "Your Cavalry has died attacking a Rifleman." Only the GG death message mentions the name of the Warlord.		Both messages mention the Warlord by name, and the regular message says e.g. "Your Heinz Guderian has died attacking a Rifleman."
Rationale	The BtS messages are more overtly redundant and not grammatically correct. The grammar is still incorrect in messages about a Warlord surviving combat. These messages are quite frequent, so I've tried putting the "Your %s1_UnitName" phrase into a separate key, but this would've caused problems with gender agreement in the Romance languages.	

004v	Changes to scoreboard text	
AdvCiv		*BtS*
The hint about Ctrl for trade table and Alt for DoW are merged into a single line.		Two lines of UI help, one above the line about worst enemy, the other below.
Rationale	Cleaner this way.	
See also	106d changes BUG settings concerning the scoreboard.	
In multiplayer, AI civs are no longer marked with "[AI]" on the scoreboard.		
Rationale	Square brackets are for highlighting the active player. And it should be clear enough from the leader names which ones are AI-controlled.	

See also	[155](#) color codes team membership on the scoreboard.

004w	Removal of unnecessary help text

AdvCiv	BtS
For buildings already completed, don't show requirements in help text, and don't show if it's a unique building, if it founds a corporation, if it starts a Golden Age, if it centers the map, if it's required for another building, if it can be built by a Great Person.	Help text for buildings in a city's building list shows e.g. that the Palace requires at least 4 cities and that the Trading Post is a unique building replacing Lighthouse.
Help text for wonders and projects only says how many instances are allowed if more than 1 instance is allowed, which is only the case for some spaceship parts.	Says e.g. "Wold Wonder: 1 Allowed" or "(National Wonder: 0 Left)".
The remaining slots for National Wonders are only shown in help text on the city production buttons, not on the list of completed buildings, and e.g. "2 Left" means that two more national wonders can be built in the selected city.	"2 Left" would mean that two more cities can build the given wonder. The number of remaining national wonders per city is only shown once it is maxed out.
Show "0 left" in red when a wonder is already in production in another city.	The reason why a building can't be cnstructed is normally shown in red, but not in this case.
Civiliopedia no longer shows whether a building appears for free when starting in a later era.	
Yield bonuses of resources not shown in city and trade screen.	Always shown, though K-Mod at least makes clear that the bonus applies "on plot" (and not to all connected cities).
Some abilities that require a tech are not shown in help text when the player's era is more than 1 behind the tech era.	E.g. Work Boat: "Can Create Oil Rig" shown in the Ancient era.
Active dual deals (peace treaty, OB, DP) shown as e.g. "Open Borders with Alexander".	"Open Borders to Alexander for Open Borders"
Active peace treaty shown as "Peace Treaty (x turns)", where x is the number of turns until the deal can be canceled.	"Peace Treaty (10 turns)", i.e. shows the initial duration.

Rationale	This text is at best distracting, at worst misleading.
	The number of remaining national wonders per city is especially helpful for One-City Challenge.
Tbd.	The "What are the current deals we have" list shouldn't say "We would have nothing to gain" about ongoing resource trades. (I guess `CvDLLWidgetData::parseTradeItem` will have to check whether the trade is already active.)
See also	[004a](#) removes "can be researched by a" from technologies. [002b](#) (larger fonts) makes it a bit more urgent to reduce the amount of help text. [034](#) shows the turns-to-cancel of a peacy treaty under "What are the current deals we have". [047](#) revises help text for resource tiles.
Help text for obsolete buildings in the building list of a city says that it's obsolete.	No indication in the building list whether a building is obsolete.
Rationale	While I was at it.

004x	Kill redundant minimized popups; other changes to civics/religion poups
AdvCiv	*BtS*
When a choose-tech popup is launched or the player chooses a tech, all pending choose-tech popups are killed. When a change-civics popup is launched or civics are changed, all pending change-civics popups are killed. When a change-religion popup is launched or the player converts to a religion, all pending change-religion popups are killed. When anarchy breaks out, all choose-production popups are killed. They reappear when order is restored.	When research finishes on a tech and no tech is queued for research, a choose-tech popup is launched and appears minimzed at the start of the next turn (if playing with the "minimize popups" option; otherwise there isn't a problem). For each additional tech that the player receives through e.g. tech trade before choosing his/her next tech, another minimized popup is launched. All but the latest popup will show outdated research options (not taking into account all the additional techs discovered). Once the next tech is chosen, any remaining popups disappear once maximized. Similarly, multiple change-civics and change-religion popups can appear and don't disappear when the player changes civis/ religion through an advisor screen. I don't think multiple choose-production popups for the same city can appear, but the single popup fails to disappear when the player chooses production through the city screen.
Rationale	I'd actually prefer to allow multiple change-civics and change-religion popups, but it's difficult to do this consistently as there appears to be a mechanism in the EXE for preventing multiple change-civics popups, it just doesn't always work. E.g. after discovering Feudalism, BtS shows only one popup for Serfom and none for Vassalage (intended behavior I think, but I'd like it better to also have a popup for Vassalage), but when trading for, say, Code of Laws while the change-to-Serfdom popup is waiting, another change-civics popup will appear for Caste System (OK, but inconsistent with the missing Vassalage popup).
When the Pyramids or Shwedagon Paya is completed, a change-civics popup is shown unless the player already had access to all Government/ Religion civics. When a new civic becomes available (through a technology or a wonder) at a time when no revolution is possible, then the popup is delayed until the player can change civics again.	Buildings that unlock an entire column of civics don't trigger a change-civics popup.
Rationale	I've forgotten about switching civics after completing the Pyramids one time too many.
Tbd.	Should also delay change-religion popups. Could then, as part of an overhaul of the leader traits, restrict the fiddly ability of the Spiritual trait so that a free revolution is allowed only on a turn on which a change-civics or change-religion popup occurs (and perhaps once per era in addition).

004y	Changes to Civilopedia formatting; Sevopedia	
Civilopedia lists (when clicking on a top-level category like "Units" or "Wonders")		
AdvCiv		*BtS*
Show production costs of units in help text. When Civilopedia (or Sevopedia) is accessed from the main menu, show number of required buildings as e.g. "Requires University: 4-6". Also show other numbers that depend on the map size as a range.		Only shown inside the unit articles. The number from `Civ4BuildingInfos.xml` is shown, which corresponds to Duel map size. E.g. "Requires University (4 Total)".
See also	140: Changes to map size adjustment multipliers. 008: Changes to Civilopedia content	
AdvCiv		*K-Mod*
Sevopedia (with alphabetical sorting) enabled by default. When entering Civilopedia from the main menu without having started or loaded a game first, Sevopedia is shown regardless of the setting in the BUG options menu. Sevopedia then remains enabled until Civ 4 is restarted. Sevopedia doesn't list e.g. Ruins under "Improvements"; only improvements that civs can actually build.		Disabled by default. If Sevopedia is enabled from the BUG options menu, the BtS Civilopedia is still shown when entering Civilopedia diectly from the main menu. The Sevopedia setting in the BUG options is then permanently ignored: Sevopedia remains disabled even after restarting Civ 4; only toggling the checkmark in the BUG options menu twice brings it back.
Credits	Copied this bugfix by EmperorFool. I also had to copy his makeOptionId function. (The bugfix was later reverted, perhaps because it doesn't fully solve the problem.)	
See also	More or less fixes this open K-Mod issue.	
Tbd.	Would be nice to use the `INTERFACE_GENERAL_CIVILOPEDIA_ICON` instead of the commerce icon for the Hints and Concepts sections on the index. That would have to happen in `SevoPediaIndex.py` under `type == "Concept"`, but can I simply use `addDDSGFC` there?	
Put a gray panel behind the list of hints; same style as in the BtS Civilopedia.		
Rationale	The white text was too hard to read on the beige background.	
The box with the strategy help and historical background has the title "Background" and the historical background section has the heading "History".		The box has the title "History" and the historical background section has the heading "Background".
Rationale	Strategy advice doesn't fit under "History".	
Config	Through `Civ4GameText_advc.xml`	

004z	Changes to layers	
AdvCiv		*BtS*
The Resource layer always shows all resources; no option in Globe view for filtering the shown resources.		In Globe view, all resources are shown by default, and a selection box opens for showing only happiness, only health or only strategic

The Unit layer shows all units by default regardless of Globe view.	resources.	
	The unit layer shows "Enemies in Territory" by default. In Globe view "All Units" is the default, and several other options can be selected. It appears that the "Enemies in Territory" option was added by the BtS expansion.	
Config	Customizable through switches in `GlobalDefines_advc.xml`. The default option for the Unit layer can only be changed through the DLL (a hack was required).	
Rationale	The Resource options seem almost useless to me. Could make it easier to check which rivals have access to a particular resource, but I've never once used it for that. I'm less sure about the Unit options. Even when one is only interested in e.g. enemy units, showing allied units (in a different color) along with enemies doesn't seem like much of a distraction; after all, they can't occupy the same tiles. That said, showing only "Domestic" units is useful for locating Spies and Workers, though I think few players ever use this. In any case, "Enemies in Territory" isn't a good default option in Standard view; normally there are none. Makes it seem like the Unit layer is broken (help text doesn't say which units are shown).	
Tbd.	It would be nice if the Unit layer could somehow communicate stack sizes more clearly and not just in Globe view.	
When a layer without options is selected, the scoreboard is shown in Globe view.	The scoreboard is never shown in Globe view.	
Config	`SHOW_SCORE_IN_GLOBE_VIEW` in `GlobalDefines_advc.xml`	
Rationale	Should be possible to access to the scoreboard in Globe view, e.g. for following all-AI games from a high viewpoint. When there are no options to display, the space might as well be used for the scoreboard.	
Tbd.	Would be nice to have a button that toggles the scoreboard in Globe view. Currently, one has to go back to Standard view in order to disable the scoreboard. Above the giant flag button, there's still room for plenty of layer buttons. Doesn't seem trivial to implement though.	
The Resource layer also highlights goody huts when the "All Resources" option is selected unless the unit action recommendations option (UAR) is enabled. UAR cause huts to be highlighted when any nearby combat unit is selected.	Highlights only resources. Tribal Villages aren't highlighted by any layer. If UAR is enabled, Tribal Villages are highlighted with a blue circle when a nearby Recon unit is selected.	
See also	315 increases the size of the goody hut 3D model, but they're still a bit hard to see on Forest tiles. Don't want a UAR circle *and* an indicator bubble, but the indicator alone isn't good enough when it only works on Recon units. Therefore I've removed the Recon restriction.	
Rationale	Normal map scripts don't place a hut and a resource in the same tile, so the Resource layer seems like a good place for highlighting huts.	
Config	`SHOW_GOODY_HUTS_ON_RESOURCE_LAYER` in `GlobalDefines_advc.xml`.	
Tbd.	Even when UAR are disabled, huts can be highlighted with a blue circle at the very beginning of a game. One way to prevent this could be to make the Settler the selected unit at game start (not the Warrior/ Scout).	
When in Globe view, layer icons ("indicators", "bubbles") are shown at a smaller diameter than in Standard (non-Globe) view.	Resource icons are the same size in Globe view as in Standard view. It might be that their size relative to the size of a tile increases with the	

		screen resolution; one CFC user describes the icons as "ridiculously big at 1920x1200". ([link](#))
Rationale	Unfortunately, there appears to be [no way](#) to shrink the indicators in Standard view. Shrinking them in Globe view is better than nothing.	

The Trade layer colors all revealed tiles according to the trade network grouping except some very small groups like water tiles enclosed by shelf ice. Cities that are actively visible to the player (i.e. not fogged) and not connected to their owner's capital are marked in black.	The Trade layer colors only tiles owned by the (human) player's team. No special marker for disconnected cities.

Rationale	I think this layer is used (if ever) for getting a better understanding of the trade group rules. Showing trade along unowned coasts (with Sailing) should be an improvement. It would be nice if the layer could also show the trade networks of rivals – in BtS, the coloring is entirely based on the player's civ. The problem with showing rival networks is that it can give away information about unrevealed coastlines and routes. Therefore, I'm only providing info about currently visible cities. The black mark should be helpful for verifying that an enemy city has been cut off from the capital, e.g. through a naval blockade.
See also	[124](#) allows only revealed routes to carry trade. Without this, the Trade layer coloring of tiles owned by other civs would give away routes on fogged tiles.
Config	`GlobalDefines_advc.xml`

The Unit layer option for showing non-military units is called "Civilians". The indicator bubbles show a non-military unit. If multiple non-military units are present, the shown unit is selected based on a priority list (from highest to lowest): Great Person, Settler, Spy, Missionary/Executive, Worker/ Work Boat.	Called "Domestics". Some commented-out code suggests that, in some earlier version (Warlords?), only units within the active player's borders were shown, but BtS highlights all tiles with visible non-military units. The plot indicator on a highlighted tile shows the tile's top defender. That's a military unit when the tiles contains both military and non-military units.

Rationale	The name "Domestics" doesn't fit anymore in BtS, and it shouldn't show bubbles with military units – it's counterintuitive and makes it difficult to locate Spies (which are usually in cities together with military units).

AdvCiv	*K-Mod*
The culture layer shows the tile owner's color even if that civ has less than 20% tile culture, e.g. right after conquering a faraway city.	Only the colors of civs with at least 20% tile culture are shown.

Rationale	Since borders aren't shown in Globe view (and can't be shown through the SDK), the Culture layer is the only way to highlight territories in Globe view. Too easy to overlook a recently conquered area when it is shown entirely in other civs' colors.

005	Minor flavor changes
"Sumeria" changed to "Sumer"	
Rationale	Seems to be much more common (also in German and Italian). Wiktionary lists "Sumeria" only as "(archaic, poetic) Sumer." And brevity is always good.
005a	Leader personality tweaks

AdvCiv	BtS
`MaxWarMinAdjacentLandPercent=2` for Bismarck. While he eventually gave up his reluctance to off-shore colonies, he was never keen on distant parts of Europe (let alone Asia): "The Balkans are not worth the healthy bones of a single Pomeranian grenadier." The Realism Invictus mod even sets it to 4.	Was 0. It's a preference for long-distance land wars, ranging between 0 and 4. 0 means Bismarck treats neighboring civs no different from other civs on the same continent when it comes to war planning.
Also lowered his attitude threshold for defensive pacts to Cautious (realpolitik, Triple Alliance), and increased his weight for diplomatic victory and lowered the one for domination victory. Conversely, gave Brennus higher weight for domination and lowered weight for diplo.	Threshold is at Pleased, like most other leaders. Victory condition weights have been added by BBAI. I don't think they actually have a big impact on the game.
While I was at it (further minor changes): Shifted Catherine's weights from conquest toward domination and science. Added a bit of science weight to Ramesses, and reduced his conquest weight. Increased Saladin's weight for diplomacy a bit at the expense of conquest and space.	
`MaxWarDistantPowerRatio=70` for Napoleon. Napoleonic France fought few off-shore wars and even ceded Louisiana to the US.	Was 100. A preference for naval war. Napoleon is tied for the highest value, while his MaxWarNearbyPowerRatio (land wars) is only moderate.
`MaxWarMinAdjacentLandPercent=2` for Charlemagne and Cyrus. Charlemagne extended his borders gradually in all directions; Cyrus conquered several empires that weren't exactly at his doorstep.	Was 1 and 3 respectively.
`MaxWarRand=150` for Willem, i.e. now a bit less willing to start "total" wars. In part, because wars of conquest seem out of character for the small Netherlands; in part, because he's doing a bit too well in AdvCiv games in my experience (and more so than other Financial leaders).	Was 100.
Also shifted his victory weight a bit from Conquest to Culture and made him a little less interested in dogpile wars. And increased `NoWarAttitude` when Pleased to 90.	Was 80, tied for the lowest value with Alexander, Louis, Mao, Montezuma, Qin, Victoria. 90 is the same as the other 19 leaders who attack when Pleased
Increased Roosevelt's `NoWarAttitudeProb` at Pleased to 100 and at Cautious to 70, but increased his `Build-UnitProb` to 25. Decreased `NoWarAttitudeProb` for Brennus at Cautious to 50 and for Darius at Pleased to 90.	Was 90 at Pleased, 50 at Cautious, 20 BuildUnitProb. Was 70 (Brennus, Cautious) and 100 (Darius, Pleased).
Suryvarman's favorite religion is Hinduism and his primary flavor is Religion. He was a Hindu and built large temples. *Tbd.*: His favorite civic should be Caste System.	Buddhism. Some later Khmer kings were Buddhists. Primary Gold, secondary Culture. Gandhi the only Hindu.
Overhauled Unit AI weight modifiers and reduced their impact to at most +50% per Unit AI type. And two small accompanying changes to `CvPlayerAI::AI_unitValue`.	Each leader (except Hatshepsut) has 100% weight bonus for one particular Unit AI type, namely *Worker* (Pacal, Frederick, Gandhi), *Explorer* (Mansa Musa), *Attack* (Alexander, Brennus, Cyrus, Hannibal, Justinian, Montezuma, Peter), *Attack City* (Augustus, Chalemagne, Kublai Khan, Louis, Suleiman), *Counter* (Catherine, Julius, Napoleon, Roosevelt, Saladin, Wang Kon, Willem), *City Counter* (Darius, Huayna Capac, Lincoln, Tokugawa), *City Defense* (Churchill, Gilgamesh, Hammurabi, Sitting Bull, Zara Yaqob), *Reserve* (Asoka, Ramesses, Suryavarman, Washington), *Pillage* (Boudica, Genghis Khan, Mao, Shaka), Collateral (Bismarck, Mehmed, Qin), *Attack Sea* (Isabella, Pericles, Peter), *Reserve Sea* (Victoria), *Assault Sea* (Ragnar), *Explore Sea* (Elizabeth, Joao), *ICBM* (De Gaulle).
Also overhauled AI improvement weight modifiers and increased their impact to up to 30% per improvement type.	
See also: [131] makes minor changes to `AI_bestUnit`, and `AI_getImprovementValue` (both in `CvCityAI.cpp`), the functions that apply the weight modifiers.	31 leaders have 10% weight bonuses for one or two improvements, namely *Farm* (Bismarck, De Gaulle, Shaka), *Farm & Windmill* (Brennus, Boudica, Churchill, Elizabeth, Willem, Napoleon, Peter, Pericles, Cyrus, Hamurabi, Mehmed, Suleiman, Isabella, Joao, Pacal, Washington), *Cottage..Town* (Darius, Frederick, Huayna Capac, Ragnar, Victoria, Wang Kon), *Cottage..Town & Windmill* (Gandhi, Hannibal, Lincoln, Mansa Musa), *Workshop & Watermill*

	(Mao, Stalin).
Rationale	Roosevelt change: 90/50 NoWarAttitudeProb is the same as the Mongol leaders or Napoleon. Some peaceful leaders like Mansa Musa and Elizabeth also have it, but along with a low BuildUnitProb. This makes for leaders that are ruthless but powerless. This doesn't fit for Roosevelt at all. He's the leader most representative of the present-day America that doesn't invade partners, but has a big military. Changed Brennus and Darius to keep the overall balance. I don't know if that balance is exactly right, but if anything there are too many leaders that don't normally attack at Pleased.
	Unit AI weights: Doubling the weight seems extreme, and, for most leaders, a preference for a particular Unit AI type doesn't even make much sense. See `Civ4LeaderHeadInfos.xml` for the new weights and some handwave rationales. I've tried to avoid reinforcing the AI type(s) of the unique units because the AI already trains these more frequently than the unit stats would justify. About Worker weights, note that Workers are rarely trained through `AI_bestUnit`, so these have very little impact. This may also apply to other unusual bonuses (e.g. Spy).
	Improvement weights: I can't make much sense of the BtS weights. Looks like the AI didn't build enough Windmills and the developers decided to amend this through weights for all civs that have ever built windmills. This reason should be obsolete because of K-Mod changes in the DLL, and 10% is very little (it said 20% in XML, but the DLL halved that). I've given most leaders two 20% bonuses (no longer halved), and some a single bonus of 30%. The impact of these bonuses still seems very small, perhaps too small. The choice of the improvement is now vaguely based on the leaders' historical policies. I didn't take into account whether an improvement supports a leader's traits, favorite civics or playstyle; the DLL can handle that, and I don't want to make the playstyles (even) more predetermined.
Tbd.	Considering (low-key) changes to make certain leaders more distinct, improve historicity and to increase the number of warlike leaders. Under consideration for becoming more dangerous: Augustus, Brennus, Cyrus, Darius, Churchill, Frederick, Hammurabi, Justinian, Ramesses.
	Willem is still too aggressive. May need a thorough overhaul to become a small civ interested in culture and only slightly feisty.
Increased cap for the relations penalty from shared borders to 3 for Mao, Stalin and Darius, and decreased the cap to 3 for Qin and to 2 for Roosevelt.	2 for Mao, Stalin and Darius, 4 for Qin, 3 for Roosevelt. The cap is between 1 (only Willem has this value) and 4 (most of the typical warmongers).
Rationale	Modern China has plenty of border problems with pretty much all its neighbors. In Mao's time, border tensions with the Soviet Union escalated. Stalin was impossible to get along with for his western neighbors. I'd set both caps to 4, but that change would be a bit drastic. Both Persian kings invaded most of their neighbors, but let's keep Cyrus somewhat peaceable for now. To counter the increased caps, I've reduced Roosevelt (I don't see why he should be sensitive about border tiles) and Qin. The Qin dynasty secured its northern border with the Wall, but that doesn't quite justify a cap of 4. And it's strange to give Qin a higher cap than Mao.
005b	GP names assigned chronologically
AdvCiv	*BtS*
GP names are assigned in the order they're listed in `Civ4UnitInfo.xml`, i.e. roughly ordered by date of birth; no more Ancient Heisenberg. About every second (based on the number of civs in the game) name is skipped at random, so that GP	When a GP is born, the name is chosen uniformly at random from among the GP with matching type. Heisenberg is just as likely to be the first Great Scientist as Socrates.

names aren't the same in every game. There is an additional offset when starting in the Medieval era or later, i.e. early names are skipped. Corrected a few misspelled GP names, e.g. "Frank" Kafka. Replaced the two Great Generals that also appear as civ leaders with two new ones (Charlemagne→ Zizka; Boudica→ Hai Ba Trung).	
Names of playtesters replaced with actual spies from the 20th century.	The last 10 names for Great Spies are the real names or nicknames of BtS playtesters.

Credits	The new spy names are taken from a link that etiennefd compiled for the RFC: Dawn of Civilization mod.
See also	038 picks historians that somewhat match the type of civ ranking (e.g. Machiavelli for the "most powerful civilizations").

005c	City ruins bear the name of the former city
Help text shows the name of the most recent city in a tile with city ruins. Can't pillage city ruins, meaning they can only be removed by building an improvement on top.	The name of the former city isn't recorded anywhere. Can pillage city ruins (0 gold).
Rationale	For flavor. No pillaging because the name of a destroyed city could have strategic importance (albeit very little), and I wouldn't want players to destroy ruins in order to monopolize information (in multiplayer). Also, while Sennacherib boasted to have "removed the dust of Babylon for presents to be sent to the most distant peoples," the idea of pillaging ruins doesn't immediately make sense.
005d	Spurious/ misattributed tech quotes corrected or marked as "ascribed to ..." (only English and German)
Credits	CFC discussion about Civ6 tech quotes: link; offshoot about BtS: link CFC user Steb pointed out a few more in the Dawn of Civilization subforum: link
005e	German text: Changed the name of Galley from "Triere" to "Galeere" and the name of Trireme from "Trireme" to "Triere" because "Triere" and "Trireme" are synonyms. The names are also problematic in English: A trireme is a special kind of galley. The Warlords Civilopedia text says that the Galley unit is supposed to be a pentekonter. Apparently, they didn't want to give Galley that rather obscure name.
005f	City art style based on highest culture
The art style of a city's 3D models is that of the civ with the highest tile culture in the city.	The city owner's art style is used.
Rationale	The style of the buildings shouldn't immediately change upon conquest. (It kind of did in the New World, but in these cases much of the former population and its culture was also gone.) It's nice to have more traces of the past on the map. Disabled this change again after realizing that there is no way to make the same change for Cottages, Hamlets etc. Looks like the code in the EXE checks the owner of the improved tile, calls `CvPlayer::getArtStyleType` on the owner and uses the returned `ArtStyle`.
Config	XML switch in `GlobalDefines_advc`
Credits	Idea from Xyth's History Rewritten v1.25

005e	City name tweaks
Tbd.	All the city lists could use an overhaul: Higher priority for ancient capitals; avoid high priority for cities that were very close to each other; include more remote cities, maybe even some in client states that don't appear in the game. Mods like Realism Invictus and DoC could be of help.
Angkor Wat removed from the Khmer city list.	It's in position 4. Yasodharapura is in position 1.
Rationale	The temple was in Yasodharapura, also known as Angkor ("capital"), but not as Angkor Wat ("capital temple"). The temple district could be seen as its own city, but isn't commonly seen that way, and having a wonder and a city of the same name is awkward.
Tbd.	Chichen Itza: Should rename the wonder in this case (Temple of Kukulcan).

006	Disabled some assertions
Disabled assertions that are supposed to be rare and were still under investigation by earlier modders. In some cases, I've tried to resolve these myself, in others I've disabled them because they were interfering with my testing of more immediate issues.	

007	Changes to info shown in Debug mode; logging

- No confirmation needed for entering WorldBuilder if already in Debug mode.
- Red circles from BBAI only shown if Show-Yields view was enabled before entering Debug mode. (Can also toggle the circles by toggling Show-Yields and entering and leaving a city screen.)
- Military Advisor shows all foreign units.
- Privateer owner revealed.
- Alt+Ctrl on an owned tile shows the AI resource trade counter (which is divided by 50 to yield the "appreciate the years" relations bonus).
- Can no longer show Info, Victory, Espionage and Foreign Advisor screen for Barbarians. These screens aren't helpful and some had been leading to failed assertions.
- When Alt is held down on a tile, the tile's found values are recomputed ignoring overlap with planned city sites. This value is shown first, then the cached value (planned sites taken into account). (BtS shows the cached value first, then a recomputed value that normally equals the cached value and then then a value computed as if the map was empty, marked with an "s" for "starting location". AdvCiv does not compute this "s"-value.)
- Need to hold down Shift in order to see stack compare values along with combat odds.

See also	001d fixes some Debug mode bugs in various Advisor screens.

XML switch `PER_PLAYER_MESSAGE_CONTROL_LOG` for creating multiple `MPLog.txt` when testing multiplayer games on a single PC. These will have to be deleted manually.

Procedure: Set `LoggingEnabled = 1` and `RandLog = 1` in `CivilizationIV.ini`. Will probably also have to set `MessageLog = 1` and `SynchLog = 1`. Or rather, put these in a copy of `CivilizationIV.ini` (say, `MPDebug.ini`), set `Mod = Mods\AdvCiv` and `FullScreen = 0` in the copy and place it in the same folder as `Civ4BeyondSword.exe`; then create a shortcut targeting `"C:\Program Files (x86)\Sid Meier's Civilization 4\Beyond the Sword\ Civ4BeyondSword.exe" ini=advcMP.ini multiple`, where `multiple` is for allowing multiple

instances of the BtS process. Launch the game twice through that shortcut, create a Direct IP game named `chipotle` (see 135c) with one process and join it with the other by connecting to `127.0.0.1`.	
Rationale	Need an `MPLog.txt` from each player in order to debug OOS errors.
See also	001n fixes OOS errors 135c allows deug tools in multiplayer and refactors `CvGameTextMgr::setPlotHelp`.

007b	Cheat and debug shortcuts disabled unless in Debug mode	
AdvCiv		*K-Mod*
Unless in Debug mode, only the shortcuts Ctrl+D (menu for graphics debugging) and Ctrl+Z (enter Debug mode) are enabled.		Numerous shortcuts (list on GameSpot.com) that require only "chipotle" to be entered in `CivilizationIV.ini`; Debug mode isn't checked. Some of these are easy to trigger by accident, in particular Ctrl+Shift-+Left Click (Object Placer menu) and Plus key while hovering over a city (immediately finishes the city's production).
Rationale	If players actually want to use these shortcuts for cheating a little, then it could be annoying that Debug mode is required because Debug mode reveals the map, which can be a spoiler (and so does WorldBuilder). Still, for development purposes, I need to have Debug mode at hand, so I need the cheat mode ("chipotle"), but I don't want to run into other cheat commands, perhaps without even noticing.	
See also	Chapter on all-AI games: The spectator mode requires Debug mode, which in turn requires cheats to be enabled, so regular players may end up leaving cheats enabled permanently. Don't want these players to stumble onto cheat commands.	
Tbd.	Could add an override in GlobalDefines to allow cheat commands without Debug mode.	

008	Changes to Civilopedia content and hintsObject Placer (Ctrl+Shift+Left-Click) disabled unless in Debug mode. (BtS probably requires "chipotle" and singleplayer, though I haven't checked. Other developer shortcuts, e.g. Ctrl+Shift+W for wonder movies, do seem to require
I've updated some content that is no longer accurate. For some Game Concept pages, I left the content alone, and merely added a warning at the top that the info could be outdated.	
I've only changed the English and German version.	
Config	The modified bits are in a separate file called `CIV4GameText_advc.008.xml`.
Tbd.	Not all the strategy advice is up to date. Especially the tech and building advice is a lot of work to maintain, and much of it is redundant. The tech advice is only shown when Sid's Tips are enabled. Would be best to somehow disable these texts completely for anything past the Ancient era; the early-game texts actually do contain some advice.
See also	004y: Changes to Civilopedia formatting 033 shows the Privateer's plunder ability in Civilopedia 179 shows the production bonus of the Apostolic Palace in Civilopedia
008a	Hide abilities in Civilopedia when they don't apply
Rationale	To unclutter the Civilopedia
See also	004w unclutters the help texts for buildings on the city screen.

AdvCiv	BtS
Showing the "Can be built on X era and earlier starts" restriction only when X is smaller than the current game's start era, i.e. when the restriction applies to the current game. When the Civilopedia is accessed from the main menu, the restriction is shown when X is not equal to the wonder's tech era plus 1.	The restriction is shown for all buildings that have one regardless of how Civilopedia is accessed and regardless of the current game's start era. For most wonders, X equals the wonder's tech era plus 1.
Shwedagon Paya not available on Renaissance start and Statue of Zeus available on Classical start.	Both wonders were added in BtS. Shwed is available on Renaissance start and earlier and Zeus only on Ancient start.
Versailles not available on Industrial start.	Industrial start or earlier.

Rationale	Most wonders become unavailable when starting two eras after their tech era; spell out only these exceptional cases (e.g. most Ancient wonders are available when starting in the Classical era, but Stonehenge isn't). The changes to individual wonders reduce the number of exceptions that the Civilopedia needs to mention.
See also	[310](#) changes the start era restriction of the Great Wall
Tbd.	Civilopedia should list the free buildings from later-era start along with the descriptions of the later-era start settings. Perhaps prevent civs from constructing a wonder once they reach the threshold era – regardless of the game's start era. This could make wonders scarcer in games with few civs.

Show required victory condition ("such-and-such victory must be enabled") only when accessing Civilopedia from the main menu or when the victory condition is disabled in the current game.

008b	(unassigned)
008c	Updated some of the hints that are shown while loading savegames (only English and German)
008d	New hints about AdvCiv changes and a few K-Mod changes that weren't previously covered. Gave all hints about modded content a higher probability of being shown than the hints from Vanilla and BtS (Warlords didn't add any). Tried to mimic the tone of the original hints. Only in English and German.
Config	Increased the probability by duplicating entries in `CIV4Hints.xml`. Separate file for the new hints: `CIV4GameText_advc.008d.xml`.
008e	Changes to the names of wonders and projects

No wonder or project name starts with "The" or any other article (translations).	Totally inconsistent; e.g. "Angkor Wat", but "The Taj Mahal".
Rationale	Makes it easier to find wonders in Civilopedia and on the Wonders tab. Just "Pyramids" is a little strange, but most of the names work fine without an article. Could make it "Great Pyramids" (joining Great Lighthouse, Great Wall and Great Library), but I guess "Pyramids" is OK.
Config	Separate file `CIV4GameText_advc.008e.xml`. Further changes to wonder names will have to be made there. Can delete the file to undo all name changes.

009	Setup of configuration files: BUG settings, GlobalDefines, BUG and BBAI help files

AdvCiv	K-Mod
Included the BUG help files in three languages (no French and Spanish translation seem to exist).	No BUG help files included; clicking on "BUG Mod Help" in the BUG options menu results in an error message.
Rationale	The help files also include developer credits; gotta have those.
See also	[002b](#) also deals with file paths
Tbd.	Would like to rename the `Mod/AdvCiv/Settings` folder (doesn't actually contain important settings), but that's not so easy to do; see the `txt` file in that folder.
	Would be nice to use the [SourceForge URL](#) that `BugHelp.py` tries to access for Mac installations as a fallback when help files aren't found locally.

`CvTextScreens.cpp` removed from `CvGameCoreDLL`.	
Rationale	Apparently doesn't get compiled into the DLL, so it doesn't serve any purpose.
Credits	alberts2 (Caveman to Cosmos mod): [SourceForge revision](#)
009b	BUG initialization (only relevant for developers)

AdvCiv	BUG
Catch and discard exceptions that occur in BUG code when scripts are reloaded in response to a change in a script file while the game is running.	It seems that the BUG initialization code doesn't support scripts getting reloaded at runtime. Exceptions in the components Civ4lerts and Field-of-View slider can lead to an unresponsive UI and nonfunctional alerts until the game is restarted. So, unlike in unmodded BtS, Python changes at runtime aren't really possible in BUG-based mods.
Python changes at runtime still often require a restart because BUG initialization code tries to access functions (e.g. in `CvMainInterface.py`) that somehow aren't accessible yet. (*Tbd.*) Typical error trace:	

```
File BugConfig, line 124, in unknown_endtag
File BugConfig, line 348, in endChild
File BugConfig, line 351, in end
File BugConfig, line 332, in process
File BugConfig, line 579, in handle
File BugUtil, line 642, in getFunction
File BugUtil, line 631, in lookupFunction
ConfigError: Module 'CvMainInterface' must
define function 'onSwitchHotSeatPlayer'
```

Reverting [this](#) change should fix that, but there are also issues with `CvScreensInterface`:

```
ConfigError: Module 'CvScreensInterface'
must define function or class 'init'
ConfigError: Module 'CvScreensInterface'
must define function or class
'deleteTechSplash'
```

Rationale	I understand too little about the BUG mod's design to fix this properly.

010	Worker stealing disabled

AdvCiv	BtS
Settlers and Workers die when attacked; no captured Worker appears.	Settlers and Workers die and the attacker receives a captured Worker. The AI immediately

	disbands captured units.
Rationale	Unlike human players, the AI doesn't know how to look for exposed Workers and steal them; nor how to disband Workers that are about to be stolen; nor how to guard Workers on border tiles. If the AI could do these things, it would be largely impossible to steal Workers from the AI, and players would have to guard their Workers on border tiles, which would be very tedious. This might be why the original developers abandoned efforts to let the AI steal Workers (`CvUnitAI::AI_poach` is never called).
	So, Worker stealing as a game mechanism can only work against an unwitting AI. I do like the slave-raid flavor, but I don't think it's worth putting the AI at a considerable disadvantage. Early disruptive wars remain useful for destroying AI Workers (see Tbd.) and for keeping enemy tiles from being improved – I wouldn't want to make this tactic unviable.
	Flocks of Workers captured in conquered cities also contribute to Worker under-employment, which tends to slow player turns down.
	Worker stealing also undermines difficulty settings that give the AI a free Worker.
	The [DDiplo](#) changes (decay of AI memory) would make Worker stealing even more attractive than it is in BtS.
Config	Purely an XML change; can re-enable Worker stealing by restoring three values in `Civ4UnitInfos.xml` (look for `advc.010`).
Tbd.	Considering to have declarations of war take effect only at the end of a turn, meaning that the attacked side gets to move first. Then Worker stealing could be re-enabled. Variant: Bump Workers out of border tiles when a war is declare, and have all movement points spent when crossing a border (also of units in cargo) so that Workers become impossible to catch on the turn that a war is declared.
	Additionally or alternatively, Workers should have limited charges; this would be another way to nerf Worker stealing.
	If attacks on Workers remain possible, AI improvements would be desirable. See discussion on CFC [here](#).

011		Decay of invested Worker turns	
AdvCiv		*BtS*	
Once per round, when no progress has been made on any of a plot's unfinished Worker builds for the fifth turn in a row, the number of invested Worker turns is reduced by one for all unfinished builds in that plot.		No decay of invested Worker turns.	
Rationale		BtS allows for some very fiddly micro-optimization, especially pre-chopping, but also e.g. pre-building of Forts to protect strategic resources.	
		I don't want players to worry about leaving an improvement unfinished for some turns, e.g. until a Barbarian unit has been dealt with, but I want decay to be fast enough to make pre-chopping an irrelevant tactic. This balance is a bit difficult to get right.	
Config		Can be adjusted or disabled through `DELAY_UNTIL_BUILD_DECAY` in `GlobalDefines_advc`	
Tbd.		Pre-build actions would still be nice to have, if only for any players who disable the decay mechanism. Ideally for any Worker build by holding down the Ctrl key.	

012	Forest/Jungle defense reduced

AdvCiv	BtS
Forest and Jungle provide no defense if the attacker owns the attacked tile, otherwise 25% defense. (Feature attack/defense bonuses from unit abilities or Woodsman promotion still apply regardless of tile ownership.)	50% regardless of ownership.
Rationale	Some players complain that removing Forests in the inner ring of a city is a no-brainer because the defense bonus for invading armies is too dangerous. I'm more bothered by the implausibly high defense bonus from Forest and Jungle, which leads to game-play problems too, such as Barbarians refusing to attack fortified units. Forested chokepoints are difficult to handle for the AI. It makes some sense that units can defend well in forests (forests offer material for palisades etc.), and it makes sense that the civ that knows its way around in a forest (i.e. the tile owner) has an advantage; I'm assuming that these two factors cancel out when units in a Forest are attacked by the tile owner.
Config	Tag `RivalDefense` added to `Civ4FeatureInfos.xml`. Can set that to 0 and `Defense` to 50 to restore BtS behavior.
Tbd.	The Woodsman promotions should provide a (net) attack bonus against Forest and Jungle. Currently, only Woodsman III does.

014	Capitulated vassals don't pursue victory strategies

AdvCiv	BtS
Capitulated vassals can't be elected AP or UN leader, and can't be on the ticket for diplo victory.	A vassal votes for its master unless the vassal itself stands to be elected; no restriction on that.
Rationale	When even a capitulated vassal has more votes than the master civ's biggest rival, then the game is decided, and the master civ should win a diplo victory with the votes of its minions. And of course a capitulated vassal shouldn't win.

AdvCiv	BBAI/BtS
Capitulated vassals don't pursue victory strategies, don't build team projects and don't build wonders of the world except Shrines.	Capitulated vassals pursue victory strategies and can actually win the game.
Rationale	Internet and Manhattan are things that the master may not want the vassal to build; SDI is covered by the master (change 143b); the other projects are for space victory. Capitulated vassal shouldn't build wonders that the master might want to build or that could hurt the master (UN, AP); it's simplest to block them all.
See also	130v about capitulated vassals voting along with their master and generally behaving like zombies. 112 about voluntary vassals breaking free when approaching victory. 143b scraps nukes upon capitulation.

015	Changes to Great People

Tbd.	Will probably allow Priest and Artist to hurry certain wonders; move culture bomb to Spy.
015a	Changes to tech flavor values
See also	[020](#)

AdvCiv	*BtS*
No production flavor for Constitution. I.e. can't be discovered by a Great Engineer.	3 production flavor, 4 gold, 2 culture, 2 growth. Thus a tech that Great Engineers can (and may have to) discover.

Rationale	Engineers inventing constitutions is too far a stretch.
Tbd.	Fascism is also dubious (6 production flavor).

016	Extra tile yields from random events not added to city tile yields

AdvCiv	*BtS*
On city center tiles, extra yields from random events are added to the natural tile yield before raising the yields to at least 2 food, 1 production, 1 commerce.	City tile yield is computed as the yield from terrain, hill, unimproved bonus and river, all assuming that features (incl. Flood Plains) are removed. The result is raised to at least 2 food, 1 production, 1 commerce. Finally, extra yields from random events and yield bonuses from Golden Age are added.

Rationale	Should be treated like all the other yield effects; counterintuitive in BtS.
Credit	Pointed out [here](#) on CFC by traius.
Tbd.	Considering to change the city tile yield formula so that bonuses are applied after the raise step.
See also	[004b](#) shows the city tile yield before founding

017	AI trains fewer units when its military is already very large and drafts less in general
See also	018: Reduced impact of Crush strategy

AdvCiv	*BtS*
The probability of training a unit in a city is reduced based on the military power of the strongest potential opponent.	The military power of other civs affects the number of trained units only indirectly through the "Area AI type"; generally keeps building units so long as the maintenance is affordable.
Rationale	Better to develop the economy more than to train excessive armies. AI stacks of doom can also get too disheartening if the human player is behind when Drafting and Rifling become available.
Decreased the base probability to train a military unit by 4 percentage points overall. Added an upper and lower bound for the city-specific train-unit probability based on the number of cities: The AI only gets to use very	The probability is effectively 6 higher than set (per AI leader) in XML because the experience from Barracks is doubled and added in.

high or low probabilities once it has about five cities.	

Rationale	The average probability to train a unit was about one in three, which seems a bit much in a situation where there is no war on the horizon.

AdvCiv	K-Mod
AI unlikely to build Barracks before training a Settler for founding a second city.	About three times more likely than in AdvCiv.

Tbd.	Want to give Barracks a tech requirement.

AdvCiv	K-Mod
Don't draft away more than a third of a city's population unless defenders are urgently needed. (K-Mod has the same condition, but doesn't apply it to Rifleman.) Don't draft at all when there is neither a war plan, nor a reason to reduce population.	Draft as many units as allowed except when there are angry citizens or upkeep gets too costly (that's a high ceiling). Stricter rules when drafting sth. other than Riflemen.
When it's not urgent, only draft with a per-turn probability equal to the normal `buildUnitProb`.	No randomness in drafting.
Reduced AI utility value for Nationhood civic when already paying high unit upkeep.	Utility is only reduced when `maxUnitSpending` is exceeded.

Rationale	The K-Mod behavior leads to huge AI stacks once/ if the AI hits Rifling and switches to Nationhood. If the player can stay out of harm's way through diplomacy, it becomes too easy to overtake the AI economically. One third of the population is still a lot.
	Drafting without planning war is generally a bad idea; can draft units pretty quickly once they're needed. Probably shouldn't adopt the Nationhood civic without war plans either. The change to civic evaluation may help with that. Don't want to make war plans a hard requirement for Nationhood though – that would give away the AI's intentions.
	The probability should make AI drafting less abrupt, and reduce it a bit overall.

Tbd.	`buildUnitProb` should be taken into account in a more meaningful way: currently mostly slows AI drafting down. However, need to change the drafting rules before putting effort into the AI; drafting is too efficient currently.

AdvCiv	K-Mod
The target number of warships to escort a naval assault is adjusted based on the number of coastal cities owned by the enemy and the game era. Potential bug fixed in BBAI code that may have lead to large AI fleets when only a "minimal attack force" had been intended.	Only the number of escorted transport ships matters, and whether they can defend themselves (Galleons).

Rationale	No need for an expensive escort if the enemy has very few ships. Can't be sure of that, but the number of coastal cities should be a pretty good predictor (and don't want to count enemy ships that the AI can't see).

Tbd.	Should check if the enemy can even train any dangerous ship; no need to protect (Industrial-era) Transports if the enemy ships are Frigates.
	Once that's implemented, should probably use `relativeNavyPower` if UWAI is enabled.

See also	905a buffs Trireme and stops the AI from using (and training) Caravels as escorts. Not sure if this has lead to fewer or more AI ships.

017b	Dynamic changes of unit AI type	
AdvCiv		*BtS*
Caravels (and Carracks) trained by the AI as attackers (`UNITAI_ATTACK_SEA`) can turn into explorers (`UNITAI_EXPLORE_SEA`) if there is nothing to attack and there are too few explorers. Lowered the priority of guarding seafood when in `UNITAI_RESERVE_SEA`. Relaxed conditions for changing from `UNITAI_SETTLER_SEA` to `UNITAI_ASSAULT_SEA`. Galleys and Work Boats can change from `UNITAI_EXPLORE_SEA` to any other sensible type when Caravels are available.		Land units can turn into (land) explorers, and there is a narrow rule that can turn a Galley into an explorer after transporting a Settler; but Caravels can only act as explorers if they've been trained for that purpose. Explorers can adopt various other roles if exploration isn't needed anymore. AI won't train Caravels for exploration if it already has enough exploring Galleys.
Rationale	Should lead to fewer Caravels; that's why I'm grouping this with change 017.	
Tbd.	There are probably other sensible AI type changes that the BtS code doesn't consider. A comment by the Vanilla developers also suggests this: "move some of this into a function? maybe useful elsewhere."	

018	Impact of Crush AI strategy reduced	
AdvCiv		*K-Mod*
The "Crush" strategy no longer causes the AI to train more units overall, and doesn't shift its yield focus to production. On the contrary, the AI trains slightly fewer units with Crush. The AI doesn't adopt the Crush strategy until it's clear that the enemy doesn't pose much of a threat.		Crush makes the AI prioritize production. It also (no change in AdvCiv) lets the AI mobilize some of its defensive units as invaders, and trains more city attackers instead of defenders. At least with Aggressive AI enabled, some AI leaders adopt Crush in any "total" war that isn't going badly. The Crush strategy has been introduced by BBAI.
Rationale	In K-Mod, Crush seems to be used in situations where the AI might be able to win a decisive victory by concentrating all its resources on the war. This leads the AI to go all-in more often than I'd like. The AI can easily end up training far more units than would be needed in these all-out wars, which sets it on a road toward a military victory. The AI goes for military victories too often in K-Mod. Now the AI should use Crush only to bring war to a quick conclusion when it's winning anyway.	
See also	115 and 104c also make the AI less willing to go for a military victory.	

019	Lower impact of Aggressive AI mode (AAI) in BBAI/K-Mod code	
AdvCiv		*K-Mod*

Only minor impact of AAI in some of the BBAI and K-Mod code.	Especially K-Mod behavior depends on AAI in many places.
Rationale	For experienced players, I think there is a happy medium between aggressive and non-aggressive AI, and really no need for two modes. Even for inexperienced players, it would be better to tie AI aggressiveness to the difficulty setting instead of a separate game option. (To be fair, BtS does that too: `iAIDeclareWarProb` is based on difficulty.) In the original Civ 4 code, the non-AAI behavior is very passive, especially on the low and medium difficulty settings; this has been a recurrent player complaint since the Civ 4 release. Therefore, I haven't reduced the impact of Aggressive AI in the original code.
See also	AAI can only be disabled through XML; see chapter on UWAI. 120b: No impact of AAI on malicious espionage.

020	Changes to AI flavor values
See also	015a deals with tech flavor changes that determine which techs can be discovered by Great People.

AdvCiv	*BtS/Warlords*
Military flavor added to buildings that reduce maintenance; reduced on buildings that increase city defense. Gold flavor no longer associated with government center (reduced distance maintenance) and reduced on Courthouse. Gold flavor of corporate HQ reduced. Culture flavor added to modern entertainment wonders (Hollywood, Rock'n'Roll, Broadway) and Growth flavor reduced. Culture flavor also on Temples and Cathedrals (in addition to Religion), and on some misc. wonders. Growth flavor added to some happiness buildings (Colosseum, Market, Broadcast Tower) and National Epic. Added Religion flavor to Apostolic Palace (how was that missing?). Plus some minor changes. I went through all buildings. Espionage flavor removed from West Point, Pentagon and Forbidden Palace. Instead, AI governors consider flavor when evaluating Great Person points.	Since Warlords, each AI leader has one or two flavor values, and prioritizes buildings (and technologies) that match those values. *Military* flavor is on buildings that increase city defense, grant free XP, increase unit production or reduce war weariness. *Gold* flavor for extra trade routes, increased gold rate or reduced maintenance. *Culture* for some of the buildings that generate culture (Monument, Stonehenge, Theater, National Epic, Hermitage, Sistine Chapel, Eiffel Tower). *Growth* on buildings that improve health or spur population growth, and on a few that increase happiness (Notre Dame, Globe Theater). *Espionage* flavor for buildings that produce espionage points or Great Spy points. Religion for religious buildings. *Production* for buildings with (generic) production bonuses.
Rationale	Military leaders don't usually want to get on the defensive and, therefore, shouldn't build Walls and Castles. I'm not removing the military flavor entirely because warlike leaders are also prone to counterattacks, and, (pre-)historically, militaristic cultures tended to build fortifications. Note that Protective leaders are still more inclined to build defensive buildings because of the production discount from the Protective trait; many of the Protective leaders have Military flavor. Reduced maintenance leads to a high science rate, which conflicts with buildings like Market that increase gold output. Gold flavor does give some incentives for growing wide (trade route bonuses), but I still think it's more important not to have the same flavor on Courthouse and Market. The next best choice seems Military; militaristic

	leaders tend to conquer wide empires.
	Corporations aren't there for generating gold. The HQs pair well with +gold buildings, but Gold-flavored leaders try to build Markets everywhere, not just in the HQ cities.
	The missing Culture flavor on Hollywood etc. seems like an oversight. While Cathedrals are more of a religious thing, they're so instrumental to Culture victory that they should also have Culture flavor.
	If Growth is supposed to support tall cities, it needs an even mix of health and happiness.
Tbd.	The Trade Mission ability of the Great Merchant also clashes with the plus-gold-rate buildings.
Apply the tech flavor values multiplicatively.	Additively; i.e. a flavor-based value between 0 and about 100 is added to the utility value of each tech. The utility value tends to increase with the economic output of a civ.
Reduced the impact of flavor on building evaluation, so that flavor typically makes about a 20-30% difference.	Additive in BtS, K-Mod replaced it with a multiplicative formula. Flavor can make up to a 100% difference, though 40-50% seems more typical. Since the building evaluation also affects the tech evaluation in K-Mod (not in BtS), building flavor indirectly affects tech evaluation too.
Rationale	The BtS formula means that the impact of flavor decreases with the economic output, so that a civ starts making more rational choices when it's doing well, and that flavor matters more when all eligible techs have a low utility value. None of this makes sense to me.
Tbd.	The flavor values in `Civ4TechInfos.xml` look loopy; need an overhaul. Doesn't take into account that the utility value counted for unlocked buildings includes the flavor values assigned in `Civ4BuildingInfos.xml`. Should perhaps treat units and civics in a similar way, i.e. assign flavor values through `Civ4UnitInfos.xml` (most would simply get sth. like 5 Military flavor) and `Civ4CivicInfos.xml` (no flavor tag yet) and count them only indirectly in the tech evaluation. This way, the flavor value would be reduced along with the unit value when a tech doesn't immediately unlock a unit, and the flavor values would not have to be changed when making changes to tech requirements.
	Should ignore first-to-discover abilities when assigning flavor values: already addressed through custom code.
	Revised flavor values will change GP "bulb" paths though; bad for players who have them memorized.

021	Adjusted map scripts with simulated tectonics; see also chapter [PerfectMongoose](#).
See also	Since these map scripts frequently produce mountain chains and large areas of uniform terrain, the improved AI handling of areas separated by Peaks ([030](#)) and the reduced probability of large resource lumps ([129](#)) are especially relevant.
	Also tend to generate oblong continents near the poles, and [027](#) improves the selection of starting areas in such cases.
021a	Tectonics

AdvCiv	BtS
Uses the latest version 3.16 (Nov 2008) of the Tectonics map script. *"[...] added more rivers. [...] Terra option now has a nice looking Arabia instead of some landbridges and islands."* source	Uses version 3.15.
All map scripts are allowed to place Jungle on Plains. The impact on most map scripts seems very minor; most tiles at the equator are Grassland anyway. A sample (non-Tectonics) Pangaea map had only 8 Plains Jungles and 40 Grassland Jungles. (Not sure if that means that there would have been 8 fewer Jungle tiles without my change.)	Jungle can only be placed on Grassland. Since Tectonics maps have lots of Plains near the equator, these maps end up with very little Jungle.

Credits	It's LDiCesare's map script. It was included in BtS patch 3.17, and he updated it once more after that.
Config	The Jungle-on-Plains change is done in XML (`Civ4FeatureInfos.xml`).

AdvCiv	Tectonics 3.16
Tectonics landmass type options "Earthlike" 80%, 70% and 60% water.	Only 70% and 60%
Reduced the number of rivers for all landmass types, and a bit more for Pangaea.	Was supposed to be reduced (perhaps to the level of v3.15) only for Pangaea, but due to an apparent bug affected (only) 60% water instead.

Rationale	Corresponding to High, Medium and Low sea level. My 80% option actually does the same as the 70% option in the original script, the new 70% corresponds to the old 60%, and the new 60% is a new setting. I've noticed that far less land is generated than the old percentages said. My percentages are still too high. Actually, the ratios vary a lot. The new 60% option sometimes does lead to 40% land, but other times just 23% ... 3.16 generally had more rivers than e.g. Fractal; I didn't like that. Not sure if Pangaea really needs special treatment. Seems to receive fewer rivers in any case (albeit longer ones than on maps with smaller continents).
Tbd.	Make the script produce reasonable land ratios reliably. Should be the same as Fractal; see the frequencies stated under 021b. I probably won't ever do this because the PerfectMongoose script obsoletes Tectonics in my mind.
Credits	4Dingo4 and LDiCesare have suggested formulas for the 50% setting here.
021b	PerfectMongoose (PM)
Config/ See also	It's all in the map script (Python): `PublicMaps\PerfectMongoose.py`. The version history (prior to my own changes) is also in there. Out-of-synch errors were reported about the predecessor PW2. That seems to have been fixed by AIAndy, but if not, setting `self.UsePythonRandom = False` should help. Screenshots and standalone download: CFC link (The version included with AdvCiv only works with AdvCiv.) In Oct 2018, cephalo published "PerfectWorld6" as a Lua script for Civ 6 (link), which "might be the best PerfectWorld yet." But I doubt that I could port anything from that to

	Civ 4.
Credits	See chapter [PerfectMongoose]
Tbd.	Could probably improve the performance substantially by moving some code into the DLL.

AdvCiv	*PM 3.2*
I've measured the relative frequencies of all terrain and feature types for Fractal maps of various sizes, and tried to get PM to somewhat match those frequencies. For reference, the Fractal frequencies at Low sea level are approximately 28.5% land, 7% forest, 2% jungle, 1% peak, 5% hill. 6% river, 3% desert, 3% tundra, 8% plains, 12% grassland. Only 20% land at Medium sea level, 15% at High. The frequencies I've ended up with are closer to 31% land ratio (Low), 25% (Medium), 19% (High). With Old World Starts, the script often tries to break a continent up, which results in lower land ratios. There are still some more hills than on Fractal, and more plains, less grassland and more rivers, but shorter ones. Same map sizes as Fractal.	The land ratio is really hard to predict unless the break-Pangaea option is disabled. Assuming a land ratio of 28.5%, forest typically covers about 10% of all tiles; 2% jungle, 3% peak, 9% hill, 5% river, 4% desert, 5% tundra, 7% plains and 7% grassland. A larger tile grid is used for all map sizes, leading to about 40% more tiles.

Rationale	One goal is to let players set the same number of civs that they use for most other maps. Although PM now produces more land than Fractal (higher land ratios), the number of decent city spots seems to be about the same, and that's what matters in the end. The main reasons why PM produces more marginal or unusable terrain seem to be the large stretches of plains, clusters of hills and terrain generally being less mixed. I wouldn't know how to change that, and I rather like it. For one, it gives the various regions of the map more character. Marginal terrain can also present a third choice between stopping to expand and waging war; and it's a historically plausible source of Barbarians. That's why I've kept a slightly higher ratio of plains and hills. I don't see realistic terrain proportions as an important objective. E.g. if there isn't quite as much desert as in reality, one can simply assume that a Desert tile represents a larger area than, say, a Grassland tile (i.e. not a scale model), or that some arid regions of the Earth are represented as Plains or Tundra in the game. The [LoR SDK ModMod] makes some changes to PerfectWorld2, but these are probably obsoleted by LunarMongoose's work. [Changes by Fuyu] in RevDCM are minor and obsoleted by my own changes. Likewise those by Antmanbrooks for [Realism Invictus].

Jungle can occur on plains, but is more common on grassland. Oases don't have to be surrounded by desert; a few adjacent non-desert tiles are OK. No cold deserts near the poles.	Jungle only on grassland. Jungle is less dense than on other maps, but extends a bit farther north and south. Oases only on tiles entirely surrounded by desert. Sometimes large deserts are placed right next to tundra.

Rationale	Jungle on plains makes jungles a bit less scattered. (PM places a mix of plains and grassland in the tropical latitudes.)

	Oases that are totally surrounded by desert are rarely useful.	
Reduced the amount of land near the poles.		Often generates an Antarctica-like continent that connects temperate continents.
Limit the scope of the map to 80° latitude.		Up to 90° latitude (same as most maps), but configurable in the script.
Rationale	Such a land bridge is unrealistic (armies can't traverse a polar desert), and wouldn't play well either: Diminishes the importance of ships, and long attack paths are difficult for the AI.	
	Limiting the scope seems like an elegant way to reduce the extent of uninhabitable areas (tundra and snow) without sacrificing realism. For reference, the Arctic Circle (on PM and in reality) is at about 66° latitude.	
The balancing ("normalization") of the tiles near starting plots is handled almost entirely by the DLL functions that most other map scripts use for normalization. I've kept the PM code that ensures at least 2 hills.		All the standard normalization functions are disabled and replaced with custom code that seems very reluctant to make any changes: No rivers or lakes are added, no bad terrain (tundra) converted, jungles and peaks only removed when they occur in large numbers.
Rationale	The PM normalization code can lead to awful starting locations. BtS might do a bit too much balancing (especially for a map that's supposed to look natural), but, fortunately, I've already made some changes (id 108) that make the balancing a bit less aggressive.	
`AI_foundValue` from the DLL (with many improvements by karadoc and some by myself; 031) is used for pre-selecting tiles on which civs might start.		A custom function "PotentialValue" is used.
Rationale	`AI_foundValue` has the same purpose as far as I can tell and is (now) much more sophisticated than `PotentialValue`.	
Tbd.	Should perhaps also replace `PotentialValue` in other places.	
Starts in/ near the polar zone and on small islands are ruled out.		Starts on small islands and near the poles (not rarely both) are possible
Place greater priority on mutual distance when choosing starting plots, especially when the map is crowded (a function of the number of players, world size, sea level and Old World Starts).		Not rare for civs to start just 5 tiles apart from each other.
Added some code that encourages one starting plot per continent to be placed inland.		Inland starts practically never occur; probably mostly because coastal starts lead to greater pairwise distances and because of the shapes of continents, low average river length and lack of food on inland tiles.
Rationale	It's nice that civs mostly start at the coasts because most of the early civilizations' capitals were situated at or near a coast. But of course inland starts should also occur.	
Tbd.	Inland starts are still too rare. The code for selecting starting locations in the DLL doesn't have this issue, but doesn't take land reachable via Galleys into account, and I think the PM code does.	
After PM has selected a starting plot for each civ, the standard algorithm (`CvGame`) may swap plots based on difficulty setting.		For the standard map scripts, `CvGame::assignStartingPlots` tries to assign starting locations based on difficulty. PM doesn't call `CvGame::assignStartingPlots` and doesn't

	take difficulty into account; locations are randomly assigned.
Rationale	Don't want the game to be easier on PM than on other maps.
See also	Requires [108b](#) (a DLL change).
Config	If the AdvCiv version of PM were included in another mod, this change would have no effect.

Resources are placed in the standard way (`CvMapGenerator`). Fur can only be placed on flat tiles, and only above a latitude of 35°. This applies to all map scripts.	Custom code for resource placement. Seems to be largely the same as in `CvMapGenerator`. I guess cephalo wanted to make some changes without changing files other than the map script. The BtS map generator places Fur on flat and hilly Tundra and Snow tiles at any latitude. Since PM uses Tundra and Snow (usually as hills, but not always) to represent high elevations, Fur can appear fairly close to the equator. Deer is restricted to latitudes above 30°.
Rationale	I want my own changes ([129](#)) in `CvMapGenerator` to apply. Also, for whatever reason, the PM code creates large clusters of resources. I've seen e.g. a 2x3 rectangle filled with Ivory on a Small map. Fur near the equator could represent savanna fauna, but, in BtS, that's clearly not the idea. 35° is still pretty far away from the poles, but, in combination with the no-hill restriction, it should be OK. Fur on hills doesn't make perfect sense to me anyway as the most widely known fur-bearing animals (beaver, ermine, mink) live near water, which tends to be more abundant in flatlands (mountain valleys too, I guess). Perhaps fresh water should be required?

Map options for land generator and climate system removed. Always use the defaults: PW3 Square Grid and PW3 Climate System.	Options "PW3 Generator (Square Grid - Accurate)", "PW3 Generator (Hex Grid - Interesting)" and "PW2 Generator" for landmass generation; and "PW3 Climate System" and "PW2 Climate System" for climate.
Rationale	I don't see much reason to use the old PW2 code, and it would've been a lot of work to adjust the land, feature and terrain ratios for PW2. As for the "accurate" versus "interesting" choice – how is a player supposed to decide this? I just went with "accurate" because that code was newer and it was the default setting.

"Break Pangaea" map option removed. Enabled if and only if the Old World Start option is set. The limit for the number of meteors is based on the map size and sea level; no more than 9 (Huge map, Low sea level). The average diameter of meteors is about 5 tiles. Inside that diameter, the elevation is decreased. The decrement is maximal in the center and becomes gradually smaller toward the edge of the crater. This way, there are usually(?) no Peaks on coastlines created by meteors.	If the Break Pangaea option is enabled (which it is by default), the script checks in the end if there is a single continent containing more than 70% of the land tiles; if so, circular groups of land tiles are removed (explained as meteor strikes) until all continents have at most 70% of the (remaining) land tiles. The impact sites are chosen (I think) based on the [betweenness centrality](#) metric. The number of meteors is limited to 15, the average diameter appears to be about 15 tiles. The larger the map, the smaller the diameter (this appears to be a bug). All tiles in the diameter have their elevation set to 0. Since Peaks are placed (in a later step) based on differences in elevation, coastlines created by meteors are (always?) covered by Peaks. Since

With Low sea level, its fairly common that meteors fail to break up the largest continent, resulting in a small New World (e.g. 20% of the total land) or just a few uninhabited islands. With Normal and High sea level, it seems that a New World is created pretty reliably.	the total number of Peaks to be placed is limited by a target ratio, few or no Peaks get placed inland. The meteors normally succeed in eliminating any 70%-sized continent, but may remove so much land that the map looks like a plucked goose and the Old World becomes very crowded.
Rationale	My changes make the meteors almost invisible. It's a nice metaphor for explaining how the algorithm works, but the meteor impacts shouldn't actually show up on the map because a real meteor strike doesn't significantly alter coastlines. Since PM is able to identify choke points, a few small meteors can suffice to break up a continent. It would be easy to show a message "failed to generate multiple continents; please regenerate the map," but I think some uncertainty about whether there's a (sizeable) New World doesn't hurt; players just need to be aware that it's not guaranteed.
Tbd.	Could further minimize the tiles affected by meteors by undoing meteors that fail to break up Pangaea. Not so hard to implement. E.g. first check if any single meteor can do the job, then try pairs etc.
See also	I've added a recommendation about the number of players to the label of the Old World Start option. This is consistent with change 137, which adds such recommendation labels for Low and High sea level.

022	Changes to AI paranoia
See also	107 also deals with the AI's defensive strategies 109 sets Economy Focus when no threatening civ is known 130u treats human civs as Cautious toward everyone
Tbd.	I've considered basing paranoia on enemy war utility (if UWAI is enabled), but, so far, the K-Mod code seems to work well enough alongside UWAI (if it never correctly anticipated UWAI attacks, that would be bad).

AdvCiv	K-Mod/ BBAI
The paranoia value of an AI civ is based on the attitude and personality of rival civs, not vice versa. Human rivals are assumed to be moderately bellicose with an adjustment based on the AI civ's attitude toward them. Made a similar change in the computation of `CityThreat` (non-immediate military threat toward a city); using a mix of defender and attacker attitude there. Decreased impact of rival victory strategy. Increased impact of geographical closeness; except when not on the same landmass. Some other, minor changes.	Paranoia is computed as a function of vicinity, power ratio, our attitude and personality, their victory strategies and whether we're their worst enemy. Paranoia determines if the BBAI strategies "Economy Focus" (low paranoia) or "Alert1" and "Alert2" (high paranoia) are adopted (neither if medium paranoia). Paranoia is greatly increased if a rival is at stage 3 of Domination or Conquest victory.
Rationale	A K-Mod comment in the CityThreat function says, "*For good strategy, this should probably be* their *attitude rather than ours. But perhaps for role-play it is better the way it is.*"

	For `CityThreat`, I think both arguments have merit, so I'm averaging the attitudes in this case. As for paranoia, producing additional defensive units against a benevolent rival makes little sense roleplay-wise, and can be quite damaging for the AI, therefore, only use the neighbor's attitude in that case.
See also	[107](#) changes the computation of closeness between civs.

Reduced paranoia if the threatening civ is so powerful that resistance is likely futile.	The more powerful they are, the more paranoid we get.
Rationale	"Things without all remedy should be without regard."

023	Occupation countdown based on revolt probability
AdvCiv	*BtS/ K-Mod*

AdvCiv	BtS/ K-Mod
The occupation timer (after conquest or a revolt) is decremented only with a per-turn probability equal to the tenth power of 1 minus the revolt probability.	The occupation timer is decreased by 1 each turn.
When a city is conquered, the occupation timer is set to the minimum of 3 and the population size.	Occupation after conquest last for 3 turns plus 50% of the population size, e.g. 13 turns in a size-20 city.
A revolt sets the timer to 2 plus the number of prior revolts.	Also 2 in BtS and in K-Mod 1.45 (but 3 in earlier K-Mod versions).
Damaged units have their culture garrison strength reduced proportionally to the damage.	Unlike combat strength, garrison strength is unaffected by damage.
The per-turn chance to decrease the occupation timer is shown on the main interface (city tile help text) and on the city screen (Nationality bar help text).	

Rationale	BtS occupation times get too long in Renaissance; one reason why it's difficult to catch up at that point. 10 turns is a very long time when the game may last just 100 more turns, and the city may still have to spend some 20 turns on essential buildings before it starts paying off.
	By basing the occupation duration on the revolt probability, I hope to reward players that conquer only one or a few cities at a time and can then afford to sit in them to make occupation end quickly. Generally, occupation durations are still going to increase as the game progresses – mature cities tend to have high revolt probabilities. Now, 3 turns is often just the time that units need for healing anyway, so this would hardly slow down conquests if it weren't for the reduced garrison strength of damaged units.
	I'm not showing a message when an occupation counter is decremented; could become too much when occupying several conquered cities.
Config	The conversion of revolt probability into the probability of decrementing occupation can be tweaked in `GlobalDefines_advc.xml`. Can also restore the BtS rules there (longer but deterministic occupation).
See also	101 reverts the K-Mod changes to revolt probability. 099c makes revolts more common by allowing them to happen outside of foreign culture range. 023 wouldn't really work without 099c because, in BtS, conquered cities often have 0% revolt chance. 210b displays an alert when occupation ends.

AdvCiv	BtS/ K-Mod
Revolts can't happen in occupied cities (conquest or prior revolt) if the city owner is at war with the cultural owner. If they're not at war, a revolt in occupation is possible, but mitigated by the following special rules: • The revolt test is only executed if the decrement-timer test has failed. • Revolt probability is halved while in occupation • A revolt during occupation does not increase the occupation timer; it does increases the	No revolts during occupation.

revolt counter and can flip the city. Being at war does not increase culture garrison strength.	Culture garrison strength doubled while at war.
Rationale	If revolts were impossible during occupation, a player could withdraw all units to deliberately prolong occupation, which makes the city worthless for the current owner, but also for the cultural owner (can't flip). Regular revolts during occupation would be too punishing though. The halved probability only makes up for the loss of garrison strength when units are damaged as part of a revolt. I don't like having complicated special rules for revolt during occupation, but I don't see a better solution. Or perhaps a city should flip deterministically after spending 10 consecutive turns under occupation (unless at war)? That would be a bit simpler.
An occupied city heals units only as fast as a friendly non-city tile (15 HP per turn).	An occupied city heals as fast as an unoccupied one (20 HP per turn) except that Hospital doesn't count while in occupation.
Rationale	For plausibility and to slow wars of conquest down a bit more. 10 HP per turn (heal rate in neutral territory) might be even more appropriate, but then players could heal units faster by moving them onto some owned tile adjacent to an occupied city, which would be counterintuitive and tedious.

024	Order in which AI contacts other AI randomized	
AdvCiv		*BtS*
When contacting other AI civs for trades, the AI goes through them in a randomized order.		Fixed order based on the player slot id.
Rationale	Some deals aren't mutually exclusive, but the AI can e.g. give away a resource only once, and may only have enough gold to convince one civ of a joint war. The fixed order leads to a slight bias for trading with AI civs with low ids.	

025	Reduced culture spread by capitulated vassal onto master's tiles	
AdvCiv		*K-Mod*
The tile culture spread by a city onto a tile is halved if the city owner is a capitulated vassal of the tile owner.		Capitulated vassals spread their culture normally.
Rationale	Even if cities can't flip to vassals (change 099c), the revolt-inciting culture spread is still a good reason not to accept capitulations. It's OK if capitulation isn't always the correct choice, and perhaps this is an interesting dilemma, but capitulation should be correct more often than not, and 099c makes it much harder overall to keep revolts in check.	
Config	Through `GlobalDefines_advc.xml`	
See also	130v neuters capitulated vassals in several ways	

026	More gold offered in AI-proposed deals

AdvCiv	K-Mod
When an AI civ contacts a human with a trade offer, when trying to balance both sides of the deal, the AI is willing to give away more gold than normally. If the player negotiates, the extra gold is no longer offered.	The AI can offer deals that are slightly more favorable to the player, but the portion of the AI treasury offered for trade isn't increased.

Rationale	The aim of the K-Mod change was to make it "worth considering the deal the AI offers [...] rather than going straight to the renegotiate button" (from the K-Mod 1.07 changelog). But a worthwhile offer still seemed very rare, so, while worth considering, it didn't exactly hurt to never consider AI proposals.
Config	`AI_OFFER_EXTRA_GOLD_PERCENT` in `GlobalDefines-advc.xml`
Tbd.	A general problem with any one-time offers: If the player can't just click "renegotiate", then the player doesn't know what else the AI might have. Encourages the player to routinely enter the Foreign Advisor during diplo. The only fix I can think of (other than removing the one-time offers) is to have the AI remember its initial offer. Then, if the deal is renegotiated, that offer remains available through "what would make this deal work": If the player offers to give the AI what it had originally asked for (or that and sth. in addition), or asks for what the AI had originally offered (or a subset of it), the AI suggests the original offer unless it finds an even better one. This way, the player would again always renegotiate, but would still take a look at the original offer in order to possibly get back to it.
	For now, I've added a loading screen hint about opening the Advisors during diplo.
	Another way to make one-time offers more attractive: Increase the trade value counted for "fair and forthright" trade if an AI offer is accepted without renegotiation (but don't increase the trade value for trade with worst enemy). Or even decrease fair-trade memory if an AI offer is rejected.
	Another issue: AI-proposed tech trades are often worse than the trade resulting from "care to renegotiate" → "what would make this deal work?". Should check `AI_counterPropose` before offering a tech trade to the player.

027	Changes to the selection of starting plots	
AdvCiv		*BtS*
When computing the starting area score for a continent, count only those rivers and coastal tiles that aren't peaks, tundra, snow or dry desert. Take the land tile count times 0.5. Add 1.5 times the number of bonus resources.		When starting locations are not determined by the map script (and most map scripts don't), then a starting continent is chosen for each player by `CvPlayer::findStartingArea`. That function computes a score for each continent and selects the one with the highest score. Part of the score formula is the number of river edges, the number of coastal land tiles (to account for the water surrounding the continent) and the total land tile count. Bonus resources don't count directly, but the total of all tile yields does.
Rationale	Too many civs had been placed on continents near the poles.	
Tbd.	Would be better to evaluate the surrounding water directly (than to count coastal land tiles); should be pretty easy to do through the Shelf class that I've added in change [300](300).	
	Should perhaps sometimes, at random, leave a small-ish continent empty. This would make Fractal a bit more unpredictable (a good thing in my mind), but could lead to crammed starting locations.	
See also	[108](108) is concerned with the normalization and assignment of starting plots (after they've been selected).	
If cheats are enabled, Shift+Ctrl+mouseover on a land tile without any units shows a breakdown of the starting area score.		Various combinations of Ctrl, Shift and Alt reveal various internals for development purposes.
Rationale	I've used this to figure out where the assignment of starting areas goes wrong, and left it in the code for future adjustments.	

028	Submarines as escorts	
AdvCiv		*BtS*
When a stack with invisible and visible units is attacked, the attacking player sees combat odds against the best visible defender, but an invisible unit may replace that defender once the attack is ordered, i.e. if the invisible unit is the better defender (considering unit cost and combat odds). Invisible units don't defend if all the team's units in the tile are invisible (same in BtS), i.e. an attacker can't stumble upon an invisible stack, and invisible units don't defend units of other teams.		Invisible units only defend when revealed (e.g. by a Destroyer).
Rationale	Not plausible for a Submarine to sit by while e.g. a fully loaded Transport gets attacked by another Sub. The new behavior makes Subs worse in situations when the defenders are outnumbered by modern ships, e.g. a Transport (or just a Work Boat) and a Sub against four Battleships. That said, players can easily prevent this by not stacking Subs with visible units. All in all, the change should make Subs (and Stealth Destroyers) a bit more useful.	

029	Changes to recon missions	
AdvCiv		*BtS*
Tiles revealed by a recon mission remain visible until the *end* of the subsequent turn of the recon unit's owner, or until the unit carries out another mission. Consequently, it doesn't matter much if a recon mission is carried out early in a turn (manually), or after all other units have moved (auto recon or queued mission).		Visibility ends on the *start* of the owner's subsequent turn. If the options for showing foreign moves are enabled, the player still sees all foreign moves before the fog of war returns. Auto recon and queued recon missions are barely usable because tiles are only visible from the end of one turn to the start of the next.
Rationale	During the owner's turn, nothing happens in the fog of war, so there isn't much of a point in hiding the tiles at the start of a turn. (It can make a difference for air strikes.) The advantage of my change is that players no longer need to remember which units had been visible, and it makes it easier to automate recon.	
Tbd.	Would still be nice the have a "Recon until canceled" mission that repeats recon on the same tile every turn (akin to the Blockade mission; on that note "Blockade for one turn" would be nice to have too). OrionVeteran had started to implement something like this, but didn't finish it. I'd like to nerf recon a bit by allowing units on recon to be intercepted, ideally even when not at war (and no OB). And reduce the number of revealed tiles (-2 radius), especially for non-recon air missions (-3 radius).	

030	Peaks can separate areas
Config	`PASSABLE_AREAS` flag in `GlobalDefines_advc`.

AdvCiv		*BtS*
When one or several peaks make parts of a landmass unreachable by land, that secluded part is treated as separate land area.		Only water can separate land areas.
Rationale	Should make things easier for the AI. The AI still has to be able to handle dynamic obstacles because of closed borders, and it can (but not that well).	
	Would prefer to base the rules for colonies and single-continent wonders on BtS landmasses, but that seems like too much work. When e.g. Notre Dame is completed in one area, would have to call `changeBuildingHappiness` on all areas with the same `RepresentativeArea` id.	
Tbd.	The additional areas increase savegame sizes and memory usage by a few KB. Could offset this by not having water areas allocate memory for e.g. each civ's building effects. About a dozen arrays are unnecessary for water areas. Could set these to `NULL` in the constructor and allocate memory only when an area becomes a water area, i.e. when `CvArea::reset(id,true,false)` is called. Accessors would have to check whether the arrays are `NULL`.	
	Could also eliminate water areas that are entirely enclosed by ice.	
When shelf ice makes part of a water area unreachable, that secluded part is treated as a separate water area. Exception: In scenarios that let the civs start with more than just a Settler and Warrior (i.e. don't call `CvGame::setInitialItems`), water areas are as in BtS.		Only land can separate water areas.
(No change to the trade rules.)		Trade cannot pass through ice (nor peaks).
Had to revise a lot of code related to unit movement so that the AI recognizes that submarines can pass between adjacent water areas.		The AI handles submarines well, but builds all sorts of ships in cities cordoned off by ice.
		Barbarian ships can also spawn trapped in ice.
The amphibious `canMoveAllTerrain` unit ability is not supported by my code. (Shouldn't crash, but the AI won't be aware of potential attacks.)		I don't think the BtS AI supports it either. Anyway, no unit actually has this ability. (Gunships can't enter water.)
When ice is added or removed (WorldBuilder, global warming), the water areas are not recalculated, i.e. the AI remains unaware if e.g. the Northwest Passage opens up.		
A city adjacent only to an ice-locked water area of fewer than 10 tiles can't construct buildings like Lighthouse that require an adjacent water area of at least 10 tiles.		
Rationale	Shipbuilding in ice-locked cities makes the AI look very bad.	
Tbd.	Can't recalculate the water areas in a running game because various statistics and AI data are stored at the `CvArea` objects; hence the exceptions for scenarios and global warming. Another issue is that placing a Peak through WorldBuilder currently leads to recalculated land areas, which should be fine when creating a scenario, but bad when play is supposed to continue after exiting WorldBuilder. Should bite the bullet and	

	write code that preserves per-area data after recalculation.
	Also, plot groups (for trade network) aren't currently updated after removing ice. (That's not an issue introduced by change 030, but still ...)
	Or, if I can't do the above, I should at least change global warming so that Ice can only melt when it is orthogonally surrounded by water (so that water areas are unaffected by global warming).
	Could limit the (step) diameter of water areas (by limiting the search depth of the `calculateAreas_visit` function), which might help the AI when the geography resembles the American continent (minus the Panama Canal). Then again, distances between coastal cities are rarely long enough to make naval movement between them impractical.
	Regarding Lighthouses in ice-locked cities: Easier to implement this way. Also plausible that a lighthouse isn't helpful in a city that is locked away from maritime trade.
See also	[033](#): The checks for naval blockade had relied on water areas not being adjacent to each other, so I had to change these checks. [051](#) is responsible for calculating areas in scenarios.

Fractal-based map scripts are two times less likely to place a Peak on tiles orthogonally adjacent to water than on other tiles.	It seems that Peaks are just as likely near water as inland. A Peak that is orthogonally adjacent to water can make part of a landmass inaccessible via land. (Inland Peaks could do that too in theory, but would have to form a circle.) Almost(?) all map scripts bundled with Civ 4/Warlords/BtS are based on Fractal, but [PerfectMongoose](#) isn't.
Rationale	On Earth, a drop in height from above the tree line to sea level is rarely so abrupt that it would justify a Peak next to a water tile, though there are some examples, in particular in the Central Andes. Still, there is (always?) a coastal strip wide enough to be traversed even by an army, so Peaks completely denying land access to an area is not realistic. Then again, the Darién Gap does prevent traffic by land between the Americas. This is a case of swamps more than mountains, but Civ doesn't have a swamp terrain type. As a compromise, I'm making Peaks that block coastal movement less likely rather than impossible. [This](#) discussion on CFC is somewhat related.
Config	Implemented in Python (`CvMapGeneratorUtil.py`)

030b	AI doesn't train cargo units for naval assault in land/ice-locked waterbodies	
AdvCiv		*BBAI*
Build cargo units for naval assault only in coastal cities that share a water area with an enemy city.		Build cargo units for naval assault in all coastal cities that don't have a land path to an enemy city.
Rationale	Change 030 generally prevents cities that aren't adjacent to "relevant" water areas from building ships, but doesn't address the specific case of building up for a naval assault.	
Tbd.	The tracking of city counts per water area may not be totally reliable in scenarios. See comment in `CvPlot::processArea`.	

031	Changes to AI found value: Revised most of the code, rearranged it a bit and made several addtions
See also	[108](#) makes changes to the found value of the initial city (which is important for starting plot normalization). [040](#) assigns a found value to unrevealed tiles. [052](#): changes AI found behavior in scenarios [007](#) makes some changes to the found values computed when the Alt key is held down in Debug mode.
Tbd.	I don't think that the K-Mod found value computation takes city specialization into account at all. The BtS code was already messy, and it's really bad now. Shoud be moved into a separate class.

AdvCiv	K-Mod
AI considers settling on plots without any bonus resource in the city radius if the city can expect to work at least 3 freshwater tiles.	Plots without any nearby bonus resource are disregarded.
Reduced the impact of distance from capital based on era. No distance penalty for small-ish landmasses near the capital.	Strong and uncapped impact of distance in all eras, making the AI highly reluctant to settle e.g. the New World on Terra.

Rationale	A river (or oasis) without resources is rare, but can be worth settling on (esp. with Flood Plains). About the impact of distance: Need to be careful not to revive the AI habit of planting colonies on a far edge of foreign territory. I think that used to happen in Vanilla Civ 4 and in Civ 3.

AdvCiv	K-Mod
Fixed a likely bug in the K-Mod evaluation of additional copies of a resource near a city site.	Especially extra copies of strategic resources had been way overrated.
Utility of happiness/health/strategic resources (i.e. not the utility from yield) halved when the resource can't be worked yet. Further reduced if there is already an improved copy available.	Utility computed as if the resource could be worked. Unimproved copies not taken into account. This leads the AI to aggressively settle near any Oil sources when Oil isn't yet workable.
Reduced the penalty for bad tiles near a city site by subtracting a multiple of the number of bad tiles rather than dividing by it. Decreased the base utility that the found value starts at.	Sites with 10 or more bad tiles practically never settled. The bad-tiles check seems to be the main guard against settling land that isn't (ever) worth settling.
Utility reduced when a site has very little food; to the point of making the AI unwilling to settle completely dry areas. The penalty is not applied to resource trade values though, so the AI could e.g. settle in the middle of a desert in order to get access to Oil.	The code that checks the available food only takes into account food on resource tiles, along the lines of "the Grassland Cow will allow this city to work its Plains Hill Gold", but doesn't take into account e.g. regular Grassland Farms, and the low-food penalty is rather moderate. It applies to the trade values of resources though (although trading/ sharing of resources does not require the tile to be worked).
Snow, desert and tundra hills counted as bad tiles. Ocean tiles count as half bad.	Hill and ocean tiles are never counted as bad (nor half bad).
When a resource enables units, the AI power values (from XML) of those units are factored	Evaluates the unlocked units only based on how useful they are compared with other currently

AdvCiv	BBAI
into the utility value of the resource (which, in turn, factors into found value). Increased the utility counted for yields from bonus resources, especially if these yields are provided from a small number of powerful resources.	available units. Tends to overrate Iron and underrate Oil and Uranium (once they can be worked). Utility is assigned based on the total yield from bonus resources (assuming they're all improved and worked); the number of resources doesn't matter in this context.
The per-tile utility values are decreased by a constant, then sorted in descending order and multiplied by decreasing weights. The total is multiplied by a normalization factor to keep it on a similar scale as in BtS. The special penalty for bad tiles is much lower than in BtS.	The per-tile values are mostly based on tile yields. The values are summed up without weights (or with uniform weights if you will). A special penalty is applied for "bad" tiles toward the end of the found value computation.

Rationale	The subtracted constant represents the food consumed by the citizen working the tile and largely replaces the bad-tile penalty. The food consumption is the reason why e.g. a yield of 2 food and 2 production is about twice as good as 2 food and 1 production. The weights give the AI a tendency to prefer a few good tiles over a lot of mediocre (or marginal) ones. A few powerful resources (e.g. Gold, Pig) are preferable to several weak resources (e.g. Silk, Fur) because, in the latter case, it takes longer and costs more food to grow the city enough to work all the resources. Also, while cities with few worthwhile tiles aren't very profitable, they also don't cost much maintenance because the population stays small.
Tbd.	Shouldn't count bad tiles at all. The counting of "special" yields from resources is also dubious; should be possible to cover these through the tile weight distribution. The "taken" tiles count also seems redundant.

AdvCiv	BBAI
Utility threshold for founding a city increases throughout the second half of the game. Threshold lowered based on the number of owned corporate HQs.	Increases only based on number-of-cities maintenance, not game progress. Threshold lowered based on total city maintenance (to prevent overexpansion), which includes corporation maintenance and can lead to very high thresholds once corporations have spread.

Rationale	Toward the end of the game, too little time remains for cities to become profitable and amortize. Corporations can cause high city maintenance before the Modern era, i.e. not that late in the game. At that point, high city maintenance shouldn't worry the AI too much because the corporations bring in high yields that can be turned into gold if necessary.

AdvCiv	BBAI
Reduced the utility assigned for access to the sea, especially when the site doesn't offer much production, when already having many coastal cities and when playing on Pangaea. Nothing to encourage the AI to found at least 25% of its cities at a coast.	Code added to encourage coastal cities for more AI shipbuilding, but doesn't take into account how much production these cities would actually have. Also adds a clause that gives a substantial extra boost to coastal sites when fewer than 25% of the owned cities (rounded down) are coastal. This can lead to coastal cities in totally awful sites.

Rationale	The current code may still encourage more AI coastal cities than would be rational, and that's OK with me if it helps make naval units viable. But I see no reason to have every AI civ found at least a few coastal cities – being entirely landlocked isn't a

	particular disadvantage.	
Tbd.	Taking the map script name into account could help in other parts of the AI too.	
AdvCiv		*K-Mod*
Bug fixed: Tech requirement for removing Jungle had not been taken into account.		The AI happily settles its second city in the middle of Jungle.
Great reluctance to settle sites that will lose food due to bad health during the Ancient and Classical era. No change for other eras (except for the bugfix).		
Some extra utility for chopping opportunities, utility from good health capped.		Chopping only accounted for indirectly through good health.
Tbd.	My code for chopping utility is actually also only based on good heath. Should instead count the Forests and compute the total chopping yield.	
When computing the total potential production rate at a city site, count 1 production for non-Hill land tiles only if a worthwhile improvement that grants production (i.e. a Workshop with +2 production) can actually be built there.		Count 1 production for any non-Hill land tile, even a Peak and regardless of available technology.
2 production per Hill (no change).		
Some utility is counted for tiles in the radii of other cities, i.e. tiles that could be stolen from rival cities or shared with a friendly city. Such tiles are not counted as bad tiles.		Tiles within the radius of a city (rival or friendly) are counted as "bad tiles" and otherwise disregarded. For tiles outside city radii that are within rival borders, tile utility is decreased (a bit, say, by 25%) based on the amount of foreign tile culture.
Stolen tiles: Tile utility is reduced through essentially the same formula that K-Mod uses for tiles that have a rival owner but aren't in any city radius. I'm making that formula more pessimistic overall and especially for tiles in a rival city radius because the rival city owner is more likely to focus on culture when there is a contested workable tile. A second (new) formula accounts for potential diplomatic (or not so diplomatic) consequences of stealing tiles. This formula is personality-based (Protective trait, power threshold for limited war).		The AI can place cities close to each other, it just doesn't expect the new city to win any contested tiles.
Shared tiles: I'm counting only those tiles that are going to be assigned to the new city, and only tiles that the old city is probably not going to need in the medium term (i.e. not until it grows three more times). Even then, the old city is normally going to miss the tile at some point, and I'm reducing the yield value counted for the new city to about 40% to account for this. The tile is counted fully for deciding whether the new city is going to have sufficient food and production.		When the radii of two cities owned by the same AI civ overlap, the tiles are assigned based on step distance with orthogonal vs. diagonal as a tiebreaker. K-Mod adds a routine for reassigning tiles when close to a culture victory (`CvCityAI::AI_getCityImportance`).
I haven't changed the AI code that assigns shared tiles to cities.		
Rationale	This should mostly allow the AI to settle map regions with abundant resources (or floodplains) more densely than regions with normal or scarce resources, in particular	

	in Earth scenarios (which tend to place a lot of resources in Europe). Multiple cities can start working the good tiles faster than a single city can.
	K-Mod comment in `CvPlayerA::AI_foundValue_bulk`: "*it kind of sucks that no value is counted for taken tiles. Tile sharing / stealing should be allowed.*"
	As for counting bad tiles: Tiles in a city radius that the new city is very unlikely to win are really bad tiles, but it's difficult to count them as such because of the structure of the code. The bad-tile counting is a kludge anyway; I'm not sure that it's needed anymore at all (or maybe just as a shortcut to improve performance).
	karadoc on the bad-tile clause (`CvPlayerA::AI_foundValue_bulk`): "t*his final condition is... not something I intend to keep permanently.*"
Tbd.	Ideally, the formula for diplomatic consequences of stolen tiles should check whether the rival is a military threat.
See also	099b (culture decay) makes it a bit easier to steal tiles, especially those outside a city radius.

The Financial trait is factored into the predicted tile yield.	Only done for river tiles, not for coastal tiles. AI civs with a unique naval unit or coastal building have a preference for coastal spots, but the Financial trait has no such effect.
See also	The nerfed Financial trait (908a) still benefits coastal tiles.
AI leaders with Growth flavor are more inclined to settle at a plot distance of exactly 6 tiles from the nearest city than leaders without Growth flavor.	Growth flavor biases the AI toward settling at a plot distance of 6 or more(!) from the nearest city. Plot distance is computed as max{deltaX,deltaY} + floor(0.5 * min{deltaX,deltaY}).
Rationale	Growth flavor should mean that a leader likes big cities, so the city radii shouldn't overlap much. Cities that are 6 tiles apart don't overlap; shouldn't encourage even larger distances that may lead to unworkable tiles (or a another city getting crammed in later on) and high distance maintenance in the early game.
When a tile connects two seas (non-Lake water areas), found value is increased based on the size of the smaller of the two seas.	The possibility of a canal does not affect found value. The AI considers canals when placing Forts, but only under narrow conditions, and not on workable tiles, meaning that the AI can't establish a canal after settling in the city radius around the tile that allows for a canal.
See also	121 (partly) deals with the Worker AI for Forts as canals
Tbd.	This only works if the two seas are fully separated from each other by land or (through change 030) ice. Will have to call the pathfinder to identify mere shortcuts like in Panama or at Suez. Could do it as follows:
	At the start of the game let `CvGameAI` compute a canal value for every land tile. It would be better to do this e.g. once per turn and for each team independently based on the revealed portion of the map and OB agreements, but I think this would be too costly to compute. The canal value of a tile T should equal the number of movement points saved by ships passing through a canal in T. Algorithm: Iterate over the tiles adjacent to T in clockwise order (very cheap to do). Make a list of all water tiles encountered directly after a land tile. In most cases, that list is going to be empty or a singleton; this means the canal value is 0 or very small; set it to 0. If the length of the list is greater than 1 (maximum: 4), i.e. if there are adjacent water tiles separated by land, run the pathfinder on each pair of tiles in the list. Set an upper bound for the path length somewhere between 30 and 40 (won't care if the shortcut is even greater) for efficiency, and let the pathfinder only worry about water, land and impassable tiles.

	Store the maximum of the computed path lengths as the canal value. Use the canal value for the AI placement of cities and Forts.

032	Signing a peace treaty when there already is one causes turns-to-cancel to be reset	
AdvCiv		*BtS*
When a peace treaty is signed between two civs that already have a peace treaty, then the turns-to-cancel are reset to 10 turns. This can happen through a diplo vote or sponsored war (due to change [146](#)). I don't think gifts and demands are possible when there is already a peace treaty.		Signing a peace treaty has no effect if there is already a peace treaty.
Rationale	More intuitive this way. Otherwise, e.g. the target of a UN peace proposal could get attacked just one turn after the vote.	

033	Changes to naval blockades, Privateer	
Tbd.	Try excluding Privateers from "show enemy moves". When are messages about pillaging and Privateer combat shown to the player then? Combat log? Is it still possible to deduce the owner of a Privateer from the turn order? Try delaying these messages too.	
	The movement bonus from circumnavigation can also reveal a Privateer's identity; I intend to replace that ability with some trade route bonus.	
	Or give up the secrecy; seems historically dubious anyway. ([Wikipedia](#): "The convention was a vessel must hoist her true colors before firing the first shot.")	
See also	[007](#) reveals the owners of Privateers when in Debug mode	
AdvCiv		*BBAI*
When collecting gold from Privateers, compute the plunder range based on path distance (e.g. not across an isthmus).		BtS does it all based on air distance. BBAI uses path distance for blockaded tiles, but seems to have forgotten to change the plunder code as well.
Rationale	Or they had been worried about performance, but I'm only checking cities adjacent to blockaded plots, which should be quick.	
See also	[030](#) (ice-locked water areas) depends on this change. [124](#): Can use blockade to let trade pass through hostile tiles.	
AdvCiv		*BtS* (BBAI and K-Mod made some changes to the Privateer AI, but the basics are unchanged)

When selecting a city to plunder, the AI takes its leader's attitude toward the city owner and the tech known to the city owner into account. The AI doesn't use Privateers against ships and improvements of partners. What a "partner" is in this context depends on the AI personality. If the attitude is equal to `DeclareWarThemRefuse` `AttitudeThreshold` or worse, AI Privateers will attack. This threshold is Pleased, Cautious or Annoyed for all leaders except Catherine (Friendly).	AI Privateers behave largely like Barbarians and treat all civs except the Privateer's team alike.

Rationale	It's not smart to use Privateers against one's partners, especially not for attacks and pillaging. An attack puts the Privateer at risk for no gain and the gold from pillaging water improvements is negligible. Plundering a partner should be OK when there is no one else to plunder.
Tbd.	Privateer attacks on ships should have some upside for the Privateer owner. Stalking ships is fun, but just not rewarding. A ransom mechanism would be nice because it would also curb the losses of the owner of the attacked ship, but too much work to implement at this point, and no other mod seems to have implemented this either. A chance to steal the ship (in a damaged state, and any cargo transformed into a single Worker)? Captured Caravels wouldn't be very useful though ...
See also	130v makes vassals Friendly toward their master.

Civs in a vassal-master relationship can't pillage each other's improvements with Privateers, can't block tiles from being worked (`CvUnit::` `canSiege`) and can't blockade each other's cities. They can still attack each other's ships through Privateers, and no restrictions apply to vassals of the same master.	Privateers can attack, pillage and plunder everything not owned by the Privateer's team.
The AI never attacks ships of its vassals or master. (That's the idea anyway. Seems difficult to guarantee this ...)	AI Privateers attack anything that comes near them.

Rationale	About capitulated vassals, see below. Voluntary vassals plundering their master might be OK, but a master plundering its vassals (voluntary or not) is jarring; the master is supposed to protect the vassal. An AI change wouldn't stop a human master from harassing his/her vassals, so this has to be prevented on the rules level.
	I've considered changing `CvUnit::isEnemy` and `getCombatOwner` so that Privateers of vassal/master behave as if they're on the same team, and revealing the Privateer owners' identities between vassal and master. This would entail the following: • can't attack each other and can coexist in the same tile • can heal in each other's territory and enter each other's cities • can't blockade each other • moves shown as friendly • Privateers not seen as a threat by the AI
	This would be a pretty clean approach, but goes a bit too far I think. Implausible that everyone on the vassal's and master's side knows a Privateer's identity, but other civs have no clue. Submarines aren't revealed between vassal and master either.
	If the owner if a vassal/master Privateer is to remain secret, then it has to remain possible (for humans) to attack Privateers; otherwise one could tell who the owner is. And if Privateers can be attacked, they should also be allowed to fight back, so, no restrictions on Privateer combat. It's a little strange that combat is possible, but not pillaging; I guess there's no perfect solution for this.
Credits	Cruiser76 raised the issue here on CFC.
See also	123e makes it impossible to plunder Barbarian cities
Tbd.	When using a Privateer to attack a unit that the Privateer owner is not at war with, and hovering for combat odds, the mouse cursor shows a white circle. I think it should be a red circle like for all other attacks. This isn't a result of my changes; it's a white circle in BtS too.

Capitulated vassals only train Privateers if they somehow have no other general purpose naval unit. All civs stop training Privateers once the game enters the Industrial era.	Capitulation doesn't affect the training and behavior of AI Privateers. There is a unit "viability" check (`CvPlayerAI::AI_calculateUnitAIViability`) to prevent the production of outdated units, but that's based only on units that the same civ can train, not the global tech level.

See also	130v makes capitulated vassals subservient to their master in most regards.
Rationale	Capitulated vassals shouldn't even indirectly interfere with their master's goals. Don't want them to use Privateers against civs that the master might like (with a human master, one can never tell) and don't want a blockading Privateer to affect the master indirectly e.g. by cutting off some important sealane.

The Privateer's plunder ability is listed in Civilopedia and help text.	Only mentioned on the BtS concept page about trade blockades. For the Privateer, only the hidden nationality ability is listed. A feat message ("Congratulations, you have trained your first Privateer ...") also explains plundering, but that's a one-time notice.

Rationale	Technically, the Privateer doesn't have a special plunder ability. Any ship can collect plunder if it can manage to blockade a city without declaring war. This rule is very obscure though; need to list plundering as a separate ability.
	Also, when a player wonders why a Privateer can't plunder a vassal, that player may look up the Privateer in Civilopedia, and there it'll now say that Privateers have the ability to plunder *rival* cities.
AI civs don't blockade Barbarian cities.	Not sure if the BtS code actually targets Barbarian cities for blockades or only ends up blockading them opportunistically while bombarding.
Rationale	No gain in starving Barbarian cities.
Tbd.	Naval bombardments of Barbarian cities might still happen, and then the AI would also blockade. There's no point in this because Barbarian cities normally only have building defense, and by the time Frigates become available, most AI land units ignore building defense.

034	Temporary Open Borders after war (optional through XML, **disabled** by default)	
AdvCiv		*BtS*
When a war ends, an Open Borders (OB) agreement is automatically signed between the former belligerents. Units aren't bumped until that agreement ends after a configurable number of turns (recommended: 3 to 5). It's a special OB agreement, internally called a "disengagement" agreement, that does not affect trade and diplomacy; only a right of passage for units. Details about the temporary OB agreement: • No movement bonus from roads and railroads. • No risk of getting caught for idle and moving Spies. • Canceled when a proper OB agreement is signed, or when a Vassal Agreement or Permanent Alliance is signed. • Shown as "Open Borders (x turns)" on the scoreboard and in other help text. • The turn on which peace is made counts as the first turn. When it says "1 turn" remains, then the agreement is canceled at the end of the round. • Unaffected by embargoes.		When a war ends, units are immediately bumped out of rival territory, teleporting to the nearest tile that they can legally occupy. The AI is not pro-grammed to anticipate this.

Rationale	To allow the AI to reposition its units after a war, in particular, to prevent large AI stacks from getting stranded. This happens quite regularly when the AI conquers a remote city, and it can be very harmful for the AI because it still counts on those units when when deciding on war/peace against a third party and when calculating needed floating defenders. The change also reduces unit bumping, which is a pretty strange mechanism.
	The ability to explore the territory of a former war enemy just after the war ends is highly immersion-breaking though. It's worse than I had anticipated before implementing this change.
Config	Increase `DISENGAGE_LENGTH` in `GlobalDefines_advc.xml` to enable this change.
Tbd.	Not properly tested.
	The "You have made peace with" message (`CvTeam::makePeace`) should also mention the Open Borders.
See also	035 (also disabled) would also address the problem of stranded units. 099b (tile culture decay) addresses it a little bit. 046: AI improvements for units stranded on a different landmass and changes to the bump algorithm.

035	While at peace, civs own all tiles that no other civ could work
Config	Currently **disabled** (including the AI changes) through the `OWN_EXCLUSIVE_RADIUS` switch in `GlobalDefines_advc.xml`.
See also	099b replaces 035. If 035 is enabled, then the `CITY_RADIUS_DECAY` part of 099b should arguably be disabled. Revolt chance (101) is adjusted to 035 if it's enabled.
Tbd.	Try letting civs only own those tiles in the exclusive radius where they're somewhat close to having the majority culture; e.g. set a multiplier $m := 75\%$ and let civ A own tile T in its city radius if culture(A,T) > m*culture(B,T) for every civ B that does not have T in a city radius, and culture(A,T)>culture(C,T) for every civ $C{\neq}A$ that does have T in a city radius. I guess inner and outer radius should be distinguished too. Perhaps too complicated, but, other than that, it might play better than the decay in 099b.
AdvCiv	*BtS*

A civ can only own a tile when that tile is either within the (workable) radius of one of the civ's cities, or when it's not within the radius of any cities that the civ is at peace with. I.e., at peace, cities own all tiles that they could work and that no rival city could work, and the highest culture value only matters for tiles in overlapping city radii and for tiles that are in no city radius. At war, tile culture matters on all tiles contested between the war parties, and thus some tiles may flip when war is declared and when peace is made. A unit that was about to cross the border can get bumped back upon declaring war.	The civ with the highest tile culture owns a tile so long as that tile is within the culture range of one of the civ's cities (up to 6 tiles depending the city's culture level). Thus, tiles within a city's radius can belong to a civ that is too far away to work the tile, meaning that no civ can work it. War/ peace does not affect tile ownership.

<u>Minor AI changes</u> (more below)

Forts: Don't build them on tiles that will flip when at war.

Pathfinder: When moving to hostile territory and war is not yet declared, try to avoid tiles that are going to flip to the enemy upon DoW, and prefer enemy tiles that are going to become friendly.

Rationale	It's implausible that tiles near a city can't be worked by anyone. At least, this shouldn't happen as commonly as it does in BtS. It's a mechanism that encourages culture, but it does so mostly through punishment (loss of workable tiles). A civ with high culture gains tiles, but it's not much of a reward because that civ can't work them; it only gets bonus resources and a tactical advantage, which is somewhat neutralized by the diplo penalty for stealing tiles. My change preserves the tactical advantage.

Border tensions: When not at war, stolen tiles in overlapping city radii count 50% more than in BtS. Tiles that would flip when at war add to border tensions; the civ that would own them when at war is mad about them.

Rationale	The rules change result in fewer stolen tiles, but I don't want less border tension. The diplo penalty for tiles that flip when at war works against civs with low culture (good), whereas the diplo penalty for stolen tiles works against civs with high culture (not good, as in BtS).
See also	[147](#) also changes the border tensions formula.

AI found value: Don't worry much about foreign culture on tiles near a city site, so long as those tiles are not within the radius of a foreign city. Take into account which tiles will flip when settling near a rival city.

Rationale	The AI should still avoid foreign culture a bit because tiles around the city will flip when the owner of the foreign culture founds a city nearby or when war is declared (making the city difficult to defend). Foreign culture will also add to border tensions (see above), and can cause the city to revolt.
See also	[031](#) makes other changes to found value.

<u>UWAI</u>: Reduced utility penalty from culture-pressure penalty (`GreedForAssets` aspect).

Tiles lost by war enemies are counted as "lost assets", making the AI more reluctant to make peace when this will flip tiles to the enemy. Flipped tiles could also motivate the AI to start a war that otherwise looks like a stalemate.

Rationale	A peace treaty practically cedes the tiles around any lost cities to the conqueror. The AI needs to be reluctant to do that and factor it into reparations.

036	AI changes concerning resource trade
See also	[133](#): Cancelation of resource deals [004](#): "You must be joking" resources excluded from the trade screen [210d](#): Alert about AI-AI resource trades [912c](#) changes the ability of the Hereditary Rule civic because 036 would otherwise make too many happiness resources available for trade.

AdvCiv	*BtS*
The AI takes into account the current happiness and health (and anger and bad health) of its cities and buildings like Grocer and Forge when evaluating resources for trade or the placement of cities and improvements (found and build value).	The AI does a detailed evaluation of strategic resources, but assigns the same utility value to every health and happiness resource, except that surplus resources are valued less.
The evaluation for trade differs a bit from the evaluation for found and build value. Since a trade can be canceled after 10 turns, the resource needs to be useful in the short term.	A single "`baseBonusVal`". The AI trades for strategic resources long before it needs them.
The AI refuses to accept resources with low utility in trade: "We would have nothing to gain". The AI is willing to trade away even non-surplus resources when it doesn't have a use for them. (But the AI still doesn't wheel and deal, i.e. never both exports and imports the same resource.) E.g. in the early game, the AI typically refuses to accept health resources in trade and is willing to trade away health resources that it has only one copy of.	Not a matter of utility. The AI accepts any resource that it doesn't already have, and any resources consumed by its corporations. The AI only trades away resources that it owns (directly; not through import) multiple copies of.
The AI knows how to buy resources from other AI civs for gold per turn and can even out resource-for-resource trades with gold per turn.	Only trades one resource for one resource.
The price in gold per turn that the AI charges for a resource is computed based on the utility for the recipient and a "market value". The utility of the recipient is computed from the number of its cities, and the happiness and health in those cities if a sufficient portion of the recipient's territory is revealed to the AI. The market value is based on the number of other potential buyers and the number of their cities. The market value tends to be quite a bit lower than the recipient's utility.	Based only on the city count of the seller and the recipient. Resources sold between large civs tend to be overpriced.
Relaxed AI attitude threshold for trading away strategic resources when the recipient already has access to the respective resource and only needs additional copies for a corporation.	The leader-specific threshold applies regardless of whether the recipient already has the resource.
Rationale	The more flexible AI behavior creates a larger market for resources, allowing civs that lack resources to grow their cities through reasonably priced imports. Should make it

	more feasible to grow tall without growing wide.
	The utility of the seller does not factor into the price for resources because the AI still only trades away resources that it doesn't have much of a use for.
	I've considered allowing resources in peace deals, but that's not workable. Too difficult to predict whether there is going to be a trade connection, and the civ providing the resources could just pillage its own roads to get out of the deal. Might also cause problems outside the SDK.

AdvCiv	*BUG (Exotic Foreign Advisor)*
In the list of resources that the AI is willing to import from the player (Resources tab of the Foreign Advisor), surplus bonuses are listed before bonuses that the player has only one of.	BUG's Foreign Advisor screen (enabled by default; not sure if it can be disabled) lists resources that other civs are willing to import or export on a tab "Resources". The lists are ordered by the (meaningless) internal ids of the resources.
Rationale	It's preferable to trade away surplus resources, so these should be distinguished from other resources that the AI is willing to import. This is not directly related to the AdvCiv changes to AI trade behavior (in BtS, humans can export non-surplus resources as well).
Tbd.	I've tried to highlight the surplus resources in the import list somehow, but that's difficult to do because the lists are shown through BUG's `IconGrid` class, which uses `addMultiListControlGFC`, and that function treats every listed icon the same way. Perhaps a graphic could be overlaid like it's done under the BUG comment "*add the circles behind the amounts*" in `CvExoticForeignAdvisor.py`.

AdvCiv	*BtS*
The AI makes up to about one third of its total commerce available for trade as gold per turn. The current income also no longer factors into the amount of cash that the AI is willing to trade. Instead assume an income equal to 20% of the total commerce; this usually leads to more cash for trade than in BtS.	The amount of gold traded per turn is capped at the current per-turn income (commerce times gold slider position minus expenses). This cap is usually a one-digit number or a small two-digit number. Often, it's negative, meaning that the AI is unwilling to trade away any gold per turn. The amount of cash that the AI is willing to trade is partially based on the current income.
Rationale	Now that the AI knows how to evaluate resources, there's no harm in making gold available for resource trades. This allows small AI civs to take advantage of the resource market. It also allows large civs to sell most of their surplus resources, but the prices, especially those paid by small civs, are low, so this change helps small civs more than large ones. A low income shouldn't prevent the AI from trading; doesn't imply financial trouble.
See also	104w lets UWAI decide how much gold the AI should be willing to pay for peace. 104m allows the AI to demand gold per turn as tribute. 026 makes the AI willing to trade even more gold in an AI-initiated one-time offer. 550f determines how much gold the AI saves up (gold target). 210e extends the resource trade alert so that it triggers when the AI becomes willing to import a resource in exchange for gold. 131 deals with avoiding strikes during anarchy; the increased trade budget makes the AI more vulnerable to this.
The AI assigns a fixed trade value to gold (per turn, cash).	The trade value depends on whether the AI is in financial trouble.

Rationale	The BtS approach means that the AI receives less gold in trade when in financial trouble. This makes some sense (you're in a bad position to negotiate when you need money badly), but isn't really intuitive. Finances factor into the amount of gold that the AI makes available for trade; that's good enough to prevent broke civs from overspending.	
The gold per turn and cash that the AI is willing to trade to another civ is adjusted based on the attitude toward that other civ except when the two civs are at war or when the AI civ is a capitulated vassal.		The amount of gold that the AI is willing to trade is not affected by attitude.
Rationale	When e.g. an AI civ promises that it'll "never trade" with its worst enemy, that civ shouldn't be perfectly willing to pay gold to that enemy (but shouldn't refuse to pay any gold either). This change should also make attitude matter more when tech trading is disabled. Exception for capitulated vassals: Don't want the master or the master's friends to plunder the vassal.	
AI memory about cash traded to other civs decays.		The AI keeps track of how much gold it has traded to every other civ. That amount is subtracted from the cash that the AI is willing to trade to another civ. This subtrahend tends to become negligible over time because the AI generally becomes willing to trade larger and larger sums of gold as the game progresses.
Rationale	The amount of gold that a civ is willing to trade (prior to subtracting gold-traded memory) can stagnate, and then the BtS AI can stay unwilling to trade any gold indefinitely. Also, pretty much all other AI memory decays in AdvCiv (cf. 130r).	
When asked to "make this deal work", the AI may add resources to the trade table that the human civ has only one copy of if the human civ doesn't have enough gold per turn available for trade. If the human player is offering resources to the AI, then the AI offers to buy them with gold per turn if the current human income is negative, and otherwise tries offering surplus resources in return and uses gold per turn to balance the deal. May offer non-surplus resources as a final option.		Never adds non-surplus resources to the table. Tries to give surplus resources, then gold per turn.
Rationale	Had to adjust the counter-propose algorithm to the more flexible AI trade denial behavior (which involved refactoring the entire function). The human income condition leaves it up to players whether they want the AI to pay in gold or in resources: Just change the gold slider for a moment. Resources are often preferable because the AI doesn't pay much gold, but gold can also be preferable, especially when the player doesn't need the resources of the AI. Players shouldn't have to optimize the deal through trial and error then.	
The AI refuses to give away more than 2 non-surplus resources of the same kind (happiness or health) at once, and refuses to accept more than 2 resources of a kind at once. The precomputed resource values are updated after starting or canceling a trade.		Capitulated vassals give any number of non-surplus resources to their masters. Other civs never give away non-surplus resources. No limit on resources accepted at once. Resource values are precomputed (since the BtS expansion) for efficiency and only updated once

	per turn.
Rationale	Now that the AI evaluates happiness and health from resources situationally, it must be careful not to buy too many resources at once because the evaluation is done for each resource independently. I.e. the AI knows what e.g. one more happiness is worth, and simply triples that value when three happiness resources are offered (but perhaps needs only one). Similarly, the AI can tell whether it can spare e.g. one non-surplus happiness resource, but it can't tell if it can spare more than that.
Tbd.	Should call `AI_updateBonusValue` each time that the AI connects a resource to its city network (easier said than done). Currently, an AI civ updates its resource values at the start of its turn, so resources connected during the AI civ's turn aren't taken into account until the next turn of that AI civ.

Once per round, all AI-AI deals are checked for cases in which two civs A and B sell resources to each other. If one deal is found in which A sells exactly one resource to B, and another in which B sells exactly one resource to A, and both deals can be canceled, then they're canceled and immediately replaced by a resource-for-resource deal in which one side may additionally have to pay some gold.

Rational	Now that AI civs are able to import resources from other AI civs for gold per turn, resource-for-resource deals have become rather rare because often only one side has a suitable resource available. Sales are harder to read on the Foreign Advisor screen than barters and take up more space. Therefore try to collapse sales into barters.

When trading one resource for another with a human, the AI never asks for 1 gold per turn in addition.	Not an issue because all health and happiness resources have the same trade value.

Rationale	Adding the 1 gold to the trade table is tedious, and it makes the AI look petty.

AdvCiv	*BtS/K-Mod*
Changed AI tech evaluation to increase the value of bonus improvements with high tile yields (such as Cow Pasture or Corn Farm) and to decrease the value of military units whose bonuses haven't yet been revealed (such as Axeman and Swordsman; multiplier now 60%).	The utility counted for bonus yields is proportional to the yield. (BtS code) Military units requiring unrevealed bonuses are valued at 80% (compared with units whose bonus requirements are fulfilled). (K-Mod code)
Rationale	Since health in the early game is now (correctly) counted as unimportant, the AI tech values of Agriculture and Animal Husbandry need to be adjusted. Prior to this adjustment, the AI often went for Iron Working(!) before Animal Husbandry, even if it had a Cow next to its capital. (Actually, I suspect that this happens in K-Mod too, despite the overestimation of health, but I haven't checked. In unmodded BtS, it's fine.) K-Mod comment on the Axe and Sword evaluation (`AI_techUnitValue`): "*We're quite optimistic... mostly because otherwise we'd risk undervaluing axemen in the early game! (Kludge, sorry.)*" Undervaluing Axeman isn't a problem currently.
Tbd.	Animal Husbandry may still be a bit underappreciated, but I feel that I shouldn't boost the tech value from resource yields any further. Would have to look into the strategic value counted for Horse. The fact that Wheel enables Chariot complicates matters.
See also	k146 increases the tech value counted for chopping Forests and Jungles; I've also reduced that effect a bit.

AdvCiv	*BtS*

The AI values surplus resources based on the potential for trading them away, and (as in BtS) based on corporation yields.	Unless consumed by a corporation, a surplus resource is valued at 20% of the first copy. This value is sometimes so low that the AI doesn't connect surplus resources. (Perhaps also due to K-Mod changes to the Worker AI and the evaluation of the first copy; not sure if this is a problem in unmodded BtS.)
Rationale	The value of the first copy shouldn't affect the value of surplus copies; one resource for trade is as good as another. Tradeable strategic resources might be a bit more valuable than luxury and food resources, but not much; difficult to find buyers for strategics. And the AI needs to connect all its (surplus) resources; it's the correct play most of the time, and can't really hurt.
See also	Prior to v0.92, this change was tagged with `advc.121`. Change [121](#) deals with AI Worker builds.

037	Prevent masters from stifling their voluntary vassals
Rationale	Voluntary vassals can be difficult to keep, and that's intended. There shouldn't be much that a player can do about this. The game certainly shouldn't reward dirty tricks.
Tbd.	Voluntary vassals should treat "we'd like you to research" and "join us in preparing war" as recommendations and answer "we'll see what we can do" (as opposed tio "we'll do our best"). Should also give a noncommittal answer to "why don't you attack."
See also	[033](#) prevents masters from using Privateers against their vassals

AdvCiv	*BtS*
Voluntary vassals lower their trade value to 67% when trading resources with their master. Capitulated vassals charge the full trade value (no change).	50%
Voluntary vassals refuse to trade resources that they badly need themselves.	Are willing to trade all resources.
Rationale	Don't want the master to starve the vassal's cities by buying the vassal's crucial resources.
	Capitulated vassals aren't a concern because players have no reason to sabotage those (they're not going to break away without outside help). Probably no trade discount in BtS because the master can get resources for free through "time for your tribute"; fair enough.
Tbd.	Perhaps put some limit on "time for your tribute".

038	Top Civs popups

AdvCiv	*BtS*
The "top civs" pop up ("Pliny the Elder has completed his great work: ...") appears for the first time on turn 80, then every 40 turns, but stops appearing once the active player has met more than half of the other civs. The appearance frequency is adjusted to the game speed.	Appears every 50 turns throughout the entire game. No game speed adjustment.

Rationale	The popup interferes with shown foreign moves, and it's somewhat obsoleted by the Statistics screen (demographics). That said, demographics only become available once a civ is met. When starting in isolation or on a continent with few other civs, it's nice to get some sign of intelligent life from the rest of the world.
Config	`TOP_CIVS_INTERVAL` in `GlobalDefines_advc`. That setting can also be used to disable the popup entirely, as had been the case prior to AdvCiv v0.92. The conditions for showing the popup are easy enough to modify through the `turnChecker` function in `CvTopCivs.py`.
Tbd.	The map-centering effect (Calendar, Stonehenge) also gets in the way of shown foreign moves; should be moved to the beginning of turns. This may require a variable at `CvPlayer` that is set by `processTech`. Won't have to be stored in savegames.

The "wealthiest" civs are ranked based on their GNP values (see [004s]). The "most advanced" civ is the one with the highest total cost of known techs.	Based on gold in the treasury. "Most advanced" based on the number of known techs.
Rationale	Cash fluctuates a lot; not a meaningful statistic. GNP is more about research than gold, but "wealth" just doesn't really play a role in Civ 4. Research is the most useful information, so it doesn't hurt to have two rankings about that (the rankings all have equal probability of being shown). GNP is hopefully different enough from the tech cost total. The former indicates which civ is coming up in research, the latter says which civ is currently leading.
	The number of techs can be misleading in the early game. Humans beeline more than the AI does, so the tech count tends to underestimate the human performance. Not good to tell a player who may already be leading in tech that he/she is falling behind.

The ranking is chosen based on the synchronized PRNG (`SorenRandNum`).	Based on a non-synchronized PRNG, meaning that the outcome can change after reloading a savegame.
Rationale	The chosen ranking has some strategic importance; should be consistent when reloading. OOS errors aren't an issue because top civs popups don't appear in networked multiplayer.

The name of the historian is chosen at random from the two names that I've assigned to each ranking. E.g. Machiavelli and Tacitus for the "most powerful" civs.	The historian is chosen at random from among 11 names regardless of the type of ranking.
Rationale	Just for historical immersion.
Config	I've hardcoded the assignment of historians to rankings in `CvTopCivs.py`.

039	Reparations (payments for peace) are announced to third parties

AdvCiv	BtS
When two civs make peace and one side pays reparations, then all other civs receive a list of the reparations in the peace-made message.	Third parties only learn that peace was made and, apart from capitulation, nothing about the peace conditions. Can tell though whether a city was ceded – the owner changes, but there is no "captured" message. By monitoring discovered techs and gold available for trade, it's also possible to guess whether a tech or gold was received. No other reparations are possible between AI civs.
Rationale	To make AI behavior more transparent. The peace terms are not so secret anyway (not in the real world either).
Config	Can be disabled through `ANNOUNCE_REPARATIONS` in `GlobalDefines_advc.xml`.
Tbd.	Would like to make all trades transparent. See Tbd. at 210 (Civ4lerts). After all, the AI already learns about trades with its worst enemy and all tech trades (for "fear you're becoming too advanced" memory).

040	AI improvements for settling other continents
See also	300: Barbarian placement on continents without civilizations. 905a gives ships better stats (cost, speed, cargo capacity). 031 reduces the impact of distance on AI found value.
Tbd.	Would like a Columbian Exchange mechanism that reveals resources in the Old World once a copy is obtained from the New World.

AdvCiv	K-Mod
When an AI civ has no city on a continent, it counts unrevealed tiles in the city radius as average tiles when computing found values (with a number of exceptions and restrictions). The Settler may change its mind once it gets to the spot and reveals its surroundings.	Unrevealed tiles don't add anything to found values. This makes the AI very reluctant to settle a continent that it has only explored from the sea.
Rationale	Could instead try to improve AI exploration. Not so easy; how can the AI tell that a continent is large enough for land exploration (without circumnavigating it first)? Should Caravels be routinely accompanied by a Scout/ Explorer?

AdvCiv	BBAI
The AI moves Settlers trained in inland cities to coastal cities when there are no city sites on the continent.	Inland AI Settlers wait indefinitely for a ship. BBAI comment: "*TODO: Go to a good city (like one with a transport) ...*"

041	Can train ships in any coastal cities	
AdvCiv		*BtS*
Cities adjacent to any water area larger than a lake can train ships and construct a Dry Dock. The AI ignores this change, i.e. builds ships/ Dry Dock only in cities at a size-20 water body.		Can train ships and construct Dry Dock only in cities adjacent to a water area of at least 20 tiles. Other coastal buildings require only 10 water tiles, which is also the threshold for a salt water lake.
Rationale	Since BtS, it can make sense to train naval units in small water areas because Forts can act as canals into larger water areas. Implausible that this should not be allowed. Since the AI doesn't have a notion of canals, it needs to stick to the old rules though.	
	This change also eliminates the confusion about two different area size thresholds (10 for buildings, 20 for units). Cities are now either proper coastal cities, or only (fresh water) lake-side cities.	
	Don't want to allow shipbuilding at lakes because it's confusing to see shipbuilding options on the city screen of some inland city with a 1-tile lake. Dawn of Mankind players have also argued that small lakes aren't deep enough for constructing and launching oceangoing ships.	
Tbd.	By allowing Lighthouse in lake-side cities, I could remove the awkward incentive for founding in tiles that are both coastal and lake-side.	
	But I'd rather treat Lake tiles as being a terrain different from Coast and Ocean, and thus unaffected by Lighthouse (and Colossus, Moai); then give Lake +1 food, -1 commerce from the start (i.e. like Oasis but 1 less commerce).	
See also	030 prevents coastal buildings in ice-locked cities.	

042	Currently unassigned	

043	Dan Quayle scale adjusted	
AdvCiv		*BtS*
For a "Julius Caesar" victory, a normalized score of at least 100 000 is needed; the next best victory is at 75 000, then 50 000, 40 000 ... 1000 is needed to avoid the worst title (Dan Quayle).		15 000 suffice for the best victory, the next thresholds are 14 000, 13 000, ... Dan Quayle is below 3000.
Rationale	Almost all my victories have been "Julius Caesar", so this is apparently too easy to reach for an experienced player. More of a logarithmic scale now, covering a wider interval of scores. It's possible that the original scale worked OK in Vanilla Civ 4; hasn't been changed in either of the expansions.	
Tbd.	The score formula needs work too; increase the weight of victory date and difficulty. The main incentive should be to win as early as possible on the highest possible difficulty. Though the bigger issue is that yields increase too much in the Industrial era, so a lot of points can scored by drawing the game out.	
	Should also move the formula into the DLL so that R&F can access it (see comment	

	in `RFTotalScore::updateString`).
See also	<u>707</u>: The Rise & Fall scores are normalized to match this new scale.

044	No auto-save after loading initial auto-save	
AdvCiv		*BtS*
No auto-save right after loading a savegame. There's still an auto-save after regenerating the map, which replaces the initial auto-save and deletes all other auto-saves.		When the initial auto-save is loaded, the game immediately auto-saves again, overwriting the savegame just loaded and deleting all other auto-saves.
Rationale	It's unnecessary to save right after loading, and the deletion of other auto-saves is somewhat unexpected; should only happen when a new game is started (via the main menu).	

045	Hide rival buildings	
AdvCiv		*BtS*
In cities where the player doesn't have a unit and that he/she can't investigate, only wonders (small and great), defensive buildings and buildings that can be inferred from their plot yield change (Lighthouse, Levee) are shown as 3D models on the main interface. Whether a city is in the fog of war (still) doesn't matter.		All buildings are shown in all revealed cities.
Rationale	Too much information. If a player has all cities of a rival revealed, he/she could check every turn whether a building was completed, and infer that units or wonders are being produced when no (ordinary) building gets completed for some time. With detailed knowledge about the AI code, it might also be possible to deduce the AI strategies and war plans. No one does this, but the game still shouldn't reward it. The change could improve performance, but probably just reduces the main memory usage, which isn't an issue in AdvCiv. And it makes the important buildings (wonders, Walls, Castles) easier to spot. Would be more realistic to show the buildings whenever a city is visible (i.e. not fogged), but hiding them seems better for gameplay; I think showing them only when a unit is inside is a good compromise.	
Credits	From Rise of Mankind, though they don't check if the city could be investigated or if there's a unit, and don't show Lighthouse and Levee. Link to source code (1 MB file): <u>Sourceforge.net</u>	
Tbd.	Fog of war should apply to the shown buildings, i.e. only those buildings should be shown that were present when the city was last visible. Doesn't seem that hard to implement. Since only a handful of buildings are ever shown in the fog of war now, the additional memory usage should be negligible. A Civ4lert about completed buildings. Now that the player doesn't learn about most buildings, this wouldn't necessarily generate too many messages. See also Tbd. under <u>210</u>.	
See also	<u>120d</u> removes the Sabotage Building cost from the Espionage screen; could	

	otherwise use that cost to learn about the cheapest building in a city.

046	Pickup of stranded units	
AdvCiv		*K-Mod*
Just some tenative minor improvements to the transportation AI so far.		Units can get stranded on landmasses without friendly cities by razing the only cities or by making peace without conquering any. I think the BtS AIjust leaves them there. BBAI has added AI routines for picking up such units, though, judging by the K-Mod changelog, the BBAI code worked only in certain cases.
Tbd.	Not much; don't want to spend time on low-level AI functions.	
Credits	CFC user vedg reported units not getting picked up in K-Mod 1.46 and provided savegames.	
See also	040 also deals with transportation AI	
When deciding where to place a bumped land unit, landmasses where the unit owner has a city are preferred.		When a unit needs to be removed from the territory of a rival because of an ended war or canceled Open Borders agreement, that unit gets "bumped" to the nearest tile it can legally occupy. Tiles on the unit's current landmass are preferred (tiles on a different landmass are effectively considered to be 1.5 times more distant than their air-line distance).
Rationale	Might make stranded units a bit less common, especially on tiny islands. I don't want to enforce teleportation to a friendly city because this could be exploited for moving units quickly between theaters of war. At least for now, distance should remain the primary criterion.	
See also	034 (disabled) was an attempt to avoid bumping altogether.	

047	Help text for resource tiles revised	
AdvCiv		*K-Mod*
The help text shown when hovering over a tile with a resource is now hopefully clearer and more concise. There was also a minor Vanilla Civ 4 bug (marked with id `001` in my code) that had been giving away rival improvements in the fog of war. In the example on the right, the text now simply says: "Grassland, 2 food, 2 production, 3 commerce Uranium (with Fission) Mine Road" If there is no Mine:		karadoc already made some improvements; a comment says: "*I've rearranged and edited some of the code in this section to fix some bugs.*" E.g. says for a Uranium Mine owned by the player when the player has Physics, but not Fission: "Grassland, 2 food, 2 production, 3 commerce Uranium, Research: Fission, Requires: Mine +2 production, +3 commerce (with Mine) Mine Road"

"Grassland, 2 food Uranium (with Fission, Mine) +2 production, +3 commerce (with Mine)"	
Rationale	The example is what prompted my changes.
See also	Somewhat dependent on 135c, which refactors `CvGameTextMgr::setPlotHelp`.

048	Changes to combat odds text

AdvCiv	K-Mod
When more than one unit is selected by the attacker, the combat odds help text shows which of the selected units is about to attack. Under the breakdown of combat modifiers, the defending unit is shown. (The units are shown as a one-line short description with promotion icons.)	When more than one unit is selected, the next attacking unit is chosen for the human player by the AI. Which unit is chosen can only be inferred from the strength value and odds breakdown. In BtS, the same goes for the defending unit. K-Mod indicates the defending unit through the 3D model shown on the map, but, on the attacker's tile, 3D models of multiple units are shown when multiple units are selected.
No separate info about hitpoints.	If either of the two combatants is damaged, the current hitpoints are shown after the combat odds.
If ACO is enabled, both the attacking and defending unit are shown by default. ACO is still disabled by default (as in K-Mod).	By default, ACO shows the defending unit as a one-line short description with promotions. The attacking unit is not shown by default.

Tbd.	When a stack attacks, the map should show only the 3D model of the unit that is about to attack. It's easy enough to set the "center unit" of the attackers' tile accordingly in `CvGameTextMgr::setCombatPlotHelp`, but the game ignores the center unit and shows a mix of 3D models instead. Not sure if and how this can be changed. In any case, the one-line descriptions are still going to be helpful: can't tell from the 3D model which promotions a unit has.
Rationale	The UI needs to make clear which units are about to fight. ACO already had an option for this, but I don't want to use ACO because I find it too bulky. Hitpoints: The one-line descriptions already include the current strength and the total strength, which is how the UI usually represents hitpoints. It took me a moment to understand what the ACO settings "always", "never", "normal" and "alternate" do. The idea is, apparently, to let users configure two sets of settings, a "normal" one and an "alternate" one for further details or some special purpose. The "swap views" checkbox enables the alternate settings. I've set the info about attacking unit to "always" (the defending unit was already set to "always").
048b	Replaced a few uses of the word "retreat" with "withdraw" in help text.
Rationale	Game terms should be used consistently. Plus I may want to use the term "retreat" in the context of a combat round limit in the future.

049	The AI doesn't build roads in human territory. (But may upgrade human roads to railroads.)
Rationale	If the human pillages those roads, the AI keeps rebuilding them, which can

	permanently occupy several AI Workers. Also, ultimately, humans should be in control over the roads in their territory.
Tbd.	Implemented through a new pathfinder flag. I'm not sure that I'm using that flag in all the right places; should take another look some time to make sure I'm not preventing pathfinder instances from being reused, which could hurt performance.

050	Earth scenario

The [EuroWorld](#) scenario is not part of AdvCiv yet, but I've already made some changes in AdvCiv to accommodate that scenario:

[300](#) prevents large deserts from filling up with Lions. [140](#) reduces the effects of various world-size modifiers. Earth scenarios tend to be crammed despite their great size, so the BtS modifiers don't work well. [171](#) lets the AI pick religions in chronological order ("Choose Religions" option) when no favorite is available.

And all the changes with id 05-something.

Designer's notes: In a scenario, when holding down ALT while hovering over a tile with a resource, the game displays a short text that explains why the resource was placed there if the scenario comes with a game text file containing such designer's notes. See `Civ4GameText_Earth18Civs.xml` for an example. Disabled when in Debug mode (because ALT key has a different function then).

Tbd.	I'm not sure if I'm ever going to use this – would have to be done for most resource locations (if not all) to make sense.
See also	ALT key shows combat odds instead of plot help when hovering over a unit. [004](#) disables this when the unit is owned by the player – one can't attack one's own units.

051	Initial game state in scenarios

AdvCiv		*BtS*
In scenarios, civs receive free tech from the game difficulty in addition to any free techs defined by the scenario.		Only free units are received based on the game difficulty (but only if the scenario doesn't define any free cities or units; no change).
Rationale	Don't want the game difficulty to have a smaller impact in scenarios like Earth18Civs than in regular games. Also, the absence of free Archers leads to problems with very early AI-on-AI wars in crowded scenarios.	
See also	[104u](#) fixes issues with AI initialization in scenarios. [126](#) grants free tech from game difficulty when starting in a later era.	

052	Adjustments to AI found behavior for scenarios
See also	Several of the changes under [031](#) were made with scenarios in mind, but also have a significant effect on randomized maps.

AdvCiv	*K-Mod*
When the AI chooses its city sites, found values are randomly increased or decreased by up to 1.5%, and when deciding which site to settle next	Neither AI found values nor the choice of the next site are randomized. Randomness in other choices, e.g. research, scouting, city production

(Settler Unit AI), the respective found values are randomly increased or decreased by up to 4%. (These random adjustments do not change from turn to turn, but stay the same for each tile for the entire game.) Only applies to scenarios.	and Worker builds, can affect AI found behavior, but the placement of the first couple of cities is often perfectly predictable.
Rationale	Should improve replayability of scenarios. Not much randomness in the site selection because this could move a city from a locally optimal position into one that is obviously inferior, which makes the AI look bad.
The AI considers training a Settler in a size-2 capital when that capital is slow to grow.	The AI normally lets its capital grow to size 3 before training a Settler. Exception: When the capital isn't growing at all or has no decent unworked tiles left.
Rationale	Capitals with low food but high production shouldn't wait for size 3. (On random maps, such captials don't really occur.)

053	No Tundra Farms
Tbd.	Want to allow Farms only on Grassland, Plains and Floodplains. Not implemented yet, but I'm letting the AI already treat Tundra river tiles with caution. When the change is made, Tundra river without Forest should also be counted as a "bad" tile.
AdvCiv	*BtS*
AI found value counts only a little extra utility for an adjacent river when a tile has Tundra terrain.	Tundra river tiles are treated the same as other river tiles; quite a bit of utility is added for the river.
Rationale	Earth scenarios have large taiga areas along rivers, and these areas are not supposed to be deforested and farmed. Taiga soils are very badly suited for agriculture (and actual tundra soils are even worse). On randomized maps, this shouldn't make a big difference as they generate few Tundra rivers. Settling the far north can still be worthwhile when there are bonus resources.

054	Options on the Custom Scenario screen
See also	[250b](): Advanced Start and SPaH
AdvCiv	*BtS*
The "Always War or Peace" game option is shown on the Custom Scenario screen, but not on the Custom Game screen.	The option is visible on both screens, but it's equivalent to "Always Peace" unless a scenario sets certain civs to be at war from the beginning.
Rationale	The option is confusing and superfluous in non-scenario games.
Config	Set to invisible in `Civ4GameOptionInfos.xml`. Can be toggled to make the option visible on the Custom Game screen too (as in BtS). The AdvCiv DLL makes the option visible on the Custom Scenario screen regardless of the XML setting.
Tbd.	Would be nicer to add a field to `Civ4GameOptionInfos.xml` that determines whether an option shows up on Custom Scenario.

055-059	Still unassigned

060	Add-to-spaceship not shown after part completed

AdvCiv	BtS
After completing a Spaceship (SS) part, the player is only taken to the SS screen if the SS is ready to launch.	Except in networked multiplayer, the player is taken to the SS screen after every completed SS part. The SS screen was added in BtS.
Config	BUG menu, "General" tab under "Splash Screens"
Rationale	Finishing one of the sixteen parts isn't such a grand event.

< 099	*Still unassigned*

099	Culture isn't removed when a civ is destroyed
See also	Could merge dlph.24 fully in order to stop colonial vassals from using the slot of a dead civ (which, I suppose, resets the culture of the dead civ).

AdvCiv	BtS
When a civ is eliminated, its culture remains in the game and keeps causing anger.	When a civ is eliminated, its culture disappears as well.
The AI player is announced as having been "defeated".	An announcement says the *civ* was "destroyed".
Anger before and after conquest is explained as "We resent being ruled by a foreign culture".	Before elimination, anger from culture is explained as "We yearn to join our motherland". No anger after elimination (the motherland is gone).
Anger is 40% of the foreign population with Open Borders (or capitulated vassal or Barbarian), 150% times 40% = 60% without OB (or if they're conquered), and 200% times 40% = 80% while at war; all rounded down.	Anger is 40% of the foreign population while at peace, and 150% of that, i.e. 60%, while at war, both rounded down.

Rationale	Removes one strong incentive for conquering a civ entirely. The goal is to make a vassal agreement the correct choice most of the time – less micro-management that way. Also intended to weaken military strategies.
	It's also glaringly implausible that a culture would instantly disappear.
	No AI changes: conquering cities is still very desirable, and the AI doesn't consider anger from culture anyway when deciding whether to accept a capitulation.
Config	The anger can be tweaked through XML (`GlobalDefines_advc`), but can't re-enable cultural elimination. This is because BtS doesn't actually set culture to 0 in one place, but checks for elimination in numerous places and treats culture as 0 when appropriate, so making it optional is messy.
Credits	Contributions by Chronis, lfgr and vincentz CFC thread
See also	Chapter about "Immortal Culture"
	130w adds a diplo penalty for cities with high foreign culture.
099b	Tile culture decays

Each round, the culture value of each player (civs and Barbarians) in each tile is decreased by 1%.	Tile culture doesn't decay. (But it's treated as 0 when a civ is eliminated.)
When a tile is within the city radius of at least one civ, the tile culture of civs that don't have the tile within a city radius decays faster: if the tile is within the outer ring of any city radius, 2 percentage points are added to the decay rate, and 4 percentage points if it's within the inner ring of any city radius. Exception: civs with less culture in the tile than the city owner with the highest culture don't suffer from expedited decay.	
(This change does not affect *city* culture.)	

Rationale	Should lead to fewer unworkable tiles (see also the rationale for [035](035)) and fewer issues with stranded AI stacks (see also rationale for [034](034)). Higher decay rates would accomplish more, but I don't want tiles to flip too easily around conquered cities. That said, in BtS, it's too difficult to culture-flip tiles in the radius of a conquered city, especially in Renaissance or later; tiles have tens of thousands of culture points by then. It generally takes too long for city culture rate to translate into relative tile culture in BtS.
	Another way of looking at the decay rates: If a tile receives culture at a constant rate, tile culture can't exceed that rate times the (multiplicative) inverse of the decay rate, e.g. 100 if the decay rate is 1%.
	Why not simply tweak the culture spread formula so that tiles near cities receive more culture? The player only sees the culture percentages, so, visually, it doesn't make a difference. I don't want to increase culture on tiles that are near multiple cities of the same civ lest that "two cities would almost always be able to culture press a solo city" (from the K-Mod readme file). The main goal is to allow civs to work tiles in their (exclusive) city radii. That's also why I'm exempting civs with less tile culture than the city owner. It's fine if another civ has 45% tile culture so long as the 55% civ is able to work the tile. The exemption also makes it easier to implement this change without a performance penalty.
Config	`TILE_CULTURE_DECAY_PER_MILL` and `CITY_RADIUS_DECAY` in `GlobalDefines_advc.xml`
See also	[035](035) (disabled): City owns all tiles that no other city could work It turns out that "RoM: A New Dawn" also has a culture decay mechanism (SourceForge link to revision), but theirs is only triggered every 50 turns and then halves tile culture. For performance reasons I suppose; but I've managed to make the computing time negligibly short in my implementation after some tweaking.

Cities in occupation spread no tile culture.	Cities in occupation produce 0 city culture, but the present city culture generates tile culture as normal.

Rationale	This should give civs that allow their cities to revolt a harder time.

No increased decay in city tiles, nor in tiles owned by Barbarians.

Rationale	Don't care if Barbarians are able to work tiles. Rather give those tiles to civs with strong culture.
	Culture in city tiles doesn't affect which tiles are workable. The increased decay would make revolts and anger from foreign culture easier to handle, which isn't what I want. The exception for city tiles can lead to higher culture percentages of the city owner in tiles surrounding the city than in the city tile. This is a bit odd, but not a real problem I

	hope.
099c	Cities revolt regardless of culture range
See also	[210b](#) adds an alert about positive revolt probabilities

Any city with sufficiently strong foreign culture can revolt, but the revolt can only flip the city if the owner of the foreign culture is alive and has a city nearby. (And can't flip if flipping is disabled in game options.) Made some adjustments to AI willingness to accept capitulation vs. trying to capture further cities.	Foreign culture can only cause a city to revolt if the owner of that culture is alive and has a city nearby, i.e. close enough so that the first city is within the culture range (based on culture level) of the second city.

Rationale	To remove another incentive for eliminating civs, to make conquests more costly and culture more relevant. Resurrecting a prior owner seems needlessly messy; the probabilistic occupation times (change [023](#)) should make revolts from dead culture painful enough. Joining the Barbarian civ would be easy, but strange, I think, because the city would then train units based on the Barbarian tech level. Not sure if cities with high living foreign culture but outside of foreign culture range should be allowed to flip. Let's say the rebels only dare joining the homeland if the homeland is near enough to protect them.
Config	Can (largely) restore BtS behavior through `REVOLTS_IGNORE_CULTURE_RANGE` in `GlobalDefines_advc.xml`.

Barbarian culture can cause cities to revolt. They can't flip to Barbarian control though, and Barbarian culture strength is only counted half in surrounding tiles. Cities can't flip from a master to its vassal; only go into occupation. Increased strength of foreign culture in cities of capitulated vassals.	Essentially the same, but Barbarian cities have practically never enough culture range to cause another city to revolt. Culture in tiles adjacent to the city always contributes to the foreign culture strength, and, ultimately, the revolt chance. Can flip between vassal and master. No way then for the master to get the city back.
Rationale	Not sure about this. Seems more flavorful/ historical to let conquered Barbarians revolt. Might play better without these revolts; players don't expect them, and conquering Barbarians should be easier than conquering civs. Then again, Barbarians don't generate much culture, so it doesn't take much effort to suppress them, at least not when the surrounding tiles don't count. Could say that only counting the city tile models the (political) disunity of the Barbarians. Could easily implement flipping to Barbarian control. Historically, that hasn't really happened; see the list of colonial uprisings [here](#) (Wikipedia). More accurately modeled as a period of unrest. Flipping from master to vassal could incentivize elimination over capitulation. Also, I find it ultimately more annoying than challenging.
Config	`BARBS_REVOLT` switch in `GlobalDefines_advc.xml`
See also	[025](#) reduces culture spread from capitulated vassals

The revolt chance is increased on account of city religions if a) the civ to whom the revolt culture belongs is	Only a) increases the revolt chance, and also applies to capitulated vassals. Dead culture can't cause revolts.

alive, not a capitulated vassal of the city owner, has a state religion and that religion in present in the city; or b) if the city owner has a state religion, and that religion is not present in the city but some other religion is. No change: The revolt chance is decreased (which may cancel out the above) if the city owner has a state religion, and that religion is present in the city. The revolt chance is also decreased (but only half as much) if the city owner has no state religion. AI city owner is slightly inclined to switch to the religion of the foreign population.	When there is a non-state religion in the city, then an oppressive state religion (which is not present in the city) is no worse than no state religion.
Rationale	I almost removed this complicated stuff entirely, but it's kind of nice that spreading one's state religion can help flip a city. The BtS rule doesn't work for dead culture, so I felt that some replacement was needed to balance out the decreased revolt chance from owner's state religion. The BtS rule also doesn't work well for capitulated vassals of the city owner: The owner can just tell the vassal to switch to a different religion; not an interesting decision, and players that aren't aware of the religion/revolt rules get confused or screwed.
Halved the religion-based modifiers (see above).	
Rationale	Spreading one's state religion had made a huge difference previously, going from doubled to halved foreign culture strength, i.e. a factor of 4.
Config	`STATE_RELIGION_MODIFIER` parameters in `GlobalDefines_advc`.
If a city can't flip on the third revolt (because the cultural owner is dead or flipping disabled in options), it loses one population instead (and goes into occupation).	No extra penalty if flipping isn't possible; occupation periods just keep getting longer.
Rationale	To discourage players from ignoring revolt probabilities (the lost turns don't become punishing until numerous revolts have taken place). And it would be strange if cities could just keep revolting. The loss of population reduces the revolt probability so that the city should eventually end up depopulated but pacified.
0 revolt chance in the first 10 turns (adjusted to game speed) after a city was founded in the Ancient era.	No such period of grace, but since cities can't be founded within the culture range of a foreign city, revolt chance is always 0 in newly founded cities.
Rationale	Now often an issue in the early game when founding anywhere near a foreign border. Probability tends to decrease quickly as the new city starts spreading tile culture, but can get unlucky with revolts until then. Don't want that randomness, don't want to punish settling near foreign borders (player can't even tell that there is foreign culture; not shown on unowned tiles), and don't want to scare players with an initially high revolt probability.
Extra AI defenders in cities that might revolt.	No code for this at all. The AI tends to put units in border cities though, against external threats.
Rationale	Since revolts no longer occur only in border cities, the AI had to be adjusted.

099d	Can't spread religions during civil disorder.	
AdvCiv		*BtS*
Missionaries and Executives can't spread religions/ corporations in cities that are in disorder (from occupation, anarchy or a random event).		Can spread regardless of disorder, but there isn't much of a point because happiness and culture from religion have no effect during disorder, and revolt chance is 0.
Rationale	Now that the occupation duration is linked to the revolt probability, spreading a religion right after conquering a city could reduce the (expected) occupation time. Don't want players to micromanage missionaries to spread religions right after conquest. Also seems realistic that religious communities (or corporate branches) can't be established during disorder.	
Tbd.	Would be better to show the Spread Religion button grayed out with explanatory text. Currently, the button isn't shown when a city is in unrest.	

099e	AI for promotions that reduce revolt chance	
AdvCiv		*Warlords*
The AI ignores revolt protection when selecting promotions and when moving units.		A promotion with revolt protection is chosen based on whether the cultural owner of the current tile differs from the actual owner. When moving units, revolt protection is ignored. Revolt protection from promotions was added in Warlords, but remained unused. K-Mod gave the Leadership promotion 50% revolt protection.
Rationale	Too much work to do this properly (see *Tbd.* below). What Warlords does is worse than nothing.	
Tbd.	The promotion should be selected based on the revolt chance in a nearby city, the number of units already stationed there and the revolt protection percentage. When there is a city with a high revolt chance, a unit with revolt protection should be given a defensive Unit AI type and stationed in that city.	

100	Changes to sponsored wars	
See also	[146](#): Peace treaty between sponsor and the civ that declares war. [210a](#): Alert about AI willingness to be hired for war.	
AdvCiv		*BtS*
When an AI civ declares war at the request of another civ (hired/bribed for war), the DoW message informs the human players about this sponsorship: "...declared war on ... at the request of Alexander."		Humans don't learn about AI bribes.
Rationale	The information isn't terribly relevant strategically, but makes it easier to make sense of the AI, and makes it clear that the AI actually does sponsor wars. Moreover, if AI civs learn about sponsored wars ("You brought in a war ally against us!"), the human civs should be allowed to know this too.	
(Only relevant if UWAI is disabled:)		Weak AI civs are sometimes bribed into joining

AI civs are reluctant to be hired for war against a powerful civ. Either they decline fearing "their military might", or the price for war is high, up to two times higher than in K-Mod, depending on how disparate the power ratio is.	wars against powerful civs. An AI civ doesn't consider its individual military power, but only the total power of the war coalitions.
Rationale	War against a considerably stronger civ is a big risk, even as part of a coalition, and, in any case, the weakest link is unlikely to conquer any cities. Moreover, sponsoring wars was too cheap overall.
Config	`WAR_TRADEVAL_POWER_WEIGHT` in `GlobalDefines_advc`.
While negotiating peace, no declarations of war against third parties can be discussed: no "Declare War On" items are shown on the trade screen.	Normally blocked by "we don't like you enough" or "will never trade with our worst enemy," but it may occasionally be possible to hire an AI civ for war as part of a peace treaty.
Rationale	Shouldn't show the option if the AI practically always refuses, and Cautious attitude despite war is an oddity that shouldn't matter. Could instead remove the attitude checks while at war. Seems more realistic that such options can't be discussed. Would also take a bit of implementation work because the the war trade should be evaluated assuming that the peace treaty is already signed.
100b	Brokered peace shown in replays
Brokered peace is shown in the replay log ("brokered by ...").	Replay log only says "has made peace with".

101	Revolt after conquest
See also	[210b](#) shows an alert when revolt probability changes from 0 to a positive value.
AdvCiv	*K-Mod*
Reverted the K-Mod 0.9 change to revolt probabilities, and made some changes of my own. I did keep the K-Mod game speed scaling. Revolt probability increases (essentially) linearly with the percentage of foreign culture, as it does in BtS, but the strength of the culture garrison is now exponentiated. This means that doubling the garrison of a city more than doubles the protection against revolts, and a large stack of recent units can suppress any revolt. More specifically, the culture garrison strength (CGS) of each individual unit is reduced to two thirds, then taken to the power of 1.4, and the sum of these values is again taken to the power of 1.2.	Revolt probability increases superlinearly with the percentage of foreign culture, while garrison strength does not. There are some other mechanisms at work, but the effect is that sometimes, especially after conquest, no stack is large enough to keep a city from revolting. On the other hand, a medium-size stack is often enough to reduce the revolt probability nearly to 0, but not all the way. CGS values are set in XML to e.g. 3 for Warrior, 6 for Maceman and 9 for Rifleman (same in BtS). The total garrison stength of a city is the sum of these values.

Rationale	The K-Mod behavior is intended, i.e. it's not that karadoc hadn't considered flipping after conquest; see disussion [here]. I can see how keeping a city can be harder than conquering it in the first place, but not *that* much harder. Say, ten good units should generally suffice to hold on to a city. If this makes revolts easy to prevent late in the game – fine; it's mostly early expansion that needs to be paced. The near-0 probabilities in K-Mod are a really bad idea imo. Disastrous events with low probabilities are annoying, think of nuclear meltdowns. I'm doing the opposite by giving garrisons a superlinear effect, so that it's hopefully clearer whether a city is worth keeping and less up to chance.
Config	`REVOLT_TOTAL_CULTURE_MODIFIER` in `GlobalDefines_advc`.

AdvCiv	*BtS*
Revolt strength is reduced based on the highest city tile culture of any civ, even if that civ doesn't have a nearby city. For example, when the owner of a city has almost no culture, say, 1%, and the only other nearby civ has some culture, but also not much, say 10%, the revolt probability is low or zero.	Only tile culture of nearby civs matters. The 10% in the example would lead to a high revolt probability because it's much more than the owner's 1%.

Rationale	Don't want to reward civs for just 10% (or so) culture, especially not uninvolved parties in wars. Also implausible that the 10% would find sufficient support for a revolt.
See also	A somewhat common issue because of [099] (culture of dead civs sticks around).

Revolt strength reduced if foreign tile culture isn't far higher than owner's tile culture. E.g. if foreign tile culture is just 25% greater than owner's culture, revolt strength is reduced to 25%. This makes revolts easy to suppress with one or a couple of units when the owner's tile culture is close to the foreign tile culture.	Revolt strength is increased by up to 100% if owner's tile culture is small, but high owner's culture can't reduce the base strength from population and surrounding tiles. Cities with up to 49% tile culture of the owner can still have a high revolt chance.

Rationale	Counterintuitive that a city could easily flip at nearly 50-50 tile culture. The change rewards the owner for building up culture, even if the owner hasn't (yet) reached parity.

City flipping after conquest enabled by default. (Actually, flipped the option to "No city flipping after conquest" and kept it disabled by default.)	The option is called "City flipping after conquest" and disabled by default.

Rationale	Part of my efforts to weaken military strategies. I want to build on the revolt mechanism, so it should be (fully) enabled by default.

~~Reduced culture garrison strength of all mechanized units (Armored and Siege except Machine Gun) to 50% through the DLL.~~ Since v0.94, the CGS of Catapult, Trebuchet, Cannon, Artillery and Mobile Artillery are reduced through XML; no change to Armored units.	E.g. Catapult has CGS 4, same as Axeman; Tank 12, same as Marine. Machine Gun 9, same as Rifleman.

Rationale	More flavorful, hopefully also more intuitive. One would assume Catapults to be less suitable for quelling revolts than Axemen or other infantry. It's asymmetrical warfare. This explanation also fits with early units having relatively high CGS.
	Important that Machine Guns are exempt because the AI uses these as standard city defenders.
	As for Armored units, there are examples of tanks being effective at supressing revolts and examples of tanks being ineffective. Better to leave the CGS value unchanged then.
Config	`Civ4UnitInfos.xml`
Tbd.	Consider giving Spy a positive CGS, possibly also recon units. Espionage should somehow help against revolts. ("Spread Culture" does in K-Mod, but needs to happen before conquering the city, which requires some foresight.)

When a city flips while at war, the garrison is bumped. Only Barbarian garrisons are killed.	The garrison is killed. Bumping only happens when flipping at peace-time.

Rationale	Killing a stack of units is pretty outlandish. Bumping Barbarians would be unusual, and killing them is less problematic wrt. game balance. I guess they just lay down their arms.
Credits	The issue had been pointed out (and narrowed down) by DarkLunaPhantom here.

Added the number of prior revolts to the Nationality help text, and whether the city will flip on the next revolt.	Help text only shows the revolt probability.
All civs that know a city are notified about a revolt.	Only the actual owner and the cultural owner are notified.
Revolt probability (if > 0) shown on the main interface as part of the plot help text.	Need to enter city screen to see revolt probability; no way to see revolt probability of a foreign city.

Tbd.	In addition to the revolt alert (change 210b), the main interface should indicate when a city has a positive revolt chance (change 002f makes room for another indicator). An extra column on the Inland Advisor screen would be nice to have.
	May have to disable the notifications again if they turn out to happen too frequently (given change 099c) in large games.
	Revolt probability in visible foreign cities shouldn't be secret – all factors are public knowledge.

Revolt probability is initially based on the current population of the city. If the city has ever had a higher population than currently, then, over the course of 75 turns (slightly longer or shorter on speed settings other than Normal), a gradually higher population is assumed, up to a maximum of the highest population ever.	Always based on the highest-ever population of the city.
Culture in the eight adjacent tiles factors into foreign culture strength; the effect increases over time (same mechanism as above for population). After 50 turns (on Normal speed), culture strength is further increased when adjacent tiles are *owned* by the foreign civ.	Ownership of the adjacent tiles always counts, and can increase culture strength significantly. Culture points in those tiles don't count directly.
While there is hurry anger ("cruel oppression"), foreign culture strength is increased as if the city had 5 population more and the resulting foreign culture strength is increased by 50%. The AI doesn't use Slavery in cities that already have a positive revolt chance.	

Rationale	I think the BtS rules are supposed to make cities flip faster once the adjacent tiles have flipped. Loss of tiles will often lead to population loss, which would normally reduce culture strength.
	I agree that cities enveloped by foreign culture should flip quickly, but I don't want conquered cities to be untenable, and I don't want players to feel compelled to continue their wars in order to push back foreign borders. My rules are supposed to give the conqueror time to build up some culture.
	That's all overly complicated (already in BtS), but hopefully players don't need to know the details.
	Slavery would be an easy way to get around anger from foreign culture, and to keep the population small, making the city easier to pacify.
See also	If 035 is enabled, it's *cultural* ownership (highest tile culture that matters for the revolt chance after 50 turns. 912d allows Slavery to be disabled.

Barbarian cities flip on the second revolt.	Flip on the first revolt.

Rationale	Given the increased revolt proabilities in K-Mod and AdvCiv and the removal of the range restriction for revolts (099c), a single Barbarian revolt happens (way) too quickly. A holy city conquered by Barbarians in the early game would flip back in something like 10 turns.

102	Show fewer foreign moves
AdvCiv	*BtS*

"Show friendly moves" and "Show enemy moves" enabled by default. Note that changing the default doesn't have much of an effect because player options are read from `CivilizationIV.ini` unless it's a fresh installation.	Both disabled by default.
Rationale	Now that the biggest problems with these options are fixed, players should use them. Better than having to inspect the map after every round of AI turns to find out which units have moved.
Config	`Civ4PlayerOptions.xml`
See also	[108d](#) shows a loading screen hint recommending the show-moves options
When a move starts in a visible plot and ends in an invisible plot, the camera is centered on the start plot and the player gets to see/ glimpse the unit moving out of sight. Not shown: Units that begin and end the turn in invisible tiles, i.e. move only through a visible tile.	Only moves ending in visible plots are shown. In the case of a multi-tile move ending in an invisible tile, not even the visible portion of the move is shown.
Rationale	Would make sense to show units passing through, but difficult to implement; can't catch the unit as it moves. What's easy to do is show the empty traversed tile, but that's confusing, and it doesn't make sense that the player learns about the tile, but not the unit that moved. Better not to show those moves at all.
Tbd.	Often the unit moving out of sight is already gone when the camera jumps there. Not sure if this can be helped.
AI avoids patrolling within its own borders. Patrolling units tend to move in a consistent direction. Leads to wider patterns.	AI constantly patrols within its borders, especially with fast units like Knights. Patrol movement is memoryless; narrow patters.
Rationale	The patrols make "show enemy/friendly moves" unusable, and there isn't much of a point. After all, borders grant visibility. I guess patrols add some uncertainty to small-scale surprise attacks (can't be sure how many units exactly are going to be near a city at a given time) and could help against nukes. Well, anti-nuke AI behavior needs to be improved at a later point anyway.
Tbd.	I didn't disable inner-border patrols entirely because, in order to patrol unowned land, AI units may have to traverse owned land. Moving in one direction for a longer time also helps with that. That said, patrols in unowned land don't seem crucial either. Against Barbarians, the guard-city-site AI routine is probably more effective. If there's too much or too little patrolling, I may have to find a cleaner solution.
Moves of non-hostile Workers, Missionaries and Executives within their owners' cultural borders are no longer shown when the "show friendly moves" option is enabled. As for non-hostile ships, moves of human ships and cargo ships are always shown (except AI ships on patrol), moves of other ships only when moving into sight, out of sight or inside the borders of the observing player.	All unit moves are shown.

Rationale	These land moves are practically never interesting. Even if Worker stealing weren't disabled (change [010]), I doubt that seeing rival Worker moves would help. For ships, it's a bit trickier because a passing Caravel could matter (target for Privateer, or could be carrying a Spy), but mustn't show patrolling Destroyers. Cargo units that can carry city attackers need to be shown in any case.
	By not showing moves of cargo ships on patrol, I'm giving away some info about the intentions of the AI. That said, a lone cargo ship is practically always a patrol, and patrolling AI Galleys are just too annoying to watch.
Config	`SHOW_FRIENDLY_WORKER_MOVES` and `SHOW_FRIENDLY_SEA_MOVES` in `GlobalDefines_advc`
Tbd.	Could be an issue for enemy moves as well when there is city visibility from espionage. So, should perhaps apply the change to enemy moves too.

~~Related: Fixed a bug that caused AI non-combat units to oscillate between safe cities when at war. See change 001.~~ (Also fixed in K-Mod 1.45, now using the K-Mod fix.)	
~~"show friendly moves" can be toggled using Shift + M. If the option is toggled this way, the change won't be visible in the Options menu, and won't be saved upon leaving the game.~~ (Disabled through a switch in `GlobalDefines_advc.xml`. Turned out I had never used this.)	
No moves are shown when in Globe View.	The camera jumps around, but the moving units aren't visible in Globe View.

103	Spy unit can investigate cities	
AdvCiv	*BtS*	*Vanilla/Warlords*
A player can investigate a rival city if that player has a Spy unit in that city, and that unit hasn't moved this turn. (Can still investigate cities through passively accumulated espionage points as well.) Great Spy can also investigate.	Can only investigate rival cities by accumulating espionage points. That said, the "Sabotage Building" and "Sabotage Production" missions (and the cost of these missions) give away some information. Not even Great Spy can investigate.	A local spy unit allows city investigation regardless of whether it has moved. City religion can also grant visibility. No visibility from espionage points. No Great Spy unit.
Rationale	To make Spies more useful for players that don't invest heavily in espionage. Also, constructing wonders is more fun when one can find out who else is in the race. Players don't spend thousands of espionage points just to find out if someone is currently building a wonder.	
	Perhaps investigation was a bit too easy in Vanilla/WL; I'm adding the restriction that the Spy mustn't have moved, which should make quite a difference when hopping from city to city to keep an eye on all of them. Moreover, BtS increases the overall risk of Spies getting caught.	
Config	Can be reverted to BtS in `Civ4UnitInfos.xml`.	
Tbd.	Would be nice to have an "Investigate" button in the "Perform Espionage Mission" list. Clicking the button would simply open the city screen. Could also charge a mission	

	cost if investigation is too easy now.
See also	[120d](#): Mission cost for Sabotage Production no longer shown on the Espionage screen. It had previously been possible to guess based on that cost whether a city was close to completing a wonder.

104	UWAI: See chapter [Utility-Based War AI](#)
	Most of the changes are in newly created classes. I've added a few auxiliary functions in pre-existing classes too. Technical documentation only inline. There are also some changes in unlikely places, which I've marked with the following sub-ids.
	Since the skeleton of the code was written before I thought of the name "UWAI", the identifiers in the code are prefixed with "wpai" or "WarAndPeace(AI)".
See also	[210a](#): UWAI changes that make the war trades alert less noisy.
Config	By checking "Aggressive AI (Legacy)" on the Custom Game screen, UWAI can be disabled. Can also disable it through XML; see instructions under [Known Issues](#).
	UWAI settings in `AI_Variables_GlobalDefines.xml`.
104b	Code for measuring path lengths between cities. (A hack that measured distances between cities by generating paths for garrisoned units was removed in v0.94.)
104c	AI avoids military victory strategies in order to spare friends

AdvCiv/ UWAI	*BBAI/ K-Mod*
When weighing its victory strategies, the AI considers whether a military victory (esp. conquest) will require an attack on a friend. If so, the AI will pursue different strategies instead.	The AI doesn't take friendships into account when choosing victory strategies.
If the AI still comes close to a military victory, it may ultimately attack friends, depending on the specific circumstances.	Once stage 4 out of 4 of a military strategy is reached, the AI ignores attitude when it comes to war targets.

Rationale	See the UWAI chapter. Victory strategies aren't within the scope of UWAI, but, in this case, the strategy weights need to be aligned with the DoW policy.
Config	Only effective if UWAI is enabled.
See also	[115](#): AI commitment to victory strategies
104d	Added a function that evaluates holy cities, shrines and corp. HQ, replacing the (overlapping) code in the `targetCityVal` and `cityTradeVal` functions.
104e	Halved military power values of ships through the DLL.
	Reduced military power (not combat str.) of Maceman from 9 to 8; Samurai at 9 (no change), Berserker at 9 (was 10), Jaguar at 5 (was 6). Increased power of Infantry to 22 (was 20).
Rationale	UWAI handles naval and land power separately, so the power of ships relative to land units doesn't matter. But the K-Mod AI uses a single power rating, and, considering that ships are only useful in certain situations, ships contribute too much power. Also, even if UWAI is enabled, some strategic AI choices are based on a single power rating, and the Statistics screen shows only one rating as well.
	High power of Maceman makes UWAI overestimate Maceman when predicting military build-up; appears as a better offensive unit than Grenadier. The bonus against melee isn't that useful for this type of unit at that point of the game (whereas 7 power for

	Crossbowman seems OK). UWAI (if enabled) increases the power values of all offensive units that can receive city raider promotions; this gives Maceman another boost.
	The 25% bonus of Infantry vs. Gunpowder is very valuable, whereas Woodsman I shouldn't be enough to bring Jaguar to the same power as Swordsman (which has 1 more strength). Montezuma is suicidal enough without overestimating his unique unit.
Config	`Civ4UnitInfos.xml`
See also	[131](#) also makes some changes to XML AI settings, e.g. the asset value of Infantry.
104f	More narrow conditions for Dagger strategy

No Dagger while in a chosen war; Dagger disabled entirely when UWAI is enabled.	Having started a war doesn't affect Dagger.

Rationale	Staying in the Dagger strategy while at war doesn't make much of a difference for the K-Mod AI, but it gets in the way of my UWAI testing (UWAI running in the background while K-Mod decides).
	The purpose of the Dagger strategy seems to have shifted from BAI to BBAI to K-Mod. [Here](#)'s the original description by Blake. The latest purpose was probably to build up units without having a war plan, and thus also without giving away war preparations through WHEOOHRN; then a sudden strike. UWAI solves this problem differently.
104g	Don't demand tribute from unreachable civs (implemented based on UWAI code)
104h	Moved the BtS and K-Mod code for negotiation of peace terms into a separate function, and made some minor functional changes too (that also take effect when UWAI is disabled).
104i	Refusal to talk (RTT) when at war. A new AI memory type, `MEMORY_DECLARED_WAR_RECENT` is used for distinguishing a DoW at the request of a third party or through a defensive pact (DP) or a vote from a normal DoW.
Config	The `MemoryDecayRand` value of the new memory type determines the RTT duration in wars on behalf of a third party. This value can be set through `Civ4LeaderHeadInfos.xml`, and a default of 22 is hardcoded in the DLL (`CvLeaderHeadInfo::getMemoryDecayRand`). That default value corresponds to an expected RTT duration of 22/2 = 11 turns. (Though, as in BtS, war success and AI personality can shorten the duration.) [130j](#) is responsible for the division by 2.
Tbd.	When the AI is already willing to talk according to the BtS rules, adding `DECLARED_WAR_RECENT` memory has no effect. Thus, a civ could e.g. make peace with the target of a force-war resolution right after the vote. Not sure what to do about this. For a start, the turn on which a vote takes place or a war ally is brought in should be remembered.

When a DP leads to a DoW, then declared-war-recent memory is added for all involved parties, not just those that join the war through the DP. When peace is made between two civs, the civs become willing to talk to the other side's DP allies.	

Rationale	Otherwise, the target of the original attack would be free to negotiate peace, while the allies that declared war because of the DP would be forced to continue the war.
See also	[dlph.3](#) allows DP despite war
Tbd.	War votes should arguably lead to a (10-turn?) period of forced war. The current code based on AI memory can't enforce war between two human civs (or just for 1 turn).

When two civs make peace, all their declared-war-recent memory is set to 0, i.e. both become willing to talk to everyone (unless war utility is too high).	

Rationale	Refusal to talk is a matter of fairness toward a third party (sponsor, DP ally, voting members of the AP). When a war party bows out (possibly said third party itself), it's a big enough change in circumstances to disregard any commitments for continuing the war.
104j	Change in a master AI's war plans affects war plans of its vassals. The unit stacks decide where to invade first. Active even if UWAI is disabled, meaning that BBAI's `CvTeamAI::AI_isOkayVassalTarget` function ("*Block AI from declaring war on a distant vassal if it shares an area with the master*") no longer works.
Rationale	With K-Mod's AI changes, I doubt that `isOkayVassalTarget` is really needed, whether UWAI is enabled or not. I'm not allowing unit stacks to anticipate wars triggered by Defensive Pacts (DP) because diplo penalties need to be taken into account, so the strategic side of the AI needs to choose the target for the declaration of war and the tactical side needs to respect that decision.
See also	[003b](#): It could be important for performance that `CvTeam::getMasterTeam` is precomputed.
104k	Moved rounding of trade values into an auxiliary function (no functional change)
104l	Caching of war utility to keep the user interface fully responsive when checking if a civ is willing to talk or willing to trade certain items. No functional change outside UWAI, but had to put some code to switch caching on and off into `CvDLLWidgetData.cpp`.
104m	Handling of tribute demands redirected to UWAI; fewer random AI requests and faster decay of AI memory about human response to tribute demands (only if UWAI enabled). Regardless of whether UWAI is enabled: AI doesn't ask for help, an embargo or (no change) tribute if it's about to declare war on the player (war preparations complete). On Noble difficulty and higher, the AI only makes tribute demands with a significant trade value; e.g. won't just ask for a food resource or some small sum of gold. The AI can demand gold per turn (not possible in BtS). The demanded sum is based on the human player's commerce rate and expenses (not on the current gold income which is often negative or near 0).
Rationale	This should also address problems with players pillaging their own roads in order to cancel a deal that results from a tribute demand for a resource. That trick doesn't always work (the resource could be next to a river or in a city tile) and requires two roads to be pillaged, which is somewhat costly in the early game. So AI resource demands can make sense; don't want to disable them entirely.
Tbd.	Resources and gold per turn demanded in tribute should be canceled automatically after 10 turns. This is difficult to implement; see comments in `CvPlayer::handleDiploEvent`, case `DIPLOEVENT_ACCEPT_DEMAND`. Though perhaps `CvGame::handleDiplomacySetAIComment` could help.
104n	Diplo votes
104o	Handling of sponsored wars and conditions for vassal agreements when UWAI enabled.
104p	Target size for invasion stacks based on difficulty and less random (even when UWAI is disabled). Always choose a target city while war is imminent. (BtS sets no target with one chance in three.)
Rationale	Except on high difficulty settings, the AI often took too long to get invasions started

	after finishing preparations.
104q	Changed some K-Mod uses of `WarPlanStateCounter` to `AtWarCounter`
104r	Handling of empire split
104s	Propagate UWAI decisions about limited, total and naval war to other parts of the AI: • Treat faraway land targets as only reachable by sea. • Change Area AI from Offensive or Massing to a naval assault type when UWAI thinks that the attack should be made via sea. • Increase train-invader chance when preparing a total war. (K-Mod: Chance only increased once the war has started.)
104t	Handling of team changes: Permanent Alliances and elimination of a team member
104u	Fixes initialization issues with scenarios
104v	Messages about AI war preparations in all-AI games
See also	Chapter about [all-AI games](#)
104w	Make all the AI's cash and gold-per-turn (up to a limit based on total commerce) available for peace deals, and trust the UWAI code not to spend more than peace is worth.
See also	[039](#) announces the conditions of peace deals to third parties. [036](#) and [550f](#) make more gold available for trades other than peace deals.
104x	Loading of AI-related parameters from `AI_Variables_GlobalDefines.xml`

104y	No-war probability without Open Borders	
AdvCiv		*BtS*
If the no-war probability from `Civ4LeaderHeadInfos.xml` would be 100% for a civ that the AI doesn't have Open Borders with, the AI computes its no-war probability as if its attitude toward that civ was one level lower than it actually is.		If the no-war probability is 100%, then the AI tends to behave non-aggressively. Depending on AI personality, Pleased or Friendly attitude is needed for 100%.
Rationale	Don't want humans to take advantage of a friendly AI neighbor by closing the borders and thus, possibly, preventing the neighbor from attacking anyone.	

104z	Handling of random events that lead to war/ peace: "Spy Discovered", "Wedding Feud", "Great Mediator", "Heroic Gesture". Random Events disabled by default.	
AdvCiv		*BtS/K-Mod*
Spy Discovered – No change Wedding Feud – Fixed a bug: When a response to a random event will anger a rival civ that the AI dislikes, the AI picks that response only if the rival is not too powerful.		There is some BtS code for deciding if the AI wants war, and K-Mod improves that code a bit. The event data doesn't say that one of the responses can lead to a DoW; the AI only knows that the response is going to worsen relations. If a rival is powerful, the AI is all the more inclined to anger that rival. As a result the AI will, on rare occasions, get into a war with a far too powerful

Great Mediator, Heroic Gesture – Reduced the probability for peace from 50% to 33%.	rival.
	The DLL gets no info at all about this event, so the AI has to decide based on the "AIValues" of the two possible responses. Both have the same value, so the AI ends up picking a response at 50-50 odds.
No Change	The other side can still decide to continue the war, but if that's also an AI civ, it never does (no change in AdvCiv).
No Change	Through, what karadoc calls "an ugly hack" in the respective canTrigger functions, K-Mod prevents the event from triggering when either side refuses to talk.

Rationale	I don't want to invest time here because there are serious issues with almost all random events; the sane approach is really to disable them. The war/ peace events are especially consequential though, so I'm applying some more band-aids.
	I'd like to add that the war/peace events more or less hinge on irrational AI behavior. Giving the opponent an option to make peace is pointless – the two civs could just negotiate via the trade table. And Wedding Feud lets one civ pay 60 gold for a relations penalty, and the other civ is simply asked whether it wants to declare war (diplo penalties still apply).
	The proper way to handle the last three events would involve adding tags to the EventInfo schema so that the DLL can tell what the events actually do. (The DLL could probably also identify them based on EventTriggerData, but that's messy.) And `CvRandomEventInterface.py` would have to call some new Python-exposed DLL function instead of just always starting a war (in the case of Wedding Feud) or always making peace.
	If I wanted to overhaul the events, [MongooseMod](#) (see "Event Overhaul" in LunarMongoose's feature list) would have to be the starting point. I don't think it fixes the war/peace events though (or only through his DLL, which is closed-source).
See also	[106g](#) is responsible for recording war/peace events in replays.

"No Random Events" enabled by default.	All options on the Custom Game screen are disabled by default.

Rationale	I feel that at this point (v0.94), the mod makes improvements in so many areas that players might expect that Random Events have also been overhauled. So I want to signal somehow that this isn't the case. Renaming the option to "Random Events" (disabled by default) would be more consistent, but players who update from v0.93 would have to toggle the option then.
See also	[101](#) renames "City Flipping after Conquest" to "No City Flipping after Conquest". That was done earlier in the mod's development when updating was less of a concern.

105	AI relies less on `getAnyWarPlanCount`
AdvCiv	*BtS*
Replaced most calls of `getAnyWarPlanCount` and some of `getAtWarCount` with a new function `isFocusWar` that ignores wars that are	

probably not worth focusing on.	
Found values are unaffected by at-war status. (Other parts of the AI code already take care of overexpansion and Settlers not walking into war zones.)	The AI assigns lower utilities (found values) to settlement spots when at war, to the point that AI civs practically don't expand while at war.
Rationale	Just being at war doesn't imply that the AI needs to build up units or switch to wartime civics. It could be that the war enemy can't even reach the AI civ, or has just one city left, is hopelessly backwards etc. In particular, don't want human players to declare meaningless wars in order to hamper the economical development of an AI civ.
The AI makes no tribute demands when busy with a war. (Only relevant when UWAI disabled; with UWAI, such demands are possible.)	The AI checks if its own military power is greater than the target's defensive power before demanding tribute. The target's defensive power accounts for ongoing wars with third parties, but only in a crude, unreliable manner.

106	Announcements and replays
See also	[004f](#) disables celebrations See [104z](#) about random events. Most messages about random events are irrelevant, but I don't want to fix this because I think players should just disable them. [127](#) records start and end of AI Auto Play in replays. [120f](#) announces and records spy missions that cause a revolution.
Tbd.	Would be nice to show and record messages about captured and razed wonders. I think Civ 3 had those. I've already written the code and translations (not on GitHub), but it turns out that `CvPlayer::acquireCity` isn't the proper place for my code because the raze-city popup isn't resolved until later. This really complicates things.

AdvCiv	*BtS*
No message when autosaving	Autosaving message at end of human turn

Rationale	Players who rely on autosave tend to set narrow intervals via `CivilizationIV.ini`, which makes the frequent messages disruptive. Autosave is known to be reliable; no need to report success.
Config	`TXT_KEY_AUTOSAVING` in `Civ4GameText_advc`

AdvCiv	*BtS*
Only GP births of known civs are reported. The city owner is stated if the city isn't revealed, e.g. "in the Incan Empire".	All GP births are reported; "in a faraway land" if the city is unrevealed.
Show only the GP name in yellow.	Entire message in yellow. Makes it harder to pick out the yellow BUG gold-trade alerts.

Rationale	Gotta kill some messages. This one is implausible (how do you learn about GPs on an undiscovered continent?), and doesn't have great strategic value.

Finished wonders are always reported (no change); the city is stated if revealed.	Message says "faraway" when the city isn't revealed. If the owner is known, it is listed on the Statistics Screen. The message never states the city, but highlights it on the map.
No change to the way religions and corps are reported.	When a religion or corp. is founded, if the holy/ HQ city is unrevealed but the city owner known, report only "faraway".
The name of the city where a GP is born is no longer recorded in replays. Record it as "The Great Scientist Antony van Leeuwenhoek has been born in the Russian Empire." (important info at the start and the end)	"Antony van Leeuwenhoek (Great Scientist) has been born in St. Petersburg (Catherine)!"

Rationale	"In the Incan Empire" is extra information. Reporting "faraway" (as in BtS) is misleading in this case. Not reporting them at all would also be bad. Should either report all GP births of a civ or none. The crucial info is how many GPs a rival civ produces, and not so much which GPs specifically.
	Wonders: just to be consistent.
	GP in replay: In order to shorten the message a little. The city is irrelevant.
Tbd.	Perhaps remove the GP name from replays, i.e. just "A Great Scientist has been born in the Russian Empire".

AdvCiv		*BUG/ Civ4lerts*
No more BUG alerts about civs no longer willing to trade a resource.		The alert about resource trades triggers whenever the set of resources offered by a rival changes from one turn to the next.

See also	210e makes the alert trigger also when the AI becomes willing to import a resource.
Rationale	It's a helpful alert, but fires too often. Typically, the willing-to-trade part is more important. The player then either trades for the resource or decides not to. In the latter case, it's not immediately helpful to know that it's no longer available.
Tbd.	The same reasoning can be applied to the tech trade alert, though techs seem to become unavailable less frequently. Unavailable techs and resources hint at inter-AI trades and/ or changes in AI attitude. The proper solution is to implement a new alert for AI attitude changes and one for inter-AI trades. (Update: The latter has been implemented by now, 210d, but turned out to be too noisy.)
	Will probably still need the "no longer willing" alert because the AI could also have started building a wonder.

Civics changes except to Free Religion excluded from the replay log.	
Replays record when a leader enters a new era. (disabled by default)	Except for Liberalism, technological progress is only recorded indirectly through civics changes and constructed wonders.
Replays record the first discovery of each tech.	
Era transitions and first discoveries are shown in green. Cities founded are shown in the owner's player text color. Religion changes in light blue.	Cities founded in green, religion and civics changes and random events in white.
Cities hit by nukes recorded.	Only announcements; not mentioned in replays.

Rationale	Civics changes are not very important and occur very frequently; make replays difficult to follow. (Religion changes tend to be rarer and more consequential.)
	Replays should give some indication of technological progress. Era transitions were my first idea, then I thought first-to-discover would be even better. There's some redundancy when techs cause religions to be founded, but I guess that can't be avoided.
	Colors: Green should be the color of research. For cities founded, I've tried magenta (the color used by the disabled city-founded Civ4lert) and `COLOR_CULTURE_RATE`, but they're too hard to read against the brown background of the Replay screen. I've also tried white (now that civics changes and random events are no longer reported), but found player colors easier to follow. (Although replay messages are otherwise not color-coded based on the affected civ; so it's inconsistent.)
Config	`SHOW_FIRST_TO_DISCOVER_IN_REPLAY` and `SHOW_ENTERED_ERA_IN_REPLAY` in `GlobalDefines_advc`.
Tbd.	Perhaps recording every tech is too much and era transitions too little. Could do era transitions plus Liberalism plus first discovery of techs granting a free GP.
	Are nuclear meltdowns announced or recorded?
106b	Message limit
This change only applies when playing with the "Minimize Pop-Ups" (MPU) option.	
Rationale	It's awkward when the Event Log opens along with a popup because then the Event Log can't be closed until the popup is dealt with. This happens all the time when playing without MPU. Also, I suppose players who don't use MPU are fast players that don't pay a lot of attention to each individual message.
Config	Override: `MESSAGE_LIMIT_WITHOUT_MPU` in `GlobalDefines_advc.xml`
AdvCiv	*BtS*

If more than 3 messages are waiting at the beginning of a turn, don't display them on the main interface; open the Event Log instead. Exception: Messages about most major events are always displayed on the main interface.

The following major events are *not* shown on the main interface when the Event Log is opened:
- Golden Age begun
- city founded
- city liberated
- foreign city flipped
- city captured/ razed
- war declared on or by a vassal
- peace with a vassal
- wonder built

Also not shown, and now only a minor events: when a religion or corp spreads in a city, birth of a GP, civics changes, tech discovered.

The signing of a Permanent Alliance is now a major event.

No sound is played when war is declared by or on a non-human vassal, nor when war with a non-human vassal ends.

Also open the Event Log when there are 1 or 2 messages along with a diplo popup (unless that popup is just an AI civ making first contact with the human civ).

In Hotseat, always open the Event Log when there is a new message.

No limit on the number of messages. The Event Log is only ever shown when the player opens it.

Major events are kept in the Event Log indefinitely, whereas minor events are cleared after 20 turns and info messages after 2 turns. The following events are major:

War started/ ended, alliance formed, defensive pact signed, capitulation/ vassal agreement signed/ broken, tech discovered, first to discover Liberalism, circumnavigation, wonder/ team project built, city founded, civics or state religion changed, revolution started/ ended, Legendary culture reached, religion or corp founded, city religion/ corp spread or removed, city liberated/ flipped, game won, GW sustainability reached (K-Mod), vote source established (UN, AP), city captured/ razed, Golden Age begun/ ended, civ conquered, GP born/ GG killed, empire split, spaceship launched/ failed, nuke.

The multiple (pairwise) DoW at the start of a war involving vassals result in a single loud war-horns sound.

The Event Log button becomes inaccessible when a diplo popup opens (hotkey also blocked).

On-screen messages are cleared in between turns, including those that haven't been displayed yet. This means that a player who follows another human in the turn order misses most messages.

Rationale	The main interface really isn't suitable for displaying frequent messages. It's obtrusive; the display delays add up; messages can disappear too fast. My limit guarantees that after waiting for 3 messages, no further messages can arrive.
	When a diplo popup opens, any messages on the main interface become difficult to read, so it's important to provide access to the Event Log. The player should be able to learn what happened during the AI turns before making any decisions.
	Major events on the main interface: These can easily get buried and missed in the Event Log because they occur already during opponent's turns. Especially when playing without sound. The ones that I've excluded are either not that important or there is some additional mechanism that alerts the player (e.g. tech splash screen when a tech is discovered). Religions are spread all the time; that's not a major event at all.
Config	`START_OF_TURN_MESSAGE_LIMIT` in `GlobalDefines_advc`
Tbd.	Could repair message delivery in Hotseat; opening the Event Log is only a workaround solution. Would have to store messages within the DLL when they are triggered, and call `CvDLLInterfaceIBase::addMessage` only at the start of the recipient's turn. Can also rewrite that function in the DLL if necessary; probably just wraps data into a `CvTalkingHeadMessage` object and calls `showMessage`.

All messages are cleared from the main interface at end of turn. Any messages still queued for display are flushed before that (i.e. cleared without having been on display).	Once displayed, messages only disappear when they've been on display for the proper amount of time (depends on message type). When a human player's turn ends, all messages still waiting to be shown to that player are displayed at once (delay skipped).
Rationale	When turns are ended in quick succession, in BtS, messages from different turns get displayed together, which can be confusing. Dropping messages without ever displaying them isn't much of a problem anymore because the Event Log tends to open periodically and the missed messages are in there.
At the end of each human turn, a special message with text "Older messages:" is put into the Event Log. On the next turn, the player can tell from this message which messages are new. The special message never appears on the main interface and it expires after 1 turn, meaning that only one such message is ever in the Event Log.	Each message in the Event Log is preceded by a date. All messages with the current turn's date are certainly new, but those with the previous turn's date may or may not be new. E.g. tech discovered is sent at end of turn and appears at the start of the next turn.
Rationale	By the midgame, there are more than three messages on most turns, so scanning the log for new messages is something the player does all the time, and it's vexing when it's not clear which messages are new. Also easy for a message to slip by unnoticed. I've tried some things (backspace characters, setting the message turn to -1, same text color as the Event Log background) to get rid of the date in front of the special message, but it appears to be impossible from within the SDK.
106c	No more alerts upon loading savegame
AdvCiv	*BUG*
The BUGEventManager fires `BeginActivePlayerTurn` only right after the previous turn ends, not when loading a savegame. Consequently, alerts aren't checked (and aren't displayed) when loading a savegame. Alerts have the same display duration as normal events: 10 seconds.	`BeginActivePlayerTurn` fires after the end of the previous turn, and when loading a savegame. Alerts are checked after loading. Since Civ4lerts doesn't store data in savegames, the alerts assume a blank slate, and display a bunch of messages, e.g. for all technologies that anyone is willing to trade. Alerts are displayed for 20 seconds.
Rationale	Arguably a bug. `BeginActivePlayerTurn` shouldn't fire multiple times per turn, but that's what happens whenever a savegame is loaded. Listing all trades upon loading can't be considered a feature either. That info is presented better by the Foreign Advisor.
See also	[127](#): Other changes to AI Auto Play
106d	Civ4lerts and Scoreboard default settings changed
See also	[004v](#) also makes changes to the scoreboard.
AdvCiv	*K-Mod*

Enabled some alerts by default, namely Worst Enemy and all those from the second batch ("MoreCiv4lerts") except domination and map trade.	K-Mod disables all alerts by default (whereas standalone BUG enables them all).
Enabled the "willing to talk" alert by default, and disabled "peace treaty" by default.	It's the other way around.
Refusal to talk not reported when it happens at the start of a war.	

Rationale	The ones I've enabled are essential for intermediate players, whereas domination and the first batch of alerts (city management and trade gold) are only essential for perfectionists.
	AI willingness to sign a peace treaty implies willingness to talk. Additionally, the "willing to talk" alert covers ending embargoes; very helpful to learn about those.

Changed the Advanced Leaderboard default layout so that open borders (B), espionage advantage (E), defensive pacts (D), trade network (N) and whether they have any vassals (V) aren't displayed.

Default line height lowered from 22 to 20.

Rationale	Frees up space on the main interface, and I find it difficult to imagine that players can't remember whom they have these relations with. I've never even learned how the espionage icon is supposed to be helpful. The vassal indicator is redundant when "Group Vassals" is checked (as is the case by the K-Mod default).
Config	The in-game BUG menu contains a formatting string. See above for the letters I've removed (B, E, D, N, V).

Reduced the vertical space between Minimap buttons and Advanced Scoreboard.

Rationale	Wasted space. In K-Mod, with its smaller fonts but greater line height and the vertical space, the whole scoreboard doesn't even fit on my screen when playing with 18 civs.
Tbd.	When the BUG Advanced Scoreboard is disabled (default: enabled), then the space is now larger than before. I can't figure out where to change the text position in that case.

AdvCiv	*K-Mod/Civ4lerts*
The "pending" alerts only trigger when a negative event is about to happen: when a city is about to become unhappy or unhealthy or is about to shrink.	Trigger also when a city is about to become happy or healthy or is about to grow.
	The non-"pending" city alerts trigger when a city becomes healthy, unhealthy, happy or unhappy or when a city shrinks or grows.

Rationale	When something bad is about to happen in a city, the player may want to do something to prevent it, and when something bad has happened, the player may want to do something to repair it. I think that's the purpose of these alerts. Presumably, the triggers for positive pending events were only added for consistency – most (all?) alerts trigger on some condition and the negation of that condition (e.g. willing to trade/ no longer willing to trade). However, reducing the noise from alerts is more important than consistency.
	I'm not removing any non-"pending" triggers because players may want to check the job assignment when a new citizen is born or when an angry citizen goes back to work. I don't think this reasoning can apply to has-become-healthy, but in this case, I don't want to break the pattern.

See also	God knows what the "Borders Pending" alert was supposed to be good for. Will remove that one when I need the space for [210]().

AdvCiv	K-Mod
"Happiness Pending" (i.e. about to become unhappy) enabled by default.	All Civ4lerts are disabled by default in K-Mod. (I think BUG as a standalone mod enables them all by default.)

Rationale	"About to shrink" is often helpful to know too, but annoying in recently conquered cities.
Tbd.	One reason why it pays to be alerted about cities that are about to shrink is that the AI (and thus the governor) doesn't take into account that cities can lose only 1 population per turn. Once it's decided that a city will shrink, the correct play is normally to deprioritize food for one turn. This is tedious, so the governor should do it automatically or there should be some additional penalty for a food deficit when the food store is empty.

106e	Report all religion and corp changes
Show a message whenever a corp spreads in a revealed city. Announce religion spread only if the religion differs from the city owner's state religion, or if the player owns the city or the holy city. Once the player is in the Industrial era, announce religion spread only if the player owns the city or the holy city.	Message only shown to city owner and to players that have the religion as their state religion or own the holy city (in the case of religion spread) or to players that own the HQ (corp spread).
When a corp spreads in a city that isn't revealed to the HQ owner, the city becomes revealed to the HQ owner.	HQ owner may receive messages about unrevealed cities.
Don't announce the establishment of a corporate HQ, and don't announce that the HQ spreads the corporation to the HQ city. I.e. show only one message when an HQ is founded, namely (e.g.) "Alexander has completed Mining Inc. in Athens".	Three messages: one for completing a wonder, one for establishing the HQ and one for spreading the corporation.

Rationale	Update (v0.91): The foreign religion spread messages get too annoying in the mid-/endgame; therefore disabled post-Renaissance. Perhaps there should be a "Show foreign religion spread" Civ4lert, but that would have to be enabled by default, and then players would have to manually disable it in the midgame – if they'd even realize that this is possible. Update (v0.92): It's actually also too annoying before Renaissance. No longer announcing if the religion is already the city owner's state religion.
Tbd.	Does a holy city generate gold from unrevealed cities?
Config	The era threshold for foreign religion spread messages can be changed through `STOP_RELIGION_SPREAD_ANNOUNCE_ERA` in `GlobalDefines_advc.xml`. The v0.92 update can be disabled by toggling `ANNOUNCE_STATE_RELIGION_SPREAD` in `GlobalDefines_advc.xml`.

106f	Announce canceled Defensive Pact (DP)

AdvCiv	BtS
Canceled DP are publicly announced and recorded in the replay log.	DP are announced and recorded when signed; only the parties involved are notified of cancelation.

106g	No random events in replays
Random events aren't recorded in replays. The replay says "in response to a random event" when a declaration of war or a peace treaty was triggered by a random event.	All random events are recorded in replays.
Rationale	Most of the random events are unimportant, and many are quite wordy, making replays difficult to follow. The war and peace events are exceptions.
Tbd.	There are some other important events, e.g. fulfilled quests.
See also	[104z](#) improves the AI response to war and peace events a little.
106h	Replay lists game settings
Most info from the Settings tab (Victory screen) is stored in the first entry of a replay.	The relevant info is stored in the replay file, but not displayed anywhere. The Hall of Fame screen only shows difficulty, world size, starting era and game speed.
Rationale	For old replays and replays shared with other players.
Config	`SETTINGS_IN_REPLAYS` in `GlobalDefines_advc.xml`
Tbd.	Would be nice to indicate which color is the player color, but I don't think replays support the `<color>` tag, and I don't want to show an entire entry in the player color.
106i	Replay file names prefixed with mod name
Replay file names start with "[AdvCiv]". The mod name is shown on the Settings tab (Victory screen).	The replay name is composed of the player name, year of the final turn and, apparently, a two-digit random number to avoid name collisions with earlier replays. The mod name is stored in the replay file, but that file has a binary format. BtS associates the `.CivBeyondSwordReplay` file ending with `Civ4BeyondSword.exe`, but this does not cause the proper mod to be loaded. The mod name is shown on the main menu screen; from within a game, it's not visible.
Config	`TXT_KEY_REPLAY_PREFIX_ADVC` in `Civ4GameText_advc.xml`
Rationale	Given a replay file, one needs to know the name of the mod in order to load it.
	Ideally, no mod would be required to load AdvCiv replays; they don't require any particular text keys or other XML data. I've added one field to the CvReplayInfo class, but that could easily be folded into another field to restore compatibility with BtS. The problem, though, is that the EXE discards replays whose `ModName` string differs from the currently loaded mod. If I set that to an empty string in AdvCiv, it should load in the unmodded game, but will no longer load in AdvCiv unless I reimplement `gDLL->loadReplays`.
106j	A deal canceled during an AI turn is only immediately announced if it's an open borders agreement, defensive pact or peace treaty; canceled gold and resource deals aren't announced until the start of the next human turn. Exception: If a resource deal is canceled because the trade connection was lost, the announcement is shown immediately.
Rationale	Only important events should get an immediate announcement. Canceled resource deals are (typically) followed by either a diplo popup or a declaration of war – unless the trade network was severed.

Pillaged improvements are immediately announced.	
Rationale	Not really important, but foreign moves are shown immediately (if the respective player option is enabled) and combat results are announced immediately, so it's more consistent this way.
106k	City name changes in replays
At the end of each turn, the game checks if the name of any city has changed since the start of the turn. If so, the name change is recorded in the replay log.	City name changes are not recorded in replays. If a city is renamed, future replay messages refer to the city by its new name, but older messages remain unchanged.
Rationale	I'm recording the change at end of turn because a player who renames a city might change his/her mind once he/she sees the new name on the main interface; don't want to spam the replay log with temporary changes.

107	Fewer AI defenders
See also	023 can add some defenders when there is a revolt chance. 017 builds fewer military units overall when there are already a lot. 022 Changes the computation of AI paranoia, which also affects garrison sizes.
AdvCiv	*BtS*
When at war and on the defensive, floating defenders are now assigned like under the Alert1 strategy.	Floating defenders in defensive wars are assigned as under Alert2.
The AI is more willing to mount a counter-offensive (offensive Area AI), even when a war is no longer recent, and war success has been poor. (War success is still considered though.)	Once an enemy DoW is no longer considered recent, the AI relies on its war success rating for selecting its stance (offensive or defensive Area AI).
AI personality (`LimitedWarPowerRatio`) slightly factors into the choice between defensive and offensive Area AI.	
Rationale	Need to counterattack more. Shouldn't rely much on war success even in long-ish wars; successes from an initial surprise attack can give a false impression (see also 130r under *Tbd.*). Unless the power ratio is highly unfavorable, just sitting there isn't the most effective tactic, and it's also boring to play against.
	Risky counteroffensives seem out of character for some leaders, and very much in character for others; hence the leader personality factor. Use `LimitedWarPowerRatio` because counteroffensives should have limited objectives.
See also	104p changes the stack size required for launching an attack
AdvCiv	*BBAI*
An AI civ following the "Turtle" strategy stops building defenders when their number exceeds a threshold.	Turtling AI civs keep building defenders until they can make peace or the power ratio shifts in their favor.
Rationale	A turtling civ can't recover economically from building Archers for 50 turns.
AdvCiv	*BtS*

AI doesn't try to guard non-city tiles when a war starts looking hopeless.	Nothing to prevent guarding of resources or Forts. Not sure if an urgent need for defenders elsewhere can cause the AI to stop guarding non-city tiles.
Rationale	If they're strategic resources, it could actually be crucial to keep them, but I don't think that's generally feasible when the AI gets beaten badly. It's normally more useful to guard the cities then.
Reduced impact of Space victory stage 3 on city defenders.	Extra defenders in capital and all cities building spaceship parts.
Rationale	Space victory is a lengthy process, and stage 3 begins with the completion of Apollo. Doesn't usually mean that the AI just needs to survive in order to win.
When the AI computes the (spacial) closeness between two civs, cities on different continents are considered to be less close to each other.	Cities on different continents are considered to be closer to each other than those on the same continent.
	Closeness mostly affects the distribution of AI defenders, the Alert strategy, raze decisions and the price of sponsored war.
Rationale	Arguably an oversight by S. Johnson (or whoever wrote the PlayerCloseness code). The intention was probably to use a wider search range for cities on other continents, not to treat them as being nearer.
See also	In some situations, the impact of a land connection is further increased: 022: Alert strategy 104o: WHEOOHRN when already fighting a war (currently disabled)
More floating defenders on the highest three difficulty settings, fewer on low difficulty.	Difficulty affects how many units the AI manages to train (in particular through the `AITrainPercent` modifier), but the target defender counts are the same for all difficulty settings.
Rationale	There's very little war in BtS on the low difficulty settings because the AI only manages to build enough units for defense. It's good that the low-difficulty AI is less aggressive, but it can't be entirely passive. Fewer defenders also make it easier for human players to wage war.
	Conversely, the high-level AI trains so many units that it can afford some more defenders.
The AI counts units that temporarily guard a city as defenders in certain situations.	Only units with the approriate (permanent) Unit AI type are counted.
Rationale	I'm not sure how often this comes up, but I think the change can't hurt.
Credits	Merged from "RoM: A New Dawn" (Afforess). SourceForge revision: link

108	Starting plot normalization and assignment
See also	027 is concerned with the selection of starting plots. 129 makes starts with multiple Gold or Gem resources or numerous flood plains much less likely.
AdvCiv	*BtS*

When placing extra bonus resources (`placeExtras`) in a singleplayer game, the game tries to make the worst starting plot at least 70% as good as the best (in terms of found value). No change for multiplayer.	Tries to make the lowest found value at least 80% of the best.
Transforms most, but not all, bad terrain (Tundra), bad features (Jungle) and mountain peaks around starting plots. Ice is always cleared. In multiplayer games, all peaks are cleared, too, and almost all bad terrain and features.	Ensures that all land plots around starting plots are decent plots.
A freshwater source is still guaranteed (no change).	

Rationale	The player handicap makes the human starting plot match the desired difficulty; e.g. Settler puts the human civ into one of the best available starting plots, and Deity in one of the worst. Therefore, equal starting conditions aren't crucial in singleplayer. More unequal starts probably make games on Prince upward more challenging, which I don't mind. Low-difficulty games hopefully get a bit more dynamic in terms of warfare due to some AI civs having (much) worse starts than others.
	Removing all bad plots makes the starting region look unnatural. A few bad plots give a start more character and provide more variety.
	Reduced normalization also leads to weaker starting plots overall, which should reduce the importance of capitals a bit. Very powerful capitals reward early warfare too much, and make wars generally too much about taking the capital.
Config	Several parameters in `GlobalDefines_advc.xml`; can restore BtS normalization too. Selecting "Balanced" in the Custom Game screen only affects the map generation before normalization; it does not enable BtS normalization. I wish it did, but once the map has been generated, there is no way to tell if the Balanced option was set.

The city cross around the starting plot is revealed when the game starts.	No plots are revealed other than those that the starting units can see.

Rationale	Makes it more attractive to move the starting Settler. Don't want players to settle blindly and hope for the best (or regen) when a starting plot looks poor. When all city-cross tiles are revealed upfront, and hidden resources are unlikely (see below), there isn't much to hope for. Can accept the starting plot for what it is or go find a better one.
Config	`START_SIGHT_RANGE` in `GlobalDefines_advc`

In singleplayer games, initially hidden resources are disregarded when choosing starting plots. Hidden resources are no more likely to occur around the starting plot than anywhere else. (Less likely, in a way, because Horse, Copper and Iron can't be on riverside.)	As far as I can tell, yields from all hidden resources are fully factored into the found value when choosing starting plots. Only their strategic value is discounted. A poor starting plot can hint at a hidden resource in the surrounding city cross.

Rationale	It can't be rationalized historically that a poor starting plot hints at hidden resources.
	It seems that BtS and K-Mod don't even take into account in which era a resource is going to be revealed, i.e. Coal would be valued about as highly as Copper. This needed to be fixed one way or another.
	The flip side is that AdvCiv can theoretically produce very strong starting plots because `addExtras` is unaware of hidden resources. That's something to keep an eye on.

The AI moves its starting Settler if it sees a better spot on turn 0 after moving its exploration units (if any). Most of the time, the AI still founds its first city on turn 0 (possibly after moving the Settler just 1 tile), and it practically always has a city at the end of turn 1.	The AI always founds its first city on turn 0 without moving the Settler.
I've made a few adjustments in the found-value function to help the AI evaluate potential sites for its capital. In particular, a low-ish value is assumed for unexplored tiles. This change does not apply to scenarios; AI always settles in place as in BtS.	There is special code in `AI_foundValue` for selecting starting locations, but that's not really AI code. E.g. it evaluates also tiles beyond the city radius. Unexplored tiles are normally treated as having 0 value.

Rationale	The starting plot finder doesn't ensure that the starting plot is locally optimal, and moving the Settler is sometimes, perhaps in one out of 10 or 20 games, very advantageous. (More often, moving the Settler is only slightly better than settling in place.)
Credits	Merged from the Better BUG AI mod, mostly by copying the code by Fuyu and Afforess. I've made a few adaptations and added some special clauses to the found value function because neither the tile evaluation for starting tiles nor the normal evaluation was quite right for this AI decision.

Exploration units that civs receive at game start are placed on a different tile than the starting Settlers, Workers and defensive units. If more than one exploration unit is received (AI on Immortal and Deity), each one is placed separately.	All units that an AI civ receives at game start are placed in the same tile. For humans, only the Settlers are placed in the same tile; every non-Settler unit is placed alone on a separate tile. The UnitAI type (City Defense, Explore, Worker) of the non-Settlers doesn't matter.
Since the starting Warrior that humans receive counts as an exploration unit, nothing changes for human civs under typical game settings. If a human civ receives free defensive units or Workers (low difficulty settings or later-era start), then there is a slight change: Those units are placed on separate tiles in BtS; now they're placed together with the Settler(s).	

Rationale	My guess is that the separate starting tiles for human units were implemented in order to nudge beginning players away from immediately fortifying the starting Warrior in the first city. The separate placement also reveals a few more tiles and thus makes it easier to move the starting Settler; I like that (though it may not have been the original goal) and, now the AI knows how to move its starting Settler, I want the additional visibility also for the AI.
	And of course it's always nice to make the rules for human and AI civs more alike.

Resources added during normalization can't result in more than 3 seafood; more than 2 unlikely.		More than 3 coastal food ruled out, and more than 3 ocean food ruled out, but both taken together practically unlimited (up to 6).
Rationale	Cities with more than 2 seafood grow unrealistically fast; doesn't play well either. This happens too often.	
Tbd.	When I get around to XML balance changes, I intend to reduce the food yield of Pig Pasture and Fishing Boats by one. Should make starts with overabundant food less common.	
108b	Assignment of starting plots	
AdvCiv		*BtS*
Slightly increased `StartingLocPercent` for most difficulty levels, meaning that human civs receive slightly worse starting locations than in BtS. E.g. on Noble, humans receive the median location if the total number of civs is odd; one better than the median if the total number of civs is even.		The starting locations selected by the map script are reassigned by the DLL based on the difficulty setting. `StartingLocPercent` is a percentile rank for the human civ. On Noble, humans always get locations that are slightly better than the median (40% rank), i.e. they get an advantage over the AI civs. (In as much as the game can't accurately determine whether one starting location is better than another.)
Rationale	Noble should only favor human or AI when there is an important reason to do so. And I like giving humans rather bad starts on the higher difficulty settings; it's a more organic handicap than e.g. free tech (see also chapter SPaH about this).	
See also	250d slightly reduces some AI advantages from the difficulty setting.	
Config	Through `Civ4HandicapInfos.xml`; though I've also changed the way these values are handled by the DLL a bit (see below).	
If the difficulty sets `StartingLocPercent` to 100 (Deity: 95), then the human players receive the worst starting plots.		Human players only ever receive the second worst starting plot.
Rationale	Could be a bug. Or the developers didn't trust their starting plot heuristic and worried about players getting unplayable starts. This shouldn't be an issue with K-Mod (rewrites the starting plot heuristic).	
In all non-team games, human starting plots are assigned based on difficulty setting.		In team games (no change), a round-robin algorithm is used to assign each team starting plots of a similar total value; afterwards, plots may be swapped around to bring members of the same team closer together geographically. In non-team singleplayer (no change), human starting plots are assigned based on difficulty. In non-team multiplayer, humans receive the best starting plots.
Rationale	I see no reason not to use `StartingLocPercent` in multiplayer.	
See also	135c: other multiplayer changes	
Tbd.	Difficulty should also matter in team games.	

If a map script calls `useDefaultImpl` after assigning starting plots, the DLL reassigns those plots through swaps based on team membership and difficulty (see above).	The DLL will select new starting plots (based on team membership and difficulty) and ignore the plots selected by the map script. I think the script could implement `FindStartingPlot` and leave `AssignStartingPlots` entirely to the DLL. The PerfectMongoose (PM) script doesn't do this though.
Rationale	This seemed like the easiest way to let PM use the standard reassignment algorithm.
See also	[Chapter](#) about PM

109	AI improvements for isolated starts	
AdvCiv		*K-Mod*
AI civs that haven't met any rival by the second era focus more on Science, and less on the flavor values set in `Civ4LeaderHeadInfos.xml` until they meet a rival. Isolated AI civs are reluctant to pursue a culture victory. Adopt the "Economy Focus" strategy when alone, or when no threatening civ is known.		Optics is prioritized when isolated, but not Science in general. AI civs that haven't met anyone adopt Economy Focus; I don't think that strategy is reliably adopted when there are Friendly or faraway neighbors. Economy Focus (a BBAI-introduced strategy) reduces the production of military units.
Rationale	All naval technologies have a Science flavor, and faster research will reach Optics faster.	
See also	[130n](#) delays penalties from different religion. [130p](#) decouples enemy trade penalties from the has-met counter. Both should make it easier to find partners abroad.	

110	Changes to AI military build-up	
See also	[104s](#) increases military build-up when preparing for a "total" war.	
AdvCiv		*K-Mod*
Increased the target commerce surplus for research in the early eras of the game. E.g. 65% in Classical, 45% in renaissance. (If the target isn't met, the AI is reluctant to build more units.) The AI can still build a lot of early units on high difficulty settings because of AI discounts on all upkeep costs, and because the target surplus can be lowered further when at war or preparing for war.		35% regardless of era.
Rationale	A low research slider position is especially worrisome in the first third of the game.	
AI production weight lowered. Was 270% of the commerce weight (except when in financial trouble). AI food weight lowered to match the reduced AI use of Slavery (change [121](#)).		

Rationale	Still high, but that's OK – the AI is better at growing cities than at choosing sensible tech or city production. Would make sense to increase the production weight when Slavery is used less, but 270% was way too high, and resulted in post-Chemistry Workshop spam (without supporting civics). Huge outdated AI armies don't exactly make the game enjoyable either.
	In the late game, it doesn't normally make sense to grow cities further. I'm still giving food a fairly high weight because the AI should only avoid growth, not actually shrink cities (leave that to human players who know what they're doing).

111	Units in neutral tiles prevent pillaging of routes	
AdvCiv		*BtS*
Can't pillage routes on unowned tiles that contain a (non-Spy) unit of a different team.		No special restrictions for pillaging unowned tiles. Can, in particular, pillage routes in order to slow down another civ's units.
Rationale	Not an important change. Yanking out roads from under other civs' stacks is pretty bizarre, and occasionally exploitable.	

112	AI changes for voluntary vassal agreements (VVA ; "peace vassalage")	
Tbd.	The VVA code was already messy in K-Mod, and it's worse now. Should be rewritten based on a utility value that replaces the dozens of exclusive clauses.	
See also	037: Rule changes to prevent masters from sabotaging voluntary vassals.	
AdvCiv		*K-Mod*
AI lowers its VVA attitude threshold (Friendly or Pleased for most leaders) only when feeling powerless (as in BtS) *and* acutely threatened, particularly when in a losing war against a third party.		AI lowers its attitude threshold when it is among those civs with the least military power.
A civ that has at least one Defensive Pact and is not at war with anyone refuses to sign a VVA.		Defensive Pacts don't matter for VVA decisions. Once a VVA is signed, Defensive Pacts of the vassal get canceled.
No leader is willing to sign a VVA when Cautious and not threatened. Leaders that have their threshold set to Cautious in XML are instead a bit more willing to lower their threshold when threatened.		E.g. Frederick signs a VVA at Cautious.
Rationale	VVA happen too quickly in K-Mod, probably also owing to increased military budgets. The idea that civs without prospects for winning the game should become vassals asap comes from Warlords though. Perhaps they're supposed to catch up under the protection of their master, and then break free again, but it doesn't usually work this way. The AI should certainly prefer independent survival over becoming a vassal and helping another civ win.	
See also	133 cancels tribute deals once vassalage ends. 143 adds recently-canceled memory for vassal agreement.	
AdvCiv		*BtS*

"Grown-too-powerful" restriction removed.		AI leaders refuse to sign VVAs when the would-be master gets close to a military victory: "You've grown too powerful for us."
Rationale	Just prolongs the inevitable.	
"Your land is too far away" rules out vassal agreements only until the Industrial era. If the prospective master is in the Industrial era or later, its power rating is decreased when not sharing a continent with the vassal, but a vassal agreement is possible.		The AI refuses to become the vassal of any civ that it doesn't share a continent with.
Master refuses to accept voluntary vassal whose population is much smaller than the master's unless aiming for Conquest victory or liking the vassal.		Only considers refusal when acceptance means war.
Rationale	Peace vassals are fickle and may lead to wars with third parties. Not worth the hassle unless they bring a considerable economic value.	
When deciding whether a vassal breaks free, the territory of the vassal is treated as at least 10 tiles large. Thus, a vassal that has fewer than 15 tiles left when becoming a vassal can only break free by gaining land, not by losing land.		A capitulated vassal with, say, 12 tiles initially gets to break free after losing 6 tiles (from war or culture pressure). Voluntary vassals don't care if they lose tiles.
Rationale	Through change 143 (cancelation of voluntary vassal agreements), vassals with very little territory left can end up changing hands a lot.	
Civs that are at stage 3 or 4 of any victory strategy refuse to sign vassal agreements, and break free if they can: "We'd rather win the game." The leader of AP or UN also refuses/ breaks free.		Civs that are close to domination victory refuse to become vassals (such civs will normally also be way too powerful to accept, so this is pretty pointless). In K-Mod, civs refuse to accept vassals that are at stage 3 or 4 of Culture or Space victory ("Surely, you must be joking"); may also cancel the agreement. Diplomacy victory not covered.
Rationale	Don't want a civ to win the game while hiding behind a master who can't cancel the agreement, especially not a human master. Important to let the vassal refuse (not the master) because the master could be human.	
See also	115 prevents civs with too little production capacity from pursuing a Space victory, which is important for this change: Technologically advanced civs might otherwise refuse to ever capitulate once they have the Apollo Project. 143b prevents vassals from having nukes. 014 prevents capitulated vassals from pursuing victory strategies.	
An independent colony can break free if its power is at least 80% of its master's power.		Only attitude can cause an independent colony to break away. And since the +10 "granted us independence" bonus doesn't decay, this happens practically never.
Rationale	A War of Independence should at least be a possibility.	
See also	130r causes "granted us independence" memory to decay.	

An AI civ ready to become a vassal contacts the prospective master only with a per-turn probability. The probability is based on the scoreboard rank of the master – between 1 in 20 if the master is ranked in the middle of the scoreboard, and 1 in 40 if the master is at the top. Increased by 400% if at war with anyone.	The same contact-delay is used for vassal agreements as for permanent alliances, but this only affects offers to human players. There is only a 1 in 80 chance of implementing a permanent alliance, but no such probability for voluntary vassal agreements; they're checked each turn and are directly implemented.

Rationale	It's possible that the Warlords developers had meant to use the permanent alliance probability also for vassal agreements and misplaced a closing curly brace. Be that as it may, civs are too quick to sign vassal agreements when their power ratio takes a dip, which doesn't only happen in defensive wars, but also when an AI focuses on its economy (AI strategies Economy Focus or Get Better Units) or after an unsuccessful aggressive war.
	The change only affects AI-AI vassal agreements. Could also implement it in a way that makes civs more reluctant to become vassals of human civs, but that's a bit more work, and I think it's still difficult enough for humans to obtain AI vassals because humans can't generally afford large enough armies to impress the AI.
	Probability based on rank should reduce snowball effects.

When a vassal is more advanced than its master, the vassal may decide to gift tech to the master from time to time. This is contigent on a sufficiently high relations value (Cautious when capitulated, otherwise Pleased).	The master may gift techs to the vassal, but not vice versa.

Rationale	The master should gradually catch up with a technologically more advanced vassal. Normally this happens through tech trading, but sometimes the vassal is too far ahead. Not (historically) plausible that it takes a civ forever to absorb the tech of its vassal. From the vassal's point of view, one can argue that a voluntary vassal is – to an extent – invested in its master's success. A capitulated vassal prefers to break free, but this is always a long shot and, if relations have thawed, helping the master win is still better than a rival victory.
See also	130v makes vassals always Friendly toward their master – this does not apply when deciding whether to gift tech.
	In this demo game of mine with an earlier version of AdvCiv, Tokugawa managed to make Willem capitulate in the midgame despite being some 10 techs behind; the two remained unable to trade tech for much of the rest of the game because it took Tokugawa too long to catch up.
	130z deals with tech gifted between non-vassal rivals.

AdvCiv	*BBAI* (v0.83)

Disabled BBAI's human-as-vassal option.	This option had allowed human players to offer themselves as vassals to an AI master. The option was disabled by default (through XML). K-Mod enabled the option, but K-Mod AI changes `CvTeamAI::AI_surrenderTrade` seem to have broken it. At least in K-Mod 1.45, I can't bring any AI civ to accept a human vassal, and the explanations (denial text) don't make much sense.

Rationale	Looks like too much work to make this work. Also, it's rarely smart to accept a human vassal – it's not going to send military assistance and will work hard on breaking free.

See also	[Rise & Fall](#) and Debug mode allow human players to take control of a vassal. This still works; I've only disabled the option of becoming a vassal through diplomacy.
Config	Can re-enable it through `BBAI_Game_Options_GlobalDefines.xml`, but I don't think the AI is ever going to accept.

112b	AI changes to surrender decision
See also	[123d](#) blocks an exploit where cities gifted to a war ally can lead to faster capitulation.

AdvCiv	K-Mod
AI civ doesn't surrender unless there are numerous enemy units in its territory on an important landmass (or having been nuked).	Enemy positions matter for peace treaties, but surrender is only a matter of power and war success.
Also refuses to surrender If 30% or more of the civ's population are on a landmass with few enemy units.	
Response is "You'll have to take it from our cold, dead hands" if denied.	That response isn't used anymore at all. BtS used it for cities that the AI didn't want to trade.

Rationale	Let the enemy demonstrate that they can reach our important cities before capitulating.

AdvCiv	K-Mod
Don't surrender while there are units en route to the master's territory.	This is checked before signing peace treaties, but not when considering surrender.
If a war enemy is the worst enemy of an AI civ and the attitude toward that enemy is Furious, the enemy's power is treated as 10% lower than it actually is. I.e. the enemy needs slightly more power in order to achieve capitulation.	The worst enemy's power is treated as 25% lower regardless of attitude.

Rationale	Should perhaps disable this power adjustment entirely. It makes some sense flavorwise, but makes capitulation easier to achieve when the winning side already has a much larger army when the war starts; otherwise, it'll take time to get the upper hand, and "This war spoils our relationship" will typically lead to a Furious attitude. From a human pov, it's annoying if the AI won't capitulate when a war has already become tiresome.
Tbd.	Attitude could play a bigger role when there is more than one powerful war enemy.

AdvCiv	K-Mod
When considering capitulation, the power modifier based on war success is applied to the vassal's power, meaning that war success matters not just for the vassal-master power ratio, but when comparing the vassal's power with the average power of other civs.	The master's power is modified based war success, and therefore only matters when comparing the vassal's power with that of the master.
A civ refuses to capitulate unless its power rating is at most 76% of the global average power rating.	The threshold is 80%.
The impact of war success on capitulation is reduced a bit overall. Can reduce the vassal's power by at most 45%.	Can increase the master's power by up to 100%.

Rationale	Perhaps the average power shouldn't matter at all for capitulation. Now matters less when the master's war success is high.

113	AI builds more Workers	
AdvCiv		*BtS*
The City AI prioritizes Workers until the total number of needed Workers is reached. And various tweaks that increase the target number of Workers,		Workers prioritized only when there are far too few of them; otherwise, any decent building takes precedence.
Rationale	The BtS/K-Mod AI tends to train 1 Worker per city, which is about right for an experienced human player, but the AI is far worse than such a player at scheduling its Workers, so 1/city isn't enough. If Workers are everywhere, scheduling is much less of an issue. Also note that the AI generally isn't good at choosing city production. Can't go too wrong with a Worker (unless there are evidently too many already). Should be about 1.5/city now. (Also a matter of traits, leader personality, coastal cities ... so it varies a lot.)	
Config	`WORKER-RESERVE_PERCENT` in `GlobalDefines_advc`	
Tbd.	Should take into account currently researched tech (e.g. Calendar, Railroad). Fuyu has tried to get the AI to build more Workers as well. His [code] seems more sophisticated than mine. Should perhaps merge the parts in his `CvCityAI.cpp` marked with "Build more Workers" (also "Worker Counting"?).	
See also	[117]: AI chopping; [121]: Forts	
AI cities receive more Workers for local jobs.		A rather large portion of Workers gets assigned to no city and builds "territory" roads.
Rationale	Territory roads aren't that useful; rather improve tiles around a city before they're actually worked. Once a citizen is assigned to an unimproved tile, the AI will send a Worker, but it may take some 10 turns until the tile is actually improved. Better to do it ahead of time.	
The Worker speed bonuses that the AI receives on the highest three difficulty settings have been reduced to 30, 40 and 50% respectively.		No bonus on Noble and lower; 10% on Prince, 20 on Monarch, 50 on Emperor, 75 on Immortal, 100 on Deity.
Rationale	Given the number of Workers that the AI trains now, it doesn't seem to benefit much from having super fast Workers on Immortal and Deity after the Ancient era. Double Worker speed mostly means that the AI quickly improves and routes every tile it can, which looks ugly and rather unintelligent. One approach would be to factor the speed bonus into the target number of AI Workers, i.e. have the AI train fewer Workers on Immortal and Deity. But I don't like this bonus anyway; it makes the AI get ahead too fast in the early game, and might provide an extra incentive for attacking AI Workers.	
See also	[250]: other changes to difficulty settings	

114	Changes to AI attack courage
114a	Breaking sea blockades
AdvCiv	*BBAI*

AI willing to break a sea blockade using inferior ships. Will attack at near-0 odds if the defenders are sufficiently outnumbered.	AI keeps building e.g. Triremes, but never dares to attack even a single Privateer. (Not sure if it would attack with Caravels.)
Rationale	Known issue in BBAI, not fixed by K-Mod. I've also posted about this on CFC, but the code I posted there is now outdated; doesn't fully solve the problem.
Tbd.	Would probably be smarter to stop building primitive ships, and wait for better tech. Also dubious that there is dedicated code for breaking blockades – why should the normal AI behavior for stack combat be inadequate for this?
114b	Attacks on valuable units at poor odds
AdvCiv	*K-Mod/ Lead From Behind*
Changed the attack courage computation so that the cost of the involved units is given less weight when the odds are one-sided.	AI leaders and the Barbarians calculate with optimistically increased attack odds. Based on these inflated odds, K-Mod does a kind of expected value computation: attacking a Tank with a Warrior at 5% odds is wise because the Tank is much more expensive than the Warrior. (Of course, the true odds are much lower.)
Rationale	Warrior against Tank doesn't matter much, but K-Mod Barbarians are also too happy to attack advanced units in fortified positions.
See also	Koshling has addressed this by making the attack odds increase multiplicative; see this revision of "RoM: A New Dawn".
114c	Increased AI willingness to skip bombardment of city defenses a little bit
Config	Through `AI_Variables_GlobalDefines`
Rationale	Haven't looked into it in detail, but had a situation when the AI should've definitely attacked instead of bombarding.
114d	Decreased random portion of attack courage
The random summand added to AI attack courage is between 0 and 12 for AI civs and between 0 and 27 for Barbarians. Increased the base attack odds change of Barbarians by 2.	AI units have a bias toward attacking based on leader personality. The bias is composed of a deterministic base value between 0 (e.g. Asoka, Barbarians) and 6 (Ragnar and Napoleon) and a portion chosen at random once per turn between 0 and 32 for the Barbarians and between 0 and 16 for all civ leaders.
Rationale	If the AI attacks completely rationally, defensive tactics won't really work anymore; but I think making the AI a bit more rational won't hurt.
Config	Partly through the DLL, partly through `Civ4LeaderHeadInfos.xml.`

115	AI less willing to commit to victory strategies
See also	112: AI civs less willing to become vassals. 018: AI uses Crush strategy less. 019 makes the AI a bit less inclined to use military strategies in Aggressive AI mode.
AdvCiv	*K-Mod*

In a game with 7 civs, the AI enters stage 3 (of 4) of the Domination victory strategy when meeting 55% of the (land and population) requirements. More generally, the target percentage for stage 3 is 62 minus the number of civs, and 87 minus the number of civs for stage 4.		The thresholds are 50% for stage 3 and 80% for stage 4, and don't depend on the number of civs. However, the requirements themselves do depend on the number of civs (e.g. 64% with 7 civs, 51% with 16). Victory strategies with stages 1 to 4 were introduced by BBAI. At stage 4, victory is imminent.
Rationale	The K-Mod AI goes for military victories too often (or early) for my taste. The BBAI approach of letting the AI play more rationally is fine, but let's not turn it into a wannabe HoF player.	
	50% means 24% of the world population and 32% of the land, i.e. about a "double share" in a standard game: 2 in 7 is 28.5%. This shouldn't quite be enough to trigger domination 3.	
	55% means that 35% of the land is needed for stage 3. That's right between 3 in 7 (42.8%) and 2 in 7.	
	I'm factoring in the number of civs because it is easier to conquer more land when that land is divided among several weak opponents than when it is owned by a few powerful ones.	
Added a condition that makes the AI less willing to go for Conquest victory if there are many rivals on other continents.		No such condition.
Escalated the conditions so that the conquest stage is essentially one less than in BBAI/K-Mod. Added requirements for stage 4: half of the initial rivals, rounded down, need to be defeated.		The half-rivals-defeated condition is checked for stage 4 (which becomes stage 3 in AdvCiv), but there are also alternative conditions for that stage.
Rationale	As above: military victories are too commonly pursued. Also: It's problematic when an AI civ goes for a military victory before naval invasions become feasible, because it's too difficult for players on other continents to interfere in time.	
Made the conditions for culture victory strategies more narrow.		
Rationale	Culture-loving AIs can be unpleasant to play against (culture pressure, wonder grabbing), so the AI should only go for it when there is a realistic chance of success.	
(Only relevant if UWAI is disabled.) When in multiple wars at once, the AI ignores its military victory stage and applies the normal decision process to any war that is no longer recent. I.e. multiple wars are still possible, but the AI won't just refuse to talk.		AI in Conquest 4 or Domination 4 never ends a chosen war so long as war successes are favorable.
Rationale	It's OK that an AI close to a military victory likes to fight wars, but it doesn't have to insist on fighting everyone at once.	
Conquest 4 only when owning at least half of the world's cities.		
Rationale	Even when militarily superior, conquering so many cities is going to take time.	
Space victory not pursued if total production clearly insufficient.		Once Apollo Project is built, stage 3 can be reached just through technological progress.

Rationale	To discourage small civs, say, with just three cities, from pursuing a space victory. If they want to have a chance, they'll need to expand instead.

If a civ has a very large total production rate in the end game, Space victory is considered even if other civs are a bit more advanced technologically.

Rationale	Mostly to allow civs that are pursuing a military victory to switch to Space victory if they run into a stalemate with another very powerful civ.

115b	Stages for Diplo victory revised

AdvCiv	*BBAI*
Based mostly on the current (voting) population of the own team, vassals and friends. Personality and randomness still factor in; game options don't (unless Diplo victory disabled). Stages 3 and 4 can be run regardless of other victory stages. AI prioritizes food a bit at stage 4 (grow votes).	Based on leader personality, randomness and, a little bit, on Aggressive AI and Always Peace game options. Stages 3 and 4 are impossible if already in stage 3 or 4 of another victory condition.

Rationale	This part of the victory-stage code hadn't been revised by karadoc and it didn't do anything intelligent. Checking for peaceful game options isn't good: Diplo victories are usually half conquest, half diplomacy. Diplo victory isn't often a viable route for the AI. I've made the changes mostly because I had already written code for estimating voting populations for UWAI.

Diplo victory stage 2 factors into the decision to build AP and UN. The AI avoids building AP/UN if another civ seems closer to Diplo victory.	Only stage 1 is considered for AP/UN. No avoidance. (NB: Building evaluation also affects AI tech paths, i.e. the AI is able to aim at Mass Media – if it can properly evaluate the UN.)

Tbd.	Doesn't look reliable; at best, it'll no longer build the UN when it's *obviously* a terrible blunder.

See also	178 is supposed to improve CityAI decisions about the AP.

AdvCiv	*BtS*
When near a religious victory, the AI is more inclined to pursue the "Missionary" strategy, and its vassals switch out of Theocracy.	"Missionary" is a BtS strategy that is adopted based on AI flavor and the number of civs with Open Borders and whether they've already converted. Victory doesn't play a role. The AI makes no effort to deal with Theocracy.

Rationale	Should at least allow the AI to win an AP victory when all human players are already members of the AP. Will otherwise have to use Holy Wars to bring down the humans.

Tbd.	AP victory conditions need to be overhauled. It's silly that a single converted city makes all the difference in war and victory votes.

The AI proposes the victory resolution when it gets the chance and a team member is at Diplo victory stage 4. Voting AI abstains if it likes two candidates equally.	AI chooses uniformly at random from all the resolutions that it supports. Votes for the candidate with the lowest internal id; normally humans have lower ids than AI civs.

Tbd.	The AI still proposes random resolutions in all other cases, and this is often agonizing to watch.

115c	Victory strategies in zero-sum games	
AI doesn't pursue Diplo victory when there's just one other team left; AI does pursue Conquest if there is just one other team to begin with.	Diplo2 possible with just one rival, but UN and AP require at least two other teams.	
	Conquest1 requires at least one civ to be a vassal or eliminated; doesn't work if there are only two teams at game start.	
Rationale	Both only really relevant for games against a single AI opponent.	
115d	Show human victory stage in debug mode	
Debug mode has no bearing on victory stages.	The victory stage of human civs is computed as if they were AI civs when in debug mode.	
(No change.)	Also, human civs can never be at stage 1 or 2 of a victory strategy, only 0, 3 or 4.	
Rationale	Since [R&F](#), [UWAI](#) and other parts of the AdvCiv AI code use victory stage in order to determine whether a (rival) civ is getting close to a victory condition, it's important to see the human victory stage the same way that the AI sees it.	
	Stage 1 and 2 are probably too unreliable and might lead to peculiar decisions from AI governors of human cities. I'm guessing that's why BBAI restricts human victory stages. Fair enough; the AI only needs to know when a human is close to victory; 0, 1 and 2 don't (need to) make a difference.	
Tbd.	The `AI_calculate..VictoryStage` functions aren't ideal for determining how close a civ is to victory. The main purpose of these functions is to determine whether and how much the AI should focus on a particular victory condition; therefore, e.g. AI flavor values factor in. Would be better to write separate code for measuring the progress toward victory.	

116	Changes to raze decisions	
See also	[250b](#) moves the No City Razing option to the bottom of the Custom Game screen. [122](#) makes the AI raze cities in awful sites. [300](#) deals with razing by Barbarians. [cdtw.1](#): razing by vassals.	
Tbd.	Try to use code from the [UWAI](#) evaluation of conquered cities and from `CvPlayer::AI_cityTradeVal`.	
AdvCiv	*K-Mod 1.44*	
If the AI raze value plus a random number between 0 and 5 is above 0, the city is razed. 0 to 5 is very little; it's hardly random at all.	Raze value is used as the probability of razing a city, i.e. even if the value is just 1, the city might be razed (with probability 1%).	
The AI leader's `RazeCityProb` adds at most 15 to the raze value. Settled Great People count as 5 against razing.	`RazeCityProb` adds up to 75 ro raze value. Settled GP count as 2 against.	
Impact of distance and finances lowered; impact of distance adjusted to map size.	Cities past a distance threshold are usually razed.	
Unlikely to raze when controlling fewer than 5 cities, i.e. in the early game.	Cities conquered in a very early rush are usually razed because of the distance.	
When no other city on the continent is owned by the conquering AI civ or when the city is very far	K-Mod has a similar clause, but it only checks if the war plan type is "total".	

away from that civ's territory, the AI tries to predict if other cities in the vicinity are going to be conquered. If so, the city is less likely to be razed.	(Some improvements in K-Mod 1.45, but my changes are more comprehensive.)
Rationale	K-Mod razes too much and too randomly, and this is among the most common complaints about K-Mod. Leader personality has far too much impact: Genghis Khan has 75 RazeCityProb while some leaders have 0. A city would have to have e.g. 15 settled GP to make up for that difference (assuming each GP counts as 5; in K-Mod it's actually only 2), or 5 active wonders (each counts as 15).
AdvCiv	*BtS*
AI factors cultural ownership into raze decisions. Reluctant to raze cities with own majority culture or with majority culture of a partner civ (i.e. attitude Pleased or higher).	Tile culture is ignored. The AI incurs diplo penalties by razing cities with cultural majority of a third party.
Rationale	The Diplo penalty is usually not worth it. Can give the city away if it becomes too costly. (The AI knows how to do that too.)
AdvCiv	*BBAI*
When an AI civ conquers a city that, if reconquered, may soon lead to a Culture victory of the previous owner, the conquering civ razes the city if reconquest seems plausible (based on power ratios and nearby units).	The dangerous city is razed in any case.
Rationale	The BBAI comment actually said to raze unless we "overpower" them, but no power check was there.

117	AI chops more Forests	
AdvCiv		*K-Mod*
AI is always somewhat willing to chop depending on available Workers and competing Worker tasks. More specifically, assigns a priority of 0.5 * P in situations where the K-Mod AI is unwilling to chop, and 1.5 * P otherwise. When computing the Workers needed at a city, chopping opportunities are taken into account.		Only chops while building something urgent, or a building in a small city. Then assigns a priority P that is proportional to the chopping yield. Chopping seems to happen only opportunistically, i.e. when a Worker is assigned to a city in order to build improvements, it may (afterwards) be instructed to chop if there happen to be Forests.
Rationale	K-Mod tries to discourage extensive chopping, but I don't think this can work without reducing or delaying chopping yields further (beyond what patch 1.61 did). As it stands, the K-Mod AI is missing out on early chopping yields. See also this discussion on CFC. In particular, there are few reasons not to cut down Forests along rivers and on hills. With Replaceable Parts, a hill Lumbermill yields only one more commerce than a Mine, and, in part due to change 902, a river Lumbermill can't compete with Watermill. As a result of my changes, AI Lumbermills on hills/ at rivers don't seem to occur anymore at all. The other Forests remain largely intact.	

Tbd.	Chopping along rivers is historically sound, but on hills not so much. Perhaps I'll allow Mines to coexist with Forest (though some areas were deforested for producing charcoal for smelting ores). The AI should arguably chop even more. I intend to nerf chopping instead, probably by restricting the yield to apply only to buildings and ships.
See also	[113](#) also includes chopping opportunities in the estimated Worker tasks.
AI chops Forests outside of city radii. Restrictions: • Only when there is nothing else to do. • Not when automated and chopping is disallowed in options. • Not if there is already anger from global warming. Possible future cities, distance and the correct timing of the chop aren't considered.	The AI never chops Forests on tiles that no city can work on.
Rationale	My conditions are simplistic and rather conservative. At least the AI now fells unworked Forests within its own borders at some point.
Tbd.	The code seems to say that the AI always builds a route before chopping a Forest. I haven't verified this, and I'm not sure if it's reasonable. Considering to set 0 yield from chopping outside the BFC; then this change will be obsolete.
See also	[119](#) prohibits chopping on unowned tiles, i.e. the AI doesn't have to worry about those tiles. [012](#) gives Forest and Jungle a defensive bonus that only the tile owner benefits from. Therefore [this](#) change in K-Mod 1.45, which makes the AI more inclined to chop Forests in the inner city ring, has no effect unless change 012 is disabled. (I've still merged that K-Mod change.)

118	AI changes regarding peacekeeping votes	
AdvCiv		*K-Mod*
AI proposes and votes for peace if it likes both sides and neither side is clearly winning or losing. "Like" means that the attitude is *strictly greater* than `DeclareWarThemRefuse-AttitudeThreshold`.		AI only seeks peace if it likes the losing side or dislikes the winning side. "Like" means attitude greater than or *equal to* `DeclareWarThemRefuseAttitudeThreshold`.
Rationale	A minor thing that vexed me in one game. The AI should stop inconclusive wars between its partners. The second part is probably a bug in K-Mod. A comment says, "if [we] like them enough to not declare war on them", and this isn't what the code does.	
See also	UWAI ([104n](#)) partly handles peace vote decisions, but 118 still applies.	

119	Can't chop Forest, Jungle outside borders

Worker builds that remove features can only be built in plots owned by the Worker's team.	Features can be removed from unowned plots and even from plots owned by a war enemy.
Rationale	Forests being chopped for marginal gains by idle Workers isn't realistic. In part, the problem lies with Workers working for free, but large-scale deforestation without nearby human settlement is strange in itself. Moreover, the AI doesn't chop outside of its borders, and it's easier to change the rules than to change the AI. Part of an overall effort to reduce and delay deforestation (without inhibiting the AI).
See also	117: AI chopping on owned tiles that aren't workable.

120	Usability and AI improvements for espionage
See also	132 makes the AI use the force-religion mission less (also changes the mission cost).
Rationale	Espionage in BtS is beyond redemption. Focus on the few parts that somewhat work, and try to make the rest easier to ignore.

AdvCiv	*K-Mod*
Default espionage weight set to 0.	1 in K-Mod (since v1.30), was 0 in BtS.
Rationale	Important in the (frequent) situation where a player sets some espionage weights before meeting all rivals. When meeting another rival, a default weight of 0 means that no points are assigned to that rival until the player readjusts the weights in the espionage screen. 1 could mean that a few points are assigned or a lot, depending on the weights set previously.

AI less worried (50%) about war opponents having a leg up in espionage. Not likelier to train Spies when fighting a war, only during war preparations.	War plans increase the odds for training a Spy as if running the Espionage Economy strategy.
Rationale	It's better to focus commerce on research or entertainment when at war, and production on military units. Espionage is for cold-war situations. That said, when war is declared, relations take a dive and the enemy may quickly order some malicious Spy missions. It's good to prepare for that, and some extra Spies for lowering city defenses could also be helpful (although the AI rarely manages to use that mission).
120b	AI Spies less malicious
Tbd.	Higher AI diplo penalty for malicious missions, and no diplo penalty for failed missions. E.g. 2/3 chance of a diplo penalty (and spy identity revealed) for successful malicious missions, 1/3(4?) for successful non-malicious missions. Espionage screen should then indicate which missions are considered to be malicious.
See also	130v makes Spies less likely to attack capitulated vassals.

AI uses "malicious" espionage only when Cautious or Annoyed, depending on the leader's no-war threshold. (If no war at Pleased, then malicious at Annoyed; if no war at Friendly, then malicious at Cautious.) Aggressive AI has no impact on AI malice. (AI may also be malicious when planning war or	Attitude threshold not leader-specific. With Aggressive AI, malicious unless Friendly, otherwise malicious unless at least Pleased.

against a civ that is close to victory; no change.)		
Rationale	The "take that" missions are rarely beneficial for the AI (although the K-Mod AI uses them quite well). I like them for flavor, but, flavor-wise, malicious espionage only makes sense against enemies. Aggressive AI still has an indirect effect because war plans enable malice, and Aggressive AI leads to more AI war plans.	
No fomented unrest, poisoned water or sabotaged building while a city is in disorder.		Cities in disorder are only exempt from sabotaged building K-Mod comment: "*disorder messes up the evaluation of production and of building value*"
Rationale	Cities in disorder won't lose food.	
No revolt incited when city defenders are overpowered by a factor of 8:1 or worse.		The K-Mod code only make sure that the defenders aren't too powerful. Will even use the revolt mission against undefended cities. (Whereas BBAI had a clause – disabled in K-Mod – that blocked the revolt mission when the attackers were more than twice as powerful as the defenders.)
Rationale	2:1 as in BBAI would be too strict. Just because a city can be conquered without inciting a revolt doesn't mean that a revolt isn't worthwhile.	
The Espionage Economy strategy greatly reduces AI espionage weights against civs from whom no techs could be stolen.		K-Mod added this strategy; comment in `AI_Defines.h`: "*run high espionage slider to steal techs at a discount.*" When hoping to steal a tech from a particular civ, the weights of other civs are halved.
Decreased chance malicious missions further when in Espionage Economy.		Espionage Economy already decreases the chance of malicious missions.
Rationale	Espionage Economy tends leads to a much higher espionage output than normal. Even 10% of that can amount to a lot of wasted commerce if it's spent on frivolous missions.	
120c	Hide the espionage slider when it's at 0	
AdvCiv		*BtS*
Espionage slider not shown on the main interface when it's at 0. Added the slider to the Espionage screen.		Once Writing is discovered, the Espionage slider is shown on the main interface, city screen and Financial Advisor.
Rationale	More room on the main interface. Many players hardly ever touch the espionage slider.	
Config	Optional through the "General" tab of the BUG menu.	

120d	Info on Espionage screen revised	
AdvCiv		*BtS*
The heading above the point thresholds for passive espionage is "Threshold".		Says "Cost"; same as the heading for the espionage mission cost.
Thresholds that the player has reached and mission costs that he/she could pay are shown in green.		All in white.
Rationale	If it isn't paid, it isn't a cost.	

Credits	The green numbers I've seen in another mod, probably BULL or BUFFY.	
No mission costs are listed if the player can't train Spies (i.e. prior to Alphabet). Exception: Costs are shown if the player controls a Great Spy.	Mission costs are listed as soon as the player learns the location of a rival city.	
Rationale	Rather distracting to see the costs early in the game.	
See also	Ties in with change 004w (uncluttering the UI). A Great Spy prior to Alphabet is a rather academic possibility since the Great Wall no longer provides Great Spy points (change 310).	
If mission costs are shown, the Sabotage Production/Improvement/Building missions are shown as a single item "Sabotage" with mission cost "?". Sabotage Project is shown with a cost, but omitted entirely if the city doesn't have a project (a.k.a. Spaceship Part).	Three separate entries. Costs are shown for all except Sabotage Improvement. The cost for Sabotage Production gives away the number of hammers spent on the target city's unfinished production. The cost for Sabotage Building is based on the cheapest building in the city.	
Rationale	The Sabotage Building cost is mostly unhelpful – unlikely that the player wants to sabotage the cheapest building. The amount of invested production is useful information (close to completing a Wonder?), but arguably information that the player shouldn't get for free. The cost for Sabotage Project doesn't give anything away I think; Spaceship Parts are listed on the Victory screen.	
See also	103 allows Spy units to investigate cities; that's the fair way to find Wonders under construction. 045 hides buildings in rival cities (meaning that the Sabotage Building cost does give away secret information)	
See also	Should show the missions as in BtS when able to investigate the city. And should additionally name the cheapest building and the current production and its progress as "hammers/hammers needed".	
"Steal Technology" is shown without a cost if the player is unable to trade techs with the owner of the target city. If they can trade, the cheapest tech (on which the mission cost is based) is shown in parentheses in addition to the cost.	The cost for stealing the target's cheapest tech is shown unless there is nothing to steal.	
"Steal Treasury" shows the amount of gold that would currently be stolen (and on which the shown mission cost is based).	Can compute the amount of gold from the shown mission cost.	
Rationale	Don't want to give away the cheapest tech in situations when tech is otherwise secret (pre-Alphabet, No Tech Trading option). If a cost is shown, the cheapest tech can be deduced; more convenient and transparent to just name the tech. Same with gold.	
See also	004i tells a player from whom gold was stolen how much was stolen.	

120e	AI response to poisoned water and unrest	
AdvCIv		*BtS*

The effects of poisoned water and formented unrest don't affect the AI population target, meaning that the AI tends to prioritize food more after a spy attack (in order to keep the current population despite food lost due to anger and bad health).	The effects of spy attacks are treated just like other causes of bad health and anger when setting a population target, meaning that the AI lets its population shrink after a spy attack (may even de-prioritize food).
See also	[160](#) slows down starvation
Tbd.	The AI should be more upset about poisoned water and formented unrest than about other spy missions. Could implement that, but spies get identified too rarely (25%; `ESPIONAGE_SPY_REVEAL_IDENTITY_PERCENT`) for it to matter. Perhaps give these missions a 50% chance of revealing spy identity even when the spy isn't caught? See also *Tbd.* under 120b.

120f	Spy missions announced to third parties	
AdvCiv		*BtS*
Spy missions that cause a revolution are announced to third parties that know the mission target. The owner of the spy unit is not named in the notification. Missions that change the religion of a civ are recorded in replays along with the spy owner.		Third parties are notified of revolutions (and they're recorded in replays), but only the target of a spy mission learns about the mission, and no missions are recorded in replays. I'm not sure if the BtS AI uses the revolution missions much; the K-Mod AI does use them from from time to time.
Rationale	It's easy to forget about the possibility of a spy mission and to assume that something is wrong with the AI code when an AI civ switches to a suboptimal civic or religion, sometimes, only to switch back after 5 turns.	
	I don't think there is generally a way to infer whether a revolution was triggered by a spy. A normal revolution causes anarchy, but that anarchy has normally already ended when the next human turn starts. So this change reveals information that players don't have in BtS. I don't like that, but I like an AI that looks incompetent even less.	
Config	Switch in `GloablDefines_advc.xml` (doesn't affect the replay message though)	

121	Misc AI changes to Worker builds and citizen assignment	
See also	[131](#): Other minor misc. AI changes	
AdvCiv		*BtS/ K-Mod*

For deciding whether to build a Fort or a cheaper improvement to connect unworkable resources, the AI uses a heuristic that considers the following circumstances: • How busy Workers currently are overall; • whether the tile has natural defenses; and • if a Fort would function as a canal. AI always prefers any improvement with a positive yield over Forts on workable tiles, and replaces the Fort when a tile with a Fort becomes workable (once a Worker finds time to do it; not necessarily high priority). (Fixed a possible bug that may have prevented improvements that connect a resource – like Forts – from being replaced – even by an improvement that also connects the resource). Probably not a bug after all. I think my change only gives higher priority to replacing Forts.	The Worker AI frequently builds Forts on resources that aren't (yet) workable. Forts are always preferred on these tiles. Once Fort tiles become workable, the AI is hesitant to replace Forts with yield improvements. Also likes to build Farms and Cottages on revealed but yet unusable resources, and doesn't replace them with improvements that connect the resource later on.

Rationale	I've posted some screenshots about the K-Mod problems here. Forts cost a lot of Worker turns and often have to be replaced later on, so the AI should be hesitant to build them. Possibly a bug in BtS: The AI picks the most expensive improvement; was perhaps intended to be the cheapest (hard to say). My heuristic using natural tile defense leads to a reasonable number of Forts in reasonable locations. Not really smart, but looks good on the surface. Forts can theoretically be better than yield improvements even on workable tiles. A Silk Fort preserves the underlying forest, which is worth 1 production vs. the 3 commerce from a Plantation. 3 commerce is generally preferable to 1 production, and I don't think the AI can figure out when 1 production is better. Better stick to the obvious improvements.
Tbd.	I'm still seeing Forts on workable Silk. I intend to add one commerce to Silk Plantation and Fur Camp anyway, will hopefully no longer happen then. Could also look into Fuyu's Better BUG AI code marked with "Forts Connect Resources but should never be built"; seems to address the same problem as my code. I don't think I've actually seen an AI canal yet (not through `CvPlayerAI::AI_getPlotCanalValue` either).
See also	117 also deals with Worker builds (chopping). 017 makes the AI draft fewer units. 036 improves the evaluation of surplus resources, and this fixes issues with the AI not connecting those resources.

AdvCiv	*K-Mod*
AI more reluctant to use Slavery. AI prioritizes food more when choosing Worker builds and when assigning citizens.	The K-Mod AI whips a lot; the BtS AI rarely.

Rationale	The AI can't judge well which city production is useful or urgent, whereas a larger population tends to lead to faster research, and that's always good. Short-term production is good for expert players, but the AI should better focus on long-term development. Team NP of the Civ 4 Reimagined mod have (independently) arrived at the same conclusion: "AI doesn't use slavery as extensively as before which results in bigger cities and stronger AI overall." ([source](#))
	The AdvCiv AI still whips more than the BtS AI.
See also	[110](#) shifts yield priorities to match the decreased use of Slavery. [912d](#) allows Slavery to be disabled for human players.

Increased the value assigned to GPP when choosing jobs for citizens by 38%, but made the value decrease faster with each additional GP.	K-Mod comment: "[...] *because of the flawed way that food is currently evaluated, I need to dilute the value of GPP so that specialists don't get value more highly than food tiles. (I hope to correct this later.)*"
Rationale	I've noticed that the AI doesn't create enough GPs in the first half of the game and rather too many in the second half. I didn't look into the food evaluation issue mentioned by karadoc, but AI cities still seem to grow normally in tests.

122	Changes to city trades
Tbd.	Make the AI willing to trade cities with high foreign culture at peace and allow the AI to accept or give any trade items for cities (currently: only gives cities in peace deals or as gifts, and never pays for cities except with a peace treaty). This is already work in progress for v0.95, and there is some temporary code tagged with "advc.tmp" in `CvPlayer::updateTradeList` and `CvPlayerAI::AI_cityTrade`.
See also	[139](#) reduces the trade value assigned by the AI to evacuating cities. [104h](#): Slightly changes the conditions under which the AI adds cities to peace deals.

AdvCiv	BtS
When a city is traded, e.g. through liberation or as reparations, the tile culture of the old owner is decreased in the city tile and in the city cross (21 tiles), except for tiles assigned to other cities of the old owner.	The old owner's tile culture is set to 0 in the city tile and in the inner circle. The outer circle remains unchanged.
The tile culture of the new owner is increased by the same amount that the old owner's culture is decreased. The amount of converted culture is equal to 50% of the old owner's culture or 100% of the new owner's culture, whichever is smaller. I.e. the new owner's culture can at most triple, and the old owner's culture can at most halve. 33% of the old owner's city culture is converted into culture of the new owner. This doesn't increase the city's total culture (sum over all civs), so it should be safe in multiplayer.	The new owner doesn't gain any tile culture. If the city is liberated, then the new owner's city culture (not: city tile culture) is increased by 50% of the old owner's city culture. The old owner doesn't lose any city culture. K-Mod disables the culture increase when the new owner had already owned the city at some earlier time; this was done to block an exploit in multiplayer mode. City trades that don't count as liberation don't affect city culture.
Rationale	The instant removal of all culture in BtS is jarring. That said, the mutual agreement should have some (appeasing) effect on the population, so I'm halving the removed culture. Excluding the outer ring can lead to strange borderlines with foreign enclaves.
	The culture is converted to make the city suffer less from culture pressure, to account

	for the consensual change in ownership (as opposed to violent conquest), to avoid strengthening the influence of third parties, and because culture shouldn't just vanish.
	The converted city culture can't be based on the new owner's city culture because the new owner doesn't normally have any city culture. Therefore, I'm not using the tile culture conversion formula for city culture.
Config	`CITY_TRADE_CULTURE_THRESH` in `GlobalDefines_advc.txt`
See also	dlph.23 removes the distinction between liberation and regular city trade when it comes to city culture.

In order to be able to receive a city through trade, a civ needs to have at least 10 percent tile culture there.	All cities can be traded between humans. The AI accepts all cities from humans where it has at least 1% culture, and otherwise refuses only if the city is 10 or more tiles away from the nearest AI city, or when in financial trouble (which rarely occurs).
	Outside of peace negotiations, cities change hands between AI civs only through liberation (which requires much more than 10 percent tile culture).
	Vassals can only receive cities through liberation; see next blue box.

Rationale	Should make it harder to gift worthless cities to the AI. It's also implausible that a city could be given over to a nation that has no history there. Tile culture also implies geographical vicinity.

A master civ can gift any cities to its vassal where the vassal has more culture than the master. The vassal may reject the city; will then appear in red on the Trade screen. A vassal can't offer cities to its master (or any other civ); no change.	Can only *liberate* cities to vassals. If a vassal isn't the civ that would receive a city upon liberation, then the vassal can't receive the city at all.

Rationale	I suspect that the restriction was put in place to prevent masters from demanding their vassals' cities, and that the inverse direction had been assumed to be covered by liberation. Not true in the case of a city that is culturally contested between a vassal and a third civ.
	Giving cities to vassals means less human city management; should be encouraged (and allowed, to begin with).
	The culture clause is just flavor. I suppose the master population wouldn't want to be ruled by the vassal.

Can liberate a city even if there is an enemy sea unit or non-combat unit visible from the city.	There must not be any unit hostile to the prospective city owner visible from the city. Otherwise, the city can still be traded, but it doesn't count as a liberation (no diplo bonus).

Rationale	The visible-enemy restriction is reasonable – if the new owner has to fight for the city, it's not really liberated –, but units that can't attack the city shouldn't block liberation.

When enemy units (war enemies or Barbarians) are near a city, that city can only be traded to a war enemy. While at war with the previous owner of a city,	Only liberation cares about hostile units, and that clause is only about units hostile to the new owner.

that city can't be traded to civs that aren't at war with the previous owner. These two restrictions don't apply to liberation.	
Rationale	To prevent players from giving threatened (and possibly untenable) cities to an uninvolved party. In reality other civs (including the enemy at the gates) would simply not recognize such a change in ownership.
Only revealed cities can be traded for.	Can receive previously unknown cities as part of a peace deal. AI civs accept unknown cities from human civs as gifts.
"... make a trade proposal" option hidden when there are no eligible trade items.	Proposal can lead to an empty Trade Screen.
Rationale	A minor change while I'm at it. Not plausible that the AI is (supposedly) able to decide whether to accept a city that it has no knowledge of. Moreover, unrevealed cities are, in principle, secret in K-Mod, and the Trade screen can leak that info. An empty Trade screen is a bit confusing, and became a more common ocurrence in the early game after I excluded unrevealed cities.
Tbd.	"What do you think of ..." - "Yes?" "Let's discuss something else" is also confusing (when there is no third civ to talk about), but funny enough to leave it alone.
The AI recognizes awful city sites, doesn't accept such cities in trade and razes them after conquest.	If a city is close enough and has enough culture, the AI accepts it, and doesn't normally raze it.
Rationale	The BtS behavior can be exploited by gifting the AI useless cities, and the AI will even be thankful for it (fair trade diplo bonus). See strategy advise [here](#) (CFC). That strategy still works, the city site just mustn't be *extremely* bad.

123	Blocked exploits
See also	Meatgrinder exploit: [139](#). Worker stealing ([010](#)) is a bit of an exploit too I guess. Flat maps for lower distance maintenance: [140](#). Gifting GP for diplo victory: [141](#). Neutral units shielding cities from nukes: [dlph.7](#). Gifting the AI useless cities: [122](#). Gifting nukes: [143b](#). Extra gold in Advanced Start with Expansive trait: [dlph.11](#). Rival wonders under construction deduced through Sabotage Production mission cost: [120d](#). Loopholes closed by K-Mod (not a complete list I think): Prevent overflow shenanigans (or at least rein them in) by allowing multiple units to be produced within the same turn. AI never agrees to Cease Fire. Spread Culture spy mission doesn't increase city culture.
Tbd.	If I ever want to write AI code for Cease Fire: `CvPlayerAI::AI_considerOffer` would be the place (see comment near the start of that function).
123a	Can't gift Missionaries to bypass Theocracy
AdvCiv	*BtS*
Can't gift a Missionary to a civ in Theocracy unless the Missionary matches their state religion.	Can bypass the Theocracy restriction by gifting Missionaries. The AI will normally use them too.
Can't gift Caravels to a civ without an OB agreement.	Can gift Missionaries inside Caravels in order to spread a religion without OB.
Rationale	Arguably an exploit because the Theocracy restriction is pretty pointless this way. And

	keeping borders closed should keep Missionaries out, period.	
Credits	DarkLunaPhantom fixed the Theocracy part independently. I hadn't thought of cargo units (other than Caravels), so I've adopted part of DLPh's fix.	
See also	dlph.4	
123b	Blocked AI paths	
AdvCiv		*K-Mod/ BtS*
The pathfinder should have no more problems with hostile units along the way.		Reportedly, the BtS AI is generally unable to plot around enemy units; in K-Mod, I can only recreate this for Barbarians vs. units blocking the entire inner ring of a city.
Tbd.	Passing `MOVE_ATTACK_STACK` to `AI_cityAttack` might be a cleaner fix, but I'm not sure about side effects.	
123c	Chains of cargo units	
Land units can only be loaded as cargo if they have at least 1 move left. No change to air units; can still be loaded right after rebasing.		Loading and unloading don't require moves (although Loading consumes all moves). Can exploit this to move land units across arbitrary distances over water within a single turn by using a chain of dispersed cargo units.
123d	Reduce war success when trading away a city while at war	
When a city is traded away, and the old owner is at war with any earlier owners of the traded city, the war success of the old owner against these earlier owners is reduced by 25.		A player can conquer a city (+25 war success against the enemy), gift it to a war ally (no change to war success), wait for the enemy to conquer the city again (+25 war success against the player's ally), and repeat. The war enemy will then assume that the war against the player is going very badly.
Rationale	Not so easy to exploit, but occasionally leads to quick capitulation. Reducing the war success against *all* earlier owners can be overkill, but this is difficult to avoid.	
Tbd.	The war success counted for a cnquered (or traded) city should be based on the importance of the city. Currently, every city counts as `WAR_SUCCESS_CITY_CAPTURING` – which should remain the base value, to be multiplied by some modifier – except the capital, which already has a modifier of 1.5 (was 2 in BBAI; I've reduced it). The function that records war success is `CvUnit::setXY`.	
123e	Can no longer plunder gold from Barbarian cities	
Credits	Civ 4 Reimagined 1.2	
See also	033 prevents Privateers from plundering vassal cities.	
123f	Fail gold only for great wonders and at most once per wonder	
Tbd.	Perhaps convert only 50% of the invested production into gold and the rest into city culture. That should be a separate change id though because it's a balance change rather than just blocking an exploit. For now, fail gold remains a valid tactic, and this gives wonders with very weak abilties (e.g. Chichen Itza) at least *some* use.	
AdvCiv		*BtS*
When a great wonder is completed in a city, that wonder is immediately removed from the		After a message about a rival finishing a wonder, another turn passes before the game removes

production queues of all other cities, generating fail gold.	the wonder from production queues and generates fail gold.	
Exception: Members of the team that has completed the wonder never receive fail gold.	No such exception.	
When a player has invested production into a wonder, but removed that wonder from the production queue, no fail gold is generated.	Fail gold is generating regardless of whether the wonder is queued. This allows crafty players to cash in multiple times per wonder.	
World projects are treated just like wonders. Units and national wonders never produce fail gold.	Units, national wonders, great wonders, world and team projects are all treated alike, meaning that fail gold can also be obtained from e.g. Missionaries (see e.g. this CFC thread).	
Rationale	The Wealth process should be used for converting production into gold, and that's already a pretty efficient conversion. Award fail gold only when it has to be done, namely when a civ is beaten to a wonder by a rival. If there was no such compensation, wonders would become too unattractive and frustrating. (Civ 6 reportedly has that problem.)	

AdvCiv		K-Mod
Units never produce overflow gold.		K-Mod uses excess production on additional units of the same type. Overflow can still occur I think, but only on units with a national limit.
		As for buildings (no change): BtS 3.19 with the unofficial patch converts production into gold, but cancels out building-specific modifiers like Stone for Walls.
Rationale	A side-effect of disabling fail gold for units, and I don't think that overflow gold should be a worthwhile tactic.	
Config	`MAXED_UNIT_GOLD_PERCENT` in `GlobalDefines_advc.xml`.	
Tbd.	Once I remove the whip ability (hurry through population), it should be all but impossible to use the overflow rules for converting production into gold.	

124g	Need to choose research a.s.a.p. at the start of a game	
Once the player has founded a city, a choose-research popup appears. If the player ends the turn without addressing the popup or sets research back to "no technology" after dealing with the popup, the AI chooses a tech for the player and the popup appears again on the next turn.

After founding the first city, the choose-research popup appears before the choose-production popup. | A choose-research popup appears one turn after founding the first city. If the player manages to avoid choosing a tech to research, then, during the first five turns, research is stored as overflow research; that research is spent once the player does select a tech and research modifiers are applied based on the selected tech. After five turns, the AI chooses for the player. Not choosing a tech for five turns can yield a little bit of extra research due to known-tech modifiers; see the description here on CFC.

The choose-production popup appears first. | |
| Rationale | My guess is that the Civ 4 developers wanted to delay the choose-tech popup by one turn to make the first turn easier for beginners, and set the limit to five turns because the player might move the Settler around a bit before founding a city. For this mod, this wouldn't make sense, and is a needless (and exploitable) complication.

Choosing tech before production should actually be a bit easier for experienced | |

	players than vice versa.

124	Restrictions on trade	
AdvCiv		*BtS*
Trade connections only along revealed plots, i.e. in order to establish a trade route, the owner of the first city needs to explore the second city and the roads/rivers/coast leading there.		Plots owned by another civ don't need to be revealed. I.e. by revealing a path of road, river and coastal tiles up to any foreign tile connected to the foreign capital, trade routes are established with all foreign cities connected to the foreign capital.
Resource trades require a connection to any foreign city that is connected to the capital; the capital itself doesn't have to be revealed. I.e. pretty much no change.		Resource trades require a connection to the foreign capital.
No trade routes with cities in occupation, and no trade routes with cities whose owners are in anarchy.		
Rationale	The BtS concept isn't that unrealistic. If one side knows half of the way and the other side the other half, trade can be conducted in the middle. Soren Johnson explained this in a Twitch video, naming trade between Han China and Rome as example.	
	I think it's better for gameplay when the other city has to be revealed because this rewards repeated exploration of rival territory, and the game tends to be more fun when you keep updated on rival activities. Also makes Scouts more useful. Trade between Han and Romans is better modeled as resource trade.	
	The BtS rules are also inconsistent with K-Mod's treatment of unrevealed cities as secret; the trade routes listed on the BtS city screen give the cities away.	
	The occupation/ anarchy rule is just for added plausibility. I've considered excluding blockaded and plundered cities as well, but such cities could still trade across land, i.e. unless the whole landmass is blocked, in which case trade routes are already severed.	
	Should tiles owned by a rival block trade unless there is an OB agreement? I think the BtS rule (trade with third parties only blocked when at war) plays better and is arguably also more realistic. E.g. the Strait of Hormuz remained open despite the 1995 sanctions against Iran.	
Tbd.	Would like to change the way that cities are matched. The current algorithm creates long-distance trade routes between large cities, but these cities aren't usually the borderland trade hubs that would realistically profit from trade passing through. Boils down to the question if trade routes should be represented from end to end or hop by hop.	
For resource trades, only one side needs to be able to reach the other.		Trade connections are always symmetrical, so this isn't an issue.
Rationale	Want a civ that establishes a trade connection to be able to trade resources right away (as in BtS), instead of having to wait for the other civ to e.g. also research Saling.	
Trade along rivers doesn't require any tech; back to how it worked prior to BtS. Trade along unowned coasts still requires Sailing. Help text says "Enables trade on Coasts		Trade along *owned* rivers works from the beginning, along unowned rivers only with Sailing. Sailing help text just says "enables trade on Rivers"/ "...Coasts".

outside own borders".		
Rationale	Not sure why this change was made in BtS. The distinction between owned and unowned rivers is pedantic, and confuses players (people ask about this now and then on CFC). Rivers now work just like roads when it comes to trade.	
Tbd.	Want rivers to speed up movement as in Alpha Centauri. Fishing could enable this.	
AI only willing to sign Open Borders with another civ once it has revealed a land tile owned by that civ, or if AI attitude is one level above the normal OB threshold, i.e. at Pleased in most cases. Otherwise: "We would have nothing to gain."		OB based only on a personality-based attitude threshold.
Will sign OB at attitude one level below the normal OB threshold when sharing a war, but, again, only if there is a revealed owned tile.		AI signs OB regardless of attitude when sharing a war.
The AI initiates OB with another AI (or proposes OB to a human) 10 turns (on average) after becoming willing to agree to an OB proposal.		20 turns
In between OB proposals to humans, there is a 20-turn delay on Quick and Normal speed, a 30-turn delay on Epic speed and a 40-turn delay on Marathon speed.		20 turns regardless of game speed
Rationale	Signing OB on the first meeting has always struck me as strange.	
	Once the AI is willing to sign OB with another AI, it shouldn't wait for another (up to) 20 turns.	
	About the speed adjustment, see the discussion [here](#) on CFC.	
Credits	Got the idea for signing OB more quickly from Civ 4 Reimagined [1.3](#). They even set it to 5 turns.	
Tbd.	With Paper, one can still get the AI to sign OB right away through map trading. AI should check if it can actually reach any foreign tile before signing OB.	
The AI makes it a high priority to build at least one naval explorer once it knows Sailing.		The AI prioritizes exploration only until meeting all civs.
AI considers Galley to be suitable for exploration.		Unit AI types for Galley are only Transport and Attack. Before Caravels, only Work Boat and Trireme have the Explore AI type.
Rationale	Due to the trade route rule change, the AI needs to explore coasts more reliably. Should use Galleys too because Work Boats get picked off by Barbarians at some point and Triremes come too late.	
See also	[905a](#) increases the speed of Galleys; this makes them more suitable as explorers.	
Trade can pass through hostile plots if these plots are affected by a naval blockade by a party that is not hostile to the trading civ. In particular, the trading civ itself could blockade the plots.		Trade can never pass through hostile plots and blockades can only prohibit trade.
The AI does not use blockades to enable trade.		
~~Water tiles with a friendly unit can be worked despite being blockaded.~~ Disabled again. It's a bit more sensible, but too unimportant to bother.		Blockade prevents tiles from being worked despite the presence of units protecting the tile. Those units will have to engage the blockading unit to make the tile workable.
Rationale	Occasionally, a declaration of war severs important maritime trade connections	

	between cities of one of the war parties or with some third party. This should not happen to a civ that has naval superiority.
	Would be too much work to get the AI to use blockades this way.
	Should the mere presence of a unit in a (land) tile cause that tile to be blockaded? How do you operate, say, a winery in a tile that is occupied by enemy military? Could argue that wine remains available from a stockpile for one turn, and after that turn the enemy has had an opportunity to pillage the tile. Would be nice to have the option of blocking a resource for several turns without pillaging, but I worry that resources would get disrupted too frequently for just one turn, causing (human) trades to be canceled and citizens to be reassigned. Anyway, `CvPlot::isTradeNetwork` would be the place to implement such a change.
A structure (route, fort or city) can only be part of a civ's trade network, if that structure is revealed to the civ.	If the tile is owned by another civ, then not even the tile needs to be revealed in order to carry trade. Otherwise, it's sufficient if the tile is revealed, even if the tile is fogged and no structure existed the last time that it was visible. (Structures on unowned tiles are unusual though, so this isn't really a problem in BtS.)
Rationale	Consistent with the (AdvCiv) rule that trade only works along revealed tiles and can only be conducted with revealed cities.
See also	Somewhat important for 004z, which lets the trade layer show trade connections on unowned tiles. Don't want the Trade layer to give away structures hidden in the Fog of War.

125	Culture from trade routes disabled	
AdvCiv		*K-Mod*
Trade routes generate only raw commerce. ~~Trade routes only generate culture if the city tile already has some culture (more than 0 points) of the trade partner.~~ (Decided to disable it entirely instead.)		Trade routes generate foreign tile culture in addition to raw commerce.
Rationale	The only real upside of trade culture is flavor, and I don't think this justifies the added complexity. The confusing part is that trade culture could also be added to city culture (but it isn't). Tile culture from faraway trade partners may be a disadvantage in local border disputes; difficult to say.	
	Unimportant culture in plot help text is another problem. Very small percentages aren't shown, but this means plot culture sums up to just, say, 97% sometimes, which is confusing. (99% is OK – everyone's used to that.)	
	Another issue: The Nationality bar on the city screen can show only culture of up to four different civs, and this can't be changed within the SDK.	
Config	USE_KMOD_TRADE_CULTURE in GlobalDefines_advc	

126	Changes to the later-era start option

See also	138 changes the religion assignment when starting in a later era 307 makes Machine Gun ineligible as a free starting unit (because it can't stop Barbarians from pillaging).

AdvCiv	BtS
Added one free tech for each era after Ancient (except Future) to each difficulty setting that grants free technology to the AI. These free techs are only granted when starting in the respective era. Similarly, the human player receives additional free techs on Chieftain and Settler. On Settler to Chieftain and Monarch to Immortal, the new free techs are Mathematics, Machinery, Printing Press, Steampower and Plastics. In addition to those, AI Deity and human Settler receive Ironworking (only AI), Alphabet (only human), Feudalism, Gunpowder, Steel and Refrigeration.	When starting in a later era, every civ receives at least all Ancient techs. Neither human nor AI receive free techs beyond those.
On difficulty settings that grant free units to the AI, more units are granted when starting in a later era: another defensive unit for each era beyond Ancient, another Worker for every 2 eras and another Scout or Explorer for every 3 eras.	Every civ receives additional free units in later eras. AI civs also receive free units granted by the difficulty setting. All free units are chosen based on the start era, e.g. Riflemen as defensive units when starting in the Industrial era.

Rationale	Games starting in later eras tend to be much easier to win than normal games, surely in no small part, because the AI doesn't get a proper head start. No tech advantage, and the extra free units are relatively few compared with the total number of free units, which may even allow a human player to conquer a high-level AI right away.
Config	The free tech is configured in `Civ4HandicapInfo.xml`.
See also	301 prevents Barbarians from using Copper and Horse until these resources are connected by some city. This used to be a problem with Classical starts – Barbarians would have Axemen and Horse Archers right away, whereas the (AI) civs needed some 50 turns to establish access to Copper or Horse.
Tbd.	The free techs aren't carefully chosen. At some point, I want to change the era of some techs; can reconsider the freebies after that. Later-era starts probably still have balance issues that make them too easy or too difficult to win; I've never even finished a test game starting in a later era. Would be nice to make at least Classical and Medieval starts playable; these aren't *that* different from normal games, but could be different enough to be refreshing.

The point and XP thresholds for Great People (GP) are not affected by the start era.	When starting in Renaissance, the GP thresholds are decreased by 10%, by 20% for Industrial, 30% Modern and 40% Future.

Rationale	The initial GP threshold is much lower when starting in Renaissance (namely 100) than when a normal game reaches that era, and, with the two initial cities with two population each, free Forges and Mercantilism, civs can and will immediately breed Engineers. This is pretty strange, so I was going to increase the initial GP thresholds for Renaissance and later starts. However, when starting in Renaissance, it takes way

	too long to discover essential Renaissance techs like Astronomy, and easy access to Great People can mitigate this problem. Now I'm simply using the standard thresholds as a compromise.
Config	`Civ4EraInfos.xml`
See also	005b skips early GP names when starting in a later era. 008a makes minor changes to the wonders available in later start eras. The non-Ancient scenarios of the Dawn of Civilization mod pretend that a certain number of GP have already been born. Git commit: GitHub

Free buildings per start era:	When starting in the Medieval era or later, all cities founded throughout the game receive some free buildings.
Medieval: Granary, Walls Renaissance: Market, Library Industrial: Aqueduct, Forge Modern: Courthouse, Grocer Future: Factory, Recycling Center	Medieval: Granary, Lighthouse (if coastal) Renaissance: Aqueduct, Forge Industrial: Market, Harbor (if coastal) Modern: Library, Courthouse, Jail Future: Factory

Rationale	Want to keep it at two buildings added per era. Walls kind of spoil the fun, but Medieval rush tactics seem too potent in BtS. Free Walls in the Industrial era are immediately obsolete, but still raise city defense. No more room then for the coastal buildings. I also don't like that these give a somewhat obscure extra incentive (an additional free building) for settling at the coast.
	Library instead of Forge in Renaissance should help jump-start research, especially through Great Scientists. Aqueduct should stick with Forge as it helps against the health penalty.
	I suspect Jail was added in the Modern era because espionage was the big novelty when the later-era start option was implemented.
Config	`Civ4BuildingInfos.xml`; to disable Walls (and Dunn) in the Industrial era, set their `MaxStartEra` to `ERA_RENAISSANCE`.
Tbd.	Test this to see if the tech cost modifiers based on start era need to be adjusted.

Decreased the start turn for Medieval and Renaissance start a little.	
Rationale	Should match the tech pace better (or less badly).
Config	`Civ4EraInfos.xml`

127	Changes to AI Auto Play
Tbd.	Options One City Challenge and Always War should apply while in Auto Play. Lots of `isOption(GAMEOPTION_...)&&isHuman()` checks to be replaced with new functions like `CvPlayer::isOneCityChallenge` and `CvPlayer::isAlwaysWar` that check `isHuman()|| isHumanDisabled()`.
AdvCiv	*AI Auto Play mod*

While Auto Play is enabled, the proxy AI civs (i.e. originally human-controlled) adopt the AI handicap. E.g. in a singleplayer game on Emperor difficulty, the human civ normally incurs 100% inflation, and the AI civs 90% times 80% = 72%. The 90% comes from the AI handicap (Noble), and the 80% from the AI adjustment of the game handicap (Emperor). On Auto Play, the proxy AI civ also incurs 72% inflation.	Auto Play doesn't affect player handicaps; however, proxy AI civs do benefit from AI bonuses defined by the game handicap. In the example, the proxy AI civ incurs 100% times 80% = 80% inflation. Both factors come from Emperor.
Rationale	For simulating all-AI games, proxy AI civs should play by the exact same rules as the normal AI civs. AI Auto Play could also be used for fast-forwarding a normal singleplayer game e.g. when a human victory looks inevitable. In this case, the human AI civ should play by the same rules as a normal human. That's not what the original AI Auto Play does (see example above), and implementing it like that actually looks difficult. For development purposes, it's far more useful to treat proxy AI civs like normal AI civs. This change makes it unnecessary to take the human AI civ out of the game (e.g. by surrounding it with Ice) when running a "Battle Royale"-style AI tournament.
Tbd.	Should scenarios with unequal AI handicap settings (e.g. Earth1000AD) be exempt from this change? E.g. the default handicap of France is Chieftain. If a player plays as France, sets the game difficulty to Emperor and starts AI Auto Play, what should the AI handicap be? Currently, it's the average of the other AI handicaps: Prince. I don't think the difficulty from the scenario is accessible from the DLL if the player configures a different one on the Custom Game screen.
The proxy AI ignores player options, in particular "Workers leave improvements/ forests". (Probably also fixed in K-Mod 1.45, but I'm keeping my fix to be on the safe side.) Minimized popups (from the "minimize-popups" option) are killed when Auto Play starts. Reminders (Alt+M) are not shown while in Auto Play.	Proxy AI civs don't replace improvements and don't chop Forests if the respective options are set. Minimized popups can remain on the screen for some time. Reminder messages and popups scheduled before starting Auto Play appear during Auto Play.
Rationale	Probably just things jdog hadn't thought of.
Auto Play ends at the end of a round, i.e. normally at the end of a Barbarian turn. That means, the human civ is treated as an AI civ during the AI turns. In particular, they can't send diplo messages to the human civ, so there can't be diplo popups when human control resumes.	Auto Play ends at the end of a proxy-AI turn. During the subsequent round of AI turns, the human civ is already treated as human. If the human civ is not in slot 0, e.g. in a scenario, it is also already treated as human during the AI turns in lower slots.

Rationale	It's counterintuitive that e.g. running Auto Play for a single turn only skips over the human turn, but not the AI turns.
	Diplo messages upon resuming are problematic because they force the human player to make decisions. Makes it impossible to simulate an all-AI game in chunks of e.g. 50 turns without any human influence. More generally, running Auto Play in multiple short chunks produces markedly different results than a single long run; not good.
	Caveat: While there can't be diplo popups anymore right after Auto Play ends, popups are unusually frequent on the next turn. This is because the last-contacted timers of the AI civs keep decreasing during Auto Play. Put differently: The AI has much to say if you haven't spoken in a while.
	For a fair all-AI game on Noble or Prince difficulty, it should now suffice to activate Auto Play on turn 0; for other difficulties, the WorldBuilder is needed for giving the human civ the same initial freebies as the AI civs. Could automate this (special treatment for Auto Play on turn 0), but it seems not quite worth the effort.
Config	A Python change (`AIAutoPlay.py`)
Tbd.	The player can still be forced to make a proposal or vote on one right after Auto Play ends.

Spectator mode

When both in AI Auto Play and Debug mode, the human player receives messages about the following major events regardless of whether the civs and cities mentioned in the messages are known to the player's civ: war/peace, Defensive Pact or Permanent Alliance signed, vassal agreement started/ended, city conquered/razed, city culture-flipped, city or colony liberated, wonder completed, Golden Age started/ended, religion founded, state religion changed, resolution of the Apostolic Palace or UN passed, Legendary culture reached, nuke launched/intercepted.	Messages are displayed as if the player was in control, i.e. based on the information available to the player's civ.	
The messages are shown in the usual colors and can be located on the map once Auto Play ends by clicking on them in the Event Log.	I think the original Auto Play mod delivered messages as if the human player was in control, including indicator bubbles on the map that weren't cleared until Auto Play ended. No indicator bubbles in K-Mod (good), but colors and location info were also removed.	

Rationale	Civics changes (except Free Religion) and random events aren't reported because they occur too frequently.
	It would be nice if messages did not refer to the player's civ as "you" (e.g. "You declared war on Alexander!"), but it's too much work to change this.
	Sadly, one can't use the Event Log to jump to locations that aren't revealed to the active player. Looks like the EXE checks `isRevealed` with `bDebug=false` before moving the camera.
See also	[104v] shows messages about AI war plans when in Spectator mode.
Tbd.	Also show messages about diplo resolutions that don't pass?

Can use AI Auto Play in multiplayer by setting `ENABLE_AUTOPLAY_MULTIPLAYER` to 1 in `GlobalDefines_devel.xml.` All players become automated and de-automated at once.	Multiplayer is supposed to be supported in the final version (2.0, which is, as far as I can tell, the version included in K-Mod): "*AIAutoPlay is now multiplayer compatible [...]: it will apply to all players, not just the one who activates it.*" ([source](#))
	This final addition probably wasn't tested much; due to what looks like a bug, only one player gets automated at a time, and only one can be returned to human control.
	Moreover, K-Mod 1.30 made this change: "*Autoplay and change player functionality is now only available in cheat mode.*" However, cheat mode ("chipotle") isn't recognized in multiplayer games.
See also	[135c](#) allows Debug mode and WorldBuilder in multiplayer.

Start and end of Auto Play are recorded in replays.	
See also	Relevant mostly for [R&F](#)
Civ4lerts are not updated during Auto Play and no alert messages are displayed right after Auto Play ends.	AI civs don't have attached Civ4lerts, but when a human civ comes under AI control during Auto Play, its Civ4lerts keep getting updated. When Auto Play ends, alerts are displayed based on the differences between the current game state and that on the last turn under AI control.
Rationale	The updates during Auto Play are a waste of CPU time. And the game state after Auto Play ends can be completely different from the game state before Auto Play started; alerts shouldn't try to communicate that difference.
See also	[106c](#) prevents alerts from being shown right after loading a savegame.
Tbd.	I've added an is-AutoPlay check to every onEvent function in the two Civ4lert scripts. The cleaner (and faster) approach would be to unsubscribe the Civ4lert objects from being notified of game events when Auto Play starts and to re-register them when Auto Play ends. (It's an Observer design pattern.) My Python skills aren't quite up to this task.
	(The alerts added by [210](#) are disabled during Auto Play in a clean manner through the `AdvCiv4lerts` class.)

127b	Store location info (`iFlashX`, `iFlashY`) for most announcements

When the player clicks on an announcement in the Event Log, the camera will normally focus on a tile that has something to do with the respective event:	Announcements about events that don't happen in a particular tile don't get associated with any tile on the map. Clicking on such an announcement in the Event Log has no effect.
Anarchy, Golden Age begun/ ended, project completed, civic/ religion change, circumnavigation: Jump to the capital of the affected civ.	
DoW, war trade alert: Jump to the capital of the civ that started the war (unless it's the active player) or has become willing to start a war.	
Peace made, PA, DP, vassal agreement signed/ broken: Jump to the capital of the civ that has initiated the treaty/ cancelation. (One might as well jump to the other capital; this is pretty arbitrary.)	
Colony liberated: Jump to the location of the new capital.	
Diplo vote: Jump to the location of the vote source (AP or UN); when a resolution passes, also show an indicator bubble on the map.	
Rationale	No harm in allowing these camera jumps via the Event Log. Mostly helpful for following Auto Play games, in order to jump back and forth on the map as wars are declared, ended etc.
	Indicator bubble for passed resolutions: "This is the city you need to conquer in order to stop such resolutions in the future."

128	AI cheats less obviously with visibility
AdvCiv	*BtS*
An AI unit can't target units on invisible tiles unless those units are within a randomized subrange of the search range around the AI unit.	The Unit AI treats all tiles within a unit's search range as visible.
Units in visible tiles (e.g. visible by a different AI unit) can be targeted within the whole search range; no change.	
Rationale	This (well known) AI cheat becomes very obvious when AI ships pursue human Privateers or intercept human cargo. (The search range is a multiple of the number of movement points, and ships have lots of movement points.)
	Can't just exclude all invisible tiles because this would leave the AI completely unable to pursue units. I also doubt that AI patrols could search for enemy cargo ships effectively.
	With my change, the AI sometimes finds targets on invisible tiles, and sometimes doesn't. This looks similar enough to human guessing and deduction, which also isn't always successful.

129	Changes to resource and feature placement during map generation

See also	021b prevents Fur from being placed on hills.

AdvCiv	BtS
Place fewer copies of resources that have a lot of eligible tiles, and thus would normally be placed abundantly. E.g. a bit less seafood on maps with lots of coastline, and sparser resources overall on Huge maps (but still far more in total than on Large maps).	The number of copies of a given resource is proportional to the number of tiles where the resource could be placed.

Rationale	Make unusual maps a little less unusual and more playable.

Config	SUBLINEAR_BONUS_QUANTITIES in GlobalDefines_advc

The map generator avoids placing several resources of a kind adjacent to each other, in particular when placing a cluster of resources on a 3x3 square.	It seems that a cluster can theoretically fill an entire 3x3 square. The number of copies to be placed on the map in total puts a cap on this, but not on large maps.
Added a separate resource class for Gold, Silver and Gems. Clusters of these resources are now kept at least 4 tiles apart. Can still overlap within a city's radius, but not in a way that would allow the city to work every resource.	Nothing to ensure that clusters are placed apart.
Can certainly still get more than 1 Gold/ Silver/ Gems within a city's radius, but 3 or more are quite rare now, even on large maps.	The map generator can produce large clusters of precious metals/stones that make for very powerful (starting) city plots. 5 such resources aren't that uncommon.

Rationale	Starting plots with more than one Gems or Gold tend to be overpowered. Could also be fixed when assigning starting plots or during normalization; however, the cluster placement algorithm also scaled badly with map size, so it needed work anyway.

See also	108 also weakens starting plots, and it increases the value counted for commerce a bit when evaluating starting plots, which should make starting plot normalization more fair.

Map scripts try to place at least 0.88 Silver resources per player, and only 0.78 Gold resources.	1 Gold per player and 0.67 Silver.
Gold can appear on Snow, Desert and unforested Plains, river possible, whereas Silver can appear on forested Grassland and on Tundra regardless of Forest, but not along rivers.	Gold only on Desert and unforested Plains, and Silver on Snow and unforested Tundra. Both can appear next to rivers.

Rationale	Gold was arguably more rare throughout most of history. More importantly, Gold is very powerful, and fewer occurrences should improve the game balance a bit.
	Allow Silver to appear on forested Grassland to make it more common. Also, restricting Silver to extreme latitudes is, as far as I can tell, completely unrealistic; should really appear on just the same tiles as Gold. The intention was probably to make Gold and Silver more distinct. I'm trying to keep them distinct, but make the distinction more historically informed. The most famous gold rushes happened in the Australian desert, Alaska and maybe "on the banks of Sacramento," as a shanty says.
	Silver can't be or isn't commonly panned from rivers. The densely forested Central European mountain ranges have seen silver rushes in the Early Modern era (Berggeschrey). Grassland Forest also fits with Colorado and British Columbia. Indeed, silver mining might be more reliant on charcoal for refinement than gold mining.
	Ancient Egyptian gold deposits and silver in Attica and Baetica also fit.
	Gems can only appear on Jungle Grassland (though the Jungle can get cleared near a starting plot); thus distinct from Silver.
Credits	Inspired by Civ 4 Reimagined 1.2, which also makes Silver more common than Gold.

When placing a cluster of resources, the probability of placing an additional resource decreases exponentially with each resource already placed. The potential target plots are processed in a randomized order.	The targets are processed in clockwise order, and each one gets the same probability (25 or 50%, depending on the resource) until the upper limit is reached.

Rationale	Make large clusters less likely, especially on maps that have large areas of uniform terrain because such areas are especially likely to receive large resource clusters (e.g. Ivory in a large area of Plains).

129b	No flood plains on river bends

Flood Plains appear only on Desert tiles that are orthogonally adjacent to a river. Desert tiles that are only diagonally adjacent to a river still get 1 commerce from the river, but no Flood Plains feature. This change affects all standard map scripts and also PerfectMongoose.	Also on river bends and tiles diagonally adjacent to a river mouth.

Rationale	Cities with too many Flood Plains don't play well, and, in reality, not every flat desert soil becomes fertile when irrigated. This could be addressed by reducing the appearance probability of the Flood Plains feature from 100% to, say, 67%. I like the river-side rule better because, graphically, Flood Plains on river bends can be difficult to see and bending rivers are the ones that produce the highest number of Flood Plains within a city radius in BtS. I've thought about an exception to allow Flood Plains diagonally adjacent to river mouths as the flood plain is usually widest at the mouth:
	
	      □
	      □‖□
	
	But this really isn't a good way to depict a river delta; should use distributaries instead. Also, the absence of a Flood Plains diagonal to the river mouth leaves room for a city and thus encourages civs to settle at the river mouth.

Tbd.	Shorten the Floodplains texture so that it doesn't get so close to the tile corners. Currently, Deserts on river corners look (almost?) the same as in BtS, so it's easy to forget that corner tiles no longer receive Floodplains.
	Would be nice if the Fractal map generator would sometimes create distributaries at a river mouth. I think, currently, this can happen, but is very rare.
Config	`Civ4TerrainInfos.xml`

130	Changes to AI diplo modifiers ([DDiplo](#))
See also	[112](#): vassal agreements (especially voluntary ones, whereas 130v and 130d focus on capitulated vassals) [141](#): No diplo effect from gifted GP

AdvCiv		*BtS*
130a	Sustained peace	
"Years of peace" only start to count when an AI civ is met. The turns needed per relations bonus decrease from 60 initially to 30 in the middle of the game (normally AD 1700) and then stay at 30.		Years of peace are counted from the beginning of the game. The relations bonus is one for every 60 turns (and at most 2).
Rationale	Being ignorant of each other's existence shouldn't "strengthen relations," and civs that have just met shouldn't have strengthened relations. That said, don't want to make it too difficult for civs that start isolated to find partners on other continents. The decreasing threshold should also help keeping "years of peace" relevant after war in the late game – when the game may end in 100 turns, it's almost irrelevant whether relations are going to improve 60 turns from now.	
130b	Personality-based modifiers	
Peace weight reduced to 45% and warmonger respect to 75%, resulting in diplo from peace weight between -2.7 and 1.8, warmonger respect between 0 and 1.5 and their rounded sum between -3 and 3. To this sum, a modifier from handicap is added (see [148](#)) and a base modifier (e.g. Gandhi +2, Tokugawa -1; no change).		Diplo modifier from peace weight between -6 and +4, warmonger respect between 0 and 2.
		(The peace weight of an AI leader is apparently a measure of that leader's love of peace. It's partly randomized at game start. Leaders with similar peace weight like each other, and leaders with dissimilar peace weight dislike each other.
		Warmonger respect says whether a leader is considered to be a warmonger, and warmongers like each other.)
Rationale	I think these modifiers are intended to prevent warlike leaders from fighting inconclusive wars among each other while the peaceable leaders get ahead economically. Fair enough, but it's overdosed, sometimes leading to practically inseparable bonds between peaceful civs. The excessive modifiers make diplomacy overall too predictable from the beginning.	

Tbd.	When there is a large majority of either warlike or peaceable AI leaders in a game, the small minority doesn't stand much of a chance. Can easily happen when AI leaders are chosen at random. It's less of a problem with the change above, but I'm still considering to adjust the hidden modifiers based on which leaders are in the game. Could adjust the modifiers versus all AI leaders that are too popular or too unpopular overall. Don't want every game to have perfectly balanced diplo though ...
	Another problem: Don't want the modifier to give away info about the leaders that the player hasn't yet met. If only met civs are taken into account, the first impression modifier may change upon meeting a civ. But "a first impression is a lasting one" suggests that the modifier doesn't ever change.
	Could I bias the random leader selection instead?

130c	Rank-based modifiers	
AdvCiv		*BtS*
The AI dislikes civs that are ranked higher on the leader board, but not those ranked far higher.		Civs on the bottom dislike those on top; the greater the rank difference, the greater the hate. The second doesn't dislike the first, but the last does.
Civs in the lower half of the leaderboard no longer have +1 relations with each other. However, certain leaders still grant a relations bonus to civs ranked beneath them (no change).		
No rank-based modifiers in the first game era.		Modifiers change a lot in the Ancient era because ranks change a lot.
The AI assumes that civs not yet encountered are ranked on the very bottom (or top) of the leaderboard; i.e. these civs don't affect relations.		The AI magically knows the ranks of unknown civs. Humans can sometimes use inter-AI diplo values to deduce the ranks of unknown civs.
Example: Assume that the human player is ranked 7th at the start of the Classical era, and gradually climbs to rank 1 over the course of the game. AI Peter starts on rank 4 and stays there until overtaken by the player. Let's say he meets all his rivals during the Ancient era. Peter's modifier toward the player then starts at +1, changes to 0 when the player reaches rank 5, to -1 when Peter is overtaken, -2 when the player reaches rank 3, -1 again at rank 2, and 0 as the player takes rank 1; see the table below.		+1 until the player reaches rank 3, then 0, and -1 when the player takes rank 1. I suspect that the initial +1 is due to a bug and should be +2 until the player reaches rank 6.
Rationale	Presumably, a (slight) tendency of the AI to gang up on the leader of the field was intended. Not unreasonable, but it doesn't work: Civs that are far behind can't do much to impede the leading civs. They just hurt themselves by sulking.	
	It's not necessarily wise for civs in the lower half to stick together either. Cooperation is just one way to improve, war another.	
Tbd.	Should be based on score ratio instead of rank difference.	
Willem dislikes civs that are ahead of him and likes civs that are behind him, just like all the other leaders.		Willem is the only leader that dislikes civs that are behind him, and likes those that are ahead.

Rationale	Probably a mix-up by the BtS developers.

No diplo bonus from rank when the low-ranked civ is already at stage 3 or 4 of a victory strategy. Conversely, AI civs at stage 3 or 4 of a victory strategy only assign a diplo penalty to civs at victory stage 4.	AI victory strategies were introduced by BBAI; the diplo modifier is only based on rank.
Rationale	In the endgame, score and rank become unreliable measures of how well a civ is doing.

Rank player vs. Peter	7-4	6-4	5-4	4-5	3-5	2-5	1-5
Modifier AdvCiv	+1	+1	0	-1	-2	-1	0
Modifier BtS intended(?)	+2	+1	+1	+1	0	-1	-1
Modifier BtS bugged(?)	+1	+1	+1	+1	0	0	-1

Example 130c

130d	A master can't be its own vassal's worst enemy, and capitulated vassals can't be anyone's worst enemy. Can't ask civs in a vassal-master relationship to stop trading with each other.
Rationale	Most of the consequences of worst-enmity don't apply to the master anyway, in particular, the vassal will always trade with the master. That means, a vassal with its master as worst enemy effectively has no worst enemy at all. Perhaps OK, but certainly don't want a vassal to promote trade embargos against its master.
	UWAI ignores relations with capitulated vassals; to be consistent with this, capitulated vassals should not be worst enemies. Capitulated civs are already marginalized; their enemies should be content with this.
130e	Worst enemy updated upon relations change

AdvCiv	BtS
Whenever the relations value of an AI civ changes, that civ's worst enemy is immediately updated.	Worst enemy is only updated at the end of an AI team's turn, i.e. never during a human turn. Attitude is updated immediately though, so, e.g. after making peace with a human civ, if the AI attitude changes from Annoyed to Pleased, the AI will still consider the human its worst enemy for the rest of the human turn.

Rationale	Attitude and worst enmity should be consistent during human turns.

130f	Trade embargo changes
See also	130m: AI requests an embargo when at war and too Annoyed to ask for military aid. 001q fixes a bug in the computation of the price charged for an embargo. 001e fixes a bug that causes the AI to make a stop-trading demand against a civ that has just stopped being its worst enemy. 104o uses the AI embargo trade value as a lower bound for the AI war trade value.
Tbd.	Would be nice to let the Foreign Advisor show the time-to-cancel for deals between other civs. Would have to happen in `CvGameTextMgr::getDealString`.
	A dozen AI leaders have stricter attitude thresholds for embargos than for sponsored war (Alexander, Brennus, Hammurabi, Mansa Musa, Mehmed, Peter, Roosevelt, Saladin, Suleiman, Suryvarman, Wang Kon, Zara Yaqob; maybe more when `THEM_REFUSE_ATTITUDE` is counted as well). E.g. when Mansa Musa is Pleased or Cautious, he can be persuaded to begin a war, but says "We don't like you enough" when it comes to embargoes. He likes to trade, and I guess war is seen as a trade in this context (hired for war) and embargo as sth. that severs trade; but of course an embargo is also a kind of trade and a hired war also severs trade ... These leaders should perhaps be willing to stop trading when willing to go to war, but only for a high price.
	An alert (see 210) about AI willingness to stop trading would be helpful.
AdvCiv	BtS

Apart from vassal and peace treaties, a trade embargo cancels all deals, including those recently signed. The AI refuses to stop trading if it is currently receiving reparations from or paying reparations to the target: "Not right now ... Maybe we'll change our mind in a few years."	Embargo doesn't affect deals with a positive number of turns left to cancel.
Rationale	It's [confusing](#) when some deals aren't canceled, especially between AI civs because players can't see which inter-AI deals are recent. This contributes to embargos being largely irrelevant, and allows players to undercut AI embargo requests by renewing resource trades every 10 turns.
Tbd.	Or rather treat reparations as in BtS?
Can't propose a trade embargo if currently trading with the target. Once enacted, the civ that proposed the embargo is affected by it as well, i.e. the target won't talk to the instigator, though there is no diplo penalty for having "stopped trading with us", only the penalty for negotiating a trade embargo.	Except for the diplo penalty (negotiated a trade embargo), the embargo does not affect the civ that proposes it.
Exception: A master can always tell its capitulated vassals to stop trading; this does not disrupt the trades of the master. Moreover, the capitulated vassal agrees to the embargo without asking for compensation. The master still receives a diplo penalty from the embargo target though ("negotiated a trade embargo").	The vassal asks for compensation.
When a capitulated vassal breaks free or when a civ capitulates, all stopped-trading memory of and about that civ is deleted.	If e.g. a master asks its vassal to stop trading with a rival, the rival continues to not talk to the vassal even if the vassal breaks away.
Rationale	Trading with a civ after negotiating an embargo seems implausibly hypocritical. The precondition for proposing an embargo (having no current deals with the target) is needed because, otherwise, embargo proposals could be employed to terminate uncancellable trades at will. This would be problematic in the case of per-turn war reparations. Regarding the exception for capitulated vassals: Colonies being allowed to trade only with the mainland was a common practice in mercantilism. I'm keeping the diplo penalty because I don't want players to routinely enact embargoes after accepting capitulation; that would be a bit tedious.
Stop-trading resolutions (UN, AP) cancel recently signed deals, and such deals don't prevent the resolution from being proposed. Exception: The civ that proposes the resolution mustn't have deals with the target that are too recent to be canceled. The other AI civs try to honor their commitments by voting against the resolution if they have deals with the target that couldn't normally be canceled.	Recently signed deals don't prevent resolutions, but resolutions also don't cancel such deals.

Rationale	Mostly to prevent human players from gifting 1 gold per turn to an AI in order to block stop-trading resolutions for 10 turns and to prevent human players from proposing a resolution that cancels tribute or reparations.
See also	Consistent with dlph.25: war resolutions overrule peace treaties, but the proposing civ mustn't have a peace treaty.
When a player proposes a trade embargo as part of a peace treaty, the AI doesn't refuse on account of attitude. Attitude (toward the war enemy and toward the target of the embargo) still factors into the trade value that the AI assigns to the embargo.	Normally refuses: "We don't like you enough" or "we couldn't betray our close friends".
Rationale	Makes sense to ask the losing side in a war to stop trading e.g. with remaining war enemies of the winning side, and the losing side should be open to this. Similarly, the BtS AI doesn't check attitude when asked to change its religion as part of a peace deal.
See also	Similar issue with war trades as part of a peace treaty; see 100. Similar rationale for 132 (change civics as part of a peace treaty).
Tbd.	The AI should demand this when Furious and at war with the target or when the target is the worst enemy despite the ongoing war. 039 might have to be adjusted.
When asked to stop trading, the AI assigns greater trade value to OB while at war. Exception: trade value not increased when the civ that asks for the embargo is at war with everyone that the contacted civ is at war with.	OB doubles the trade value of the embargo, regardless of war.
Rationale	OB are potentially more useful at war. Canceled OB can prevent the AI from reaching its target cities. Unlikely to be a problem when the civ who's asking is a war ally.
Tbd.	A proper evaluation of an OB agreement while at war would be too much work to implement. But the AI should generally be very reluctant (possibly refuse) to sever OB while at war and also while preparing war. The latter part is problematic because it could expose AI war preparations.
Trade value charged by the AI for an embargo is reduced by 25% if Pleased toward the (human) civ that asks for the embargo, by 50% if Friendly.	No impact of attitude toward the civ that pays; only the attitude toward the embargo target matters.
Rationale	Embargoes seemed slightly overcosted overall (now that the preconditions are stricter), and both attitude values should matter. At Annoyed attitude, the AI refuses embargo trades anyway; therefore no point in a cost increase when attitude is low.
Refuse-to-talk duration after embargo is 18 turns on average. The trade value charged by the AI is proportional to this expected duration (apart from other factors).	30 turns
"You agreed to stop trading with our worst enemy" is remembered for 50 turns on average.	100 turns
Rationale	30 is too long considering that diplomacy is now more dynamic overall. And can let the AI offer an embargo at a more reasonable cost now that the duration is shorter.
See also	130r makes the embargo target forget that the player stopped trading after 60 turns on average. (The BtS AI never forgets this.)

Tbd.	Should perhaps use the same AI memory decay rate for "You agreed to stop trading" as for "You stopped trading." Not sure if 50 or 60 would be the better expected duration though.
Config	`Civ4LeaderHead.xml`; will have to change the values for each of the 52 leaders though.

The relations penalty for negotiating a trade embargo is normally remembered for an average 60 turns (no change), but an embargo proposed against a war enemy is forgotten twice as fast by that enemy (i.e. after 30 turns on average).

When a war ends, recent-embargo memory of all war parties is reduced to 1, meaning that embargoed war parties become willing to trade 9 turns after the war ends (on average).

Rationale	To make embargoes more useful and to help reconciliation after a war. Of course players don't want third parties to trade with their war enemies – this shouldn't upset the AI too much. Which is to say, being upset with a third party that agrees to the embargo does make sense.

Furious AI civs don't ask for embargoes. The AI also doesn't ask for an embargo if the relations value toward the human is the same as toward the worst enemy or only one higher.	Typically, if the AI is Furious toward a player, then that player is him-/herself the worst enemy. When the AI is Furious toward multiple teams, and the player is not the worst enemy, then the attitude toward the human doesn't prevent embargo requests.

Rationale	Not trading with other enemies of the AI is expected too much when already Furious. And shouldn't keep digging when relations are already at rock bottom. The relations-value clause should prevent worst-enemy oscillation.

If the AI attitude toward the (human) player that proposes an embargo is strictly greater than the threshold (i.e. Friendly in most cases), the attitude threshold for the embargo target is reduced by 1. However, except for Tokugawa, an AI leader still won't agree to stop trading with a civ that he or she is Pleased with.	The most common attitude thresholds require that the AI is at least Pleased with the human player and Annoyed or worse with the target of the embargo (else: "we couldn't betray our close friends"). Some AI leaders require Friendly or only Cautious attitude toward the human and are willing to stop trading at Cautious attitude toward the target. Only Tokugawa is willing to stop trading despite being Pleased with the target.

Rationale	The BtS thresholds for attitude toward the target are a bit strict – when Annoyed, there isn't going to be much trading anyway. This change also makes Friendly relations a bit more rewarding.

Regardless of attitude, the AI refuses to stop trading if this means canceling Open Borders with a dangerous civ: "We're afraid of their military might."	Military power isn't taken into account.

Rationale	Should make it harder to abuse the AI as a meat shield.

Power ratio is factored into the cost that the AI charges for an embargo.	Only the game turn, number of cities, attitude values and current deals matter.

Rationale	Even if a civ is not an immediate threat, an embargo makes a war at a later time more likely. Don't want humans to set a peaceful AI that is getting ahead in tech on a collision course with a militarily more powerful civ through an embargo; or at least not so easily.

The number of civs in the game factors into the embargo trade value.	
Rationale	An embargo is more consequential when there are few civs to trade with.
Tbd.	Just counting the civs alive is a bit simplistic. Could copy code from `IllWill::preEvaluate` for a start.
130g	Relations penalty for rejected demand lifted during war

When an AI civ has been at war for at least 10 turns, and it's a war the AI civ started, it forgets about tribute demands rejected before the war. Memory about demands is also erased when a civ signs a vassal agreement. The vassal forgets that its demands were rejected (but other civs continue to remember demands that the vassal rejected).	Rebuked demands are remembered for 150 turns on average regardless of war.
Rationale	To make reconciliation after war easier. (Also, tribute demands are perhaps more common with UWAI.) The interpretation is that the rebuke has been avenged through war. (If the war was unsuccessful, then the AI, apparently, had been wrong to make demands.) Erasing the rebuke memory directly upon declaring war could obscure the fact that the rebuke contributed to the DoW; the rebuke wouldn't be visible anymore on the Foreign Advisor screen. Hence the 10 turn delay.
130h	War-on-friend penalties
See also	[130y](#) deals with reduced declared-war-on-us penalties from vassals

When assigning war-on-friend penalties, master civs ignore their vassals, and vassal civs ignore their master and the master's other vassals. Bringing in a war ally does not lead to a penalty from vassals of the target (no change). No war-on-friend penalty from anyone for attacking a capitulated vassal.	When a master civ is attacked, the aggressor gets a diplo penalty for declaring war on the master and – if the master likes its vassals – a penalty for attacking the vassals. Similarly, the vassals resent the attack on their master, and each vassal may resent the attack on the other vassals (of the same master). Can get a penalty both for the master and its capitulated vassal.
Rationale	The "You declared war on us!" penalty suffices. Should make it a bit easier to have normal relations with a vassal after helping it break free. War on capitulated vassal: Relations toward a capitulated vassal should basically never matter; see change [130v](#).

No penalty if the AI civ has war-on-friend memory about the attacked civ and the attacked civ has recently attacked a liked civ (i.e. the liked civ has war plan "attacked" or "attacked recent").	
Rationale	If the AI is unhappy about a civ under attack, it shouldn't be unhappy about a third civ attacking the aggressor (even if the AI still likes the aggressor).
Tbd.	Not nice that this depends on information that the player can't see (AI war plan type). The following should help a little (but still ...):

The confirmation popup for a declaration of war lists all AI civs that are going to disapprove (if any).	If war is declared through the diplo screen ("Your head would look good ...") or Alt+Click on the scoreboard, the "Does this mean war" popup appears. When attempting to enter closed borders, the "Entering will trigger war" popup appears along with "You can peacefully enter if you sign an Open Borders Treaty" if OB trading is possible.
Rationale	The list could be especially helpful in team games because the penalty is based on team-toward-team attitude and I'm not sure that these attitude values are shown anywhere on the UI.

130i	Diplo modifier from Open Borders (OB)	
AdvCiv		*BtS*
Each turn that an AI civ has OB with another civ, the OB counter of the AI is incremented twice, each time with the same probability (cf. 130k). This probability is based on the AI civ's profit from trade routes with the other civ and the (spacial) closeness value (cf. 107) between the two civs.		The counter just counts the number of turns that the two civ have had OB.
Rationale	It had been too easy to please the AI, and, consequently, there wasn't enough warfare overall. See for example this game report of mine played with v0.87, prior to change 130i. In particular, civs that never had much to do with each other were often unwilling to go to war when they came in closer contact through Galleons or conquest.	
See also	149 has the same aim.	
Memory about OB decays at a rate of 1.45% when borders are no longer open. The OB memory has an upper limit of 60.		OB memory never decreases. When borders are closed, the relations bonus is suspended until they are open again. The relations bonus is +1 for every 25 turns. Although the bonus is capped at 2, the OB memory keeps increasing after 50 turns with OB.
Rationale	Mostly for consistency: all diplo memory and counters decay (130r, 130k). Regarding the upper limit: otherwise OB that have lasted for, say, 250 turns would never decay to the point of reducing the relations bonus.	
130j	~~Friendly AI more resentful about bad actions, Annoyed AI happier about good actions~~ Changed scale of AI memory	
~~When an action displeases the AI, it adds 1 to corresponding memory if it's already Annoyed or Furious, 3 if it's Friendly and 2 otherwise. When an action pleases the AI, it adds 1 if already Friendly, 3 if Annoyed or worse and 2 otherwise.~~ ~~This results e.g. in -4 relations for a DoW on a Friendly civ, and only -2 if they're Annoyed.~~ (Disabled the attitude-based logic again.) Memory is increased by 2 in all cases.		The AI stores separate memory about each civ and for each type of action, e.g. DoW or an accepted tribute request. When a diplo action occurs, the respective memory is increased by 1. The current AI attitude has no impact on this. (Although the AI e.g. doesn't make tribute demands at Pleased.)

This faster increase of memory is evened out by 100% faster decay than in BtS for all memory types, and the impact of each remembered action is halved.

Since each action normally corresponds to a memory value of 2, it's unlikely for an action to be completely forgotten after a few turns, or to be remembered fully for a long time.

"You razed our cities/ a holy city" and "You nuked us" work differently; see 130q. (But not "You nuked our friend".)

The decay speed depends on the memory type and leader personality. E.g. Alexander remembers accepted tribute for 50 turns on average. That said, he could also forget about it within just 5 turns or still remember it after 115 turns (both ca. 10% probability).

Rationale	To make relations more dynamic. Also more plausible that a civ leader would be more indignant about a DoW by a friend than by an enemy. The decreased randomness is a welcome side effect.
	It doesn't make sense to base the diplo penalty for razing and nuking on attitude because these penalties only occur when already at war, and, then, the enemy attitude is usually Annoyed or worse. One could, alternatively, treat raze and nuke like the other diplo actions, but increase their base penalties; however, this would also affect razed cities with culture of non-war parties (which aren't necessarily Annoyed), and the BtS base penalty of -2.5 is already severe in this case.
	I've disabled the core of this change in v0.91 because it's a change that players need to know about, but that actually matters rarely. It can also create a counterintuitive incentive to keep relations below Friendly.
	The more fine-grained memory counting remains in place.
See also	130r uses an even finer scale for memory about declared war.
130k	Some randomness added to AI diplo counters
See also	130i deals with the OB counter, and 149 with resource trade.

Counters relevant for diplo increase and decrease probabilistically by either 0, 1 or 2 per turn.

When the condition for increasing a counter is not met, the counter is decreased by 1.7%.

For every civ, the AI keeps track of the number of turns spent in various relationships with that civ: war/peace, shared/opposed religion, shared civics, resource trade, defensive pact, OB, shared war. E.g. the defensive pact counter is increased by 1 on every turn that the two civs have a defensive pact, and decreased by 1 otherwise.

Rationale	While memory decay (130j) is too unpredictable in BtS, the counters are too predictable. E.g. the "years of peace" bonus kicks in after exactly 60 turns.
	Exponential decay should make diplo bonuses from counters less sticky.

The probability of increasing or decreasing a counter is adjusted to the game speed setting. While an AI civ is in the Ancient era, the probability is divided by the Growth modifier (e.g. 150% on Epic speed); after the Classical era, the divisor is the Golden Age modifier (e.g. 125% on Epic speed); and, *in* the Classical era, it's the mean of Growth and Golden Age modifier (e.g. 137% on Epic).

No game speed adjustment.

Rationale	On slower speed, more trades and wars tend to happen throughout the game than on faster speed, but the difference is not that great, so the Golden Age modifier seems like a good compromise. The early game is special because early wars are rare, so the peace and Open Borders counters usually increase monotonously until the Iron Age or so, and at that point, the relations bonuses often make AI leaders unwilling to attack each other on Epic and Marathon speed. Hence the extra slow increase during the first game era.
See also	130r factors game speed into memory decay. Should contact frequencies also be affected?

130l	Accepting an AI request reduces memory about a past rebuke and vice versa	
AdvCiv		*BtS*
(disabled by default since v0.85) When an AI diplo request is approved by another civ, memory about previously denied requests of the same type is reduced by 1. Likewise, a denied request reduces memory about previously granted requests. Since each request normally adds 2 occurrences to memory (see 130j), subtracting 1 does not always have a visible effect. The following request types are affected by this change: help, tribute, change religion, change civics, join war, stop trading. Requests of differing types do not affect each other; e.g. granting tribute does not erase memory about denied help.		Accepted and denied requests are remembered separately, and entirely so.
Rationale	Another means to turn bad relations around, and vice versa. Fairly low-key, I think. Multiple AI requests in a row don't happen often, and only 1 memory is subtracted. After some testing, I find that I never pay attention to this, and the other mechanisms for more dynamic relations seem sufficient. Disabled in order to make the mod a little less complex.	
Config	Can enable this change again through `ENABLE_130L` in `GlobalDefines_advc.xml`.	

130m	Shared-war diplo bonus based on war success	
AdvCiv		*BtS*

+1 relations for currently sharing a war (no change), more than that only if the one side has had losses in the war (i.e. is at least in some need of assistance) and the other side has also had losses or has inflicted losses on the shared enemy (both count equally). The exact formula is complicated; see `AI_getShareWarAttitude` in `CvPlayerAI.cpp`. The total relations bonus is capped based on leader personality (no change). Moreover, the bonus can't go higher than 2 unless the teams have shared a war for at least 8 turns; another 8 turns are required for every further point.	The AI counts the turns spent together at war (shared-war counter), and for every 8 turns, increases relations by 1 up to a limit that depends on the AI leader. This counter never decreases, meaning that the relations bonus remains for the entire game. It is only suspended while the former war allies are at war with each other.
Success (and losses) in the shared war are remembered by the AI beyond the end of the war, but decay by 1.5% per turn (even while the war still lasts). The relations bonus for a remembered shared war is reduced if the AI needs help in a current war, but the former ally hasn't joined the war.	The shared-war counter also matters for Permanent Alliances. The AI only agrees to those after at least 40 turns of shared war.
The shared-war counter decays by 0.1 per turn (on average) when no war is being shared.	

Rationale	The everlasting relations bonus was reported as a potential bug for the [Unofficial Patch 3.13](), but didn't get patched, and I agree that the BtS behavior is probably deliberate. That said, a permanent relations bonus is clearly too big a reward for just staying at war. My change should ensure that you need to fight alongside the AI in (somewhat) good faith in order to get a relations bonus.
	I don't think players need to know the specifics of the war success formula; I hope it works pretty intuitively.

No shared war bonus if either war ally is a capitulated vassal.	Shared wars can bring a master and its capitulated vassals closer together.
No defensive pact bonus for capitulated vassals.	All vassal agreements are treated as defensive pacts when it comes to relations bonuses.

Rationale	Capitulated vassals are dragged into war by their masters. They should generally be unhappy about that. At best, the shared war experience can make up for this unhappiness.

AI less likely to ask for military aid if the war is still recent; same frequency overall. If Annoyed toward the player, the AI asks for an embargo instead of joint war. Past wars by the human don't matter.	AI civs on whom a human civ has declared war in the past don't ask that human civ for military aid, but the current attitude isn't an obstacle.
Also less inclined to ask for war against a civ that the player recently made peace with.	Can't ask if there's peace treaty, i.e. for 10 turns; beyond that, recent peace doesn't matter.

Rationale	A joint war is asked too much from a civ that the AI considers to be an adversary. (Or they could ask, but they shouldn't be mad when denied.) Embargo requests should generally be more common when the AI is at war.
	If the player has recently been at war with the target, then, apparently, the player is unwilling or unable to defeat the target. Also don't want the AI to drag players into the same war repeatedly.

Fighting against units inside another civ's borders is extra effective at increasing the shared-war memory. Of course, these units need to be hostile to the tile owner. Losing a unit in such a fight counts as much as defeating a hostile unit. Barbarians count as hostile in this context, i.e. it's possible to get a "mutual military struggle" bonus without even sharing a war, just by fighting Barbarians inside the other civ's borders. Fighting Barbarians elsewhere doesn't help though, and the bonus won't exceed +1 unless there is or was previously a shared war. Units with hidden identity (i.e. Privateers) also count (but not if the Privateer belongs to the plot owner).	War success has no impact on the shared-war diplo, no matter where it occurs.
Rationale	If someone engages enemy units in the AI's territory, that someone is really being helpful, and not just competing for loot; the AI should appreciate that. Regarding Barbarians, I sometimes find that my, say, scouting Chariot could help an AI civ against Barbarian invaders, but BtS gives me no incentive to do so. The change should make these situations more interesting.
If UWAI is enabled, the AI does not ask the player to join a war when it thinks that this would be disastrous for the player. This is checked by letting the proxy AI (see 130u) compute the player's war utility. The AI may ask for an embargo instead.	The human position is not considered by the AI.
Rationale	Would prefer to let the player decide whether a joint war is a bad idea, but the player shouldn't be punished with a diplo penalty (help refused) for not being stupid.

130n	Religions that the AI has only recently encountered cause a lower diplo penalty	
AdvCiv		*BtS*
No diplo penalty for different religion from AI civs that don't know a single city with that religion. Once they do encounter the religion in a city (from exploration, map trade or because the religion spreads), it takes 8 turns for the diplo penalty to switch on.		The diplo penalty applies almost fully (up to -3) upon meeting a civ with a different state religion. After 5 turns, it gets 1 worse.
Rationale	To help initially isolated, religious AI civs to catch up through tech trade once they meet their rivals. In BtS, everyone tends to be Annoyed toward the newcomer. Should also lessen religious animosity in the early game, but won't delay it for long. Also doesn't make sense to me that a civ leader instantly hates a religion when he/she first hears about it.	

Tbd.	I've had a better idea for this: The penalty should be based on the ratio min{ known population with the offending religion, known population with the AI religion } / known world population. Currently, small religions are tolerant, but not tolerated. Can then remove the clunky time-based progression (variable `ReligionKnownSince`). Will need a cache for the above ratio that gets updated at the end of each turn before updating the attitude cache.
130o	Changes to made-demand memory
See also	[130v](#) prevents vassals from acceding to tribute demands from rivals. [144](#): refusal of gift request.

When a human player declares war on an AI civ (primary DoW; not through DP), and that AI civ remembers having paid tribute to the player, the AI civ and all non-vassal AI civs that it has met set their recent-demand memory about the player to 8, which (due to change [130j](#)) means that they won't consider any requests for help or demands for tribute by the player for (on average, on Normal speed) 80 turns.	Accepting tribute results in a 10-turn peace treaty. After that, there is no particular penalty for declaring war despite tribute.
If the AI denies a demand for tribute, the human player does not receive a diplo penalty. Only granted tribute results in "You made an arrogant demand", and this memory decays after 30 turns on average. I.e. the only negative consequence of a denied demand is that the recent-demand memory increases.	"You made an arrogant demand" regardless of whether tribute was granted; never goes away.
Accepting tribute still results in a peace treaty.	
When an AI civ declares war (primary DoW) or signs a vassal agreement, it sets all its arrogant-demand memory to 0.	

Rationale	The BtS mechanism incentivizes players to demand tribute from civs about 10 turns before attacking them anyway. Not at all how tribute should intuitively work, not how it works when the AI asks tribute from a human player, and not an interesting decision. Could go about improving this in many ways. My approach is supposed to be low-key and low-effort. I've removed the penalty for failed demands because players need to be able to tell if a civ has actually paid; if it hasn't, it's OK to attack. Moreover, a penalty for a failed demand encourages reloading. Not sure if the penalty (no requests for 80 turns) is painful, but at least it makes it impossible to routinely receive tribute before going to war. Not ideal that the safety period is tied to memory decay, and thus randomized. Wouldn't make sense to apply this change to AI civs that declare war after receiving tribute from humans; AI civs never request or demand anything from each other, so increasing AI-to-AI recent-demand memory would have no effect. An earlier implementation kept the "arrogant demand" penalty for unsuccesful tribute demands, and added a new type of diplo memory ("exacted tribute") to distinguish the two outcomes.
Config	The 80 turns are customizable in `GlobalDefines_advc.xml`.

Tbd.	Arrogant demand should be remembered for a non-randomized period of time. Also, 30 turns is too long; try 25.
	Would be nice to show info/ a reminder about this change on the diplo screen, before or after the player makes a demand; however, the text with which the AI responds to a demand is also used for vassal tribute (which doesn't cause "arrogant demand" memory) and "We demand that you give us this in tribute" mustn't take up more than one line because it's always shown while the player arranges trades. Could show a message I guess (outside the diplo screen) ...
	Would like rejected gift requests to add only 1 to recent-demand memory; lower stakes that way. Would have to move code from `CvPlayer::handleDiploEvent` into `CvPlayerAI::AI_considerOffer` for this.

Gandhi gets as upset as most other AI leaders (i.e. -1 relations) when he pays tribute.	Gandhi is the only leader who doesn't mind tribute demands.
Rationale	Otherwise, the new mechanism couldn't apply to Gandhi, which would be strange: why do the other AI civs not care when Gandhi is attacked after paying tribute? Gandhi has still enough other quirks; he may well be the leader with the most extreme personality overall.

When the AI disregards a request for a gift or a tribute demand because it still remembers a recent request or demand (both based on recent-demand memory), recent-demand memory is only increased by one, meaning it'll take half as long as in BtS until the next request/ demand is considered. Making requests and demands can't increase the recent-demand memory beyond 2.	Each request adds fully to the recent-request memory, meaning that, if the AI still remembers one recent request when a new request is made, it takes 40 turns on average until another request is considered. Also, each tribute demand (regardless of success) further worsens relations, up to a maximum of 10 demands. I.e. one can worsen relations almost arbitrarily within a single turn.
Rationale	Thanks to change 130j, there's now a lighter punishment available for aggressive begging. 40 turns is awfully long.

If UWAI is enabled: The AI remembers for 10 turns on average (plus the duration of the peace treaty) whether a human has recently accepted a demand. While the peace treaty from the demand lasts, the AI doesn't plan war against the human. After the peace treaty, so long as the demand is remembered as recent, the AI treats the human as if its attitude was at least Pleased (as far as war planning is concerned).	Only remembers "You gave us tribute" (for 50 turns on average), but not whether the tribute was granted recently. The BtS AI never plans war during a peace treaty, but the K-Mod AI does; and the K-Mod AI is able to declare war shortly after the peace treaty ends.
Rationale	Since humans are now encouraged not to attack shortly after receiving tribute, it seems like a double standard when the AI does it.

130p	Fair-trade bonus and enemy trade penalty reworked. All pretty complicated (and especially complicated to describe), but, hopefully, in the end, the bonuses work as one would intuitively expect.
AdvCiv	*BtS*
Each time a trade is made, a score based on the	Raw gold values are recorded without adjustment

normalized gold value of the traded items and the current asset totals of both parties is recorded. The accumulated score decays by 1.45% each turn (Normal speed). The relations modifier computed from the remembered score is subject to diminishing returns, meaning that more trading is needed in order to get from e.g. +3 "fair and forthright" trade to +4 than from 0 to +1. The modifier is increased a bit if the two civs have only recently first met.	for game speed or game progress, and don't decay. When computing relations, the total recorded gold value is divided by the has-met counter, i.e. the number of turns that the two civs have known each other.

See also	[131](#) makes some minor adjustments to asset totals.
Rationale	The BtS formula works OK for Normal speed in the first third of the game, but becomes too sensitive later in the game (because trade values increase faster than the has-met counter), and on slower game speed settings. It also produces weird results for civs met in the middle of the game; a small gift can be enough for a +4 bonus or -4 penalty, and modifiers can decrease rapidly as the has-met counter increases.
	I'm taking a more explicit approach by recording normalized trade scores and applying exponential decay each turn (instead of implicit decay through increasing trade values and has-met counters). Asset totals seem well suited for computing trade scores because they tend to increase at a similar pace.
	Despite the decay, trade scores still tend to be higher between civs that have known each other for a long time than between civs that have recently met. It does, therefore, make sense to take into account the has-met counter, but the effect is now much smaller than in BtS.
Tbd.	Make this more sensitive when tech trading isn't allowed.

The fair-trade relations modifier is multiplied by `MemoryAttitudePercent-EVENT_GOOD_TO_US` in `Civ4LeaderHead.xml`, which, however, is 100 for all leaders, so this matters only if a mod-mod changes some `MemoryAttitude` values. For enemy trade, `MemoryAttitudePercent-EVENT_BAD_TO_US` is used instead. This is also 100 for all leaders.	Not based on personality at all, neither through a multiplier, nor through bounds. (The bounds are hardcoded as -4 for enemy trade and +4 for fair trade; this is still the case in AdvCiv.)

The fair-trade modifier is based on the difference between the recorded values of items that the AI has received in trade minus 5/6 of the recorded values of items that the other side has received.	100% of what the other side received is subtracted. I.e. a human who makes only deals with the AI that the AI finds perfectly fair never receives a "fair and forthright" relations bonus.
Rationale	It's clear enough that "fair and forthright" is supposed to be a bit of a euphemism, but trades that are actually fair should still have some impact. This should also make it a bit easier for AI civs to reach mutually Friendly relations (despite change [148](#), AI-AI friendships are a bit scarce).

Open Borders (OB) with a worst enemy contribute significantly to the relations penalty. The impact is based on the number of turns that the two civs have had OB. None if the borders aren't currently open.	OB and DP factor into the trade memory for both fair trade and enemy trade, but the deal value is so small that the impact is negligible.
OB (and Defensive Pact; DP) have no impact on the fair-trade bonus, and don't contribute to trade memory. Resource trades add to trade memory,	Resource trades don't matter for trade memory. All ongoing deals can cause the AI to demand a

though the impact is normally small. The trade value for the first ten turns is processed when the deal is signed, then, once the deal can be canceled, trade value is added turn by turn. The AI refuses to sign a DP if a DP was recently canceled (explicitly canceled or through a war declared by one of the signatories).	trade embargo. The AI refuses to sign recently canceled OB, but, for DP, there is no such restriction.

Rationale	OB can be very helpful for the enemy civ, may even be crucial at wartime, so I don't think the potential -1 from refusing a trade embargo is a sufficient penalty. I prefer to keep OB and DP out of the trade memory, so that cancelation of those deals immediately reduces the enemy trade penalty. This can't be abused by suspending OB and DP just for one turn because of the AI's refusal to sign OB and DP if recently canceled. DP needed this kind of restriction anyway; too easy to flick DP on and off in BtS.
See also	130t factors attitude and worst enemy into anger about rival DP. dlph.3 keeps DP intact after a foreign DoW. 550a gives civs that have fallen behind better deals by adjusting trade values. This adjustment factors half into the trade score relevant for relations.
Tbd.	Should perhaps only refuse to reinstate OB/ DP if the other side cancels them. Not quite easy to implement as cancelation memory is added in `CvDeal::endTrade`; would have to move that to `CvPlayerAI::AI_doDiplo`. Peace treaties should perhaps also add to the enemy trade penalty. Can currently ask for a gift or tribute to avoid getting asked to join a war. May have to dial this up once there is tech diffusion from OB.

"Our defensive pact proves ..." applies only when currently in a DP.	Doesn't check if currently in a DP. The relations bonus is based on the number of turns spent in a DP. That number counts backwards when not in a DP.

Rationale	More intuitive this way, and consistent with how the OB relations bonus works.

Reduced impact of OB and resource trades on the enemy trade penalty if the worst enemy has OB with many civs.	

Rationale	An AI civ can't afford to be mad at everyone. This is less of a problem for tech trades because one civ can only do so much tech trading.

Decreased the impact of gifts vs. trades on enemy trade memory a little.	The AI tracks gifts and traded items separately. Gifts are hated three times worse than traded items.

Rationale	I guess the idea is that trades aren't so bad because the worst enemy has to give something away too. But trading is dominated by tech trades, and giving away tech doesn't really hurt the worst enemy; it's very much win-win.

Reduced impact on enemy trade if the AI relations toward the enemy and the enemy's trade partner are similarly bad. When the worst enemy of an AI civ changes, that civ reduces its enemy trade memory about trades with its (former) worst enemy by one third.	When an AI civ dislikes two civs equally, and one of these enemies trades with the other, the distinction of "worst enemy" can oscillate between the two. Even if the AI reconciles with its worst enemy, it continues to be mad at civs that previously traded with its former enemy.

Rationale	Both changes are aimed at preventing situations where a civ that trades with the

	worst enemy becomes itself the worst enemy. This can seem erratic. (That said, even when the worst enemy changes, "you've trade**d** with our worst enemies" remains true.) I've considered halving the memory, but that could drop a -3 penalty to -1 due to rounding, which seems a bit much.
See also	130f prevents stop-trading demands when relations toward the player are already almost as bad as toward the worst enemy.

When picking the worst enemy, civs with whom the AI is at peace are only considered when the AI isn't at war with anyone. Exception: Dogpile wars (e.g. on request of another civ) have no impact on worst enemy.	Worst enemy chosen only based on attitude.
Enemy trade memory is increased more when the AI is at war with the worst enemy than when they're at peace.	Whether the worst enemy is a war enemy doesn't affect enemy trade memory.
Trades with a war enemy increase enemy trade memory even if that war enemy is not the worst enemy, though not as much as trades with the worst enemy do.	Only trades with the worst enemy count as enemy trade.

Rationale	Trades with a war enemy are more likely to harm the AI than trades with some cold-war foe.
See also	552 increases the AI trade value of military tech.

Payments in peace deals (between two parties or brokered by a third party) increase enemy trade memory (but not fair-trade memory). Exception:	Peace deals don't count for trade memory.
Civs don't count enemy trade memory if they like the civ with whom peace has been made (Pleased attitude).	
Payments in two-party peace deals don't count *fully* for enemy trade memory.	

Rationale	Don't want players to bypass enemy trade penalties by piggybacking regular trades on (brokered) peace deals. It makes sense to me that a civ gets upset when its worst enemy is paid for peace.

130q	Nuke and raze memory based on city size
See also	650 deals with other changes to nuclear war (minor so far). 130j (partly disabled) exempted raze and nuke memory from being affected by attitude.

AdvCiv	*BtS*
When a city is nuked, the AI owner remembers this as 1 to 3 bad actions depending on the importance of the city. Nukes that don't affect a city are counted as 1. If the nuke is counted as 1, partners of the nuked civ don't get upset ("you nuked our friends"). Razed cities count as 2 bad actions in the case of a significant city, otherwise 1.	Each nuke counts as 1 bad action (which is equivalent to 2 bad actions given change 130j), even if it only hits a ship in the middle of the ocean, and nukes always trigger "you nuked our friends". Each razed non-holy city counts equally (unless it has 0 city culture and a dead civ has the highest city culture; see change 099).

Rationale	It should make a difference whether a city is hit at all, and whether it's, say, the capital, or some backwater.
	Raze anger generally seems a bit high, or just ineffective at discouraging razing. For now, lower the anger a bit overall by exempting minor cities.
Tbd.	The raze mechanism needs to change so that it takes multiple turns (or multiple units).
	The raze popup should say how great the anger will be.

The AI isn't upset about a nuked friend if the owner of the nuke is or used to be a friend that has itself been nuked at least as badly.	The AI only checks whether it's at least Cautious toward the victim.

Rationale	Don't hate both sides of a nuclear war if it's just tit for tat.

AdvCiv	*K-Mod*
AI doesn't disband nukes when in financial trouble unless no units other than cargo units remain.	As far as I can tell, nukes are disbanded before most other units. BtS tried to save expensive units, which is fine in the case of nukes, but K-Mod focuses on XP, which is generally better, but fails for nukes.

130r	All AI diplo memory decays; see the [table](#) in the DDiplo chapter.
See also	[130y](#) counts less declared-war memory in certain situations. [130o](#) deals with memory about tribute demands.

AdvCiv	*BtS*
Super-linear (power law) decay: The more incidents of a kind the AI remembers, the faster it tends to forget each of them.	Decay is linear in the number of turns that have passed.

Rationale	There should always be a route to reconciliation (though it doesn't always have to be worth pursuing).

All decay probabilities are adjusted to game speed using the same (moderate) modifier as for Golden Ages: 100% slower decay on Marathon, 25% slower on Epic, 20% faster on Quick	The various AI memory values are decremented each turn, each with its own probability from `Civ4LeaderHeadInfos.xml`. The probabilities are the unaffected by the game speed setting.

Rationale	The contact delays are unaffected by game speed, which means that the AI does e.g. ask for help more often in a Marathon game than in an Epic game; however, there aren't normally twice as many requests on Marathon than on Epic because certain other conditions need to be true for each specific request, and other remembered events, such as declared wars (now subject to decay as well), aren't controlled by contact delays, and don't happen that much more frequently on slower settings. So, a middle ground is needed.
Tbd.	Perhaps the contact delays should be increased a bit on the slower settings. It would make sense to tie help requests to research speed, but, for hired war or requests to stop trading, this would be too slow; so, again based on the Golden Age modifier, I guess...
See also	[130k](#) factors game speed into memory increments.

Transformed the independence bonus into a memory-based bonus to let it decay. It's treated as 10 memory decaying at a rate of -1 every 30 turns on average (Normal speed).	A liberated colony is forever +10 grateful to its old homeland.
Rationale	To be consistent with the "everything decays" paradigm.
War success decays by 3% each turn; that's a reduction to 75% after 10 turns. It's still set to 0 at the end of a war.	War success doesn't decay; only reset to 0 when a war ends.
Rationale	In long wars, initial successes tend to have too much weight.
Tbd.	Initial successes should perhaps be ignored entirely, or decay very quickly because they're often owed to surprise and thus not a good estimate for the future course of the war. Resetting war success at the end of a war isn't smart because war could break out again just 10 turns later, but 0 war success while at peace might be assumed by some of the code, so I'm not sure how easy it would be to change this.
See also	UWAI remembers the overall outcome of a war before war success is reset.
No decay of declared-war memory while the war lasts. Same goes for war-on-friend memory while at war with a partner.	No decay of either memory type ever.
Rationale	Plausible that forgiveness can't happen while the transgression is ongoing. Also, war-on-us memory was decaying too fast without this restriction.
Recently-canceled memory (about OB, DP and VVA) can only decay half (from 2 down to 1) while at war.	No recently-canceled memory about DP and VVA. AI often willing to sign OB right after a war ends.
See also	130p introduces recently-canceled memory for DP and 143 for VVA. 130j counts memory at a finer granularity, which is why canceling a deal sets recently-canceled memory to 2.
Rationale	AI shouldn't generally be willing to sign agreements right after a war ends.
"You stopped trading with us" (`MEMORY_STOPPED_TRADING`) is remembered for 60 turns on average, same as "You negotiated a trade embargo," and neither of these decay while there is recent stopped-trading memory (`MEMORY_STOPPED_TRADING_RECENT`).	When a team agrees to an embargo, the invisible `MEMORY_STOPPED_TRADING_RECENT` count is incremented and lasts for an average 25 turns. Additionally, the `MEMORY_STOPPED_TRADING` count is permanently increased, leading to the relations penalty.
Rationale	The relations penalty shouldn't disappear while the embargo is still in effect.
See also	130f makes `MEMORY_STOPPED_TRADING_RECENT` decay a bit faster than in BtS.

130s	Accepting to join a war gives +1 relations
AdvCiv	*BtS*

When a human player accepts an AI request for war aid, this is remembered as "You agreed to come to our aid in wartime." for 100 turns on average (on Normal speed). The bonus is suspended when the human civ isn't sharing any war with the AI civ and the AI civ is fighting at least one war.	The relations effect, including the explanation text, is implemented, but disabled in `Civ4LeaderHeadInfos.xml`. The duration is set to 150 turns on average.
Rationale	The thankless help requests bother some players; military assistance shouldn't be treated as a matter of course – that's what defensive pacts are for. Perhaps the original developers felt that the shared-war bonus is enough reward for a declaration of war, but now that the shared-war bonus is harder to get (change 130m), it should be OK to reward the granted request directly. 150 turns seems a bit much though.
Config	Can be disabled in `GlobalDefines_advc.xml`. (Or in `Civ4LeaderHeadInfos.xml`, but there, the change would have to be made for each leader individually.)
See also	130m should make the timing of help requests more predictable. 104i (UWAI) makes the target of a joint war refuse to talk as in BtS, thus preventing the hired civ from making peace immediately.

130t	Diplo penalty for Defensive Pact based on relations toward third party
See also	130p makes the AI refuse a DP if recently canceled, and exempts DP from enemy trade and fair trade diplo.

AdvCiv	*BtS*
The relations penalty from an AI civ X toward a civ Y for having a defensive pact with a rival Z of X is based on the attitude of X toward Z. There is no penalty if the attitude is one higher than the `DeclareWarThem` threshold, or when X also has a DP with Z, or when X is too weak to attack Z regardless of the DP. The `DeclareWarThem` threshold is at Annoyed for e.g. Darius, at Cautious for e.g. Hannibal and at Pleased for e.g. Julius Caesar. (And at Friendly for Catherine, but this is no different from Pleased in this case because I'm using the threshold plus 1, and Friendly is the highest possible attitude.)	No penalty if X has a DP with Y; attitude doesn't matter.

Rationale	BtS doesn't properly factor DP into enemy trade diplo, and I think it's better to have all the negative DP diplo in one place anyway. A DP of Y with both X and Z shouldn't satisfy X and Z unless they like each other. In this constellation, Y threatens war on X if X should attack Z, which should offend X. Y also promises to protect X; but this is covered by the DP relations bonus (no change to that).
	As for the threshold, I've considered using the `DefensivePactRefuse` threshold from `Civ4LeaderheadInfos.xml`, which is Cautious for some leaders, but a leader that is quick to sign a DP shouldn't necessarily be forgiving about a rival DP. (The opposite could be true: these leaders think that DPs are important, and are therefore worried about rival DPs.)
	Warmongers tend to have high `DeclareWarThem` thresholds (easy to convince to declare war). These leaders should be bothered most by DPs.

AI refuses to sign a DP without OB: "Surely, you must be joking."	
Rationale	How are you going to defend us without entering our borders??

Anger about rival peace vassals works the same way as anger about defensive pacts.	see 130w
Rationale	Voluntary vassal agreements are much like defensive pacts.
See also	About capitulated vassals, see 130w.

130u	Proxy AI treated as Cautious
AdvCiv	*BtS*
The AI running in the background, ready to take over for a human player, is Cautious toward everyone no matter what happens.	The proxy AI computes its attitude just as if it were in control.
Rationale	Should only make a difference when a player drops out in multiplayer. With my change, the proxy AI e.g. doesn't take note of trades with the human's worst enemy (doesn't have one) until the AI takeover. This is more fair to the remaining players because they can't see who the worst enemy of the AI is until it takes control.
Tbd.	There may well be some places in the code where a proxy AI remembers something based on AI leader personality.
See also	130v lets capitulated vassals mimic their masters' attitude. In the case of a human master, this attitude is Cautious.

130v	Masters are held responsible for their cap. vassals; cap. vassals as zombies
See also	K-Mod disables vassal-master attitude sharing; UWAI disregards capitulated vassals as war targets; 130d makes capitulated vassals ineligible as worst enemies. 130t bases the "vassals to your empire" penalty on attitude in the case of peace vassals, and 130w penalizes expansionism through vassals and conquests. 130y and 130h reduce war-based diplo penalties for vassals, recognizing that vassals don't have a choice in starting wars. 099c prevents master cities from flipping to a vassal, and 025 reduces the culture spread of capitulated vassals. 143b prevents capitulated vassals from building nukes. 014 makes capitulated vassals ineligible for team votes, stops them from pursuing victory and from building great wonders. dlph.25 prevents capitulated vassals from defying resolutions. 112b changes conditions for capitulation. 130f lets capitulated vassals agree to embargoes for free. 036 (gold available for

	trade based on attitude) disregards the attitude of capitulated vassals. 033 stops capitulated vassals from training Privateers. CFC discussion about the relationship between capitulated vassals and their masters: link
Tbd.	I'm considering to turn capitulated vassals into voluntary vassals after some time; perhaps after 30-35 turns. Would only need to implement a popup asking the master to sign the new agreement or else free the vassal. Some way for a master to free a voluntary vassal would also be nice. Capitulated vassals should perhaps only be allowed to trade tech with their masters. Or just prevent them from brokering to other civs. That said, the AI currently keeps its vassals (capitulated ones too) at arm's length tech-wise; that might have to be changed if vassals can't trade or broker.

AdvCiv	*BtS*
If a capitulated vassal • razes a (holy) city; • trades with someone or someone's enemy; • has OB with someone's enemy; or • nukes someone (but not just someone's friend) half of the resulting relations modifier is applied to the vassal, and half to the master. Relations penalties about shared borders are also shared between vassal and master. In team games, the penalties apply to the leader of the master team.	Actions of a vassal don't reflect on the master, but civs are generally upset about "rivals" being vassals to the master's "empire", and vassals are possible war targets. Prior to K-Mod, the AI attitude toward the master was generally lowered based on the attitude toward the vassal.

Rationale	My thinking is that there shouldn't be grudges against capitulated vassals because they're basically dead already. This opens up a loophole: A human master could let vassals do the dirty work (razing), or use them as buffers against shared-border anger. BtS attitude averaging would fix this issue, but would also punish the master for e.g. the vassal's religion and any bad deeds prior to the vassal agreement. The change about nukes is obsolete because 143b now prevents capitulated vassals from having nukes.

Vassals are always Friendly toward their master, and capitulated vassals share the master's attitude toward rivals, but their attitude can be at best Cautious. AI civs project their attitude toward a civ onto the capitulated vassals of that civ. This does not apply when a vassal is deciding whether to break free. Masters are Pleased toward their capitulated vassals, and capitulated vassals are Pleased toward fellow vassals with the same master. Vassals never grant gifts to rivals and never ask rivals for gifts. When deciding whether to grant a gift to its master (no matter if capitulated), the vassal checks its actual attitude (what the attitude would be if it weren't for the vassal	Voluntary vassals are Friendly toward their master except when deciding whether to break free. The attitude of and toward capitulated vassals is computed normally, but rarely matters. Sometimes a (capitulated) vassal has a much more positive attitude toward another civ than its master, and will trade away technologies that the master wouldn't trade. When a vassal grants a gift to a rival or receives one, a peace treaty is signed between the master and the rival. Thus a civ with multiple vassals can sometimes be kept at peace indefinitely.

treaty). Capitulated vassals are slightly reluctant to found cities, especially on other continents.	Capitulated vassals with few cities left tend to found cities in marginal spots because the additional expenses (esp. for number of cities and civics) are small. The additional maintenance for the master isn't taken into account.
AI Spies are reluctant to attack a rival's capitulated vassals.	AI doesn't attack it's own vassals (still the case in AdvCiv).

Rationale	Given my other changes, the attitude of and toward capitulated vassals really doesn't matter anymore, and showing them, as is often the case, Annoyed toward their master is misleading. I'm still showing the actual relations value (e.g. "Friendly (-2)") and modifiers because they do matter again if a vassal breaks free.
	If vassals are supposed to be zombies, they shouldn't be relevant for tech trading, and they generally shouldn't undermine the master's foreign policy. Until v0.85, I had capitulated vassals share the master's attitude toward other civs, but this made it too easy for a human player to dictate civics and siphon gold from vassals with AI masters; now they're at best Cautious toward rivals.

Capitulated vassals are not shown on the "Glance" tab of the Foreign Advisor.	The Glance tab shows relations between all living (non-minor) civs.

Rationale	The Glance tab gets quite crowded in large games, and capitulated vassals don't have interesting relations because they follow their masters in matters of diplomacy.

Human espionage weight against vassal set to 0 after accepting capitulation.	No automatic changes to human espionage weights ever.

Rationale	Easy to forget, and cases in which a player would want to continue espionage against his/her capitulated vassal should be extremely rare. I'm not making the same change for voluntary vassals because these agreements are often fleeting.

AdvCiv	*K-Mod*
Capitulated vassals support all resolutions proposed by their master.	Team members of the Secretary-General (SG) support all resolutions. Civs Friendly toward the SG support some proposals, but not all (non-proliferation, force-civics).

Rationale	Since all votes are cast simultaneously, vassals can't always vote along with their master – they don't know how the master is going to vote.
See also	dlph.25 allows vassals to support the master in repealing resolutions (which requires them to vote "No" on the master's proposal).

130w	Penalty for expansionism: "We oppose your ruthless expansionism"
AdvCiv	*BtS*

Up to -4 based on the number of owned cities with foreign majority culture (depending on the difference between highest culture and owner's culture), the total number of cities, and the personality of the AI leader (peace weight minus warmonger respect). The penalty is reduced if the AI civ's military can't compete with that of the expansionist civ. The AI is (much) more sensitive about cities it previously owned. Other than that, so long as just about a quarter of a civ's cities are foreign, none of the other civs will mind. Up to -5 for the number of capitulated vassals, typically about -1 per vassal, but it depends on the number of cities owned by the vassal, the initial number of civs, and (as above) AI personality and power ratio. This penalty is added to the one for voluntary vassals (130t), and they're displayed together as "We are worried about our rivals being vassals to your empire".	If a civ has at least one vassal, the "vassals to your empire" penalty is based on the military power of the master and all its vassals. Other than that, there are rank-based penalties (130c).

Rationale	Not fair to give a penalty based on military power only to civs that control a vassal. A civ that just conquers all cities isn't less threatening. Since I don't want to remove the vassal penalty, I'm adding a counterpart that penalizes conquered cities. In any case, penalizing military power isn't good because that hardly affects human civs. The personality-based term means that e.g. Genghis Khan won't easily get upset about expansionism, which is consistent with his own behavior and his first-impressions bonus with other warmongers. Moreover, I don't want all leaders to increase the penalty synchronously because, then, conquering a single city could have a big negative impact on relations overall; the personality factor makes sure that the overall effect changes smoothly. Power ratio is factored in because it doesn't help if small civs stop trading with the expansionists – this mostly hurts the small civs. As razing doesn't remove tile culture, this penalty can't be circumvented by razing (and razing carries its own diplo penalties too). I've considered ignoring cities culturally owned by an enemy (war enemy or worst enemy) of the AI civ that opposes expansionism, but decided this shouldn't make a (big) difference; territorial expansion needs to be opposed even if it has happened at the expense of an enemy.
See also	Without 099 (culture of dead civs stays in the game), this change wouldn't really work because cities conquered from eliminated civs wouldn't count.
Tbd.	Should perhaps be reduced if the AI civ that opposes expansionism has conquered much more territory. Can seem a bit hypocritical the way it is now.

130x	Normalized diplo from shared/different religion and civics	
See also	130n delays the diplo penalty from "heathen" religion	
AdvCiv		BtS

	The AI counts the turns that religion and civics have been shared or have differed. The relations modifier is based on that turn count, but limited by a leader-specific bound. That bound is between +2 and +6 for civics (+6 only for Stalin, Mao and Gandhi), between +2 and +7 for shared religion (+7 only for Asoka and Zara Yaqob) and between 0 and -2 for differing religion.
The maximal relations bonuses from shared religion and civics are reduced if many known civs have this religion or civic. The maximal penalty for having a different religion is reduced if many known civs have a different religion.	
	Unaffected by the bound: +1 for shared religion/civic and -1 for differing religion regardless of the number of turns. The civ with the holy city adds another +/-1 for religion.
Rationale	The high diplo bonuses from early civics, especially Hereditary Rule, are too easy to get, and BtS diplomacy gets boring when everyone's in the same religion.
	The change seems also realistic: if everyone shares a trait, it gets taken for granted, and lack of external enemies leads to infighting. And it's unwise to eschew everyone when they all have "heathen" religions.
Tbd.	Should probably dial this up a bit, i.e. further reduce the relations bonuses from civics.
	Diplo bonuses for religious civics should be reduced (or disabled) if the state religion doesn't match. Shouldn't get a net relations bonus for sharing, say, Organized Religion with Suryavarman and running a different religion.

130y	Lower diplo penalties for wars involving vassals, DP or seeing little action
AdvCiv	*BtS*
When making peace, the declared-war relations penalty is reduced (but not beyond -2) if the other side has had very little war success, namely less than 0.3 times the equivalent of capturing a city times the era number (0 for Ancient; i.e. full penalty for early attacks on Workers).	The declared-war penalty is solely based on the number of declarations of war; only the (unimportant) hidden "this war is going badly" penalty is based on war success.
The penalty is also reduced if either side is a capitulated vassal. And a capitulated vassal reduces its declared-war penalties when it regains its independence.	When declaring war on a master civ, war against the vassal civs is implied, and the aggressor gets the full (never decaying) -3 "You declared war on us" from each vassal, even if the war takes place entirely in the master's territory, and ends up freeing a capitulated vassal. Likewise, when a master declares war, its vassals suffer a -3 relations penalty.
If a vassal is freed because its master has capitulated to a third civ, the third civ automatically makes peace with the vassal, but without signing a peace treaty.	
If the third civ doesn't have much war success against the freed vassal, and the free vassal had been a capitulated vassal, the third civs gains +2 "You've granted us independence" from the freed vassal.	When a civ capitulates, the vassals of that civ are freed. They remain at war with the master of their former master, and the former master declares war on the former vassal.

Rationale	Shouldn't hold civs fully accountable for declarations of war if these declarations were enforced by the vassal system, especially not for capitulated vassals. The change should make it easier to free vassals and have a cooperative relationship with them henceforth.
	I'm factoring in war success because vassals should not be happy about being liberated when that involves killing most of their units or taking away their cities.
	The reduced penalty for non-vassals practically only applies to wars where neither side sent any units or an invader changed its mind in the face of tough defenses. Not plausible for such wars to have long running repercussions.
See also	130h disables war-on-friend penalties for attacking master/vassal alliances; sha reduces "war spoils our relations" penalty if there is little war success.
Tbd.	Should perhaps also add "granted us independence" memory when the master is eliminated.
A DoW caused by honoring a DP leads to only a -2 relations penalty from the civ that triggered the DP. (No change to "war on friend" penalties.)	Full relations penalty (-3).
Rationale	Diplo penalties for fulfilling a DP seem justifiable, or at least not wrong enough to change radically. I'm just reducing the penalty a bit.
Tbd.	Should probably not assign war-on-friend penalties when war is triggered by a defensive pact, and perhaps not for wars declared by capitulated vassals either.

130z	AI gives help also to other AI civs	
AdvCiv		BtS
An AI leader may decide to gift a tech to any non-vassal civ that has fallen behind and that the AI leader is at least Pleased with. Friendly relations, a low difficulty setting and a high Diplo victory stage increase the probability of such a gift.		Only human civs can benefit from this. Pleased attitude is required, Friendly and difficulty don't matter. (Although a low difficulty makes the AI easier to please.)
The choice of the tech is biased toward low research cost.		The tech chosen uniformly at random.
(No change to the AI routine for gifting tech to vassals.)		
See also	112 deals with tech gifts between vassal and master. The gifted tech is also chosen randomly based on cost in that context.	
	The part that takes into account the difficulty level is based on 250a.	
Rationale	Especially with SPaH, it's not so unlikely for experienced players to trigger this AI behavior, and I don't think those players would want the AI to help them compete. So one could either disable the help routine for medium and high difficulty settings, or extend it so that AI civs can benefit too. I've done the latter because it can actually make sense for an AI civ to help a weaker partner; humans do that too sometimes.	
Tbd.	Should perhaps ask for gold in exchange if the recipient happens to have some.	

131	Misc. changes to AI evaluation of units, buildings, techs, civics and religions

See also	[cdtw](#) and [rom](#) for such changes adopted from other mods. [121](#): AI changes to Worker builds and citizen assignment
Tbd.	Open K-Mod issue: "Fix AI's tech evaluation" ([link](#))

AI more likely to build a high-utility building than an arbitrary XP or gold building.

AdvCiv	K-*Mod*
Prior to the Industrial era, the AI is reluctant to build certain National Wonders in its capital, in particular Moai Statues and Globe Theater.	Moai Statues in capitals are fairly common in K-Mod. If Globe Theater is also built in the capital, the AI can't build Oxford University there.
If a city has a Great Person Point (GPP) rate of at least 7, the AI considers building the National Epic. The threshold increases by 2 with each era beyond Classical.	The threshold is 10 (flat), and the AI often doesn't build the National Epic until late in the game.

Rationale	7 GPP could be two specialists and one wonder or three specialists. Could happen in the capital, which is OK with me; an early "GP Farm" in the capital isn't bad.
Tbd.	Oxford in the capital shouldn't always be the best choice; that needs to be addressed by a balance change. Should discourage Moai in any city with a lot of good unworked land tiles. `CvCityAI::AI_buildingSeaYieldChangeWeight` would be the place for that change. National Epic is probably still not given enough priority.

AI tech evaluation: Reduced the value assigned to units whose resource requirements aren't met. E.g. to make the AI less inclined to research Horseback Riding when it doesn't have a Horse.	K-Mod: Already reduced; I'm reducing it more.
AI switches state religion probabilistically based on the ratio of the utility of the new religion to the utility of the current one. Increased attraction to AP.	Current state religion is counted as having between +33% and +50% utility to create inertia and avoid revolutions. However, once another religion reaches higher utility despite this bonus, the AI switches immediately, leading to occasional back and forth switches as cities are conquered and lost again.
The algorithm for AI civics changes should now handle negative utility values correctly.	The inertia mechanism has the opposite effect when dealing with negative utility values. Negative values probably don't occur though (nor in AdvCiv I think).

Rationale	The values of religions can fluctuate when two religions spread in parallel or when city owners change repeatedly in a war. Probabilistic switching means that the AI tends to wait for some turns when the one religion isn't far better than the other. I had implemented the same thing for civics, but removed it again; see my post [here](#) in the K-Mod subforum (the "Update" part under No. 1).
Credits	The change for negative utility values is inspired by a similar change in "RoM: A New Dawn" by koshling. SourceForge revision: [link](#)
Tbd.	Can currently only switch religion every 15 turns unless Spiritual (see calls to `AI_setReligionTimer`) and civics every 20 turns. Would be better to lower the per-turn probability of switching based on the turns elapsed since the latest switch.

See also	[001r](#) fixes a bug that had caused the AI to switch civics too readily.

The AI only starts a revolution if it has enough gold in the treasury to prevent the strike counter from reaching 2 during anarchy.	During anarchy, civs have 0 income and expenses except that gold deals still need to be paid. This means that anarchy leads to a strike when a civ has no gold in its treasury. If anarchy lasts only one turn, the strike has no immediate effect, but multiple turns of anarchy lead to disbanded units. Moreover, the strike turn counter is never reset, so once there has been a strike, even a single turn of anarchy can lead to disbanding.
Rationale	I've thought about suspending gold deals during anarchy, but then what about the civ that is supposed to receive gold? For a human player, it could be confusing if an AI civ pays no gold during anarchy. If gold is received without having been payed, then this could exploited in multiplayer (team) games.
	Perhaps the strike counter should be reset or counted backwards (probabilistically?) when there is no strike; but then a single turn of strike now and then would have no negative consequences at all.
See also	[132b](#): Vassals with a human master reluctant to switch civics.

Reduced the tech value counted for buildings when an AI civ hasn't founded a second city yet and the population of the capital hasn't grown beyond size 3.

Don't count tech value for potential domestic trade routes when having only 1 city.

The AI assumes that it is not geographically isolated when more than 25% of its continent remains unexplored. Consequently, naval exploration is not prioritized in the very early game on account of being isolated.

So long as the AI isn't sure whether it is isolated (no one met and 30 turns not yet passed), the values counted for military units are reduced.

Reduced the utility counted for working water when the average city population is small.

Rationale	Mostly to prevent the AI from overestimating Fishing and Sailing in the very early game. Apart from Lighthouse, an early discovery of Sailing can lead the AI to waste time on a Galley or to construct Moai Statues in the capital.

Swordsman and Legionary have Attack City as their default AI type. Non-default AI types are Attack and Reserve.	For all Swordsman units, the default is Attack, non-default Attack City and Reserve. The earliest non-siege unit with default AI type Attack City is Maceman, the next one Grenadier.
	The default AI type seems to matter mostly when the AI evaluates units that it can't train yet. Will then, for each AI type of the new unit, compare the new unit with the best current unit that has the matching default AI type.
Rationale	The main advantage of Swordsmen over Axemen and other early units is that Swordsmen are better at attacking (AI) cities held by Archers.
See also	[907a](#) renames Praetorian to Legionary.

Battleship has the (non-default) AI type Escort.	Destroyer is the only late-game unit with Escort AI type. I don't think the Escort type is required for accompanying cargo ships, but if more escort ships are needed, the AI will only train ships with the Escort AI type to fill the ranks.
Rationale	Battleships don't come much later than Destroyers and aren't that much more expensive. They can handle enemy Battleships, and a mix of Destroyers and Battleships can stand up to the endgame ships (Missile Cruiser, Stealth Destroyer) and air attacks.
See also	905a removes the Escort AI type from Caravel.
The evaluation of an extra trade route granted by a technology takes into account future cities.	Looks like the K-Mod fomula only accounts for current cities.
Rationale	The AI is sometimes very slow to discover Currency.
Tbd.	Currency still seems to be underrated (and Code of laws overrated).

AdvCiv	BtS
Ancient technologies and Horseback Riding have an asset value of 6, Classical techs 12, Medieval 18, Renaissance 24, Industrial 30, Modern and Future 36.	8, 16, 24, ...
The Infantry unit has an asset value of 4.	3 for Infantry, but e.g. 4 for SAM Infantry.
	The total asset value of a civ is computed as 2 per citizen, 1 per land tile, up to 48 per technology, 1 to 5(?) per non-wonder building, 16(?) per great wonder, 8(?) per national wonder. For units, the asset value usually corresponds to the square root of its power, rounded down; though e.g. not for Infantry.

See also	130p uses asset totals for computing trade-based relations modifiers.	The total is used only for deciding whether an AI civ asks for a free technology or offers one.
Rationale	BtS asset values are heavily skewed toward technologies. E.g. early technologies cost only 60 research and count as 8 assets, whereas 4 population (also worth 8 assets) cost at least 88 food and 8 Archers cost 280 production. This is probably intentional: when the human player gets ahead technologically, the AI is supposed to ask for help even if it has more units and citizens. It was just a bit too extreme, at least for the purposes of 130p.	
	Horseback Riding being treated as an Ancient tech might be deliberate (*shrug*).	
Tbd.	The asset values for buildings look crazy; e.g. 1 for Drydock, but 2 for Barracks and 3 for Lighthouse. Hard to say how the original developers came up with these.	
131b	AI weights in `Civ4TechInfos.xml`	

AdvCiv	BtS
Negative AI weights for Iron Working and Feudalism.	All weights are 0 in BtS and K-Mod. AI weights are added to the utility values computed in AI tech evaluation. The intention was probably to give non-DLL modders a way to bring the AI to research techs with novel abilities.

Rationale	In test games before releasing v0.93, half of the AI civs were researching Iron Working right after Bronze Working, and Feudalism was practically always researched before Machinery. This is out of step with the historical development and, more importantly, makes these techs unattractive to research for human players as they're easy to get in trade.
Tbd.	This is a temporary measure. Not sure how to fix this more permanently though. Swordsman, Longbowman and Serfdom really are very useful for the AI. Eventually, I'd like to split Feudalism into two techs; see tech-tree.pdf. The AI weight should arguably be multiplied by the number of cities in the DLL in order to match the scale of the tech utility values. Currently, a non-zero AI weight for a late tech would have less impact on a map that gives civs a lot of room to expand. Shouldn't be much of a problem for early/ midgame techs because civs can't expand that quickly.

132	Changes to civics and religion trades	
AdvCiv		*BtS*
Can (a) bring vassals and war enemies (peace negotiation), or (b) any civ through a Spy, to switch to any economy and religion civic except the initial ones, and to any major religion (same threshold as for "not enough of our people follow that faith"). Exception: A master with a state religion can't ask its a vassal to accept a different state religion. A civ with a state religion can still (as in BtS) try to force another civ into that religion if the other civ has at least one city with that religion. The petitioned side charges twice as much trade value in case (a) if the petitioner is not running the target civic or religion. In case (b), twice as many espionage points are needed.		Can only ask anyone to switch to own civics (except the initial ones) and own religion (unless "not enough people ...").
AI civs refuse trades that ask them to make multiple civics changes in the same column. In multiplayer (not tested), I imagine such trades are possible and will result in the player adopting the civic that was added to the trade offer first.		As the trade table is not part of the SDK, mods can, to my knowledge, block only individual trade items, not combinations of trade items.
Rationale	"Preach only what you practice" is sensible, but only when negotiating as peers. E.g. it makes sense to demand a switch to Pacifism as part of a peace treaty, or to ask a vassal to switch out of Mercantilism or Theocracy so that the master's corporations and religions can spread. Also more interesting (and entertaining) options this way. A higher cost for switching to an unused civic makes sense in case (a) because the other side will suspect bad intentions, and (somewhat) in case (b) because the Spy owner lacks familiarity with the target civic/ religion. Why not allow all civics? Don't want that many options on the diplo screen. Also seems far-fetched to switch someone to, say, Vassalage in the Modern era, when no civ in the game has been in Vassalage for 500 years. Assume civs to be somewhat flexible in their religion civics and economics. These are also the columns with the	

	isolationist civics Mercantilism, State Property and Theocracy.	
The force-religion espionage mission requires the target religion to be present in the city where the mission is executed.		The target religion has to be present in any one city.
Rationale	More plausible this way; don't think it matters much for game balance or AI behavior.	
Increased the impact of the number of cities with the target religion on the mission cost. Increased the base cost of force-religion and force-civic by 25%. The AI doesn't use the force-religion mission if the target religion has few adherents (same threshold as the "too few of our people follow that faith" response).		K-Mod already adjusts the mission cost, but rarely increases it by more than 100%. The AI uses the mission even if just 1 city has the target religion. The affected civ usually switches back to its former religion after 5 turns.
Rationale	Being forced to convert from a widespread religion into one with just a single city can be very painful. I've considered allowing only major religions as the target religion, but a cost increase and a change to AI behavior should suffice.	
Config	Partly in `Civ4EspionageMissionInfos.xml`	
Tbd.	The number of religious cities should be factored into the mission cost *modifier*, not the base cost, because the UI shows a breakdown of the modifier, i.e. the impact of the city count could then be displayed by `CvGameTextMgr::setEspionageCostHelp`. Same for the cost increase when the Spy owner doesn't run the target civic or religion.	
When asked to change civics or religion, the AI predicts the losses from anarchy based on the goods-produced (production) and GNP (gold + research; [004s](#)) curves.		Based only on city counts, both of the AI civ and the human who's asking for the change. Can underestimate the cost by a factor of 10 in the late game.
Rationale	The human cities shouldn't play a role, and the AI city count could well stay the same during the second half of the game, but the cost of anarchy doesn't.	
132b		
AI vassals are reluctant to switch civics if their master is human.		Vassal/master status doesn't affect civic choices. The diplo bonus from sharing a religion with the master factors into the religion choice of the vassal.
Rationale	Humans tend to ask vassals to adopt certain civics; switching back and forth doesn't help either side.	
132c	Switching to a state religion requires at least one city with that religion; doesn't suffice if another team member has a city.	
Rationale	No special need for team members to align their state religions. Major religions are also determined based on per-civ city counts, and not per-team.	

133	AI cancels more deals	
AdvCiv		*BBAI*

AI cancels tribute deals ("it's time for your tribute") once a vassal agreement ends.	Tribute deals remain in place until (if ever) the AI reaches so much military power that it wouldn't have agreed to the deals in the first place.
Rationale	The problem of lingering tribute may have been introduced by BBAI, which replaced BtS/Warlords custom code for deal cancelation with calls to `AI_considerOffer`. K-Mod has mostly repaired this (deals from non-vassal tribute demands and gifts do get canceled), but missed a spot.
When deciding whether to cancel a resource trade, all trade-denial conditions are checked.	Trade value is checked every turn, but not denial conditions like those based on attitude. There's a special clause that cancels deals with the worst enemy of an AI civ.
Rationale	I think this was the intended behavior from the beginning, but a bit awkward to implement. (Comment by karadoc in `CvPlayerAI.cpp`: "*getTradeDenial is not equipped to consider deal cancelation properly.*") The denial check also cancels deals that no longer make sense for the other side, e.g. when a player imports Rice and later settles on a Rice resource.

AdvCiv	*K-Mod*
The tolerance for continuing resource deals when the trade values have become uneven is 35% with human civs and 45% for AI-AI deals, and decreases by 1 percentage point with every turn beyond the 10 turn minimum duration; lower bound: 10% for human, 20% for AI.	10% in BtS, 25%, both regardless of human/ AI and not decreasing over time.
Rationale	The changes to AI resource evaluation (change 036) lead to more fluctuation in trade values; hence the increased tolerance.
See also	Relies on code written for 036. 155 allows the AI to cancel deals with members of its own team.

AdvCiv	*BtS*
If an AI-AI resource deal is canceled, the AI immediately tries to make a new deal.	Depending on the AI personalities, regardless of cancelation, a resource deal between two AI civs is considered every 1-5 turns on average.
Rationale	Interrupted resource deals can lead to some back and forth in the city management of the AI. Not sure how harmful that is, but better to avoid it. Should also lead to more stable trade relations that are easier to keep track of for human players.
When a vassal agreement ends, all remaining deals between vassal and master can be canceled by either side (turns-to-cancel set to 0).	Deals with a minimum duration can't be canceled until the 10 turns are over, regardless of the vassal agreement. This includes resource gifts to the vassal.
Rationale	A minor issue. They shouldn't be forced to continue free resource deliveries. For players, it can be confusing to see free resource trades continue between two AI civs that no longer have a vassal agreement.

AI cancels Open Borders, Defensive Pact and Permanent Alliance when AI attitude drops below the thresholds for signing the respective agreements. Cancelation is delayed with a per-turn probability except when the other side has become the AI civ's worst enemy.	AI cancels these agreements immediately when the other side becomes its worst enemy. Otherwise, AI attitude doesn't lead to cancelation (though other considerations may). Borders can remain open indefinitely despite Annoyed attitude.
Rationale	I think the original idea was that deals get canceled when their attitude threshold isn't met anymore; they just didn't get the implementation right. The delay is supposed to give the other side time to amend relations before canceling OB. (Once OB are canceled, it's difficult to get them back because the "brought us together" diplo bonus is lost.)

134	Changes to AI-to-human offers
See also	[136b](#) also fits here (map trades offered by the AI)
134a	AI offers peace (only if UWAI disabled, and never offers to pay for peace)

AdvCiv	*BtS*
AI proposes peace, but doesn't offer to pay for it. When compiling reparations, the AI inflates its own end-war value by 20%. This discount is lost when the player counter-proposes.	The AI never contacts a human player to offer peace (or capitulation).

Rationale	Peace offers apparently worked in Vanilla; not sure when they broke. The discount is there to make the AI offer worth considering. K-Mod has introduced a similar discount for other AI offers. A good idea; without this incentive, the AI might as well not contact human civs at all.
Tbd.	I had to work around a bug in the BtS executable that suppresses diplo popups from war enemies. My workaround relies on the exact order of calls at the beginning of human turns, and on the order of call parameters of the `atWar` function. Messy. Some modders had planned to reimplement the Trade screen (for various reasons); this should fix the problem in a cleaner manner, but, so far, nothing became of it. CFC threads: [#1](#), [#2](#) On that note, I would also like to show the turns-to-cancel when a player unsuccessfully attempts to cancel a deal through the Diplo screen. I see no way to implement this change without reimplementing the Trade screen. My workaround breaks if the AI offers to pay for peace or to capitulate. Perhaps this can somehow be fixed inside the DLL, but, after struggling with this for a whole day, I've given up. Disabled this change if UWAI is enabled because UWAI uses a different order of calls; don't want to adjust the workaround while the UWAI code may change again. Probably better to remove change 134a altogether and rather send a message to the human player, asking for a call-back.
134b	(Disabled) No discount if recently begged

AdvCiv	*K-Mod*
~~The AI offers no discounts to civs that have recently asked for a gift.~~ I'm afraid it's usually more profitable to ask for gifts all the time than to wait for discounts. If so, this change would	The AI doesn't grant gift requests by civs that have recently asked for a gift, but discounts aren't affected by gift requests.

mostly disable discounts, which isn't what I want. (I want to disincentivize periodic gift requests.)	
Rationale	An attempt to disincentivize gift requests by the clock. Some players set alerts for this every 25 turns; see e.g. this CFC thread.

135	Changes to multiplayer
See also	201 plays the "you have discovered" tech sound in multiplayer. 004v removes square brackets around the names of human civs on the scoreboard. 108b applies `StartingLocPercent` from handicap in multiplayer.

AdvCiv		*BtS*
135a	Resource bubbles	
If a player activates resource bubbles in Hotseat, they remain active until a player deactivates them.		Resource bubbles are deactivated at the end of each human turn. Other map layers (e.g. yield display) are not reset.
Rationale	The BtS behavior is annoying if all players want to play with resource bubbles. Otherwise, the players could still agree not to activate them, or one player flicks them on and the next one flicks them off.	
Tbd.	The proper solution might be to remember each player's active layers at end of turn, and restore them at the beginning of the next turn of that player. Same for player options and BUG options, which are currently shared by all players. Could store layers and options in savegames, but storing them in non-serialized data members of `CvPlayer` would already be an improvement.	
See also	004m increases the default zoom distance (also reset each turn in Hotseat).	
135b	`MoreCiv4lerts` in Hotseat	

AdvCiv		*BUG*
Added per-player memory to the BUG alerts in the `MoreCiv4lerts` package. (The most useful ones, like tech trades, are in that package.)		`MoreCiv4lerts` fire every turn in Hotseat; unusable.
Rationale	The first package of alerts seems to have been implemented with multiplayer in mind, but not the "More" ones. This might also be fixed in the BUG main branch (see this commit).	
Tbd.	Don't know if the alerts also work for networked multiplayer.	
See also	106c also fixes issues with Civ4lerts. 106b always opens the Event Log when there is a new message in Hotseat.	
135c	Debug tools in multiplayer	

AdvCiv		*BtS*

Can use WorldBuilder (WB) and Debug mode in multiplayer if `ENABLE_DEBUG_TOOLS_MULTIPLAYER` is set in `GlobalDefines_devel.xml`. (I guess all players should set it if multiple PCs are involved.) In networked multiplayer (i.e. anything except Hotseat), "chipotle" needs to be set **as the game name** under "Host Game" in addition to the XML switch. The text on the large flag button will then say "cheats enabled" in order to make sure that no player can secretly cheat. The cheat code in `CivilizationIV.ini` doesn't affect multiplayer. Entering the WB makes network games go out of sync (OOS) immediately; will have to save and reload afterwards.	WB is always available in singleplayer; Debug mode (Ctrl+Z) requires cheats to be enabled through `CivilizationIV.ini` (code "chipotle"). In multiplayer, both WB and Debug mode are blocked through a cheats-enabled check outside the SDK and several checks inside the SDK, presumably to make certain that cheating is impossible.
Rationale	Debug tools are indispensable for multiplayer testing. Not sure if the OOS issue with the WB can be fixed; could just be a side-effect of my hack to make the WB accessible.
	Still missing: Python console (impossible?)
See also	[127](#) allows enabling AI Auto Play in multiplayer. [001n](#) fixes OOS errors. [007](#) describes how OOS errors can be debugged on a single PC.
To get rid of the cheat level checks in the `CvGameTextMgr` class more easily, I've split the `setPlotHelp` member function into several subroutines and made some changes to const qualifiers. That could make it a bit difficult to merge this change into another mod.	

136	Changes to map trades
136a	Circumnavigation checked at end of turn

AdvCiv	*BBAI*
The game checks at the end of each civ's turn if that civ has circumnavigated the globe. Thus, if, through a map trade, two civs meet the circumnavigation conditions on the same turn, only that civ is rewarded on whose turn the map trade is completed. In a human-AI map trade, the human always wins because trades involving humans are always completed on a human turn.	Circumnavigation is checked at the beginning of turn. If two civs are eligible through a map trade, the civ on whose turn the trade is completed misses out (always the human when it's a human-AI trade). That civ even misses out if it has completed circumnavigation through unit movement earlier on the same turn (before making the map trade).
So long as no one has achieved circumnavigation, the AI refuses to trade its map if it can train Caravels. ("We have our reasons.") If it can't train Caravels, but the other side can, the AI charges twice as much for its map.	Whether an AI is willing to trade it's map depends entirely on the leader's attitude threshold.
Rationale	The BtS rule leads to the trap sketched on the upper right. Checking at end of turn instead puts the AI at a bit of a disadvantage because human-AI trades can't be completed on an AI turn. That said, the AI suggests map trades to human civs relatively rarely, and never with an intention of completing circumnavigation, so the change doesn't really hurt the AI.
	The trade refusal should make it harder for a human to steal circumnavigation from an AI that is already close.

136b	AI doesn't pester human with unattractive map trades
The AI proposes no trades to a human civ where the human side receives only the AI map when the human value of that map is 5 gold or less. Changed the rounding of AI trade values to multiples of 5. Makes the implementation of the above change a bit easier. The AI refuses to accept trades with a value of less than 10 (the equivalent of 5 gold).	The AI occasionally asks human civs to exchange maps even if the AI map has no value to the human. Trade values are rounded to a multiple of 10.
Rationale	These map trades are pointless distractions.
Config	The rounding change is implemented in `GlobalDefines_advc.xml`.

137	Recommendations on game settings	
AdvCiv		*BtS*
On the Custom Game screen, the drop-down menu for the sea level includes recommended changes to the number of players. ("+x% players recommended.") Added similar recommendations to the description text of Terra, Oasis and Pangaea.		When the world size is changed, some player slots are automatically opened or closed in order to match the recommended number of players. No such thing happens when the sea level is changed. The Terra description contains a warning about the map being especially large, but it doesn't say whether the player number should be adjusted to this. Description texts are only shown under Play Now, not on the Custom Game screen.
Rationale	Having the proper number of civs is imo pretty important, and sea level has a big impact on this. The recommendations, if followed, should lead to about the same number of cities per civ as with Normal sea level. I think Terra plays best if the old world is rather crowded with civs. The standard player numbers don't suffice for this. Recommendations weren't my first choice. Some things I've tried: I wanted slots to be opened and closed automatically when the sea level changes. This can't be done because the Custom Screen isn't part of the SDK. When slots are opened/closed in response to a world size change, it's possible (through a hack) to also factor in sea level, but then the sea level needs to be configured before the world size, which isn't what player normally do. For Terra, I couldn't even add a warning to the Custom Game screen. The displayed map name ("Terra") is the name of the map script file, and changing this file name (to e.g. "Terra - extra players recommended") would result in a second map, listed in addition to Terra. I've tried adding a dummy drop-down menu with a single choice, but apparently at least 2 choices need to be given. Such a menu would also be easy to miss because the default menus (which all maps have) are displayed first.	
Tbd.	Archipelago perhaps needs additional players. The standard maps all seems to generate the same percentage of land tiles, but the more coastline, the more water tiles can be worked.	

Changed the default player number for Standard-size maps to 8 (+1), Large maps to 11 (+2) and for Huge maps to 16 (+5). This results in ratios (width * height) / n (where n is the default player number; i.e. tiles per player) of 34.1 for Standard; 37.8 for Large and 40.0 for Huge.	Defaults are Normal - 7, Large - 9 and Huge - 11. Tiles per player: 30 for Duel; 34.7 for Tiny; 32 for Small; 39 for Standard; 46.2 for Large; 58.2 for Huge.

Rationale	It's probably intended that larger maps leave more room for expansion, but the differences shouldn't be *that* big. To me, settling lots of unclaimed land is a drag. (As for which is more challenging, protracted confrontation probably helps the AI on high difficulty settings. That said, a higher number of civs increases the chances of some civ getting especially lucky with its starting position, and usually, the strongest adversary presents the main challenge.)
	The choice for a low player count on Huge maps may have been made for performance reasons; less of a problem with current hardware.
	As for Standard, 8 players gives everyone room for about 7 cities; a bit too much I think. 9 players, though, make it difficult to build National Wonders without conquering additional cities.
	Sparse maps are also bad for trying out [UWAI](); conflict gets delayed too much.
See also	[140]() adjusts various map size modifiers to match the new player count recommendations.

AdvCiv	K-Mod
Included a copy of `Fractal.py` from Warlords (i.e. the most recent version) with AdvCiv just so that Fractal get listed first on the Custom Game screen.	"Not too big, not too small", the single map added by K-Mod, is listed first, the rest alphabetically.

Rationale	Fractal is the default map script in BtS, and it's the most basic script. "Not too big/small" is OK, but shouldn't take the top spot. Continents was the default in Vanilla Civ 4, but really doesn't play that well, so I'm not pushing that one to the top.

Rewrote the English and German help text for each difficulty and speed setting and (unused) for each map size and sea level setting.	The help text for the sea level and map size settings doesn't seem to be shown anywhere. Help text for difficulty and game speed settings is shown on the final screen ("Snapshot") of the "Play Now" dialog chain.
	Some of the info is misleading, e.g. it says that Monarch difficulty makes the AI "much smarter" or that Marathon has an entire game's worth of turns in every era.

Rationale	I imagine that most players of this mod (wisely) never use "Play Now", but players that do use it might actually believe the info provided in the help text.
	My texts about the difficulty settings are a bit clunky, but at least somewhat informative and not highly misleading (I hope).

138	Religion assignment when starting in later eras
AdvCiv	*BtS*

When starting in an era other than Ancient, the automatically founded religions are assigned based on handicap, Spiritual trait and favorite religion. More specifically, on difficulty settings above Noble, the game prefers to assign religions to AI civs, and on lower difficulty to human civs; always prefers Spiritual leaders and AI leaders whose favorite religion is among those to be founded. The top priority is still to give each civ the same number of religions. The above change only applies when that is impossible.	After assigning the same number of religions to everyone, the remainder is assigned to a random subset of civs. In particular, favorite religions don't play a role (except possibly with the choose-religions option).
Rationale	Religions are hardly shared in games starting in in the Medieval era or later because almost everyone founds a religion. Assigning the religions to civs that like to spread them (Spiritual, favorite religion) should lead to more block-building like in normal games (Ancient start). Also want to make it more predictable for human players whether they'll get a religion if there aren't enough to go around: On Emperor difficulty or higher, probably not. Otherwise, choosing a Spiritual leader should guarantee a religion.

139	AI evacuation of cities	
AdvCiv		*BtS*
When a city is very likely to be lost before the next turn, the AI may evacuate some of its combat units from the city. Units that don't receive defensive modifiers usually leave, and dedicated defensive units usually stay. For other units, the tile defense and remaining city defense can make a difference. Won't try to evacuate if the path to safety looks too dangerous. The AI is less willing to abandon major cities than unimportant ones.		The AI only evacuates noncombatants; may even reinforce hopeless cities.
Rationale	Evacuating units without defensive bonuses and badly injured units seems like a clear improvement. Units with high defensive bonuses can be expected to cause losses to the attacker even when badly outnumbered; might, in particular, draw out the attacker's siege units.	
	It's important that a Stack of Doom can't scare away all defenders from several cities, and settle for peace when the evacuated defenders gather for a last stand. Sounds fairly realistic, but, given the other dynamics of the game, would make conquests too cheap.	
	Fixes the "meatgrinder" exploit, which was still on the BBAI to-do list when the mod was discontinued.	
Config	`AI_EVACUATION_THRESH` in `GlobalDefines_advc`	
See also	107 (more offensive Area AI) could help reclaim evacuated cities.	
Reduced AI trade value for evacuating cities.		The tactical situation does not factor into the AI trade value of a city.

Rationale	The AI should be more willing to give a city away when it thinks that it can't hold onto it, and the recipient (which may or may not be the civ about to conquer the city) should be less willing to pay for such a city.
See also	[122](#) deals with other changes to city trade value.

The AI stations ships only in cities that, for the moment, appear safe from conquest. Also prefers to use such safe cities for upgrading ships. If no city looks safe, idle ships are kept at sea.	BtS stations ships in cities that are either threatened by no hostile units at all or by fewer units than the ship's current tile. Some idle ships are used for guarding resources and patrol, but the rest is moved into some city even if none are safe. Upgrade cities are chosen only based on proximity, safety doesn't matter.

See also	In K-Mod, an interaction between a K-Mod and a BBAI change causes idle ships to be stationed in the nearest city regardless of danger. [001s](#) deals with that issue and similar ones.
Rationale	The careless positioning of ships can hurt the AI greatly against savvy players.
Tbd.	Should perhaps use a greater maximal range when checking for potential attackers, is currently 3 tiles. Embarked attackers are counted, but could be outside this range (still. able to reach the city). This still won't cover threats from civs that the AI isn't at war with, i.e. surprise attacks on the AI navy on the same turn that war is declared. I have [some ideas](#) to address this. Rather than just flagging cities as safe or evacuating at the start of a turn, a safety rating should be (pre-)computed. While gathering forces for a naval landing, the AI currently loads units into cargo as soon as they reach a tile with a ship; then the units stay in cargo for several turns. This is a needless risk.

140	Map-size adjustments (`Civ4WorldInfo.xml`)
See also	When Civilopedia is accessed from the main menu, [004y](#) shows numbers that depend on the map size as a range from Duel-size to Huge.

AdvCiv	*BtS*
Changed the map size formula (`maxPlotDistance`) that distance and colony maintenance are based on, using a rather complicated term including map dimensions, world-wrap (flat/ cylindrical/ toroidal), default number of civs, sea level and actual number of civs. I.e. the more land is available per civ, the lower the distance maintenance per city. Sample numbers for the new formula: Small, cylindrical, low sea, 7 civs: 52 Small, flat, low sea, 7 civs: 57 Normal, cyl., 7 civs: 58 Large, cyl., 10 civs: 71 Large, cyl., 6 civs: 92	`maxPlotDistance` is e.g. 55 on Small cylindrical, 72 on Normal cyl., 89 on Large cyl. and 82 on Small flat. That is, the world-wrap type greatly affects distance maintenance.

The change also affects mission costs of Spies.	
The distance maintenance multiplier set in `Civ4WorldInfo.xml` starts at 60% on Duel maps and increases in steps of about 7.5 percentage points to 97% on Huge maps.	50% on Duel, increases in steps of 10 to 100% on Huge.
Rationale	Map diameter shouldn't be so decisive. Empires tend to be circular even on oblong maps or maps without world-wrap. What leads to high distance maintenance is mostly a high number of cities, and if a map has lots of space for each civ, civs shouldn't be punished for filling that space.
	Flat maps are [known](#) as a trick for reducing distance maintenance; on high difficulty settings, AI civs pay much less for city maintenance than human civs, and thus the AI civs benefit less from additional maintenance reduction.
	I'm not sure how to set the distance maintenance multiplier in XML; that multiplier and the one based on map diameter cancel each other out to an extent. Usually, BtS adjusts too strongly to map size, so I've reduced the step from one map size to the next a bit.
Tbd.	Not sure if `DistanceMaintenancePercent` in `Civ4WorldInfo.xml` should be changed as well. Currently 50% for Duel and increases in steps of 5 to 100% for Huge. This is countered by the `maxPlotDistance` formula, but only partly I think.
The maintenance distance (from nearest government center) is now capped at around 25 on Normal settings; lower cap on smaller maps (`lower maxPlotDistance`), higher cap on larger maps (`higher maxPlotDistance`).	There is an XML parameter `MAX_DISTANCE_CITY_MAINTENANCE`, but this only serves as a weight on maintenance costs; there is no actual limit on the distance or the cost.
Rationale	If a city is very far away from a government center, it shouldn't matter how far away exactly. The BtS cost punishes (very) remote colonies too much.
Config	The distance cap is tied to `MAX_DISTANCE_CITY_MAINTENANCE` (in `GlobalDefines.xml`); changing that value will also change the cap.
Increased tech cost modifiers for Large and Huge.	Duel size has 100% tech cost, from there it's +10% for each size level.
Rationale	It's probably mostly tech trading that makes progress faster on larger maps, perhaps also trade route profit, though `iTradeProfitPercent` should counter this. With the increased tech costs, tech progress is rather too slow in the first three eras, and still too fast by the Industrial era. If I increase Industrial-era tech costs through (`Civ4EraInfos.xml`), the midgame/ late game pace becomes too slow on smaller maps.
The map-size multiplier for number-of-cities maintenance is 40% on Duel and decreases in steps of 3 to 25% on Huge.	45% on Duel, 20% on Huge, steps of 5.
Rationale	Steps of 5 percentage points would be OK if Duel was at 100%; as it is, the ratio e.g. between Small (35%) and Large (25%) is too large. Or perhaps it would also work if only 9 civs were placed on a Large map, however:
See also	[137](#) changes the default number of civs per map size.
Can draft 2 units per turn on Duel-size and Tiny maps, 3 on Small, Standard and Large, and 4 on Huge.	1 on Duel, 2 on Tiny, 3 on Small and Standard, 4 on Large, 5 on Huge.
Reduced the number of free bonuses from	5 on Standard, 6 on Large, 7 on Huge.

national wonders (Broadway, Rock'n'Roll, Hollywood) by 1 on Standard, Large and Huge maps.	
War weariness multiplier 137% on Duel, decreasing in steps of 12.5 to 75% on Huge.	150% on Duel, decreasing in steps of 20 to 50% on Huge.
Trade profit multiplier 70% on Duel, decreasing in steps of 7.5 to 33% on Huge.	80% on Duel, decreasing in steps of 10 to 30% on Huge.
Rationale	As above; don't expect the average number of cities per civ to be that much higher on larger maps than on smaller ones.
Tbd.	Corporation maintenance decreases rapidly with increasing map size: 400% on Duel, 50% on Huge. That's probably not ideal.
The six national wonders with prerequisite buildings require 4 buildings on Duel-size and Tiny maps, 5 on Small (times 10/8 percent), 6 on Standard (11/8 rounded up), 6 on Large (12/8) and 7 on Huge (14/8 rounded up). Cathedrals and the Statue of Zeus require 3 Temples/ Monuments on Small maps.	The map-size multipliers are 4/4 on Duel and Tiny, 5/4 on Small (no change), 6/4 on Standard, 7/4 on Large and 8/4 on Huge, always rounded down. Consequently, Cathedral and Statue of Zeus, which have a base requirement of 2 buildings, require only 2 buildings on Small maps.
Rationale	Oxford University is almost indispensable for competing in the Industrial era, and e.g. on a Large map with 11 civs (now the default number), it's difficult to acquire peacefully 7 cities where a University makes sense. The change to Cathedrals and Statue of Zeus is just a side-effect.
See also	310 gives the Great Wall a (base) requirement of 1 Wall.
Config	The base numbers of prereq. buildings are set in `Civ4BuildingInfos.xml`, but I didn't change these. The map-size modifiers are in `Civ4WorldInfo.xml`. The change to the rounding behavior is in the DLL (`CvPlayer.cpp`).
Tbd.	Would prefer abilities that scale with the number of buildings, e.g. "Oxford University: +10-15% research (based on map size) per University up to a maximum of 60%". No required number of buildings necessary then.

141	No diplo bonus from gifting GP	
AdvCiv		*K-Mod*
Gifting a Great Person (GP) to an AI civ does not affect relations with that AI civ. Like in BtS, only units with positive production cost can boost relations when gifted.		+1 relations for each gifted GP.
Rationale	Too easy to exploit for a diplo victory.	

Tbd.	Gifted military units should only boost relations when the AI has an immediate need for military aid. The relations bonus should probably also be capped; seems exploitable.
	Comment by karadoc in `CvUnit::gift`: *'It would nice if there was some way this could also reduce "you refused to help us during war time", and stuff like that. But I think that would probably require some additional AI memory.'* I don't think this is worth the effort, but perhaps gifted units should count for "you gave us help" instead of "fair trade".

142	Master gets a happiness bonus only from the first peace vassal	
AdvCiv		*BtS*
The master of a vassal civ receives a happiness bonus only from voluntary vassals, and only the first one counts, i.e. at most +1.		Each vassal, capitulated or not, provides +1 happiness in all cities of the master.
Rationale	In large games, the stacking happiness bonus, combined with the free luxury resources from vassals, can let master civs ignore happiness altogether. I also don't like that the bonus applies even if just one city is left; this provides an incentive to keep tiny vassals around, which lead to some oddities in global diplomacy (despite my efforts to fix such issues). Also, oppression of capitulated vassals is hardly a point of pride. Should perhaps remove the bonus entirely, but for voluntary vassals "We influence other civilizations" makes some sense, and these vassals are harder to get.	
	The anger at the vassal side seems sensible (though unimportant) and can't stack.	
	Change 130 and related changes (see under [130v]) remove several disadvantages of vassal agreements for the master, so, as far as game balance goes, I don't think a happiness bonus is needed at all.	

143	Recently-canceled memory for voluntary vassal agreements (VVA)	
If a vassal loses 35% of its territory, it cancels the VVA with a per-turn probability of 15%. Cancels immediately when losing 45%.		Only capitulated vassals revolt when losing territory (50%).
Rationale	The vassal can then make peace independently (possibly by capitulating), while the master is justly punished for not having protected its vassal. The third party (possibly human) is faced with a strategic decision: focus attacks on the vassal or the master? In BtS, only attacks on the master can break up the VVA (by lowering the master's power rating).	
Config	`VASSAL_DENY_OWN_LOSSES_FACTOR` in `GlobalDefines_advc.xml`	

When a vassal cancels a vassal agreement for no particular reason (i.e. vassal feels safe or powerful enough on its own), the (AI) master remembers this for, on average, 20 turns, and refuses to sign a VVA during that time. When the agreement is canceled because the master hasn't protected the vassal, including the case where a capitulated vassal breaks free after losing too much territory, the vassal remembers this for 30 turns (on average), and refuses another VVA. (Whether the master or the vassal remembers is only relevant when the master is human.)	No memory about canceled vassal agreements. When a capitulated vassal breaks free, it often signs a VVA with the same master on the same turn. When a voluntary vassal is near the power threshold for a VVA, the agreement can flicker on and off every few turns.
Rationale	The flickering isn't only goofy, it also means that war preparations against a former vassal can easily get interrupted by a new VVA, which is frustrating. Also, some mechanism is needed to keep a vassal independent for a while when the master has failed to protected it.
143b	Cancelation and nukes

VVA canceled also after being nuked repeatedly. The threshold is randomized; usually, the vassal doesn't break away until more than half of its cities have been hit. Doesn't cancel if the master has SDI and the vassal does not.	Only lost territory counts (and only for capitulated vassals).
Master's SDI protects vassal.	SDI is a team project, but doesn't protect vassal teams.
Vassal cancels VVA if it has any nukes unless master has SDI and vassal doesn't: "doing fine on our own."	Vassal's nukes factor into its power rating, but a single nuke doesn't usually make a difference.
Capitulated vassals don't build nukes. When a team capitulates, all it's nukes are scrapped. Nukes can't be gifted (between any civs).	Vassals don't hold back on anything. Can gift nukes to circumvent the diplo penalties.
Rationale	SDI is supposed to be an array of space-based lasers. Should be able to intercept any nukes that the SDI owner wants to intercept. Vassals that are powerful enough to build nukes should stand on their own.
See also	130v makes the master responsible for nukes fired by a capitulated vassal (obsolete now that vassals can't have nukes). 112 cancels VVA when near victory and stops capitulated vassals from pursuing victory.
Tbd.	A cancelation condition based on present population vs. population when signed might be better. May want to scrap other units upon capitulation too, probabilistically. E.g. when France surrendered to the Third Reich, the French navy was partly scuttled.

144	AI gift request (part of the DDiplo changes)
See also	130v exempts vassals from this change and prevents vassals from granting gifts to rivals or to a disliked master. 130o deals with memory about tribute demands. 104m: Some gift requests are triggered during war planning.

AdvCiv	BtS
Without considering any specifics, the AI refuses gift requests with a leader-specific probability. That probability is based on `ContactRand`: `CONTACT_GIVE_HELP` and between 5% (Gandhi) and 32% (Sitting Bull, Montezuma). I'm capping the probability at 50% for Tokugawa, otherwise he'd always refuse. Requests are always refused while preparing war against the player (no change).	The only randomized aspect of the AI response to a gift request is the decay of recent-demand memory: The request is refused if the AI still remembers an earlier request (or tribute demand). So, the first request is handled without randomness, and if a previous request is far enough in the past, it's very likely forgotten (the expected time to forget is 20 turns). `CONTACT_GIVE_HELP` determines only how frequently an AI leader offers a gift to human civs that have fallen behind.

Rationale	Shouldn't be able to use requests to determine reliably if the AI is preparing war. It's semi-decidable now – if a request is granted, then the AI certainly isn't plotting. That said, they might start on the very next turn ... In BtS, `CONTACT_GIVE_HELP` is irrelevant for experienced players; it's nice to give this an actual use.

Memory about requests and rejected demands is not decreased while there is a peace treaty between the two civs. Gift requests are rejected during a peace treaty unless the AI remembers receiving a gift from the player (and that case the peace treaty may well result from a gift to the AI).	Can decrease on any turn. AI may grant gifts when there is already a peace treaty.

Rationale	To increase the time in between granted requests. A bit too easy in BtS to keep a Pleased AI from planning war: can reliably sign a peace treaty about every 25 turns, which leaves just 15 turns in between, which can sometimes be bridged by asking the AI to attack a third party (which results in a peace treaty; see change 146). My change makes this tactic unsustainable.
	Could argue that "begging for peace" shouldn't ever be a tactic. I like that it makes Pleased attitude relevant even for warlike leaders. Think of it as a Reinsurance Treaty. I don't like that this is something only humans can use. (Could alternatively merge DarkLunaPhantom's one-sided peace treaties.)

AdvCiv	K-Mod
AI refuses gift request if planning war against the player, and refuses with a high probability if war utility is positive (but not yet planning war).	Only refuses if already planning war against the player. (In BtS, the AI doesn't take the resulting peace treaty into account at all; grants request regardless of war plans.)

AdvCiv	BtS
When asking for a gift, the AI asks for the tech that it needs most, with a bias for cheap tech.	The requested tech is chosen uniformly at random.

Rationale	Which tech the AI asks for doesn't have to be unpredictable; no need for any random element (though the AI function that I'm using now, `AI_bestTech`, does have a random element). If cost is ignored, the most useful tech tends to be expensive, and I don't want the AI to ask for expensive tech all the time. On the other hand, the AI shouldn't ask for cheap tech often because this makes the decision of the human player too easy. Hence tech cost is given some weight, but not full weight.

When asking for tribute, the AI is likely (threefold increased probability) to demand the tech that it needs most, though techs that no other civ knows yet remain off-limits.	The demanded tech is chosen uniformly at random from among those techs that at least two civs know.
Rationale	Not quite the same procedure as for gifts because I wanted to keep the exception for cutting-edge tech; picking (with certainty) the most useful tech that is known to at least two civs would've been a bit awkward to implement because of the signature of the `CvPlayerAI::AI_techVal` function. Is the exception really a good idea? Maybe yes: The civ that receives tribute remains a threat in the medium or long term, so yielding to that civ an edge in (military) tech is rarely going to be prudent.

145	No diplo bonus from accepted favorite civic/ religion if no longer in that civic/ religion	
AdvCiv		*BtS*
The diplo bonus from having accepted an AI civ's religion or favorite civic is suspended if the human civ isn't presently in that civic or religion, or if the AI civ is no longer in the civic or religion. Likewise, the penalty for refusing the fav. civic/ religion is suspended if the human civ is now in that civic/ religion, or if the AI civ has switched out of it.		The bonus lasts for an expected 100 turns, regardless of whether the player keeps the civic/ religion. Can switch out after 5 turns.
Rationale	Switching right back is a bit cheap, especially with the Spiritual trait.	
See also	Part of the [DDiplo](#) changes.	

146	Hired (sponsored) war results in a peace treaty	
AdvCiv		*BtS*
When a civ agrees to declare war on another civ at the request of a third civ, the civ declaring war and the third civ automatically sign a 10-turn peace treaty.		No peace treaty; can ask someone to start a war, and immediately attack that someone.
Rationale	A bit of a loophole in BtS. Also want to be sure that the AI doesn't attack a human that has just paid it to attack someone else; not a problem in BtS because the AI only fights one war at a time, but could be a problem with UWAI.	
See also	Part of the [DDiplo](#) changes. Change [100](#) is also about sponsored wars (mostly UI changes). When there is already a peace treaty between the sponsor and the civ declaring war, [032](#) causes that peace treaty to be prolonged.	

147	Changes to border tensions	
See also	[004g](#) changes the explanation text from "close borders" to "shared borders". (The formula works a bit differently if [035](#) is enabled.)	
AdvCiv		*BtS*

The number of lost tiles counted per city can be at most equal to the mean of the city's current population and its highest-ever population, or at most 6, whichever is higher.	No such per-city limit. A size-1 city enclosed by foreign borders can contribute 20 lost tiles. The number of lost tiles is then divided by the total number of owned tiles and multiplied by a personality factor to compute the diplo penalty from border tensions.
Rationale	Shouldn't get -4 relations from a single city choked city; this can easily happen in BtS, even in the late game. I generally don't like when high culture leads to painful diplo penalties. This change reduces border tensions a bit overall, and the following change should even that out:
When an AI civ steals tiles from a neighbor that the AI civ can't work because they're too far away from its cities, then the AI civ is slightly upset about this. The multiplier for those tiles is 5, whereas the multiplier for tiles stolen *from* the AI civ is 8. Both weights are multiplied by a percentage based on the size of the AI civ's territory and the map size; this multiplier decreases as more territory is acquired and tends to be near 50% by the end of the Classical era. The weight for the length of the border shared with another civ (no matter if tiles are stolen) is 5. The result is capped at 40, and no border tiles are counted if the border length is less than 5 tiles.	There's only a diplo penalty for stealing tiles from the AI, not vice versa. The weight for stolen tiles is 3. If the border is longer than 7 tiles, a flat penalty of 40 is counted. In the end, the total penalty is divided by 100 and multiplied by the AI leader's `CloseBordersAttitudeChange` value (between 1 and 4; no change).
Rationale	Count unworkable tiles because I don't want change [099b](#) (culture decay in foreign city radii) to reduce border tensions. Should also encourage civs to put at least enough effort into culture to prevent a no man's land that no civ can work (which is implausible at peacetime). Makes sense to me that the AI is annoyed by not being able to work the tiles that it owns and is inclined to remedy this by conquering the cities near those tiles. All the formulas take into account the total size of the territory because, to a civ that has only 2 cities, 4 lost tiles should be a big deal, but not to a civ with 10 cities. I've shifted some weight from the common border penalty to stolen tiles because, when neither side loses tiles, there really shouldn't be much bad blood. The BtS formula is also too abrupt (0 or 40).
Tbd.	Perhaps let the relations penalty increase sublinearly with the weighted sum of stolen tiles. Easy enough to do in `CvPlayerAI::AI_updateCloseBorderAttitudeCache` by e.g. exponentiating `iPercent` in the end with 0.7 and then times 3, but maybe a penalty of 1 or 2 already happens much more easily than -3 or -4 (this would be the goal).
Stolen tiles with a bonus resouce are counted double.	Every stolen tile counts as 1 tile.
Tbd.	Should make the value counted per tile fractional and take into account yields as well. Perhaps there is already a suitable tile evaluation function in the `CvCityAI` or `CvPlayerAI` class.

148	Relations to attitude mapping of the AI changed	
AdvCiv		*BtS*
At a relations value of 4, the AI becomes Pleased, at -2 Annoyed, at -8 Furious, at 10 (no change) Friendly. Human players receive no relations penalty from any of the difficulty settings. On the lowest three difficulty settings, humans receive relations bonuses ("a first impression ...") of 3, 2 and 1 respectively.		Pleased at 3, Annoyed at -3, Furious at -10. On Noble difficulty and above, all relations suffer a penalty of -1. On Chieftain, humans get +1 relations from AI civs and on Settler +2.
Rationale	In effect, this makes Friendly 1 easier. A distance of 7 between Pleased and Friendly was too much considering that most AI civs are already very unlikely to start a war at Pleased and are willing to trade tech. The additional benefits of Friendly aren't that great. Apart from this, the main benefit is that the player sees the "A first impression ..." line much less in the game. It was a bit silly to tell the player that he/she is making a bad first impression everywhere.	
	The downside is that players have to relearn the thresholds, and that Pleased and Annoyed (and Friendly and Furious) are no longer symmetrical. Tough call. At first, I had meant to increase the Pleased threshold by one more for balance reasons, which would've broken the symmetry anyway. It turned out that this made it too hard to please the AI, so I rather made the bonuses from OB and resource trade more difficult to attain, but kept the change to first-impression diplo.	
	Furious at -8 (not -9) means that the AI gets Furious a bit faster than previously. I'm not sure if that's an improvement, but I don't want the fury threshold to be *almost* symmetrical with the friendship threshold (-9 vs. +10). -10 would make the Annoyed interval too long and Friendly/ Furious being symmetrical when Pleased/ Annoyed aren't wouldn't be good either.	
See also	The DDiplo changes to relations modifiers arguably make it a bit harder to have very good relations with the AI.	
	The Show Hidden Attitude mod makes the BtS relations penalty from difficulty visible to the player.	
Friendly attitude causes the AI to vote for someone in a victory vote; Pleased is not enough.		+8 relations needed for a victory vote.
Rationale	This makes it 1 harder to get the victory vote, which should still be manageable. More importantly, the +8 threshold was a bit of an obscure oddity; much easier to remember that Friendly attitude is required.	
AI civs have a +0.3 bonus to "first impression" relations (cf. 130b) on difficulty settings lower than Prince. From Prince to Deity, the bonus increases from 0.4 to 0.9.		No diplomatic handicaps for human players, though the AI-specific portion of the "first impression" modifier (i.e. from peace weight and warmonger respect) is more often positive than negative.

Rationale	This was a bit of an accident. Until v0.93, I had assumed that the BtS relations penalty (-1) applied only to human-AI relations, and I had meant to replace this with a +1 bonus on AI-AI relations. Now that diplomacy overall is balanced around the inter-AI bonus, I'm finding it a bit difficult to remove it entirely; I don't like when AI leaders are Annoyed at each other from the beginning.
	Relations bonuses from "fair and forthright" trade are generally easier to attain for humans than for the AI, and some relations bonuses tied to AI requests are only available to humans. This is evened out by relations penalties for rejected requests, but not entirely, one could argue. Let's say that the AI bonus makes up for these asymmetries.
See also	250d removes a few minor advantages that the AI receives through the difficulty level.

149	Diplo modifier from resource trade	
AdvCiv		*BtS*
When an AI civ receives one or more resources from another civ, the resource trade counter of the AI is incremented twice per turn, each time with the same probability (cf. 130k). This probability is based on the number and utility of resources received from the other civ and the number of resources available from elsewhere (city network, other trades) in the AI civ's capital. The number of resources that the other civ has available also factors in – when it has, say, only three resources available for trade, then the recipients feel special.		The counter is incremented once (with probability 1) per turn for each received resource. It doesn't matter how many resources the AI civ already has, how useful they are or how many resources the other civ has.
The resource trade counter is decreased by 1.7% per turn when no more resources are received through trade, but can also decrease if the increment probability becomes too low.		The counter is only decreased if 0 resources are received through trade. The decrement is 1 plus one quarter of the number of cities owned by the AI civ.
The resource trade counter can't increase beyond 125.		The counter can increase indefinitely.
Vassal tribute deals no longer affect the resource trade counter.		
Rationale	Same as 130i: Make the AI harder to please. The exponential decrease is consistent with 130k.	
See also	Part of the DDiplo changes. 036 changes the evaluation of resource utility. 007 shows AI resource trade counters in Debug mode (Alt+Ctrl on an owned tile).	

150	Additions to the replay log	
See also	100 adds sponsored wars and brokered peace to the replay log. 106 excludes some things.	
AdvCiv		*BtS*
150a	Switch to no state religion	

Replay indicates when a civ renounces its state religion, i.e. switches to no state religion.	Religion changes are logged, as are civics changes to Free Religion.
Rationale	Can also switch to no religion without adopting Free Religion, and that's worth logging.
See also	151 below
150b	Results of diplo votes
Record successful UN and Apostolic Palace proposals including targets (e.g. the name of the city to be reassigned), the civ who made the proposal and the vote tally.	Replay only shows the vote tally for and against, without naming the proposal.
Rationale	Since I'm including the name of the Secretary-General/ AP Resident when recording proposals, there should be no need to record the Secretary-General elections.

151	Message about changed religion or civic indicates the earlier civic or religion

152	War trade (sponsored/hired war) indicators on Glance tab
AdvCiv	BUG
New BUG option "War Trades" on the Advisors tab (enabled by default). If checked, the Glance tab (Foreign Advisor screen) shows a fist icon when a leader is willing to declare war on another leader.	The Glance tab shows icons for war and worst enemies. To find out which war trades are currently offered by the AI, the player has to contact every leader.
AdvCiv never shows a fist icon on the scoreboard (neither did K-Mod prior to v1.46).	The fist icon is shown on the scoreboard when an AI civ is *not* willing to start any wars.
Rationale	Same principle as listing available tech trades on the Tech tab. I didn't want to add a separate tab for war trades though, and, on the Glance tab, the indicators don't require extra space because ongoing war (swords icon) and willingness to start a war (fist icon) are mutually exclusive.
See also	210a adds an alert for war trades, but this is no use when a savegame is loaded or when the player loses track of the trades mentioned in alerts.

153	*Most ids above 152 are still unassigned*

155	Changes to team games
Tbd.	Hardly tested.
AdvCiv	BtS

Trades proposed to the AI by a member of its team are considered with more goodwill than trades proposed by members of other teams, but still rejected if they're very uneven.	The AI accepts gift requests ("sure would come in handy") and gifts from team members. Can't even ask the AI to offer a trade.
The AI can reject gift requests by a teammate. It remembers granted requests and forgets them twice as fast a gift requests from non-members. The diplo text for a gift request to a team member is still "sure would come in handy."	Always accepts gift requests and doesn't remember them; i.e. the human can ask as frequently as he/she likes. (Whereas the AI remembers both granted and rejected requests from non-members and refuses to consider further requests while still remembering an earlier one.)
Rationale	Don't want the AI to behave like a puppet in human-AI teams. Should feel more like playing together with another human being, and these have their own opinions and tend to behave not entirely selflessly. Kept the special diplo text because gift requests to team members still get a special treatment (e.g. forgotten faster).
AdvCiv	*Unofficial Patch*
A human can't offer to an AI teammate to switch civics or religion.	Can offer this to the AI. Not sure if the AI appreciates it in any way. Probably a bug.
Rationale	The AI can't judge whether it benefits from a human civics or religion change.
AdvCiv	*BtS/BUG*
In team games, team membership is color-coded on the scoreboard: Civs belonging to the same team (and also their vassals) have their score shown in the text color of the (master) team leader.	BUG adds an option for grouping vassals with their masters (enabled by default in AdvCiv), but there's no way to indicate team membership on the scoreboard. Scores are always shown in white.
Rationale	Hard to tell which team is doing well when team membership isn't shown.
Config	Can be disabled through `COLOR_CODE_TEAM_SCORE` in `GlobalDefines_advc`.
Tbd.	Should add an option for this to the BUG menu. The player text colors can be a bit hard to read, so players may want to disable this change. Alternatively, I could merge DarkLunaPhantom's "option to add team number to BUG scoreboard." (Git commit)
See also	004v*: Other changes to scoreboard text.*

160	Food after starvation
AdvCiv	*BtS*
After a city with a Granary loses population from starvation, the food store of the Granary is emptied into the city's food store. The Granary's capacity is only 40% of the city's capacity.	Whenever food is added to the city's store, the same amount of food is added to the Granary's store. The maximal capacity of the Granary is 50% of the city's store (whose capacity is 10 + 2 * population). After growth, the Granary's store is added to the city's store, but the store of the Granary isn't emptied. The Granary provides no food after starvation.

Rationale	The Granary already provided some protection against starvation by providing a cushion after growth and helping regrow lost population. However, the cushion is just 15 food in a size-10 city. If such a city has balanced health and can't get extra food by reassigning citizens (the AI often doesn't have unworked Farms), a poisoned water supply will consume the 15 food in two turns, and then kill 6 population. My change essentially doubles the cushion, meaning that only 3 population would be killed, which seems much more reasonable. It's not a big issue for human players, but, in the Industrial era, the AI can become very vulnerable to poisoned water.
	It's strange that the Granary isn't emptied when a city grows, but normally irrelevant (it would be refilled by the time the city grows again), and actually convenient for my anti-starvation mechanism; don't need a separate food store this way.
	Since the Granary is already considered to be the most powerful building in the game, I didn't want to make it even better; and I had planned to reduce the amount of stored food at some point anyway.
Config	The capacity change is an XML change (`Civ4BuildingInfos.xml`).
Tbd.	Nerf Slavery and Drafting; this will make Granary far less powerful.
See also	912d: No Slavery option

161	Probability of war trades check	
AdvCiv		BtS
The AI considers hiring another AI civ for war with a per-turn probability of **p** for each potential hireling computed as follows: p(t) = 10 / (DWTR + 10 * min{10,t}), where **t** is the number of turns spent at war and DWTR is `DeclareWarTradeRand` in `Civ4LeaderHeadInfos.xml`. For DWTR=40, this results in a probability of 1/4 when a war has just started (0 turns spent at war), 1/5 on the next turn etc. down to a lower bound of 1/14 after 10 turns spent at war.		`DeclareWarTradeRand` is 40 for all leaders except Pacal, whose DWTR value is 60. Regardless of DWTR, the BtS formulas result in p=1 when the war is 0 turns old. For DWTR=40, p is 1/(t+1) for the next three turns, and, for t=4 to t=10 gradually decreases to 1/40.
Rationale	I'm not sure if the guaranteed check after 0 turns was intended. If so, then perhaps the checks on subsequent turns were made probabilistic only for performance reasons – the number of (hireling, war target) pairs grows quadratically with the number of civs. That said, most of the pairs are usually eliminated by attitude checks (attitude toward the sponsor and toward the target), so I'm not too worried about performance. The BtS probability seems too high to me in the beginning and to low later on. Pacal's value may well be an accident.	

Tbd.	Considering to set leader-specific DWTR values so that some leaders tend to wait and see before bringing in help (DWTR=60), some hardly ever do (DWTR=80 or even 100) and some take all the help they can get asap (DWTR=20). Proud and miserly leaders would get a high DWTR, and profligate leaders a low one. I'm finding it difficult to fit the leaders into these categories though. Tentative: 3xDWTR=20: Huayna Capac, Louis, Justinian 11xDWTR=40: Hannibal, Suryavarman, Mansa Musa, Hatshepsut, Hammurabi, Montezuma, Saladin, Churchill, De Gaulle, Roosevelt, Augustus Caesar 14xDWTR=50: Cyrus, Brennus, Julius Caesar, Willem, Pericles, Pacal, Catherine, Washington, Joao, Boudica, Frederick, Bismarck, Wang Kon, Peter 6xDWTR=80: Alexander, Shaka, Genghis Khan, Qin Shi Huang, Gandhi, Kublai Khan, 2xDWTR=100: Tokugawa, Sitting Bull 16xDWTR=60: the rest

170	(Reserved for an overhaul of religion)
170a	Diplomacy
See also	[145](#) applies accepted-religion memory only so long as the religion is shared. [115b](#) changes how a favorite religion affects the utility of the Theocracy civic. [150a](#): religions in replays [106e](#), [151](#): notifications about religions [131](#): AI switches its state religion probabilistically
AdvCiv	*BtS*
Rationale	

171	Founding of religions by the AI
Tbd.	AI shouldn't found religions before founding a second city or hitting the happiness cap in the capital. AI with a favorite religion should avoid founding earlier religions.
AdvCiv	*BtS*
When an AI leader gets to choose which religion to found ("Choose Religions" game option) and the favorite isn't available (already founded or none specified), that leader chooses the religion with the cheapest tech requirement.	Chooses uniformly at random.
Rationale	If the preference of the leader can't be matched, at least try to match the game year by picking religions in chronological order.

178	Changes to Apostolic Palace (AP) and United Nations (UN) votes
See also	[dlph.25](#) allows AP war votes against voting members. [130f](#) allows embargo votes to sever recent deals.

Tbd.	Several gameplay changes, most importantly to the membership rules. The only thing done so far (apart from dlph.25): A temporary adjustment of the City AI evaluation of the AP as a vote source. Assigns 0 value when the state religion is shared by no other civ. Will have to replace that with code estimating the potential for spreading the AP religion after/ while building the AP. (Don't want to force an AI civ that has just founded Christianity to spread that religion around before being allowed to build the AP.)
	[Some players] really hate the AP victory. The change to the membership rules will address this.
See also	[115b] only counts vote source utility when aiming at a religious victory; that'll also have to change.

AdvCiv	BtS
UN and AP don't require Diplo victory to be enabled, but the victory votes do.	Can't build AP and UN when Diplo victory is disabled.
Rationale	The AI can handle this. Disabling Diplo victory without disabling all votes is requested on the CFC forums from time to time ([two] [examples]). Seems like players generally don't dislike voting, just the victory votes, either for reasons of game balance/ fairness (mostly AP) or because they find it irrational that the AI civs will vote for a rival's victory. That said, some non-victory AP votes appear to be problematic in multiplayer (the RtR mod disables them; see under "Miscellaneous" [here]); will have to disable them through XML then.
Config	Can be reverted through `Civ4BuildingInfos.xml`. Individual votes can be disabled through `Civ4VoteInfos.xml` (though this may break savegame compatibility).
The "None" option in the popup that asks the player to select a resolution explains that this will trigger an early election. (Unless the vote cycle is ending either way.)	Not even the Civilopedia explains this as far as I can tell.
Rationale	The early-election mechanism is OK, but needs to be communicated to the player.

179	Changes to the production ability of Apostolic Palace (AP)

AdvCiv	BtS
The production bonus to religious buildings is shown in the AP's help text, Civilopedia text and actual-effects text (<Alt> key).	The only mention of the production bonus is buried in the "BtS Concepts" page about the Apostolic Palace. Actual-effects (BUG mod) shows the bonus when hovering over religious buildings, but not when hovering over the AP.
The AI evaluation of the AP includes the production bonus, taking into account religious buildings that already exist and that could still be built, future religion spread and the effects on other civs and diplo relations with those civs.	The production bonus is ignored by the BtS AI. There is BBAI code that factors the bonus into the evaluation of religious buildings, but not the evaluation of the AP itself.
Rationale	The ability is quite powerful; shouldn't be a secret. It's tied to the AP vote source (`Civ4VoteSourceInfos.xml`), not the building, but that's a technicality that players shouldn't have to worry about.
Tbd.	Reduce the production bonus to 1 and give religious buildings +1 production from a trait once/ if I get around to revising the leader traits.

See also	008a shows some of the restrictions for AP only when they apply. 008e drops the "The" from the AP's name.

200	Reverted K-Mod changes; see chapter on K-Mod
Tbd.	Rebalance culture victory. Something to make up for the halved culture bonus from Free Speech. (K-Mod gives Colosseum +20% culture, but I don't like that; *ludi* should be happiness, not culture.)
201	Play "you have discovered ..." sound in multiplayer

AdvCiv/ BtS	*K-Mod*
Play a "you have discovered" sound when a tech is discovered by a teammate.	Always play the tech quote.

Rationale	A bit of a pity never to use the "you have discovered" audio. Should also be slightly more informative to use different sounds for own discoveries and those of team members.
Tbd.	Not tested.

210	Additional Civ4lerts
See also	135b makes `MoreCiv4lerts` work in Hotseat 106c prevents Civ4lerts from triggering after loading a savegame 106d changes the default settings for BUG alerts and disables some alert triggers. 127 suspends alert updates during AI Auto Play

I'm not adding a second Alert tab to the BUG menu for the new alerts – the BUG menu is already huge. Instead, I'm removing BUG alerts to make room; some aren't really useful in a mod like AdvCiv, others are made obsolete by the new alerts.

Tbd.	Get rid of the "willing to sign Open Borders" alert. Instead simply have the AI contact humans right away when it becomes willing (the turn on which a human discovers Writing will need special treatment). Also remove the "peace treaty" alert; "willing to talk" is enough. And remove "pending border expansion". "<team1> has signed|canceled Open Borders with <team2>." "You have gained|lost access to a source of <bonus> (now <n> sources)." "The peace treaty between <team1> and <team2> has ended." "<team1> is willing to make peace with <team2>." "Can now|no longer access demographics about <civ>." "<team1> has discovered <tech> [(trade from <team2>)]. [Obsoleted wonders: ...]" "<team1> is willing to stop trading with <team2>." (But what about embargoes that the AI would agree to if the player didn't have any deals with the target?) "5 turns have passed since the last revolution; it's again possible to change civics." "<leader> can be convinced to convert to <religion>." "The enemy has been spotted near <city>." (Currently, the game reports the same enemy time and again; should work better as a Civ4lert that remembers which enemy units had already been visible on the previous turn.)

	and possibly: "A tile near \<city1> has flipped to \<city2>." (How to describe the tile?) "\<leader1> is now [e.g.]furious toward y (was annoyed)." "\<leader> has constructed a \<building>|the \<national wonder> in \<city>." (cf. 045) "You|\<leader> have|has overtaken \<leader>|you in military power." "The military power of \<leader> has increased substantially over the last 10 turns." (probably too noisy) "The effect of our counterespionage mission against \<leader> has ended." (A message about enemy counterespionage ending would be difficult because we only learn that "enemy spies appear to be extra vigilant to our espionage efforts," but not whose spies, and the durations can overlap.) "\<leader> has acquired the \<wonder> of \<city>." (The *Tbd.* under 106 would be preferable, but an alert that is checked at the end of turn would be easier to implement.)
210a	War trades (= hired war/sponsored war/joint war)
See also	The RevolutionDCM mod also has such an alert, but I didn't know this when I implemented the alert for AdvCiv. UWAI uses a different procedure than BtS/ K-Mod to decide whether to entertain joint-war offers (but this alerts works in any case). 152 shows currently offered war trades on the Glance tab.

AdvCiv		*BUG/ K-Mod*
Triggers when an AI civ becomes willing to declare war on another civ at the player's request. Shown in the "Trade" column of the BUG Alerts tab; enabled by default. Removed the "Victory" alerts to make room.		No alert about this, but BUG shows a fist icon on the scoreboard when a civ is unwilling to declare war on account of "having too much on [their] hands." Prior to v1.46, K-Mod did not show this icon (not even as an option). K-Mod 1.46 reverts to the BUG behavior (icon enabled by default).
Rationale	The K-Mod 1.45 approach (no UI support for joint wars) certainly wasn't ideal, and bothered some players greatly. The fist icon is a bit obscure, takes up room on the main interface, and the player has to have an eye on it every turn; an alert is much better. The victory alerts seem useful only in HoF games.	
Config	Can also show an alert when the AI stops being willing to declare war: `ALERT_ON_NO_LONGER_WAR_TRADE` in `GlobalDefines_advc.xml`.	
UWAI rejects war trades when already in a war and the new target is not at war with the sponsor and farther away than the closest current war enemy: "We have enough on our hands right now."		AI refuses war trades when it is in any war, regardless of other circumstances. (This is still the case when UWAI is disabled.)
Rationale	Need to reduce the amount of messages produced by this alert. War against an additional target rarely makes sense; the hired AI civ isn't going to send units.	
210b	Revolts	
Triggers when revolt probability changes from 0 to greater than 0 in a city, or when occupation (from conquest or revolt) ends in a city unless the city also needs orders. Shown in the "City" column, taking the spot if the		The only way to learn about changes in revolt probability is to check the city screen each turn. The Pacification alert triggers when occupation ends in a city; the pending version when occupation is about to end. Without the alert,

BUG "Pacification/ Pending" alert.		there is no notification about ending occupation, although a conquered city will ask for production orders when occupation ends (unless the new owner has already put something in the queue).
Until v0.94, the alert also triggered when the revolt chance became 0.		
Rationale	Now that revolts play a more prominent role (see <u>099c</u>), an alert is direly needed. The Pacification alert seems fairly unimportant to me, but I've still included it with the new alert. Though not the "pending" option; I don't see why one would want that.	
	No pacification alert when the city also needs orders; seems superfluous then.	
210c	City founded alert removed	
When a foreign city is founded in a tile that is revealed to the player, the game shows a message about this to the player. No option to disable this. No messages about cities founded in unrevealed tiles.		The description says that the alert is triggered when "a rival founds a city," but I think it also works for vassal cities (which aren't rivals). K-Mod prevented the alert from showing cities founded in unrevealed tiles and set it to disabled by default.
Rationale	AdvCiv sticks with the K-Mod principle that unrevealed cities should be secret. No need for an optional alert then. Frees up space for a new alert (see *Tbd*. under 210).	
210d	Third-party resource trades	
Triggers when a civ starts or stops trading a strategic resource to another civ, and when a civ starts trading any resource to a civ that it was previously not trading any resources to, or when the only resource trade between two civs is canceled.		Resource trades are public knowledge and can be looked up on the Foreign Advisor screen.
		The BUG Resource Trade alert triggers when an AI civ becomes willing to trade a resource to the player or stops being willing (<u>106</u> disables the latter part).
Rationale	Was helpful for testing <u>036</u>. Triggers way too often when all started and ended resource trades are reported. Reporting only strategic resources and the first and last trade is OK, but not quite as interesting as I thought it would be.	
Config	**Disabled** by default. Can be enabled from the BUG menu, Alerts tab, column Trading. There's also a debug mode for reporting all resource trades, but that can only be enabled in the DLL (`AdvCiv4lerts.cpp`).	
Tbd.	Perhaps this alert should only cover strategic resources; the current scope is a bit complicated.	
	A "third party" checkbox for an alert about inter-AI tech trades (cf. *Tbd.* under 210) could be placed in the same column of the BUG menu.	

210e	AI willing to import from human	
The resource trade alert (enabled by default) triggers also when an AI civ becomes willing to import a surplus resource from the player at a price of at least 3 gold per turn.		The alert only checks AI willingness to export resources.
It doesn't trigger when the resource is consumed by one of the player's corporations, nor when an AI civ stops being willing to import a resource.		
See also	Such an alert wasn't necessary prior to <u>036</u> because the AI was always willing to import human surplus resources.	
	<u>106</u>: The alert doesn't trigger when the AI stops being willing to export a resource.	

250	Changes to handicaps
See also	[104p](#) sets the target size for AI invasion stacks based on difficulty. [126](#) deals with free AI techs when starting in a later era. [113](#) reduces the AI Worker speed bonus. [108b](#) increases the bias toward better starting locations for the AI. [313](#) gives human units an anti-Barbarian bonus on Monarch, Emperor and Immortal, and reduces human and AI bonuses against animals.

250a	King handicap	
New difficulty setting "King" with big initial AI advantage (free Worker, free Pottery, humans get the worst starting plots), and moderate ongoing AI advantages (akin to Monarch).	Initial AI advantage and ongoing advantages go hand in hand for the 9 BtS difficulty settings.	
Uncoupled difficulty rating from handicap id. A difficulty rating from 0 to 100 is now assigned explicitly through a new XML tag. Settler to Immortal at difficulty 0, 10, 20, ..., 70; Deity at 90 and King at 65. Plus another 30 when playing a One City Challenge.	Handicap ids from 0 (Settler) to 8 (Deity) are used as a measure of difficulty, e.g. when computing player scores at the end of a game. This method breaks when handicap settings are added. If added at the end of `Civ4Handicap Info.xml`, it's treated as more difficult than Deity; if added in the middle, all the handicaps below increase in difficulty.	
Rationale	for Pottery: Free tech from the first row (e.g. Hunting or Agriculture) puts those AI civs at a disadvantage that always start with these techs. Pottery should also put the AI on a path to long-term development (Granaries, Cottages), rather than using its initial advantage to choke the human players.	
Config	I've removed this difficulty level in v0.90. Monarch combined with SPaH has a pretty similar result, and I wanted to reduce the complexity of the AdvCiv mod, at least on the surface. (An additional difficulty level is a very visible change from BtS.) To re-enable the King difficulty, remove the `<!-- ... -->` comment tags around the last `<HandicapInfo>` entry in `Civ4HandicapInfo.xml`. This should also allow savegames with King difficulty to be loaded.	
Tbd.	The victory score should take into account other game settings (through difficulty or directly), e.g. Always War.	
See also	[108](#) allows the game to give the worst starting plot to a human civ. [dlph.22](#) rounds the difficulty setting in multiplayer to the integer nearest to the average.	

250b	SPaH; see also chapter Start Points as Handicap.

Config in scenarios	Since v3.17 ([reportedly](#)), the Base Points box is grayed out on the Custom Scenario screen unless Advanced Start is set as a default option by the scenario. As a consequence, Advanced Start and SPaH (which builds on Advanced Start) are unavailable in most scenarios. I haven't found a way to work around this. However, it's easy to add Advanced Start as a default option in a scenario file: Locate the file in `Sid Meier's Civilization 4\Beyond the Sword\PublicMaps` (CivBeyondSwordWBSaves) or `Sid Meier's Civilization 4\PublicMaps` (Civ4WorldBuilderSaves). This also works for [EuroWorld.CivBeyondSwordWBSave](#). Open it file in a text editor. (Or better make a backup copy first.) Somewhere between `BeginGame` and `EndGame`, add this line: `Option=GAMEOPTION_ADVANCED_START`
See also	[Chapter](#) Start Points as Handicap [Advanced Rivals](#) mod, precursor of Advanced Civ
Tbd.	Allow players to enter arbitrary point distributions, in particular ones that assign start points to human players. Obstacles: • Can't add a drop-down menu for this to the Custom Game screen; if it's done in-game, it will have to happen after game start. For multiplayer, it's not clear who should enter the points; and they'd have to be explicitly synchronized. • I've tried an XML file, but that doesn't work well for multiplayer – not clear to the players if they should all use the same XML file, or if XML data of the host will be synchronized with the others. I'd rather avoid using XML for custom game settings. Caveat: Code added in `CvPlayer.cpp` assumes that only AI civs can have Advanced Start when SPaH is enabled.

The new SPaH option takes the spot of No City Razing (NCR) on the Custom Game screen; NCR moves to the bottom.

SPaH can't be used in scenarios because the Base Points box isn't available on the Custom Scenario screen.

See also	[250c](#) changes the default start points on the Custom Game screen, and increases the start turn based on the number of start points.
Tbd.	Not sure if the default start points are appropriate for later-era starts.

SPaH suppresses the difficulty adjustment of AI start points. Civs receive no free wins against Barbarians and no free initial production when SPaH or [R&F](#) is enabled.	On Prince difficulty and lower all civs are guaranteed to win their first combat against a Barbarian unit (regardless of Advanced Start). On all difficulty settings, the AI receives some free production (akin to a chopped Forest) in its capital.

Rationale	When playing with SPaH, any free initial items and any AI head start in terms of initial items should be covered by the start points configured for the AI. The free win is also a kind of free item. More importantly, advanced players might want to combine a medium difficulty setting like Prince with a big AI head start (or with the R&F option), and those players might find the free win cheesy.
See also	[250c](#) disables free AI tech from difficulty setting when using (any) Advanced Start option.

(Just restating what's already described in the SPaH [chapter](#))	
SPaH gives the human civs normal starts with e.g. a Settler and Warrior/ Scout in the Ancient era, and Advanced Starts to the AI. If less than 10000 start points are entered, all AI civs get the same number of points (flat distribution). Otherwise, if a 5- or 6-digit number is entered, the AI civs receive unequal amounts of points. The first 4 digits determine the max number of points. This is assigned to the AI civ in the bottommost slot. The last two digits are interpreted as a percentage of the max. The resulting min number is for the AI civ in the topmost slot. The others receive values in between min and max, linearly distributed and slightly randomized.	There is no SPaH option; all civs, human and AI, receive the same number of start points.
The AI start points can be reviewed on the Settings tab of the Victory Screen.	
Tbd.	The unequal distribution is linear between max and min, but also based on pairs that tend to have similar point values. Originally, this was supposed to make the assignment of start plots easier. The human civ and the bottommost AI civ were placed first, and the other civs were evenly distributed in between. This doesn't generalize well for multiplayer, so I've abandoned it. Given the current start-plot assignment algorithm, it would be conceptually simpler to use a linear distribution without pairs.
Config	The randomization of start points is configurable in `GlobalDefines_advc.xml`.
SPaH is factored into the game-end score. More specifically, the difficulty factor, normally between 0 and 90 (see 250a), is increased based on the start point distribution. For example, a Noble game has normally a difficulty of 30; with 1000 start points for every AI civ, that difficulty is increased by 20, which results in the same score as a Monarch game without SPaH.	Game-end score doesn't account for Advanced Start.
Rationale	The end-score function has numerous issues, but I think players still care about it a little bit as a rough indicator of how well they did. So, the formula doesn't have to be perfect, but, if start points work as a handicap, they should be accounted for somehow.
	I haven't thought about scoring in multiplayer games – not important enough to worry about.
250c	Changes to (regular) Advanced Start
AdvCiv	*BtS*

No impact of difficulty setting on the human start points.	Extra start points for human civs on low difficulty settings (150% on Settler), reduced start points on high difficulty (75% on Deity).
AI start point bonuses increased to Prince 125% Monarch 145% Emperor 175% Immortal 210% Deity 270% (and they're actually applied).	Set to 110% 120% 135% 150% 170% but aren't applied because of a bug.
Rationale	Want to reduce the number of modifiers that affect start points. Instead of giving human civs fewer points on higher difficulty settings and AI civs more, I'm giving the AI civs a lot more. This is also to account for the free AI tech that is no longer granted in Advanced Start (see below). The higher amount of start points for human civs on Prince and above is countered by an increased point cost for units, buildings and cities (see below).
No free initial items in Advanced Start except for the technologies of previous eras when starting in the Classical era or later and civ-specific tech when starting in the Ancient era.	No free units, but free technologies from the difficulty setting are granted in addition to start points.
Rationale	Shouldn't treat free (AI) tech differently than free units. Obviously, free tech from earlier eras needs to be granted, so my solution isn't entirely consistent either.
Charge 1.5 start points per production (units, buildings, cities).	The ratio is 1 for 1. 1 Food (population) costs 1.5 start points though.
1.5 start points per 1 culture.	1 culture costs 2.5 start points.
Revealing a tile costs 1 start point plus 1 per every 25 revealed tiles. Advanced Start normally reveals at least 50 tiles upfront. Although AdvCiv doesn't count these fully, the cost normally starts at 2.	2 * (100 + 3 * number of revealed tiles) / 100 rounded down, i.e. 5 initially.
Can't reveal Ocean tiles that aren't adjacent to Coast.	Can reveal any tile that isn't adjacent to a previously revealed tile (no change).
Start point cost for routes and improvements reduced to 67%.	E.g. a Mine costs 24 start points, a Farm 30.
Techs cost 1 start point per research point (no change).	

Rationale	Units seemed extremely cheap compared with tech. It's not that dangerous because units can only be placed in cities, and each city has a limit of two military units; still, makes lots of Workers and Settlers a too obvious choice. 1 start point essentially corresponds to 1 gold, so 1.5 per 1 production is still a bargain. Should perhaps be 2 for 1 – not sure if there's a good reason to make techs relatively unattractive during Advanced Start. Similarly, 1 revealed tile per 2 start points is still pretty expensive; seems better to buy Settlers and found later than to pay some 50 points extra for revealing the surroundings of a potential city site.
	A Mine for 24 is too expensive when a Worker costs 60. Now Workers are at 90 and Mines at 16.
	With cheaper visibility, it could make sense to reveal a diagonal across the entire map under the BtS rules. That would spoil all the surprises, so I'm prohibiting the oceans from being revealed.
	2 culture per 3 start points is still expensive – except for the first border pop, which I don't want to turn into a complete no-brainer.
Config	Costs for culture, revealed tiles and Worker builds are set in `GlobalDefines_advc.xml`.

Start points shown on the Custom Game screen are only auto-adjusted to match the start era. All start point costs are reduced based on game speed.	Shown points are adjusted to game era, game speed (silently) and world size. The impact of world size is minor; the multiplier is between 80% and 120%.

Rationale	A large world isn't necessarily less crowded than a small one. The BtS auto-adjustment is generally problematic because it overwrites any start point value that the player may have already entered. Also gets in the way of 250b – don't want the player handicap to increase with the world size.
	The silent game speed adjustment can be a bit confusing – the player ends up with a start point budget that differs from the value shown on the Custom Game screen. I think it's a bit more elegant to change the costs instead. Makes no functional difference (apart from rounding).

Dawn-of-Man Screen always shown. The "since time immemorial" text and initial techs are only shown when starting in the Ancient era. While in Advanced Start, scoreboard help text shows the player's leader.	Dawn-of-Man only shown for normal start, i.e. non-Advanced in the Ancient era. While in Advanced Start, players can only infer their leader from the text color or by using keyboard shortcuts to access Advisor Screens or Civ Description (Alt+D).

Rationale	Players need to know their civ and leader upfront, especially if it was set to Random on the Custom Game screen.
	The initial techs are meaningless when starting in a later era.

The start turn is based on the number of start points, more specifically, the maximum and the mean of the start point distribution. Only applies when starting in the Ancient era (and only when the average of mean and maximum is greater than 500). Example: If everyone receives 750 points (max=mean=750) on Normal speed, Emperor difficulty, then the start turn is 20, i.e. 1880 B.C.	The start turn only depends on the start era.

Rationale	Should match the historical time line better, and, in the case of SPaH, gives the impression that some of the AI civs have been on the map since 4000 BC, whereas the human civs are late arrivals.
Config	`INCREASE_START_TURN` in `GlobalDefines_advc`

No free food when population is added to a city through Advanced Start.	Whenever the population of a city is increased in Advanced Start, half of the city's food store gets filled. 0 food in newly placed cities.
Rationale	Perhaps the free food was supposed to make Granary useful in Advanced Start? But then the cost for increasing population should also be based on the present food store (and it isn't). Anyway, the rule is too obscure; no one expects free food when adding population. If adding population isn't powerful enough, one could always adjust `ADVANCED_START_POPULATION_COST`, but 1.5 points per 1 food seems fine now that 1 production also costs 1.5 points.
Credits	DarkLunaPhantom (Git commit)

The Imperialistic trait reduces the point cost for placing cities except for the first city.	The Imperialistic trait reduces the point cost for Settlers, but not for cities. Civs are forced to place at least one city before they can buy Settlers.
	When not in Advanced Start, the Imperialistic trait only increases the production invested in Settlers, not food. Thus, the production bonus is closer to 25% in the early game than to 50%.
Rationale	Inconsistent to apply the bonus to Settlers and not to cities. No bonus for the first city because, in non-Advanced Start games, Imperialistic leaders don't get an advantage from the initial Settler either.
	I'm OK with the 50% bonus (rather than e.g. 25%) because Imperialistic is a fairly weak trait, and, at some point, I intend to change its ability and the Expansive trait bonus to Workers so that they also apply to invested food.
Credits	DarkLunaPhantom (Git commit); I've only added the exception for the first city.

The AI doesn't spend start points on culture in its capital unless it has a lot of points to spend.	The AI expands the borders of every city that it places.
Rationale	The border pop is normally a good investment, but not really needed in the capital (although it's so cheap that this was barely worth changing).
Credits	Afforess (RoM: A New Dawn mod); SourceForge revision: link
Tbd.	Afforess makes some other changes in the Advanced Start AI code. I think these are mostly for dealing with very high numbers of start points, say, more than 10 000. A lot of magic numbers in his code that would probably have to be adjusted to AdvCiv.

250d	AI unit supply and upgrade cost not affected by game era
The AI advantages that are the same for all difficulty settings, namely the discounts on unit supply and upgrade cost, are unaffected by the AI per-era modifier.	The per-era modifier increases most of the AI advantages with each passing era.

Rationale	I wanted to apply the AI supply cost modifier to the gold paid for Pacifism (change 912b). The era progression complicates this. And perhaps AI upgrades also happen a bit too swiftly in the late game on Emperor and above.
	It's also conceptually simpler to have these two AI modifiers apply regardless of difficulty, i.e. also regardless of the per-era modifier (which does depend on difficulty). Look at them as an acknowledgement that the AI needs to have far more units than a human player in order to guard its cities.

250e	Fewer free AI Scouts
On Emperor difficulty, the AI starts with 1 free Scout, 2 Archers and 10 overflow production.	Same, but 2 Scouts.
Rationale	To make Scouts more attractive for human civs; especially the initial Scout from Hunting. One Scout and one Archer (and possibly soon one Warrior if the AI uses its free production for that) is still plenty, but should leave some goody huts to humans that start with a Scout.
	Also note that, on Monarch, most AI civs don't start with Hunting and thus get 0 free Scouts. 0 to 2 is quite a jump when going from Monarch to Emperor.
See also	The table in the chapter about the SPaH option lists the AI freebies for each difficulty setting.

251	Start turn and AI tech costs based on difficulty
AdvCiv	BtS
AI tech costs are reduced on the lowest four difficulty settings, and increased on the highest three. I've adjusted the human tech cost modifiers for these seven difficulty settings so that the ratio between human and AI tech costs remains approximately as in BtS.	AI tech costs are not affected by difficulty. Human tech costs are reduced to 60 (Settler) to 90% (Warlord) on difficulties below Noble, and increased to 110 (Prince) to 130% (Deity) on difficulties above Noble.
Rationale	The overall progress had been too fast on difficulties above Monarch and too slow on difficulties below Prince. It's an aesthetic issue (AI tech matching game date), but also a matter of pace: How much time there is for warfare until another tech is discovered. I don't think, say, Warlord and Immortal should have fundamentally different pace (that's what the game speed setting is for).
	karadoc seems to have thought so too; in K-Mod 1.45, he tied inflation to the global technological progress. I don't like this solution; see the discussion here.
	Civ 4 Reimagined appears to do something similar to my change ("tech costs for all players scale with handicap setting;" Bitbucket link). And Caveman to Cosmos also (SourceForge link; 12th bullet from the top).
Config	`Civ4HandicapInfos.xml`. To undo the change, one can set (for each difficulty) `AIResearchPercent` to 100 there, and reset `ResearchPercent` to the respective original value.
Tbd.	Perhaps `AIPerEraModifier` should apply to `AIResearchPercent`; then AI research would become faster as the game progresses. Already the case for AI expenses for civics and units, so maybe that's enough (as far as commerce is concerned); I worry that the total effect of the progressive bonuses would become too noticeable. If I do make this change, higher `AIResearchPercent` values should be set, so that the overall AI research speed stays the same.

	Even without AI research getting faster with each era, the Deity AI gets ahead of the historical time line by the Industrial era. I think a further increase of tech costs (already 150% for the human player and 125& for the AI) would make buildings and units too cheap in comparison. Would have to change the mapping from turn number to year instead. Won't do that because I don't care that much about Deity; with a few more (fundamental) balance changes, Immortal should become hard enough for everyone. On a related note about the per-era modifiers: It's not ideal that the bonuses are triggered (entirely) by the tech era of the AI civ that receives the bonus; it means that the AI civ that is first to reach a new era is also the first to benefit from the bonus. Could be the main reason why some AI civs get so far ahead of others technologically in Deity games. Using the game era would also be problematic because of possible human manipulation, and any average would be distorted by vassals/ small civs. Just base it on the game turn? `AITrainPercent` should get the same treatment as `AIResearchPercent` in order to reduce overcrowding of the map in high-difficulty games.
See also	910 adjusts the per-era tech modifiers (which apply to everyone, not just the AI).
The start turn is advanced by 10 (on Normal speed) for every free Worker or Settler (beyond the first) that the AI receives. This only applies when playing without Advanced Start (about the start turn in Advanced Start, see 250c).	The start turn is only affected by start era, not by difficulty.
Config	`INCREASE_START_TURN` in `GlobalDefines_advc`

300 et sq.	Overhaul of Barbarians; see chapter Better Barbarians. I've structured the changes a bit through sub-ids, but I doubt they could all be merged separately.
Config	A few parameters in `GlobalDefines_advc.xml`
300	The fundamentals: gradually increasing activity, ships placed per shelf, food yields matter, fogbusting nerf, game speed scaling, city placement bugfix, New World Barbarians, no cooperation between Barbarian cities, misc. AI improvements vs. Barbarians
AdvCiv	*BtS* (K-Mod hardly changes Barbarians)
Barbarian activity reaches its peak when 67% a continent are owned by civs (or Barbarian cities). The difficulty setting determines on which turn Barbarians first appear. Quite early on high difficulty settings, e.g. turn 15 on Immortal. They initially appear only in small numbers though, and don't immediately attack cities.	Barbarian activity peaks shortly after they first appear, typically around turn 50. Barbarians can't appear until there are 1.5 cities per civ. Thus, the early start turns set for high difficulty settings through XML have practically no effect.
Rationale	Since Barbarians start slowly, the 1.5-cities rules isn't needed anymore.
Barbarian ships are created for each continental shelf, i.e. the ring of coastal tiles surrounding each land mass (or enclosed in the case of inland seas).	Barbarian ships are created for each water body; usually, there is only one large water body.
Rationale	To prevent neglected shores on one continent from affecting Barbarian activity on the shores of another continent, and to prevent Barbarian ships from piling up near remote islands (as they sometimes do in BtS).

Rationale	 Update (v0.94): Not crucial to know because even Raging Barbarians start appearing gradually. And after the turn on which Barbarians could theoretically first appear (based on the difficulty setting), it may take another 10 or 20 turns until a unit actually enters visibility, so the turn number can be misleading.
When computing the target number of Barbarian land units and cities per continent, tiles with 0 food yield are disregarded. Coastal water tiles count half.	All land tiles count equally, and water tiles count only for sea units.
Barbarian units can't appear on tiles with 0 food yield. On tiles with a yield sum of 1, in particular Jungle and Tundra, Barbarians are less likely to appear than on tiles with higher yields. I'm computing the yield sum twice, once including and once excluding features, and take the minimum. This way, all Tundra except Tundra Hill Forest and River Tundra gets fewer Barbarians.	Yields have no impact on Barbarian unit placement.
Civ units only prevent Barbarians from appearing on visible tiles.	Barbarians can't appear in a 5x5-tile square surrounding each civ unit ("fogbusting" range). Visibility practically doesn't matter.
Animals only appear on tiles with a positive food yield or freshwater.	A passable tile not visible to any civ is chosen at random, then an animal suitable for that tile's terrain is chosen.
Rationale	Want Barbarians to work as a corrective for starting positions that have much room for expansion. To this end, fogbusting needs to be nerfed, and decent tiles need to be distinguished from bad tiles. It's also rather implausible that large numbers of Barbarians would appear in the polar region or desert. The early civilizations were frequently raided by pastoralists from marginal (but not desertic) lands, which is why I'm not distinguishing between e.g. Plains, Grassland and Flood Plains. Animals: A problem in Earth scenarios; the Sahara gets filled up with Lions. One could look at this as a representation of the harsh conditions there, making the desert difficult to explore, but, ultimately, the lion-filled Sahara looks too silly, and the Sahara lions prevent animals from spawning elsewhere.
Barbarian creation rate adjusted to game speed. The target number of Barbarians per continent (upper bound) remains independent of game speed. Barbarians start appearing roughly in the same year for all speed settings.	Creation rate and target number are independent of game speed. Barbarians start appearing later on slower settings.

Rationale	On Epic and Marathon, it takes civs longer to train units, but Barbarians are (re-)placed just as quickly as on Normal and Quick. The original developers may have intended to even this out through a later start year. This doesn't work well – BtS Barbarians are a lot harder to deal with on Marathon than on Normal speed, and I don't see why they should be.
	The creation rate does not take into account how densely or sparsely the civs are placed. It's plausible that more Barbarians appear when there is room for them, and I want to allow players to create games with extra tough Barbarians by placing civs far apart.
The creation rate of Barbarian cities increases slightly with the game era.	Static creation rate configured in XML.
No Barbarian units are created on continents without civ cities (nor in the surrounding waters), but Barbarian cities appear earlier on such continents and more densely than in BtS. If a continent (or shelf) becomes very densely populated with Barbarian units, the game starts culling them. The greater the density, the higher the per-turn probability of removing a unit. The Barbarian AI never disbands units for financial reasons, and Barbarians are immune to strikes.	Plenty of Barbarian units are created on continents without cities because these continents have 100% unowned tiles. While Barbarian units are created independently for each continent, cities are placed globally, and the game prefers to place them on continents with civ cities. The game might eventually remove Barbarian units through strike, and the Barbarian AI can disband units. Not sure how frequently that happens; perhaps not at all.
Rationale	Want terrae incognitae to look more like in Colonization, i.e. with lots of Barbarian cities, but not so many units. The cities actually produce too many units, hence the scrapping mechanism; it's also a general safeguard against implausibly large Barbarian stacks. Could interpret the removed units as a result of Barbarian infighting.
	Disbanding based on finances isn't good because it may leave high concentrations in some areas, and because Barbarians aren't supposed to have an overarching economy.
Tbd.	Barbarians can currently be removed from tiles visible to a player, which is a bit jarring. Should show a message then, e.g. "A Barbarian Galley has been destroyed as a result of infighting." Can't simply exclude visible tiles from removal: In one game, for example, Barbarian Galleys kept spawning around an uninhabited continent and moved from there to an inhabited continent. In such a case, naval stacks of arbitrary size can form on visible tiles.
	Or simply program the Barbarian AI not to move into overcrowded non-city tiles.
Barbarian units are never upgraded.	Upgrades are possible using commerce from Barbarian cities, but seem to happen rarely because resource requirements are checked when upgrading; cf.
Rationale	Don't want a Barbarian economy. Outdated units are still killed eventually, either in combat or removed by the scrapping mechanism above. A mixed bunch of Barbarian units is more flavorful than a uniformly upgraded army; I imagine that Barbarians acquire sophisticated weapons from the civs (through trade), but also continue making their traditional weapons.
	It can happen that civs keep trained and spawned Barbarians on a continent in check, thus preventing scrapping, but don't attack (all) the Barbarian cities. Then, early-game garrisons will remain unupgraded indefinitely, which starts looking weird once the Barbarians reach Gunpowder. Too rare to worry about.

Fixed two BtS bugs that lead to Barbarian cities being placed either in completely arbitrary locations (like a snow island without seafood), or in ideal locations (as far as the AI is able to figure those out).	
See also	[Thread](#) on CFC
The aggressiveness of Barbarian units escalates independently for each continent based on the number of local civ cities. Barbarians avoid approaching civ cities on continents with more Barbarian cities than civ cities, even when playing with Raging Barbarians (RB).	There are essentially three levels of Barbarian aggressiveness: Initially, Barbarians avoid civ cities, then they attack them opportunistically, and eventually they seek cities out. This escalation is based on the *total* number of civ cities, and affects all continents alike. With RB, the Barbarians usually seek out cities right away. Without RB, only the number of civ cities is decisive, not the ratio of civ cities to Barbarian cities.
Rationale	To remove implausible repercussions of civ development on one continent for the Barbarian behavior on another continent. New World Barbarians shouldn't immediately attack colonies. Now only turn aggressive when half the continent is colonized.
Barbarian Workers don't connect cities with roads, chop fewer Forests and prioritize production.	Barbarian Workers build road networks between Barbarian cities and builds lots of Cottages.
Rationale	A road network makes it look like a Barbarian empire, but it's supposed to look like independent cities. Cottages are nice for pillaging, but don't make much sense for the Barbarians. Chopping: Don't want players to discover a deforested New World.
See also	DarkLunaPhantom has made a similar change (Git commit [1](#), [2](#), [3](#)); haven't merged it because I still want Barbarians to build *some* Cottages.
Tbd.	Barbarian Workers still tend to gather in a single city once all tiles are improved.
If RB is enabled, AI civs assign fewer units to guard cities unless threatened militarily by another civ. New AI routine for guarding high-yield improvements against Barbarians.	The AI defends its cities against Raging Barbarians, but doesn't defend crucial improvements. Often allows Barbarians to move onto Mines or onto improvements across a river, negating the 25% combat bonus that the AI gets against Barbarians on all difficulty levels.
Rationale	Also frees up units for guarding future city sites, which is similar enough to human fogbusting.
Tbd.	Doesn't help much. Early on, when it matters most, the AI still needs most of its defenders to protect its cities, and doesn't reliably indentify the most precarious improvements. Would be better to move from the city onto a threatened improvement only when a Barbarian unit approaches. Need to be careful not to expose AI cities to Barbarian or human attacks though.
See also	[315](#) gives Scouts a defensive bonus against Barbarians and allows them to guard city sites.

The AI only guards proper city sites, i.e. tiles that it is presently willing to settle.	Willing to guard any tile with a positive found value. Found values are 0 near tiles that the AI currently wants to settle, so the guarded tiles are either proper city sites or sites in an area not currently worth settling (too remote or too marginal).
Rationale	Don't want the AI to guard remote city sites because this rarely helps the AI civ and may help other civs (by keeping away Barbarians).
AI may guard a tile adjcacent to a proper city site if that tile has a higher defensive bonus or visibility.	Only city sites can be guarded.
Rationale	The main point of guarding city sites is fogbusting; should prefer hills and forest/jungle for that. Also avoids telegraphing to humans where exactly the AI is going to settle.
AI civs are more willing to target Barbarian cities on other landmasses when there is nothing else to do or when it doesn't take much effort.	AI civs hardly ever conquer Barbarian cities on landmasses where they don't have their capital.
Tbd.	The AI still attacks Barbarian cities too rarely, even on the same landmass. Just doesn't have enough city attackers at peacetime. May have to increase the probability of training city attackers based on number and attractiveness of Barbarian cities, perhaps through an AI strategy flag for fighting Barbarians/ Minor civs and/ or by setting the per-Area target city to a non-civ city (currently happens rarely, if ever).
	And the AI needs to be more reluctant to attack remote Barbarian cities.
	For Barbarian cities on other landmasses, code for preparing and executing small-scale naval landings is needed. Warfare between civs on maps like Archipelago could also benefit from this.
AdvCiv	*K-Mod/BtS*
Barbarians raze cities based on the difference between the city owner's era (1 for Ancient, 2 Classical ...) and the city's population. The difference is multiplied with `RazeCityProb` =10%, the base probability for Barbarian razing. I.e., Barbarians only raze Ancient and Classical cities when they have to (size < 2), and can raze size-2 in the Medieval era and up to size-3 in Renaissance. I'm capping the era number at Renaissance.	In K-Mod, the 10% probability applies regardless of population, but closeness to other Barbarian cities can reduce the probability. BtS used the same procedure for Barbarians as for AI civs, just with 10% increased probability. There were some fairness clauses to prevent razing in the early game.
Rationale	Closeness shouldn't matter; different Barbarian cities aren't supposed to cooperate. Want razing only for flavor reasons; balance-wise, losing a city to Barbarians temporarily is already big setback.
Config	`RazeCityProb` is in `Civ4LeaderHeadInfos.xml`.
301	Early Spearman fix, no spawning of units older than the previous era

The game creates Barbarian units with resource requirements only once the Barbarians have the tech that allows that resource to be traded. This only affects Spearman, which now requires Bronze Working.	The tech for building the proper improvement suffices, i.e. Mining for Spearman.
Moreover, Barbarian units requiring a resource can only appear on continents where at least one civ has access to that resource (or where a Barbarian city has access to it).	The same Barbarian units appear on all continents, and the game only checks if the Barbarians could work the necessary resources, not if they're actually available anywhere.

Rationale	Early Barbarian Spearmen were probably not intended by the BtS developers. The Bronze Working requirement should make Chariots more useful against Raging Barbarians.
	Barbarian access to resources that don't exist on a continent is highly implausible. It's also a game balance problem when starting in the Classial or Medieval era. In BtS, the Barbarians then immediately get horse, bronze and iron units while it usually takes the AI civs some 50 turns to hook up a military resource.

The game only creates Barbarian units from the Barbarians' current tech era or the previous era, i.e. no Warriors and Archers in the Medieval era. Spearman is treated as a Classical-era unit because of its resource requirement.	The unit to be created is chosen uniformly at random from among the allowed units, including those from all earlier eras. Obsoletion isn't checked.

Rationale	Ancient Barbarian units become a pointless distraction at some point.

302	Tech diffusion only from civs sharing an area with Barbarians

Barbarians get research only from civs they share a landmass with. The specific conditions (for a shared landmass) change as the game progresses. For the first 100 turns, any Barbarian land unit on a landmass with a civ city suffices (or a ship on the surrounding coast), later on, a single Barbarian city isn't necessarily enough. See `CvTeam.cpp` for details. The intention is that research of New World Barbarians stops once they're driven out of the Old World.	Barbarians receive research based on the ratio of civs alive that have a given tech to the total number of civs alive.
Update (v0.93): Barbarian research is now only slowed down when they don't share a landmass with a civ. (Because Longbowman is arguably a better representation of American Indians than Archer.)	

Rationale	Want the research of New World Barbarians to stop once they're (nearly) eliminated in the Old World. That way, the New World will usually only have Classical-era Barbarian units, and occasionally Medieval.
See also	300: Barbarian aggressiveness now escalates based only on local cities (not those on other landmasses)
Tbd.	If I really want New World Barbarians to have Longbows, I could give Barbarians more original research capacity (they already have a little, maybe by accident) and give the Barbarian leader a flavor value that matches the flavor of Feudalism.
303	Never build culture, can't build cultural buidings, found value considers only inner ring

Barbarians never build culture. Can only build the following buildings: Barracks, Granary, Lighthouse, Walls, Forge, Stable, Aqueduct, Colosseum and Bunker.	Can build all mundane buildings except: religious and research buildings, Theater, Security Bureau, Int. Agency and Broadcast Tower. Can expand its borders through Monument (or Castle); not sure how often they actually do that. The K-Mod Barbarians immediately expand their borders by building culture if they have the Music tech.
Rationale	Want each Barbarian city to appear as an independent entity. If they expand their borders as in K-Mod, the borders can easily touch, and then Barbarian cities appear like a unified empire. Aqueduct, Colosseum: Want Barbarians to occasionally have populous cities (think Tenochtitlan); for that they need all the health and happiness they can get.
See also	Important for the New World because change 300 places Barbarian cities more densely on uninhabited continents. 300 also prevents Barbarians from building a road network.
Config	Buildings are disabled through `Civ4CivilizationInfos.xml`.
Only the inner ring is taken into account when placing Barbarian cities. And some minor adjustments to the computation of Barbarian found values.	All 21 tiles in the city radius are considered. K-Mod: There is already some special code for Barbarian found values.
Rationale	Since Barbarian borders never expand, it doesn't make sense to consider the outer ring. I also like that this makes Barbarian city sites distinct from normal city sites, and a bit weaker overall.
See also	[300](#) fixes Barbarian city placement bugs.
304	`synchRandPlot` rewritten
`CvMap::syncRandPlot` is guaranteed to return a plot when there is at least one plot satisfying the selection criteria. Exception: For the placement of Barbarians, the function probabilistically fails to find a plot when fewer than four plots are eligible.	Picks plots at random until it finds one that satisfies the criteria, or gives up after 100 trials.
Rationale	Don't want to place a Barbarian unit on every turn (or every other turn) in the same plot, so a probabilistic failure to return a plot is good. However, the probability for failure is too high in BtS and shouldn't depend on the map dimensions.
Barbarian cities are slightly less likely to occur on landmasses where Barbarian cities were destroyed previously.	Barbarian cities can appear again and again on landmasses that civs don't want to settle.
Tbd.	A similar mechanism could rein in XP farming (cf. [312](#)); e.g. keep a (decaying) count of the number of Barbarians created and destroyed per tile, and base the per-tile spawn probability and overall creation rate on these counts. Could use AI `strengthMemory` for this (currently unused for the Barbarian player). Could then also remove the special treatment of Barbarian spawn locations in `synchRandPlot`.
305	Barbarian Work Boats

Barbarian cities can build Work Boats, and tend to build them early, i.e. after producing 1 or 2 military units. Build Workers a bit later than in BtS, especially in coastal cities.	Can't build Work Boats. Usually build Worker after 15 turns.

Rationale	To allow Barbarian cities to grow more population. The original developers had perhaps been worried that Work Boats would distract Barbarian cities too much from building military units. To make up for that distraction, I have Barbarian cities build Workers later.

306	Units spawned on Galleys, Barbarian naval AI

See also	The [Mongoose SDK](#) PirateMod works similarly, but hasn't been merged; I only learned about this mod component after implementing my own changes.

Barbarian land units can be placed aboard ships in the fog of far. If there is no such ship, the land units are placed on land tiles instead; the total number of Barbarians placed is the same either way. Barbarian ships with cargo target a nearby city with a naval assault, though the units can also be dropped along the way to the target. Once unloaded, the ships switch back from assault mode to "attack" mode, which works as in BtS: Harass a city for a while, then move on and patrol. Ships on patrol seek out unobserved tiles where they can receive new cargo.	Barbarian land units can only be placed on land tiles, and their AI does not allow them to enter cargo units. Created cargo units only harass cities and patrol. Units produced in Barbarian cities, however, can undertake naval assaults, which is why naval assaults do happen in BtS, but very rarely.

Rationale	Should make Barbarian sea units more interesting and harder to ignore; allows them to interact with civs that don't have worked sea tiles.
Tbd.	When a Barbarian ship has been on the map for a long period of time, say, 20 turns, it should stop patrolling and just blockade a city; can get annoying if a player just can't build a ship for lack of a coastal city.
See also	[102](#) makes AI units on patrol more likely to move in a consistent direction.

Damaged Barbarian units gradually heal by resting for a turn from time to time (probabilistically).	Apart from hitpoints received from a received promotion, Barbarian units heal only in cities or when they can heal fully in one turn. Near civ cities, badly damaged Barbarian units never attempt to heal. If they're too weak to make an attack, they may patrol indefinitely.

Rationale	If the civs fail to finish a Barbarian unit off, it should eventually do the smart thing and heal.

307	Post-Medieval Barbarians

Barbarian units can be created by the game in all eras. Barbarians can receive and train Musketman, ~~Cavalry, Anti-Tank and SAM Infantry~~. Cannot train Rifleman, Grenadier, Paratrooper, Frigate. As of **v0.94**, Musketman is the only post-Medieval unit that Barbarians can receive or train.	Can only receive and train Warrior, Archer, Spearman, Axeman, Swordsman, Horse Archer, Longbow, Maceman, Galley. No Barbarian units created by the game in Renaissance and beyond. Can train Rifleman, Grenadier and Frigate.
Barbarians can't receive cities in Renaissance and beyond.	Barbarian cities still appear in the Industrial era.
Starting from Renaissance, Barbarian research ignores tech prerequisites. The Raging Barbarians option creates more Barbarian units in later eras: the tiles-per-unit divisor is reduced to 60% in the Ancient era, 52.5% in Classical, 45% in Medieval, 37.5% in Renaissance, 30% in Industrial, 22.5% in Modern and 15% in Future (relative to the divisor without RB).	In BtS, Barbarian research always ignores tech prereqs, i.e. Barbarians can research e.g. Pottery and the Wheel simultaneously. K-Mod has changed this, so that Barbarians only make progress on techs that they could research if they were a civ. RB reduces the divisor to 50% in all eras.

Rationale	Gunpowder units mostly for Terra and similar maps – on normal maps, there is typically no land left for post-Medieval Barbarians to appear on. Therefore the reduced divisor for later eras with RB; so that RB players get to see the occasional post-Medieval Barbarian.
	Muskets are supposed to represent natives that have acquired firearms (through trade or as spoils). Until v0.94, Barbarian Cavalry and (as a fairly ineffective type of infantry) Anti-Tank and SAM were also allowed. I'm reverting this because Cavalry practically never appears (requires a local Horse resource to train), and because advanced weapons like bazookas and MANPADS are jarring in the hands of the Barbarians. Would have to create custom units for the Barbarians to represent adequately e.g. mounted post-Columbian Amerindians or Daesh insurgents.
	Don't want Barbarians with firearms to be on par with properly trained armies, hence no Rifle, Grenadier and Frigate.
	No Pikeman: Two Medieval Barbarian units (Longbow, Mace) are enough, and I want mounted units to be effective against Barbarians, especially Cuirs/ Conquistadores.
	Barbarian research ignoring tech prereqs allows Barbarians to catch up quickly once colonies are founded. By the time New World Barbarians turn aggressive, they'll typically have Muskets. Interestingly, Chronis seems to have had the same idea years before me (though I haven't checked if he implemented it in the same way).
	No Barbarian cities past Renaissance: Seems more realistic, and enough cities are created in the New World during the early eras.
See also	302 stops Barbarian research if they stop sharing a continent with any civ. 301 lets Barbarians only build units that some civ on the same continent can build. dlph.6 disables Barbarian Spies.

Marines (or is it Infantry?) as free defensive units in Modern-era starts.	Machine Gun as free defensive unit.
Rationale	Can't use Machine Guns to prevent Barbarians from pillaging.
308	Tech speed increased when playing with Raging Barbarians

Increased research speed modifier for all civs in games with RB in the Classical in Medieval era.	
Rationale	RB forces the civs to dedicate resources into fighting Barbarians, and as a result, global research tends to lag behind the historical time line.

309	No Animals option, patrolling animals prefer their native terrain/features	
"No Animals" option added; disabled by default (i.e. animals do appear by default). "No Espionage" option removed. "No Barbarians" implies "No Animals". NB: Without animals, Barbarians tend to appear a bit quicker.		Can't disable just animals, only all Barbarians. "No Espionage" was added with patch 3.17; converts espionage points to culture. (The game counts animals as Barbarians when deciding how many Barbarians to create on a given turn. Therefore, the presence of animals slows down the placement of proper Barbarians.)
Rationale	Animals are nice for teaching beginners how combat works, but too silly for some tastes. I guess one can always imagine they're "really" human nomads, say, "lion warriors" instead of lions. Don't want to clutter the Custom Game screen with options. The No Espionage option wasn't properly implemented and can't be recommended in its current state. Players who dislike espionage are arguably better off just ignoring it.	
Config	Can get the option back by setting `bVisible` to 1 for `GAMEOPTION_NO_ESPIONAGE` in `Assets\XML\GameInfo\CIV4GameOptionInfos.xml`.	
Patrolling animals favor their native terrain and features (as defined in `Civ4UnitInfo.xml`). They still enter other tiles, but with a smaller probability.		Animals spawn only on their native terrain and features, but move indiscriminately.
Rationale	Flavor	
Credits	Idea from [Mongoose SDK] AnimalMod	
Animals aren't removed from landmasses without civ cities (unless the landmass gets too crowded with units; change 300).		Once the game stops creating animals, it removes one animal per turn from each landmass.
Rationale	Buffalo flavor for the New World. Once colonized, the animals will start disappearing.	
310	Great Wall reworked, balance changes to Great Lighthouse and Colossus	
Config	Can be reverted in `CIV4BuildingInfos.xml`.	
The Great Wall (TGW): cost 300, req. Archery, 2 Walls (1 on Duel and Tiny world size, 3 on Huge), obs. with Corporation, 2 Great Merchant points, abilities based on game settings: i. +1 trade route in cities on the same continent except when playing with RB. This ability is based on a "global trade routes" ability that was already in the game but unused. Now restricted to cities on the same continent. ii. Prevents Barbarians from entering your		Cost 150, Masonry, no prereq. buildings, no obsoletion, 2 Great Spy points, abilities (ii) and (iii) regardless of settings.

borders on this continent (no change) except when playing with No Barbarians. iii. +100% emergence of Great Generals within owner's borders (no change) if playing with RB or No Barbarians. I.e. TGW doesn't have this ability anymore under normal settings.	
Can be built on Classical and earlier starts.	Can be built on Ancient and earlier starts.

Rationale	A strangely cheap wonder in BtS considering that it represents (arguably) the most massive building on Earth. Can be costlier now that Barbarian activity peaks later (and OK to allow it with Classical era start). Removing the GG ability under normal settings keeps the rules complexity in check (wouldn't be a problem wrt. game balance).
	Trade route flavor: One purpose of the Chinese Great Wall was to protect traders. Some segments protected a portion of the Silk Road. Similar to Castles providing an extra trade route. GM points go along with this, but the goal is also to further sideline the awful espionage system.
	A nice side-effect of the Wall prereq. is that Protective leaders get an implicit discount on TGW. Also makes sure that TGW can't be built before founding a second city – players should analyze whether they're exposed to Barbarian attacks before deciding to build TGW.
	The Archery req. is to make Archery a bit better, and to make Masonry less cluttered visually; TGW still requires Masonry for the prereq. Walls. I believe this makes some sense historically as well – walls (with protruding towers) are much more useful with effective projectiles. (But this doesn't explain why ordinary Walls don't require Archery.)
See also	Without [140], which changes the formulas for the number of prerequisite buildings, only 1 Wall would be required on Standard-size maps.

The Great Lighthouse (GLH): cost 250; obs. with Astronomy	cost 200 in BtS, 300 in K-Mod; obs. with Corporation
Rationale	Too powerful in BtS, at least compared with most other wonders. And I don't like that this ancient wonder becomes most effective in renaissance (with Astronomy). I meant to nerf this later on (along with other balance changes), but with TGW obsolete at Corporation, GLH obsoletion needs to be moved right away.

The Colossus: cost 250 (as in K-Mod); obs. with Chemistry.	cost 150 in BtS, 250 in K-Mod; obs. with Astronomy.
Rationale	Don't want both Colossus and GLH obsolete at Astronomy. The K-Mod cost increase seems reasonable; it's an extraordinarily cheap wonder in BtS.
Tbd.	Perhaps Forge should be nerfed instead – if Forges weren't spammed everywhere, Colossus wouldn't be such a small investment.

311	Number of units from uprising events reduced (now independent of world size)
Tbd.	These events could use additional checks and balances.

312	XP from Barbarians counts half for Great General
XP from combat against Barbarians counts 50%, rounded down, toward Great Generals (GG). Rounding down means that 1 XP (i.e. after combat with very one-sided odds or withdrawal)	XP from Barbarian combat never counts for GG.

doesn't count at all toward GG. Units that already have 10 XP can't gain further XP from Barbarians (no change), and thus can't contribute to a GG either.	
XP multiplier for attacking Barbarians reduced to 3; no change when defending against Barbarians. Thus, can't hope to gain more than 1 XP (0 GG points) by fighting a Barbarian unit at odds above 90%.	XP multipliers are 4 when attacking and 2 when defending. Can expect to gain 2 XP from attacking a Barbarian unit even at 95% odds.
Upper limit for XP gain per combat set to 6. Consequently, can gain at most 3 GG points per Barbarian combat.	Can gain up to 10 XP from a single attack.

Rationale	It's not plausible that wars against Barbarians should produce no GG. Ancient China had plenty of GG that only fought against peoples that Civ would represent as Barbarians. I'd also like to give players a (fighting) chance to get a GG without starting a war.
	The original developers must've been worried about Barbarian XP farming, and for good reason. Having Barbarians respawn in some cul-de-sac isn't difficult. Can be worthwhile to exploit just for getting units to 10 XP; which is why I think some restrictions were needed regardless of GG points.
Tbd.	Farming may still be feasible; is a 15% risk of losing a unit worth 2 XP and 1 GG point? Could be, especially if it's an outdated unit. Cf. *Tbd*. under 304.
	Reduce upper bound for per-combat XP to 5 (2 GG points)?
	Perhaps apply the XP restrictions to all combat; would like to reduce combat XP in general in order to lower the stakes in combat.

313	Difficulty-based combat bonuses vs. Barbarians
Set the Barbarian combat penalty against humans to 5% on Monarch, Emperor and Immortal (and King; see 250a). This is in addition to the 10% penalty for Barbarian Galleys from K-Mod ("Disorganized" promotion). No change to the other difficulty settings and no change to the Barbarian penalties against the AI.	The penalty is 40% on Settler and drops by 10 percentage points with each difficulty level to 10% on Noble. Then 5% on Prince, and 0 on all levels above Prince.
Rationale	Despite the nerf to fogbusting (300), it still seemed best to rely mostly on fogbusting on the higher difficulty settings because fighting Barbarians at tech parity is very costly. This slight change to the combat penalty should make a significant difference because, when units are evenly matched, even a slight change in combat strength tips the combat odds from 50:50 to 60:40 or more.
	I haven't changed Deity because degenerate tactics (such as excessive fogbusting) are normal on that difficulty. Also matches the degression of the animal penalty, which reaches 0 only on Deity (see below).

The combat penalty that animals receive is:					
difficulty	*vs. human*	*vs. AI*	*difficulty*	*vs. human*	*vs. AI*
Settler	-60% (-100%)	-25% (-50%) on all difficulty settings	Settler	-70% (-110%)	-40% (-65%) on all difficulty settings
Chieftain	-45% (-75%)		Chieftain	-60% (-90%)	
Warlord	-30% (-50%)		Warlord	-50% (-70%)	
Noble	-25% (-35%)		Noble	-40% (-50%)	
Prince	-20% (-25%)		Prince	-30% (-35%)	
Monarch	-15% (-20%)		Monarch	-20% (-25%)	
Emperor	-10% (-15%)		Emperor	-10% (-15%)	
Immortal	-5% (-10%)		Immortal	-5% (-10%)	
Deity	0% (0%)		Deity	0% (0%)	
The numbers in parentheses include the penalty for Barbarians, which, as in BtS, also applies to Animals.					
Rationale	The total penalty against AI units and the penalties against humans on the medium difficulty settings seemed needlessly high to me. Losing an exploration unit now and then won't hurt the AI much and could help delay the first contact between far-flung civs.				

314	Tribal villages ("goody huts") revised
See also	[315b](#) makes it easier for Explorers to enter guarded Tribal Villages.
Config	Most of the specific changes to the Tribal Village outcomes are customizable and revertible through `Civ4GoodyInfo.xml`. I haven't added any new tags; instead, I'm e.g. using the Gold and Tech tags together to represent tech progress.

AdvCiv	*Vanilla Civ 4* (no changes in WL/BtS/K-Mod)
All effects of goody huts are adjusted to the game progress. No such adjustment during the first 50 turns, nor after turn 250 (on Normal speed; these turn numbers are speed-adjusted). Most of the adjustments happen through a multiplier that is computed from the current game turn. That multiplier starts at 1 on turn 50 and increases superlinearly (power law) to 10 on turn 250 and then stays 10 for the rest of the game.	The Warrior outcome is blocked until 20 turns have passed (not speed-adjusted), and Barbarians can only appear at a certain distance from cities. Apart from that, only the Tech outcome somewhat scales with the game progress (by granting a tech that can currently be researched).

Rationale	The main goal is to make huts discovered via Caravels or Galleons more rewarding, and thus also give Explorers a better use. And some of the free techs granted in BtS are too powerful in the early game – I guess that's why players commonly play without goody huts. I'm tying the adjustment factor to the game turn rather than e.g. era because I don't want players to wait for an era transition before entering a goody hut. That's also the reason for the flat effects during the first 50 turns. Gold doesn't have any use in the very early game, so players might decide to let a hut "grow" before entering it. The power-law function is supposed to mirror the overall economic growth, which is superlinear. I'm freezing the effects on turn 250 because I don't think that industrial civilizations can gain that much from visiting or raiding Bronze Age (or Chalcolithic) villages. "Times 10" is a nice and simple maximal effect (and one can kind of tell that the maximum is reached when a multiple of 10 gold is payed out).
Config	Start turn, peak turn and maximal multiplier are set in `GlobalDefines_advc.xml`.

The High gold outcome grants between 40 and 100 gold, and the speed adjustment is based on the training cost modifier, i.e. only 200% on Marathon. Other than that, the payout during the first 50 turns is as in BtS. By turn 250, the payout is multiplied by ten (after being multiplied by the training cost modifier).	The Low gold outcome grants between 20 and 60 gold and High gold is between 20 and 120. Low is the more likely outcome on the medium and high difficulty settings (no change); e.g. on Monarch, Low is four times as likely as High. The amount of gold is fully adjusted to game speed, i.e. tripled on Marathon.

Rationale	120 gold is too much early on, but expected values between 40 and 50 are OK I think, considering that gold can't be utilized until city maintenance becomes a factor, whereas e.g. a free Scout worth 15 production (=30 gold?) is immediately useful. Marathon games tend to be played on larger maps with more huts per civ, hence the smaller speed-adjustment factor than in BtS.

During the first 50 turns, goody huts grant 35 to 75 progress toward a tech. The tech is directly discovered only if that progress is enough to cover at least 80% of the (remaining) tech cost. The granted progress is adjusted to the game speed and game turn in the same way as gold (see above). The tech is chosen uniformly at random from all pre-Industrial techs that the civ entering the Village is able to research, including the currently researched tech.	When the Tech outcome is rolled, the hut grants a free tech regardless of that tech's cost. The tech is chosen uniformly at random from among those currently researchable techs that are flagged as `bGoody` in `Civ4TechInfos.xml`. No game speed or progress adjustment, but tech costs increase with the game speed and progress. That said, the only post-Classical `bGoody` techs are Music and Astronomy, so the only way to benefit significantly from huts across the ocean is by reaching them in between Optics and Astronomy, and even then it's a long shot.

Rationale	The expected amount of research is about the same as the expected amount of gold (considering that some research can go to waste when the tech is cheap or already nearly discovered). In the early game, research is going to be more valuable because gold can't be spent immediately; in Renaissance, gold is going to be more valuable because civs can funnel it into a tech of their choice via the research slider. I guess the `bGoody` techs were chosen based on whether a "primitive" civilization could plausibly possess them. I don't think this works for Astronomy, which unlocks Galleon and Observatory, nor for most other post-Ancient techs. Tech progress somewhat gets around this plausibility issue by merely suggesting that the primitives contribute to the discovery, maybe like modern astronomers employing knowledge from ancient Babylonian records. Such contributions strain credibility for techs like Radio, so I've taken the Industrial and Modern techs off limits.

Tbd.	Should perhaps also adjust the outcome to the map size. Tech costs are higher on larger maps (e.g. 100% on Duel, 130% on Standard), and the current payout is going to grant a full tech only rarely on large maps, particularly on high difficulty settings. Then again, one could argue that larger maps have more huts and therefore each hut should provide less research than on smaller maps, if anything. Might also want to adjust to game era; see [910](#).

Outcomes that can't be scaled up in a straightforward way, namely Map, XP, Heal and Scout, get a chance of being "upgraded" if they occur later than turn 50. The upgrade probability reaches 100% around turn 160. For Map, XP and Heal, an upgrade means that another positive outcome is chosen at random and both are applied. For the Scout outcome, the upgrade is a free Worker instead of the free Scout.	Regardless of the game progress, the Map outcome reveals a randomized subset of tiles within a radius of 4, XP grants 5 XP points, Heal heals the unit entering the Village and Scout grants a free Scout.

Rationale	These four are pretty worthless when triggered by an Explorer; can't have so many dud outcomes. A higher amount of XP wouldn't help (not needed on an Explorer) and would be too similar to a Great Warlord. A free Scout seems out of place when that unit is already obsolete; better to replace that outcome entirely than to roll an additional one. In Renaissance, a free Worker is not as valuable as tech progress or gold, but it should work well enough as a consolation prize.

The Warrior outcome produces a free unit chosen based on combat strength and randomness from among those pre-Industrial combat units that don't require resources and for which the Barbarians have all the prerequisite techs, i.e. Warrior, Archer, Longbow or Musketman. (The same procedure is used when playing with "No Barbarians" as that option does not prevent the Barbarians from discovering tech.)	Always produces a Warrior.
The types of hostile units (Barbarians outcome) are also chosen as above. The lower bound for the number of hostile units (`iMinBarbarians`) increases a little over time, but there's also an upper bound of 2 + `iMinBarbarians`.	Hostiles are always Warriors. The Weak Barbarians outcome usually spawns 1 or 2 Warriors and Strong 2 to 4, though as many as 8 are possible.
A non-hostile free unit has a chance of receiving up to two free promotions. Each of the two promotion is assigned with a probability equal to half the upgrade probability (see Scout above). If a promotion is assigned, the specific promotion is chosen randomly from Combat1, Guerilla1, Guerilla2, Woodsman1, Woodsman2 and Cover. The surrounding terrain also factors into the selection of the promotion.	The free Warrior starts with 0 XP and without any promotions.

Rationale	Choosing the unit based on the game era would be simpler, but then Barbarian Archers would appear too early (even if game era minus 1 was used).
	In Renaissance, the received unit will usually have to be upgraded in order to be useful; the free promotions should make such an upgrade worth considering. I've picked promotions with a "native" flavor. The selection algorithm is pretty complicated, but I don't think players need to worry about that.
See also	302 curbs Barbarian research when civs don't share a continent with Barbarians. (But this doesn't apply when playing with "No Barbarians".)

The Worker outcome can't occur until turn 20 (on Normal speed).	Only the Warrior outcome has such a restriction, presumably to prevent a super early rush. The Worker outcome can't occur on Prince difficulty and higher (no change).
Halved the probability of the Settler outcome on Chieftain and Settler difficulty and set it to 0 on Warlord.	
Rationale	I think novice players should play on Noble difficulty, but for a R&F game, it could make sense to go down to Warlord, so that difficulty setting shouldn't have grossly unbalanced goodies.
Config	The Settler changes are implemented through `CivHandicapInfo.xml`.

Increased the probability of the Tech outcome at the expense of the Gold outcome so that Gold is less than two times as likely as Tech.	For most difficulty settings, Gold is three times as likely as Tech.
Rationale	The Tech outcome is more interesting than Gold. Now that their power level is similar, Tech can be awarded more frequently. Gold and Tech should perhaps even be equally likely.
Config	Through `Civ4HandicapInfo.xml`

Increased the size of the Tribal Village 3D model on the map.	
Rationale	They're hard to spot on Forest tiles. I've also tried a more reddish, saturated color, but the increased size seems sufficient and a color change alone doesn't help because the BtS-size huts barely poke out of the trees.
See also	By now, I've added a Tribal Village "bubble" to the Resource layer (change 004z), so the size of the 3D model isn't so relevant anymore.
Config	Through `XML\ArtCiv4ArtDefines_Improvement.xml`

315	Recon units
Rationale	To make these units more useful. Scout has the problem that Warrior provides sufficient exploration early on while also being highly useful for military happiness, city defense and for staving off Barbarians. Moreover, on high difficulty settings, the AI grabs most of the goody huts. Explorer is rarely used at all.
315a	Scout can attack Animals.
Rationale	Makes it easier to get promotions. Plus Scout requires Hunting, so it should know how to hunt.
Config	I've added a new tag `bOnlyAttackAnimals` to `Civ4UnitInfos.xml`.
Tbd.	Give Scout the ability to enter Peaks. Will have to adjust the isImpassable check added to `AI_guardCitySite` by change 300. (And perhaps other `isImpassable` and `isPeak` checks too.)

See also	Change 500b, once enabled, will make Warrior less useful for military happiness. 912c already reduces the military happiness from Hereditary Rule. 124 (trade routes only through revealed tiles) and the increased AI aggressiveness of K-Mod/UWAI compared with BtS reward repeated exploration. 250e reduces the number of free AI Scouts on Emperor difficulty.
315b	Explorer can attack Barbarians, but can't capture cities and gets no free promotions. Culture garrison value: 3 (0 in BtS; Warrior 3, Archer 4, Axeman 4)
Rationale	It's quite common for goody huts to be guarded by a Barbarian unit by the time Explorer becomes available. In BtS, there is no way to enter such goody huts with an explorer. That's kind of realistic – one can't expect friendly relations with the villagers after killing their guards –, but the Explorer needs a buff, and it should be a buff that makes it better at exploring rather than giving the Explorer some auxiliary use in warfare. It's also wrong to imply that the European explorers engaging in combat with American Indians always acted in self-defense.

With "no capture" as an additional ability ("attack only Barbarians" merely replaces "can only defend"), the unit gets too complicated, or at least too verbose, so I'm removing the promotions. They're not really useful anyway because Barbarians rarely attack Explorers, at least not on Forest, Jungle or Hill tiles, and Guerilla2 and Woodsman2 are unattractive for a unit that already ignores terrain movement costs.

Culture garrison value: E.g. Columbus became governor of Hispaniola. It's a pretty low value, but the same value as Axeman seems a bit high. |
| *Config* | I've added a new tag `bOnlyAttackBarbarians` to `Civ4UnitInfos.xml`. |
| *Tbd.* | Replace the "ignore terrain movement cost" ability with a free Sentry promotion. (Does that work inside a Caravel? Should it?). When Scout gets the ability to enter Peaks, Explorer will have to get it too.

Are huts sometimes guarded by Archers? Even if an Explorer starts with a promotion from Barracks, a fully fortified Archer is a tough opponent ... |
| *See also* | 314 makes overseas goody huts discovered in Renaissance more rewarding. |

AdvCiv	*BtS*
The move-all-terrain ability prevents Gunship from capturing Workers. Explorer can capture Barbarian Workers.	The "cannot capture cities" ability prevents Gunship (and any other unit that can't capture cities) from capturing Workers.

See also	Not relevant for now because 010 currently causes captured Workers to be destroyed.
Rationale	I'd like to enable Worker stealing again somehow in the future, and then another (rare) use for Explorer could be to steal Barbarian Workers for nearby colonies.
315c	Scout gets +100% combat strength against all Barbarians, not just against Animals. The AI may use Scouts and other exploration units to guard city sites (i.e. for fogbusting) when there is nothing to explore.
Rationale	Warrior is still the better unit against Barbarians (as it should be) in every regard except mobility: greater benefit from combat promotions due to greater base strength; can attack pillagers; +25% city defense.
315d	Cap on early Scouts from huts

Recon units entering a hut can't get the Scout outcome if their owner already has two or more exploration units.	Scouts can beget more Scouts, and, in the first 20 or so turns, it's not so rare to end up with a total of three Scouts when starting with a Scout. Here someone reported three Scouts in a row for a total of four.

Rationale	The third Scout is a weak outcome, and no fun because the map gets explored too fast.

500	Dormant changes; to be enabled sometime in the future.
AdvCiv	*BtS*

500a	Land of two rivers	
	Tiles bordering on more than one river get twice the commerce yield from rivers, i.e. 2 commerce instead of 1. A shortcut on a far-winding river also works. Normally, only a few tiles per map qualify. Exact condition: two river segments that aren't connected along the tile in question. Settling on a double-river tile leads to 2 commerce on the city tile (akin to settling on plains hill).	A tile is either river-side (+1 commerce) or isn't.
Rationale	Plan to nerf the Financial trait further ([908a](#)), which will make rivers less useful. The double commerce bonus will make up for that a tiny bit. But mostly just for added flavor. Update: Probably won't ever enable this. Would provide too much extra commerce in Earth scenarios.	
Config	Disabled in `CvPlot.cpp`.	
500b	Demand better protection	
	Anger from lack of protection computed based on the defensive strength of the local units and population size. A single weak unit doesn't always suffice to avoid "We demand better military protection". A city requires a total defensive strength equal to at least half its population. Defensive strength is computed as combat strength increased by defensive modifiers (e.g. from Archer, Wall, Garrison promotion) Outdated units, i.e. units that the city can no longer train, count only half. The anger is proportional to the lacking defensive strength; e.g. an almost sufficient garrison will lead to just 1 anger.	Any one military unit suffices to avoid "We demand military protection".
Rationale	Requiring just any military unit becomes a pretty nonsensical rule by the Medieval era. Can either abolish it, or change it so that credible garrisons are required.	
Config	Disabled through `DEMAND_BETTER_PROTECTION` in `GlobalDefines_advc`.	

Tbd.	Need to show "Garrison strength x.x, population: y" in help text when there is anger. Otherwise it's too difficult to learn. Remove the "can no longer train" clause; would get circumvented by cutting off strategic resources. Need to add something else to account for technological progress – don't want cities that don't grow to be guarded by Warriors indefinitely. Game era? But don't want all cities to demand better protection at once when the game era advances ...
	Might make upgrades mandatory (if not upgraded in time, units refuse to fight with outdated equipment and defect). Then this change will be important because otherwise players could try to play around unit obsoletion (e.g. don't get Hunting so that Warriors can be trained indefinitely) so that they don't have to upgrade their city garrisons.

550	Changes to tech trading	
See also	[130z](#) deals with tech gifted by the AI to rivals	
550a	Tech trade value dependent on tech score and power	
AdvCiv		*BtS*
AI gives tech away cheaper (or expects to get it cheaper) when the receiving side is less advanced and powerful than the giving side; charges more if the receiving side is more advanced/ powerful. The effect is small in the early game and increases as the game progresses. Exception: Doesn't apply to vassal-master relationships, i.e. vassals don't expect to get tech from their master at a discount.		Tech trade value is independent of how well the involved civs are doing. (Vassals can receive free tech from an AI master if they're behind, but that's not a matter of trade value.) BBAI and K-Mod let AI civs that are falling behind technologically check for tech trades more frequently (no change in AdvCiv). Vassals charge less from their master for resources, trade embargos and civic/religion changes. Tech trades are unaffected by vassal/ master relation.
Rationale	A little extra catch-up mechanism. Also, when dealing with a backwards civ, it's smarter to be generous than to insist on a square deal.	
	For vassal-master, the basic idea in BtS is that the master can trade favorably with the vassal. Don't want to turn this upside down.	
550b	AI doesn't make bad offers for human tech	
AdvCiv		*K-Mod*
The AI doesn't propose or counter-propose any trade to a human civ that gives tech to the AI civ and is more than 50% in favor of the AI civ. The AI always offers something when proposing a trade.		The AI can (counter-)propose trades that are up to 300% in its own favor. May offer nothing at all.
Rationale	I used to accept bad AI offers for tech because I believed that they're due to partial research progress of the AI. That can be the case, but often isn't; so it's a bit of a trap.	
Tbd.	The AI probably shouldn't contact players with bad non-tech deals either.	
550c	Changes to tech monopoly thresholds ("don't want to trade just yet")	
AdvCiv		*BtS*

AI is more willing to trade tech if it has contact with few civs and still hasn't met most civs. E.g. if an AI civ knows only one civ, the AI civ acts as if 40% of the other known civs already knew the tech (when in fact it's 0%).	AI willingness to trade a tech is based on the percentage of known civs (excluding itself) that already know the tech. If the AI knows only one civ, the AI will hardly ever trade (unless Friendly) because the percentage is either 100%, meaning the other civ already knows the tech, or 0%, meaning the AI tries to monopolize the tech.	
Rationale	This should make civs on small continents fare better.	
The AI leader-specific thresholds for monopolies (`TechTradeKnownPercent`; between 0 and 100) are randomly increased or decreased by up to 15 points. This random adjustment is applied once per game to each tech separately, i.e. it's not the same for all techs, and can't be manipulated through repeated trade requests by a human player.	`TechTradeKnownPercent` is only adjusted for techs that the AI wants to monopolize badly, in particular military techs. There's no random component.	
Rationale	The BtS monopoly thresholds are a bit too predictable in some cases, especially when there are just two or three civs on a continent. And e.g. Pleased Tokugawa *never* trading anything useful is depressing.	
Tbd.	Perhaps the issues with small continents are already taken care of by the change above; not sure if the randomization is still needed.	
550d	Research bonus if tech trading disabled	
When the "No Tech Trading" option is checked on the Custom game screen, research rates are increased for all eras except Ancient and Future. The research bonus is the highest for Medieval and Renaissance tech.	"No Tech Trading" doesn't affect research speed, and such games tend to lag behind the historical time line.	
Rationale	A lower bonus in the early game because tech trading doesn't become available until the middle of the Classical era even if it's enabled. A lower bonus after Renaissance because tech progress tends to get more disparate the longer the games lasts, and so fewer and fewer tech trades happen.	
Config	Can be adjusted or disabled through `GlobalDefines_advc.xml`.	
Tbd.	Would be unnecessary if there was a proper tech diffusion system to replace tech trading.	
550e	Era threshold for "fear you're becoming too advanced" based on the recipient's era	
AdvCiv		*K-Mod*

When a civ receives a tech in trade, all third parties who know the recipient increase their received-tech memory about the recipient (as in BtS), except when (as in K-Mod) the recipient had already researched 2/3 of the tech, or when the era number of the tech is at least 2 lower than the era number of the recipient. E.g. when a civ is in the Medieval era and receives Archery, no tech-received memory is increased. The recipient's tech-received memory (for "You've shared your discoveries") is also not increased when one of the exceptions above applies.	Tech-received memory leads to "We fear you are becoming too advanced" (as in BtS). K-Mod adds the two exceptions. In the second one, game era (averaged over all civs) is decisive, not the recipient's era.

Rationale	K-Mod comment in `CvDeal::startTrade`: "This is to prevent the AI from being crippled by human players selling them lots of tech scraps." Good reason, but this also affects human players receiving tech. Humans need to be able to tell whether a trade is going to count, and the game era is unknown early on, and tedious to determine later on. I've extended the exceptions to "shared discoveries" because that's also exploitable in BtS.

Insignificant tech trades (2/3 progress or 2 eras behind; see above) are unaffected by the no-brokering game option. Regardless of the brokering option, such techs can be passed along on the same turn that they've been received. The AI does not reject any tech trades on account of the no-brokering option.	Techs can't be traded on the same turn on which they've been received in trade. When the AI has already 50% or more progress toward a tech, it refuses to accept that tech in trade when "No Tech Brokering" is enabled: "We would have nothing to gain."

Rationale	Removing the 1-turn delay made it much easier to implement the change to "no brokering". Also makes sense to treat techs that are traded when 2/3 complete the same way as techs discovered entirely independently.

550f	Tech purchases
See also	036 also affects the amount of cash that the AI is willing to trade.
AdvCiv	*BtS*
The target amount of gold that the AI tries to keep in its treasury can be increased beyond the BtS value depending on the potential for tech trades.	Based on civ size, leader flavor and units needing upgrades.
When the an AI civ checks for possible tech trades with another AI civ, if it doesn't find a tech-for-tech trade, then the first AI civ tries buying the tech that it is currently researching for gold (if the second AI civ knows that tech).	AI-AI tech trades are always tech-for-tech. One side can offer gold in addition or multiple techs, but just gold for tech isn't possible.
Rationale	Should help against AI civs falling far behind in tech. On the flip side, it means extra gold for the tech leader. That said, the AI doesn't pay very well for tech, especially when it has fallen behind (see 550a, 551).

The portion of its treasury that the AI is willing to trade to a human player is tied to the research progress of the AI. The portion is maximal when the AI has researched 75% of a tech and minimal at 25%.	Based on civ size, finances, gold previously traded (all still the case in AdvCiv).
Rationale	Should make it more likely that a somewhat fair gold-for-tech trade is possible when the BUG gold alert triggers.

551	AI trade value of tech reduced	
AdvCiv		*BtS*
When the AI trades for tech, the research cost of that tech is multiplied by 1.25 as part of the trade value computation.		The multiplier is 1.5. For comparison, traded gold gets multiplied by 2.
Depending on how widely a tech is known, its trade value is multiplied by a factor between 0.83 and 1.17.		The multiplier is between 1 and 1.5.
Rationale	Could argue that research and gold should have the same modifier because gold and beakers are essentially interchangeable. But gold should be more valued in trade because the other side loses the gold whereas imparting a tech costs nothing. By reducing the trade value of tech, I'm making it harder to conduct diplomacy (sponsored war, brokered peace, fair trade bonuses) through tech, and easier to buy tech with gold. I'm not setting the multiplier even lower (say, 1) because change 550a already makes it easier to buy tech (for civs that have fallen behind).	
Tbd.	The underlying issue is that it doesn't cost anything to share tech.	

552	AI trade modifiers (XML) revised	
AdvCiv		*BtS*
AI trade modifier reduced from 10 to 0: Archery, Horseback Riding, Guilds, Military Tradition, Ecology, Electricity, Advanced Flight, Composites, Stealth, Genetics, Fiber Optics, Satellites, Robotics Increased from 0 to 10: Civil Service, Nationalism, Chemistry, Military Science		In trades, the AI treats some technologies as having a 10% higher value than their beaker cost would suggest, namely those listed in the left column and (no change): Feudalism, Flight, Machinery, Gunpowder, Rifling, Steel, Assembly Line, Railroad, Artillery, Industrialism, Rocketry, Fission, Fusion.
Rationale	The BtS weights seem to be aimed at military techs, especially nuclear war, and Space victory. I think this should be (and is at least in part) handled by the DLL; don't want an AI civ that isn't aiming at a Space victory to pay extra for e.g. Genetics. I'm keeping the modifiers for military tech and I'm adding a few more, but not for pre-Medieval tech as pre-Medieval AI warfare is fairly rare. There is also `CvTeamAI::AI_getTechMonopolyValue`, which makes the AI not "want to start trading away this technology just yet," but if the AI still agrees to the trade, I want there to be an extra high penalty if it's a trade with someone's worst enemy.	

Tbd.	+10% trade value is not going to affect the enemy trade penalty much. Perhaps [130p](#) should give the AI trade modifier some extra weight when recording trade values (`peacetimeTradeValue`).
Config	`CIV4TechInfos.xml`

650	Changes to nuclear warfare
Tbd.	Nukes need major balance and AI changes. My changes so far are very minor.
See also	[130q](#) about diplo effects of nukes [031](#) changes the AI evaluation of resources in a way that makes Uranium more attractive (once nukes can be built). [dlph.7](#): Neutral units not hurt by nukes [dlph.16](#): Minor AI changes [906](#) lets Stealth Destroyer carry missiles.

AdvCiv		*BtS*
AI uses air recon along its coast.		AI seems to use air recon only on rival cities.
Rationale	Could reveal enemy submarines. Not enough to properly defend against Tactical Nukes, but the BtS AI doesn't even seem to try.	

AdvCiv		*K-Mod*
AI willing to build the Manhattan Project unless it looks like it will win the game anyway,		AI considers the Manhatten Project only when in the Dagger or Crush strategy, or when close to a Conquest victory.
Rationale	The AI shouldn't take risks with nukes when it's winning anyway (Conquest, or crushing its current war opponents).	
AI less worried (divisor 3) about attitude of AI civs that aren't (prospective) war enemies when deciding whether to build the Manhattan Project. Not worried at all about unlocking nukes for rivals that are about to win the game (victory stage 4). Utility value for gaining access to nukes takes into account the number of civs in the game.		The K-Mod AI checks the attitude of all rival civs; divisor is 2. Utility for nuke access is a constant.
Rationale	A K-Mod comment says that it should be up to the human player to decide whether he/she wants nukes in the game. I don't agree with that, but I mustn't make the AI so willing that some AI builds Manhattan most of the time; or at least not until the game is about to end. Generally, I'd like the AI to unlock nukes when a disliked civ is about to win the game.	
AI doesn't disband nukes when in financial trouble unless the only other remaining units are cargo units.		As far as I can tell, nukes are disbanded before most other units. BtS tried to save expensive units, which is fine in the case of nukes, but K-Mod focuses on XP, which is generally better, but fails for nukes.

700	Rise & Fall game option; see chapter [Rise & Fall](). Id 700: the fundamentals. Other ids only for code outside the R&F classes. Except for those highlighted in blue, all changes in the following are only relevant if R&F is enabled.
Rationale	For the term "intermediate period": Ancient Egyptian periodization ([Wikipedia]).
Config	The number of chapters, interlude length and scoring delay are configurable through `GlobalDefines_advc.xml`.
Tbd.	Text so far only in English and German.

Earth1000AD scenario not currently supported. During initialization, `CvPlayer::verifyAlive` kills all civs because no cities have been created yet. I don't see how the R&F code causes this, but apparently, it does. Also, the unequal AI handicaps aren't currently supported by R&F. Would have to store the AI handicap (in `RFChapter` and in savegame) before human takeover and restore it when AI control resumes.

Should perhaps factor game settings other than difficulty into the Rise score, in particular the number and length of chapters. For now, my assumption is that a higher number of chapters implies a lower number of turns per chapter, which makes it harder to maximize the chapter score, and that this about cancels out.

R&F autosaves at the start of the human turn, not at the start of the round. Should do this also when R&F is disabled, especially in scenarios. |
| *Credits* | Inspired by board games like [Peloponnesian War]() and [History of the World]() (both from 1991) and Kael's Assimilation mod (which is included in [Fall From Heaven II]() and [RoM]()). |
| *See also* | Since R&F scoring is partially based on victory stages, it somewhat hinges on change [115](), which revises the computation of those stages.

[250b]() disables free wins against Barbarians when the SPaH or R&F option is enabled. |
| **701** | "Require complete kills" option replaced by the R&F option |

AdvCiv	*BtS*
When the last city of a civ is captured, all its remaining units are removed, and the civ is eliminated; there is no option for changing this behavior.	When "Require Complete Kills" is checked, units remain in the game when the final city is captured. A civ is only eliminated when all of its units are killed and all cities captured.

The option was added by patch 1.61. |

Rationale	I had already disabled the complete-kills option (for the reasons stated below) before adding the R&F option. Removed it entirely now because it's easier to replace a game option than to add a new one (while maintaining savegame compatibility).

Too much of a hassle to keep the complete-kills option in mind for all the AI code. I doubt that the WL, BtS, BBAI and K-Mod code can really handle it either, especially in team games when some team members still have cities and others don't. Not sure if this option was ever intended to be more than a gimmick. You even need to kill every enemy Spy (or since BtS: hope that the Spy kills itself somehow).

Now, in principle, the AI still needs to be able to handle civs without cities because a human player could decide to never found a city. Through Advanced or later-era start, the player could even have a sizeable army, not to mention scenarios. I'm trying to have the game at least not crash in such cases, but it's not really supported. (Barbarians don't necessarily have cities either, but get special treatment in most of the AI code; this works.) |
| *Tbd.* | Instead of just removing the units, remove some, turn some into Barbarians and turn some over to any teammates or (war) allies that the dead civ might have had before |

	its demise. This is more plausible and doesn't create issues for the AI.

702	Error handling if game settings are incompatible with R&F
Not compatible: multiplayer, team games (including Permanent Alliances), One-City Challenge, SPaH.	

703	"Score" tab on the Victory advisor screen
Showing scores of past chapters and the start dates of chapters still to be played. When R&F is enabled, the tabs "Resolutions" and "Members" are merged into one in order to make room for another tab.	

704	Changes to Dawn of Man (DoM) screen
Show the screen at the start of each chapter.	
Tbd.	In the later chapters, the DoM can appear with a few seconds delay. Seems like the EXE is too busy with something else. Perhaps this wouldn't happen if I'd launch the popup earlier.
See also	004j: DoM screen shown after regenerating map

AdvCiv	*BtS*
Heading of the DoM screen says "The Dawn of Civilization".	"Dawn of Man"
Rationale	Perhaps they were thinking of Kubrick's "2001", which shows a subtitle "The Dawn of Man"; but this is followed by a scene with apes ...

705	Rules and AI changes to prevent self-collusion (helping a civ from the previous chapter that hasn't been scored yet, or one about to be taken over)
In addition to the AI behavior described in the R&F chapter:	
The AI is a bit more lenient in pre-Currency tech trades – accepts if it receives only 90% of what the player receives.	
If UWAI is enabled, the AI refuses to talk when war utility is 20 or greater.	
Rationale	During a chapter, the player should (ideally) only have to consider the interests of his/her current civ. The AI changes described above (and in the R&F chapter) combined with intermediate periods can't completely prevent self-collusion, but make it much less relevant.
	Restrictions don't apply to civs that the player is probably not going to want to play in the next chapter..
	Trade acceptance: With R&F, it can be extra annoying when the AI refuses to trade two techs of (almost) equal value, but won't accept a 2 for 1 either because this would already favor the AI too much.
	War utility threshold: Don't want players to bypass trade restrictions through reparations.
	Would be nice to give the player more feedback, e.g. a grayed-out "gift" button, or the AI responding "you're being too generous" when an offer is too good, but these things seem almost imposible to implement. I did manage to get the AI to say "no thanks" to gifts.

Tbd.	Perhaps the AI should always show some leniency in pre-Currency trades, i.e. regardless of the R&F option.
	Perhaps reduce or remove the penalty for playing a civ multiple times.
	Should the AI be willing to talk when all potential peace deals are too favorable for the AI? E.g. when the AI wants the equivalent of 1000 gold and the player doesn't have that much gold, but does have some 5000-beaker technology. Currently, the AI is willing to talk then, and that's a bit confusing. Though refusing to talk would also be confusing I think – "How is that big technology not enough?"

706	Changes related to AI Auto Play and switching the human-controlled civ
When the player "Retires", the current chapter completes on AI Auto Play. The intermediate periods in between chapters aren't actually AI Auto Play; there simply isn't a human-controlled civ at all.		
I hide some UI interface elements during intermediate periods and suppress advisor screens and popups. This has required changes in a bunch of different places.		
Rationale	The player may simply want to end a chapter because he/she doesn't feel like completing it. But retirement is mainly intended for situations when things are going *too* well. The civ could then become a huge obstacle in later chapters (or just win the game for the AI). Don't want the player to sabotage his/her own civ then.
Tbd.	After retiring, the player's civ keeps the game handicap, e.g. Prince, but since the civ is treated as an AI, the AI modifiers from the game handicap also apply, e.g. 5% faster training of units on Prince. This is confusing, but difficult to change because the AI modifiers get applied in many different places. AI Auto Play without retirement applies the AI handicap (change 127), which is consistent, however, a retired civ should generally do rather badly because retiring is supposed to help when the player's civ gets dangerously far ahead. Perhaps set the handicap after retiring one higher than the game handicap (or always Monarch?) to somewhat cancel out the AI modifiers.
	Should provide some means of ending the game on the spot so that the replay is shown. Can currently only fast-forward to the replay by retiring repeatedly until a civ wins during Auto Play.
	Known issue: When taking control of a civ via Civ Changer (Alt+Z) for debugging purposes, all non-expired messages that that civ ever received are displayed on the main interface. Calling `CyInterface().clearEventMessages()` from `ChangePlayer.py` doesn't get rid of them.
See also	Hinges on 127, which allows MoreCiv4lerts to work when the player takes control of an AI civ. Also records start and end of AI Auto Play in replays, which makes it unnecessary for R&F to record early retirement in replays.

707	Changes to the game end sequence
No game end upon defeat; Rise score shown als "final score" in HoF, scaled up ("normalized score") for the Dan Quayle screen.	
See also	043: Uses stricter thresholds for the titles on the Dan Quayle screen.

901 et sq.	Changed stats
Config	mostly XML-based

See also	310 (Great Wall, Great Lighthouse, Colossus) would also fit here. 160 lets Granary store less food.		
Tbd.	See this draft of long-term balance and historicity changes.		

901	*AdvCiv*	*K-Mod*	*BtS*
Forest Preserve	at Biology; +1 commerce	at Scientific Method; +1 commerce; +1 commerce if riverside	at Scientific Method; +1 commerce if riverside

K-Mod 1.45 has added a 7th effect to Scientific Method, and enlarged all tech boxes to make room for a 7th icon. Not a good solution; surely no single tech needs to do 7 things.

Forest Preserve can use a buff anyway, and nature reserves originated in the early 19th century according to Wikipedia, which fits with Biology. I also don't see much of a connection between scientific method and forest preserves. Not a question of game balance really because Forest Preserves are rarely useful.

Removed the riverside commerce while I was at it. Simpler this way. Not much of a loss because Forests along rivers get chopped anyway (see also change 117). Consistent with Lumbermills, which also provide commerce regardless of river.

Tbd.: Make the Forest spread ability more predictable and more useful. Grant health instead of happiness.

902	*AdvCiv*	*K-Mod*	*BtS*
Watermill	+1 commerce and +1 production initially; +1 commerce with Electricity; 4 turns to build; +1 production with Replaceable Parts	+1 commerce and +1 production initially; +1 commerce with Electricity; 8 turns to build +1 production with Replaceable Parts	+1 production initially; +2 commerce with Electricity; 8 turns to build +1 production with Replaceable Parts

Watermills are decent with Replaceable Parts, but rarely useful before that (whereas, historically, they were highly useful throughout the Middle Ages). The K-Mod change to Serfdom (+1 commerce from Farms) exacerbates this. One commerce at Machinery (also a K-Mod change) is the least that needs to be done.

Commerce from Electricity is apparently supposed to get the shift from waterwheels to turbines across (similar for Windmill). That's OK (electricity can be sold), but doesn't have to be so pronounced. Electricity boosting local production is also plausible.

Never saw why Watermills should be slow to build. Perhaps originally an attempt to make Serfdom attractive – well, that didn't work. Reducing build time is a way to make Watermill better early on without making it too good later on.

Tbd.: Still a bit unattractive. 6 turns to build but +2 production earlier?

Lumbermill	at Guilds +1 commerce initially; +1 production with Replaceable Parts; 5 turns to build +1 production with Railroad track; doesn't remove Forest	at Guilds +1 river commerce and +1 production initially; 8 turns to build +1 production with Railroad track; doesn't remove Forest	at Replaceable Parts +1 river commerce and +1 production initially; 8 turns to build +1 production with Railroad track; doesn't remove Forest

The middle column is K-Mod 1.45; I'm keeping the earlier version (not shown above) and I'm reducing the build time in order to give Lumbermill a little extra push. Also, Replaceable Parts is just one tech away from Steam Power, which grants +50% Worker speed, but since Lumbermills are now at Guilds, that bonus is still out of reach, so they really take a long time to build in K-Mod.

I don't think players can be incentivized to not chop all Forests along rivers; not without making Lumbermills too strong in the lategame. Therefore, I don't like the river commerce ability (not on Forest Preserve either).

Tbd.: Want to move both Lumbermill and the +50% chopping yield (currently at Mathematics) to Machinery eventually, and apply chopping yields only to buildings and ships (not land units).

903,904	reserved		

905a	*AdvCiv*	*K-Mod*	*BtS*
Galley	3 moves, 3 cargo, cost 45	2 moves, 3 cargo, cost 50	2 moves, 2 cargo, cost 50
Trireme	3 moves, 3 strength, no bonus vs. Galley, upgrades to Caravel and Privateer, cost 45	2 moves, 2 strength, +50% vs. Galley, upgrades to Caravel and Frigate, cost 50	
Caravel	4 moves removed AI types "Reserve" and "Escort"	3 moves	3 moves
Carrack	4 moves, 2 cargo, removed AI type "Reserve"	3 moves, 3 cargo	3 moves, 2 cargo
Navigation2 promo	Only available for units that can enter ocean	Available for all sea units	

Should give Galleys a use in early warfare (fast deployment), and make them better explorers. If 3 moves aren't enough to make naval deployment useful in land wars, then 4 moves with Navigation1 should do the trick. Sea units moving twice as fast as infantrymen along roads is reasonable from a historic pov, but 5 moves might be a bit much, also gameplay-wise. Therefore, I'm restricting Navigation2. Makes sense that "navigation" benefits ocean-going vessels more.

4 moves for Caravel to keep it faster than the early ships. Now just as fast as Galleon, which is also more accurate historically. Carracks, caravels and galleons could travel at 4 to 5 knots, triremes at 2 to 3 (much faster during battle; see e.g. Olympias on Wikipedia).

3 strength for 45 production makes Trireme a viable warship (perhaps even the best) until Frigate, which should make Triremes more worthwhile overall and might help the AI, which tended to train too many Caravels previously. Should now train a mix of Triremes and Caravels, and use only Triremes for protecting resources and escorting Galleys. May still train too many ships, but at least Trireme is cheaper than Caravel. While I'm at it, the upgrade from Trireme to Privateer is a bit less painful than to Frigate because Privateer is cheaper than Frigate, and this should make AI privateering a bit more common.

Historically, trireme-based ships remained in use in the Baltic Sea until the 18th century, and their usage didn't decline until the 16th century. "[The Battle of] Lepanto [1571] marks the last major engagement in the Western world to be fought entirely or almost entirely between rowing vessels, the galleys and galeasses that were still the direct descendants of the ancient trireme warships." (Wikipedia)

Carrack: K-Mod had increased the cargo capacity along with the other transport ships, but I think this takes the unit unnecessarily close to Galleon, especially now that I've increased the speed (can't not increase Carrack speed if I increase Caravel speed). Back to 2 cargo spaces.

Tbd.: Require Optics or Astronomy for Navigation2; that's more elegant than the restriction to oceangoing ships. "Explore rival territory" of Carrack should perhaps not work with military units in cargo (unless those units somehow also have that ability).

See also: 124 assigns Galley the Explore AI type.

905b	AdvCiv	K-Mod	BtS
Galleon (as in K-Mod)	4 moves 4 cargo 4 strength cost 80	4 moves 4 cargo 4 strength cost 80	4 moves 3 cargo 4 strength cost 80
Transport	5 moves 5 cargo 14 strength cost 100 requires Oil can't attack	5 moves 5 cargo 16 strength cost 125 requires Oil or Uranium	5 moves 4 cargo 16 strength cost 125 requires Oil or Uranium

East Indiaman	unique Frigate
	5 moves
	3 cargo
	8 strength
	bombard rate 12
	cost 90
	upgrades to Destroyer
	  or Transport
	req. Astronomy,
	  Chemistry, Iron
		unique Galleon
		4 moves
		5 cargo
		6 strength
		can explore rival territory
		cost 80
		upgrades to Transport
		
		req. Astronomy
			unique Galleon
			4 moves
			4 cargo
			6 strength
			can explore rival territory
			cost 80
			upgrades to Transport
			
			req. Astronomy

Frigate	4 moves
	8 strength
	bombard rate 12
	cost 90
	upgrades to Destroyer
	req. Astronomy,
	  Chemistry, Iron
		4 moves
		8 strength
		bombard rate 8
		cost 90
		upgrades to Destroyer
		req. Astronomy,
		  Chemistry, Iron
			4 moves
			8 strength
			bombard rate 8
			cost 90
			upgrades to Destroyer
			req. Astronomy,
			  Chemistry, Iron

Ship of the Line	3 moves, +1 with Coal
	10 strength
	+25% vs. Frigate
	bombard rate 16
	cost 110
	req. Astronomy, Military
	  Science, Iron
		3 moves
		10 Strength
		+20% vs. Frigate
		bombard rate 12
		cost 120
		req. Astronomy, Military
		  Science, Iron or Copper
			3 moves
			8 strength
			+50% vs. Frigate
			bombard rate 12
			cost 120
			req. Astronomy, Military
			  Science, Iron

Credits: CFC user vedg pointed out here that there aren't enough incentives for upgrading Galleons and East Indiamen.

Rationale:

Transport: Having just 25% more cargo space than Galleon doesn't justify a more than 50% higher cost. Often not worth upgrading. To balance out the lower cost, I've removed the offensive abilities, which aren't entirely unimportant against rivals without Combustion. The unit can still "besiege" water tiles, i.e. prevent them from being worked. The lower strength should give pre-Combustion ships a fighting chance against besieging Transports, and shouldn't make much of a difference against post-Combustion units. While I was at it, I removed the Uranium requirement for historical accuracy; see this CFC discussion.

East Indiaman: Also no incentive to upgrade to Transport. On top of that, historically, East Indiamen appeared a century later than galleons, and were usually larger than frigates. Rather than a warlike Galleon, this is now a Frigate with cargo space. The ability to enter rival borders is messy on cargo ships because these ships (and their cargo) don't get bumped upon declaring war (see *Tbd.* under 905a). Instead, the East Indiaman gets +1 speed. The Civilopedia states that "the East Indiaman was inevitably slower than its descendants: the Ship of the Line and the Frigate." This appears to be nonsense: East Indiamen were often full-rigged clippers that could sustain speeds of 10 knots, whereas ships of the line sailed at perhaps 5 knots.

Bombard rates: 8 is the same as Catapult, far too little for ships equipped with cannons. Did not increase Ironclad's bombard rate (12 as in BtS) because at least early ironclads weren't as heavily armed as ships of the line.

Ship of the Line: I don't love the K-Mod change to strength; it makes Ship of the Line stronger, which is good, but does so partly at the expense of Ironclad, which is also too weak. 120 production seems pretty clearly overcosted. I've restored the BtS Iron requirement because it doesn't make sense from a historical point of view to require Iron for Frigate and not for Ship of the Line. The latter requires more metal parts (cannons, cannonballs, nails(?)), and thus has more need of a cheap metal. The K-Mod changelog says the goal was to give "ironless civs a decent

naval ship if they go for the right tech." Fair enough, but not really important. I hope my other changes to Ship of the Line can give the unit more plausible (niche) uses.

The speed bonus with Coal represents auxiliary steam engines that were installed on ships of the line in the early 19th century (see [Wikipedia](#)), and should make it easier to use Ship of the Line offensively. The tactical side of the AI (`CvUnitAI`) is aware of the increased speed, but I haven't changed the strategic evaluation (`CvPlayerAI`) of Coal and Ship of the Line. Too minor to make a difference.

The details of what it means that a unit has access to a resource are a little messy. The trade network doesn't extend onto hostile tiles, but I don't want Ship of the Line to lose speed in hostile waters, especially not immediately upon entering. Relying entirely on the availability in the capital could lead to situations where a Ship of the Line sits right on a Coal tile in a friendly Fort or city, and still doesn't get the movement bonus when the tile isn't connected to the capital. The current solution is to grant the extra move so long as either the current tile or the capital has access to Coal. This means that Ship of the Line can, in theory, still lose the extra move upon entering hostile waters, but this should be rare.

Tbd.: Should perhaps guarantee the extra move until the end of a turn if Coal was available at the start of that turn.

Bombard rates are still a bit too low. Ship of the Line and Ironclad need to be buffed further, and Frigate should upgrade to Ironclad. Want to allow Transport, Destroyer and Battleship with Coal, but with a movement speed penalty. Move Transport to Industrialism and Destroyer and Battleship to Artillery.

Could give Frigate and Ship of the Line +1 strength to make both more effective against Privateer and then restore Ship of the Line's 50% bonus against Frigate.

Want to apply the new faster-with-resource ability also to Industrial-era ships: allow them to be trained with Coal, but make them faster with Oil. Uranium should then be removed as an alternative requirement for Destroyer.

Config: `Civ4UnitInfos.xml`; note that East Indiaman is called `NETHERLANDS_OOSTINDIEVAARDER` in that file.

Ironclad	3 moves
	+25% Coast defense
	req. Steam Power
		3 moves
		req. Steel and
		  Steam Power
			2 moves
			req. Steel and
			  Steam Power

Rationale: To match the increased strength of Ship of the Line. The defense ability is a bit more flavorful than just +1 strength (and 13 would be an unusual strength value); ironclads had difficulty sinking each other and their battles tended to be stalemates. There is no generic defensive bonus in Civ 4 (though it would be easy enough to implement one), hence the terrain restriction. Note that cultural borders can allow an Ironclad to enter Ocean, so the restriction is not entirely irrelevant.

Removal of the Steel requirement gives Ironclad a longer window of utility. Also, the first ironclads, produced in 1862 for the US Civil War, were not clad in modern steel: the first steel mill in the US based on the Bessemer process was set up in 1865.

Tbd.: Stalemates aren't always fun; if it turns out that the ability plays badly, I could still just increase combat strength. It may also, despite the K-Mod change, still be too difficult to engage faster ships. Even early ironclads were only a few knots slower than frigates, so speed 4 would be justifiable; the restriction to Coast would still get across that ironclads aren't as mobile as frigates.

906	*AdvCiv*	*K-Mod*	*BtS*
Submarine	24 strength 6 first strikes	24 strength +25% attack	24 strength

	7 moves
	cost 210
	req. Rocketry, Radio,
	  Uranium
	renamed to
	  "Nuclear Submarine"
		6 moves
		cost 150
		req. Radio,
		  Oil or Uranium
			6 moves
			cost 150
			req. Radio,
			  Oil or Uranium

Attack Submarine	24 strength 6 first strikes 6 moves cost 160 req. Radio	30 strength +25% attack 7 moves cost 200 req. Rocketry, Radio +50% vs. Submarine	30 strength req. Rocketry, Radio 7 moves cost 200 +50% vs. Submarine
Switched graphics of (Nuclear) Submarine and Attack Submarine			
Battleship	250 cost	225 cost	225 cost
Destroyer	200 cost ignores first strikes	200 cost	200 cost

Stealth Destroyer	270 cost
	30 strength
	1 first strike
	can see stealth ships
	  and submarines
	ignores first strikes
	can load 1 Missiles
	30% chance to intercept
	  aircraft
	requires Stealth
		220 cost
		36 strength
		2 first strikes
		can see stealth ships
		
		requires Stealth and
		  Robotics
			220 cost
			30 strength
			2 first strikes
			can see stealth ships
			
			requires Stealth and
			  Robotics

Rationale: The BtS submarines were too weak against Battleship and the role of Attack Submarine (hunter-killer) was too narrow. Now Attack Submarine is the ordinary submarine unit for the World Wars, and Missile Submarine a more expensive unit representing the cruise missile and ballistic missile subs of the Cold War. First strikes match the flavor of torpedos and invisibility well; consistent with first strike on Stealth Destroyer. Strength 25 and 5 first strikes would have a nicer symmetry with the 50% withdrawal ability, but that would make Submarines a bit too effective against Destroyers, which, as anti-submarine units, get to ignore first strikes.

Increased the cost of Battleship in order to further weaken that unit against submarines. The BtS cost is also too close to that of Destroyer.

Stealth Destroyer isn't needed as an efficient combat unit, and this would also be unrealistic. The few stealth destroyers that have been manufactured are classified as multi-role guided missile destroyers, and have strong anti-air and anti-submarine weapons. These additional abilities make the Stealth Destroyer an expensive Swiss Army knife. Removed one first strike to make the multiple first strikes of the Submarines more special. The Robotics requirement seems nonsensical and makes the unit very difficult to access.

Credit: Dawn of Civilization lists Stealth Destroyer's submarine detection as a bugfix in its list of features: "*Stealth Destroyers detect Submarines as (presumably) intended*"

See also: 028 allows Submarines and Stealth Destroyers to defend weaker visible units.

I've only skimmed through this thread (title: "Submarine Confusion"), but I think the participants mostly agree that BtS has its two submarines confused.

Tbd.:
Destroyer is still a bit weak against Submarines. May have to give it an explicit combat bonus

against Submarines (instead of relying entirely on first strikes vs. first-strike immunity), or give Submarines an Ocean attack bonus.

Would be nice to show the abilities shared by the two submarines more compactly in help text and Civilopedia:
"Submarine (invisible, reveals Submarines, can dive under Ice, can explore rival territory)"

Lower the strength of all post-Combustion ships a bit; they don't need to be *that* much more powerful than Ironclad.

Air recon shouldn't reveal Submarines so easily.

Would like to give Stealth Destroyer two missile slots, but so long as two Tactical Nukes can eliminate any stack, this seems a bit too dangerous.

Missile Cruiser needs work. Want to move it to Rocketry, but will first have to make room by moving the spaceflight stuff to Satellites.

907: Uniques	*AdvCiv*	*BtS*	*before patch 1.52*
907a Praetorian	strength 7, cost 40, starts with March named "Legionary"	strength 8, cost 45, named "Praetorian"	strength 8, cost 40 named "Praetorian"
Rationale	Clearly intended to be easy to recognize as powerful even for new players, and it worked, but this mod isn't for new players, and the unit is toxic for game balance. Supplants all pre-Renaissance units plus Musketman. Because it's so obvious, I'm nerfing this unit before all others. 7 strength for 40 would be fine, I think, but bland. March is a promotion that doesn't give the unit more raw power, but is still useful, and a good fit flavor-wise as the Roman army was known for its forced marches. As for the name change (only in the English game text), Soren Johnson mentioned in a Twitch video that "Praetorian" was chosen over Legion(ary) to avoid repeating too many names from Civ3, and seemed regretful about this. Legionary is obviously a better fit for the BtS unit, and also fits well with my changes.		
Tbd.	Nerf other early attackers, starting with Axeman; Legionary should then perhaps cost 45 again, which also fits with the high-quality equipment of Roman legions.		
See also	[131](#) gives Legionary Attack City as its default AI type.		

	AdvCiv	*K-Mod*	*BtS*
907b Quechua	cost 15, starts with Combat I named "Quechua Warrior"	cost 20 starts with Combat I +100% vs. Archer named "Quechua"	cost 15 starts with Combat I +100% vs. Archer named "Quechua"
Rationale	The BtS unit is far too powerful, and I don't think the K-Mod nerf really changes that. And players who aren't willing to take advantage of the anti-Archer bonus end up with a unit that is worse than a regular Warrior. "Quechua Warrior" because Quechua is just an ethnic group (like Oromo).		

Tbd.	Want to turn Holkan into the unique Warrior because such an early unique unit makes more sense for an early civilization like the Maya than for the Inca. Free Combat1 could still encourage rush strategies, so I'd rather give the unit an ability that lets it gain XP faster. The Quechua could then become a unique Maceman with lower combat strength and easier tech requirements than a regular Maceman.

908: Traits	*AdvCiv*	*BtS*	*K-Mod*
908a Financial	+1 commerce in tiles with a natural yield* of at least 2 commerce or a total yield of at least 3 commerce.	+1 commerce in tiles with at least 2 commerce.	(as in BtS)
* By "natural yield" I mean the yield from terrain, feature, river and hill. Yield from improvement, building, trait or civic is not part of the natural yield.			
Rationale	The Financial trait is by far the most potent trait in the hands of the AI, to the point that games with several Financial leaders get far ahead of the historical time line, and, unlike most other top-tier traits, players can't help but exploit it. Plus, the K-Mod change to Serfdom makes Financial even more powerful. For these reasons, I've decided to nerf the Financial trait ahead of a full overhaul of the traits that I might still do in the future. Several mods, e.g. Rebalance the Realms, raise the extra yield threshold from 2 to 3, which is easy to do through XML. In terms of power level this seems OK if building discounts are granted in addition (or other traits nerfed), but then there would be no trait that makes coastal cities more worthwhile (without also requiring the Colossus).		
Config	I've changed the semantics of the `ExtraYieldThreshold` ability through the DLL. So, not really configurable; sorry.		
Tbd.	Would like to split Financial into two traits eventually, one dealing with coast and rivers (seafaring flavor), the other with terrain improvements (entrepreneurial flavor).		
See also	031 and 053 reduce AI found values counted for rivers.		

909	reserved		

910	Era tech cost modifiers adjusted; these modifiers were added by BBAI. There's one per era, and it changes the costs of all techs in that era. K-Mod has tweaked them, and eventually (version 1.45) tied them to the inflation rate.		
Config	Set in `Civ4EraInfos.xml`.		
Tech Era	*AdvCiv*	*K-Mod 1.44*	*BBAI*
Ancient	0	0	0
Classical	2%	0	0
Medieval	7%	6%	4%

Renaissance	22%	12%	9%
Industrial	25%	16%	14%
Modern	33%	20%	18%
Future	30%	18%	18%
See also	251 adjusts the AI research speed based on difficulty. 140 adjusts tech costs based on map size.		

911	reserved		

912: Civics	*AdvCiv*	*K-Mod*	*BtS*
Tbd.	Lots of broken civics ...		

912a
Serfdom
	+1 commerce from
	    Farm, Plantation
	-1 commerce from Town
	+50% Worker speed
	Medium upkeep
		+1 commerce from
		    Farm, Plantation
		-1 commerce from Town
		+50% Worker speed
		Low upkeep
			+50% Worker speed
			Low upkeep

Rationale	The switch to Emancipation is a bit too painful in the K-Mod version. At Low upkeep, Serfdom is usually still less powerful than Slavery, but that's not a good baseline, and, for the AI, I'd say Serfdom is more useful than Slavery even with Medium upkeep.		
See also	131b assigns a negative AI weight to Feudalism because the tech is too popular now.		

912b
Pacifism
	military cost 1 gold;
	  only 0.5 gold for the AI
		military cost 0.5 gold	military cost 0.2 to 1 gold
			  depending on difficulty
			  (e.g. 0.2 on Settler, 0.5
			  on Noble, 1 on Deity)

Rationale	It's good that K-Mod decoupled the cost from the difficulty setting because the difficulty-based modifier was undocumented and needlessly complicated. However, the K-Mod change made Pacifism cheaper on all difficulty settings above Noble, and Pacifism had already been one of the more powerful civics in BtS, even on Deity. The AI used Pacifism rarely in K-Mod, and the AdvCiv change might've made the civic unusable for the AI. Therefore, the AI supply cost modifier now applies to the Pacifism cost. This should be not nearly as confusing as the BtS approach because the human cost is always the same, and the AI cost is simply 50% of that. Since the AI needs far more units than the human players to guard its cities, I think it's fair to place a 50% discount on anything that punishes a high unit count.		
See also	250d makes the AI supply cost modifier truly independent of difficulty		
Civics screen shows the cost per unit without inflation (i.e. shows just 1 gold) and shows the current total cost (hypothetical if not currently running Pacifism) including inflation.	Cost per unit shown including inflation. No total shown.		Cost per unit without inflation, no total.
912c	*AdvCiv*	*BtS/K-Mod*	

Hereditary Rule	1 happiness per 2 military units +25% happiness from resources Low upkeep	1 happiness per military unit Low upkeep
Config	Can restore the BtS ability in `Civ4CivicInfos.xml`. If `iHappyPerMilitary Unit` is set to 2, the game treats it as 1 happiness per (one) military unit.	
Rationale	The BtS ability is fiddly, encourages players to train lots of Warriors and never upgrade them (or generally to train more units than needed), makes it too easy to grow cities without buildings and is a poor fit flavor-wise (would fit for a military dictatorship). This ability should arguably be removed from the game entirely, but the replacement that I have in mind (see *Tbd.*) would require some other balance changes that I don't want to make yet. I had to come up with a temporary solution after change 036 (AI trades away non-surplus resources if it doesn't need them) because there were too many civs offering happiness resources during the second third of the game and too few civs willing to import them. The bonus to resource happiness should make Hereditary Rule better than Representation at least in some (rare) circumstances, namely when a civ has a lot of luxury resources (and the matching buildings) and needs even more happiness (due to war weariness I guess). The bonus also means that civs can normally get 2 extra happiness out of Hereditary Rule without making a particular effort, namely by having at least 4 luxuries and station-ing a second unit.	
Tbd.	Want to give it +1 happiness from Monument and Castle and +35% or 40% happiness from resources in the end (and nerf Representation a bit). Will first have to make changes to the Charismatic trait and to Castle.	
912d Slavery	New game option "No Slavery" prevents human civs from adopting the Slavery civic, but allows cities with a Sacrificial Altar to sacrifice population regardless of civics.	
Tbd.	A replacement civic; see future gameplay changes, specifically this file. The Kremlin will also need a new ability eventually.	
Rationale	The balance issues with the hurry ability could probably be solved by allowing only 1 citizen to be sacrificed at a time and by basing the production yield on the city size, but the ability is also complicated, tedious to use (practically requiring the noisy can-hurry alert to be enabled) and highly unrealistic (less so with Sacrifical Altar). So long as I haven't implemented a civic to replace Slavery with, disabling Slavery needs to be optional. Treat the "No Slavery" option as an extra challenge for the human player for now; the AI uses Slavery only sparingly anyway (see 121). Of course one could simply not use Slavery, without the need for a game option, or use it only to train defenders in the event of a surprise attack; the game option is mostly intended to raise awareness.	
Config	Can hide the option in `Civ4GameOptionInfos.xml`.	

test	Temporary changes for debugging and testing are marked with `advc.test.` or `advc.tmp.`

I've kept a "Giant" world size setting commented out in `Civ4WorldInfos.xml`. I use it for tests with more than 18 civs. It's from vincentz's [34-civ mod](#).

make	Changes to the compilation process are marked with `advc.make`.
Credits	The AdvCiv Makefile is essentially [DannyDaemonic](#)'s.

sha	Changes to the merged Show Hidden Attitude Mod (SHAM)	
See also	[130c](#): Changes to rank-based modifiers	
AdvCiv		*SHAM*
No display of the low-rank modifier because this has been disabled by change [130c](#).		"Developing nations should work together to catch up."
No option for hiding "spoilers". 130c changes rank-based modifiers so that they don't give away the ranks of unknown civs. Rank-based hate explained as "You're getting ahead of us".		"We feel threatened by your large civilization."
First impressions not shown when playing with randomized personalities.		Still shows the human penalty from the difficulty setting – which doesn't hurt, but isn't exactly helpful either.
Config	`SHOW_HIDDEN_ATTITUDE` in `GlobalDefines_advc`. Game text in `HiddenAttitudes_CIV4GameText.xml`.	
Removed the penalty "This war is going badly for us"; instead "This war spoils our relations" partly based on war success.		-1 "going badly" if their war success is less than ours, "spoils relations" based only on how long the war has been lasting.
Rationale	The -1 doesn't make any difference, a needless complication. The AI not getting as mad if a war sees no action makes more sense. Gameplay-wise, it's mostly a matter of whether (or at which point) a war enemy becomes the worst enemy.	
If a non-vassal AI civ would otherwise be Pleased toward a non-vassal war enemy, "... spoils our relations" is increased just enough to make the attitude Cautious.		War enemies can have any attitude toward each other, though anything better than Cautious is rare.
Rationale	Weird if the AI is pleased despite war. Cautious is also weird, but less so, and [UWAI](#) actually increases the willingness for peace a little ("Affection cost") if Cautious despite war.	
	Vassals excluded because they don't choose their wars, and may not participate much; conceivable that attitudes remain non-hostile.	

dlph	Bugfixes (and other changes) by DarkLunaPhantom
Credits	[Source](#) (Kek-Mod) I've only adopted those changes that were easy to make (cost/ benefit), and none that only deal with PBEM.
See also	[250c](#) also includes a couple of changes by DarkLunaPhantom [001](#): My own misc. bugfixes

dlph.1	"*Circumnavigation bonus is now always preserved when forming permanent alliance, previously it was only when the player having it had smaller team number.*" (also fixed in K-Mod 1.45)
dlph.2	"*Fixed a (...) bug which caused unremovable espionage city visibility after forming permanent alliance for all cities that the player with larger team number had visibility of at that moment.*"
dlph.3	Defensive pacts despite war

AdvCiv	BtS
BBAI option for defensive pacts despite war enabled, and adopted a bugfix and extension from DarkLunaPhantom: "*now enable[s] defensive pacts to be signed while at war.*" But the AI only signs a DP when sharing all wars; cancels DP when wars are no longer shared. And I'm allowing defensive pacts to be canceled (0 turns to cancel) after a DoW.	When war is declared on a civ, the defensive pacts of that civ take effect and are then canceled. BBAI has an optional rule change that leaves defensive pacts in place after taking effect; disabled by default. A civ that declares war loses all its defensive pacts. Can't sign defensive pacts while at war.

Rationale	May not make defensive pacts a lot more useful, but it's more plausible this way. As for my adjustment: "We'll aid you against any further aggression, but in your current wars, you're on your own" doesn't sound like a typical military pact. The immediate cancelation when no longer sharing all wars happens in `CvPlayerAI::checkCancel`. If that code is removed, then [133](#) will handle the cancelation, resulting in a probabilistic delay. This could give the DP ally enough time to make peace, preserving the DP. After a test, I think a DP will rarely survive a peace deal despite the delay, and it's cleaner to cancel the DP immediately.
See also	[130y](#) reduces the diplo penalty from DoW triggered by a DP. [104i](#) makes the AI willing to talk with all DP allies upon making peace with one of them. [dlph.25](#) allows DP votes while at war.
dlph.4	Can't gift cargo if it contains units that can't be gifted.
See also	An addition to [123a](#)
dlph.5	"*Obsolete buildings and unused power plants (e.g. Nuclear Plant without Uranium or in a city that also has Hydro Plant or receives power from Three Gorges Dam) cannot trigger meltdown event anymore.*" Further change by AdvCiv: Adjust the meltdown probability to game speed (always 0.05% in BtS).
dlph.6	Barbarians can't build spies.
See also	[307](#) prevents the Barbarians from training some later-era units.
dlph.7	Can nuke despite neutral units; they take no damage.
Rationale	If the neutral units took damage (without having to declare war), this would again be exploitable. Units in nuke range not taking damage is counterintuitive, but I don't see a better simple solution.
dlph.8	"*Fixed bug in AI evaluation of gifted unit for the purpose of relations bonus.*"

Not merged	"*Player cannot gift combat units to third party which in war with rival with whom the player has unbreakable (temporary or permanent) peace treaty. Also, the receiving player now must satisfy technology requirements (both for the unit itself and for the prerequisite resources).*" These aren't restrictions that players would intuitively expect, and I'm not sure that they're necessary. (I do think that there should be diplomatic consequences for gifting units beyond "traded with our worst enemy.")
dlph.9	"*Fixed how AI and worker actions treat fallout feature. Fallout had bNoImprovement set to 1 signaling to AI that no improvements can be built there which didn't make sense since fallout can be cleared just like forest and jungle can. This made AI far less likely to scrub fallout (if at all) than to chop jungle although the features are similar. Improvements can now be built directly on top of fallout and fallout will be cleared in the process just like it is with forest and jungle.* *Fixed interface and AI bug that caused the game to sometimes wrongly show an improvement as unbuildable. Sometimes the game doesn't* [realize] *that an improvement can be built. E.g. plains jungle yields 0 food so farm cannot be built as it requires 1 food, but farm can be built there by choping the jungle as the underlying plains terrain yields 1 food. AI followed the same slightly flawed logic as did the interface. My fix for fallout feature introduced many more such situations.*"
dlph.10	"~~*Added verification of state religion. Player shouldn't be able to keep their state religion when there are no cities with it anymore.*~~"
Rationale	Disabled this again. I don't want to force a civ out of its religion while it may still try to reconquer its holy city.
Config	Disabled through `CvPlayer::doTurn`.
dlph.11	"*Fixed advanced start bug with reduced unit costs. Advanced start code is bad in general so I just fixed the immediate problem. (There was a way to get extra gold by refunding a worker while having expansive trait.)*"
dlph.12	"*Removed Disorganized promotion from free barbarians boats with hidden nationality. Hidden nationality units shouldn't be too obviously (non-)barbarian.*" (But I'm not allowing Barbarians to have Privateers.)
dlph.13	"*Fixed permanent alliance bug with AP/UN leader. Similar as with other permanent alliance bugs, if AP/UN leader had higher team number than its permanent ally an empty team would become AP/UN leader instead of the newly formed team.*"
Not merged	"*Changed condition when is a team considered AP/UN full member (and thus eligible for election). Previously all team members had to be full members, but now at least one is enough.*" I don't have an opinion on how this should work.
dlph.14	"*Set barbarian unit* [gold] *costs to 0. These costs don't affect barbarians directly, but they still do influence some decisions.*" Git [commit](#)
dlph.15	"*Moved the code for building missiles for missile carriers outside of assault only case. K-Mod made similar change for building planes for carriers already so I did the same for missiles. Also fixed a bug when checking whether there are enough missiles already.*" Git [commit](#)

dlph.16	"*Bomb Shelter was previously always evaluated as almost completely worthless (!!!). I think that AI should build it as soon as possible pretty much everywhere as it is very cheap and effective.*" Git commit
Not merged	"*SDI evaluation previously ignored that nukes can quickly obliterate entire militaries and there were some issues with estimating number of nuclear attacks.*" Too much work to merge considering that the rules for nukes will have to change at some point, and that the AI code will have to be revised afterwards.
dlph.17	"*Game era calculation changed from rounding down to rounding of all players' average era.*" Git commit
Rationale	I had always assumed that it worked this way, and I'm frequently referencing the game era in AI and Barbarian code, so this should be a significant improvement.
Not merged	"*Added Advanced Settlers game option. When used, settlers behave similarly like in Advanced Era starts, i.e. new cities start with more buildings and population as the game progresses through eras. Settler era is a minimum of player's era and game era [...]*" I want to add something like this, but I'm not quite happy with the implementation. Looks like it could reward stockpiling Settlers, and the cost of a Settler can increase while in production if the player or game era changes, which is a bit messy. Alternative solutions implemented in other mods: A second Settler unit ("Colonist") with a tech requirement in late Renaissance (which mod was that?) and Realism Invictus's Ministries. Another idea: A production bonus for Ancient and Classical buildings from e.g. the Steel technology.
dlph.18	"*Hidden game options are now always set to their default value as they cannot be changed or interacted with anyway and switching between mods can mess up those options.*" (But I've implemented it through `CvInitCore::resetGame`.)
dlph.19	"*Capital cannot be moved while spaceship is underway. Reason is the fact that capturing the capital destroys the travelling spaceship, so capital cannot be hidden in this way after the launch.*"
Tbd.	Would prefer to let the production cost of Palace increase over the course of a game. This could also make it easier to move the capital in the early game when starting in an akward spot.
See also	cdtw.6 causes the AI to move its capital when close to a Space victory.
dlph.20	"*Fixed Bomb Shelter effect for non-combat units. Bomb Shelter used to reduce the probability of nuke destroying a non-combat unit from around 80% to around 2-3% (these probabilities are not immediately obvious and have to be calculated; exercise is left for the reader) because someone was not careful with probabilities. `NUKE_NON_COMBAT_DEATH_THRESHOLD` was probably picked so that the probability is close to average nuke damage to combat units (which is 79%).* I changed the chance to destroy a non-combat unit to exactly 79%, and Bomb Shelter halves that so those are now exactly the same as average damage to combat units. `NUKE_NON_COMBAT_DEATH_THRESHOLD` is now unused.*" Git commit, later bugfix The formula sounds legit; just copied it.

dlph.21	"*Show barbarian territory on the minimap and in the globe view.*"
	Git commit

dlph.22	"*Changed average handicap* [in multiplayer] *from round down to round.*"
	Git commit

See also	250a bases that computation on difficulty values assigned to each handicap through XML.

dlph.23	*AdvCiv*	*Kek-Mod*
	Razing: Not merged; no tile culture is removed. Culture after trade is handled by change 122, which converts only a fraction of city and tile culture. I've adopted the equal treatment of liberation and regular city trade from Kek-Mod. I've merged this change. Cities liberated upon the creation of a colonial vassal still receive the free units; that's also the case in Kek-Mod.	"*Reworked how culture behaves when a city is razed or acquired. Razing a city will now erase (most of) its plot culture. Trading a city will transfer both city and (most of) plot culture to the new owner.* *Not all plot culture will be included because plot culture is generated by different mechanisms (eg. trade routes and free plot culture) and increasing and decreasing city culture doesn't result in adding and removing the same amount of plot culture.* *Also, liberated cities don't get free units just because a vassal acquired them and diplomatic votes resulting in changing of city ownership will leave old owner's culture intact.* *An attempt to get more consistent and sane plot/ city culture effects related to city trades.*" Git commit
Rationale	A single movement point spent on razing a city shouldn't be enough to ethnically (let alone culturally) "cleanse" a region. Likewise, city ownership agreed to on paper shouldn't instantly resolve all ethnic/ cultural conflicts in favor of the new owner.	
Tbd.	Razing should cause some loss of tile culture.	

dlph.24	"*Colonies don't inherit espionage points from parent civ anymore (this didn't seem fair or necessary), but they do inherit EspionagePointsEver.*"
	Git commit

Not merged	"*Colonies cannot reuse player slots anymore as this can cause weird bugs sometimes and this is the easiest fix. Number of players can be easily increased (it already is 48) so this is not necessary.*" The maximal civ count in AdvCiv is only 18 and increasing it comes with a performance penalty. Reusing slots is not really compatible with the Immortal Culture changes (I suppose culture will be set to 0 when the colonial vassal is initialized), but I don't think I want to disallow colonial vassals in games with 18 civs.

dlph.25	"*Reworked resolutions. Fixed multiple bugs and inconsistencies with conditions for proposing and defying resolutions. [...] Vassals cannot defy resolutions anymore. Players can defy resolution assigning them a city. AI can now choose (and vote) to repeal resolutions.*"
	Git commit
	Changed it so that only capitulated vassals are unable to defy. Voluntary vassals can defy everything except war and peace votes (in BtS, they can defy everything, in BBAI they can defy peace votes but not war votes).
	Regarding a comment in `CvPlayerAI::AI_diploVote` about vassals and friends of the Secretary General in repeal votes: "[O]*nly important if the Secretary General plans to vote yes. Incorporating the other case properly would be a lot of additional work....*". I've tried to do that extra work; hope I got it right (so that friends and vassals help the Secretary General repeal resolutions).
	"*Human vassals are forced to vote for their master. Unless they are also a candidate themselves.*"
	Git commit
	Only relevant for the R&F option because humans can't normally become vassals in AdvCiv.
	I'm only applying this to capitulated human vassals.
	"*War resolution can now be proposed against voting members (and non-members). Defensive pacts with attackers are cancelled before implementing war resolution.*"
	I don't think this ever works the way it's implemented in Kek-Mod. `CvGame::canDoResolution` checks if all voting members – including the target! – are able to declare war on the target. I've corrected that: Now only full members are checked, only they declare war and only they can defy the resolution. These change are tagged with `dlph.25/advc`. Moreover, only peace treaties of the AP leader can block a war resolution; peace treaties of other members don't matter. (But the AI tries to honor its promises by voting against war when there is a peace treaty.)
Rationale	Shouldn't expect human players to keep track of peace treaties between AI civs, and don't want to allow players to block war votes by signing peace treaties (e.g. by asking for a gift). K-Mod already allowed vassal agreements to override peace treaties.
See also	130f deals with stop-trading resolutions in a similar way.
Tbd.	Planned changes to membership rules (see 178) will address the problems with war votes in a simpler way. And I don't think I want civs without a state religion to be eligible targets for war votes.
Not merged	"*Religious population for votes in AP is now divided by number of religions in the city. Defiance penalty is now given to the whole team if one team member defies a passing resolution.*"
	This penalizes civs too much for heaving multiple religions and might weaponize Missionaries of non-AP religions. Also, a state religion tends to have larger communities than a non-state religion (and a civ with a state religion not matching the AP religion already has its votes reduced).
	Not sure about the defiance penalty. If civs vote individually, then it seems that they should also bear the consequences individually.
See also	130v makes capitulated vassals vote along with their master and places many other restrictions on capitulated vassals. 178: My own changes to AP votes

k146	K-Mod update 1.46

"Fixed estimateCollateralWeight with non-combat units."
"Fixed potential divide-by-zero in AI_estimateBreakEvenGoldPercent"
"Fixed overflow bug in CvCity::doPlotCultureTimes100"
Not merged; AdvCiv had already fixed these.

"Adjusted of attitude of human players toward AI."
Not merged; I think I got this covered already.

"Restored WHEOOHRN scoreboard indicator."
Not merged; see 210a.

"Tweaks to default options."
Not merged: *"Great person bars should be on by default."* (Disagree.)

"Increased trade culture rate. Instead of 1% per culture level, it's now the average of that and the max rate. ie. percentage = (current level + max level)/2;"
Merged although trade culture is disabled by default in AdvCiv (see 125).

"Updated loading hints: [...] added [...] alt-wake [...]"
That's the only new hint I've merged (press Alt to wake up units worldwide).

"changes to AI_techValue [...] Increased chop value."
I had to water this down a bit because, in combination with change 036, the AI was prioritizing Bronze Working and Iron Working too much.

The remaining changes, i.e. the bulk of the update, are in the back end of the AI and I've merged them almost without adaptation:

"Fixed handling of AI_follow actions which split the group.
CvSelectionGroupAI::AI_update no longer assumes that the group stays intact with CvUnitAI::AI_follow actions."
This fixes a fairly rare non-reproducible crash-to-desktop bug.

"Added CvPlayer::haveResourcesToTrain
This is used to help with AI decisions when it isn't clear which city we'll be building in."
Used in just one place so far though.

"Decreased food devalue rate. (Fast growth is more highly valued.)
bEmphasizeFood causes more optimistic evaluation of slave-whipping.
SlaveryValue re-written to use a 'devalue rate' system.
growthValue now takes into account the food cost of worked jobs.
'plotMagicValue' now (usually) assumes fully-upgraded improvements.
'Emphasise food' should work better now.
CvPlot::getYieldWithBuild bWithUp now uses full upgrade rather than 2 stages."

"AI_updateCommerceWeights now better understands focused espioange.
Having very high values on the espionage weight slider are now taken to mean that you don't want to spend espionage on the other teams. This reduces the chance of the AI choosing to assign spies inapproriately. Previously, having a non-zero weight against a team was taken to mean that the player wanted to [have?] espionage points against that team - and thus espionage was more highly valued if the points were low. Now that is only the case if the weight is above a certain threshold. The threshold is based on total weight, and number of teams etc."

"Minor changes to AI unit movements.
Tweaked attack threshold for AI_attackCityMove. Increased the acceptable number of ship loading turns AI_attackCityMove
Disabled the 'smart' danger aversion in AI_pirateBlockade. (It was computationally expensive, and not particularly effective.)"

"Minor tweaks to CvCityAI::AI_buildingValue
Reduced building value of free-tech. (The evalutation for this is still just a very poor guess; but it is very diffcult to evaluate it properly. A true evaluation would require details which we currently do not take into account.)

Reduced the value of espionage commerce multipliers."

"*Many changes to AI_techUnitValue*
We now use slightly more detailed war state info: bLandWar, bIsAnyAssault.
Default AI type max value weight increased from 100 to 250, but calculated weight decreased. (ie. Units that are good at their default role will now be valued much more highly; but units that are poor will be valued slightly lower.)
Increased max value weight for non-default types (from 100 to 150).
Adjusted most military values based on bLandwar status, as well as other strategy adjustments; such as for ECONOMY_FOCUS.
Added an optimistic value bonus for tech which reveal required resources."

"*For UNITAI_COUNTER, reduced value of attack modifier, added value for defence modifier. Reduced value of speed. For UNITAI_CITY_DEFENSE, added value for hills defence.*"

"*Tweaked small-city yield evaluation. Yield evaluation now assumes that cities with population < 3 will want to grow, even if there are currently no good jobs. This helps prevent flip-flopping with food plots.*"

"*Many changes to AI_techValue.*
Disabled the random value bonuses for techs with iPathLength > 1. (Raw bonus, and bonus from wonders). ie. techs for which not all prereqs have been met no longer get these random bonuses.
Note: This is partially to help the AI focus on real benefits; but a big reason for removing this randomness is a technical one. [...] *changing the way multi-step research paths are evaluated. Having randomness in prereqs could upset the evaluations because the values will be used for several techs.*
Decreased random wonder value.
Increased the value of gold trading.
Changed several constant values to scale with the number of cities. (These things don't necessarily have anything to do with the number of cities. We're only multiplying by cities so that the value scales like things which are evaluated properly.)
Moved project evaluations to a new function: AI_techProjectValue.
Increased value of civic improvements.
Decreased the value of religions.
Rewrote evaluatation of bonus techs. It's now based on the average of the max tech cost and average tech cost for currently researchable techs.
Renamed bIgnoreCost to bFreeTech, to better reflect what the argument is used for. Rescaled the return value so that it is roughly comparable for free and non-free tech.
Renamed "tech whoring" to "tech ground-breaking", to better reflect the concept. (ie. getting the tech first, for better trade options.) Slightly increased the value."

"*Rewrote CvPlayerAI::AI_bestTech to better consider tech pathways.*
Previously the AI would choose to beeline high-value techs within the depth limit without considering the prerequisites at all. This sometimes led to poor choices; eg. getting stuck on very high cost prereqs, or researching prereqs which would obsolete important bonuses. In the new system, the AI only ever chooses techs that they can research; but adds value based on which techs follow on.
NOTE: this is a totally new system which will require some changes and balance."
I had fixed [these two](#) bugs and [another](#) one mentioned [here](#) by Mattygerst, but replaced my bugfixes with the code karadoc released in early May 2018. I've decreased the `DepthRate` so that the AI is less interested in beelining toward powerful techs. I worry that a high `DepthRate` makes AI tech paths too predictable.

kmodx	Bugfixes from K-Mod Extended

Credits	By alberts2
	[Git repository](#)
	These issues appear to have been found through a stricter compiler or some other code analysis tool. A lot of it just improves hazardous code, but there are also actual bugfixes, e.g. comparisons betweens different enum types and a mix-up of inner- and outer-loop variables. Hard to say how significant these bugs were, but good riddance!
	I'm listing the descriptions of the merged Git commits below.
	K-Mod 1.45 includes these fixes as well, but I had merged them separately before v1.45 was published.
"Fixed a MemoryLeak in CvDllPythonEvents::reportSelectionGroupPushMission *Fixed a memory leak in CvGameTextMgr::setCombatPlotHelp* *Fixed uninitialized variables in CvInfoWater.cpp* *Fixed the CyGameTextMgr(CvGameTextMgr* pGameTextMgr) constructor* *Fixed a few coding errors* *Fixed various coding errors"*	

cdtw	AI changes by Dave_uk
Credits	[Source](#) (LoR SDK ModMod)
	Dave's changes in the LoR code are tagged with "CD Tweaks". I don't know what the "CD" stands for, but, anyway, hence my tag "cdtw".
	I've adoped only a small portion of his changes because some are only important for LoR (with its focus on modern warfare), many superseded by K-Mod/AdvCiv and a few I didn't find worth having (e.g. because of a planned gameplay change or too minor). And I've made some small changes to the code I did adopt.
cdtw.1	"*vassals are more keen to keep* [rather than raze] *cities, as they can't declare war themselves to expand*"
cdtw.2	Regarding the AI choice of target city when in a Blitz or Fast-mover strategy: "*when blitzing place higher value on cities with no defense modifiers*"
cdtw.3	AI evaluation of tech that unlocks a process (Alphabet, Currency, Drama): "*value good processes if we already have lots of units, and are not at war with anyone*".
	Disabled this again after some testing. Early unit spending doesn't seem to be an issue in K-Mod/AdvCiv.
cdtw.4	Greater willingness to switch to Police State when war weariness is painful.
cdtw.5	"*if we're worried about being attacked, don't wait to sign defensive pacts*"
cdtw.6	"*if we're going for a space victory let's quietly relocate our capital away from the coast*"
	Probably bugged in LoR SDK ModMod because `AI_isDoStrategy` had been confused with `AI_isDoVictoryStrategy`.
See also	[dlph.19](#) disallows moving the capital once the spaceship has been launched. So the AI can only move its capital prior to launch.
cdtw.7	"*if going for culture victory, build lots of fighters to avoid be*[ing] *blitzed*"
	Disabled again. I guess that's really only smart when playing with Dale's Combat Mod.
cdtw.8	"*if our best city attacker is crappy, be less likely to build invaders, unless we aren't paying support costs yet*"
	Disabled again; K-Mod seems to have this covered.

cdtw.9	In Unit AI, a few checks for same owner replaced by same team.

advc.rom	Misc. changes adopted from RoM-based mods
Credits	Some of the largest Civ 4 mods are based on <u>Rise of Mankind</u> (RoM, started 2007), including <u>A New Dawn</u> (Rand), <u>Caveman to Cosmos</u> (C2C), <u>Vincentz Infinite Projects</u> (VIP) and <u>Dawn of the Overlords</u> (DotO).
	RoM/Rand and C2C have had several AI programmers among their contributors. It seems that most of the AI changes are specific to the many features added by those mods, superseded by K-Mod/AdvCiv or not worth adopting from a cost-benefit angle.
	I'm listing some of the changes that I did adopt here; others are so minor that I'll only tag them with "advc.rom" in the source code.
Tbd.	I'm still in the process of sifting through the revision histories on SourceForge.
rom1	*"% modifiers are undervalued by the AI for two reasons:* *1) It only calculates its efect at the time of construction, but that discounts future increases as base reserach goes up* *2) In the early game because this calculation only takes account of the absolute increase, not its proportion of the civilization whole, which will be substantial early on (indeed 100% with 1 city).* *We therefore apply a small boost to reflect futures, and compare to the whole and make an upward adjustment proportional to the ratio with the civilization whole.* *FUTURE - should we do this for other commerce types too? I am inclined to say no for hammers (since what you produce with them sacles with civ size, which the tech tree does not except very indirectly via progression through it). Not sure about gold or espionage."*
	<u>SVN revision</u>
	This change increases the utility assigned by the AI to buildings that increase a city's research rate. However, this applies only when the City AI wants to focus on research buildings, which is actually never the case in K-Mod. So I'm also adding this Koshling change from the same revision:
	"increased priority for economic builds,"
	which makes the AI choose city production with focus on all economy buildings, including research buildings.
	Removed this again; in multiple test games, it never had any effect. Looks like K-Mod already prioritizes economic buildings sufficiently. The AdvCiv code with the change still present: <u>Git commit</u>
Credits	Koshling
rom2	AI doesn't reassign working plots while in anarchy as "*plots return no yields anyway*."
	<u>SVN revision</u>
	Reassigned working plots don't seem to be causing problems in AdvCiv, but it does save some CPU time.
Credits	Afforess