

Credits to **dcor** for his handy [Combat Odds Calculator](#), to **Robert Cebula** for the BtS 3.13 [Reference Guide](#) and to [Boris Gudenuf](#) for his CFC posts about military history and game design. A few ideas are from other mods: [Civ 4 Reimagined](#), [Rebalance the Realms](#), [Realism Invictus](#), [American Civil War](#), [K-Mod-Z](#), [Dawn of Knoedel](#), [Dawn of Civilization](#), [Heph Mod](#), [Rise of Mankind](#), [New Balance Mod](#).

Blue: To be changed or added (but removed abilities aren't indicated)

Green: Already implemented in AdvCiv/K-Mod (but different from BtS)

Pink: Entirely different, details not color-coded

Brief rationales are given in the endnotes, but tech requirements, obsolescence techs and some of the resource requirements are only explained in `tech-tree.pdf` except for special requirements of unique units and buildings, which are covered by this file.

Civilizations¹

American Empire	Agriculture Fishing	Navy Seal (Marine) Mall (Supermarket)
Arabian Empire	Fishing Wheel	Camel Archer (Knight) House of Wisdom (Library)
Aztec Empire	Agriculture Hunting	Jaguar (Swordsman) Sacrificial Altar (Courthouse)
Babylonian Empire	Agriculture Wheel	Bowman (Archer) Garden (Aqueduct)
Byzantine Empire	Fishing Mysticism	Cataphract (Knight) Hippodrome (Arena)
Carthaginian Empire	Fishing Mysticism	Numidian Cavalry (Horse Archer) Cothon (Harbor)
Celtic Empire	Mining Wheel	Gallic Warrior (Swordsman) Dun (Walls)
Chinese Empire	Mysticism Wheel	Cho-Ko-Nu (Crossbowman) Pavilion (Theater)
Dutch Empire	Fishing Wheel	East Indiaman (Frigate) Dike (Levee)
Egyptian Empire	Agriculture Mysticism	War Chariot (Chariot) Obelisk (Monument)
English Empire	Fishing Mining	Redcoat (Grenadier) Stock Exchange (Bank)
Ethiopian Empire	Hunting Mining	Oromo Warrior (Rifleman) Stele (Monument)
French Empire	Agriculture Wheel	Musketeer (Musketman) Salon (Observatory)
German Empire	Mining Wheel	Panzer (Tank) Assembly Plant (Factory)

Greek Empire	Agriculture Fishing	Phalanx (Spearman) Odeon (Theater)
Holy Roman Empire	Hunting Wheel	Landsknecht (Pikeman) Rathaus (Courthouse)
Incan Empire	Agriculture Hunting	Quechua Warrior (Maceman) Tambo (Granary)
Indian Empire	Mysticism Wheel	Fast Worker (Worker) Mausoleum (Cathedral)
Japanese Empire	Fishing Mysticism	Samurai (Maceman) Shale Plant (Coal Plant)
Khmer Empire	Hunting Mysticism	Ballista Elephant (War Elephant) Baray (Aqueduct)
Korean Empire	Mining Mysticism	Hwacha (Crossbowman) Seowon (Monastery)
Malinese Empire	Hunting Mining	Javelineer (Spearman) Mint (Forge)
Maya Empire	Agriculture Mining	Holkan (Warrior) Ball Court (Arena)
Mongolian Empire	Hunting Wheel	Keshik (Knight) Ger (Stable)
Native American Empire	Fishing Hunting	Dog Soldier (Axeman) Totem Pole (Monument)
Ottoman Empire	Agriculture Wheel	Janissary (Musketman) Hammam (Arena)
Persian Empire	Agriculture Mysticism	Immortal (Spearman) Apothecary (Grocer)
Portuguese Empire	Fishing Mining	Carrack (Caravel) Feitoria (Customs House)
Roman Empire	Fishing Mining	Legionary (Swordsman) Forum (Market)
Russian Empire	Hunting Wheel	Cossack (Cavalry) Research Institute (Particle Accelerator)
Spanish Empire	Mining Mysticism	Conquistador (Cuirassier) Citadel (Castle)
Sumerian Empire	Agriculture Mining	Vulture (Axeman) Ziggurat (Courthouse)
Viking Empire	Fishing Hunting	Berserker (Maceman) Trading Post (Lighthouse)
Zulu Empire	Agriculture Hunting	Impi (Axeman) Ikhandu (Barracks)

Traits²

- Bellicose**³ (Bel) Cyrus (Civ), Montezuma (Dev), Brennus (Ent), Julius (Law), Alexander (Inn), Mehmed (Pio), Ragnar (Cos), Shaka (Prt), Genghis Khan (Exp)
Melee and Gunpowder units start with Combat I
-25% unit upgrade cost
faster production of Barracks/ Ikhandas
- Civilized**⁴ (Civ) Cyrus (Bel), Ramesses (Dev), Willem (Ent), Pericles (Gra), Hammurabi (Law), Qin (Inn), Gandhi (Pio), Gilgamesh (Prt), Augustus (Exp)
+2 culture rate in all cities
faster production of Library
- Developmental**⁵ (Dev) Montezuma (Bel), Ramesses (Civ), Pacal (Gra), Huayna Capac (Law), Catherine (Inn), Zara Yaqob (Pio), Hannibal (Cos), De Gaulle (Prt), Kublai Khan (Exp)
25% faster production of Worker and Work Boat
15% food stored after population growth
faster production of Lighthouse, Aqueduct, Hydro Plant, Coal Plant and Nuclear Plant
- Enterprising**⁶ (Ent) Brennus (Bel), Willem (Civ), Hatshepsut (Gra), Lincoln (Law), Washington (Inn), Mansa Musa (Pio), Joao (Cos), Tokugawa (Prt), Victoria (Exp)
+1 commerce from improved resources and Oasis
+1 commerce from Town
faster production of Market
- Grandiose**⁷ (Gra) Pericles (Civ), Pacal (Dev), Hatshepsut (Ent), Boudica (Law), Louis (Inn), Suryavarman (Pio), Roosevelt (Cos), Mao (Prt), Darius (Exp)
+50% wonder production
-15% anger from crowdedness
faster production of Arena
- Lawful**⁸ (Law) Julius (Bel), Hammurabi (Civ), Huayna Capac (Dev), Lincoln (Ent), Boudica (Gra), Frederick (Inn), Asoka (Pio), Bismarck (Cos), Sitting Bull (Prt), Napoleon (Exp)
Can have a revolution without anarchy once per era and on any turn on which a new civic or religion becomes available
faster production of Courthouse and Jail
- Innovative**⁹ (Inn) Alexander (Bel), Qin (Civ), Catherine (Dev), Washington (Ent), Louis (Gra), Frederick (Law), Charlemagne (Pio), Elizabeth (Cos), Wang Kon (Prt), Peter (Exp)
+65% Great Person birth
+5% research
faster production of University
- Pious**¹⁰ (Pio) Mehmed (Bel), Gandhi (Civ), Zara Yaqob (Dev), Mansa Musa (Ent), Suryavarman (Gra), Asoka (Law), Charlemagne (Inn), Isabella (Cos), Saladin (Prt), Justinian (Exp)

+1 health per city religion
+1 production from all state religion buildings
faster production of Temple

Cosmopolitan¹¹ (Cos) Ragnar (Bel), Hannibal (Dev), Joao (Ent), Roosevelt (Gra),
Bismarck (Law), Elizabeth (Inn), Isabella (Pio),
Churchill (Prt), Suleiman (Exp)

+1 commerce on water tiles
+1 trade route in cities on rivers
faster production of Harbor/ Cothon and Airport

Protective¹² (Prt) **Shaka** (Bel), Gilgamesh (Civ), **De Gaulle** (Dev),
Tokugawa (Ent), Mao (Gra), Sitting Bull (Law), Wang Kon (Inn),
Saladin (Pio), Churchill (Cos), **Stalin** (Exp)

Archery and Gunpowder units start with Garrison I and **Guerilla**
+20% espionage
faster production of **Castle and Police Headquarters**¹⁷⁷

Expansionistic¹³ (Exp) Genghis (Bel), Augustus (Civ), **Kublai Khan** (Dev), Victoria (Ent),
Darius (Gra), **Napoleon** (Law), **Peter** (Inn), Justinian (Pio),
Suleiman (Cos), **Stalin** (Prt)

-50% civic upkeep
+50% faster production of Settler

Terrain, Features, Elevation

Grassland	1 move	2 food +1 commerce from river +1 food with Genetics if already at least 5 food
Plains	1 move	1 food, 1 production +1 commerce from river
Desert	2 moves ¹⁴	+1 commerce and Flood Plains with river -35% Worker speed ¹⁵ founding a city requires fresh water ¹⁶
Tundra	1 move	1 food +1 commerce from river -35% Worker speed ¹⁵
Snow ¹⁷	2 moves	-50% Worker speed can only found city at coast
Coast	1 move	2 food, 1 commerce +1 commerce from Lighthouse ¹⁸ +1 commerce from Public Transportation ¹⁹ +10% defense requires Fishing
Ocean	1 move	2 food, 1 commerce requires Lighthouse ²⁰

Exclusion Zone ²¹	+1 move	-3 food, -3 production, -3 commerce +0.5 bad health in nearby cities cannot build any improvements 1% chance of disappearing
Hill	+1 move	-1 food, +1 production +25% defense +0.5 health if in city tile ²²
Peak	2 moves	impassable (except by Recon units) ²³
Jungle	+2 moves	-1 food ²⁴ +1 commerce with Environmentalism ²⁵ +25% defense for ²⁶ Melee and Gunpowder units unless tile owned by attacker ²⁷ -1 commerce from river req. Mining to clear -35% Worker speed ²⁸
Oasis	-1 move ²⁹	+3 food, +2 commerce source of fresh water cannot build any improvements +50% Worker speed ³⁰
Flood Plains	-1 move ¹⁴	+3 food +0.4 bad health in nearby cities
Forest	+2 moves	+1 production +1 commerce with Environmentalism ³¹ +25% defense for ²⁶ Melee and Gunpowder units unless tile owned by attacker ²⁷ +0.5 health in nearby cities -1 commerce from river can be chopped for production of buildings and pre-Industrial ships ³² (up to 20 with Bronze Working, up to 30 with Machinery) req. Mining to clear
Ice	+/- 0 moves	impassable (except by Submarines)
Lake	+/- 0 moves	+1 food fresh water source max. size 2 to 7 tiles ³³
Islet ³⁴	+/- 0 moves	+1 production

Improvements

Mine	req. Mining only on Hill or resource	+1 production +1 production from Rail Track (2 if no Forest) doesn't remove feature ³⁵ chance of discovering resource while worked Aluminum: +3 production, +1 commerce Coal: +3 production Copper: +2 production, +2 commerce ³⁶
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		Iron: +3 production Gems: +1 production, +5 commerce Gold: +1 production, +6 commerce Silver: +1 production, +4 commerce Uranium: +3 commerce ³⁷ 4 turns to build
Windmill	req. Engineering only on Hill, only Plains or Grassl. ³⁸	+1 food, +1 commerce +1 production with Replaceable Parts +2 commerce with Environmentalism 5 turns to build
Cottage	req. Pottery not on Snow, Desert ³⁹	+1 commerce becomes a Hamlet after 10 turns 4 turns to build
Hamlet	from Cottage	+2 commerce +1 commerce from Caste System ⁴⁰ becomes a Village after 20 turns
Village	from Hamlet	+3 commerce +1 commerce from Caste System ⁴⁰ +1 commerce with Printing Press becomes a Town after 40 turns
Town	from Village	+4 commerce +1 production from Universal Suffrage +1 commerce from Enterprising trait ⁶ +1 commerce with Printing Press -1 commerce from Serfdom ⁵¹⁸
Farm	req. Agriculture only on resource, or irrigated Plains , Desert or Grassl. ⁴² (Aqueduct and Steam Power help spread irrigation, and Crop Rotation allows Grassland Farm w/o irrigation) ⁴⁴	+1 food if irrigated or Grassland ⁴¹ +1 commerce from Serfdom ⁵¹⁸ +1 food from Biology Corn: +1 food Rice: +2 food ⁴³ Wheat: +2 food 5 turns to build
Watermill ⁴⁵	req. Machinery only river-side one per river bank	+1 production, +1 commerce +1 production with Replaceable Parts +1 commerce with Electricity 4 turns to build
Workshop ⁴⁶	req. Pottery only flat tiles only Plains until Guilds	-1 food, +2 production +1 production from State Property +1 production with Replaceable Parts 5 turns to build
Lumbermill	req. Machinery only on Forest	+1 commerce ⁴⁷ +1 production with Political Economy

		+1 production from Rail Track doesn't remove Forest 4 turns to build
Forest Preserve	req. Ecology not on Snow, Desert	+1 commerce ⁴⁷ +1 commerce from Rail Track ⁴⁸ 36 turns to grow a Forest , minus 4 per adjacent Forest doesn't remove Forest and Jungle +0.5 health in nearby cities on Forest or Jungle: +1 health in nearby cities 4 turns to build
Fishing Boats	only on resource ⁴⁹	Clam +1 food, +2 commerce ⁵⁰ Crab: +1 food Fish: +2 food +1 food with Refrigeration built by Work Boat
Whaling Boat	req. Compass only on Whale	+2 production ⁵¹ , +2 commerce built by Work Boat
Offshore Platform	req. Plastics only on Oil	+2 production, +4 commerce ⁵² built by Work Boat
Well	req. Combustion only on Oil	+2 production, +4 commerce ⁵² 8 turns to build
Camp	req. Hunting only on resource	Deer: +2 food Fur: +4 commerce ⁵³ Ivory: +1 production, +1 commerce doesn't remove Forest or Jungle 2 turns to build ⁵⁴
Pasture	req. Animal Husbandry only on resource	Horse: +2 production, +1 commerce Cow: +1 food, +1 commerce , +1 production ⁵⁵ Pig: +2 food ⁵⁶ Sheep: +1 food, +2 commerce 4 turns to build
Plantation (Dye, Incense, Silk) ⁵⁷	req. Agriculture only on resource	Dye: +4 commerce Incense: +5 commerce Silk: +3 commerce doesn't remove Forest ⁵⁸ 4 turns to build ⁵⁹
Plantation (Banana, Sugar, Spices)	req. Guilds only on resource	Banana: +2 food Spices: +3 commerce Sugar: +1 food, +1 commerce doesn't remove Forest ⁵⁸ 6 turns to build ⁵⁹
Winery	req. Monotheism only on resource	Wine: +1 food, +2 commerce 5 turns to build
Quarry	req. Masonry	Marble: +1 production, +2 commerce

	only on resource	Stone: +2 production +1 production from Rail Track 6 turns to build
Fort	req. Monarchy	+25% tile defense for up to 6-10 units ⁶⁰ acts as a city ⁶¹ 8 turns to build ⁶²

Routes⁶³

Rail Track ⁶⁴	req. Railroad req. Coal or Iron	sets movement cost to 0.1 +1 production for Mine, Quarry, Lumbermill +1 commerce for Forest Preserve ⁴⁸ 4 turns to build ⁶⁵
Road	req. Wheel	sets movement cost to 0.5 2 turns to build

Resources

Aluminum	+1 production	revealed by Electricity on Plains Hill, Desert Hill and Tundra Hill
Banana	+1 food	+1 health +1 health from Grocer on flat Jungle Grassland and Jungle Plains ²⁴
Clam	+1 commerce	+1 happiness ⁶⁶ +1 health from Harbor on Coast
Coal	+1 production	revealed by Steam Power on Grassland Hill and Plains Hill disconnected by National Park, Environmentalism
Copper	+1 production	revealed by Bronze Working +1 happiness from Forge ⁶⁷ on Hill ⁶⁸ tiles without features
Corn	+1 food	+1 health +1 health from Granary on flat Grassland and Plains ⁶⁹ without features
Cow	+1 food	+1 health +1 health from Supermarket on flat Grassland and Plains tiles without features
Crab	+1 food	can't be traded until Railroad ⁷⁰ +1 health +1 health from Harbor on Coast
Deer	+1 food	+1 health obsolete with Equality on flat Tundra

Dye	+1 commerce	+1 happiness on flat Jungle Grassland ²⁴ obsolete with Combustion
Fish	+1 food	+1 health +1 health from Harbor on workable water tiles
Fur	+1 commerce	+1 happiness +1 happiness from Market obsolete with Plastics on flat ⁷¹ Tundra and Snow, global spread ⁷²
Gems	+1 commerce	+1 happiness +1 happiness from Market ⁷³ on Jungle Grassland ⁷⁴ , global spread ⁷²
Gold	+1 commerce	+1 happiness +1 happiness from Forge on hilly Plains, Desert and Snow ⁷⁵ without features, global spread ⁷²
Hit Movies/Singles		+1 happiness +1 happiness with Broadcast Tower +1 happiness from Mall generated by Hollywood/Rock'n'Roll
Hit Musicals		+1 happiness +1 happiness with Broadcast Tower generated by Broadway
Horse	+1 production	revealed by Animal Husbandry obsolete with Advanced Flight +1 happiness from Hippodrome on flat Grassl., Plains or Tundra without features
Incense	+1 commerce	revealed by Mysticism +1 happiness +1 happiness from Temple ¹⁰¹ on Desert without features ⁷⁶
Iron	+1 production	revealed by Iron Working on land tiles ⁶⁸ without features except on Snow ⁷⁷
Ivory	+1 production	+1 happiness ⁷⁸ obsolete with Ecology on flat ⁷⁹ Jungle Grassland and Plains ²⁴
Marble	+1 production	on Plains and Tundra ⁷⁷ tiles without features
Oil	+1 production	revealed by Combustion +1 bad health ⁸⁰ +1 bad health from Factory on flat Desert, Tundra and Snow tiles without features, and on Ocean and Jungle Grassland

Pig	+1 food	+1 health +1 health from Supermarket on flat Grassland Forest and flat Plains ⁸¹
Rice	+1 food	+1 health +1 health from Granary on flat non-Forest Grassland
Sheep	+1 food	+1 health +1 happiness ⁸² from Supermarket on Grassland and Plains tiles without features
Silk	+1 commerce	revealed by Animal Husbandry +1 happiness +1 happiness from Market on flat Grassland Forest and flat Plains Forest
Silver	+1 commerce	+1 happiness +1 happiness from Forge on hilly Tundra, Tundra Forest and Grassland Forest ⁷⁵ , global spread ⁷²
Spices	+1 commerce	+1 happiness +1 health from Grocer on Grassland and Plains, Forest and Jungle ⁸³
Stone	+1 production	can't be traded ⁸⁴ on Plains and Desert without features
Sugar	+1 food	+1 happiness ⁸⁵ on flat Grassland Jungle and Plains Jungle ²⁴
Uranium		revealed by Radio ⁸⁶ on any land tile
Whale	+1 food	+1 happiness +1 happiness from Market obsolete with Combustion on Ocean
Wheat	+1 food	+1 health +1 health with Granary on flat Plains without features
Wine	+1 commerce	+1 happiness +1 health from Grocer on non-Jungle ⁸⁷ Plains

Buildings

Faster production of UB from trait only listed if there is a leader that has both the UB and the trait (although the bonus could always apply with the Unrestricted Leaders option). Trait bonuses to "all religious buildings" are not listed here.

Values within ranges (e.g. 2-4 Temples for Cathedral) are determined by the map size.

Airport	250	Advanced Flight Oil	+1 trade route +3 XP for Air units +4 Air unit capacity +1 bad health with Oil can airlift non-mechanized land units ⁸⁸ and missiles (except ICBM) ⁴²⁶ with Oil faster production with Cosmopolitan trait
Aqueduct	100	Mathematics Mining	+2 health city tile gains fresh water if city has fresh water ⁸⁹ faster production with Developmental trait
Baray	100	Mathematics Mining	+2 health city tile gains fresh water if city has fresh water +1 food
Garden	100	Mathematics Mining	+3(2?) health next to fresh water: city tile gains fresh water +1 happiness ⁹⁰
Barracks	50	Monarchy	+3 XP for land units +1 XP for naval units ¹³⁰ +2 happiness from Militarism faster production with Bellicose trait
Ikhandu	50	Monarchy	+3 XP for land units +1 XP for sea units +2 happiness from Militarism -20% city maintenance faster production with Bellicose trait
Stable	60	Animal Husbandry Horse or Ivory ⁹²	+3 XP for Mounted units ⁹¹ obsolete with Advanced Flight
Ger	60	Animal Husbandry Horse or Ivory	+3 XP for Mounted units Mounted units start with Skirmisher I ⁹³ obsolete with Advanced Flight
Fallout Shelter ⁹⁴	100	Medicine Steel Manhattan Project	-50% damage from Tactical Nuke and ICBM
Broadcast Tower	180	Mass Media power ⁹⁵	+50% culture +25% espionage ⁹⁶ +1 happiness per 10% culture +1 happiness from Hit Musicals, Singles, Movies 2 Artist slots 1 Spy slot
Monastery/ Madrasa/ Confucian Academy ⁹⁷	60	Meditation religion	+10% research +10% research with Alchemy +2 culture can train Missionaries of religion obsolete with Scientific Method

Seowon ⁹⁸	60	Meditation religion	+20% research +2 culture 1 Scientist slot can train Missionaries of religion
Cathedral/ Mosque/ Ancestral Hall/ ¹⁰² Synagogue/ Pagoda ¹⁰⁴ /Stupa/Mandir/Fire Temple ¹⁰⁵	225 ⁹⁹	Patronage 1 per 2-4 Temples	+40% culture ¹⁰⁰ +1 happiness ¹⁰¹ +2 happiness if religion is state religion 1 Priest slot ¹⁰³
Mausoleum ¹⁰⁶	240	Divine Law 1 per 2-3 Temples	+50% culture +2 happiness +1 happiness if religion is state religion 1 Priest slot faster production with Marble
Temple	75	Priesthood religion	+1 happiness +1 happiness from Incense ¹⁰¹ +1 culture 1 Priest slot faster production with Pious trait
Walls	50	Masonry	raises city defense to 50% ¹⁰⁷ +25% defense vs. Mounted ¹⁰⁸ +10% defense vs. Melee and Archery ¹⁰⁹ obs. with Railroad faster production with Stone
Dun	50	Masonry	raises defense to 50% +25% defense vs. Mounted +15% defense vs. Melee and Archery Melee ¹¹⁰ and Archery units start with Mountaineer I obs. with Railroad faster production with Stone
Castle	100	Feudalism	+1 happiness with Hereditary Rule ¹¹¹ +1 trade route -50% bombardment speed of pre-Gunpowder Siege ¹¹² 1 Artist slot ¹¹³ obsolete with Liberalism faster production with Stone or Protective trait ¹¹⁴
Citadel	100	Feudalism	+1 happiness with Hereditary Rule +1 trade route -50% bombardment speed 1 Artist slot obsolete with Steel ¹¹⁵ faster production with Stone
Bunker ¹¹⁶	90	Steel	-50% collateral and air damage

			-50% bombardment speed damage limits apply to mechanized units
Coal Plant	140	Electricity Coal ⁹²	+3 bad health with Coal ¹¹⁷ provides power with Coal
Shale Plant	140	Electricity	+3 bad health with Coal provides power with Coal ¹¹⁸ provides 1 Oil to the city
Hydro Plant	250 ¹¹⁷	Electricity Steel river	provides power
Nuclear Plant	350 ¹¹⁷	Fission Uranium ⁹²	provides power chance of nuclear meltdown
Arena ¹¹⁹	110	Republic Masonry	+1 happiness +1 happiness per 10% culture rate ¹²⁰ faster production with Stone or Grandiose trait ¹¹⁴
Ball Court	90	Priesthood Masonry	+2 happiness ¹²¹ +1 happiness per 10% culture rate
Hamam	90	Construction	+1 happiness ¹²² +1 happiness per 10% culture rate +2 health
Hippodrome	110	Republic	+1 happiness +1 happiness with Horse +1 happiness per 6% culture rate ¹²³ faster production with Stone
Theater	50	Literature	+3 culture +1 happiness from Representation ¹²⁴ +1 happiness per 20% culture rate ¹²⁰ 2 Artist slots
Odeon	50	Literature	+3 culture +20% culture ¹²³ +1 happiness from Representation +1 happiness per 10% culture rate 2 Artist slots
Pavilion	50	Aesthetics	+3 culture +1 happiness ¹²⁵ +1 happiness from Representation +1 happiness per 20% culture rate 2 Artist slots
Courthouse	120	Code of Laws	-50% maintenance +4 espionage ¹²⁶ 1 Spy slot faster production with Lawful trait

Rathaus	120	Code of Laws	-75% maintenance +2 espionage 1 Spy slot
Sacrificial Altar	120	Code of Laws	-50% maintenance +2 espionage 1 Spy slot can sacrifice population ¹²⁷ to finish city production
Ziggurat	100	Priesthood	-50% maintenance +1 happiness ¹²⁸ +1 culture 1 Priest slot faster production with Lawful trait
Lighthouse	60	Sailing coastal	can work Ocean ²⁰ +1 commerce on Coast ¹⁸ faster production with Developmental trait
Trading Post	60	Sailing coastal	can work Ocean +1 commerce on Coast +3 XP for naval units ¹²⁹
Drydock	95 ¹³⁰	Replaceable Parts coastal	+50% Naval unit production +1 bad health
Harbor	80	Construction Lighthouse	+1 health from Clam, Crab and Fish +1 XP for naval units ¹³⁰ +1 commerce per trade route ¹³¹ +1 trade route with Plastics 1 Merchant slot ¹³² faster production with Cosmopolitan trait
Cothon	120	Construction Lighthouse	+1 health from Clam, Crab and Fish +1 XP for naval units +1 commerce per trade route +1 trade route 1 Merchant slot faster production with Cosmopolitan trait
Customs House	120 ¹³³	Political Economy Harbor	+2 commerce ¹³¹ per foreign maritime ¹³⁴ trade route
Feitoria	120	Political Economy Harbor	+1 commerce ¹³⁵ per foreign maritime trade route +1 production per maritime trade route ¹³⁶
Levee	180	Steam Power river	+1 production on flat riverbank tiles ¹³⁷
Dike	150 ¹³⁸	Engineering Coast	+1 production on flat riverbank tiles +1 production on water tiles orthogonally adjacent to land ¹³⁹
Forge	110	Iron Working	+1 happiness from Gold, Silver and Copper ⁶⁷ +20% production ¹⁴⁰

			+1 bad health 1 Engineer slot
Mint	110	Iron Working	+1 happiness from Gold, Silver and Copper +20% production with Coinage: ¹⁴¹ +10% gold +1 bad health 1 Engineer slot
Factory	180	Assembly Line Coal, Oil or power ¹⁴³	+30% production ¹⁴² +20% production with Oil ¹⁴⁴ +2 bad health +1 bad health from Oil 1 Engineer slot 2 Laborer slots ¹⁴⁵
Assembly Plant	180	Assembly Line Coal, Oil or power	+30% production +20% production with Oil +2 bad health +1 bad health from Oil 2 Engineer slots 2 Laborer slots faster production with Coal
Industrial Park	150	Industrialism Factory power	+30% production ¹⁴⁶ +1 bad health ¹⁴⁷ +1 anger ¹⁴⁸ 1 free Engineer with Robotics 2 Engineer slots
Bank	180	Banking	+40% gold ¹⁰⁰ 2 Merchant slots ¹⁴⁹
Stock Exchange	180	Banking	+40% gold 2 Merchant slots -100% corporation maintenance ¹⁵⁰
Market	90	Bookkeeping	+20% gold ¹⁵¹ +1 happiness from Fur, Gems ¹⁵² , Silk and Whale 1 Merchant slot faster production with Enterprising trait
Forum	90	Bookkeeping	+20% gold +1 happiness from Fur, Gems, Silk and Whale 1 Merchant slot +25% Great Person birth
Grocer	90	Compass Guilds	+20% gold ¹⁵³ +1 health from Banana, Spices and Wine ⁸⁵ 1 Merchant slot
Apothecary	90	Guilds ¹⁵⁴	+20% gold +2 health +1 health from Banana, Spices and Wine

			1 Merchant slot
Supermarket	130	Refrigeration power ⁹⁵	+1 food +1 health from Cow and Pig ¹⁵⁵ +1 happiness from Sheep ⁸²
Mall	130	Refrigeration power	+1 food +1 health from Cow and Pig +1 happiness from Cow, Pig and Sheep ¹⁵⁶ +1 happiness from Hit Singles and Movies +20% gold
Granary	60	Pottery	+1 health from Corn, Rice and Wheat 40% food stored after population growth or starvation ¹⁵⁷
Tambo ¹⁵⁸	60	Pottery	+1 health from Corn, Rice and Wheat 40% food stored after population growth or starvation +1 culture ¹⁵⁹
Library	80	Writing	+20% research ¹⁶⁰ +2 culture 1 Scientist slot ¹⁶¹ faster production with Civilized trait
House of Wisdom ¹⁶²	80	Writing	+20% research +2 culture ¹⁶³ +1 research per foreign trade route ¹⁶⁴ 1 Scientist slot
University	200	Education Library	+30% research ¹⁶⁵ +3 culture with Corporation: can train Corp. Executive ¹⁶⁶ 1 Scientist slot ¹⁶¹ faster production with Innovative trait
Observatory	140	Physics	+20% research ¹⁶⁷ 1 Scientist slot
Salon	140	Scientific Method ¹⁶⁸	+20% research 1 Scientist slot 1 free Artist
Particle Accelerator ¹⁶⁹	250	Superconductors Computers Fission power ⁹⁵	+15% research ¹⁷⁰ +50% spaceship production 1 free Scientist
Research Institute	250	Satellites ¹⁷¹ power	+15% research +50% spaceship production 2 free Scientists
Hospital	180 ¹⁷²	Medicine	+3 health

		power ⁹⁵	heals units +10% extra per turn 1 Scientist slot ¹⁷³
Jail	120	Constitution	+50% espionage -25% war weariness -25% colony maintenance ¹⁷⁴ reduces chance of revolt ¹⁷⁵ 1 Spy slot ¹⁷⁶ faster production with Lawful trait
Police Headquarters ¹⁷⁷	180	Equality	chance to intercept rival spies +50% espionage defense +25% espionage ¹⁷⁸ +5 espionage ¹⁷⁹ 1 Spy specialist slot ¹⁸⁰ faster production with Protective trait
Monument	30	Mysticism	+1 culture +1 happiness from Hereditary Rule ¹⁸¹ obsolete with Constitution
Obelisk	30	Mysticism	+1 culture +1 happiness from Hereditary Rule +1 Great Priest point ¹⁸² obsolete with Constitution
Stele	30	Mysticism	+3 culture ¹⁸³ +1 happiness from Hereditary Rule obsolete with Constitution
Totem Pole	30	Mysticism	+1 culture +1 happiness from Hereditary Rule +3 XP for Archery units obsolete with Constitution
Public Transportation	180	Railroad Oil or power ¹⁸⁵	-15% bad health from population ¹⁸⁴ +1 commerce on Coast and Lake ¹⁹ +1 happiness from Environmentalism ¹⁸⁶
Treatment Plant ¹⁸⁷	230	Ecology	-70% bad health from buildings ¹⁸⁴
Std. Ethanol Branch	from	Std. Ethanol Exec. Oil or Sugar	consumes Oil and Sugar ¹⁸⁸ outputs 1 production and 2 gold per resource ¹⁸⁹ +1 bad health ¹⁹⁰
Alum. Co Branch	from	Alum. Co Exec. Aluminum or Coal	consumes Aluminum and Coal ¹⁹¹ outputs 4 research per resource ¹⁹² +1 bad health ¹⁹⁰ competes with Mining Inc
Mining Inc Branch	from	Mining Inc Exec. Coal, Copper, Iron or Uranium	consumes Coal, Copper, Iron and Uranium ¹⁹³ outputs 1 production per resource +1 bad health ¹⁹⁰ competes with Alum. Co and Creative Constr.

Creative Constr. Branch from CrCo Exec.	Aluminum, Iron, Marble or Stone	consumes Aluminum, Iron, Copper and Marble ¹⁹⁴ outputs 1 production and 4 culture per resource ¹⁹⁵ competes with Mining Inc and Alum. Co
Cereal Mills Branch from Cereal Mills Exec.	Wheat, Corn or Rice	consumes Wheat, Corn and Rice outputs 2 food per resource ¹⁹⁶ competes with Sid's Sushi Co
Sid's Sushi Branch from Sid's Sushi Exec.	Rice, Fish or Crab	consumes Rice, Fish and Crab ¹⁹⁷ outputs 1 food and 1 health per resource ¹⁹⁸ competes with Cereal Mills
Civ. Jewelers Branch from Civ. Jewelers Exec.	Gold, Silver or Gems	consumes Gold, Silver and Gems outputs 1 gold and 1 happiness per resource ¹⁹⁹

National Wonders

Std. Ethanol HQ	from Great Engineer or Great Merchant 2-4 Std. Eth. Branches	+2 gold per Std. Ethanol Branch ²⁰⁰ reduces maintenance of all Std. Ethanol Branches no gold cost for pushing out competitors that have no HQ
Aluminum Co HQ	from Great Scientist or Great Merchant 2-4 Alum.Co Branches	+2 gold per Aluminum Co Branch Mining Inc. can't spread here reduces maintenance of all Alum. Co Branches no gold cost for pushing out competitors that have no HQ
Mining Inc HQ	from Great Engineer or Great Merchant 2-4 Min. Inc Branches	+2 gold per Mining Inc Co Branch Alum. Co and Creative Constr. can't spread here reduces maintenance of all Mining Inc Branches no gold cost for pushing out competitors that have no HQ
Creative Constr. HQ	from Great Artist or Great Merchant 2-4 Cr. Constr. Branches	+2 gold per Creative Constr. Branch Alum. Co and Mining Inc can't spread here reduces maintenance of all Creative Constr. Branches no gold cost for pushing out competitors that have no HQ
Cereal Mills HQ	from Great Merchant 2-4 C. Mills Branches	+2 gold per Cereal Mills Branch Sid's Sushi Co can't spread here reduces maintenance of all Cereal Mills Branches no gold cost for pushing out competitors that have no HQ
Sid's Sushi Co HQ	from Great Merchant 2-4 Sid's Branches	+2 gold per Sid's Sushi Co Branch Cereal Mills can't spread here reduces maintenance of all Sid's Sushi Branches no gold cost for pushing out competitors that have no HQ
Civ. Jewelers HQ	from Great Artist	+2 gold per Civ. Jewelers Branch

or Great Merchant reduces maintenance of all Civ. Jewelers Branches
 2-4 Civ. Jewl. Branches no gold cost for pushing out competitors that
 have no HQ

Palace	80-800 ²⁰¹		+10 commerce minus 1 for every other city ²⁰² +2 culture +4 espionage +1 happiness government center (reduces maintenance in nearby cities) faster production with Stone ²⁰³
Forbidden Palace	200	Statecraft 4-8 Courthouses	+4 culture government center (reduces maintenance in nearby cities) +1 Great Spy point
Globe Theater	200	Nation State Theater	+1-2 happiness per Theater (up to 6) ¹⁸⁴ +6 culture 1 Artist slot ²⁰⁴ +1 Great Artist point
Hermitage	300	Nation State	+80% culture ¹⁰⁰ +1 Great Artist point faster production with Dye ²⁰⁵
Triumphal Arch ²⁰⁶	200	Republic Construction level-5 unit	+70% ¹⁰⁰ production of non-mechanized ²⁰⁷ military +3 culture +1 Great Artist point faster production with Marble
Steelworks ²⁰⁸	600	Steel Iron, Coal Forge	+15-25% production of buildings, projects and mechanized units ²⁰⁷ per Forge ²⁰⁹ (up to 100%) +1 bad health +1 anger ¹⁴⁸ 2 Engineer slots ²⁰⁴ +1 Great Engineer point
Mt. Rushmore	500	Rapid Fire	-25% war weariness in all cities +4 culture +1 Great Artist point faster production with Stone
Heroic Epic ²¹⁰	210	Literature Library ²¹¹	+50% ¹⁰⁰ Great Person birth +4 culture +1 Great Artist point faster production with Marble
Intelligence Agency	350 ¹⁷⁶	Totalitarianism	+100% espionage ²¹² 2 Spy specialist slots
National Park	300	Ecology	+1 trade route commerce (up to a maximum of 4) per every 2 nearby tiles with a Peak, obsolete resource, ²¹³ or Preserved Forest or Jungle

			+1 happiness in all cities of this continent ²¹⁴ removes access to Coal from the city +1 Great Scientist point
Oxford University	400	Education University	+10-15% research per University (up to 60%) ²⁰⁹ +4 culture 1 Scientist slot ²⁰⁴ 1 Engineer slot ²¹⁵ +1 Great Scientist point faster production with Stone
Red Cross	250 ²¹⁶	Medicine 4-8 Hospitals	Units in this city start with Medic I +1 Great Scientist point
Wall Street	600	Corporation Bank	+10-20% gold per Bank (up to 70%) ²⁰⁹ -100% corporation maintenance in this city ²¹⁷ 2 Merchant slots ²⁰⁴ +1 Great merchant point
Military Academy ²¹⁸	650 ²¹⁹	Military Studies Barracks ²²⁰ level-6 unit	+4 XP for all new units +1 Great Spy point faster production with Stone

Religions²²¹

Hinduism	Polytheism Buddhist city if Buddhism is already founded	Shrine: Kashi Vishwanath
Buddhism	Meditation Hindu city if Hinduism is already founded	Shrine: Mahabodhi
Zoroastrianism	Monotheism no Holy City ²²²	Shrine: Adur Burzen-Mihr no monastic building
Judaism	Monotheism Zoroastrianism already founded ²²³ no Holy City ²²²	Shrine: Temple of Solomon no monastic building
Confucianism	Statecraft Taoist city if Taoism is already founded	Shrine: San Kong ^{224 225}
Taoism	Alchemy Confucian city if Confucianism is already founded	Shrine: Dai Miao ²²⁵
Christianity	Theology Jewish or	Shrine: Church of the Nativity 1 free Missionary

Zoroastrian city

Islam	Divine Law	Shrine: Masjid al-Haram
	Jewish, Christian or Zoroastrian city	2 free Missionaries ²²⁶

Special Buildings and Projects

Academy	from	Great Scientist Republic	+40% science ¹⁰⁰ +4 culture 1 Scientist slot ²²⁷
Military Academy	<i>disabled</i> (name used for West Point) ²¹⁸		
Security Bureau ¹⁷⁷	from	Great Spy Equality	+60% espionage ¹⁰⁰ 1 Spy slot ²²⁸
Apollo Program	1600	Satellites	allows spaceship production faster production with Aluminum
SS Casing	1200	Composites	1-5 required for Space Victory faster production with Aluminum
SS Cockpit	1000	Fiber Optics	1 required for Space Victory faster production with Copper
SS Docking Bay	2000	Robotics	1 required for Space Victory faster production with Aluminum
SS Engine	1600	Fusion	1-2 required for Space Victory
SS Life Support	1000	Computers Ecology	1 required for Space Victory faster production with Copper
SS Stasis Chamber	1200	Genetics Refrigeration	1 required for Space Race Victory
SS Thrusters	1200	Superconductors	1-5 required for Space Victory faster production with Aluminum
Internet	2000	Fiber Optics	Grants all technologies possessed by two or more known civilizations faster production with Copper
Manhattan Project	1100	Fission Nuclear Plant ²²⁹	enables nukes for all civs
SDI	2500	Satellites Manhattan Project	+50% chance of intercepting ICBM minus 5% for each interception attempt on the same turn ²³⁰ Mobile SAM and Missile Cruiser can intercept non-ICBM missiles faster production with Aluminum

Great Wonders

Shrine	from	Great Prophet holy city	+0.5-2 gold ²³¹ per city of the holy-city religion, up to a maximum of 25 ²³² ; halved if another religion is state religion ²³³
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			increases spread of the holy-city religion +4 culture 2 Priest slots ²⁰⁴
Angkor Wat	450	Aesthetics any state religion	+1 production from Priest and Great Prophet ²³⁴ in all cities with the state religion ²³⁵ +7 culture ²³⁶ 2 Priest slots ²⁰⁴ +2 Great Prophet points obsolete with Scientific Method faster production with Stone
Apostolic Palace	400	Theology any state religion >2 non-vassal teams	city owner chooses proposals for religious votes ²³⁷ +1 production ²³⁸ for all religious buildings of the Apostolic Palace religion (can benefit other civs) +4 culture 2 Priest slots ²³⁹ +2 Great Prophet points obsolete with Mass Media
Broadway	800	Electricity Theater	provides 5 Hit Musicals +10-15% culture per Theater (up to 65%) ²⁴⁰ +1 happiness 1 Artist slot ²⁴¹ +2 Great Artist points
Rock'n'Roll	800	Radio Arena ²⁴²	provides 5 Hit Singles +10-15% culture per Arena (up to 65%) ²⁴⁰ +1 happiness 1 Artist slot ²⁴¹ +2 Great Artist points
Hollywood	1000	Mass Media Broadcast Tower	provides 5 Hit Movies +10-15% culture per Broadc. Tower (up to 75%) ²⁴⁰ +1 happiness 1 Artist slot ²⁴¹ +2 Great Artist points
Temple of Kukulcan = Chichen Itza	300	Bookkeeping Priesthood	+1 commerce and no food penalty from Jungle can build Farm on flat and hilly Jungle ²⁴³ +7 culture +2 Great Merchant points ²⁴⁴ obsolete with Biology ²⁴⁵ faster production with Stone
Colossus	250	Construction Forge coastal	+1 commerce on salt ²⁴⁶ water tiles in all cities +5 culture ¹⁶³ +2 Great Merchant points obsolete with Blast Furnace faster production with Copper
Cristo Redentor	800	Steel city on Hill ²⁴⁸	can change civics and religion without anarchy ²⁴⁷ +5 culture

Eiffel Tower	1250	Radio Forge	+2 Great Engineer points free Broadcast Tower in all cities +6 culture +2 Great Merchant points faster production with Iron
Great Library	350	Literature Library	1 free Engineer ²⁴⁹ 1 free Scientist +7 culture ¹⁶³ +2 Great Scientist points obsolete with Printing Press faster production with Marble
Great Lighthouse	250 ²⁵⁰	Masonry Lighthouse	+2 trade routes in coastal cities +5 culture ¹⁶³ +2 Great Merchant points obsolete with Optics
Great Wall	300 ²⁵¹	Archery 1-3 Walls ²⁵³	+1 trade route in all cities on this continent ²⁵² (disabled when playing with Raging Barbarians) +100% Great Gen. emergence inside owner's borders (disabled when playing with normal Barbarians) Barbarians can't enter owner's borders (disabled when playing without Barbarians) +2 culture +2 Great Merchant points ²⁵⁴ faster production with Stone obsolete with Corporation
Hagia Sophia	450	Theology	free Temple ²⁵⁵ of the state religion in each city with the state religion free spread ²⁵⁶ of the state religion to newly founded cities and upon conquest +8 culture +2 Great Engineer points faster production with Marble
Hanging Gardens	300	Mathematics Aqueduct	+1 population in all cities +1 health in all cities +6 culture +2 Great Engineer points faster production with Stone
Kremlin	800	Military Tradition	+75% Great General emergence ²⁵⁷ raises city defense to 100% 2 Spy specialist slots +2 Great Spy points faster production with Stone
Moai Statues	200	Polytheism Sailing coastal	+1 commerce on city's Ocean tiles Islet feature on city's Ocean tiles ²⁵⁸ +2 culture

Mausoleum of M.	450	Aesthetics	+1 Great Prophet point faster production with Stone
Notre Dame	550	Engineering	+50% Golden Age length +10 culture +2 Great Artist points obsolete with Constitution faster production with Marble
Oracle	350	Priesthood	+2 happiness in all cities on the same continent +8 culture ¹⁶³ +2 Great Artist points faster production with Stone
Parthenon	400	Republic Priesthood	makes peace ²⁵⁹ with all pagan civs (no state religion and not in Free Religion) and all civs of owner's state religion; such civs can't declare war on owner +8 culture +2 Great Spy points ²⁵⁴ obsolete with Liberalism faster production with Marble
Pentagon	1250	Industrialism	enables all Government civics ²⁶⁰ +8 culture ¹⁶³ +2 Great Scientist points ²⁶¹ faster production with Marble
Pyramids	500	Masonry	+2 XP for all new units in all cities +2 Great Spy points
Shwedagon Paya	400 ²⁶³	Coinage Meditation	reveals the secrets of Mysticism, Polytheism Priesthood and Monarchy ²⁶² +5 culture ¹⁶³ +2 Great Engineer points faster production with Stone
Sistine Chapel	600	Patronage	enables all Religion civics +6 culture ¹⁶³ +2 Great Prophet points faster production with Gold
Space Elevator	2000	Laser Satellites latitude < 30°	+4 culture from all buildings of the state religion +2 culture per specialist in all cities +8 culture ¹⁶³ +2 Great Artist points faster production with Marble
Spiral Minaret	550	Divine Law	Faster ²⁶⁴ spaceship production in all cities +2 Great Scientist points faster production with Aluminum
			+2 gold from all buildings of the state religion +7 culture ¹⁶³ +2 Great Prophet points

Statue of Liberty	1500	Equality in Emancipation in Free Religion Harbor ²⁶⁵	production bonus with Stone 1 free specialist in all cities on continent +6 culture +2 Great Merchant points production bonus with Copper
Statue of Zeus	380 ²⁶⁶	Aesthetics ²⁶⁷	+50% Great Person birth ²⁶⁸ +8 culture ¹⁶³ +2 Great Artist points production bonus with Ivory
Stonehenge	120	Mysticism	free Monument in all cities +7 culture ¹⁶³ +2 Great Prophet points obsolete with Constitution production bonus with Stone
Taj Mahal	700	Engineering Divine Law	starts (or prolongs) Golden Age +8 culture ¹⁶³ +2 Great Artist points faster production with Marble
Temple of Artemis	350	Priesthood	1 free Priest +2 commerce per trade route in the city +7 culture ¹⁶³ +2 Great Merchant points obsolete with Liberalism faster production with Marble
Three Gorges Dam	1650	Electricity Steel 2 river hills in city radius ²⁷⁰	provides power to all cities no more than 8 tiles away ²⁶⁹ on the same continent +2 Great Engineer points
Univ. of Sankore	350 ²⁷¹	Paper any state religion ²⁷²	+2 research from all buildings of the state religion +7 culture ¹⁶³ +2 Great Scientist points
United Nations	1000	Mass Media >2 non-vassal teams	triggers election of Secretary General guarantees eligibility for elections +2 Great Merchant points
Versailles	800	Political Economy Monarchy	government center (reduces maintenance in nearby cities) +1 happiness ²⁷³ +6 commerce +4 espionage +8 culture +2 Great Spy points faster production with Marble

Units

Catapult	50	Construction Archery	str. 4, Siege, damage limit 20% ²⁷⁴ bombard rate 8 +25% attack vs. Melee and Archery ²⁷⁵ upgrades to Trebuchet
Trebuchet	70	Engineering	str. 4, Siege, damage limit 25% ²⁷⁴ bombard rate 16 +75% attack vs. Gunpowder, Melee and Archery ²⁷⁵ can attack only cities ²⁷⁶ receives no defensive bonuses upgrades to Cannon
Cannon	100	Blast Furnace Iron	str. 6, Siege, 2 first strikes ²⁷⁷ , damage limit 30% coll. damage to 1 target, limit 30% ²⁷⁴ bombard rate 16 ²⁷⁸ +50% attack vs. Gunpowder, Melee and Archery ²⁷⁵ +25% city defense can't make moves ²⁷⁹ that exceed its movement pts. upgrades to Machine Gun ²⁸⁰ and Field Gun
Field Gun ²⁸¹	170 ²⁸²	Rapid Fire	str. 11, Siege, 2 first strikes ²⁷⁷ , damage limit 40% coll. damage to 2 targets, limit 40% ²⁷⁴ bombard rate 20 ²⁸³ +50% attack vs. Gunpowder ²⁷⁵ +50% vs. Siege can't make moves ²⁷⁹ that exceed its movement pts. upgrades to Howitzer
Howitzer ²⁸¹	260	Laser Ballistics Oil	str. 20, Siege, 2 first strikes ²⁷⁷ , damage limit 50% coll. damage to 2 targets, limit 50% ²⁷⁴ 2 moves bombard rate 20 ²⁸³ +50% attack vs. Gunpowder ²⁷⁵ +50% vs. Siege
Airship	140	Combustion Physics	air str. 5, damage limit 20%, range 10 coll. damage to 1 target, limit 20% ²⁸⁴ air bomb rate 12 ²⁸⁵ can't strike sea units and improvements upgrades to Jet Fighter ²⁸⁶
Fighter	130	Flight Oil	air str. 10, damage limit 45% ²⁸⁷ , range 6 air bomb rate 8 can intercept Fighter, Bomber ²⁸⁸ (100%) upgrades to Jet Fighter
Bomber	180	Flight Radio Oil Aluminum	air str. 14, damage limit 35%, range 8 coll. damage to 3 targets, limit 35% ²⁷⁴ air bomb rate 16 -50% str. vs. sea units upgrades to Stealth Bomber

Jet Fighter	190	Advanced Flight Oil Aluminum	air str. 20, damage limit 45%, range 10 ²⁸⁷ air bomb rate 12 can intercept aircraft (100%)
Stealth Bomber	250	Stealth Advanced Flight Oil Aluminum	air str. 18, damage limit 40%, range 12 coll. damage to 3 targets, limit 40% ²⁷⁴ air bomb rate 20 -50% str. vs. sea units 50% chance to avoid interception
Archer	25	Archery	str. 3, Archery, 1 first strike +50% city defense +25% Hill defense upgrades to Crossbowman and Longbowman
Bowman	25	Archery	str. 3, Archery, 1 first strike +50% city defense +25% Hill defense +50% vs. Melee upgrades to Crossbowman and Longbowman
Crossbowman	60	Machinery Iron or Copper ²⁸⁹	str. 6, Archery, 1 first strike +50% vs. Melee +10% city defense ²⁹⁰ upgrades to Musketman ²⁹¹
Cho-Ko-Nu	60	Machinery Iron or Copper	str. 7, Archery, 2 first strikes ²⁹² +25% vs. Melee ²⁹³ +10% city defense upgrades to Musketman
Hwacha	60	Machinery Alchemy	str. 6, Archery, 1 first strike ²⁹⁴ +75% vs. Melee ²⁹⁵ +10% city defense +25% Hill defense ²⁹⁶ starts with Amphibious ²⁹⁷ upgrades to Musketman
Longbowman	65	Feudalism Iron Working ²⁹⁹ Archery	str. 7 ²⁹⁸ , Archery, 1 first strike +25% city defense +25% Hill defense upgrades to Rifleman
Warrior	15		str. 2, Melee +25% city defense upgrades to Archer ³⁰⁰ , Axeman and Spearman
Holkan	15		str. 2, Melee, 1 first strike ³⁰¹ +25% city defense gains +75% XP in combat except from Animals ³⁰² upgrades to Archer, Axeman and Spearman
Axeman	30	Bronze Working Copper or Iron	str. 4 ³⁰³ , Melee +50% vs. Melee

Dog Soldier	35	Bronze Working	upgrades to Maceman str. 4 ³⁰⁴ , Melee +75% vs. Melee upgrades to Maceman
Vulture	35	Bronze Working Copper or Iron	str. 5 ³⁰³ , Melee +50% vs. Melee upgrades to Maceman
Impi	30	Hunting Copper or Iron	str. 4, Melee, ignores first strikes ³⁰⁵ 2 moves +50% vs. Melee ³⁰⁶ upgrades to Maceman, Musketman and Rifleman ³⁰⁷
Swordsman	40	Iron Working Iron	str. 6, Melee +10% city attack upgrades to Maceman
Legionary ³⁰⁸	45	Iron Working Iron	str. 7, Melee starts with March ³⁰⁹ upgrades to Maceman and Musketman ³¹⁰
Gallic Warrior	35	Iron Working Iron or Copper	str. 6, Melee +10% city attack double movement on Hill ³¹¹ upgrades to Maceman and Musketman ³¹⁰
Jaguar	35	Iron Working	str. 5, Melee, 1 first strike +10% city attack double movement on Forest and Jungle ³¹² upgrades to Maceman
Maceman	65	Guilds Machinery Iron ³¹⁴	str. 8, Melee +35% vs. Melee ³¹³ upgrades to Grenadier ³¹⁵
Berserker	65	Guilds Ironworking ³¹⁶ Iron	str. 8, Melee +35% vs. Melee pillages upon entering a hostile tile ³¹⁷ starts with Amphibious upgrades to Grenadier
Samurai	65	Feudalism ³¹⁸ Iron	str. 8, Melee, 1 first strike +50% vs. Melee ³¹⁹ upgrades to Grenadier and Rifleman
Quechua Warrior ³²⁰	50	Crop Rotation ³²¹	str. 7, Melee +25% vs. Melee ³²² upgrades to Grenadier
Spearman	35	Hunting Copper or Iron	str. 4, Melee, ignores first strikes +75% vs. Mounted ³²³ upgrades to Pikeman
Phalanx	35	Hunting	str. 5, Melee, ignores first strikes ³⁰⁶

		Copper or Iron	+35% vs. Mounted ³²⁴ upgrades to Pikeman and Maceman
Javelineer ³²⁵	40	Iron Working ³²⁶ Hunting	str. 5, Melee ³²⁷ , 1 first strike ³²⁸ +25% vs. Mounted ³²⁹ starts with Skirmisher I upgrades to Musketman
Immortal ³³⁰	40	Archery ³³¹ Copper or Iron	str. 5, Melee ³²⁷ , 1 first strike, ignores first strikes +25% vs. Mounted ³²⁹ and Melee ³³² National Unit: at most 3 at a time ³³³ upgrades to Musketman
Pikeman	65	Guilds Iron	str. 7, Melee +75% vs. Mounted ³²³ upgrades to Rifleman ³³⁴
Landsknecht	65	Guilds Iron	str. 7, Melee +75% vs. Mounted +75% vs. Melee upgrades to Rifleman
War Elephant	60	Statecraft Horseback Riding Ivory	str. 8, Mounted +50% vs. Mounted receives no defensive bonuses Cost increases by 12% with each War Elephant in play ³³⁵ upgrades to Cuirassier
Ballista Elephant	65	Statecraft Construction Horseback Riding Ivory	str. 8, Mounted, 1 first strike ³³⁶ +50% vs. Mounted receives no defensive bonuses upgrades to Cannon ³³⁷
Galley	45 ³³⁸	Sailing	str. 2 3 moves ³³⁹ , 3 cargo spaces ³⁴⁰ can only enter Ocean from Coast ³⁴¹ upgrades to Galleon
Trireme	45	Mathematics Sailing	str. 3 ³⁴² 3 moves ³³⁹ can only enter Ocean from Coast ³⁴¹ upgrades to Privateer ³⁴³
Caravel	60	Astronavigation Machinery	str. 3 4 moves ³⁴⁴ , 1 cargo space (only for Special units) can explore territory of pre-Radio ³⁴⁵ rivals upgrades to Frigate ³⁴⁶
Carrack	60	Astronavigation Machinery	str. 3 4 moves , 2 cargo spaces can explore territory of pre-Radio rivals upgrades to Frigate
Galleon	75	Optics	str. 4

			4 moves, 4 cargo spaces ³⁴⁰ upgrades to Transport
Privateer	75	Optics Guns Iron or Copper	str. 6 4 moves can plunder rival ³⁴⁷ trade routes hidden nationality starts with Skirmisher I ³⁴⁸ upgrades to Attack Submarine ³⁴⁹
Frigate	85 ³⁵⁰	Blast Furnace Optics Iron	str. 9 ³⁵¹ 5 moves ³⁵² , 1 cargo space (only for Special units) can explore territory of pre-Radio rivals ³⁴⁶ bombard rate 16 ³⁵³ upgrades to Ironclad ³⁵⁴ and Destroyer
East Indiaman ³⁵⁵	85	Blast Furnace Optics Iron	str. 9 5 moves, 3 cargo spaces can explore territory of pre-Radio rivals bombard rate 16 upgrades to Ironclad and Destroyer
Ship of the Line	110	Military Studies Blast Furnace Optics Iron	str. 9 ³⁵⁶ 4 moves ³⁵⁷ , +1 move with Coal ³⁵⁸ bombard rate 20 +50% vs. Frigate upgrades to Destroyer ³⁵⁹
Ironclad	100	Steam Power Iron Coal	str. 13, 3 first strikes ³⁶⁰ 4 moves ³⁶¹ bombard rate 16 ³⁶² can only enter Ocean from Coast ³⁴¹ upgrades to Destroyer
Transport	90	Industrialism Oil or Coal	str. 14 ³⁶³ 5 moves, +1 move with Oil ³⁶⁴ , 5 cargo spaces ³⁴⁰ can't attack ³⁶⁵
Battleship	260 ³⁶⁶	Ballistics Oil, Coal or Uranium	str. 32 ³⁶³ 6 moves, +1 moves with Oil or Uranium ³⁶⁴ bombard rate 28 ²⁸³ coll. damage to 1 target, limit 60% ²⁷⁴ upgrades to Missile Cruiser
Destroyer	200	Ballistics Radio Oil or Coal	str. 24 ³⁶³ 7 moves, +1 moves with Oil ³⁶⁴ bombard rate 20 ²⁸³ can intercept Fighter, Bomber ²⁸⁸ (30%) reveals Submarines immune to first strikes ³⁶⁷
Missile Cruiser	280 ³⁶⁶	Rocketry Computers Oil or Uranium	str. 30 ³⁶³ 7 moves, 4 cargo spaces (only for Missiles) bombard rate 24 ²⁸³

			can intercept aircraft (50%) ³⁶⁸ with SDI: can intercept non-ICBM missiles (50% regardless of evasion chance) ³⁶⁹
Stealth Destroyer	280 ³⁶⁶	Stealth Oil or Uranium	str. 20, 1 first strike ³⁶³ 7 moves ³⁷⁰ , 2 cargo spaces (only for Missiles) ³⁷¹ can intercept aircraft (30%) reveals Submarines immune to first strikes stealth ship ³⁷²
Carrier	225 ³⁶⁶	Flight Oil, Coal or Uranium	str. 16 5 moves, +1 move with Oil or Uranium ³⁶⁴ 3 cargo spaces (only for Fighter and Jet Fighter)
Attack Submarine	145	Radio Oil or Uranium	str. 20, 6 first strikes ³⁷³ 6 moves, 1 cargo space (only for Special units) 60% withdrawal chance Submarine (invisible, reveals Submarines, can dive under Ice, can explore rival territory)
Nuclear Submarine ³⁷⁴	210	Rocketry Radio Uranium ³⁷⁵	str. 20, 6 first strikes ³⁷³ 7 moves, 3 cargo spaces (only for Missiles) 60% withdrawal chance Submarine (invisible, reveals Submarines, can dive under Ice, can explore rival territory)
Chariot	35 ³⁷⁶	Wheel Horse	str. 4, Mounted 2 moves +50% attack vs. Melee ³⁷⁷ 15% withdrawal chance ³⁷⁸ receives no defensive bonuses upgrades to Horse Archer ³⁷⁹
War Chariot	40	Wheel Horse	str. 4, Mounted, 2 first strikes ³⁸⁰ 2 moves +50% attack vs. Melee 20% withdrawal chance receives no defensive bonuses upgrades to Horse Archer
Horse Archer	50	Horseback Riding Archery Horse	str. 6, Mounted 2 moves +25% attack vs. Melee ³⁸¹ +25% vs. Siege ³⁸² 25% withdrawal chance ³⁷⁸ receives no defensive bonuses upgrades to Knight
Numidian Cavalry	40 ³⁸³	Horseback Riding Bronze Working ³⁸⁴ Horse	str. 5, Mounted 2 moves +50% attack ³⁸⁵ vs. Melee +25% vs. Siege

			35% withdrawal chance ³⁸⁶ receives no defensive bonuses upgrades to Knight
Knight	85 ³⁸⁷	Feudalism Machinery Horse Iron	str. 10, Mounted 2 moves +10% vs. Melee ³⁸⁸ immune to first strikes receives no defensive bonuses upgrades to Cuirassier
Cataphract	60	Machinery Horseback Riding Horse Iron	str. 8 ³⁸⁹ , Mounted 2 moves +10% vs. Melee immune to first strikes receives no defensive bonuses upgrades to Cuirassier
Keshik ³⁹⁰	65	Statecraft ³⁹¹ Iron Working Horseback Riding Archery Horse	str. 8, Mounted 2 moves +10% vs. Melee 25% withdrawal chance ³⁹² receives no defensive bonuses upgrades to Cuirassier
Camel Archer	60 ³⁹³	Guilds ³⁹⁴ Horseback Riding Archery ≥1 Desert tile in in city radius ³⁹⁵	str. 8, Mounted 2 moves +10% vs. Melee +20% withdrawal chance ³⁷⁸ +25% combat strength in Desert ³⁹⁶ receives no defensive bonuses upgrades to Cuirassier
Cuirassier	110 ³⁹⁷	Military Tradition Gunpowder Horse Iron	str. 12, Mounted 2 moves immune to first strikes 15% withdrawal chance receives no defensive bonuses upgrades to Cavalry
Conquistador	110	Military Tradition Gunpowder Horse Iron	str. 12, Mounted 2 moves +25% attack vs. Melee and Archery ³⁹⁸ immune to first strikes 15% withdrawal chance receives no defensive bonuses ³⁹⁹ upgrades to Cavalry
Cavalry	125 ⁴⁰⁰	Rifling Military Tradition Horse	str. 15, Mounted 2 moves +25% attack vs. Melee ⁴⁰¹ 30% withdrawal chance

			receives no defensive bonuses upgrades to Anti-Tank and Tank ⁴⁰²
Cossack	110 ⁴⁰³	Rifling Military Tradition Horse	str. 15, Mounted 2 moves 30% withdrawal chance +25% attack vs. Mounted and Melee ⁴⁰⁴ receives no defensive bonuses upgrades to Anti-Tank and Tank
Musketman	75 ⁴⁰⁵	Guns	str. 9, Gunpowder, 1 first strike ⁴⁰⁶ +25% vs. Melee ⁴⁰⁷ upgrades to Grenadier ⁴⁰⁸ and Rifleman
Musketeer	75	Guns	str. 9, Gunpowder, 1 first strike 2 moves +25% vs. Melee upgrades to Grenadier and Rifleman
Janissary	75	Guns	str. 9, Gunpowder, 1 first strike starts with Drill I and II ⁴⁰⁹ +25% vs. Melee upgrades to Grenadier and Rifleman
Grenadier	95	Blast Furnace	str. 9, Gunpowder +25% attack vs. Gunpowder ⁴¹⁰ starts with City Raider I ⁴¹¹ upgrades to Infantry ⁴¹²
Redcoat	100	Nation State ⁴¹³ Guns	str. 10 , Gunpowder +25% vs. Gunpowder upgrades to Rifleman
Rifleman	115 ⁴¹⁴	Rifling	str. 14, Gunpowder +25% vs. Mounted upgrades to Infantry
Oromo Warrior	85	Rifling ⁴¹⁵	str. 13, Gunpowder +25% vs. Mounted upgrades to Infantry
Infantry	190 ⁴¹⁶	Assembly Line Rapid Fire	str. 22 ⁴¹⁷ , Gunpowder upgrades to Marine ⁴¹⁸ and Mechanized Infantry ⁴¹⁹
Machine Gun	130	Rapid Fire	str. 15 ²⁸² , Siege +50% vs. Gunpowder +25% vs. Mounted ⁴²⁰ can intercept Fighter , Bomber ²⁸⁸ (20%) can only defend upgrades to Mech. Infantry, Howitzer ²⁸⁰ and Gunship ⁴²¹
Marine	225	Industrialism Rapid Fire	str. 24, Gunpowder starts with Amphibious and City Raider I ^{422 418}
Paratrooper	225	Flight	str. 24, Gunpowder

		Silk or Plastics ⁴²³	paradrop range 5 25% chance to evade interception
Navy SEAL	225	Flight	str. 24, Gunpowder paradrop range 5 ⁴²⁴ 50% chance to evade interception starts with Amphibious, March, Mountaineer I and Tactics National Unit: at most 4 at a time
Mech. Infantry	270	Composites Rapid Fire Aluminum Oil	str. 32, Gunpowder 2 moves starts with March
SAM Infantry	180	Rocketry Radio	str. 18, Gunpowder +75% vs. Helicopter can intercept Fighter, Bomber ²⁸⁸ (40% chance) upgrades to Mobile SAM
Mobile SAM	260	Laser Rocketry Oil	str. 22, Gunpowder 2 moves +50% vs. Helicopter can intercept aircraft (50% chance) with SDI: can intercept non-ICBM missiles (50% regardless of evasion chance) ³⁶⁹
Guided Missile	70	Rocketry	air str. 30-60 (randomized) ⁴²⁵ , Missile, range 4 1 move ⁴²⁶ targets the most expensive unit ⁴²⁷ can only target mechanized units, only outside cities and no Submarines ⁴²⁸ bombard rate 16 can destroy tile improvements
Tactical Nuke	300 ⁴²⁹	Fission Rocketry Uranium Manhattan Project	nuclear Missile, range 4 1 move ⁴²⁶ 50% chance to evade interception
ICBM	500	Fission Satellites Uranium Manhattan Project	nuclear Missile, global range
Tank	230	Ballistics Assembly Line Railroad Oil	str. 28, Armored ⁴³⁰ 2 moves starts with Blitz doesn't receive defensive bonuses upgrades to Modern Armor
Panzer	250 ⁴³¹	Ballistics Assembly Line Railroad	str. 28, Armored, 2 first strikes ⁴³² 2 moves +25% vs. Armored

		Oil	starts with Blitz doesn't receive defensive bonuses upgrades to Modern Armor
Modern Armor	325	Composites Laser Ballistics Oil	str. 38 ⁴³³ , Armored ⁴³⁰ 2 moves +25% vs. Armored ⁴³⁴ starts with Blitz doesn't receive defensive bonuses
Anti-Tank	160	Rocketry	str. 15 ⁴³⁵ , Gunpowder +100% vs. Armored targets Armored units ⁴³⁶ upgrades to SAM Infantry and Gunship ⁴³⁷
Gunship	220	Advanced Flight Oil	str. 24, Helicopter 3 moves ⁴³⁸ +50% vs. Armored 25% withdrawal chance ignores extra movement costs immune to first strikes ²⁷⁷ cannot capture cities receives no defensive bonuses
Scout	15	Hunting	str. 1, Recon 2 moves can enter Peaks ²³ +100% vs. Barbarians (and Animals) ⁴³⁹ better results from Tribal Villages can attack only Animals ⁴⁴⁰
Explorer	40	Compass	str. 4, Recon 2 moves starts with Lookout ⁴⁴¹ can enter Peaks ⁴⁴² better results from Tribal Villages can attack only Barbarians ⁴⁴³ cannot capture cities
Work Boat	30	Fishing	civilian 2 moves builds improvements on water tiles cannot enter Ocean until Optics
Worker	60		civilian 2 moves builds improvements on land tiles trained with food and production 25% faster production with Developmental trait disbanded after 60 non-idle turns ⁴⁴⁴ 10 production for the nearest city when disbanded ⁴⁴⁵
Fast Worker ⁴⁴⁶	60		civilian

			2 moves builds improvements on land tiles trained with food and production disbanded after 60 non-idle turns 10 production for the nearest city when disbanded ignores extra movement costs ⁴⁴⁷
Settler	100		civilian 2 moves founds city trained with food and production 50% faster production with Expansionistic trait +1 gold maintenance cost ⁴⁴⁸
Spy ⁴⁴⁹	35	Alphabet	civilian 1 move invisible starts with Commando ⁴⁵⁰ may not reveal unowned terrain ⁴⁵¹ chance to intercept rival spies
Missionary	25-65 ⁴⁵²	Monastery	civilian 2 moves can spread religion National Unit: at most 3 at a time
Corporate Exec.	80 ⁴⁵³	Corporation Combustion (Std. Eth.) Industrialism (Alu. Co) Railroad (Mining Inc) Steel (Creative Constr.) Biology (Cereal Mills) Refrigeration (Sushi) Mass Media (Civ. Jewl.) University	civilian 2 moves can expand corporation to owner's city ⁴⁵⁴ National Unit: at most 3 at a time
Great Artist	from	Great Artist pts.	civilian 2 moves can start a Golden Age can create a Great Artwork ⁴⁵⁵ (hurry the production of a cultural wonder) ⁴⁵⁶ can boost city culture and join the city as a settled specialist ⁴⁵⁷ can construct the HQ of Civilized Jewelers Inc and Creative Constructions ⁴⁵⁸
Great Engineer	from	Great Engineer pts.	civilian 2 moves can start a Golden Age can help discover an engineering technology can hurry the production of any building or project ⁴⁵⁹ can construct a production building and join the

		city as a specialist ⁴⁶⁰ can construct the HQ of Std. Ethanol and Mining Inc.
Great Merchant	from Great Merchant pts.	civilian 2 moves can start a Golden Age can help discover a commercial technology can conduct a trade mission for gold ⁴⁶¹ can construct a commercial building and join the city as a specialist ⁴⁶⁰ can construct any corporate HQ
Great Prophet	from Great Prophet pts.	civilian 2 moves can start a Golden Age can help discover a religious technology can create a Sacred Work⁴⁶² (hurry the production of a religious wonder) ⁴⁵⁶ can create 1-5 Missionaries at a city and join the city as a specialist ⁴⁵⁷ can construct a Shrine in a Holy City
Great Scientist	from Great Scientist pts.	civilian 2 moves can start a Golden Age can help discover a scientific technology ⁴⁶³ with Republic: can construct Academy can construct a scientific building and join the city as a specialist ⁴⁶⁰ can construct the the HQ of Aluminum Co
Great Spy	from Great Spy pts.	civilian 2 moves invisible can start a Golden Age with Equality : can construct Security Bureau ¹⁷⁷ can infiltrate a foreign city for espionage points can convert foreign culture in city tile and surrounding tiles ("culture bomb") ⁴⁶⁴ can construct an intelligence building and join the city as a specialist ⁴⁶⁰
Great General	from Great General pts.	civilian 2 moves can attach to a unit for free upgrades and 20-40 ⁴⁶⁵ XP distributed among units in the same tile can join city as Great Military Instructor can found a city²¹⁸ with free culture and a free military building ⁴⁶⁶

Promotions

Accuracy	Siege or Naval Drill I or Barrage I > 0 bombard rate ⁴⁶⁷	+8% bombard rate
Ace	Air Combat III	+25% evasion chance
Ambush	Siege, Gunpowder, Air, Helicopter or Armored Combat II Rapid Fire	+25% vs. Armored
Amphibious	Archery, Gunpowder, or Melee ⁴⁶⁸ Combat II	no penalty for attacking from sea no penalty for crossing river
Barrage I	Siege or Armored Blast Furnace	deals collateral damage to +1 target ⁴⁶⁹
Barrage II	Siege or Armored Barrage I	+25% collateral damage
Barrage III	Siege Barrage II	+25% collateral damage +15% damage limit
Blitz	Armored, Helicopter Mounted or Naval Combat III or Skirmisher I ⁴⁷⁰ 2 or more moves Military Studies	can attack twice per turn
Charge	Mounted, Melee, Armored or Helicopter Combat I	+25% vs. Siege
City Garrison I	Archery, Gunpowder	+20% city defense
City Garrison II	Archery, Gunpowder City Garrison I	+25% city defense
City Garrison III	Archery, Gunpowder City Garrison II	+25% city defense ⁴⁷¹ +15% city attack
City Raider I	Melee or Siege ⁴³⁰	+20% city attack
City Raider II	Melee, Siege or Gunpowder ⁴¹¹ City Raider I	ignores defense from Fortify ⁴⁷²
City Raider III	Melee, Siege or Gunpowder City Raider II	+25% city attack ⁴⁷¹ +15% city defense
Combat I		+10% combat strength
Combat II	Combat I	+10% combat strength

Combat III	Combat II	+10% combat strength
Combat IV	Combat III	+10% combat strength recovers +10% hit points per turn in neutral lands
Combat V	Combat IV	+10% combat strength recovers +10% hit points per turn in enemy lands
Combat VI	Combat V Great General	+25% combat strength
Leadership	Great General	gains +100% XP in combat reduces chance of city revolt ⁴⁷³
Morale	Great General	+1 movement point
Tactics	Great General	+30% withdrawal chance
Commando	Recon Combat I ⁴⁷⁵ Alphabet	can explore rival territory ⁴⁷⁴ can use enemy routes
Cover	Archery, Melee or Gunpowder Combat I or Drill I	+25% vs. Archery
Drill I	Archery, Siege, Naval, Gunpowder or Armored ⁴⁷⁷	+1 first strike ⁴⁷⁶
Drill II	Archery, Siege, Naval, Gunpowder or Armored Drill I	+1 first strike -10% collateral and air damage
Drill III	Archery, Siege, Naval, Gunpowder, or Armored Drill II	+1 first strike -20% collateral and air damage
Drill IV	Archery, Siege, Naval, Gunpowder or Armored Drill III	+1 first strike +1 first strike chance -20% collateral and air damage
Skirmisher I ³²⁵	Mounted, Armored, Helicopter or Naval 2 or more moves ⁴⁷⁸	+ 15% withdrawal chance ³⁷⁸
Skirmisher II	Mounted, Armored, Helicopter or Naval Skirmisher I	+20% withdrawal chance immune to first strikes
Formation	Archery, Mounted, Melee or Gunpowder Combat II or Drill II	+25% vs. Mounted
Mountaineer I ⁴⁷⁹	Recon, Archery or Gunpowder	+ 25% Hill defense ⁴⁸⁰ no extra movement cost from Hill
Mountaineer II	Recon, Archery or Gunpowder	+ 25% Hill defense +25% withdrawal chance when attacking

Guerilla ⁴⁸¹	Mountaineer I Archery or Gunpowder City Garrison I or Mountaineer I or Woodsman I Statecraft	from Hill +15% attack against tiles where owner (or a vassal) has the highest culture
Woodsman I	Recon, Melee or Gunpowder	+25% combat strength in Forest and Jungle
Woodsman II	Recon, Melee or Gunpowder Woodsman I	+25% combat strength in Forest and Jungle ⁴⁸² no extra movement cost from Forest and Jungle ⁴⁸⁰
Woodsman III	<i>disabled</i>	
Mobility	<i>disabled</i> ⁴⁸³	
Medic I	Recon, Archery, Melee, Mounted, Siege, Gunpowder, Naval Combat I or Drill I	heals units in the same tile +10 hit points per turn
Medic II	Recon, Archery, Melee, Mounted, Siege, Gunpowder or Naval Medic I	heals units in adjacent tiles +10 hit points per turn
Medic III	Recon, Archery, Melee, Mounted, Siege, Gunpowder or Naval Medic II Medicine ⁴⁸⁵	heals units in the same tile +10 hit points per turn ⁴⁸⁴
March	Recon, Archery, Melee, Mounted, Siege or Gunpowder Medic I or Combat III	recovers hit points while moving
Interception I	Gunpowder, Air, Naval or Siege ⁴⁸⁶ Interception chance > 0 Rapid Fire	+10% chance to intercept aircraft
Interception II	Gunpowder, Air, Naval or Siege Interception I	+20% chance to intercept aircraft
Range I	Air Combat II	+1 operational range
Range II	Air Range I	+1 operational range
Lookout ⁴⁸⁷	Recon, Mounted or Helicopter	+1 visibility range

	Skirmisher I or Combat III or Mountaineer II or Woodsman II ⁴⁸⁸	
Lookout (Naval)	Naval Skirmisher I or Combat III Optics	+1 visibility range
Navigation I	Naval ⁴⁸⁹	+1 movement point
Navigation II	Naval Navigation I Astronavigation	+1 movement point
Pinch ⁴⁹⁰	Mounted, Gunpowder, Air, +25% vs. Gunpowder Armored or Helicopter Combat I or Drill I Guns	
Shock	Archery, Mounted, or Melee ⁴⁹¹ Combat I or Drill I	+25% vs. Melee

Technologies

see tech-tree.pdf

Civics

Government

Despotism		low upkeep
Hereditary Rule	Monarchy	+1 happiness from Monument and Castle ⁴⁹² +40% happiness from resources low upkeep
Representation	Constitution	+2 research per specialist (and Military Instructor) ⁴⁹³ +2 happiness in the largest 3-5 cities ⁴⁹⁴ +1 happiness from Theater ¹²⁴ medium upkeep
Police State ⁴⁹⁵	Totalitarianism	+15% production +1 happiness from Courthouse, Jail, Police Headquarters and Broadcast Tower +1 happiness per 10% espionage rate -65% anger from defying resolutions and Emancipation high upkeep
Universal Suffrage	Assembly Line Equality	+1 production from Town can spend gold to finish production in a city medium upkeep

Organization⁴⁹⁶

Tribalism⁴⁹⁷

can spend gold to finish the training of
Archery and Gunpowder units⁴⁹⁸
low upkeep

Vassalage

Feudalism

new units receive 2 XP⁴⁹⁹
Workers build improvements 50% faster⁵⁰⁰
medium upkeep⁵⁰¹

Bureaucracy

Paper
Statecraft

+25% production and commerce in all
government centers⁵⁰²
+25% maintenance in all cities⁵⁰³
high upkeep

Militarism⁵⁰⁴

Military Tradition

cities can draft military units if in Emancipation⁵⁰⁵
+2 happiness from Barracks
+40% faster construction of National Wonders⁵⁰⁶
medium upkeep⁵⁰⁷

Federation⁵⁰⁸

Constitution
Nation State

-50% distance and colony maintenance in all cities⁵⁰⁹
+50% culture in all cities⁵¹⁰
low upkeep

Labor

Subsistence⁵¹¹

low upkeep

Forced Labor⁵¹²

Bronze Working

+2 Laborer slots in each city⁵¹³
medium upkeep

Caste System

Code of Laws

+1 Priest, Merchant and Artist slot in each city,
but at most 2 specialists per city in total⁵¹⁴
+1 commerce from Hamlet, Village⁵¹⁵
low upkeep⁵¹⁶

Serfdom

Crop Rotation

+1 commerce from Farm⁵¹⁷
-1 commerce from Town⁵¹⁸
medium upkeep⁵¹⁹

Emancipation

Equality

+100% growth for Cottage, Village, and Hamlet
happiness penalty for civilizations without
Emancipation⁵²⁰
low upkeep

Economy

Palace Economy⁵²¹

low upkeep

Mercantilism⁵²²

Political Economy

rivals that trade with us receive no extra yield for
sustained peace⁵²³
+1 commerce per domestic trade route
+1 commerce per foreign trade route with rivals in
Palace Economy and our vassals⁵²⁴
no effect of foreign corporate HQs⁵²⁵
high(?) upkeep⁵²⁶

Free Market	Liberalism	+1 trade route in all cities +1 anger in all cities ⁵²⁷ corporate Branches in our cities generate +50% income for the HQ owner ⁵²⁸ medium(?) upkeep
State Property	Corporation Equality	-60% corporation maintenance ⁵²⁹ no effect of corporate HQs (domestic and foreign) ⁵³⁰ +1 production from Workshop ⁵¹⁵ +25% espionage ⁵³¹ low(?) upkeep
Environmentalism	Ecology	+2 commerce from Windmill +1 commerce on Forest and Jungle tiles ³¹ -25% bad health from population ⁵³² no access to Coal +1 happiness from Treatment Plant and Public Transportation ⁵³³ corporate Branches in our cities generate -50% income for the HQ owner ⁵³⁴ high upkeep ⁵³⁵

Religion

Folk Religion ⁵³⁶		low upkeep
Organized Religion	Monotheism	+25% faster construction of buildings in cities with our state religion Missionaries can't fail ⁵³⁷ medium upkeep ⁵³⁸
Theocracy	Divine Law	+25% military unit production in cities with our state religion ⁵³⁹ -25% war weariness in cities with our state religion ⁵⁴⁰ foreign missionaries can't spread religions other than our state religion high upkeep ⁵³⁸
Pacifism	Alchemy	1 free specialist in cities with our state religion ⁵⁴¹ +1 gold cost per military unit ⁵⁴² no upkeep
Free Religion	Liberalism	+50% Great Person birth in all cities ⁵⁴¹ +1 happiness per city religion no state religion

Specialists

Not listed: free specialists, unique buildings

Artist	Theater (2), Castle, Broadcast Tower (2), Caste System,	+5 culture ⁵⁴³ +3 Great Artist points
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	Globe Theater, Broadway , Rock'n'Roll , Hollywood	
Engineer	Factory, Forge, Industrial Park (2), Oxford , Ironworks (2)	+2 production +2 Great Engineer points ⁵⁴⁴
Merchant	Market, Harbor , Grocer, Bank (2) , Caste System, Wall Street (2)	+4 gold +2 Great Merchant points ⁵⁴⁴
Priest	Temple, Cathedral, Shrine (2), Caste System , Angkor Wat (2), Apostolic Palace (2),	+1 production +2 research ⁵⁴⁵ +1 culture ⁵⁴⁶ +2 Great Prophet points ⁵⁴⁴
Scientist	Library, Academy , University , Observatory Hospital , Caste System, Oxford	+4 research +2 Great Scientist points ⁵⁴⁴
Spy	Courthouse, Jail, Police Headquarters , Broadcast Tower , Intelligence Agency (2) Security Bureau, Kremlin (2)	+1 production +5 espionage ⁵⁴⁷ +2 Great Spy points ⁵⁴⁴
Laborer ⁵⁴⁸	Factory (2), Forced Labor (1+)	+3 production exempt from bonuses to "all specialists"
Citizen		+1 production
settled Great Artist		+10 culture, +1 gold ⁵⁴⁹
settled Great Engineer		+3 production ⁵⁴⁹
settled Great Merchant		+1 food, +4 gold ⁵⁴⁹
Great Military Instructor		+2 XP
settled Great Prophet		+1 production, +2 gold, +2 research, +1 culture ⁵⁴⁹
settled Great Scientist		+1 production, +4 research ⁵⁴⁹
settled Great Spy		+11 espionage ⁵⁴⁹

Favorite civics⁵⁵⁰

Will have to be accompanied by some flavor and personality changes

Alexander	Vassalage	Catherine	Serfdom ⁵⁵³
Ashoka	Free Religion	Charlemagne	Organized Religion ⁵⁵⁴
Augustus	Representation	Churchill	Universal Suffrage ⁵⁵⁵
Bismarck	Militarism	Cyrus	Free Religion ⁵⁵⁶
Boudica	Environmentalism ⁵⁵¹	Darius	Federation ⁵⁵⁷
Brennus	Folk Religion ⁵⁵²	De Gaulle	Militarism

Elizabeth	Mercantilism ⁵⁵⁸
Frederick	Emancipation ⁵⁵⁹
Gilgamesh	Hereditary Rule
Gandhi	Pacifism ⁵⁶⁰
Genghis Khan	Free Religion ⁵⁶¹
Hammurabi	Bureaucracy
Hannibal	Free Market
Hatshepsut	Hereditary Rule ⁵⁶²
Huayna Capac	Hereditary Rule
Isabella	Theocracy
Joao	Hereditary Rule
Julius Caesar	Militarism ⁵⁶³
Justinian	Theocracy
Kublai Khan	Bureaucracy
Lincoln	Emancipation
Louis	Hereditary Rule
Mansa Musa	Free Market
Mao	State Property
Mehmed	Forced Labor ⁵⁶⁴
Montezuma	Vassalage ⁵⁶⁵
Napoleon	Representation
Pericles	Representation
Peter	Hereditary Rule ⁵⁶⁶
Qin Shi Huang	Bureaucracy
Ragnar	Forced Labor ⁵⁶⁷
Ramesses	Organized Religion
Roosevelt	Universal Suffrage ⁵⁶⁸
Saladin	Theocracy
Shaka	Police State
Sitting Bull	Environmentalism
Stalin	State Property
Suleiman	Organized Religion ⁵⁶⁹
Suryavarman	Caste System ⁵⁷⁰
Tokugawa	Mercantilism
Victoria	Representation
Wang Kon	Caste System
Washington	Federation
Willem	Free Religion
Zara Yaqob	Theocracy

- 1 I'm mostly leaving starting technologies alone because it's difficult to pin down the ancient origins of some of the civilizations. Some tech combinations are too common in BtS, e.g. four times Mining+Fishing. I'm giving Mysticism to those civs that are supposed to found early religions. Since Judaism wasn't the state religion of any civilization in the game, I'm treating the semitic civs Egypt, Persia and Carthage as potentially Jewish. That said, if I make the AI more reluctant to found religions in the very early game, there may be no need for trying to pre-program the early religions through starting tech.

The changes to unique replacements are mostly about having the unique unit or building replace the regular unit or building that resembles it most. E.g. a hippodrome is more similar to an arena than to a theater. See the notes about the specific unique units and buildings for further rationales.

- 2 There are 52 leaders and 55 pairs of traits. Each leader should have a unique pair, so it's almost a 1:1 mapping, which makes it a difficult puzzle to give each leader traits that fit his or her historical background and the AI playstyle. I'm changing most of the trait names in order to make this task easier. I also intend to adjust the AI playstyle a bit in cases where the new traits don't fit so well.
- 3 The Aggressive trait is widely considered to be one of the weakest and in need of an economic advantage. I'm giving the Bellicose trait primarily to leaders who were founders of empires.
- 4 The name "Creative" has too little to do with politics; e.g. Mao wrote poetry, but surely can't have a trait that favors culture. I'm giving the Civilized trait primarily to the leaders of great early civilizations, for whom a strong early-game trait makes the most sense.
- 5 "Expansive" doesn't make clear at all what is being expanded. This is now the infrastructure trait. No health bonus because this would disincentivize Aqueduct, the most iconic infrastructure building. Leaders who developed the infrastructure of their civilization (and don't really fit elsewhere) get this trait.
- 6 "Financial" is the most obviously overpowered BtS trait, also in the hands of the AI. I'm splitting this into two traits: Enterprising and Cosmopolitan. The Enterprising trait is given to leaders of wealthy civilizations or who pursued wealth (Joao's and Hatshepsut's naval expeditions, Brennus' sack of Rome). Tokugawa doesn't really fit (see discussion [here](#) in the Realism Invictus thread; search for "Ieyasu"), but the more suitable traits are needed more by other leaders.
- 7 "Industrious" sounds too much like "industrial". (And why is e.g. Montezuma not Industrious, is he a lazy Mexican?) Since no fail gold is granted for wonders deleted from the production queue in AdvCiv, the 50% wonder production ability shouldn't be too powerful. The Grandiose trait is a combination of Industrious and parts of the lackluster Charismatic trait. It's given to leaders with a reputation as builders and to leaders of civilizations that built several of the game's wonders (Greece, France, America).
- 8 The Lawful trait merges the Spiritual trait with parts of Organized. A free revolution every 5 turns isn't necessarily too powerful, but too tedious to use optimally. Lawful leaders are creators of law codices, modern lawyer-politicians and leaders with legal grievances (Boudica, Sitting Bull).
- 9 The 100% bonus from Philosophical steers the player's strategy too much for my taste. Innovative leaders are those who have sought to modernize their society or military, or simply ruled over a technologically advanced civilization.
- 10 Merging Organized and Spiritual into a single trait without religious flavor means that a new religious trait is needed. The Pious trait takes its health ability from the Expansive trait and its production bonus from the Apostolic Palace. It's given to leaders who helped spread one of the game's religions.
- 11 The second half of the Financial trait (the first is Enterprising). Cosmopolitan takes the spot vacated after merging Charismatic and Industrious. It's supposed to be a seafaring trait, but needs to work on maps with a single landmass too. It's given to leaders who built large fleets.
- 12 Considered to be the weakest of the BtS traits. I'm adding a new promotion, Guerilla for this trait (not to be confused with Guerilla I-III, which I'm renaming to "Mountaineer"; see the Promotions section), but it's arguably more flavorful than powerful. The espionage bonus (inspired by Heph Mod) should at least make the trait attractive to certain players (those who like espionage), and might help reclusive AI leaders like Tokugawa keep up in technology. Also note that Castle is now mostly an economic building. The trait is given to leaders who were paranoid, relied on espionage, fought defensive wars or built the walls of Uruk (Gilgamesh).
- 13 A combination of Imperialistic and Organized. The Expansionistic trait is given primarily to leaders who inherited an empire and expanded it greatly. (Or better "Expansionist"?)
- 14 Moving through a desert doesn't necessarily take much longer than through, say, a steppe (Plains), but the desert is more attritional, and thus forms a barrier that armies avoid if they can. Could also argue that deserts are spatially compressed in Civ 4 (the standard map generator doesn't create deserts as large as the Sahara) and should therefore

take an extra move to traverse. (Moving through several Desert tiles in a row – or any uninhabited tiles really – is pretty unrealistic because pre-modern armies could not carry that many supplies, but that's difficult to model in the game.)

-1 move for the Flood Plains feature because Flood Plains are not supposed to take 2 moves.

- 15 35% should make clearer that Roads take an extra turn to build (2×1.35 rounds up to 3). Due to the way that build times are computed, even a 1% work rate penalty would lead to an extra turn.
- 16 This still allows cities next to an Oasis, but not in the middle of a desert.
- 17 Renamed from Ice to distinguish the snowy terrain better from the shelf ice feature. Polar deserts should really be places where no one wants to go (partly inspired by the Rise of Mankind mod). The only-coast restriction for terrain is already implemented in BtS, but unused. The sea tempers the hostile climate a little.
- 18 This should make Lighthouse less of a no-brainer. Also lighthouses were more crucial for traders than for fishermen, at least in antiquity.
- 19 This should make the obsolescence of the maritime wonders (Colossus, Great Lighthouse) less punishing. Two commerce (as in BtS) is very little in the last third of the game. Historical explanation: Mass transportation led to the establishment of seaside resorts.
- 20 Ocean is practically never worth working without a Lighthouse, and I think Lighthouse as a requirement is a bit simpler than having Lighthouse increase the yield.

Perhaps require some Renaissance tech (Optics?) instead for working Ocean. This could represent trawling. Change the resource placement accordingly (Crab on Coast and Ocean, perhaps a bit more Fish and Crab overall).
- 21 Scrubbing fallout after a nuclear explosion is really a negligible and quick task compared with rebuilding and repairs. In contrast, radioactive contamination after a meltdown persists for decades. Therefore replace the Fallout feature with an Exclusion Zone feature that can't be removed by Workers, but takes, on average, 100 turns to disappear. A single Exclusion Zone is placed after a meltdown, and contamination from nukes could be modeled through a poisoned water supply, though I'm not sure that this is worth implementing.
- 22 In subtropical climates, mosquito-borne diseases encouraged hilltop settlements. The health bonus also means that it can make sense to spare an odd number of Forests from chopping.
- 23 This should make Scouts a little bit more useful, and land separated by Peaks a bit more different from land separated by water. (May want to reduce the `PEAK_SEE_FROM_CHANGE` in GlobalDefines to the same value as hills.)
- 24 Jungle feature: No health penalty because it's not primarily the vegetation that breeds disease, it's the climate. (Clearing *all* vegetation would get rid of disease carriers, but then the tile would be a desert.) One could instead assign a health penalty based on latitude, but this wouldn't make sense in (all) scenarios, and I don't even think that a health penalty from rainforest is important – early Jungle cities are sufficiently discouraged by Jungle tiles being virtually unworkable.

The terrain underlying Jungle is a different issue. Perhaps the map generator should use Tundra instead of Grassland near the equator (or disallow chopping and other Worker builds on equatorial Jungle, or add a new terrain or feature type for rainforest), and a mix of Grassland and Plains Jungle to represent seasonal tropical forests. This is only a matter of realism though; not a balance problem. The various Jungle resources should then also be allowed to appear on Tundra Jungle and Plains Jungle. BtS already allows Uranium and Spice on Plains, and AdvCiv has added Sugar, Banana and Ivory (which BtS allows only on Grassland Jungle and non-Jungle Plains). To be done: Pig and possibly Dye (only on Jungle Plains; currently only Jungle Grassland).

Already implemented in AdvCiv: All livestock resources require a latitude of at least 9°.

- 25 See Environmentalism. As Forest Preserve is the only possible improvement on Jungle, it doesn't make much of a difference whether the commerce bonus is granted to Forest Preserve (as in K-Mod) or to Jungle.
- 26 I want to allow Siege units to receive defensive bonuses, but a bonus from dense vegetation doesn't make sense for e.g. Cannon. The case for Archery units is less clear. If they're also exempted, then the defense ability of Forest and Jungle can be stated positively. Once Melee units fall out of use, Gunpowder units are the units best suited for forest and jungle warfare. This logic doesn't work for Musketman, but that can't be helped.
- 27 Don't want players to clear all vegetation around their cities just to prevent invaders from gaining a defensive bonus.
- 28 To be consistent with other difficult terrain.

- 29 +1 move in BtS. I guess the idea is that units rest at the oasis for a turn, but that's pretty silly. See also Desert.
- 30 To make up for the Desert penalty and to encourage roads through oases (representing caravan routes).
- 31 Environmentalism should enable a somewhat utopian green economy; "green" as in lots of vegetation. Can't build Forest Preserves everywhere because these are only for recreation. Extend the commerce bonus to all Forests, i.e. also to Lumbermills. Lumbermills represent sustainable forestry (the Forest isn't cleared); that should be green enough.
- 32 This should make buildings and ships more attractive compared with land units, and make chopping less powerful. One could argue that Catapults and Trebuchets (and maybe Archery units) should also benefit from chopping, but this seems undesirable for balance reasons, and siege engines were typically constructed from wood procured at the site of the siege. Looking at it this way, a Catapult unit only represents engineers, workers and light materials such as sinews.
- The changed tech tree makes Ironclad a pre-Industrial unit. This is fine; early ironclads had wooden hulls.
- Alternative idea: Chopping yield only for buildings, but require an owned Forest in the city radius for pre-Industrial ships.
- 33 9 in BtS; given the total size of even a Huge map, this is far larger (perhaps about 3 times) than the largest freshwater lake on Earth and yields much more food than any lake should. Make it dependent on map size (idea from the Mongoose Mod) – at most 5 tiles at Standard size.
- 34 To give coastal cities a bit more production. Also to make up for restrictions placed on the Moai Statues and reduced food from sea resources. An idea from the Realism Invictus mod, which also has a nice 3D model. (There's also a "Rocky Island" feature in Realism Invictus; that graphic could perhaps be used as a variant in extreme latitudes.)
- 35 Pre-Modern metallurgy was reliant on wood as a combustible (charcoal), and, hence, mining was less profitable in treeless areas. Mines coexisting with Forest captures this, but doesn't capture the deforestation caused by mining. Then again, mining arguably didn't cause large-scale deforestation until the High Middle Ages when sustainable forestry began to develop (Lumbermill). With the discovery of coking processes, wood became less crucial for mining, so the advantage of Forest Mines over bare Mines should go away in the Industrial era. Steam Power would be the most appropriate tech for this, but Railroad is conceptually simpler, and rail tracks make it easier to supply mines with coke.
- As an additional twist, Forest could disappear when a Mine has been worked for a long time (some 150 turns, say). This would encourage players to replace Mines with Lumbermills when approaching Replaceable Parts. Then the Railroad bonus could be simplified (and nerfed) a bit, applying only to non-Forest Mines for +1 production.
- This is one of several changes to slow down the disappearance of Forests. It should also make Windmill more useful during the Medieval era (on bare hills).
- If this change is made, randomized resource discoveries will no longer have to ignore terrain features (as is currently the case through change advc.129).
- 36 This should make Copper a bit less attractive for early rushes and distinguish Copper and Iron (and Coal) more.
- 37 One might think all Mines should grant at least 1 production because large mines typically excavate several types of metals; otherwise Mines on Gold and Gems couldn't yield any production. However, it appears that uranium ores don't usually occur together with other useful ores.
- 38 The +1 food doesn't make sense if there is no arable soil.
- 39 BtS requires 1 food. I don't see a reason to prohibit Cottage on Plains Hill. Don't want Plains Hill to be merely a Desert Hill with +1 production.
- 40 While Farms are getting a boost from Serfdom, Hamlet and Village lose their boost from the Financial trait. So it's desirable for balance reasons to let a civic boost these two. See also Caste System.
- 41 Soils with sufficient rainfall don't need to be irrigated. This change doesn't have many practical implications though because Farm improvements still can't be built without fresh water until Crop Rotation.
- 42 Permafrost soils are obviously not suitable for agriculture. Forested Tundra should represent taiga, not tundra (because tundras lie beyond the timberline). Taiga soils aren't arable except for the southern reaches (which could be represented as Grassland or Plains Forest).
- 43 Corn and Rice shouldn't have the exact same yields, so one has to be higher. I think it should be Rice because Rice has the drawback of sometimes appearing on Jungle, and it's the more important grain for human consumption.

- 44 Cf. Crop Rotation, Steam Power in [tech-tree.pdf](#). The general idea is to spread agricultural development out more. Historically, many of the most important technological advances happened in agriculture, but in BtS, there's just the chain-irrigation ability at Civil Service and +1 food at Biology.
- 45 By the time Watermills become available, most river tiles already have improvements, and just 1 production is rarely enough to make it worth replacing that improvement, especially not if it takes 8 Worker turns.
- As an additional buff, Watermills should be allowed on Hills if the graphics can be adjusted (currently, a Hill Watermill placed in WorldBuilder floats in the air). The hilly upper reaches of rivers are usually best suited for generating hydropower.
- Watermill should perhaps require at least 1 food. Don't want Watermills on all Snow and non-Floodplains Desert river tiles where no other improvement is available (Farm, Cottage and Workshop already require 1 food). This would also prevent Watermills on non-Grassland Hill though.
- 46 As a partial replacement for the early-game conversion from food into production no longer provided by Slavery. The restriction to Plains is supposed to allude to ancient brickyards and make Plains a little bit more useful compared with Grassland.
- 47 The +1 commerce next to a river in BtS, which only makes up for the suppressed natural bonus from the river, isn't reason enough not to chop almost all Forests. By extending the bonus to non-river tiles, improving non-river Forests should become attractive enough to consider leaving some Forests alone until Lumbermill becomes available. Early-game chopping next to rivers makes some sense historically as rivers greatly facilitate the transportation of lumber.
- 48 A bunch of changes to make this improvement more attractive as, except around a National Park, Forest Preserve don't have much of a use in BtS. The commerce from Rail Track models the role of railroads in the emerging tourism industry. On the other hand, the commerce added by Environmentalism is reduced by 1 (and tied to the terrain feature, not the improvement). Additional health is often more useful than happiness by the time that Forest Preserve becomes available. The Forest-spread ability in BtS usually takes more than 100 turns to reforest a particular tile, and it only works if that tile is left unimproved – totally worthless. Moreover, the randomness is inappropriate because tree growth is not difficult to predict. The rule change allows Forest Preserve to be placed on tiles without a Forest in order to reforest them. Once a Forest has grown, the full health bonus kicks in. Of course, one could also decide to replace the Forest Preserve with a Lumbermill at that point, or even chop the Forest down again. Clarification: reforestation also works on tiles that never had a Forest, and the Forest Preserve doesn't have to be worked in order to grow a Forest.
- 49 No tech requirement; it's enough that Work Boat requires Fishing.
- 50 This is 1 food less than in BtS on each of the seafood resources until Refrigeration. The excessive amounts of seafood in BtS are highly unrealistic and don't play well either. The new Islet feature should make up for the lost food a bit.
- 51 Considering that the Whale resource usually occurs in awkward places and is available for a shorter period of time than any other resource, the BtS yields are quite disappointing. As whale oil lamps were also used in workplaces, another +1 production seems justifiable, and coastal cities need production more than additional commerce.
- 52 Part of an effort to make it desirable to own more than one Oil source. (The change to the Standard Ethanol corporation is the bigger deal though.)
- 53 I don't think that all resources need to be equally good, but (Tundra) Fur is so bad in BtS that the tile often isn't worth working.
- 54 This should make Hunting more attractive as a starting tech or as one of the first techs to discover. Pastures and Farms provide higher yields, but Camps are faster to build. It also makes sense that hunters don't need as much infrastructure as farmers.
- 55 -1 production, +1 commerce because Cow should provide all three yields. Cattle is useful in many ways: milk, beef, leather, fertilizer and, perhaps most importantly, traction.
- 56 Counterintuitive that Pig would grant more food than the grains. Also, cattle and caprines have been more important than pigs for human development, so Pig shouldn't be the most powerful of the three. Additionally, Pig and Cow should appear on both Grassland and Plains (currently: Pig only on Grassland, Cow only on Plains). Perhaps also allow Pig to appear on Forest (pigs were herded in forests in the Middle Ages) to reduce its early-game impact.
- 57 The two different improvements are a means of making plantations on certain resources available in the early game, and on others in the midgame. Both Plantations should have the same name and appearance though. Note that Incense and Silk are hidden until Mysticism (Incense) and Animal Husbandry (Silk).

- 58 The standard map generator only places Spice and Silk on Forests. Indeed, silkworms live on mulberry plantations and e.g. cinnamon is a tree and the black pepper plant is a vine growing on high supporting trees; so the Plantation consists of trees and thus shouldn't lead to a cleared tile. And I don't want players to build a Fort (which connects the resource without removing the Forest) instead of a Plantation because this is a counterintuitive play. Banana, sugar cane and indigo don't grow on trees; the corresponding bonus resources are only placed on Jungle, so the Plantation improvement should remove Jungle.

Scenarios might place Sugar or Banana on Forest; that would be bad, so perhaps only the first of the Plantation improvements should coexist with Forest. May have to switch Spice and Dye then. Should then also use individual names for the two Plantation types, I guess "Tree Plantation" and "Field Plantation".

- 59 Takes 5 turns in BtS. A bit long for Incense because of the Desert penalty. The increased build time of the later Plantations should communicate that (colonial) plantations were labor-intensive. An even higher build time would be too much I think because Jungle needs to be cleared too (usually).
- 60 6 units plus 1 for each era beyond the Classical. Cities also get a limited capacity as part of the changes to the combat system.
- 61 But ships should only be allowed to enter the Fort if it's on a flat tile without Forest or Jungle, i.e. no canal through rough terrain. (Though a coastal hill city will have to be allowed to act as a canal because ships produced in the city are going to appear in the city tile. Unless I merge the [Port District](#) mod component.) And ships should only be allowed to enter any land tile from a water tile, i.e. no 2-tile canals; such canals are jarring on Earth maps.
- 62 If Workers have limited charges the build time doesn't have to be quite as long as in BtS (10 turns).
- 63 Routes on owned non-workable tiles (or improvements too) should perhaps have a small maintenance cost – in order to rein in the road spam at least a little. Though giving Workers limited charges (see Worker unit) will perhaps already suffice.

And perhaps routes and improvements on unowned tiles should be prohibited for reasons of plausibility and to increase the importance of Sailing for trade routes. AdvCiv already disallows chopping on unowned tiles.

- 64 The name change should make it easier to distinguish the Railroad technology from the route type that is enabled by it.
- 65 The slightly increased build time should highlight the substantial effort of building railroads better. Players should have to train additional Workers. These won't end up building Rail Tracks everywhere because they're disbanded when their charges are used up (see Worker). Also bear in mind that the Worker speed bonus from Steam Power applies by the time that Rail Track becomes available.
- 66 Turned into a luxury resource because naval empires tend to suffer too much from low happiness in BtS. Flavor-wise, this makes Clam more about pearls and shell money than seafood.
- 67 Forged copper jewelry makes more sense than "forged" gemstones. The bonus to Gemstones moves to Market. A slight buff for Copper doesn't hurt because the Axeman nerf makes early Copper less powerful.
- 68 BtS also allows flat tiles. While some of the largest copper mines are open-pit mines, these mines are still located in rocky terrain. This is arguably true about ore in general, but there happen to be important iron mining regions in flat areas, e.g. the Kryvbas, and iron is also extracted from bogs and ironsand.
- 69 Maize was grown in various regions of the Americas, also in fairly dry ones. Shifting some resources from the best terrain type (Grassland) to the second best (Plains) should be healthy for game balance, especially food resources that lead to very quick city growth on Grassland. Allowing Corn and Rice to appear on hills would nicely capture terrace fields, but I'm not sure if I could get the graphics for this to work. See also Temple of Kukulcan.
- 70 Unlike fish, it's not practical to preserve crabs for export; they have to be consumed locally. Moreover, human consumption of shellfish increased greatly after the development of oceangoing trawlers (although shrimp aren't crabs, strictly speaking) at the onset of the Industrial Revolution. Gameplay-wise, the early health from Crabs is rarely needed anyway, and it should make Fish and Crab more distinct.

Since most fish species that are easy to preserve live in the North Atlantic, Fish resources should only be placed above a latitude of 35 degrees (ling are fished as far south as Gibraltar) or perhaps 30 degrees to be a bit more lenient. Conversely, Crab should be allowed closer to the equator (BtS requires a latitude of 40 degrees or greater).

- 71 The most widely known fur-bearing animals (beaver, ermine, mink) live near water, which tends to be more abundant in flatlands. Perhaps fresh water should be required? I've also added a latitude restriction.
- 72 BtS tries to place most of the resources on only one landmass, apparently in order to encourage intercontinental trade. For Fur, this really doesn't make sense as furry animals inhabit all continents. Even beavers (depicted in the

resource icon) specifically, live in North America and Eurasia. For Gems, Gold, Silver, Spices, Incense and Wine, the restriction to a single landmass is also dubious. The restriction isn't applied rigorously though, so the latter three might be OK.

- 73 Gems being traded at a Market makes more sense to me than gems being attached to precious metals at a Forge.
- 74 If this is too narrow, Desert Hill could be added (Karoo, Kimberley, Egypt).
- 75 The placement restrictions for Gold and Silver (and most other minerals) are mostly fantasy, but without those restrictions, the two resources would play very similarly. BtS places Silver only on Snow and Tundra, which makes Silver a pretty irrelevant resource in most games; plus, no notable silver rushes have taken place in the far north. For this reason, and to balance the two resources better, Gold gets to appear on Snow (think Klondike) and Silver on Grassland Forest (where previously neither Gold nor Silver was allowed).
- 76 BtS restricts it to flat Desert, but the frankincense plantations of Somalia and Yemen are on high elevations (though not those in Oman's Empty Quarter). Considering to add Jungle Grassland to cover also the types of incense traded in East Asia.
- 77 No Marble and Iron on Snow tiles. These minerals may well occur in the polar regions, but extracting them there wouldn't be economical. For Iron, even Tundra is dubious, though such an Iron resource could represent bog iron. I'm not aware of any big uranium mine north of the tree line, but it's conceivable that a nation which doesn't otherwise have access to uranium would bear the necessary expenses.
- 78 No more extra happiness from Market. 1 happiness and War Elephants is powerful enough.
- 79 Ivory should also be allowed on Forest and Jungle Hill as forest elephants also inhabit elevated terrain (and tend to be displaced by humans in arable lowlands). However, Plains Hill without features should not have Ivory as bush elephants live in flat savannas. Allowing this to be specified through XML could be more trouble than it's worth.
- 80 See Factory.
- 81 BtS: non-Forest Grassland. Want to place fewer high-yield food resources on Grassland (see also Corn). Plains Hill would seem a bit too dry, so Hill is simply disallowed in general.
- 82 Supermarkets shouldn't sell only meat, and sheep also yield wool.
- 83 Don't require flat terrain unless the Plantation graphic looks too strange on a Hill. E.g. the Maluku "Spice" Islands are mountainous.

Should perhaps be restricted to Jungle. If Plantations are supposed to preserve Forests (see Plantation), a Spice resource on a Forest becomes much more valuable than one on a Jungle, which is a strange. Also, the spices of India and Southeast Asia are mainly grown in tropical (former) woodlands.

- 84 I.e. Stone should only be available to cities that have it in their radius.

Decorative stone like alabaster should be represented by Marble. The Stone resource is really about large stone blocks from e.g. limestone or sandstone, and these blocks were only transported across short distances. Instead, monumental architecture tended to appear near deposits of suitable rock. In terms of gameplay, the availability of Stone in only one or a couple of cities should help differentiate cities specialized on wonder building from those specialized on military production. Since this change makes Stone more difficult to acquire, map scripts and scenarios should place additional Stone sources. And Stone Quarry should then arguably grant only +1 production.
- 85 No +1 health to Grocer from Sugar. Four health bonuses (none affected by obsolescence) are a bit much, and, while sugar does make a very substantial contribution to feeding the world, calling it healthy is a stretch.
- 86 For trading Uranium and using it as a strategic resource, Fission will still have to be required because, otherwise, e.g. a Carrier could run on Uranium without Fission. It's confusing when Uranium Mines grant extra yields but not the strategic resource, but the tile help text in AdvCiv has already been improved a bit to communicate this more clearly.
- 87 Forest should be allowed. The Winery will remove the Forest and make room for the vineyards.
- 88 Armored and Siege units (except Machine Gun) count as mechanized land units. It's not realistic to airlift tanks and artillery (let alone without fossil fuel).
- 89 I.e. Farms can be built on all flat tiles adjacent to the city. Part of an effort to make irrigation less simplistic. See Farm for related changes.

Perhaps, in addition, the city should receive fresh water if adjacent to a tile that has fresh water, so that cities founded one tile away from a river or lake could get the health bonus for fresh water. That's getting quite

complicated though.

- 90 Rather than a Colosseum with +2 health, make it an Aqueduct with +1 happiness and +1 health.
- 91 A slight buff for Stable and Mounted units. It shouldn't make a huge difference as the level thresholds are at 2 and 5 XP.
- 92 BtS allows Stables and power plants to be constructed by civs that lack the resources to use them. This is implausible and a potential trap for the AI.
- 93 Since Stable already grants 3 XP now, Ger can't just grant even more XP. The Skirmisher promotion (formerly named "Flanking") fits with the tactics of the Mongol Empire. War Elephants are exempt; can't receive the Skirmisher promotion.
- 94 A "bomb shelter" would also protect against air raids, but that is the role of Bunker.
- 95 I'm adding a power requirement to various buildings because the production bonus of Factory alone doesn't do a good job at representing the role of electrical power in modern economies. (I'm also moving the power bonus of Factory to Industrial Park.) Buildings that require power should be treated as if obsolete if their city loses power (until power is restored). Perhaps some code could be adopted from Realism Invictus, which, reportedly, has a suitable XML tag.
- 96 Takes over the espionage bonus of Castle and one of the Spy slots from Jail. While a broadcast tower is not a listening post, the two are sometimes combined because both benefit from an elevated location. (The broadcast could also be propaganda, but I guess that's already captured by the culture bonus.)
- 97 Monasticism has never or very rarely been practised in Islam, Confucianism, Judaism and Zoroastrianism. Since Confucianism and Islam are supposed to spread, these two need to be able to train Missionaries, so they're getting school buildings that work like Monasteries. Accordingly, the Confucian Cathedral and Arabian unique building will have to be renamed. Judaism and Zoroastrianism (if it's added to the game), aren't supposed to train Missionaries, so it seems best to disallow Monasteries too; those religions should have some advantage then, e.g. likelier natural spread to a city that already has a religion. Another possible approach would be to rename the Missionary units to e.g. "Rabbi," "Preacher," "Imam," "Brahmin," "Junzi," (as it's done in Rise of Mankind) and to assume that religion spread can represent immigration instead of conversion. "Yeshiva" or (mentioned in Civilopedia) "Talmudic Academy" would then work as the Jewish Monastery. Hinduism has a monastic tradition (matha) and became widespread in regions outside India, but wasn't and isn't really a proselytizing religion.
- 98 A Korean seowon is a Confucian shrine and academy, so replacing Confucian Academy makes the most sense (whereas Confucian Academy and Seowon alongside each other doesn't make much sense). Since I want to give the name "Confucian Academy" to the Confucian Monastery, Seowon should replace Monastery. Replacing Cathedral ("Ancestral Hall") would fit the historical timeline (Joseon dynasty) better, but I think a science-flavored Cathedral would end up having too many abilities.
- 99 Cost 300 in BtS, but that's with production bonuses from strategic resources. Some of those bonuses are nonsensical, e.g. Confucian and Taoist temples don't have a discernible relationship with copper (Buddhists do like large bells and gongs), and few famous mandirs are constructed from or decorated with marble.
- 100 Most of the 50% and 100% production and commerce bonuses in BtS are too high.
- 101 Move the Incense bonus from Cathedral to Temple because Temple needs a buff. Give Cathedral an unconditional happiness bonus instead. Also, the frankincense trade in the Mediterranean peaked in Classical Antiquity (whereas cathedrals are medieval).
- 102 Need "Confucian Academy" as the Confucian Monastery (Confucianism frowns upon monasticism). Call it either "Ancestral Hall" ("Shrine" would lead to confusion with the Shrine in the holy city) as ancestor worship is closely linked to Confucianism; or "Kong Miao," which means "temple of Confucius." That's already represented by the Temple building, however, all religions except Christianity have the problem that there isn't a commonly used term for especially large temples. "Citang" (Chinese) would also work of "Ancestral Hall" is too long.
- 103 A high number of Priests isn't really helpful by the time that these buildings become available; a potential trap for the AI.
- 104 Might want to rename this to "Taoist Guan" or "Gong" – Chinese for "palace" according to [Wikipedia](#): "is often used for large temples built with imperial or governmental patronage." A pagoda is more commonly a Buddhist temple. Then again, still, most of the large Taoist temples are pagodas.
- 105 From Realism Invictus. Could be the name of the Zoroastrian Cathedral if Zoroastrianism is added to the game.

"Atash Behram" or "Fire of Victory" would be more specific.

- 106 Mausoleum as a special kind of Jail (for dead people?) is a joke. Now a replacement of Cathedral etc. (e.g. Islamic Mausoleum replacing Islamic Mosque) that requires fewer Temples (2 or 3 depending on map size), grants more culture (as much as Cathedral in BtS) and grants more happiness regardless of state religion.
- 107 No exception for Gunpowder units. At that point of the game, most cities have 50% defense anyway (or at least 40%).
- 108 Early Mounted units need a slight buff, but Mounted units mustn't become prime city attackers. Several other mods give Mounted units an attack penalty against cities, but Civ 4 generally avoids negative modifiers, and it's really city fortifications such as walls that make mounted units relatively inefficient city raiders and besiegers. And of course Walls need a buff as well.
- 109 Bombardment speed reduction is tedious to play against and, ultimately, doesn't accomplish much for the defender, as the defenses still go down to 0 eventually. The new defensive bonuses against Melee, Mounted and Archery are not part of the city defense value and can't be lowered through bombardment (nor through a Spy).
- 110 A synergy between Dun and Gallic Warrior should make the Celtic civilization a bit stronger. In BtS, Gallic Warrior has Guerilla I (now Mountaineer I) from the beginning, and Melee units never benefit from Dun. I'm removing the promotion for Gunpowder units because duns weren't contemporary with gunpowder and because this makes it easier to let the building retain all its effects after obsolescence (which comes shortly after gunpowder anyway).
- 111 These changes (trade route, happiness) make Castle primarily an economic building. Defensive buildings just don't play well in Civ 4.
- 112 Castle takes over the bombardment reduction ability from Walls, but doesn't raise the city defense and doesn't require Walls.
- 113 Artist slots are a bit too difficult to come by in BtS (none in between Theater and Broadcast Tower), and medieval castles did host artists. The minor culture and espionage effects are removed in order to make room for the Artist and the happiness ability. The espionage bonus moves to Broadcast Tower.
- 114 A boost from trait *and* Stone would lead to an implausibly low cost and possibly problems with production overflow. As Stone is supposed to be only available to cities that have it in their radius, having a Stone source or two is not going to mean that the trait ability is worthless.
- 115 The Siege weapon ability in BtS doesn't have a historical basis, and the mix of defensive and offensive abilities doesn't play particularly well either. The new advantage over Castle is that the economic benefits last longer (not obsolete until Steel) and that Gunpowder units don't get to ignore the bombardment reduction. Historically, a citadel doesn't have to be a medieval castle, it could also be a more modern fortification such as a star fort.
- 116 The BtS ability (only reduced air damage) is too insignificant. Mechanized units (Armored, Naval and Siege except Machine Gun) except Submarines now require a Bunker for being protected by damage limits; i.e. Siege and Air units can destroy mechanized units outside cities. Considering the low production cost of Bunker, the new abilities should make Bunkers commonplace in cities on the frontlines of Modern-era wars. That said, post-Renaissance bombardment rates are also higher than in BtS, meaning that cities without Bunkers are quick to yield to bombardment.
- 117 To make the power plant choice more meaningful, the health difference between Coal and the others is now 3 and the cost difference is also greater than in BtS. Still, the total bad health from Coal Plants is 1 lower than in BtS because power no longer causes bad health on its own
- 118 A shale plant normally produces shale oil from oil shale, and the BtS Civilopedia entry states that "such plants kept the Japanese navy afloat." Power plants that *burn* oil shale are a rather obscure thing (there are a few large ones in Estonia). Therefore, the Shale Plant requires Coal in order to generate power, and its benefit over the regular Coal Plant is that it provides Oil. Neither a reduced health penalty nor the BtS production bonus seem justifiable historically (and late-game production bonuses are generally problematic because they overcrowd the map with units).

Tbd.: The "US Strategic Bombing Survey" (1945) states that "[p]lans to develop a synthetic oil industry failed to yield significant results" in Japan. In contrast, Germany (mostly) managed to meet its wartime petroleum demand through coal-to-liquid technology. So perhaps the abilities of Assembly Plant and Shale Plant could somehow be swapped. This would make for more realistic late-game incentives for Germany and Japan in Earth scenarios. The German building could be a unique Coal Plant called "Lignite Plant" (for lack of a widely used English term corresponding to "Hydrierwerk" in German) and use the Assembly Plant graphics; the Japanese building could be a unique Factory without the resource/ power requirement (see Factory) and an extra production bonus for Mechanized units – no idea what to call this other than "Assembly Plant", which is just a synonym of "Factory";

alternatively, it could be a unique Drydock (called "Shipyard"?). Or some sort of Meiji-era educational building ("Engineering Academy"?). With a tech diffusion ability – this would be a great fit for the Tokugawa AI personality. A re-themed, earlier Industrial Park not requiring a Factory could also work and would boost research through the free Great Engineer. There might be suitable graphics in the Warlords expansion (bundled scenarios).

- 119 This more generic name for Colosseum makes the building less out of place in the later eras and allows it to interact with the Rock'n'Roll wonder.
- 120 When the culture slider is increased for happiness, it's in a time of crisis, which resembles the concept of Roman ludi circenses (as in "bread and circuses"). Therefore Arena gets the more powerful slider happiness ability, and Theater the weaker one.
- 121 The Maya didn't have a Republic, so Ball Court needs a different prerequisite tech. Construction, as in BtS, isn't appropriate either because Mesoamerican ball courts were much simpler constructions than Roman amphitheaters. The Priesthood requirement emphasizes the religious importance of the ball game. Since Priesthood is a very early tech, one extra happiness is plenty. (In BtS, Ball Court grants 3 happiness in total.)
- 122 Hamam (the Turkish spelling) is swapped with the Babylonian Garden because the latter should really be an Aqueduct replacement. Hamam, a Turkish bath, is also closer to an Aqueduct than to an Arena, but the Ottomans were not fond of public games, so it makes some sense to not let them build Arenas. Construction is required because these baths tended to have an elaborate architecture.
- 123 Hippodrome and Odeon are swapped because a hippodrome is a kind of arena and not a theater, shouldn't require Drama and shouldn't provide Artist slots (it doesn't in BtS, but that gives Byzantium virtually no access to Artists). The improved slider happiness ability also makes more sense as an Arena replacement because Arena now grants more slider happiness than Theater. The Hippodrome in BtS grants 2 happiness for every increment of the culture slider, which is a bit much. Now it's 5/3 happiness per increment (rounded down). Odeon swaps abilities with Pavilion (q.v.).
- 124 Representation needs some form of conditional happiness because +3 happiness in the largest cities (where it is most needed) is too much, and +2 too little. And Dye granting happiness to Theater is a bit farfetched. Dye receives several other advantages though (see Dye).
- 125 Chinese pavilions were mostly decorative, which doesn't justify a 25% culture boost that can be quite significant when aiming at a culture victory. This ability fits better for Odeon, and the Odeon ability (a little culture and happiness) fits better for Pavilion. The prerequisite tech has to change because Drama and Literature don't make sense; Aesthetics is a good fit.
- 126 Increased by 2 to compensate a bit for the flat espionage bonus of 4 removed from Jail.
- 127 Sacrificial Altar is now the only way how population can be sacrificed to hurry city production. It would be a shame to completely remove an ability for which a fair amount of AI code exists, and, for human sacrifices, the ability is actually fitting.
- 128 A pagan temple, i.e. with all the abilities of Temple plus the main ability of Courthouse. (Having all abilities of both buildings would be too much in terms of utility and text length.) Just being available with Priesthood isn't useful because Courthouses aren't worth building that early. The low cost (90) in BtS is useful, but unexciting – Organized leaders (now Lawful) get even cheaper Courthouses.
- 129 A free Navigation promotion isn't good enough now that Navigation doesn't require Flanking (see Promotions section).
- 130 Drydock loses its XP ability, and is therefore cheaper. This is part of a larger effort to make the relatively low production output of coastal cities less painful. Also, drydocks really only construct ships; they don't train sailors. The XP ability is split between Barracks and Harbor because just one cheap building shouldn't provide enough XP for an immediate promotion.
- 131 Abilities that increase trade route commerce by a percentage get replaced by flat bonuses. The percentage abilities often have no effect at all because of rounding, and this isn't at all clear for players.
- 132 Harbor gets a Merchant slot (representing seafaring merchants) because Market provides only a single slot now and a second one would otherwise not be available until Banking.
- 133 180 is way overcosted.
- 134 Part of an effort to make trade between coastal cities more profitable, and make trade less profitable than in BtS when cities are on different continents but not coastal. As the only ability of Customs House, the BtS ability is also too narrow; it doesn't do anything an Pangaea maps.

- 135 Two commerce like Customs House would be too much together with the production from the unique ability.
- 136 The Portuguese feitorias were off-shore trading posts, but the BtS ability (+1 commerce on water tiles, like Colossus) is useful in any coastal city; too broad. The new production bonus should be especially helpful in colonies founded through Galleons because these cities have a lot of buildings to construct. Joao still gets +1 commerce on water tiles from his trait (Cosmopolitan), and, once the Colossus is obsolete, Public Transportation gives Coast +1 commerce.
- 137 BtS grants the bonus to all river tiles, which is too powerful. Also, riverside hills don't need flood protection. As for a levee granting a production bonus, my interpretation is that the production comes from river engineering, which in turns necessitates levees for flood protection.
- 138 A lower cost to match the earlier prerequisite tech.
- 139 A bonus for all water tiles is too powerful, and on Ocean also highly implausible because the ocean floor can't be reclaimed as land.
- 140 Part of an effort to reduce production bonuses, and a nerf because Forge amortizes too quickly in BtS.
- 141 Now that Currency is named "Coinage", it has to interact with Mint somehow. Requiring Coinage for Mint would make the building too weak (the Iron Working requirement can't plausibly be removed).
- 142 The bonus from power moves to Industrial Park (which now requires power) because, otherwise, Factory would have to become too expensive and too complex.
- 143 Without this requirement, Coal would have no benefits for pre-Electricity Factories (or only very indirectly through production from Rail Tracks).
- 144 In BtS, there is a health penalty of 2 from both Coal and Oil, but neither resource increases the output of Factory, which is somewhat illogical and leads to situations in which civs want to delay getting access to these resources. Now some energy source is needed to construct the Factory, and Oil (for motorization) causes additional bad health and grants additional production. Moreover, the overall health penalty in BtS is too high, incentivizing civs to stall population growth toward the end of Renaissance, and severely punishing small but tall civs.
- 145 Two Engineer slots as in BtS could be taken to mean that assembly line workers are engineers. Further slots now come with Industrial Park, and the workers are represented through Laborer slots. Laborers are primarily introduced for the Forced Labor civic that replaces Slavery; see under Forced Labor.
- 146 Industrial Park takes over the production bonus (shrunk to 30%) that Factory receives from power in BtS, whereas the free Engineer is now delayed until Robotics.
- 147 No penalty for having Oil or Coal because these resources don't increase the effect of Industrial Park, and because the Industrial-era health penalties are too high on the whole.
- 148 To represent the social alienation of the Industrial era.
- 149 One Merchant slot from both Market and Grocer moves to Bank because Market and Grocer need to shrink, and because lots of people work in banks, and not just as clerks. This gives Bank a number of Merchant slots, gold bonus and production cost equal to two Markets (or Grocers).
- 150 Proper stock exchanges appeared centuries later than Banks, but moving Stock Exchange to a later technology would require a very powerful ability. Instead, it gets an ability that only matters once Corporation is discovered. The new ability should be more interesting than just an even higher gold bonus (65% in BtS).
- 151 Market is far too costly (150) in BtS to be useful in the early game. Now it has a smaller effect, but also a much smaller cost.
- 152 All the other buildings that grant happiness or health through resources only care about three different resources (Grocer loses the Sugar bonus, Supermarket loses Deer). Market is an exception because most of its resources go obsolete at some point. The Ivory bonus is replaced by a bonus from Gems because Gems are no longer boosted by Forge, and Ivory, being also a strategic resource, doesn't need to grant 2 happiness.
- 153 As in BtS, cost and abilities mirror those of Market.
- 154 Islamic apothecaries were a high medieval thing, so the BtS requirement (Guilds) fits better than Compass.
- 155 Deer is now obsolete by the time Supermarket becomes available.
- 156 Mall is already a very efficient building in BtS, and far better than a regular Supermarket, but still not powerful enough considering how late in the game it becomes available. Now receives two happiness bonuses (Cow, Pig) in

addition to the one from Supermarket (Sheep).

- 157 Restoring food after starvation makes cities less vulnerable to temporary food losses, in particular from poisoned water, which sometimes kills more than 5 population in BtS. The AI is especially vulnerable to this. Granary is considered to be the most powerful building in BtS, but this is mostly because of its interaction with Slavery and Nationhood. The Slavery ability is now restricted to the Aztec Sacrificial Altar, and Nationhood (drafting) gets nerfed, so a slight reduction of the stored food should be sufficient.
- 158 Tambos were, according to Wikipedia, roadside supply stores of the Inca that served as travel lodges. The name "Tambo" makes much more sense as a unique Granary with a culture ability than "Terrace".
- 159 Two culture on such an early building is clearly more powerful than most, if not all, other unique buildings. One culture is still very good.
- 160 Mirrors the gold bonus of Market.
- 161 The two Scientist slots from Library make specialist slots from other early buildings unimportant. The second Scientist moves to University. It's very strange that University has no specialist slots in BtS (only Oxford University does).
- 162 I need the name "Madrasa" to replace Islamic Monastery (since Islam forbids monasticism). "House of Wisdom" normally refers to the library of Baghdad, but several other medieval libraries have also used that name.
- 163 Along with changes to the range of culture spread, K-Mod has slightly reduced the culture rate of several buildings.
- 164 The two Priest slots in BtS don't fit for the new name. The culture bonus (4 in BtS, 3 in K-Mod) fits, but I think the new trade route ability is powerful enough on its own. The libraries of the Arabian caliphates were famous for their translations.
- 165 Oxford University (q.v.) gets its research bonus reduced, and part of the research subtracted from there is added to University.
- 166 The University requirement for Executives is just for flavor; the crucial change is that Executives can be trained without Corporate Headquarters. Cf. Executive.
- 167 Decreased along with several other 25% bonuses (e.g. Forge, Library).
- 168 Physics would sound strange as a requirement for Salon (as does Astronomy in BtS for that matter).
- 169 "Laboratory" is a too generic name. "Particle Accelerator" fits with the tech requirement Superconductors (see also [tech-tree.pdf](#)), and one can imagine that experiments with particle accelerators are helpful for constructing a fusion-powered vessel for space colonization.
- 170 Yet another +25% (or 20%) research building with a Scientist slot is boring. The free Scientist makes the Russian Research Institute (which grants two of them) appear less strange.
- 171 Superconductors wouldn't fit as a requirement for a building that represents the institutes of the Russian Academy of Science, but going more than one column backwards would make Research Institute too powerful.
- 172 Costs 200 in BtS. But the more important buff is that Recycling Center (now "Treatment Plant") no longer simply removes all health penalties from buildings, and that free healing is limited.
- 173 Mostly for plausibility. The overall availability of Scientist specialists in the late game should still be about the same as in BtS because Laboratory (now called "Particle Accelerator") comes even later and Oxford University provides 1 Scientist slot instead of 3. See also the overview under "Specialists".
- 174 Sometimes, the map forces a civ to split its core cities among two continents. In this situation (and others), creating a colony is out of the question and colony maintenance becomes very punishing. The new Jail ability should alleviate this a bit.
- 175 This ability should give Jail a use outside focused espionage and lengthy wars, which are both somewhat exceptional. Because of the changes to revolt rules in AdvCiv, a reduced revolt chance is useful in any recently conquered city.
- 176 Jail, Security Bureau (now Police Headquarters) and Intelligence Agency are too many regulars buildings focused on espionage considering that many players rarely employ espionage. Intelligence Agency arguably represents the CIA (the 3D model bear some resemblance to the CIA headquarters) or some other foreign intelligence agency. These agencies operate on a national level, and while there may be installations in various cities, their locations aren't crucial. So Intelligence Agency becomes a national wonder.

Jail loses one of its Spy slots and the flat espionage bonus in favor of non-espionage abilities.

- 177 Security Bureau and Scotland Yard switch roles: Security Bureau gets built by Great Spies, and Scotland Yard, under the generic name "Police Headquarters", becomes a regular building. (The headquarters of London's Metropolitan Police Service were located at Scotland Yard until the 1960s.) The 3D graphic of Security Bureau shows apparently the NSA headquarters, though the name "bureau" brings to mind the FBI. Much of the NSA infrastructure inside the US is clustered around Fort Meade. While the FBI does have regional headquarters across the US, it's a national agency, and it's strange to build a "bureau" in every city. Police headquarters in every city (or every metropolitan area) make much more sense to me.

See also Intelligence Agency; now a national wonder for similar reasons. The overall approach is similar to Civ 5 Gods & Kings, which has Police Station as a regular building and National Intelligence Agency as a national wonder.

- 178 To compensate a bit for the loss of Intelligence Agency as a regular building. The total espionage bonus from regular buildings is still 100% this way, compared to 125% in BtS. If this is not powerful enough, one can always adjust the costs of espionage missions.
- 179 Lowered from 8 in BtS. The flat bonuses are mostly for civs that dabble in espionage; these don't need to be so high. The flat bonus from Intelligence Agency (q.v.) is gone entirely.
- 180 One slot shifted to Security Bureau, i.e. to the special building formerly called Scotland Yard.
- 181 This should make it less painful to build early Monuments for border expansion, but the main goal is to give Hereditary Rule an ability that plays better than the military-happiness ability in BtS.
- 182 Grants two Priest slots in BtS, but it's hard to imagine an obelisk as a place of work for priests. Note that the Great Person (GP) abilities have been rebalanced, so that "poisoning" of the GP point pool shouldn't be much of an issue.
- 183 That's +25% culture in BtS, which is just the same ability as Pavilion (now moved to Odeon). Such an ability doesn't make much sense on such an early building because it only becomes useful by the midgame. The flat culture bonus should allow Stele to win over contested tiles in the early game.
- 184 Almost(?) all abilities that disable some drawback entirely (e.g. no angry citizens through Globe Theater) are too easy to exploit, leading to unimmersive gameplay (e.g. reckless drafting of units in the Globe Theater city). These get turned into abilities that only attenuate the drawback (at a lower production cost).
- 185 Grants extra health with Oil in BtS, which is a bit confusing: It's supposed to reduce the health penalty from Oil, but, on first sight, it seems to say that Oil makes cities healthier. Better to just require Oil (for e.g. buses) or power (tram, trolley, rapid transit).
- 186 See Environmentalism.
- 187 While recycling does reduce landfill space, water treatment (and air filters) are much more crucial in combating pollution from industrial factories (which are the buildings with the worst health penalties in the game).
- 188 A biofuel corporation wouldn't work with the changes to the corporation system because every civ would have access to it, removing the tension of possibly having to fight over access to Oil. Standard Ethanol is now mostly Standard Oil, though bioethanol is still represented through Sugar (bioethanol is made from fermented sugar). This way, Standard Ethanol gives all civs an incentive to acquire not just one source of Oil, but as many as possible.
- 189 Outputting gold is problematic in BtS because the main cost for expanding a corporation is gold (for maintenance and spreading), meaning that a "gold corp" would spread everywhere. Not an issue anymore because the per-city output of a corporation now decreases a little each time the corporation expands. That said, corporations are still mainly a means of converting gold into other yields, and, in so far, Standard Ethanol is now an outlier.
- 190 Corporations that contribute to the manufacturing industry now cause 1 bad health in each city that hosts them. Mostly for plausibility.
- 191 See Standard Ethanol – mustn't give everyone easy access to Aluminum. In my mind, the Aluminum Co uses Coal as an energy source for the Hall-Héroult process, which produces pure aluminium from aluminium ore.
- 192 Increased research output because Aluminum Co no longer generates Aluminum, but also because per-city output is now reduced based on the number of corporate branches.
- 193 Replacing Gold and Silver with Uranium so that Civilized Jewelers doesn't compete with Mining Inc. No need for these two corporations to be mutually exclusive, and production from Gold and Silver is a bit implausible.
- 194 Doesn't consume Stone because Stone is no longer tradeable. Iron is for reinforced concrete, copper for wiring,

Marble (which could also represent other ornamental stones) for facades, Aluminum for e.g. window frames.

- 195 Make this the only corporation that generates culture. On Civilized Jewelers and Sid's Sushi, a culture ability seems contrived.
- 196 This makes Cereal Mills more effective at generating food than Sid's Sushi. Grains make a much bigger contribution to feeding the world than seafood.
- 197 No consumption of Clam. It's one resource too many, and clams contribute less than rice, fish and crabs to the human diet.
- 198 The health effect should make Sid's Sushi more distinct from Cereal Mills. A culture effect (2 per resource in BtS) is a bad match for a corporation that, I guess, sends frozen fish around the world.
- 199 Happiness is a better match for a De Beers-like jewelry corporation than culture.
- 200 These changes apply to all corporate HQs: They count as national wonders, which makes it harder to put them in the same city as Wall Street, hopefully making the decision where to place an HQ more interesting. The commerce at the HQs is 2 (4 in BtS), but adjusted to the map size and affected by the Free Market and Environmentalism civics. Another incentive for building an HQ (since it's no longer required for training Executives) is that it lowers the corporation maintenance in all cities with the respective corporation (regardless of who owns the HQ), and that a corporation without an HQ can be pushed out for free. A Great Merchant can found any HQ, but most of them can also be founded by a different Great Person.
- 201 Should be based on the game progress (probably city count or population). Early on, players only move their capital when they start in an awkward spot, which isn't their fault and shouldn't cost them 160 production. Later on, 160 becomes implausibly cheap and makes it too easy to relocate the capital to a safe position when getting close to a Space victory. Ideally, the AI should also consider moving its capital; currently, it does so only when a colony becomes larger than the mainland or to protect the spaceship.
- 202 This should make the capital less preordained to be specialized on commerce. With this formula, the total commerce in the very early game would be 2 higher than in BtS. This could be reduced to 1 by getting rid of the (undocumented) free base research. Also, more initial commerce makes Gold, Gems and Silver a bit less powerful.
- 203 To compensate for the Moai becoming a great wonder. Palaces usually (though not in Japan I guess) have great stone halls and fortifications.
- 204 One of several wonders that grant more specialist slots than a civ would even need in BtS.
- 205 To make up a little bit for the lost happiness from Theater. Very little, if any, marble appears to have been used in the hermitage buildings, though some of the exhibited sculptures are made of marble.
- 206 The name fits better with the new tech requirement. Also: one epic represented by a building is weird enough; it's difficult to classify real-world epic poems into "heroic" and "national" ones; and having two "epics" makes them easy to confuse.
- 207 This way, the production bonuses from Triumphal Arch and Steelworks don't overlap. This should help rein in the production speed of military units in the late game.
- 208 Now that there is a Blast Furnace tech (replacing Chemistry), it would be strange not to find "Ironworks" there. Hence the more specific name "Steelworks".
- 209 Remove the 6-building requirement (actually already reduced to 5 on Standard-size maps in AdvCiv) from national wonders except Forbidden Palace and Red Cross, because it practically forces civs to have a certain number of cities with a decent production capacity, and this is a needless constraint.
- 210 After renaming Heroic Epic "Triumphal Arch", name "Heroic Epic" becomes available for the National Epic. "National Epic" is the worse of the two names as nation is arguably a modern concept, and the "national" is somewhat redundant because the building class is already "national wonder".
- 211 Just for flavor. A library to contain the epic in its written form.
- 212 Same ability as Scotland Yard in BtS. A flat espionage bonus (8 in BtS) is a bit confusing on a building that also grants a percentage bonus. See also the comments about Police Headquarters (which replaces Security Bureau).
- 213 This tourism-flavored ability replaces the strange BtS ability (1 free specialist per Forest Preserve). Tourism is generally underrepresented in BtS. The broader range of rewarded tiles should also make it more interesting to find a location for the National Park. Note that obsolete resources are mostly animal and jungle resources.
- 214 Since Forest Preserve now grants health instead of happiness, there is no need for an additional health bonus from

National Park. Any big health bonus in the National Park city only leads to more industrial buildings in that city.

215 Engineer slots are too scarce in Renaissance. (Though an Artist slot would make more sense based on the most famous Oxford alumni.)

216 At 600 production, this might be the most overcosted building in BtS.

217 It's no longer possible to put all corporate HQs in the Wall Street city because the HQs count as national wonders. The 0-maintenance ability should instead incentivize spreading each corporation to the Wall Street city. The ability also connects Wall Street with the English Stock Exchange.

218 Replace the Military Academy special building with a found-city ability for Great Generals in order to reduce the overall unit production bonuses in the late game. Then give the name "Military Academy" to West Point in order to make the late game a little less US-centric.

219 No production bonus from Stone. The building material really shouldn't matter for this kind of facility.

220 To be consistent with Globe Theater requiring a Theater.

221 See tech-tree.pdf (e.g. Monotheism tech) for rationales about these (tentative) changes to religions. The gist of it is that the religions form pairs and that coupled religions are bound to be founded near each other. The spread of the early religions is delayed by restrictions on Missionaries (no Monasteries for Monotheism and Zoroastrianism, Organized Religion doesn't allow Missionaries without Monastery) and AI changes. This way, some civs should remain without a religion until the Medieval era, and this should make the late religions more useful.

Some religions tended to be more tolerant than others throughout history, but I'd rather model that through leader personalities and favorite religions.

Ideally, there should also be a penalty on trade (tech diffusion or trade routes) between civs with differing state religions and trade bonuses for civs with the same state religion so that the diplomatic effects of religions aren't pure roleplaying.

Perhaps Hellenism would work better than Zoroastrianism as an 8th religion.

A schism mechanism for Islam and Christianity could be a nice addition, especially for large games, since four pairs of religions are arguably too few for 18 civs.

222 I.e. the religion is not founded if the discoverer already has a Holy City. This way, a single civ can't found all the early religions.

223 So the second to discover Monotheism gets to found Judaism.

224 Meaning "the three Confucian [sites]," namely the temple, cemetery and family mansion at Qufu. "Kong Miao" just means "temple of Confucius"; there are many of these and they should be represented by the Confucian Temple..

225 No free Missionary because I want to reserve that advantage for Christianity and Islam. Confucianism and Taoism shouldn't need that Missionary either because of changes that inhibit the spread of the earlier religions.

226 Just a minor buff for the last religion in the game.

227 A way to get a second Scientist slot before University (now that Library grants only 1).

228 One slot moves from the regular espionage building (Police Headquarters, formerly Security Bureau) to the special building (Security Bureau, formerly Scotland Yard).

229 Requires Uranium (indirectly through Nuclear Plant) instead of gaining a production bonus from Uranium. A test has to be part of the project, and for that test a large amount of uranium is needed. The nuclear reactors for enrichment (Hanford Site) could be considered to be part of the Manhattan Project, but I think it's more flavorful to represent them as a Nuclear Plant: When a civ finishes its first Nuclear Plant, it might be headed toward the Manhattan Project. The game could show a message about this.

230 The name is still SDI (Strategic Defense Initiative), but, because the SDI with its space-based lasers was never realized, it's now more representative of the MDA (Missile Defense Agency) with a global ICBM interception chance (representing the Ground-Based Midcourse Defense) coupled with a non-ICBM interception chance for Mobile SAM (representing Patriot and THAAD) and Missile Cruiser (representing Aegis). This should make Tactical Nuke and ICBM about equally difficult to intercept on the whole. The lower cost is still a major advantage of the Tactical Nuke over ICBM. Increased cost for the SDI because 750 (with Aluminum in BtS) is not a major expenditure in the endgame, and in reality, only the United States have implemented such a program.

231 Adjusted to the map size because, in BtS, Shrines are too powerful on large maps and too weak on small ones.

- 232 Don't want extremely powerful holy cities. (An idea from the Dawn of Civilization mod.)
- 233 This should make it a bit less attractive to capture Shrines. A general problem with religions in Civ 4 is that the civ that invests in a religion isn't always the one that benefits from it. (E.g. the diplomatic bonuses apply to all civs that share a religion, regardless of who trained the Missionaries to spread the religion.)
- 234 For consistency: bonuses to specialists normally apply to settled Great People.
- 235 Require state religion in order to balance out the power level. (The main buff is that Angkor Wat is available earlier and at a lower cost than in BtS.)
- 236 To match the earlier tech requirement.
- 237 Just being eligible for the election still makes it possible that one civ builds the Apostolic Palace (AP) and another reaps the rewards. This is difficult to predict for the AI. This should also distinguish the AP more from the UN.
- 238 +2 production, as in BtS, causes Monastery and Temple to be spammed in all cities. The second production bonus has moved to the Pious trait.
- 239 No slots in BtS, strangely. Now matches the Shrines. A civ that builds the Apostolic Palace shortly after founding Christianity will need these Priests in order to build the Church of Nativity.
- 240 Broadway, Rock'n'Roll and Hollywood all having the same simple ability (+50% culture) is unexciting, and not quite good enough to be an important contribution for a culture victory (because these wonders become available so late in the game). Hollywood gets a higher ceiling for its culture bonus because Hollywood comes last and is the most expensive of the three.
- 241 Another Artist slot could help a little for a culture victory, although Theater and Broadcast Tower already provide a total of 4. It's more for plausibility; lots of artists work on Broadway etc., and even Globe Theater provides an Artist slot (3 in BtS).
- 242 Requirements such as this are going to sound strange with unique buildings like Hamam or Hippodrome. Can remedy this a bit by including the building class name (which is always "Arena") in help text when there is a unique replacement, e.g. "Rock'n'Roll – requires Arena (Hamam)."
- 243 The BtS ability is no fun and seems to suggest that the pyramid had a defensive purpose, which no one believes ("el castillo" is just a nickname). The Jungle Farms represent Mayan agroforestry and milpa fields. Note that I'm intending to remove the health penalty from Jungle entirely. Just getting 3 food out of each Jungle tile wouldn't be good enough, hence the commerce bonus and the Jungle hill Farms; the Maya also built terrace fields. (It would be nice to also capture Inca terraces, i.e. in non-Jungle tiles, but Temple of Kukulcan shouldn't be an Inca wonder. Could allow Corn to be placed on hills by the map generator to cover the Incas.)
- 244 The cult of Kukulcan had, according to [Wikipedia](#), a commercial side. Don't want Great Prophet points on this wonder because none of the game's religions were founded in the New World.
- 245 Don't want milpa to be more productive than modern agriculture.
- 246 Seafaring wonders (also Moai Statues) shouldn't affect Lakes. Also a minor nerf for Colossus. The bigger nerf is the increased cost though (200 in BtS).
- 247 Only every 5 turns, not once per turn, which is way too fiddly. This is slightly more powerful than the ability of the Lawful trait, which only allows switching without anarchy when a new civic or religion becomes available and once per era.
- 248 This restriction should establish at least some connection with the real statue; the no-anarchy ability sure doesn't.
- 249 The research boost from 2 Scientists is a bit too much, and there is a lack of Engineer slots until the Industrial era. (They should be scarce, but not quite as scarce as in BtS.)
- 250 Cost increased by 50, though the much bigger nerf is the earlier obsolescence.
- 251 The trade route ability justifies a higher cost; the low BtS cost (75 with Stone!) is very ill-fitting for this extremely massive building. Since Barbarian activity peaks later in AdvCiv than in BtS, the Great Wall doesn't have to be quick to build.
- 252 Two out of three abilities depending on whether Barbarians are disabled, Raging or normal. The Great Wall is too powerful in BtS when playing with Raging Barbarians and too weak when playing without Barbarians. The new trade route ability represents the Great Wall protecting trade routes; some segments of the Silk Road went along the Chinese Great Wall. Same logic as Castle providing a trade route.

- 253 The required Walls are a nod to the fact that the Great Wall of China consists of several separate fortifications. They also make the Great Wall costlier without necessarily making it slower to build. (Between realizing that Barbarians are going to be a problem and them becoming a problem, there is only so much time.)
- 254 Merchant points match the trade route ability of the Great Wall better. The Great Spy points move to the Oracle instead (which also gets a new ability).
- 255 Given that Workers are getting limited charges, the BtS ability (+50% Worker speed) would no longer be useless, but it's still not so interesting that both Vassalage (or Serfdom in BtS) and Hagia Sophia should have it, and there is no conceivable connection between Worker speed and the (real) Hagia Sophia. The new ability alludes to the Hagia Sophia influencing the architecture of mosques.
- 256 The free Temple wouldn't be powerful enough on its own.
- 257 The BtS ability, reduced hurry-production cost, would only work with Universal Suffrage or the Aztec Sacrificial Altar now because of the changes to the Slavery civic. In any case, the Kremlin shouldn't be a companion piece for either Slavery or Universal Suffrage. The Great General ability comes from the Imperialistic trait (now "Expansionistic"). The defense ability comes from Castle. It's mostly for some additional flavor; the Moscow Kremlin is also a citadel.
- 258 The Moai Statues are arguably supposed to represent an archipelago or region of islands like Polynesia that sailors inhabiting the Moai city discover and colonize. Not a bad idea considering that it's difficult to represent small islands in the game. However, it took me a decade to get this meaning. The Islet feature, which I wanted to add in any case, and the restriction of landmass size and to Ocean tiles should help communicate the idea more clearly. It's also a way to give Ocean tiles some use as they're otherwise hardly ever worth working.

Now a great wonder because:

- The Islet ability would be problematic on a national wonder because national wonders need to be destroyed upon conquest and destroying the Islet features would be implausible.
 - "Moai Statues" doesn't sound like something every civ should have. (Although one could argue that many seafaring nations have colonized some archipelago.)
 - Extra production for coastal cities, which is arguably needed for balance reasons, is now provided by Islet features placed by the map generator.
- 259 The Oracle ability is too powerful and too silly (suggesting that the Pythia learns a technology by looking into the future); a revised version of that ability has been moved to the Pyramids. The new ability is an improved version of the Statue of Zeus ability. The Statue's original ability (increased war weariness) is far too weak. Preventing war fits much better for the Oracle than for the Statue of Zeus: Greek kings consulted the Oracle before their campaigns. Some restrictions on the ability are necessary because being invulnerable to war would be too powerful. Secular civs and civs of a different state religion are assumed to not respect the Oracle.
- 260 Moved from the Pyramids. Early forms of democracy are a much better fit for the Parthenon, a symbol for Athenian democracy, than the Pyramids, which are associated with god kings. The original Parthenon ability (faster Great Person birth) moves to Statue of Zeus.
- 261 Of the 8 Ancient Greek wonders, only the Great Library grants Great Scientist points in BtS, but 6 of the first 10 Great Scientists in the game are Greeks. It's plausible enough for the Parthenon to inspire philosophers. Of the Greek wonders, Statue of Zeus and Mausoleum of Mausolos continue to grant Great Artist points.
- 262 The original Pyramids ability moves to Parthenon, where it fits much better. The new Pyramids ability is also a replacement for the Oracle ability. That ability, any free tech, wouldn't fit well for the Pyramids either, and is too powerful. Instead Pyramids provide all the techs related to the pharaonic funerary cult. This is backwards – these techs should really be required in order to build the Pyramids, but, in the end, the civ that has the Pyramids is going to have the matching techs, which is good enough.
- 263 Costs 450 in BtS; only a slight buff.
- 264 50% faster in BtS, which isn't powerful enough. All production speed bonuses (traits, resources, ...) should be the same so that they can be configured through a single value in XML. That value should be 80%.
- Perhaps the more important buff is that the tech requirement is no longer off the path to a Space victory.
- 265 To help civs with many coastal cities a bit once Colossus and Great Lighthouse are obsolete. A Forge is required in BtS, but the statue wasn't forged in New York (but in France).
- 266 Almost the same cost as Pantheon in BtS (400).

- 267 No longer requires Monuments because Monuments get a big buff through the change to Hereditary Rule, meaning that civs will usually build the prerequisite Monuments regardless of Statue of Zeus.
- 268 The BtS ability fits better with Oracle and has moved there. Statue of Zeus takes over the ability of Pantheon. Fits just as well with Statue of Zeus; in fact, the same artist, Phidias, sculpted the Athena at the Parthenon and the Zeus at Olympia.
- 269 This restriction shouldn't usually make much of a difference, but on large maps or when a civ has conquered much of the world, the number of supplied cities can get unrealistically high. Put more precisely, the wonder should apply to cities within a 17x17 square centered on the Three-Gorges city
- 270 Plastics (as in BtS) is not a plausible requirement for the Three Gorges Dam, but if only Electricity and Steel are needed, the Dam would be constructed long before 2003, its real opening year, in most games. This is not totally anachronistic because the first plans for the project stem from the 1930s (and similar projects like the Hoover Dam were realized at that time), but, still not ideal. Therefore the restriction with the river hills. Only a couple of civs will have a suitable city, and these civs could easily be behind in tech or too busy with warfare to build this very expensive wonder.
- 271 No discount from Stone. It's an adobe building and Sudano-Sahelian architecture is famous for that.
- 272 For plausibility; akin to thermal power plants requiring a resource.
- 273 These abilities mirror those of Palace (idea from K-Mod-Z). Not exciting, but at least easy to remember and they somewhat make sense. As simply a third government center, Versailles is quite unattractive, and would, unlike the real Palace of Versailles, never be built near the capital.
- Perhaps this should receive a totally different ability (which?) and require Palace.
Idea from the Beyond The Play mod: Allow an additional National Wonder.
- 274 Almost all units that deal collateral damage in BtS now deal that damage to a (much) smaller number of units, and Catapult and Trebuchet no longer deal collateral damage at all. Siege units have lower damage limits than in BtS, meaning that they tend to deal far less damage to the defender, but usually survive the attack. No more "suicide siege", that is. These changes that disadvantage the attacker are balanced out by changes to the way how the defending unit is chosen.
- 275 The strength of all Siege units has been reduced, but they get an attack bonus against contemporary units except against Mounted and Siege. The idea is that Mounted units counter Siege units even when the Siege unit attacks (the riders sally forth in response to the attack), but, in return, Mounted units lose their Flank attack ability. Siege units are now generally at an advantage when defending against other Siege units: Except Trebuchet, all Siege units receive defensive bonuses, and Cannon even has its own city defense bonus. This should give Siege units a use as city defenders since they're much less effective in pitched battles than in BtS. Siege units are no longer immune to collateral damage.
- 276 In reality, trebuchets were too cumbersome to be useful in pitched battles.
- 277 First strikes give Cannon, Field Gun and Howitzer a high chance of surviving combat despite their relatively high damage limits. The first strikes also make Cuirassier more effective than others units against Cannon because Cuirassier ignores first strikes. Likewise, Gunships become more effective against artillery.
- 278 Cannon has a lower bombard rate than Trebuchet in BtS, which is odd.
- 279 A little flavorful twist that should give warships a greater mobility advantage over land-based siege units. I've also considered requiring Horse, Cow or Oil for traction, but it appears that donkeys can be used as well, and, in my mind, these are always assumed to be available as nearly every pre-Modern campaign required beasts of burden.
- 280 This change integrates Machine Gun into the upgrade chain for artillery units. They're all mounted guns.
- 281 The names "Field Gun" and "Howitzer" are more flavorful than "Artillery" and "Mobile Artillery", and explain why the earlier of the two units doesn't require the (new) Ballistics tech. (A field gun isn't necessarily capable of indirect fire.)
- 282 Field Gun (a. k. a. Artillery) has been shrunk because it becomes available earlier than in BtS, while Infantry becomes available later, meaning that Field Gun is often contemporary with Rifleman. Machine Gun was already contemporary with Rifleman in BtS; also shrunk, from strength 18 to 15.
- 283 The bombard rates of most gunpowder-based units have been increased, but Bunker now halves the bombard rate. As for Industrial-era ships, range strikes against land units would be more realistic than a high bombard rate (see [this](#) post by Boris Gudenuf), but that would be difficult to implement.

- 284 Airship is a larger unit now. They feel too much like pesky mosquitoes in BtS, and are too efficient (cost 80) as recon units.
- 285 Airship strikes in WW1 were, to quote Wikipedia, "inaccurate but terrifying." Therefore they get the ability to lower city defenses (which mostly represent morale), but not the ability to strike tile improvements or ships at sea (BtS even gives them a 100% attack bonus vs. ships).
- 286 Upgrades to Fighter in BtS, but this would make Airships obsolete too quickly (now that they require Combustion). Also, Airships have a higher range than Fighters (8 vs. 6 in BtS) and now even higher than Bombers (10 vs. 8). It's also implausible that an airship, or even its crew, could somehow be converted into a fighter aircraft. Upgrading to Jet Fighter isn't any better, but since that upgrade is costlier and becomes available much later, civs will usually just disband their Airships at some point as they are very vulnerable to air defenses, even on Recon missions (through a change to the interception rules).
- Allowing no upgrade would mean that Airship can be built indefinitely, but with Advanced Flight, there really isn't much of a point in Airships anymore.
- 287 Like the Siege units, Fighter and Jet Fighter become less effective at softening defenders, though only a little bit (Fighter has strength 12 in BtS, Jet Fighter 24 and both have a 50% damage limit). The damage limit of the Fighters is now higher than that of the Bombers, meaning that Bombers can damage a target faster, but Fighters damage it more thoroughly if they strike it often enough.
- 288 Stealth bombers and jet fighters make their ground attacks from an altitude that WW2 and early Cold War air defenses practically can't reach.
- 289 By the Medieval era, only units with metal body armor should require Iron. As ranged attackers, crossbowmen frequently wore leather armor and just a metal helmet. Crossbow bolt heads had to be iron or bronze. Crossbowman with Copper also gives civs that lack Iron something to stave off Macemen. (Civs that have neither Iron nor Copper are in worse position now than in BtS though; won't have a decent defender until high Medieval times.)
- 290 Since Feudalism is no longer an early Medieval tech, Crossbowman takes over the role of the standard early Medieval defender from Longbowman.
- 291 Part of the changes that make Musketman much more useful than in BtS. The upgrade is very plausible too; both crossbow and musket had similar functions in battle and were easy to use.
- 292 Plus 1 strength to replace the collateral damage ability from BtS. Engaging more than one unit in a single attack doesn't make sense for a weapon with such a short range.
- 293 Lowered from 50%, but the extra strength and extra first strike still make Cho-Ku-No at least as effective as against Melee units as regular Crossbows.
- 294 While the Hwacha could be classified as a siege engine, it was mostly used defensively by the Koreans, which makes it more similar to Crossbowman than Catapult. (Musketman would also work, but already has two unique replacements.) The rockets fired from a Hwacha are essentially fire arrows, so Archery fits well enough as the unit class.
- 295 The Hwacha in BtS also gets a bonus against Melee units. This makes sense because a salvo of explosive rockets is most effective against tight infantry formations.
- 296 Hwachas were frequently placed on ramparts or other elevated positions.
- 297 Hwachas were also mounted on Korean warships. All in all, a pretty strange unit, but the real hwacha was also a strange contraption.
- 298 A slightly larger unit than in BtS, and no longer the prime Medieval city defender because Feudalism is now a high Medieval tech (middle column of the Medieval era). Also has an offensive use now against cities defended by Crossbowmen.
- 299 Iron was needed for the arrowheads (well-made bronze might've worked too), but perhaps not in large enough quantities to make Iron a requirement for Longbowman. Ultimately, some defensive Medieval unit not requiring a metal resource is needed for balance reasons, and a historical explanation why Crossbowman requires a resource and Longbowman doesn't involves some handwaving.
- 300 Upgrading Warrior to Axeman or Spearman is prohibitively expensive in the early game, and neither of these units can replace Warrior as a cheap defender (or fog-buster) against Barbarians.
- Alternatively, Warrior could upgrade exclusively to Axeman. This could make Warrior unavailable before a high number have been trained. Then Archer and Scout might become more useful.

- 301 A unique Warrior fits better for the Maya, an early civilization that didn't employ metal weapons, than the Inca, whose origins were contemporary with the European High Middle Ages. The Quechua ability in BtS (+100% vs. Archery) is far too powerful. The first strike should merely make the Holkan a bit better against Barbarians. It somewhat fits with the spear (javelin?) of the 3D model.
- 302 This ability is supposed to capture Maya trophy taking: The Holkan get something extra out of their victories. Extra XP is not an ideal way to represent this, but it's difficult to find any ability for such an early unit that isn't overpowered, irrelevant or boring.
- 303 Axeman's BtS stats are now the baseline for the early unique units. Too powerful for a regular unit, and most of the early unique units in BtS are too powerful as well.
- 304 Dog Soldier has 1 less strength than Axeman in BtS, and indeed, at strength 5 for 35 production and requiring no resources, it would be too powerful. Now that Axeman is nerfed, it should be OK for Dog Soldier to have almost the same stats as Axeman, i.e. +5 cost and an extra anti-Melee bonus (100% in BtS, now 75%).
- 305 One of the strengths of the impis was to approach ranged enemies quickly.
- 306 The impi didn't face mounted enemies much, and their short spears were not particularly suitable for the task, so a Spearman replacement doesn't fit well. Instead, make Phalanx a Spearman replacement again (as it had been prior to the BtS expansion).
- 307 Upgrades to Pikeman in BtS, which doesn't make sense as an Axeman replacement. The high speed makes the Impi potentially useful for the entire game; therefore the late obsolescence (upgrade to Rifleman).
- 308 Soren Johnson once mentioned that this unit had only been named "Praetorian" in order to avoid repeating so many unit names from Civ 3, and seemed regretful about this.
- 309 The Praetorian is the most obviously overpowered unit in BtS. 7 strength for 40 production would be fine, but the 5 extra cost and free promotion give it a bit more flavor. The Roman legions were famous for their forced marches.
- 310 Except against Melee units, Legionary and Gallic Warrior are superior to Maceman when cost is taken into account, therefore, they shouldn't go obsolete with Maceman. In BtS, Praetorian is also superior to Musketman, but that's no longer the case.
- 311 Gallic Warrior gets the Mountaineer I promotion (Guerilla I in BtS) through the Celtic Dun now. This should give Gallic Warrior and Dun a synergy and strengthen the Celtic civ overall. Unlike Guerilla I, Mountaineer I does not provide double movement on hills; this ability is now exclusive to Gallic Warrior. The second small advantage over Swordsman is, as in BtS, the Copper requirement, and a third advantage the production cost of 35.
- 312 The Woodman promotion no longer grants double movement; this is now the unique ability of Jaguar. First strike added to make the unit a bit more powerful.
- 313 Reduced bonus against Melee (was 50%) and cost reduced by 5. This makes them less bad against Crossbowman, which should appear more commonly as a defender now, and less good against Pikeman. Pike formations were actually very effective in melee. Also couldn't let Maceman go obsolete before Rifleman if the anti-Melee bonus was any higher (or would have to give Musketman a higher bonus against Melee).
- 314 Macemen tended to be heavily armored, and making that armor from bronze would've been too costly. Instead of Maceman, Crossbowman can now be trained with Copper.
- 315 Don't want all Medieval units to upgrade to Rifleman because this adds to the uniformity of early Industrial warfare. Maceman is the primary Medieval city attacker, and Grenadier now the primary Renaissance city attacker; same function. Also, both maces and grenades demanded an especially strong physique.
- 316 Maceman requires Machinery for mass-produced armor, but berserkers didn't wear armor.
- 317 Replacing the bland 10% city attack bonus.
- 318 Japan did not (or hardly) employ water-powered machinery for making arms, and guilds (za) became important only in the 14th century. As nobility, Samurai fit at Feudalism.
- 319 Two first strikes plus the Drill promotion would be too good at Feudalism. It's also too similar to the Turkish Janissary. Rather give Samurai an extra high bonus against Melee, emphasizing their prowess with the katana.
- 320 "Quechua" normally only refers to an ethnic group, and most Quechua aren't and weren't warriors. Just like Oromo Warrior isn't called just "Oromo".
- 321 The Maya now get the unique Warrior replacement. There are already two other unique replacements for Maceman, but three replacements is still OK: there are also three replacements for Swordsman and Axeman. Maceman

somewhat fits because the 3D model shows a cudgel, and the (European) medieval era coincided with the rise of the Inca. Crop Rotation is the only Medieval tech that the Inca can be argued to have possessed.

- 322 It's a smaller Maceman that becomes available earlier and doesn't require a metal resource. (The Inca knew how to create tin bronze, but didn't use it much for military equipment.)
- 323 Both Spearman and Pikeman are too punishing against Mounted units in BtS, and not useful enough for anything else. Also, a powerful pre-Classical anti-cavalry unit is ahistorical. One could interpret Spearman as heavy infantry with special training against mounted/ chariot tactics. Heavy armor would also be effective against archers. First-strike immunity fits with this, and should make Spearman a viable city attacker (with Axeman nerfed). Pikeman gets one extra strength, though also a slightly higher cost.

Considering that Chariot and Horse Archer get an attack bonus against Melee, Spearman is a very soft counter now.

- 324 In Warlords, Phalanx has +100% against Mounted, in BtS, it's 100% defense against Chariot. Realistically, it shouldn't receive any bonus against Chariot or other Mounted units; see the comment about Spearman. Make it 35%, which results in almost the same strength against Mounted units as Spearman (because Phalanx has 1 more base strength).
- 325 The Flanking promotion line has been renamed to "Skirmisher" (as in Civ 4 Colonization) because this fits the ability much better; flanking attacks aren't usually hit-and-run. To avoid confusion, the Mali Skirmisher has been renamed to "Javelineer". Both are invented names. The Javelineer starts with the Skirmisher I promotion.
- 326 The Mali spears (tamba) were iron tipped. The 3D model also shows this. That said, for just the spear heads, no Iron resource should be required.
- 327 Since Holkan and Impi no longer replace Spearman, there is room for two other unique Spearman.
- 328 A strength-4 Archer (as in BtS) is too dangerous as an early attacker. The Mali army did use archers a lot, and so replacing the Mali Archer with a javelineer (that's what the 3D model depicts) would give a false impression. The first strike represents the thrown javelin.
- 329 Due to the higher base strength and the first strike, this 25% bonus is almost as good against Mounted units as the 75% bonus of Spearman. Neither the Mali army nor the Immortals were especially well-suited against cavalry.
- 330 The 3D animation shows a kind of cataphract. This fits with the Zhayedon ("immortals") of the Sassanid Empire, but such a unit would have to replace Knight, which already has three unique replacements, and would be very similar to the Byzantine Cataphract. Moreover, the Persian leaders in the game are Achaemenids, and the Civilopedia says that it's a heavy infantry unit. (Then again, that text was apparently copied from Civ 3.) Better to discard the 3D model and make this unit a proper Achaemenid Immortal, famously depicted on ancient wall paintings with spears and bows. There is a matching 3D model in the Realism Invictus mod.
- The ability (national unit limit) may necessitate an AI tweak to discourage the Persian AI leaders from using Immortals exclusively in defensive roles where they may not see much action (CvPlayerAI::AI_unitValue).

- 331 The Archery requirement and the first strike represent the Immortals' bows.
- 332 Strength 6 would make this unit too powerful as an early city attacker, but strength 5 along with the other abilities would not be powerful enough overall. An anti-Melee bonus seems plausible enough, and means that neither Axeman nor any other Ancient unit is an effective counter against Immortal. This distinguishes the unit from Javelineer.
- 333 According to Herodotus (and the Civilopedia), the Immortals were always kept at a particular numeric strength.
- 334 No longer upgrades to Grenadier because that unit comes earlier now, at a time when Pikeman may still be needed against Cuirassier. Also, grenadiers had quite different functions in combat than pikemen.
- 335 Outside South Asia, war elephants were used only in small numbers; e.g. Hannibal took only 37 war elephants across the Alps along with tens of thousands of men. Therefore, large stacks comprised of mostly War Elephants shouldn't appear in the game. A sufficiently high cost could reduce War Elephant to a support role as an anti-Mounted unit, but this would be too far a fall from grace for a popular unit like this. The cost-increase ability was added by the BtS expansion but remained unused. (Alternatively, a national limit could be used, though it would be a bit difficult to exempt Ballista Elephant from that as the limit applies at the level of unit classes; the cost should then be 65.)
- 336 The Khmer were able to deploy hundreds if not thousands of War Elephants. Therefore, the War Elephant's cost increase doesn't apply to Ballista Elephant. The "targets Mounted units" ability is removed for simplicity and because the unit is powerful enough without it. (Guided Missile receives a similar ability though.) Flavor-wise, the Ballista is conveyed through the Construction tech requirement (no longer required for regular War Elephants) and

the first strike.

- 337 Muskets and rockets did not obsolete war elephants in Southeast Asia, but elephants are highly vulnerable to cannon balls. Since elephants are excluded from the Amphibious and Skirmisher (formerly Flanking) promotions, upgrading to a Siege unit shouldn't be a problem. Ballista and cannon are both artillery.
- 338 The costs of most pre-Industrial ships have been lowered a little bit. This change isn't sufficient for making ships worthwhile, but it should help a little.
- 339 Plus 1 movement for Galley and Trireme in order to make them more useful as explorers (instead of using only land units and Work Boats), and to give Galleys a tactical use in land wars. It's also realistic that road movement on foot is slower than water movement.
- 340 Plus 1 cargo space for all cargo units except Carrack. (With 3 cargo spaces, Carrack would be too close to Galleon.) Naval invasions are too expensive in BtS, making it too easy to defend a continent after pacifying all local rivals.
- 341 This allows green-water ships to venture one tile into the oceans, and thus explore one tile farther than land units, just as far as a coastal city with expanded borders. In BtS, the early ships are unhelpful for discovering new shores. The change also allows Ironclads to catch Frigates that only approach a city for bombardment or looting and then retreat onto an Ocean tile. Trade should also be allowed to cross one Ocean tile with Sailing.
- Alternatively, one could give ships a sight range of 2 from the beginning (rather than letting Astronomy or Optics increase it to 2).
- 342 Caravels weren't warships, and while triremes (a specific type of galley) fell out of use in the 4th century, warfare in shallow waters continued to be dominated by other types of galleys until the middle of the 16th century. If the Trireme unit is assumed to represent all types of galleys optimized for battle, then Trireme should be no less efficient as a warship than Galleon, and simply giving Trireme strength 3 (and no bonus against Galley) accomplishes this.
- 343 An upgrade to Caravel is no longer needed because Triremes remain useful (in principle) until Privateer. Having a unit upgrade to Privateer could also help to make the rarely used Privateer a bit more common; that said, the upgrade is so expensive that Triremes are more likely to be disbanded.
- 344 Over long distances, caravels were faster than galleys, and not slower than galleons. It also doesn't hurt to speed up the exploration of the oceans a bit; on Terra maps, the colonization of the New World tends to lag behind the real timeline.
- 345 Once Submarines become available, Caravels should no longer be useful for recon.
- 346 Wikipedia says that one of the roles of frigates was to “[convey] messages and dignitaries.” Also, caravels and carracks disappeared during the 17th century; don't want them to roam the map until Destroyers and Submarines become available. If Frigate take over the role of Caravel, then Caravel can exclusively upgrade to Frigate.
- 347 Vassal and master shouldn't plunder each other.
- 348 The free Sentry promotion in BtS (now called "Lookout") makes Privateer too useful for exploration and recon; these tasks don't fit for privateers. The extra visibility was also useful for spotting rival explorers or Galleons transporting Workers and Settlers, but attacking such units is often not worth the risk in BtS anyway. (Unless I add a capture/ransom mechanism for ships defeated by a Privateer.) The free Skirmisher promotion lowers the risk a bit.
- 349 The BtS upgrade to Destroyer is unaffordable. Attack Submarine is a bit cheaper than Destroyer and is a better fit functionally.
- 350 This is slightly cheaper than in BtS (90 production). Alternatively, Frigate, Ship of the Line, Destroyer, Battleship and possibly Missile Cruiser and Carrier could be given a cargo slot as in K-Mod-Z. I wouldn't want the AI to use these ships mainly for transportation though, so some new AI code would be needed to employ the cargo slot opportunistically.
- 351 To match the Skirmisher I promotion of Privateer. That's supposed to help Privateer against Galleon, not against Frigate.
- 352 Wikipedia says that “a long hull-design, which relates directly to speed” was characteristic for frigates in the Age of Sail. I haven't found travel speed figures for early frigates; my best guess is that they traveled at around 10 knots, which is much faster than galleons, caravels and carracks and comparable to clippers (East Indiaman) and Liberty ships (Transport). See also [this](#) post of mine on CFC.
- 353 During the Age of Sail, naval artillery usually outnumbered field artillery. The BtS bombardment rate of 8 (same as Catapult) doesn't reflect this well, and to support a stack of land units without Siege, too many Frigates are needed.

- 354 Some frigates, e.g. the USS Merrimack, were reconstructed as ironclads.
- 355 East Indiamen were contemporary with frigates, not galleons, and larger than frigates. Rather than a warlike Galleon, this is now a Frigate with cargo space. 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: frigates aren't descendants of East Indiamen, and East Indiamen were often full-rigged clippers that could sustain speeds of 10 knots, whereas ships of the line sailed at perhaps 5 knots.
- 356 To match the increased strength and bombardment rate of Frigate.
- 357 Three moves is frustratingly slow and not realistic either as ships of the line weren't slower than galleons. It's important that frigate remains faster though. (Before AdvCiv 0.97, Ship of the Line had speed 4 only with Coal. A Ship of the Line with Coal was supposed to represent steamships like the [Napoléon](#). A problem with this is that steam-driven ships of the line appeared quite late with the invention of the screw propeller. With one speed added to Frigate, Ship of the Line can have speed 4 without having to allude to steamships.)
- 358 One fewer move than Frigate is plausible, but frustrating, and oceangoing steamships aren't represented at all in BtS. A Ship of the Line with Coal now represents a 19th-century steam frigate. For later steamers, see Transport.
- 359 The function of a ship of the line was much more similar to that of a battleship than a destroyer, but I want to make a point that no pre-industrial ship can upgrade to Battleship. Dreadnoughts were far larger than any earlier battleships and had no wooden core. (An upgrade from Ship of the Line to Ironclad would be plausible, but awkward because Ironclad is cheaper and the two units become available at about the same time.)
- 360 To match the increased strength of Frigate and then some. The first strikes should enable Ironclad to take out several sailing ships in a row, and get across that it's difficult to damage ironclads.
- 361 The earliest ironclads were slower than contemporary frigates (and so were ironclad floating batteries), but just by a couple of knots, and the restriction to coastal waters should be enough to get the slowness of ironclads across. (Later ironclads were faster than frigates, but most of these later designs were also oceangoing.) In BtS, the speed-2 Ironclads are virtually unable to engage faster ships.
- 362 Increased to match Frigate. 12 in BtS, same as Ship of the Line, but early ironclads weren't as heavily armed as ships of the line.
- 363 The strength of the Industrial- and Modern-era surface ships (except Carrier) has been reduced because they now also represent fin-de-siècle steamships, and because there is no need for e.g. Destroyer to have 2.5 times as much strength as Ironclad; twice as much strength already results in 99% odds.
- 364 Transport, Battleship, Destroyer and Carrier can now be powered with Coal, but are then slower than with Oil. (The difference in speed isn't great because, arguably, marine diesel engines didn't greatly increase speed and range. One could add a combat strength bonus if speed isn't enough – the coal smoke made it difficult to take aim). This should give the Age of Steam a better representation in the game, and make the question of whether a civ has access to Oil less urgent. This makes it possible to remove some contrived BtS mechanisms that practically guarantee access to Oil (Standard Ethanol, Oil resources not grouped on the map, Oil revealed long before it is needed, Oil not consumed by corporations and thus available for trade).
- Transport and Destroyer are no longer enabled by Uranium because these vessels are arguably too small to accommodate a nuclear reactor, or at least it's uneconomical. Nuclear battleships are plausible although none have existed.
- 365 While attack transports were often equipped with naval guns, normal troop transports were very lightly armed. (Civilopedia: "in peacetime serves as a cargo or passenger vessel"). Therefore Transport should not be able to sink Ironclads or to blockade trade.
- 366 The large ships are a bit undercosted in BtS, at least compared with Destroyer. It's best to nerf powerful late-game units by increasing their cost because this reduces the number of units on the map.
- 367 See Attack Submarine.
- 368 Already in the 60s, it was typical for missile cruisers to have strong anti-air weapons. Missile Cruiser (anti-Air) and Attack Submarine (anti-Submarine) thus supersede Battleships and Destroyers.
- 369 Part of an overhaul of SDI. Should make Missile Cruiser more distinct from Battleship and Mobile SAM more distinct from SAM Infantry. The evasion chance (100% Guided Missile, 50% Tactical Nuke) is ignored for simplicity.
- 370 The only proper existing class of stealth destroyers, the Zumwalt class, is actually not that fast – 30 knots, whereas, for WW2 destroyers, 40 knots were more typical.

- 371 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.
- 372 Rather than allow Stealth Destroyer to detect others of his kind, I'd like to allow civs with the Stealth technology to reveal stealth ships through air recon; see Stealth in [tech-tree.pdf](#).
- 373 In BtS, Submarines are only weak counters against Battleship because the Submarine player is likely to lose at least one unit too. The 6 first strikes and 10% higher withdrawal chance than in BtS increase the survival odds of Submarines a lot, and it's a way to make Submarines powerful against Battleships and still keep them vulnerable to Destroyers, which are immune to first strikes now. As an attacking submarine needs to be located before it can be attacked back, the first strike mechanism fits perfectly for Submarines. The number 6 and 60% withdrawal chance match the 6 movement points. For simplicity, and because Attack Submarine is no longer assumed to be the more advanced Submarine, both Submarines have 6 moves now.
- As another simplification, Attack Submarine loses its combat bonus against other Submarines, and Attack Submarine and Nuclear Submarine have the same strength, but their respective costs are essentially switched, meaning that Attack Submarine is the more efficient attacker.
- 374 The name change allows "Submarine" to be used as a generic term for all submarines. Also, Attack Submarine represents the more generic type of submarine (Civilopedia: "nearly all subs would have been considered Attack Submarines"), so the other one can't get the more generic name.
- 375 A submarine that can launch missiles isn't necessarily a nuclear submarine, but most missile submarines do have a nuclear reactor.
- 376 Cost increased by 5 in order to balance out the anti-Melee bonus and increased withdrawal chance. The unit also feels too cheap in BtS considering that the chariotry was usually an elite force.
- 377 The 100% bonus against Axeman in BtS isn't much of a drawback for (human-controlled) Axemen because it can only apply when attacking (no defensive bonuses for Mounted units). The Axeman problem is dealt with differently now. In BtS, Chariot suffers from losing very badly to Spearman, which isn't historically sound. The anti-Melee bonus for Chariot and a reduced anti-Mounted bonus for Spearman mostly remove this vulnerability.
- 378 The withdrawal chances of pre-Cavalry units have been increased a bit overall because their withdrawal abilities are too low-key in BtS. (The withdrawal chance of Cuirassier has not been increased because this is a heavy cavalry unit.) Likewise, Skirmisher I provides a slightly higher withdrawal chance than Flanking I in BtS.
- If a combat round limit is implemented (see discussion [here](#)), the withdrawal ability may have to be changed fundamentally.
- 379 Historically, chariots were superseded by mounted archers and both had very similar functions in battle. Both Chariot and Horse Archer have anti-Melee bonuses now, and the cost gap is smaller than in BtS, and so, losing access to Chariot after discovering Horseback Riding shouldn't a big loss.
- 380 Strength 5 is too powerful. First-strike immunity helps with attacking cities, which shouldn't be the unit's main purpose, and isn't powerful enough overall. The combination of first strikes, increased withdrawal chance and increased cost hopefully gets the balance about right.
- 381 This allows Chariot to upgrade to Horse Archer (as it realistically should) and gives Horse Archer a slight buff without making it better at conquering cities.
- 382 Replacing the 50% bonus against Catapult. Catapult has a lower base strength now, so 25% is enough, and matches the anti-Melee bonus. There's no reason why Horse Archer shouldn't also be effective against Trebuchet.
- 383 This unit is a bit underpowered in BtS, mostly due to having 1 less strength than Horse Archer. The reduced strength is a good representation of the lack of armor, but it has to be cheaper then.
- 384 Numidians cavalry used metal-tipped javelins, not bow and arrow.
- 385 For consistency with Horse Archer, the bonus should apply only when attacking. Otherwise, the unit might also be too powerful as a pillager.
- 386 A free Flanking promotion, now called "Skirmisher" and granting 15% withdrawal chance instead of 10%, would be a bit much in addition to the 25% inherited from Horse Archer. 35% is still 5 points more than the total withdrawal chance in BtS though.
- 387 Reduced by 5 because Knight wasn't quite powerful enough given its numerous preconditions.

- 388 Without this bonus, Horse Archer would be slightly more efficient than Knight against Melee units and couldn't be obsoleted by Knight.
- 389 Byzantine cataphracts were early medieval progenitors of high medieval knights, and therefore shouldn't have higher strength (12 in BtS) than Knight. Instead, Cataphract now has fewer tech requirements and a lower cost.
- 390 As a Horse Archer replacement, this unit appears too early in BtS and is too weak to drive the high medieval Mongol invasions.
- 391 The Machinery and Feudalism requirements of Knight don't work for Keshik; the (tribal) Mongols did not employ these innovations. Statecraft (Civil Service renamed) makes some sense because that tech comprises Eastern military strategy. Would prefer to give it a Medieval requirement in addition, but none of them fit.
- 392 The ability to ignore extra movement costs from terrain is removed because fast movement on horseback through forests is implausible. The ability is also unpleasant to play against (easy to forget).
- 393 A lower cost and strength than Knight feels more correct for a light cavalry unit.
- 394 Mounted archers in Ayyubid Arabia were probably not heavily armored and not aristocrats, so the tech requirements of Knight don't fit well. Guilds seems more open to interpretation and trade was of great importance to the Ayyubids.
- 395 The mounts should be represented somehow. Alternatively, Horse could be required, and the map generator would be allowed to place Horse on Desert tiles.
- 396 Mostly for flavor. Would have to treat city tiles as having no terrain in this context; Camel Archers aren't for urban warfare. (In some other games, e.g. Total War and Age of Empires 2, camel units have a bonus against horse units, but it appears that, in reality, horses only fear camels if they're unaccustomed to them.)
- 397 This unit is a bit too powerful in BtS. Increase the cost by 10.
- 398 This is 50% against Melee (also on the defense) in BtS. Half of that bonus has been shifted to anti-Archery because an anti-Melee bonus is rarely important this late in the game. The new bonus should make the Conquistador very effective at conquering pre-gunpowder civs – which is what the real conquistadores were famous for.
- 399 In BtS, Conquistador does receive defensive bonuses, but this exception is easy to forget, and shouldn't be needed anymore because the attack bonuses are now more powerful.
- 400 Plus 5 cost to match the cost increase of Rifleman.
- 401 A unit with rifles should not be vulnerable against Pikeman.
- 402 The upgrade to Gunship (in BtS) doesn't make sense and comes too late. Tanks took over many functions of cavalry, but since this an expensive upgrade, Anti-Tank is offered as an alternative.
- 403 Cossack is too weak in BtS for such a late unique unit. Since real Cossack cavalry was neither especially well-trained nor well-equipped, a lower cost than Cavalry works better than a higher strength.
- 404 Reduced the bonus against Mounted units and restricted it to attacks; this way, it matches the anti-Melee bonus. It's not a very useful ability anyway.
- 405 The cost reduction by 5 is one of several small buffs. Moreover, Cuirassier, Rifleman and Cavalry are now slightly costlier, and Rifling moves into the Industrial era. These changes should ensure that Musketman is no longer skipped over.
- 406 Plate armor was a protection against muskets (albeit an imperfect one), so it makes sense to give Musketman a first strike and to let Knight and Cuirassier ignore that first strike.
- 407 Crossbow now upgrades exclusively to Musketman, meaning that Musketman has to be strictly better than Crossbowman, also against Melee units. Dense infantry formations were indeed vulnerable to musket volleys.
- 408 As a cheaper alternative to the Rifleman upgrade.
- 409 The BtS ability (bonuses against pre-gunpowder units) has kind of moved to Conquistador, where it fits better. Janissary gets the abilities of the BtS Oromo Warrior instead, though without the first-strike immunity (now only granted to heavily armored units) and without the extra first strike because the Drill promotions have been buffed. Drill fits pretty well for slave units that employed volley fire.
- 410 Now that Grenadier appears earlier and Rifleman later (see [tech-tree.pdf](#)), a bonus only against Rifleman (as in BtS) wouldn't make sense.

- 411 This should make Grenadier the primary city attacker in the Napoleonic era. In BtS, Rifleman has that role, but rifles didn't become predominant until the Crimean war. City Raider II and III are now available to Gunpowder units, meaning that Grenadier can get these promotions too (but other Gunpowder units can't because they lack City Raider I).
- 412 BtS also allows an upgrade to Machine Gun, which I'm moving into the artillery upgrade chain instead.
- 413 Now that Rifling is an Industrial tech, Redcoat would come too late as a Rifleman replacement. Also, the 3D model shows an 18th-century Brown Bess musket. A Musketman replacement would come too early. Grenadier comes at about the right time, but Blast Furnace is not a sensible requirement for an advanced musketeer. Nation State is in the correct column, and the red uniforms were first used by republicans during the English Civil War (although republicanism isn't quite what the Nation State tech represents). Constitution could be an alternative.
- 414 Riflemen are way overpowered in BtS, but this is in part because Musketmen are so weak or even skipped entirely (with Riflemen fighting against Longbowmen). With these issues fixed, a slight cost increase (by 5) should be sufficient.
- 415 The Oromo didn't fight any notable battles with muskets. The big military accomplishment of modern Ethiopia was its victory in the Battle of Adwa, in which Oromo warriors participated. The Ethiopian troops weren't especially well-trained, which is why the Drill abilities have been moved to the Ottoman Janissary. The main accomplishment was, apparently, to raise (not through drafting) and maintain a large enough force to overwhelm the Italians. Therefore, a lower cost than Rifleman looks like the best way to represent the gun-wielding Oromo warriors.
- Alternative idea: The Oromo didn't manufacture their own rifles. Could model this by requiring, say, Military Tradition and Rifling *or* having Open Borders with a civ that has Rifling. Cost and stats of the unit would then be the same as the ordinary Rifleman's.
- Might also want to rename the unit to "Mehar Sefari" (as the Dawn of Civilization mod does).
- 416 In BtS, Infantry beats Rifleman at 97% odds in open terrain, and costs only 27% more. Rather than reduce the strength difference, increase the cost of Infantry from 140 to 190. This approach should reduce overcrowding. Increase almost all Industrial-era unit production costs accordingly, i.e. by some 20 to 35%.
- 417 At 20 strength (as in BtS) and 190 cost, Infantry would be less efficient than Rifleman against Cavalry. Better (and simpler) to give Infantry more strength and to remove the anti-Gunpowder ability.
- 418 The Marine now represents not just marine corps, but any non-mechanized infantry with assault rifles (except paratroopers). After WW2, most infantry switched from battle rifles to assault rifles, therefore, this upgrade should be possible in the game. Infantry remains slightly more efficient than Marine as a defensive unit, so city garrisons shouldn't be upgraded to Marines.
- 419 SAM Infantry is now cheaper than Infantry, and the upgrade to SAM Infantry has always been difficult for the AI because SAM Infantry is a weaker unit than Infantry when air defense isn't needed.
- 420 Perhaps a cavalry charge against machine guns fared a bit better than an infantry charge, but neither should be effective.
- 421 Machine guns are mounted on attack helicopters. Also, Cavalry no longer upgrades to Gunship. Not sure if defensive promotions should be discarded (Gunship doesn't receive defensive bonuses).
- 422 The 50% bonus against Machine Gun and Artillery in BtS is difficult to rationalize. The City Raider promotion just makes Marines good at attacking fortified positions (possibly held by Machine Guns), which is what an assault rifle should do. Note that Marine can be promoted to City Raider II and III.
- 423 See tech-tree.pdf. Perhaps not worth the implementation effort though.
- 424 As the latest unique unit in the game, the Navy SEAL needs to be very powerful, and that more through finesse than raw strength. Therefore, and to match the "Air and Land" in "SEAL", it gets the paratrooper ability (with improved evasion chance) and two more free promotions. The national unit limit makes sure that the unit doesn't become overpowered (and only about 1% of the US marine corps are SEALs). The limit also means that Navy SEAL can't replace Marine because that unit needs to be available in larger numbers. Tbd.: Consider Blitz instead of Tactics.
- 425 In BtS, e.g. exactly four Guided Missiles are needed to destroy a (lone) Battleship. This needs to be less predictable, and the expected damage needs to be a bit higher. Then, given changes to the combat system that make it harder for players to get the better of the AI, it should be a reasonable play, even for human players, to fire one or two Guided Missiles onto a Battleship before a naval attack.
- 426 Instead of the BtS Rebase ability, let Missiles move like regular units, airlift through Airport and load onto special-cargo ships (Nuclear Submarine, Missile Cruiser) through the Load command. It's acceptable that airplanes can

Rebase across an arbitrary distance in one turn, but a missile can't be shot from city to city.

- 427 This ability, akin to the ability removed from Ballista Elephant, should make Guided Missile useful against unit stacks, and in particular against accompanied Carriers. (The production cost of units in cargo is added to that of the cargo unit when determining the most expensive unit.) On the other hand, Missile Cruiser and Mobile SAM get the ability to intercept Guided Missiles (see SDI).
- 428 Mechanized units are Air, Sea, Armored and Siege units (except Machine Gun). While cruise missiles can strike infantry, decimating or destroying an entire brigade or division would be uneconomical. By exempting cities, (and Forts), questions like whether Air units should be targetable or if tanks could be sheltered are avoided (or answered in the negative).
- 429 This is just 50 production more than in BtS for Tactical Nuke and no cost increase for ICBM. Instead of making nukes much more costly, their damage to units is calculated differently, and nuclear first strikes are less powerful than in BtS because declarations of war now only take effect at the end of a turn and because units can no longer attack tiles that have just been nuked. Tactical Nuke also suffers from changes to Missile movement and higher interception odds (see SDI).
- 430 Armored units can no longer receive the City Raider promotion because these units are too powerful in BtS, and because tanks aren't very effective in urban warfare. (Adopted from the Dawn of Knoedel mod.)
- 431 At cost 230 (like Tank), this unit might be more efficient than Modern Armor, whose cost gets increased a lot.
- 432 Panzer is a bit weak in BtS for such a late unique unit because the bonus against Armored units applies too rarely. Halve the anti-Armored bonus and add two first strikes. The Panther V depicted in the 3D model had a particularly high range; this should justify the first strikes.
- 433 Despite the 35% cost increase, this unit would still be a bit too powerful at 40 strength plus 2 first strikes considering that it's along the road to a Space victory.
- 434 Without the anti-Armored bonus, Panzer might be more efficient than Modern Armor in tank-on-tank warfare.
- 435 This strength increase (by 1) is enough to make up for the increased cost (only 120 in BtS), but Armored units get nerfed more badly, so, on the whole, Anti-Tank should be a bit better at its task than in BtS. Combat rule changes (choice of the defending unit), the additional upgrade option and the upgrade from Cavalry should also help a little.
- 436 In BtS, it's possible to protect Tanks from Anti-Tank without sacrificing mobility by accompanying them with Cavalry. The Ballista Elephant ability prevents this. It replaces the air interception chance added in BtS 3.17. Anti-tank bazookas have a range of no more than a few hundred meters; not enough to hit aircraft.
- If this is too powerful, Anti-Tank could simply receive a bonus against Mounted units instead.
- 437 Upgrades only to Mechanized Infantry in BtS, which is boring and Mechanized Infantry doesn't actually supersede Anti-Tank. Functionally, the only sensible upgrade is Gunship. The upgrade to SAM Infantry offers an earlier, cheaper option. Both units employ shoulder-fired rockets. It's somewhat important that Anti-Tank can be upgraded because, otherwise, civs can be stuck with a useless unit when it turns out that their enemies aren't fielding tanks.
- 438 The 4 moves in BtS make Gunships extremely fast on Rail Tracks. This is a problem with all units that have more than 1 move, but the fast Gunships are the most noticeable. 3 moves is still very fast (even on Roads), and in enemy territory, the range of helicopters is limited by fuel to a few hundred kilometers. (From the Rebalance the Realms mod.)
- 439 Being able to explore the map faster than Warriors isn't quite good enough. In BtS, it's very rarely wise to train a Scout in the early game. A defensive bonus against all Barbarians (not just Animals) allows Scout to help fighting Barbarians.
- 440 This makes it easier for Scouts to gain promotions, in particular those granting movement bonuses. These bonuses no longer benefit Warriors (nor any other units with just 1 move). A scout should know how to hunt predators; Hunting is even a requirement for Scout.
- 441 Lookout (formerly "Sentry") should be at least as useful for exploration as the ignored extra movement costs in BtS. Lookout also gives Explorer some auxiliary use in warfare once it's done exploring. (Inspired by K-Mod-Z.)
- 442 To be consistent with Scout; less important for Explorer.
- 443 In BtS, the inability to attack Barbarians prevents Explorer from entering Tribal Villages guarded by a Barbarian, and Tribal Villages should be the main reason for training Explorers rather than using some old Chariot or Scout. Scouts still can't enter guarded Tribal Villages.

- 444 Worker underemployment is one of the bigger design flaws in BtS. Worker decisions tend to take a painfully long time to make when there is nothing important to do. Limited charges help because the superfluous Workers eventually run out of charges.
- 445 This refund should steer players away from keeping reserves of almost depleted Workers.
- 446 This unit should be replaced entirely. It's an offensive stereotype and the Developmental (BtS: Expansive) trait already grants more efficient Workers. At the very least, the Civlopedia history text needs to be replaced.
- History Rewritten has a "Ratha" unit, Dawn of Civilization "Hindu Patiyodha" – possibly adopted from Europa Barbarorum. I don't like either of these ...
- 447 This is, in a way, the earliest unique unit, and three moves are too powerful for that. (Adopted from the Rebalance the Realms mod.)
- 448 This should prevent players from letting a Settler sleep on a city site until an AI civ tries to settle there. This tactic can be quite harmful to the AI (at worst, a wasted Settler).
- 449 None of the Spy missions work well, but replacing the entire system would be a disproportionate effort. As for balance issues, K-Mod already fixes the exploitable Spread Culture mission and increases the cost of the Force Religion mission. Changes to Granary make the Poison Water and Foment Unrest missions less dangerous. The Support City Revolt missions remains problematic. Perhaps replace it with a cheaper "Bribe Garrison" mission (could cost some gold for flavor) that halves city defenses, and a costlier revolt mission that counts toward flipping the city to its cultural owner (whoever that is). Sabotaging Walls and Castle would remain possible in addition.
- 450 Should imply the ability to explore rival territory.
- 451 A similar unit ability is already implemented in BtS, but unused. It will prevent Spies from being used as explorers that are safe from Barbarians. Especially among Barbarians on some unexplored terra incognita (not to mention Animals), an interloper would surely be noticed. Making Spies visible to Barbarians would be harder to implement.
- 452 Since Shrine income is now based on map size, so is the cost of Missionaries. E.g. it wouldn't be economical to spend 40 production on a Missionary just to increase the Shrine income by 0.5 gold.
- 453 That's 100 in BtS. To match the decreased corporation yields.
- 454 Can't let a rival decide where corporations spread – that leads to branches in the worst and thus most nonsensical places.
- 455 The "culture bomb" ability in BtS is too similar to settling the Artist in a city, and is therefore moved to Great Spy. The new Great (Art-)work ability should make Great Artists more useful for civs that aren't interested in a Culture victory. The discover ability is gone; there are too few techs that fit.
- 456 Cultural wonders are those with a positive culture flavor value (these value are not visible in the game) or that produce Great Artist points (some do both, but either condition is sufficient). Same for religious wonders (religion flavor, Great Prophet points).
- 457 Most of the other super specialists now construct a building when settled, but for Great Artist and Great Prophet, there are too few buildings that make sense. Instead the Great Artist provides some culture to the city (though not nearly as much as the BtS "culture bomb"), and the Great Prophet lets a number of Missionaries (depending on the map size) appear. (Or perhaps the Prophet could spread the state religion to nearby cities and remove non-state religions, both probabilistically.)
- 458 Creative Constructions generates much more culture than in BtS.
- 459 The hurry and free-building abilities of other super specialists make the Engineer ability less unique. Perhaps the ability to hurry projects can make up for that a bit. If this allows for faster Space victories, all the better; they're taking a dreadfully long time.
- 460 The building is going to be the most expensive one that grants slots of a matching specialist, i.e. a Factory, Industrial Park or Forge (in that order) from a settled Great Engineer; a Bank, Grocer, Market or Harbor from a Merchant; a University, Hospital, Observatory or Library from a Scientist; and a Police Headquarters, Broadcast Tower, Jail or Courthouse from a Spy.
- 461 That mission also grants some gold to the owner of the target city, which should make the ability more interesting.
- 462 Since the Shrine and discover abilities of the Great Prophet are so situational, the Great Prophet needs another ability.
- 463 Grants only 25% more research points than the other specialists. The 50% bonus in BtS is too powerful.

- 464 The "culture bomb" makes more sense as a diplomatic mission. The culture is converted because that matches the Spy flavor better, and because Great Spy shouldn't have an ability that helps a great deal with a Culture victory.
- 465 A K-Mod change. The XP is based on the number of units present in the tile. This should provide an alternative to a "super medic" (Medic III) Warlord.
- 466 Just founding a city wouldn't be good enough, need to give it a quickstart. The free culture should mainly expand the borders. The free building mirrors the settle abilities of the other super specialists. The most expensive building with a positive military flavor value is chosen, i.e. usually Courthouse (very useful in a new city), or, if Code of Laws isn't discovered yet, then a Stable, Barracks or Walls.
- Should perhaps disable this ability when starting in the Modern era because all cities start with a free Courthouse then. Or disable it when reaching the Modern era regardless of start era.
- Alternative idea (credit to CFC user [Tigranes](#)): Allow Great General to be sacrificed to construct a Palace
- 467 Allow this promotion for ships to make them more useful in land wars. Drill replaces City Raider as the prerequisite because ships can't get City Raider. One could allow both Drill and City Raider for Siege units, but City Raider is also a bit too powerful overall, and a unit that is good at bombarding defenses shouldn't necessarily also be good at attacking city defenders. Drilling the crews that that operate artillery weapons may not improve their accuracy, but certainly their fire rate, so an increased bombard rate seems plausible enough.
- 468 Removed: Mounted. War Elephants shouldn't get this promotion (at least not the part about attacking from the sea), and other Mounted units aren't easily deployed by ship either. Perhaps some units – War Elephant, Armored units, Artillery – should take up two cargo spaces when transported.
- 469 Due to the decreased limits for collateral damage, just increasing the collateral damage as in BtS (by 100% in total) wouldn't be useful.
- 470 This makes the Blitz promotion far easier to get. The goal is to make it harder for Transports to deploy units without a sufficient convoy. In BtS, a handful of outdated Frigates is often enough to protect the Transports until they have unloaded. Blitz makes it easier for warships to burn through a weak convoy. That said, the number of attacks is now restricted to 2.
- 471 Garrison III and City Raider III are a bit too powerful at 30% (plus another 10% vs. Melee and Gunpowder respectively). The secondary attack/ defense ability should only rarely be useful; it's more about flavor: conquest and defense of a city are both urban warfare.
- 472 This should make the tactic of clearing a city and immediately recapturing it through city attack bonuses less common. In BtS, it's +25% city attack.
- 473 A K-Mod change to make the Leadership promotion more attractive.
- 474 To unclutter the Spy unit. (Since it starts with Commando, it won't need a separate ability to explore rival territory.)
- 475 Requires Combat IV in BtS and can be acquired by almost all non-Mechanized units. I don't think the ability plays well on combat units; too unpredictable and could incentivize the removal of (rail-)roads. On Recon units, it should be OK, though it would perhaps still be better to give this promotion only to Spies.
- 476 In BtS, the Drill promotions are inferior to the Combat promotions in practically every situation. Therefore, the first-strike chance at Drill I and III is converted into a proper first strike, while one of the first strikes at Drill IV becomes a first-strike chance. The damage reduction abilities now also cover air damage, but Drill II grants only 10% damage reduction instead of 20%. These changes give Drill a smoother progression.
- 477 "Drilled Helicopter" doesn't sound right and I don't want the changes to Blitz (q.v.) to apply to Gunship.
- 478 This excludes War Elephants.
- 479 Guerilla I and II have been renamed to Mountaineer I and II because the name "Guerilla" fits very well for the new promotion to be granted by the Protective trait.
- 480 The movement bonuses at Guerilla II (now Mountaineer II) and Woodsman II are outlandish – units mustn't move faster through rugged terrain than through open terrain –, and now only appear on Gallic Warrior and Jaguar. The new movement abilities only ignore extra movement costs, which means that they are only useful for units with more than 1 move, which is to say Scouts and Explorers. The medic ability at Woodsman III is even more problematic: The Medic promotions already provide too much healing, and a Woodsman healer sounds like the druid in Asterix. Therefore, Guerilla III and Woodsman III get removed, and the remaining four promotions become more condensed.

- 481 Added for the Protective trait, but the promotion should also be worthwhile for units that don't receive it via trait.
- 482 The 25% Forest attack from Woodsman I only make up for the Forest defense bonus (i.e. unless the Forest is owned by the attacker). With Woodsman II, the attacker gets a net combat bonus from Forest.
- 483 This promotion is far too weak, and the Zulu Impi no longer receives it for free (because 2 moves provide enough mobility).
- 484 In BtS, that's 15% and also extends to adjacent tiles. Given the new limits on free healing, even 10% are very valuable.
- 485 No longer requires a Great Warlord, though the XP from a Great Warlord still makes it easier to reach this promotion. A healer is a pretty boring way to use a Great General; shouldn't be the best option most of the time.
- 486 Machine Gun and Naval units rather have too few promotion options in BtS, and I don't see why they shouldn't be allowed to get Interception I and II. Note that the promotion is only available to units that already have a positive interception chance.
- 487 Renamed from "Sentry" because that name only explains how the promotion makes it easier to spot enemies; for the exploration aspect, it doesn't fit at all. Also, "Sentry" is the name of a unit command. For ships, there's a separate promotion now because pre-Renaissance ships should not be able to spot land across ocean through a promotion. The tech requirement is Optics, and the name "Lookout" fits well with that.
- 488 To give Scouts a chance to get this promotion. (Explorer gets it for free anyway.)
- 489 Flanking I requirement removed because, even with base speed 3, Galleys are still a bit slow and gathering 5 XP for Flanking+Navigation is usually not feasible. Also, the promotions that BtS allows at level 2 are all combat promotions, but Galleys often don't anything to attack.
- 490 The pincer maneuver is more associated with classical warfare and hardly at all with Renaissance. Rename to "Volley"? But that wouldn't fit well for the Industrial era ...
- 491 Not Siege because it's silly for Machine Gun and Artillery, and I plan to add anti-Melee bonuses to Horse Archer, Knight and Musketman – let's give Melee units a break here.
- 492 The BtS ability (military happiness) is too fiddly to use, encourages civs to train more units than they need and would fit better for a military dictatorship than a monarchy. The Monument ability has moved from the Charismatic trait. The happiness from luxuries should keep Hereditary Rule viable once Castle and Monument are obsolete.
- 493 Plus 3 research is too powerful compared with the other three Government civics, and makes it difficult to balance the power level of specialists with and without Representation. 1 research is shifted to the Scientific Method tech.
- 494 This is 4-6 in BtS (depending on map size). The slightly smaller number of cities should make the ability more distinct from the Hereditary Rule abilities that apply to all cities.
- 495 This is one of the few evil civics, allowing for some role-playing. The BtS ability is too situational for that, and fits better for Theocracy (moved there). The production bonus comes from State Property and could represent labor camps. It makes Police State the Government civic with the highest production potential. The other abilities are about dealing with discontent and international pressure; police states are very good at that. (The slider ability is inspired by the Dawn of Knoedel mod.)
- 496 This column contains Barbarism, Vassalage, Bureaucracy, Nationhood and Free Speech in BtS. It's difficult to see what these have in common and why they should all be mutually exclusive. Seems like a catchall category, and hence the generic name "Legal". The new name, "Organization", is also very generic, but is supposed to refer to the more specific concept of centralism vs. regionalism/ localism.
- 497 Tribalism has moved from the Labor column and replaces Barbarism, which doesn't fit under the new column name "Organization".
- 498 This hurry ability replaces the hurry ability of Slavery. The purpose is to provide emergency defenders in the early game.
- 499 No change to this. The 2 XP could come from constant feuds among noble houses; plausible enough. For simplicity, the unit cost ability is removed.
- 500 Moved from Serfdom to Vassalage for balance reasons. The limited number of Worker charges makes this ability more powerful than in BtS. It makes a bit more sense at Serfdom, but Vassalage and Serfdom are mostly sides of the same coin.
- 501 In this column, high upkeep should be reserved for civics with centralized authority.

- 502 One of the most overpowered civics in BtS. The large commerce bonus together with the free commerce from Palace (now also reduced; see Palace) means that capitals are almost always focused on commerce in BtS.
- The bonus to other government centers buffs Forbidden Palace and Versailles.
- 503 This is in addition to an increased effect of upkeep classes. The Bureaucracy civic represents a highly centralized bureaucracy, and this should not be viable for very large civs (unless perhaps with Versailles), and only small civs should fully benefit.
- 504 "Nationhood" isn't a suitable name for a civic that primarily enables drafting; almost all modern states are nation states.
- 505 Modern military conscription went hand in hand with greater political rights; e.g. Russia introduced universal national conscription in 1874 after abolishing serfdom in 1861. As drafting is a mechanism that raises the stakes in war and adds lots of units to the map, it should become available as late as historically justifiable. Additional checks and balances for drafting: Causes local "cruel oppression" anger which prevents drafting for a number of turns, and "Hell no" anger that affects all cities. For every 2 production in the cost of the drafted unit, 1 food needs to be paid. If not enough food is stored, remove 1 population and fill the food store – repeat until enough food is paid. Can only draft in cities with own majority culture, and at least 5 population need to remain after drafting. Drafted units may receive free promotions but no free XP. Mechanized Infantry can't be drafted.
- 506 This ability, along with the happiness from Barracks, should make Militarism viable without Emancipation or at peacetime.
- 507 At least medium upkeep is needed for balance reasons (Nationhood in BtS has no upkeep). High upkeep would be a bit hard to explain historically; there are several examples of large militaristic states.
- 508 Free Speech doesn't make much sense in a column with Bureaucracy and Vassalage, and the combination of Police State and Free Speech (allowed in BtS) is jarring. Freedom of speech is now assumed to be implied by Universal Suffrage. The replacement, Federation, fits with the new column name "Organization", can take over the distance maintenance ability from State Property and the culture ability from Free Speech also somewhat fits.
- 509 Distance maintenance is an important aspect of the game, and one that leads to interesting gameplay; a civic mustn't entirely disable that. Moreover, the ability moves from State Property to Federation (formerly Free Speech); socialism shouldn't be a matter of state size.
- 510 The culture bonus from Free Speech also works well enough at Federation – allows regional/ minority cultures to thrive. The bonus was already halved (100% in BtS) by K-Mod. Had been too crucial for Culture victories in BtS, and probably also affected borders too much after the K-Mod changes to culture spread.
- 511 Replaces Tribalism, which is needed in the Organization column (previously "Legal"). The Barbarism civic gets removed entirely.
- 512 This replaces Slavery. The "whip" ability in BtS is far too powerful, to the point of warping the entire game, highly unrealistic and tedious to use. The Forced Labor civic is supposed to fulfill the same function as Slavery, namely to convert food into production. (Another important function of Slavery, emergency defenders, is taken over by Tribalism.) This does not match the historical role of slavery well; it's more similar to corvee labor. The name "Forced Labor" still allows players to assume that it's slavery if they prefer.
- 513 The most straightforward way to convert food into production is a specialist. Engineers don't provide enough production and don't belong in the early game, hence a new specialist that provides 3 production and no Great Person points.
- 514 A caste system allows very little social mobility, so the unlimited specialists ability in BtS is highly ill-suited for this civic. That ability also devalues buildings with specialist slots. The new ability is more restrictive. It allows Priests instead of Scientists because the brahmins are the most important caste, and because the game needs another early Priest slot. The power level of the different specialists needs to be adjusted so that Merchant, Artist and Priest aren't awful specialists (see the Specialists section).
- 515 In BtS, both Caste System and State Property give bonuses to Workshop. Similarly, both Universal Suffrage and Free Speech give bonuses to Town. These synergies make it difficult to balance these four civics individually, and to get the right balance for Workshop and Town.

A Workshop bonus makes more sense at State Property, representing industrialization campaigns like the Big Leap Forward. To capture the famines resulting from these campaigns, State Property gets the production bonus, not the food bonus. Caste System instead takes over the Free Speech ability, but in a way that doesn't stack with Universal Suffrage. Historically, caste and village are central and interrelated elements of Indian society; see e.g. [Dhani](#) on Wikipedia.

- 516 Once established, a caste system appears to be easier to maintain than slavery or serfdom. Uprisings by the dalit (untouchables) appear to have been rare.
- 517 In K-Mod, Serfdom yields +1 commerce from Plantation, but given that Silk and Spice Plantation are allowed to coexist with Forests, Plantations should no longer need this bonus, and +1 commerce from Farm is powerful enough.
- 518 The new Serfdom ability (inherited from K-Mod) could help replicate the agricultural revolution in medieval Europe. More importantly, the BtS ability, increased Worker speed, is not nearly powerful enough to compete with the other Labor civics. That said, increased Worker speed together with the K-Mod abilities would make Serfdom a bit too powerful and complex; the Worker speed bonus has therefore moved to Vassalage.
- 519 The upkeep class is Low in K-Mod, but that would be a bit too good now that Slavery is gone.
- 520 I've tried to explain in [this](#) CFC post why I think that Emancipation is mostly OK as it is in BtS.
- 521 This is called "Decentralization" in BtS, which would now fall under "Organization". The Organization column gets Tribalism instead though, so Decentralization isn't used anymore at all.
- 522 It's difficult to connect the strange free-specialist ability in BtS to mercantilism. That ability moves to Pacifism. Mercantilism gets a bonus to trade route yield, and the foreign-trade drawback is turned into an advantage.
- 523 The sustained-peace bonus is the main reason why foreign trade routes are more profitable than domestic ones, but, even without this bonus, foreign trade still has some small advantages. This is important because, otherwise, rivals would have a good reason to cancel Open Borders when a civ adopts Mercantilism. The AI is not going to do that.
- 524 The bonus from trade with Palace Economies rewards beelining to Political Economy (formerly Economics) as if it were a military tech, which nicely underlines the aggressive trade policies under mercantilism. (More advanced economies are assumed to respond to mercantilist policies in a way that denies the mercantilist civ the extra trade route yield.)
- 525 Under the new corporation rules, a city with a branch of a corporation whose HQ is owned by another civ is affected by Mercantilism as follows: It generates no income at the HQ; pays higher maintenance because it lacks an HQ; a competing corporation whose HQ is owned by the city owner can replace the branch without paying gold.
- 526 Mostly a matter of balance. High upkeep could be explained as costs for enforcing tariffs.
- 527 This drawback makes it easier to bring the other Economy civics to the same power level as Free Market. The anger represents anti-capitalist sentiment. (Adopted from the New Balance mod.)
- 528 Increased HQ income is more suitable for Free Market than the reduced corporation maintenance in BtS. Encourages civs in Free Market to found HQs and to boost them with Banks and Wall Street. There's also a slight incentive for HQ owners to talk other civs into Free Market.
- 529 With the changes to the corporation rules, corporations should play well enough to make an opt-out civic unnecessary. Instead, corporations under State Property represent state-owned enterprises. The advantages of state ownership (disputed as they may be) are expressed through drastically reduced corporation maintenance. This ability replaces the distance maintenance ability, which moves to Federation (formerly called Free Speech).
- 530 The drawbacks of state ownership are expressed by cutting the corporate branches off from their HQs. I.e. civs in State Property miss out on the gold income of the HQ. The lack of an HQ also increases corporation maintenance, but that effect is outweighed (by far) by the -60% corporation maintenance. Lastly, State Property denies income to foreign HQs – foreign corporations were barred from communist countries.
- 531 This bonus has moved from Nationhood (now Militarism). More plausible at State Property: it's easier for intelligence agencies to permeate enterprises when they are state-owned.
- 532 In BtS, this is a flat health bonus of 6, in K-Mod minus 30% bad health from population. If the health bonus from Environmentalism is too large, the environmentalist economy becomes too heavily industrialized.
- 533 This is a +2 health bonus from Public Transportation in BtS, which tends to make other green buildings unnecessary, especially Recycling Center (now Treatment Plant). K-Mod has turned it into a +1 happiness bonus from Public Transportation, and now Treatment Plant also provides +1 happiness. The goal is to make Environmentalism a civic that helps smalls civs industrialize. Such civs lack both health and happiness from resources.
- 534 Due to environmental regulation, and perhaps also social security contributions, as Green economics often also comprise social justice policies. The BtS ability, +25% corporation maintenance, hurts only the civ in Environmentalism (not foreign HQs), and is too debilitating.

- 535 As in K-Mod (medium in BtS). Since Environmentalism is mostly intended for small civs, high upkeep shouldn't be a big drawback.
- 536 The name change allows the term "pagan" to be used for civs without a state religion (and not in Free Religion). I'm making use of this in the new ability for the Oracle. It's also strange to say that a civ with a state religion is "in Paganism", whereas e.g. "folk Hinduism" is an established term (albeit not very commonly used).
- 537 Missionaries without Monastery make early religion spread too easy, and remove the main reason for building Monasteries. Replaced by another ability that helps with proselytization. Accompanying rule change: Can't gift Missionaries.
- 538 Organized Religion should be the go-to option for civs with a state religion, as Theocracy and Pacifism are more situational. Theocracy gets high upkeep because some Religion civic should have high upkeep.
- 539 This ability is too narrow for Police State, but fits well enough for Theocracy and mirrors Organized Religion. Widespread religious zeal makes it easier to find recruits. The BtS ability, +2 XP, is shared by Vassalage, which makes it a bit unexciting, and suggests especially well-trained units.
- 540 Moved from Police State. War weariness seems to be the one form of discontent that police states can't handle well; consider e.g. the Soviet-Afghan War and its aftermath. Reduced war weariness makes more sense for a theocracy, e.g. through veneration for martyrs. Gameplay-wise, earlier access to reduced war weariness (albeit contingent on religion) helps hyperaggressive strategies. (These should not be the norm, but viable.)
- 541 The +10% research ability of Free Religion is needed for the Innovative trait (formerly Philosophical). The Great Person (GP) birth bonus moves from Pacifism to Free Religion, and Pacifism gets the free specialist from Mercantilism. Having the free specialist and GP birth bonus in one column means that their synergy can't be exploited. Flavor-wise, the GP abilities are all pretty interchangeable.
- 542 It says "+1", but , unless playing on Deity, BtS reduces the cost based on the difficulty setting. K-Mod removes this difficulty modifier, and sets the cost per unit to 0.5 (same as on Noble in BtS). Considering that this cost replaces Pacifism's civic upkeep and that civic upkeep costs get increased overall, 0.5 is too low. 1 is arguably too high for the AI. Therefore, the AI unit supply modifier (50%) is now applied to the cost .
- 543 That's 4 culture and 1 research in BtS. For most of the techs in the game, it's difficult to conceive how artists could make a contribution. Culture-based tech diffusion, nationality-based diplo vote counting and changes to the revolt system should make culture more valuable than in BtS, but, in most situations, 5 culture is still going to be quite a bit worse than e.g. 2 production from an Engineer. The big boost is that all specialists except Artist only produce 2 Great Person points now.
- 544 All specialists except Artist produce only 2 Great Person (GP) points instead of 3. At the same time, the (other) specialist yields are increased by 1 gold or an equivalent value, except, again for Artist, and also Engineer because the 2 production in BtS is already a relatively high yield. One goal of this change is to make the GP points and the total of the other yields about equally valuable. In BtS, specialists are mostly about GP points, which is not entirely intuitive. Another goal is to make wonders more relevant for GP birth. The GP birth thresholds have been reduced a bit to match the reduced GP output of specialists and the reduced number of specialist slots in the early game (Library grants only 1 Scientist slot). The initial threshold is now 50, so a single specialist can be enough for breeding the first GP. The GP effects (e.g. Discover ability) have, in turn, been reduced.
- 545 That's 1 gold in BtS, and Artist and Spy provide 1 research each. That research moves to Priest. Religion shouldn't be all about the money (that's covered by the Shrine), and while rituals and theology may not have contributed much to technological progress, priests (and monks, also covered by the research bonus from Monastery) were usually literate and carried out all manner of record-keeping.
- 546 This should make up for the fact that Priest provides two different yields, which is a bit harder to exploit than e.g. the 4 research from Scientist. The culture won't normally help with the first border expansion because the Temple providing the Priest slot requires a religion, and that religion already produces 1 culture.
- 547 This is 4 espionage and 1 research in BtS. Spy "research" should be covered by tech stealing (Spy mission); the research bonus moves to Priest. Instead the Spy gets 1 production from, say, industrial espionage (for which there is no mission).
- 548 New specialist for the Forced Labor (q.v.) civic, formerly Slavery, and also enabled by Factory. It's only technically a specialist, i.e. it should neither produce Great Person points nor benefit from any bonuses to specialists. 3 production probably not quite enough to make the Forced Labor civic as powerful as Serfdom and Caste System; may have to come up with a second ability for Forced Labor.
- 549 All settled super specialists provide fewer yields than in BtS (about the equivalent of minus 3 gold), and they disappear after $X/2$ turns, where X is the turn on which the Great Person was born. This should make conquered

super specialists less valuable. On the upside, a free building (or another perk) is granted when a super specialist is settled, and some other uses of Great People are weakened a bit.

- 550 These changes are either flavor-based, or to increase the variety of favorite civics. The ones that are a bit too frequent in BtS are Hereditary Rule (8 times), Vassalage and Bureaucracy (4 each; now 3 each) and Police State (3 in BtS, now 1). Hereditary Rule is still the most commonly favored civic (6 times) because popularity is a part of the civic's usefulness, and royalist alliances played an important role during the Age of Enlightenment. For Police State and all civics in the Organization column (formerly Legal), a sense of mission is not so plausible. The frequency of AI requests to change civics needs to be reduced for the Organization civics. Also, the AI should hardly ever ask a player to adopt Mercantilism (because this can hurt the AI), and should only ask to adopt a Religion civic if state religions already match.
- 551 Need another Environmentalist, and little is known about Boudica except that she looks like a hippie.
- 552 Too many Organized Religion lovers. The Celts did not resist Christianization much, but Brennus is a pre-Christian leader, so who knows. This is quite a personality change of course.
- 553 Hereditary Rule in BtS, which also fits, but the love for serfdom is a Russian specialty that needs to be captured.
- 554 Vassalage in BtS, but Organized Religion fits well with attempts to convert (and conquer) the Saxons.
- 555 At his time, the conflict was between totalitarianism and pluralism, and Nationhood (or Militarism) puts him in the wrong camp.
- 556 Vassalage in BtS, which somewhat suits the Persian satrapies. Leave that to Darius though. For Cyrus, Free Religion fits because of e.g. the biblical Edict of Cyrus.
- 557 Free Religion in BtS, which fits better for Cyrus. Need some Federation lovers, and the Persians granted conquered territories more autonomy than most empires did.
- 558 Free Religion in BtS, but her tolerance only concerned Catholics. The English mercantilist system was established during Elizabeth's reign.
- 559 Universal Suffrage in BtS, but enlightened absolutism had little to do with suffrage. He did try to abolish serfdom though.
- 560 Universal Suffrage in BtS, but come on ... (Perhaps the BtS AI couldn't handle such a situational favorite civic, but the K-Mod AI can.)
- 561 Don't want many Police State fans. For their time, the Mongols, and Genghis in particular, were very tolerant toward religions. This should also make Genghis Khan's character less one-dimensional.
- 562 Don't want both Egyptian leaders to like Organized Religion; they didn't even practise any of the game's religions.
- 563 Representation in BtS, but Caesar brought about the end of the Roman Republic.
- 564 Vassalage in BtS. The Ottomans were big slavers.
- 565 Police State in BtS, but that just vilifies him. The Aztec Empire was organized through vassalage relations.
- 566 Bureaucracy in BtS, but the long-lived tsardom is more important.
- 567 Hereditary Rule in BtS; want another Forced Labor leader (the Vikings had thralls).
- 568 Mercantilism in BtS, which seems exaggerated for any US president. Give him the same preference as Churchill so that the two can be friends.
- 569 Hereditary Rule in BtS, but need another Organized Religion leader. Theocracy would also be justified (he was a caliph), but want to reserve that for more intolerant leaders, and the Organized Religion ability matches Suleiman's building activities.
- 570 Organized Religion in BtS, which is fair enough, but more interesting to have a another proponent of Caste System. The Khmer Empire had Hindu castes.