Elements of Game Design

Overview

Every book starts with a blank page, and it is the most difficult page to fill. No matter how much planning and preparation we do ahead of time, sitting down in front of that first page forces us to face the dreaded question: where do we start?

Game design is similar. When creating a new game, we must start somewhere. We may already have some basic ideas, what kind of a game it is, what the player will do, or how it will look. But the hard part is turning these plans and ideas into the actual concrete details of the new game, building a new design from the ground up, step by individual step.

Lessons from other media can be useful, to a point. Unlike with text or film, games are not read-only experiences. As the player acts in the game, the game itself reacts, as do other players, and the state of the game world evolves over time.

Games are not linear and unchangeable, so they must be designed as interactive *experiences* that *respond* to the players pushing and pulling on them, testing the game's limits, and having an active role in the shaping of the experience. Figuring out how exactly all of that should work is at the core of the game design process.

Game design is user-centered

When designers talk about their craft, there is an unspoken assumption that the games we make are *for players to play*.

Games are meant to be played – when spoken aloud, this sounds like an obvious truism. But it is a crucial guiding principle: if games are created for players, we must take players and their experience into account from the beginning. The player must be at the front and center of our design process.

User-centered design is fundamental to game design. A game must be designed as an experience, an interaction that gives the player agency and autonomy. Our design process approaches this by looking at three elements: the designer's goals for the experience, the game artifact that will bring it about, and most importantly, the players who will be having this experience. They all need to work together, in a conversation between the designer, and the player, via the designed gameplay.

Games as machines

We could look at games from a variety of perspectives: the storytelling or screenwriting perspective, or from art and visual design, or from cultural analysis, and so on. But because our focus is on gameplay and interaction, we are going to take a slightly different approach.

We will focus on games as systems that the player engages with, games as *machines for playing with.* Here "machine" is a shorthand for an artificial system of rules and interactions that players operate, not a literal physical construction. But what we want to emphasize, is the reactive, dynamic nature of the

game: the player pushing on the machine as they act and explore their options, and the pull that the machine exerts on the player and forces them to react. It is this repeating push and pull, within the boundaries of the game's rules, that the player identifies as gameplay.

To see how these machines work, we will take them apart, and we will inevitably start noticing patterns. There are commonalities that show up across a variety of games, shared structural elements and shared solutions to design problems that we can identify. Each individual game might arrange them in a novel way, but the building blocks are common, and while new blocks appear from time to time, many are old with a long and storied history. This structure enables players to interact in specific ways, and experience a particular kind of gameplay.

This is not the only way to analyze and understand games. But, it is a useful one, and practicing game designers have already identified and named a variety of common structures and building blocks that show up repeatedly in design practice. We will introduce these existing models and concepts, and see how they can be used to design new games.

So, where do we start? That is what this text is all about. For now, we start with an example.

Motivating example: poker

We can use a popular game such as poker as an example, and take it apart to see what kinds of pieces it's made up of. Let's imagine ourselves sitting down and playing some poker with a group of friends. What are the bits that make up this experience?

1. First, let's start by looking at the basic structure. On the most basic level, we have a bunch of game pieces that the players work with: cards, chips, a play table, and the various things that make up the physical aspects of the game. We can consider them as the *objects* or *nouns* of the game. Cards and chips are concrete objects, but there are also more abstract elements: one's hand of cards, one's turn to play, and so on. Objects also do not have to be physical: online poker is made up of the same pieces as table poker, only virtual.

   We also have rules for what we can do with those pieces, and at what times. Rules define what *actions* or *verbs* we can apply to those nouns – when to shuffle cards or how to deal them, what it means to ante up to get my hand, how I can place a bet or call someone else's bet, and so on. The game starts out in some initial *game state* and then player's actions move the game from one state to the next. In case of poker, we also have some rules that specify what it means for a player to win the hand, and so everyone will try to reach their winning states with the hand they have been dealt.

2. Once players sit down to play the game, they put those pieces in motion. The dealer starts by shuffling the deck, and everyone chips in the starting ante so that the cards can be dealt. Players then take their turns, examining their choices, maybe placing bets on who has the better hand, maybe changing the cards in the hand, maybe calling or raising someone else's bet, and so on. At some point the hands are compared, and one of them is determined to be the winner. And then they start all over again.

This is the *gameplay*: the decisions, interactions, and activities that players are doing in the game. Gameplay doesn't have to be limited to just the game pieces, either: players are calculating odds and reading other players' behaviors, they are bluffing and trying to get their opponents to fold, maybe they are posturing or pretending. Other players are a huge part of gameplay in many games, and poker is especially known for mixing the elements of strategic thinking and planning, with the psychological challenge of figuring out one's opponents.

3. On top of that, we can talk about what players are doing and *experiencing* when they're playing the game. They are competing, for sure. But sometimes they also collaborate, such as by making and breaking temporary alliances. They risk their money and enjoy the thrill of gambling it on an unknown future. They strategize their next moves and enjoy figuring out what the best course of action is. And yet, at the same time, they chat and joke around, and jockey for status, and have a good time in each other's company.

   This is the *player experience* of playing poker. Having fun socializing, gambling, strategizing, faking each other out - the combination is very strong, and many players enjoy the interlocking aspects of this experience.

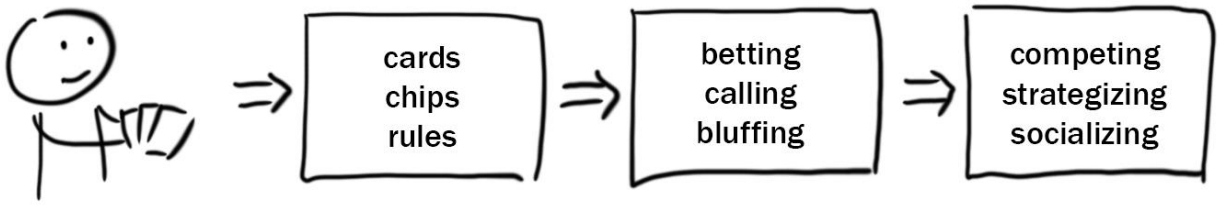
Model description

We will be examining games using these three levels. More specifically, we can summarize them like so:

1. Players interact with different game *objects* and perform various *actions*
2. Interacting with the game and other players over time gives rise to *gameplay*
3. Gameplay gives rise to specific *experiences* and *feelings* in each player

In the case of poker, the elements are cards, chips, and so on, and players can also talk to each other, which is another valid kind of game action. Based on the rules, players sit down and start dealing cards, betting, calling each other's bets, bluffing to confuse their opponents, and otherwise interacting with each other and with the evolving game state. This in turn lets players have fun by being competitive with each other, socializing but also fighting for the chips on the table, strategizing how to win over their opponents, or trash talking and posturing and generally enjoying the company of their friends.

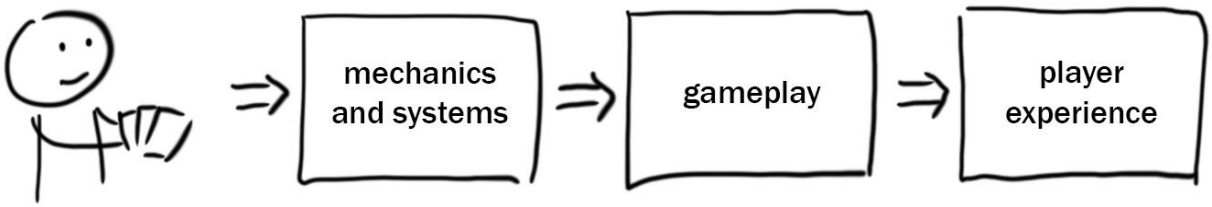
To show it in a diagram:



We will give these three elements more general names:

1. *Mechanics* are the game objects and actions that the player interacts with. They can be assembled into *systems* with specific properties.
2. *Gameplay* is the process of players interacting with game mechanics.
3. *Player experience* is the player's subjective experience of gameplay.

In other words:



The players' immediate "interface" to the game is by interacting with game mechanics. They can only perform *actions* on game *objects,* including other players. Those interactions over time create gameplay, which gives rise to the experience of what it's like to have played the game.

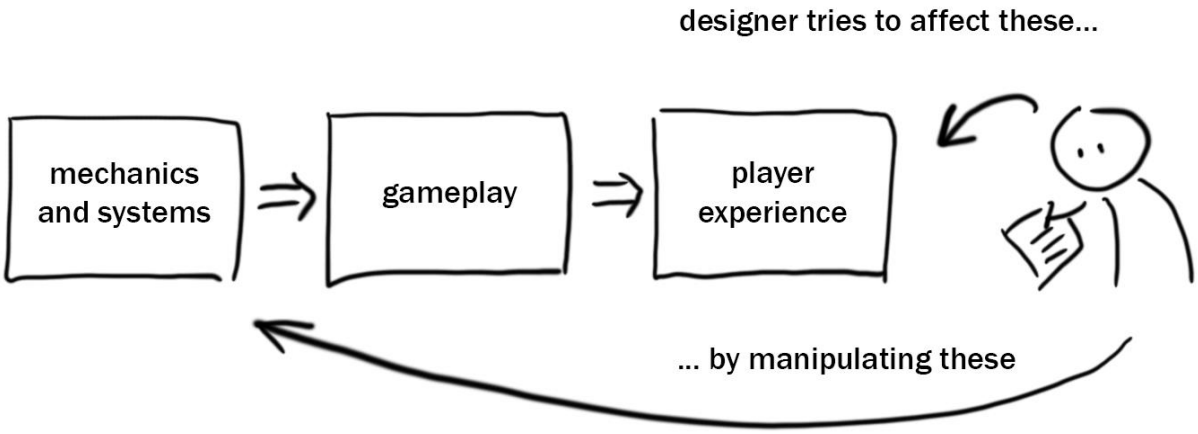
This three-part division has grown out of the MDA model (TODO REF) in which it is deeply rooted. MDA calls the three layers *mechanics, dynamics, and aesthetics,* although the correspondence is not exact. The *Further Reading* (TODO REF) section explains the similarities and differences.

Designer's role

The game designer wants to create a new game. The designer will typically have some experience in mind for the player: perhaps to have them be challenged strategically, or to have them enjoy a new story, or maybe to have them experience the fantasy of being a different person in a different time. The possibilities are legion. But the main question is: how can they bring this experience about?

This is a hard, second-order problem. The designer has only indirect control over the medium: players will interact with the mechanics in any way they see fit, so the designer will be challenged to anticipate what kind of gameplay will result, and what kind of player experience will come out of all this.

The designer cannot reach directly into the player's head to create desirable experiences. They must work through the medium, and in our case, it is the game pieces and rules that make up the game. The designer needs to set up the mechanics of the game, such that they produce gameplay that in turn finally produces the intended experience.



Designer's process

If we look at how other things get designed, not just games but also software or physical objects, we often see two general approaches to a design process:

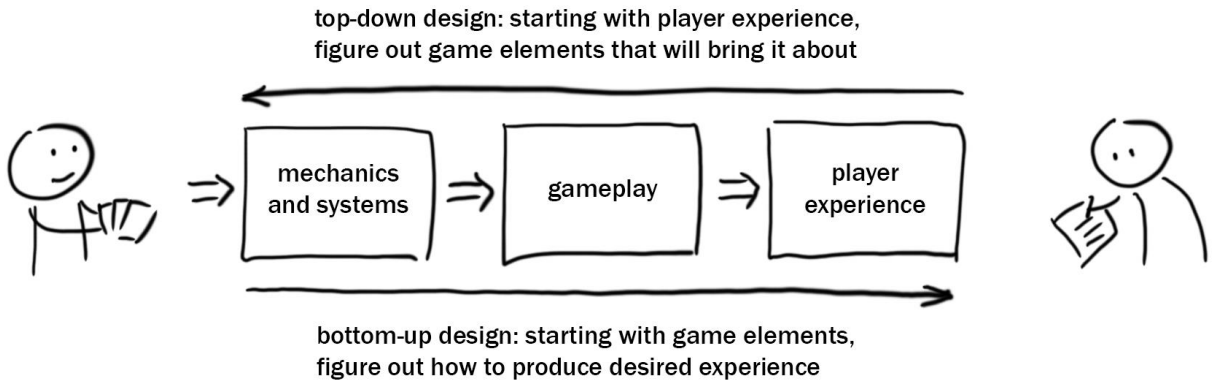
- Top-down design, where we start with the main vision and goals, then divide it up into smaller pieces that describe how those parts work in greater detail, those will divide into even simpler pieces, and so on. We design by starting from the top, from the end goal, and then decomposing and diving deeper and deeper into the details as needed.

- Bottom-up design, in which we start by making the smallest possible thing that is a starting point towards our main vision. We then test and make sure that it satisfies our goals, and then incrementally built on top of that. This approach is more exploratory and can take us in unexpected directions.

In game design, these two manifest themselves as follows:

- Top down starts with a desirable player experience and figures out how to split it up into various pieces. We figure out what kind of gameplay can generate this experience, and then how to generate this gameplay from the variety of mechanics that we are familiar with.

- Bottom up explores the space, builds mechanics and systems, and tries them out with real players, continually testing what kinds of gameplay and experiences are being produced.



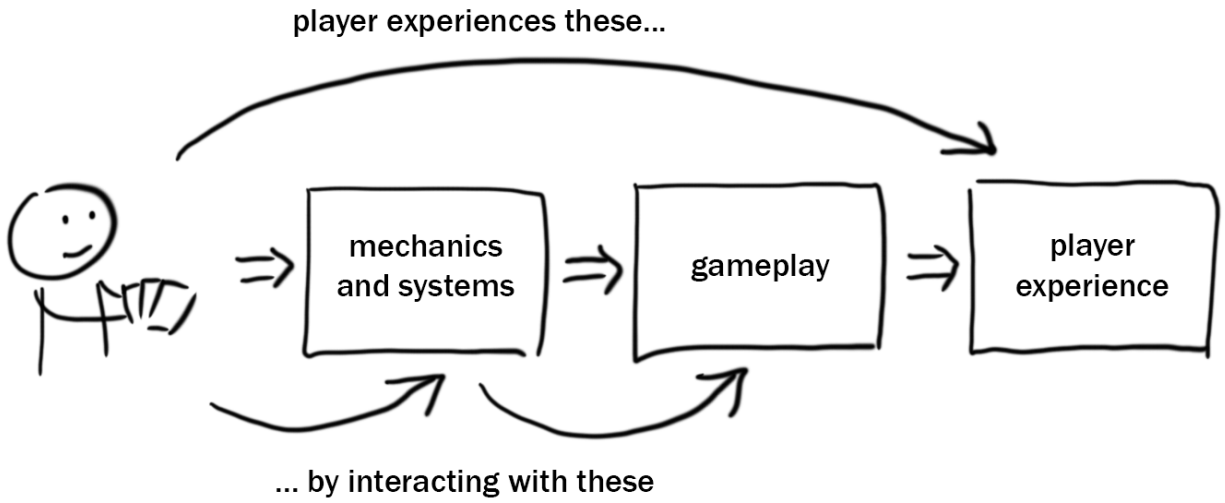
In practice, the design process takes a hybrid and iterative approach: working from both ends, and creating a lot of top-down plans as well as bottom-up prototypes, and trying to get them to converge. We need both, top-down planning and bottom-up iteration at the same time, especially in games, because it is not possible to find a solution analytically by starting from one end and working only in a single direction. This is also a process that game design shares with other areas of design practice. (Fred Brooks REF TODO)

We will talk much more about these individual pieces - mechanics, gameplay, player experience, iteration - in the subsequent parts.

Player's experience

The player comes from a different perspective than the designer. They do not know what experience the game has in store for them, and they might not even know what the gameplay is going to be like. But they start with the base elements: the mechanics, game pieces and rules, maybe other players. And they start playing.

Their experience of the game is firmly rooted in the mechanics, in the gameplay. Maybe they will experience a delightful strategic challenge, or having a good time exploring the virtual world, or perhaps have a negative experience and get frustrated or bored. But all of these experiences come from *playing the game,* from having the variety of game pieces and rules at the player's disposal and interacting with them (and possibly other players) as the player desires.



There is also a tension there. On one hand, the player plays in a world created by the designer, interacts with the mechanics and systems provided by the designer and purposefully set up in a specific way. But on the other hand, they have their own agency and ideas about what they want to do, which might not be what the designer intended. What the player does in this world is up to them, and within the rules set up by the game, they have the full freedom do drive the game in whatever direction they want.

And so, *gameplay* ends up being an interplay between the player and the designer: both the designer and the player contribute, the designer sets up an experience, and the player participates in it in a way that they want, collaborating or subverting as they please. Sometimes the negotiation is successful, and the designer succeeds in creating a desired experience; at other times, players find their own fun by subverting or turning the designer's construction into something else they want instead; and sometimes the designer's careful structure fails and the whole experience falls apart. But this interplay is a conversation, it requires a degree of cooperation from both sides, as well as acknowledgement that there is no single "correct" way to play a game.

Elements of games outside this model

We discuss these elements, mechanics, gameplay, and player experience, in much greater detail in the remainder of this text.

But as mentioned before, mechanics and gameplay are not the only things that lead to great player experience. Other things will also strongly affect how the player will experience the game:

- *Visual design* of the game has a huge impact on the player's experience. This runs the gamut from world design, such as how the game world presents itself to the player, or the characters and environments and everyday objects, to small scale design such as the choice of fonts, or how detailed the 3D models are.

- The quality of the *user interface* and its overall presentation will directly impact players as well. In computer games this includes user experience design, while in physical games it would

include the tactile feel of game pieces or the richness of the game board.

- Tied closely to visual design is the choice of *setting* or context of the game: where does the game take place, what is the player's role, and so on. How the player feels about their pretend role in the game world will naturally color their feelings about the whole game.

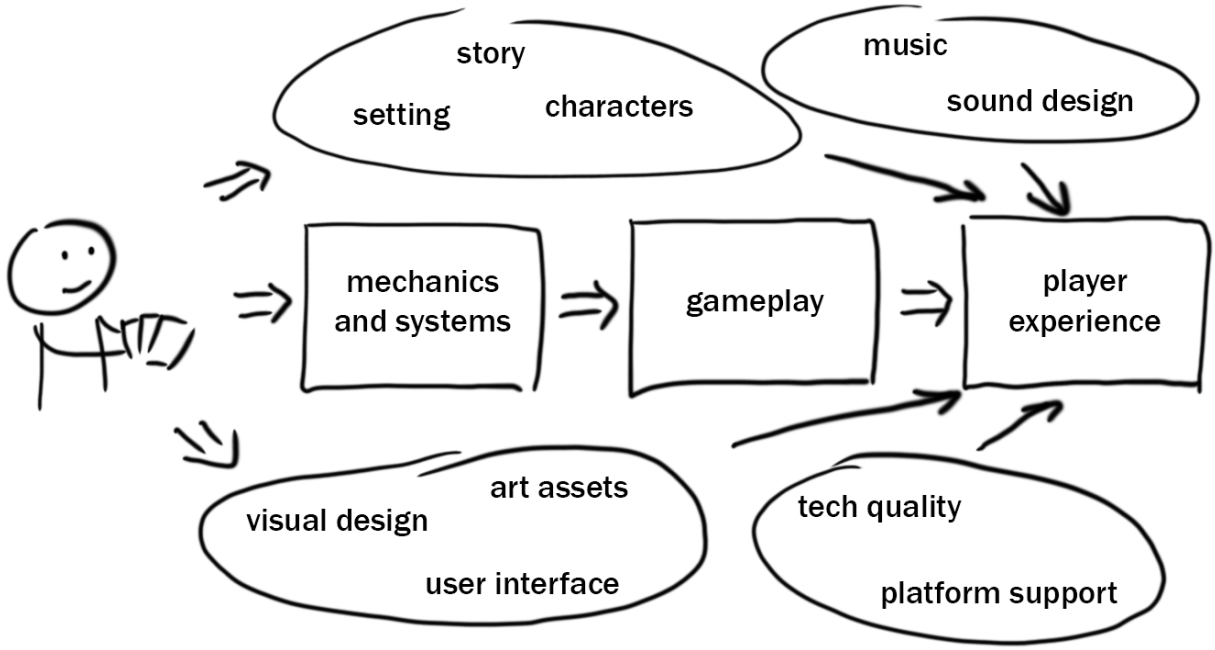
- In story-based games, the developing *story* is typically very important. Scriptwriting elements such as characters and their motivations, the situations they find themselves in, the plot being experienced by the player - but also mundane aspects like the quality of dialog writing - will also affect the player's experience.

- In-game *music* and *sound design* have a huge role in video games, as do artistic decisions about music or soundtrack. In some genres they are absolutely central to the experience.

- *Technical design* elements are usually invisible to the player, but will have an enormous impact in the quality of the player's experience, for example the quality of the AI that will challenge the player, or the types of multiplayer matches that the platform makes possible.

  … And so on.

We can try to map the variety of game elements that contribute to the player's overall experience:



In this text we only concentrate on designing mechanics, gameplay, and how changes in gameplay design affect the player, "all other things being equal". In other words, here we concentrate on *aspects of player experience rooted in gameplay.* But the player's *overall* experience is multifaceted, and

gameplay is not the only factor (and in some cases, not even the major factor) affecting the experience with any given game.

The practice of game design

So far, we have used the term "designer" very loosely to describe people who create elements of the game, the mechanics and systems that result in gameplay and then subsequently in player experience.

This is a very vague definition and could encompass virtually anybody involved in game creation. Instead, let's introduce how the term "designer" gets used in industry practice.

Game design, systems design, content design

The term *game designer* in practice tends to describe jobs where the primary responsibility is *designing rules for how things in the game behave,* and then usually implementing those rules.

This makes the job deliberately different from jobs such as art production (where the design is purely visual). In computer games there may be some overlap with technical production, however, since code is what ultimately makes the whole game run.

The designer's job further subdivides into categories:

- *Systems designers* concentrate on *overall* mechanics and systems
    - *Systems design* of what the nouns and verbs of the game are
    - *Combat design* of how fighting works, with what units and weapons
    - *Economy design* of the rules for how items and currencies change hands
    - … and others

- *Content designers* concentrate on the *particular and individual* game objects and actions:
    - *Level design* of the particular environments where the game takes place
    - *Character design* of who the characters are and what they do
    - *World design* of the player's trajectory through the game and why it's fun
    - … and others

The distinction between systems and content design can be fuzzy, especially since the same people usually do both kinds of design work. Overall, game design is figuring how things ought to behave, the rules of interaction, and within this role, systems design concentrates more on figuring out the overarching and generic rules, while content design concentrates more on creating specific places, characters, or items. The two will often intersect in the task of game *tuning*, (TODO CH4 REF) or making sure that the general rules and the individual elements are correctly balanced.

On a related topic, UI design or visual design roles are *not* considered *game designers* in the industry, they are often considered *artists* because their task is mainly visual, and not interactive (although UI / UX design is more cross-disciplinary). Similarly, designing the world may very well fall on the shoulders

of *writers*, who mainly write the overarching plot of the game, character backstories and motivations, and so on, but do not design rules for how the game world behaves.

Naturally, a single person can take on several roles at the same time, and on smaller teams, the lead designer will routinely shoulder a variety of responsibilities. Also, some of the roles interact heavily with other disciplines (content design needs to work well with visual design and storytelling, and systems design with engineering).

In this document we will concentrate mainly on systems design. For more information about content design, please see the Further Reading section.

Discipline interactions

Design is one of the main pillars of game development, the other two being art (visual design and production) and programming (including software design and implementation). Game teams will also include efforts from other disciplines, such as writers or sound designers, as well as less game-specific disciplines such as business development or marketing.

The division into art, design, and programming is very commonly reflected in studio organization. Project org charts are often divided among those lines: it makes sense for game designers to be grouped together under a design director, because they are best equipped to evaluate each other's work and give feedback.

At the same time, these roles rely heavily on working with the other disciplines. We often find that actual game teams, in addition to the vertical org divisions, are also simultaneously divided up horizontally, into small cross-disciplinary "cells" or "pods". These are small strike force units that combine contributors from all three disciplines to implement specific complete features from start to finish. In this text we concentrate mainly on the design elements. But it is crucial for a game designer to also hone their skills on working with other disciplines, from art and content, to programming, to marketing, business planning, and beyond.

Further reading

Formal tools

Game designers have shared their experiences as long as there has been a game development – describing techniques, post-mortems, or lessons on what worked and what did not. However, with the growth of the industry in the 1990s, there has been a growing desire for game designers to share more than just learnings from individual products – there was a need to *discover and document general design knowledge* in game design. Perhaps the best-known call to action for such general design research is the "Formal Abstract Design Tools" 1999 paper by Doug Church, followed by a response "I have no words and I must design" 2002 by Greg Costikyan. Both are worth checking out in entirety.

MDA

Many general models have been developed over the years, to show how games can be decomposed and analyzed. One of the popular ones is the MDA framework (Hunicke, LeBlanc, Zubek 2004), which is the precursor for this work. The author of this text is one of the authors of the MDA paper.

Readers familiar with MDA may have noticed that it similarly divides up game design work into three aspects: in MDA these are the eponymous *mechanics, dynamics,* and *aesthetics.* This text shares the three-part division, as well as an emphasis on the higher-order design problem, where players and designers only interact with the game artifact itself via its mechanics.

We do not present MDA as-is, for several reasons. Most importantly, there are stark terminology differences between MDA and contemporary design practice. Using the term *dynamics* to describe gameplay is virtually unheard of in practice, which would impair communication for readers attempting to interact with designers on the job. Similarly, the term *aesthetics* in MDA is used to mean "the aesthetic experience of interacting with game systems", but in game development it is used almost exclusively to talk about visual aesthetics, and not about the player's experience of gameplay. Keeping the MDA vocabulary would be confusing.

Secondly, the dynamics part of MDA is too ambiguous, as it includes both the analysis of dynamic systems composed of mechanics, as well as the analysis of how players interact with the game. Although they share a common root (they both describe behavior), contemporary design practice finds it useful to speak of game systems as its own class of phenomena, different from but related to player experience with its focus on gameplay loops and player experience of the interaction.

Finally, MDA's model for the designer and the player being on the opposite ends of the M/D/A chain is idealized but confusing, as the actual iterative design process approaches a game from both ends simultaneously. We hope that this improved model helps address some of these shortcomings.

The practice of design

On the topic of design theory in general, not specific to games, *The Design of Design* by Fred Brooks is an approachable introduction, while *The Design of Everyday Things* by Donald Norman is a gentle introduction to industrial design specifically.

For more information about game design, especially content design, and the everyday work of designers in the industry, including many interviews with designers in the industry, two recent books stand out:
- *Game Design Workshop* by Tracy Fullerton
- *Challenges for Game Designers* by Brenda Brathwaite

This text also focuses on the practice of designing games as artifacts, and does not focus on the external concerns of game industry, games as a medium, or the intersection with larger cultural and social practices. For those concerns, additional books worth reading are:
- *Rules of Play* by Zimmerman and Salen, especially parts 3 and 4