

# The Role of Information Architecture in Game Design

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**Abstract**—This paper explains the principles of Information Architecture (IA) and its role in game design to optimize the design of the games.

**Keywords**—*information architecture; game design*

## I. INTRODUCTION

Information Architecture is the way of designing a virtual structure. Like the physical body that can't perform any task without the bones under the muscles to support the actions, any digital systems such as a game can't deliver anything unless using information architecture to support the tasks. With designing games becoming more complex and specialized, information architecture is getting more important. The biggest part of the process in each step of designing games from determining what content should be presented to deliver the final product to the market is information architecture.

## II. LITERATURE REVIEW & DISCUSSION

“Is there any theoretical framework information architecture can use to inform their design decision?” It is a question that Dan Brown started the main conference talk on IA Summit 2010. Brown uses Morville and Rosenfeld's information ecology model (Rosenfeld & Morville; 2002) to model principle of information Architecture. Based on his article there are eight main principles that focus on underlying structures in any aspects of many works.

The following literature review defines the eight principles of information architecture and how they relate to game design.

Designing a structure and found relationships between the concepts is very important in designing video games.

The outcome of a general Information Architecture is a systematic description of the information content for any product or environment.

### 1. Principle of Objects

We can treat any content as an object. The main idea comes from object-oriented programming. Any program is made up many blocks with their own methods and behavior. Each part has their object with information attached to that. An object is a self-contained individual body with its attributes and behaviors. As Morville and Rosenfeld mention in “information architecture” book, exact or objective organization design make an important role in dividing information into well-defined and monopolized segments. Designing based on objects is relatively easy if designer knows the objects of the scheme before starting the project.

Video Games are built from the ground up with objects that are called assets. A digital asset is defined as anything that exists in a binary format and comes with the right to use. Data that does not possess that right are not considered assets. Digital assets in video games comprise of 3D models, sprites, sound effects, music, code snippets, modules, etc. Building these assets takes several different disciplines and putting them together you get a game. Organizing specific content category and defining its interaction is the initial phased in thinking about the game objects.

### 2. Principle of Choices

To prevent overwhelming the user, information should be arranged in hierarchies. Avoid long list of options at the upper level of hierarchy. If there are much content to be cover in hierarchy, using categories with sub-categories would be helpful. We can apply this principle in designing games. Each level of the game should offer meaningful choices to the player. All choices focus on a particular task in each level and all available choices have to have a meaningful definition at the end of the game.

The idea comes from “The Paradox of Choice” book by Barry Schwartz (Schwartz, 2004). In brief, the book's message is having more options leads to more anxiety for the player. In “chance and skill in game design” article by L. Nacke a well-balanced game is defined by three main characteristics (Nacke, 2014). Chances to give the skilled player to be more successful than a poor player. The level of game difficulty to challenge the player, and the main

factor that is providing meaningful choices. It means that there are several strategies to win the game and none of them is dominant.

As narrative elements are increasing in video games some principles can be applied in designing better games. Brandon Perdue explains ethical dilemmas and moral strategies in some games. With addressing some games, he explained how the idea of choices in games increases tendency of many players to make optional move in the game (Perdue, 2012). Player choices is one the most powerful fun aspects in gameplay. Based on Jamieson, one of the main elements of game design is choice (Jamieson, 2017). Choice is a factor to make a game interactive. We can present challenge to the player by providing choices in different levels of the game.

The Mass Effect trilogy prime example of choice in video games. The choices you make can drastically alter the story. Throughout the trilogy the choices you make in the first game can change what happens in the third game. Characters can last the entire trilogy or die in the first game. It is an unprecedented achievement.

These choices create moral dilemmas for players. Dilemmas are the situations where players must weigh the consequences of their choices carefully. No matter what the player chooses, something will be gained and something will be lost.

### 3. *Principle of Disclosure*

For creating a strong scene, it is good to reveal a bit of information at a time. Each step should have only enough information. One way to understand this principle is knowing about signal to noise ratio. People can process so much information at any one time, so make balance between giving information at a time. Improving signal to noise ratio is important in all designs. Probably it is better to add Signal to Noise Ratio (SNR) as a separate principle. Thinking about multiplayer online games and the frustration experience of the players is an example of SNR in games. Being in ELO Hell explains how increasing noise in a game can be frustrating. Thinking about a game, even having many variables affecting the game is being considered as noises and reduces the signal.

Sudoku can be an easy example to get the point of enough information. It is related to the dependency factor of the game. It refers to win the challenge of the current step depends on prior steps. Sudoku hints progressively reveal enough information to make further progress (Browne, 2015).

Legend of Zelda Skyward Sword is a bad example of disclosure. On several occasions in the game, when the player would arrive to a puzzle the game would directly state how to solve the puzzle. This left players who wanted

to solve it themselves disappointed because the game had disclosed too much information.

Information structure has a radical effect on the game. When we are talking about the elements of the game, we may think about the number of players, the objective of the game, the rules and mechanics, as well as resources and resource management. One important thing in the resource category is the amount of available information to the player. Some games offer total information and some contain hidden information from all players. Giving enough information can be a factor to motivate the player to continue playing (Bishop, 2009).

### 4. *Principle of Exemplars*

This principle is about context through content. It means that examples of each content describe which category it belongs to.

Exemplar Theory (or Exemplar Model) is a proposal concerning the way human memory assigns objects and ideas into different categories. It argues that when human is confronted with a new object, the mind is able to place the new object into its appropriate category. The example of the objects stored in the memory is “exemplar”. Exemplar can apply to various categories such as games as well as information architecture. Sometimes the exemplars are obvious and accepted. Using several exemplar games helps accessing better collaboration and interaction in the game. The exemplars can be illustrations the key design features. It is possible to apply exemplar model on a game based on rule-learning tasks (Chubala, Johns, Jamieson, & Mewhort, 2016).

When video games use images or items that we recognize they are using exemplars so players can easily assume what it is. They are designed the players do not have to waste time deciphering what everything is.

On the heads up display (HUD) it is good design to not overwhelm the player. We regularly see this when it comes to icons in video games. It is common for video games to use hearts to represent health or food to heal yourself. In first person shooters weapons are represented by images. Halo has the bullets on the screen that represent how much is in your magazine. Opaque shows it is full and transparent shows it is empty.

### 5. *Principle of Front Doors*

D. Brown says that every page on the site may be a “home” page. So it is important to think about a meaningful bridge between any content to other parts.

Broder talks about how users search the web. They have data that shows that most (68%) users prefer to find a good site about their search query, instead of having a website in mind. Knowing that, it implies that most people don't ever go to the main page of websites, but actually

find other ways to the site (Broder, 2002). Have you ever seen the main page of Wikipedia? Most people when they are searching for information use a search engine then click on links they feel are suitable. Thus constantly avoiding the homepage of lots of websites.

Manninen talks about interactional design and how to approach it. When it talks about non-linearity, it describes how players have a degree of authorship in games to create their own stories. They can play games in any order they want. Especially when playing open world games, players can attack missions and objectives in any order they please. You can meet and interact with characters in different orders or not even meet them at all. It creates different experiences for every user. (Manninen, 2002)

A great example of this is Legend of Zelda Breath of the Wild. You can literally go anywhere from the beginning of the game. Nothing is hindering you. When you start the game, one of the first missions that appears is the final mission of the game. If you are brave enough you can beat the game skipping everything.

#### 6. *Principle of Multiple Classifications*

Information architecture offers methods to think with multiple lenses. Rose and Levinson discuss the importance of why people search, not just how they search and what they are searching for. One of the examples used was searching for “ceramics”. It could show where to buy, where to learn, etc. It works with the Multiple Classification principle because discusses how a search engine could solve this. It could use statistics to show the most likely option or the user could better classify their search (Rose & Levinson, May 17, 2004). A term that is used in information architecture is faceted navigation. It helps understanding the importance of multiple classification. “A Faceted navigation allows user to select or de-select facets in order to brows for what there are looking for” (Smith, 2011). Giving the user multiple navigation paths helps improve the user experience.

Designers may have special tips to make their faceted navigation effective (Zajdo, 2016). Some of the tips are to use relevant options, positions facets horizontally or vertically, use images, and expandable menus. Almost all of them can be applied for designing game elements such as main menu and setting page.

Using the examples that Dan Brown gave for Multiple Classifications, Coleman explains that games can provide players with more than one way to be successful. In games people can complete levels or objectives in a different fashion, but the end goal is always the same (Coleman, Krembs, Labouseur, & Weir, Feb 23, 2005).

It can refer to the fact that different players will play with different approaches. The ability to offer different perspectives of the game or adding different choices to the

result leads to greater customer satisfaction. This sound similar to the principle of choices. The main difference between these two principles is the controlling factor. The ability to choose is principle of choice and the ability to complete one task or one game level in multiple ways is related to principle of multiple choices.

Deus Ex Human Revolution gives the players three main ways to complete any level: Aggressive, Stealth and Adaptive. Aggressive is guns blazing. Just running through and defeating anything that moves. Stealth involves finding secret paths and sneaking around enemies. Adaptive is using the environment to your advantage to hack objects and efficiently take out the enemies.

#### 7. *Principle of Focused Navigation*

Focused Navigation refers to those elements that allow user to reach to the information. This principle pertains to a simple formula that is to focus on one-way navigation. Establish a strategy and purpose for your navigation mechanism. A well-designed navigation system is a good taxonomy to improve usability of the website. One of the steps in designing an information architecture system such as a website is to test the assumption. Donna Spencer at “A practical Guide to Information Architecture” explains the usability testing (Spencer, 2010). It is basically making a draft of something available for some people to try it. Usability testing is used for software and website and games.

Northcott explains the differences between an Information Architect and a UX Designer. The differences are subtle but important. Information Architects organizes and labels information. Their focus is to make the information easily findable and labeled correctly. A UX designer takes the information with a focus on user engagement. They want to elicit the specific emotions out of their navigation. (Darren Northcott, 2012)

Being able to easily and successfully navigate menus is a necessity in video games. Players want to play games, not surf menus trying to find what they need

Dead Space has one of the best inventory menus in the entire medium. When you pull up the menu the game does not pause. That means enemies can attack you as you are managing your inventory. Its intuitive design allows you to quickly navigate the menu while still being able to explore the world and dispatch enemies.

#### 8. *Principle of Growth*

Assume the content you have today is a small fraction of the content you will have tomorrow (Brown 2010). With the growth that we have seen with the internet, nothing on a computer is stagnate. Developers have

changed their development models to cater to this mentality.

20 years ago you would walk into an Office Depot and buy the newest copy of Microsoft Windows and Office. People would sit on those copies for years until they got a new computer or a newer edition had something they wanted. It disrupts a developer's revenue source if the consumer never has to buy a new version.

Today most companies have switch to a subscription model. You pay a monthly fee and receive constant updates to the product until you cancel the service. The developers now only get a small payments, but has a long lasting revenue flow.

This concept teaches game designers to expect the content of the game to grow and manage the content in a flexible manner. As designing everything not just a game, an improved data hierarchy is a good way to increase user satisfaction.

Gamers now are used to the concept of downloadable content (or DLC), but there is a new form that is gaining momentum which is Games as a Service. Wong discusses the new trend in video games: Games as a Service. Video Games today are designed to be a service that are constantly being updated with new content and patches to keep players invested longer by extending the life of video games. Playing a game when it is released compared to years later can give players a completely different experience. It benefits developers by extending a revenue flow on their products and it benefits consumers with fixes and additional content to their games. (Wong, 2017)

World of Warcraft (WOW) came out on September 2, 2001 and the game is still alive and kicking. WOW has users pay a monthly fee to keep the servers running. They also have released 6 paid expansions and several updates along the way to keep players invested.

The new darling is Overwatch. While Overwatch does not have a monthly fee like most MMOs, it gains revenue through microtransactions. New, maps, characters and events keep players returning to play the game.

Splatoon is similar to Overwatch but does not have any microtransactions. Nintendo continues to update the game with new maps, events, gear and new weapons that are released weekly.

### III. CONCLUSION AND FUTURE WORK

The result of our research indicates that although many people think that Information Architecture (IA) organizes and structures the information of websites, we can apply the IA principles to other categories such as designing the games. Players may never notice the IA background

existence in the game, but it is one of the main keys to know about during the production of video games.

The definition of IA by different authors may be different. In this research we focus on eight principles of Information Architecture by Dan Brown (2010). Then we applied these principles in game design. The more we know about IA, the better and easier we can apply the main principles to our video games.

We believe Signal to Noise Ratio is a new principle needs to be added to these eight principles. Although the level of signal power is important, sometimes noise has a power in at the same level of signal. This factor affects any designs. Sometimes in a game having noise in the correct way can show the signal better. It may apply underneath of all the mentioned principles because it affects navigation, choices, and UX.

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