เอกสารประกอบการสอน
การออกแบบวิดีโอเกม
Video Game Design

By

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การออกแบบวิดีโอเกม
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วัตถุประสงค์รายวิชา

นักศึกษาจะได้ทราบถึงหลักการดังต่อไปนี้

1. หลักการพื้นฐานของภาพการออกแบบและพัฒนาวิดีโอเกม
   เพื่อให้ผู้เรียนมีความเข้าใจและประยุกต์ใช้เทคโนโลยีด้านการออกแบบและพัฒนาวิดีโอเกม
   ได้อย่างเหมาะสม
2. พื้นฐานการพัฒนาวิดีโอเกม และเครื่องมือต่างๆ ที่ใช้สำหรับการพัฒนาวิดีโอเกม
3. การออกแบบและพัฒนาวิดีโอเกมด้วยตัวเอง

คำอธิบายรายวิชา (Course description)

ภาพรวมของวิดีโอเกม แนะนำหลักการพื้นฐานของวิดีโอเกม การออกแบบวิดีโอเกม การปฏิสัมพันธ์ในเกม กระบวนการพัฒนาเกม การประเมินและทดสอบเกม

Overview of video game, introduction to principle of video game, video game design, game interactions, game development process, game evaluation and testing

หัวข้อสำคัญ

Topics
1. Overview of Video Game 1.1 Role and trend of video game technology
2. Introduction to Principle of Video Game 2.1 Video game definitions 2.2 Game taxonomy 2.3 Game element
3. Video Game Design 3.1 Ideas and concepts 3.2 Game design criteria 3.3 “Fun” in game 3.4 Game rules 3.5 User interface 3.6 Character design 3.7 Level design
4. Game Interactions 4.1 Game interaction definition 4.2 List of game interactions 4.3 Case study: game interaction in multi platforms
5. Game Development Process 5.1 Overview of game development process 5.2 Business model 5.3 Development team 5.4 Game programming 5.5 AI for game 5.6 Development tools (game engine, development kit, etc.) 5.7 Prototype and demo
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Chapter 1 Introduction to Video Games

Introduction

Nowadays, computer and video games are growing fast and are becoming more and more sophisticated in terms of the quality of graphics and Artificial Intelligence (AI), both of which increase the level of immersion, believability, and enjoyment.

Video games also offer the novel interactive ways to the players that deliver the new experience of gameplay. We will learn the concepts and keys of video game to understand more about this field (art and technology).

Video Game Definitions

Game is an amusement, diversion, pastime, etc. a form of contest played according to rules and decided by skill, strength, or luck [1]

"Games, activities or contests are governed by sets of rules. People engage in games for recreation and to develop mental or physical skills" [2]

Game is any interactive game operated by computer circuitry[3]. There are two main classes of electronic games: computer games, which are played on personal computers; and video games, which are designed for playing with specific home video- game systems, handheld devices, and coin-operated arcade consoles[4] [5]. The focus of this thesis is on electronic games; hence the term "games" hereinafter refers to both types of electronic games.

Video game can be divided in two main categories as showed in Table 1.

Table 1 Video game classification

Computer Game	Video Game
• It is a very first of electronic entertainment. • Games are played on personal computer. • Wide spread, tons of titles • Huge market (most family has one or more computers) • Easy to develop • Lot of development tools	• Design specific for home-video game system • Video game consoles, handheld devices, and coin-operated machine (Arcade games) • Complex to development • Limited development tools • Tides to business model (publisher's rules)

In this class, "video game" refers to both computer game and video game.

[1] "Game," in *The Canadian Oxford Dictionary,* K. Barber, Ed.: Oxford University Press, 2004.

[2] R. W. Schmittberger, "Game," in *Microsoft® Encarta® 2006 [DVD]* Redmond, WA: Microsoft Corporation, 2005.

[3] "electronic game." Encyclopedia Britannica. Internet: http://www.britannica.com/EBchecked/topic/183800/electronic-game, [May 15, 2009].

[4] "video game," in *The Oxford Dictionary of English (revised edition),* C. Soanes and A. Stevenson, Eds.: Oxford University Press, 2005.

[5] "computer games," in *A Dictionary of Computing,* J. Daintith and E. Wright, Eds.: Oxford University Press, 2008.

Game Taxonomy

There are many game classifications and taxonomy depended classification criteria. There are no such of a standard or definition of video game genre. There has been a lot of research performed surrounding game taxonomy and game genre[6][7][8]. Table 2 illustrated game taxonomy in six genres.

Table 2 Video game taxonomy

Genre	Descriptions and examples
Actions game	Action games: most action games are 2D platform, first-person shooter (FPS) or third person perspective games in which a user controls a character in a game world[8]. The plot is often about the protagonist saving the world from various enemies; many games in this genre primarily involve shooting and fighting. Example: 2D platform: Donkey Kong, Super Mario Bros First-person shooter: Wolfenstein 3D, Halo, Quake Third person perspective: Devil May Cry, Tomb Rider Fighting: Street fighter, Dead or Alive
Adventure game	Adventure games normally emphasize plot rather than action or battle. This genre typically focuses on story, problem solving, puzzle solving, and interacting with non-player characters (NPCs): users need to solve some puzzles and interact with other NPCs in order to make progress in the game. The plot can come from such diverse sources as fantasy, science fiction, mystery, horror, and comedy. Example: Secret of Monkey Island, Myst
Roles-playing game	User can play these games by playing as different types of characters, such as a warrior, a ranger, a merchant, a magician, or a thief. The users have to play their role and interact with the game world by fighting monsters, collecting and selling items, solving quests, and upgrading characters' abilities. The main feature of this genre is the character developments which user can periodic assign new skills or new items to the characters[8]. Example: Never winter night, Ultima, Final fantacy, MMORPGs
Strategy game	This genre has two sub-genres: turn-based strategy games and real-time strategy games. They are similar, but the real-time strategy games are continuous, whereas turn-based games, as the name suggests, are broken up into turns: the user moves his units, then the computer or opponent moves her units. However, this thesis focuses only the real-time strategy (RTS) games because they have become more common in the genre. Users can control military units to combat with his opponents. The settings of such games can vary but the main plot is war: historical (Age of Empires and Empire: Total War); science

[6] S. Björk, S. Lundgren, and J. Holopainen, "Game Design Patterns," in *Proceedings of Digital Games Research Conference,* Utrecht, The Netherlands, 2003.

[7] C. A. Lindley. "Game Taxonimies: A High Level Framework for Game Analysis and Design." Internet: http://www.gamasutra.com/features/20031003/lindley_01.shtml, October 3, 2003 [June, 10, 2006].

[8] T. H. Apperley, "Genre and game studies: Toward a critical approach to video game genres," *Simulation and Gaming,* vol. 37, pp. 6-23, 2006.

	fiction (StarCraft), and fantasy (WarCraft III). The general format of strategy games consists of building up a base and units, collecting the resources, and attempting to destroy the user's enemies. The users have to solve the problems of resource management and balancing between defensive and offensive strategies.
Simulation game	This genre includes games that simulate sports, flying, and driving. The simulation genre includes also more detailed simulations of specific environments and machines, such as dynamics of towns, cities, and small communities flight simulators, tactical battle simulators, or space simulators[8]. Sports games: this sub genre can be classified into two types: team sports and individual sports. Users can play as athletes or even managers. For example, a user can play a soccer player in FIFA 09 or manage the strategies of a soccer team in Championship Manager 2008. The users might need to develop their skills and tactics to overcome the opponents. The rules of sports games usually follow the sport upon which they are based but some genres, such as skateboarding and snowboarding games, have no set rules and allow the user to "freestyle." Some examples of sports games include Tiger Woods PGA Tour 09, NHL 09, and extend to cross-genre titles such as the NASCAR 09. Another simulation sub genre is the games that allow the users to interact with a simulated game. Users can see their changes of the game world through a bird's eye view, or first person view, from a growing city to the evolution of characters. A good example of this genre is SimCity in which a user plays a mayor who manages and controls an entire city. Other games in this genre include The Sims 2 and Harvest Moon: A Wonderful Life.
Puzzle game	This game genre includes traditional board games and puzzle games. Users can interact with puzzle games to solve a puzzle following the games' rules. Each game has the different puzzles, rules and ways of play. Examples include chess, crosswords, jigsaw puzzles, Tetris, and puzzle bobble. Puzzle games are intrinsically goal-oriented. Depending on the type of game, puzzle games can be played alone or against opponents.

Game Elements

Video game is composed of six essentials elements. These elements are very important and necessary for game design. Developers should consider these elements in a first place.

1. Player(s): no player means no game.
2. Game's rules: game must have the rules and player must follow game's rules.
3. Gameplay: this is a heart of game (what the game is and how to play it).
4. Interaction: the ways of game that allow player to interact with.
5. Stories: the plot or story that lead player through the game.
6. Rewards: a feedback to make player satisfy for his/her accomplishment.

Class Activity “Play games”

Playing 20 video games and classify it based on your taxonomy.

No	Game	Genre
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Chapter 2 Video Game Design

This chapter describes about how to design a video game based on game design criteria, which are obtained from game industry and academia. The ultimate goal of game design is to make a fun game.

Game Design Criteria

Our goal is to design a good video game and engage wide players. Players will not play a game if they do not enjoy (fun) it, or we can say that "no fun means no game". There are lot of design rules and guideline to create the good video games from both industry and academia.

"Fun" in Game

An essential goal for games is enjoyment or "fun" of users, which is the most significant key of success in games.

The definition of "fun" is behavior or an activity that are enjoyable or amusing.

How to make a "fun" game?

No silver-bullet solution

Trials

Possible to make *high quality* games that *satisfy* players

"Fun" for people

Diversity is one of the challenged keys for game design.

1. Gender
2. Age
3. Races
4. Languages
5. Cultures
6. Locations

Industrial Game Design Criteria

Industrial side cares about the profit, their criteria mostly focus on how to make their games to become a blockbuster. Profit is a big key, and they learn from the past (successful sequel or crappy games).

Publisher's rules mean publisher's games

Marketing (time to release, and marketing strategies)

Restrict to game engines and technologies

Table 3 Industrial game design criteria

Gameplay
Graphic
Sound
Fun, Entertainment
Value
Replayable,
Lifespan, Longevity, Durability

Control
Innovation, Originality
Concept
Impression
Presentation
Community
Multiplayer
Learning Curve
Tilt
Lasting appeal
Mainstream appeal
Experience
Plot, Story
Polish
Interface

Academic Game Design Criteria

The academic side focuses on how to create good video games that covers from game design through development.

Five main criteria

1. Game interface
2. Gameplay
3. Game mechanic
4. Immersion
5. Social interaction

Game interface & control

Table 4 Game Interface & Control Criteria

Controls should be customizable and default to industry standard settings
Controls should be intuitive and mapped in a natural way
Minimize control options
The interface should be as non-intrusive as possible
For PC games, consider hiding the main computer interface during game play
A player should always be able to identify their score/status in the game
Follow the trends set by the gaming community to shorten the learning curve
Interfaces should be consistent in control, color, typography, and dialog design
Minimize the menu layers of an interface (menus within menus)
Use sound to provide meaningful feedback
Do not expect the user to read a manual
Should include online help so players do not need to exit the game
Provide means for error prevention and recovery through the use of warning messages

Players should be able to save games in different states.
Players should feel a sense of control over the game shell (starting, stopping, saving, etc.)

Gameplay

Table 5 Gameplay Criteria

There should be a clear overriding goal of the game presented early
Intermediate goals should be clear and presented at appropriate times
There should be variable difficulty level
Challenges in games must match the players' skill levels
The level of challenge should increase as the player progresses through the game and increases their skill level
There should be multiple goals on each level
"A good game should be easy to learn and hard to master" (Nolan Bushnell)
The game should have an unexpected outcome
Artificial intelligence should be reasonable yet unpredictable
Game play should be balanced so that there is no definite way to win
Play should be fair
The game should give hints, but not too many
The game should give rewards
Games should increase the players' skills at an appropriate pace as they progress through the game
Pace the game to apply pressure to, but not frustrate the player
Provide an interesting and absorbing tutorial
Players should be able to start playing the game without reading the manual
Allow players to build content
Make the game replayable
Create a great storyline
There must not be any single optimal winning strategy
Should use visual and audio effects to arouse interest
Should provide a lot of stimuli from different sources
Include a lot of interactive props for the player to interact with
Teach skills early that you expect the players to use later
Design for multiple paths through the game
One reward of playing should be the acquisition of skill
Build as though the world is going on whether your character is there or not
If the game cannot be modeless, it should feel modeless to the player
Get the player involved quickly and easily
Should quickly grab the players' attention and maintain their focus throughout the game
Should not distract player from tasks that they want or need to concentrate on

Game mechanic

Table 6 Game Mechanic Criteria

Mechanics should feel natural and have correct weight and momentum
Players should feel a sense of control over their characters or unit and their movements and interactions in the game world
Players should feel a sense of control over the game interface and input devices
Feedback should be given immediately to display user control

Immersion

Table 7 Immersion Criteria

Players should become less aware of their surroundings
Players should become less self-aware and less worried about everyday life or self
Players should experience an altered sense of time
Players should feel emotionally involved in the game
Players should feel viscerally involved in the game

Social Interaction

Table 8 Social Interaction Criteria

Should support competition and cooperation between players
Should support social interaction between players (chat, etc.)
Should support social communities inside and outside the game
Strong communities

Chapter Summary

"Fun" is the most important key for video game

Game design criteria from industry and academic

Gameplay, game mechanic, game interface, control, immersion

Social interaction, graphic, sound, multiplayer, plot, and etc.

"Think like a child and release your imagination"

Class Activity "Fun in game"

Define your "Fun" in game

Class Activity "Play 2 games"

Play Warcraft 3 vs Lords of EverQuest

Compare these two games

Criteria	Warcraft 3	Lords of EverQuest
Game Play		
Graphic		
Control		
User Interface		

Summary

Chapter 3 Game Interaction

Interactivity is the heart of gaming, a significant difference between video games and other forms of media. In computer and video games, users interact with standard input and output devices: mice, keyboards, gamepads, joysticks, microphones, monitors, televisions, and speakers. Users can also make use of some specialized input or output devices for playing specific games, allowing them to interact with games differently. These specialized devices include motion sensors, light guns[9], EyeToy cameras[10], and Head-mounted displays (HMD[11]) for such activities as shooting targets or playing a virtual reality game.

Class Activity "Game Interaction"

15 minutes brain storming (team up 4 students)

What do you think about Game Interaction?

Write a list of game interactions (e.g. visual interaction)

What is the most important key for game interaction?

[9] M. Casamassina. "Controller Concepts: Gun Games." Internet: http://uk.cube.ign.com/articles/653/653867p1.html, September 26, 2005 [May 1, 2009].

[10] "EyeToy." Internet: http://www.eyetoy.com, January 9, 2005 [November 27, 2005].

[11] O. Cakmakci and J. Rolland, "Head-worn displays: a review," *Display Technology,* vol. 2, pp. 199-216, 2006.

Game Interaction Definition

I play game means “I interacts with game or other players”

Video games are interactive electronic entertainment.

Action <==> Response

List of Game Interactions

1. Visual (light and graphic)
2. Sound (sound FX)
3. Force feedback (vibration, push & pull force)
4. Sensors (motion, accelerometer, gravity, vibration, light, temperature, infrared, ultrasonic, neural,etc.)
5. Controls
6. Video/Image
7. Location
8. Network
9. Text
10. Social (text, chat, voice, face to face, video, action in game)
11. Mind

Future of Game Interaction

1. Game Consoles
2. Nintendo Wii ==> 3DS Wii remote with Nunchuck, Balance board
3. Microsoft XBOX 360 ==> Kinect
4. Sony PlayStation 3 ==> PlayStation Eye, PS move
5. PC & others
6. Virtual Reality, Game Devices,
7. Ubiquitous computing

Game Consoles

This is a huge market and the companies push their new technology along with new interactivity to lure players to buy and play their products: consoles, video games, and accessories. For instant, using standard controller can play music game but player can purchase a special controller to play with these games (rock band, guitar hero).

Figure 1 EyePet on PlayStation 3[12]

Figure 2 Nintendo Wii Balance Board[13]

[12] http://bitmob.com/~bit/images/stories/SCREENSHOTS/EyePet/eye-pet.jpg

[13] http://www.videogamesblogger.com/wp-content/uploads/2009/06/wii-fit-plus-screenshot.jpg

Figure 3 Microsoft Kinect[14]

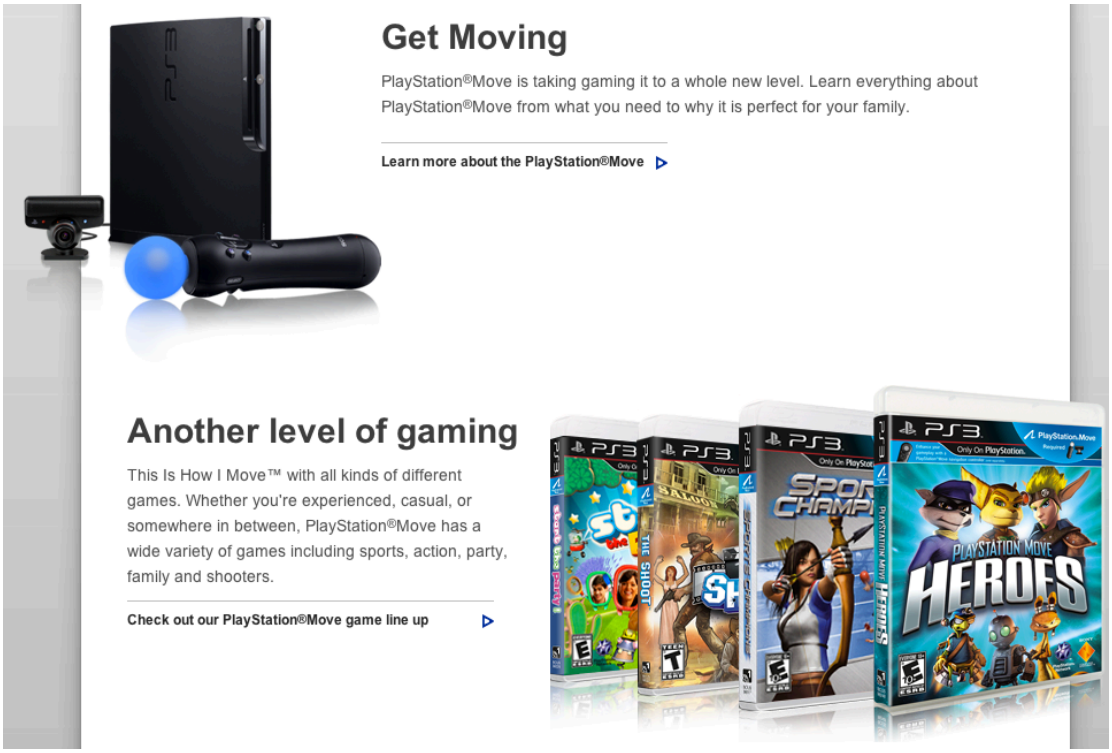


Figure 4 PlayStation Move[15]

[14] http://www.xbox.com/en-US/kinect

[15] http://us.playstation.com/ps3/playstation-move/


	Nintendo 3DS	Sony NGP	Apple iPhone 4
Release Date	3/27/2011 (U.S.)	Around Holiday 2011	6/24/2010 (U.S.)
Screen Size	3.5"(top)/3"(bottom)	5"	3.5"
Screen Resolution	400*240(top)/320*240 (bottom)	960*544	960*640 @ 326 ppi
Mass	226.8g	unknown	137 g
Dimensions	5.3" x 2.9" x 0.8" (closed)	7.16" x 3.29" x 0.73"	4.5" x 2.31" x 0.37"
Internal Storage	unknown	16GB	16GB/32GB
Removable Media	up to 32GB SDHC/ 2GB+ Cart	SDHC, Cart Size Unknown	None
System Cost	$249.99	teased < $599.99 (2)	$599 (16GB)/$699 (32GB)
Average Cost Per Game	Rumored $39.99-$49.99	unknown	$3.20 (top 100 games) (4)
Camera	front, rear w/ stereostopic (3D!)	front and rear	.3 MP (front)/ 5 MP (rear)
RAM	unknown	512MB	512MB
CPU	unknown	Quad-core ARM Cortex-A9	Apple A4 @ 1 ghz (ARM Cortex-A8)
GPU	PICA2000	Quad-core PowerVR SGX543MP4	Apple A4 (PowerVR SGX 535)
Accelormeter	Yes	Yes	Yes
GPS	No	Yes	Yes
Analog Stick	1	2	None
Graphics Look Comparable To	PS2-ish	PS3-ish	PS2-ish
Embarassing To Play in Public?	Yes	Yes	No, unless game uses accelormeter
WiFi	Yes	Yes	Yes
Battery Life	3-5 measly hours (1)	Rumored 4-5 measly hours (3)	Around 38 hours, Regular Use (5)

Figure 5 Portable game consoles[16]

[16] http://blogs.ocweekly.com/heardmentality/2011/02/sonys_ngp_vs_nintendos_3ds_vs.php

PC & Others

Figure 6 VR HMD[17]

Figure 7 Fully immerse Virtual Sphere[18]

[17] http://cb.nowan.net/images/vr/eMaginZ800.jpg

[18] http://www.gadgettastic.com/wp-content/2008/03/virtusphere_3-thumb-450x337.jpg

Figure 8 Flight Simulator[19]

Figure 9 Multi-screen Simulator[20]

[19] http://cache.gizmodo.com/assets/images/4/2007/10/simulatorCaters_450x375.jpg

[20] http://worldmustbecrazy.com/wp-content/uploads/2009/11/VR-Mach-4.jpg

Figure 10 Sport Equipments[21]

Figure 11 Toys (virtual pet)[22]

[21] http://gadgets.boingboing.net/gimages/tectrix_vr.jpg

[22] http://www.amazon.com/Littlest-Pet-Shop-VIP-Turtle/dp/B000VELQIA/ref=pd_sim_t_3

Figure 12 Human Player[23]

Figure 13 Mind game[24]

[23] http://www.engadget.com/2007/02/18/bandais-human-player-virtual-pet/

[24] http://mindflexgames.com/

Ubiquitous Computing

Anywhere

Anytime

Mixed world (Game world & Real world)

Multimedia

Change the way to play game

Various technologies (embedded, mobile, wearable, sensors, etc.)

Interaction bring experience

Explorers (players) like to have new experience.

The right interaction can bring good or new experience to players.

Must Challenge

Must fun

Innovation

Finding the right interaction for your game

Chapter Summary

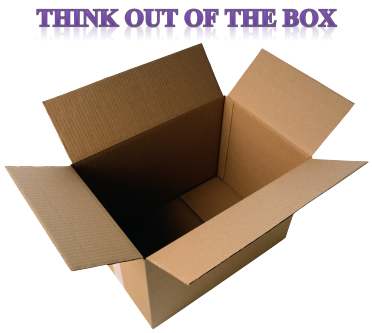
Definition

Type of interactions

Controls

Platforms

Pick the right interaction



Chapter 4 Game Development Process

There are no such of standard or rule for game development process, developers can apply good practices or disciplines from any software development processes that suite to their team and their workflow. Game studios are flexile and team members can be relocated to others projects at anytime, the development process may vary from team to team depended on the environment. Nowadays, many development teams choose rapid development process for game development such as prototyping, scrum, and other agile process.

Statistic from ESA

[25]

Computer/video game industry gradually grows.

$25 Billion in annual revenue

$90,000 average salary

72% of all Americans play video games in 2011

55% of gamers play on their phone

65% of gamers play with others (social interaction)

45% of parents play with their children

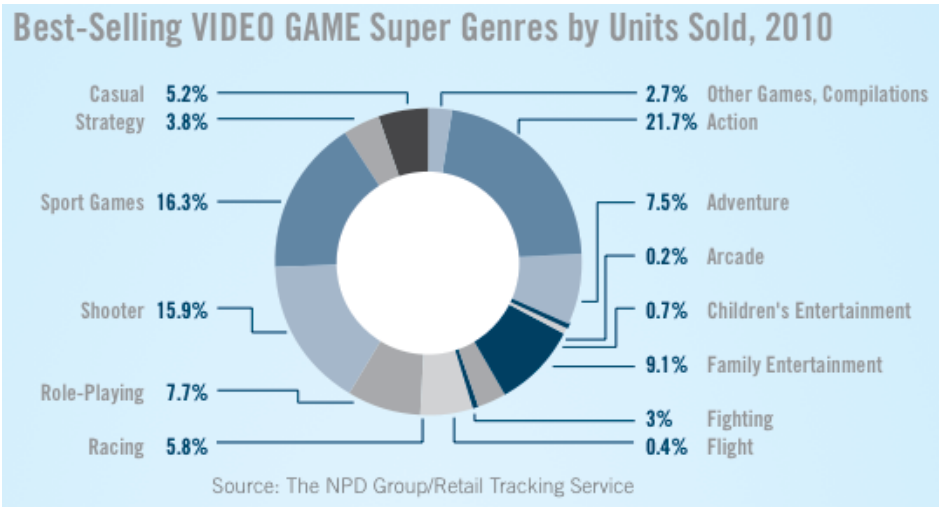


Figure 14 Best selling video game 2010

[25]

[25] http://www.theesa.com/facts/pdfs/ESA_EF_2011.pdf

Type: Hardware Software Tie Ratio					
Pos	Console	Americas	Japan	EMEAA	Worldwide
1	Nintendo DS (DS)	56.27	32.93	60.19	149.39
2	Sony PlayStation 2 (PS2)	56.26	23.27	64.89	144.42
3	Nintendo GameBoy (GB)	44.06	32.47	42.16	118.69
4	Sony PlayStation (PS)	40.78	21.59	40.12	102.49
5	Nintendo Wii (Wii)	42.55	11.91	35.17	89.63
6	Nintendo GameBoy Advance (GBA)	41.64	16.96	22.89	81.49
7	Sony PlayStation Portable (PSP)	22.60	18.19	30.09	70.88
8	Nintendo Entertainment System (NES)	34.00	19.35	8.56	61.91
9	Microsoft Xbox 360 (X360)	34.32	1.54	22.37	58.23
10	Sony PlayStation 3 (PS3)	21.50	7.27	26.77	55.54
11	Super Nintendo Entertainment System (SNES)	23.35	17.17	8.58	49.10
12	Nintendo 64 (N64)	20.63	5.54	6.75	32.92
13	Sega Genesis (GEN)	16.31	3.58	8.65	28.54
14	Microsoft Xbox (XB)	16.34	0.53	7.78	24.65
15	Nintendo GameCube (GC)	12.94	4.04	4.77	21.75
16	Sega GameGear (GG)	5.51	1.78	3.33	10.62
17	Sega Saturn (SAT)	1.87	5.80	1.15	8.82
18	Sega Dreamcast (DC)	3.98	2.25	1.97	8.20

[26]

Figure 15 Hardware unit sold chart

Sale statistic obtain on November 2011

Development Cost

Costs $3M to $10M to develop average game

Over $100M to develop Grand Tourismo 5 on PS3.

Takes 12-24 months

How they make money

Software developers & publishers

Game sales (Retail box or Download)

Online game

Initial game (Retail box or download)

Monthly fee

Console developers

Proprietary media delivery (DRM) & fee for each game sold (download game or content)

[26] http://www.vgchartz.com/hardware_totals.php

Tool developers

Sell game engines, middleware, or tools

Contract services

Artifact, motion capture, art, cut-scenes, sound, …

Who play roles

Hardware:

Sony, Nintendo, Microsoft, Intel, AMD, Nvidia

Software:

Publishers

Electronic Arts, Activision, Sony, Microsoft, Infogrames, UbiSoft, Interplay, Nintendo, THQ

Developers (game studio)

Electronic Arts, RockStar, Sony, Microsoft, Blizzard, Lucas Arts, id soft, Techmo, Bioware, Namco, Square Enix, Valve, Raven, Relic

Business Model

Developers (work hard like bees)

Publishers (Big-boss and Capital)

Distributors (Almost gone)

Retailers (Shelf master)

Developers

$90,000 a year (2011 survey)

Design and implement games

Programming

Design

Art & Animation

Sound effects and music

Production

Quality Assurance

Publishers

Support game development

Money, Technology, marketing/PR, distribution, and support

Take most of the risk /take most of the profits

Big-boss writes the rules

Merging often occurs

Most develop by their own studios (in-house)

Mile Stone

Most Publishers use mile stone to evaluate the project.

Decide which projects should go forward “Green light process”

Major mile stone in five stages:

Concept (game design document)

Assessment (analysis report)

Prototype (Mock up)

First Playable (one level)

Alpha (Q/A)

At each stage, committee reviews:

Decides whether or not to continue funding

Evaluates market potential

Adjusts unit forecasts accordingly

Publisher board reviews in all stages

Decides whether or not to continue funding

Evaluates market potential (Block buster?)

Make some small changes according to some factors

Most publishers want to minimize their risk

May limit new ideas

Successful sequel would welcome

Discontinue project might better than disaster of sale figure

Distributors and Retailers

Distributors

Get software from publisher to retailer

Almost gone because (retailers deal with publishers)

Retailers

Mass market

Over the shelf

Sell or rent software

Special deal & discount

Development Team

Early, solo/duo or garage team

Today, from 10-60 people

Programming team is smaller

Art team is larger

Artwork usually takes more time than coding

Table 9 Development Team

Executive Producer
Producer
Project leader
Programmers
Lead Designer
Game Designers
Architecture lead

Writer
Level Designers
Software Planer
Modellers
Animators
Artist
Audio Design
Sound Engineer
Q/A tester
Live support team
Live team for online

Time

12-24 months

Then take long vacation

Crunch time (serious period of working)

Crunch is used for good (motivation, achieve mile stone)

Long period of hard work

Stress will be released after release?

Balance your life (work & home)

Process

1. Creativity & Inspiration (a month)
    - Finding the idea and put it to a document
    - Make a decision to hold or go for it
2. Conceptualization & Wrap up idea (2-3 months)
    - Write a complete game design document
3. Plan (1-2 months)
    - Create project plan
    - Divide project to phases with specifications
4. Architecture design (2 months)
    - Create game architecture with specifies tools and technologies
    - Decide about tools, engine and technical specifications
5. Create Tools and engine if need (4-5 months)
    - Create or reuse tools
    - 2D & 3D graphics engine, level builder, or unit builder
6. Integration (12-14 months)
    - Build a game from the game design document
    - A complete game software and in-house tools
7. Level design (4 months)
    - Create the levels for the game with all levels, in-game tutorials, and manuals

8. Testing (3-12 months)
    - Overlap & parallel testing from design to release
    - Verification & Validation
    - Testing the code, the gameplay, and the levels
    - Try to find bug and some dent in game
    - Polished to make a master piece

Prototypes

Proof of concept

Publisher will understand your game and to test gameplay

Show your ability and potential finished it

Most of publisher makes a decision from this

Team shared the same vision & concept

Problems

Development cost is a skyrocket

Too many risks

Time to market

Games are more complex

Many projects fail

Many companies go bankrupt

Few games make profit

Revolution in process

Well organize with a good plan

Team is the most valuable resource

Choose the right software process to develop

Agile based method

Project management

QA test & polishing

Chapter Summary

Game development process requires time and effort.

Many people involved

Publisher & developer relationship

No standards or rules for game development process

Chapter 5 Game Evaluation

An essential goal for games is enjoyment or "fun" of users, which is the most significant key of success in games[27] . The definition of "fun" is behavior or an activity that are enjoyable or amusing. An assumption is "If people have a high level of enjoyment when they are playing a game, the game should be a 'good' game." According to this assumption, the level of enjoyment can be determined the quality of game in term of user satisfaction so we need to find some evaluation criteria to assess the enjoyment of users. When we have the criteria for game evaluation, we can use those criteria as game design criteria in order to produce a fun game. There are many game design criteria for designing a rich enjoyable game that can satisfy users. Hence, understanding what makes a game fun and figuring out how to assess it are important in game design. Consequently, game evaluation is a significant key of game design as a guideline for game design and a game measurement.

The existing literatures in game evaluation are divided into two main approaches: academic game evaluation, and industrial game evaluation. First, the academia is illustrated and addressed some issues of using in evaluation. Second, industrial evaluation is described in general and addressed some weakness. This section presents background of both game academia and industry that will be useful for understanding them.

How can we know is a game "good" or "bad"? From Industrial

Game industry reviews

Usually based on expert reviews (opinions)

Reviews are done after games are released

Game scores are used to reflect user satisfaction and "fun"

How can we know is a game "good" or "bad"? From Academic

Formal analysis

Analysis can be done in every stages of game development

Provide only factors for game design

Lack of evaluation method

Academic References (excerpt)

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Game Evaluation

There are a lot of game evaluation systems and reviews from game industry but little research in academia.

We created our **game evaluation model** from collected information of both industry and academia.

An experiment was conducted to find an evaluation model that can be used to justify and distinguish between "good" and "bad" games.

Evaluation Analysis

- 59 evaluation factors

From game industry and game academia

From 5 groups (game interface, gameplay, game mechanic, immersion, and social interaction)

- 60 games as the sample

From various game genres (action, adventure, role-playing (RPGs), simulation, strategy, and puzzle games)

From various game platforms (game consoles, portable gaming devices, computers, PDAs, and mobile phones)

- Internal evaluation

One expert evaluated and gave the scores for all samples.

- External evaluation

The overall game scores for all games were taken from a reliable source (www.metacritic.com).

www.metacritic.com

Figure 16 Metacritic web

Apply statistical methods to explore the key factors for game evaluation.

Descriptive analysis

Principal component analysis

Regression Analysis (model creation)

Regression Analysis

External evaluation scores are used as the independent variables

36 factors are used in the regression

Using backward regression technique to find the game evaluation model

Adjusted R^2 = 0.997 Standard error of estimation is 4.26 (<10%)

"Do these 10 variables reliably predict the evaluation score?", ANOVA test showed that the model ***p-value (0.0000)*** is smaller than the ***alpha level (0.05)***; we can conclude, "***Yes***, these 10 variables reliably predict the evaluation score"

External evaluation scores are used as the independent variables.

36 factors are use in the regression

Using backward regression technique to find the game evaluation model.

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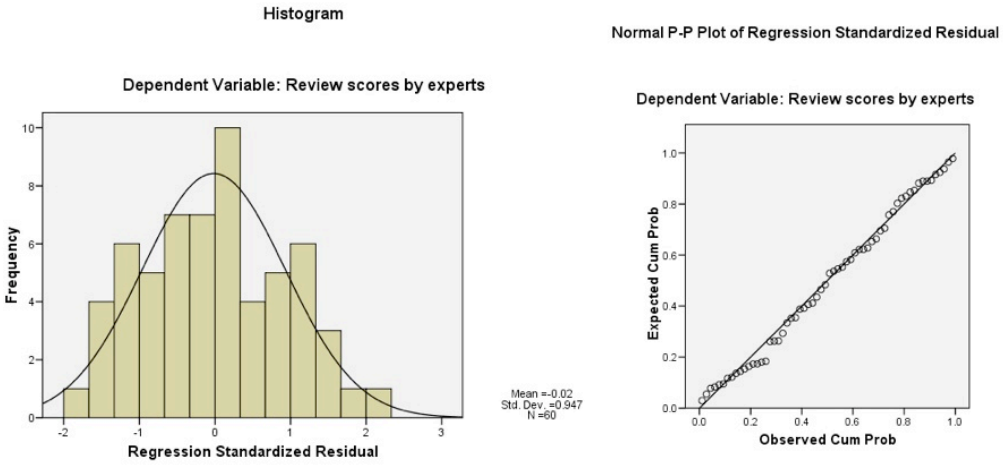


Figure 17 Regression charts

Game Evaluation Model

$$\Pr edictedScore = 5.5A + 1.9B + 1.6C + 2.4D + 1.9E + 4.5F + 4.8G + 6.6H + 3.3I + 3.3J$$

Table 11 Game Evaluation Model

Factors	Descriptions
A	Minimize control options 0->4 : Complex and difficult control->Minimize control
B	Follow the trends set by the gaming community to shorten the learning curve 0->4 : Not follow the trends set->follow the trends set
C	Players should be able to save games in different states 0->4 : Unable to save game->free to save game
D	Intermediate goals should be clear and presented at the appropriate times 0->4 : No clear goal->Presented clear goal at appropriate times
E	Make game replayable 0->4 : Lack replayable->replayable
F	Should use visual and audio effects to arouse interest 0->4 : Lack visual and audio effects->Stimulated visual and audio effects
G	Players should become less aware of their surroundings 0->4 : Aware of surroundings->Not aware of surroundings
H	Game should increase the players' skill at the appropriate pace as they progress through the game 0 : No skill development 1 : Progressive skill development
I	Allow player to build content 0 : Not allow 1 : Allow
J	Build as though the world is going on whether your character is there or not 0 : Static game world 1 : Dynamic game world

Case Study

To test the evaluation model, we used the model to evaluate 2 games to see how accurate of the prediction scores compare with the industrial score.

We picked 2 games to evaluate with our model; Half Life 2 (PC), and The Elder Scrolls IV: Oblivion (Playstation 3).

Table 12 Case Study: Evaluation Scores

Games	Predicted score	Industrial score
Half Life 2	98.4	96
The Elder Scrolls IV: Oblivion	96.5	93

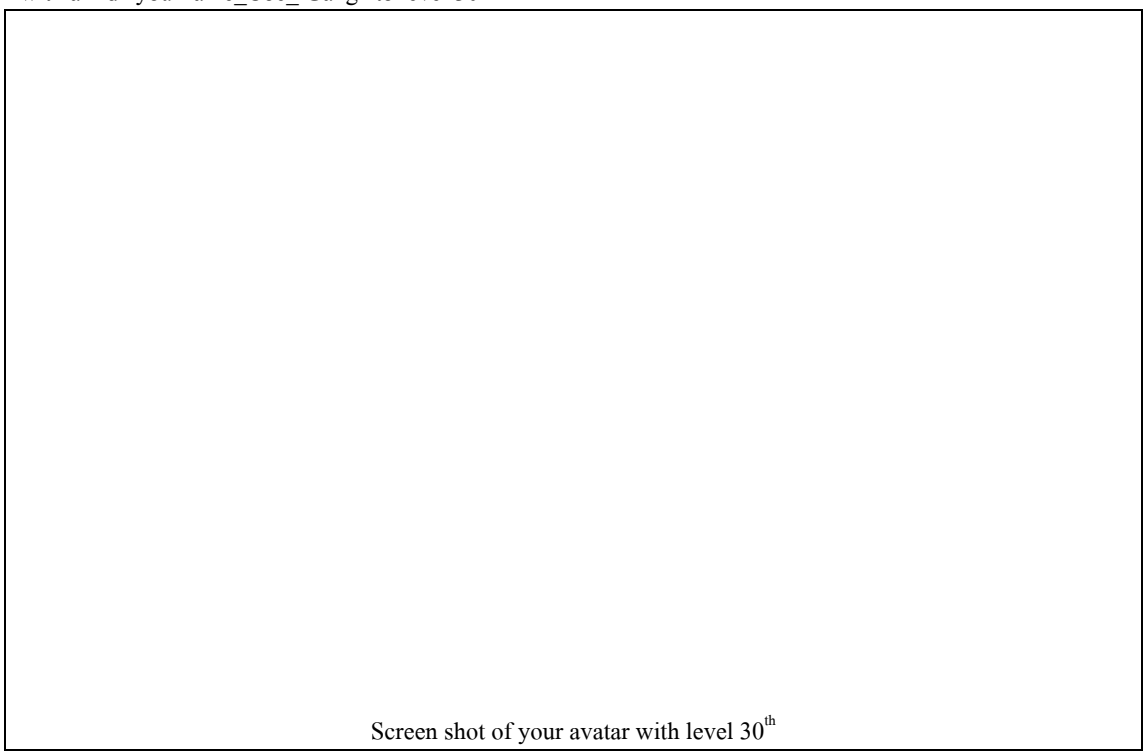
Game testing and postmortem

After a video game was released, developer or reviewer normally performs postmortem to evaluate the game. They evaluate game in every aspect to reveal the fault in games for improvement purposes.

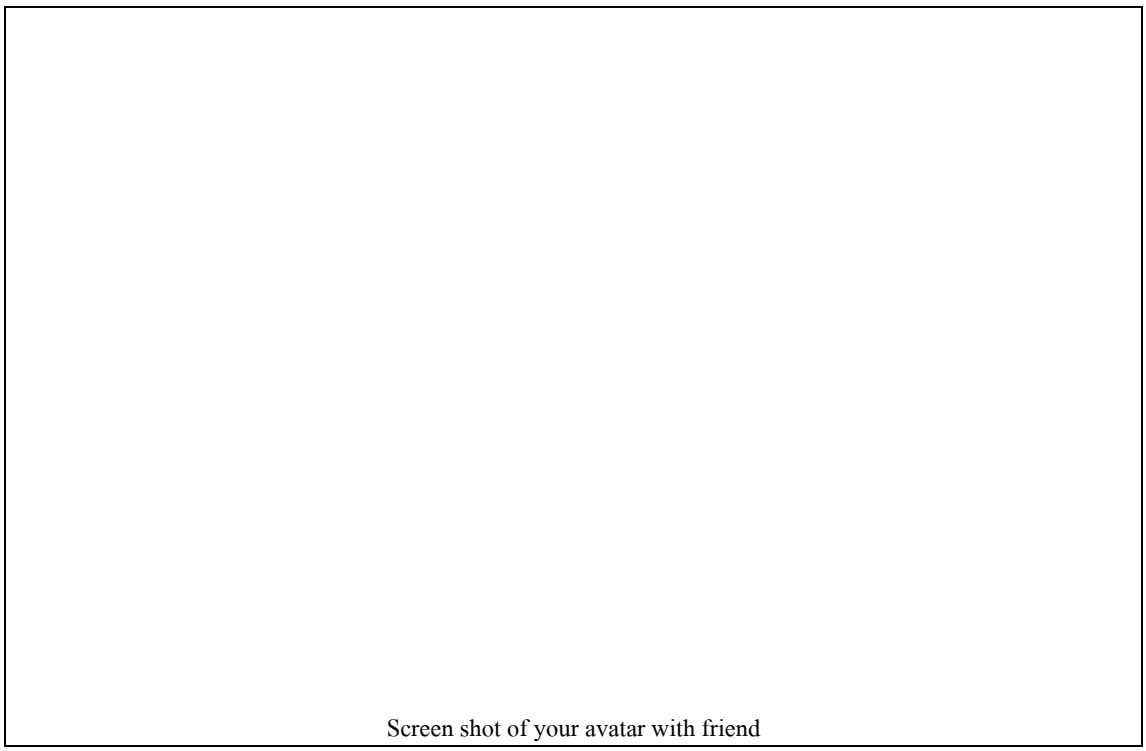
Activity game evaluation

Play an online game _____from _____

with an id “yourname_Coe_ Gang” to level 30th



Screen shot of your avatar with level 30th



Screen shot of your avatar with friend

Evaluate the played game after you real level 30th by using the game evaluation below:

$$\mathrm{Pr}edictedScore = 5.5A + 1.9B + 1.6C + 2.4D + 1.9E + 4.5F + 4.8G + 6.6H + 3.3I + 3.3J$$

Factors	Scores	Descriptions
A		Minimize control options
B		Follow the trends set by the gaming community to shorten the learning curve
C		Players should be able to save games in different states
D		Intermediate goals should be clear and presented at the appropriate times
E		Make game replayable
F		Should use visual and audio effects to arouse interest
G		Players should become less aware of their surroundings
H		Game should increase the players' skill at the appropriate pace as they progress through the game
I		Allow player to build content
J		Build as though the world is going on whether your character is there or not

Total Score:_____

Write review summary of this game (Assume that your are expert reviewer)

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Chapter Summary

Distinguish Good & Bad game

Evaluation factors from industry & academia

Game evaluation can be used to help improving video game and providing good feedback to developers.

Keep high quality to make a good game

Notes: