Lecture Serious Games (V2+Ü2), SS 2014

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Game Development,
Game Design

Schedule (preliminary)

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Di, 15.04.	Introduction to Serious Games
Di, 22.04.	**Game Development, Game Design**
Di, 29.04.	Game Technology I
Di, 06.05.	Game Technology II
Di, 13.05.	Authoring and Content Generation
Di, 20.05.	Multiplayer
Di, 27.05.	Personalization, Adaptation, Storytelling
Di, 03.06.	Serious Games and Web 2.0
Di, 10.06.	Interfaces, Games for Health
Di, 17.06.	Mobile Gaming
Di, 24.06.	Effects, Affects, User Experience and Sensor Technology
Di, 01.07.	Evaluation Session
Di, 08.07.	Summary
Di, 15.07.	Best Practice: Invited Talk by a Game Developer

Overview

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Game Development, Game Design

- Production
- Game Design
  - Game Design Document
- Game Programming
- Gathering experience

Game Development for Serious Games

- Additional constraints
- Design: storytelling, learning and gaming
- Rules for Serious Games Production

Getting into Game Development / Design

- Working with existing games
- Developing your own game(s)

Game Development – Definitions

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Project management

- Planning, organization

Game Design

- Design interactive “experiences”
- Mechanics, setting, …
- Interdependencies with technology

Asset creation

- Art, audio-visual

Game Programming

- Actual coding
- Or “just” fill existing engine

Production

Testing

- Continuous, alpha, beta
- Internal, focus-groups, external, public

Supporting roles

- Business, marketing, distribution, infrastructure

Game Development – Process

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Pre-Production

- Initialization: idea, setting, prototypes
- Requirement analysis: technical constraints, market analysis

Planning and Organization

- Rough design: software architecture, components
- Detailed design: Game Design Document
- Process: definition of production pipeline / tool chain

Production

- Implementation / integration: programming, middleware & libraries, assets
- Configuration management: versioning
- Quality assurance: checking requirements, alpha / beta tests
- Documentation: manuals, help texts, process / development documentation

Post-Production

- Distribution: master disk, installer, marketing
- Support / maintenance: patches, add-ons / DLCs

Game Development – Scheduling

Pre-Production

- Ideally starts before last project is shipped
- Pitched to investors (publishers)
- May not go into full production

Planning and Organization

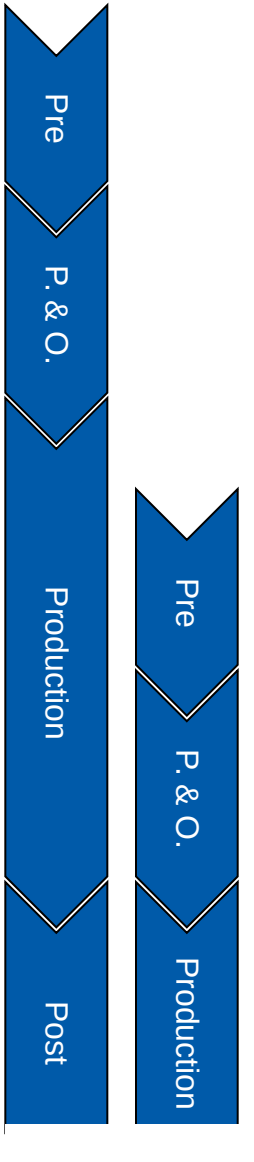
- Design builds on Pre-Production
- Process in refined over several productions

Production

- Takes the majority of time and money
- Prevent idle times at all costs
- Code / talent may be shared with other projects

Post-Production

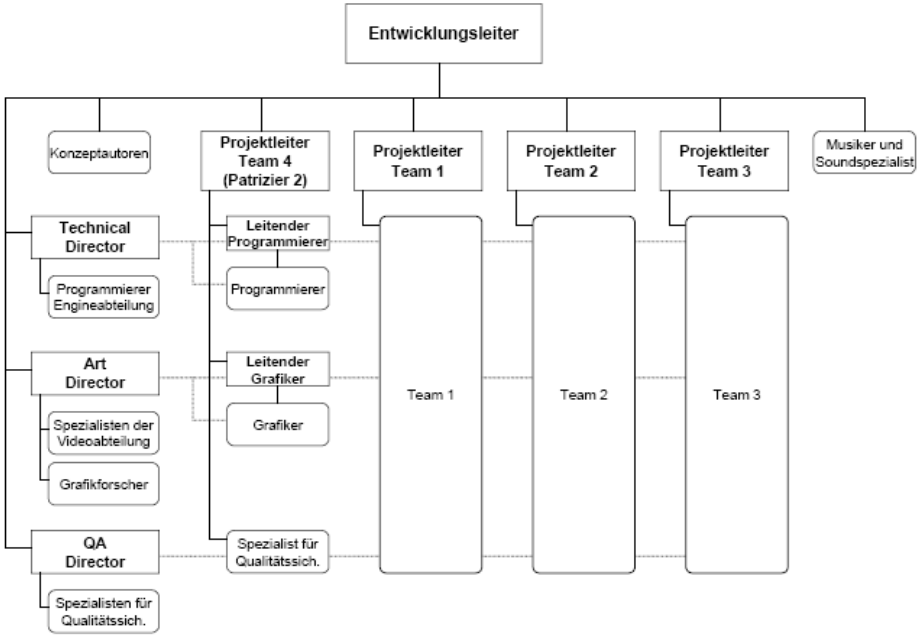
- Distribution handled by external publishers
- Marketing increasingly early (to build anticipation / “hype”)
- Support / maintenance by specialized teams
- DLCs can keep artists busy in pre-shipping weeks



Game Development – Roles

Production

- Producer (director)
- Individual leads for each discipline



Game Design

- Designer
- Writer

Asset creation

- Artist (3D, UI, Cutscenes)
- Sound engineer (effects, composers)
- Level designer

Game Programming

- Engine programmer (graphics, physics, AI, network, …)
- Tool programmer (process support, e.g. level editor)
- Game programmer (gameplay, UI)

Game Development – Skills

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Many aspects of CS

- Computer graphics
- Artificial intelligence
- Human-computer interaction
- Security
- Distributed programming
- Simulation (realtime)
- Software engineering

Also interdisciplinary

- Psychology
- (Liberal) arts
- Social sciences
- Pedagogy
- (Subject-specific) didactics (for Serious Games)

Production – Outsourcing

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Motivation

- Not every role is needed equally
  - Art in the beginning
  - Testing later
- Specific know-how
  - Platform (PS3 -> Cell-processor)
- Specific tools
  - Development-Kits / licenses
  - Sound studio, motion-capturing

Unternehmen und Projekt	Von Zulieferern erstellte Komponenten
Ascaron: Patrizier 2	▪ Intro ▪ Musik ▪ Sprachausgaben für das Tutorium[415] ▪ Handbuch mit Hintergrundinformationen zur Hanse
Funatics: Cultures	▪ Intro und Cut Scenes ▪ Musik
Software 2000: BMX	▪ Intro ▪ Sprachausgaben für die Kommentation der Fußballpartien ▪ 3D-Animationen zu Bewegungsabläufen von Fußballspielern mittels Motion Capturing
Sunflowers: TechnoMage	▪ Intro und Cut Scenes ▪ Sprachausgaben zu allen Dialogen (alleine 33 Sprecher für die deutschsprachigen Varianten von TechnoMage)
Synetic: MBTR	▪ Softwarewerkzeug für die Menügestaltung ▪ Sound ▪ Musik ▪ Ghostrennen[416]

Subcontracting

- Translation
- Sounds
- Cutscenes
- Testing
- Porting to different platforms
- Multiplayer-mode

Production – Scope

AAA: Complex process

- Long timespan
- Many people with different backgrounds
- Complex interdependencies
  - External factors
- Multimillion-dollar budget
  - Salaries
  - Software licenses, hardware
  - Rent
- High risk, formalized process

Assassin's Creed III, 2012

Example: Assassin's Creed III

- 3 years
- 600 employees
- 6 studios, 8 locations
- 6.000.000 $ for marketing only

Production – Publishers

Publishers

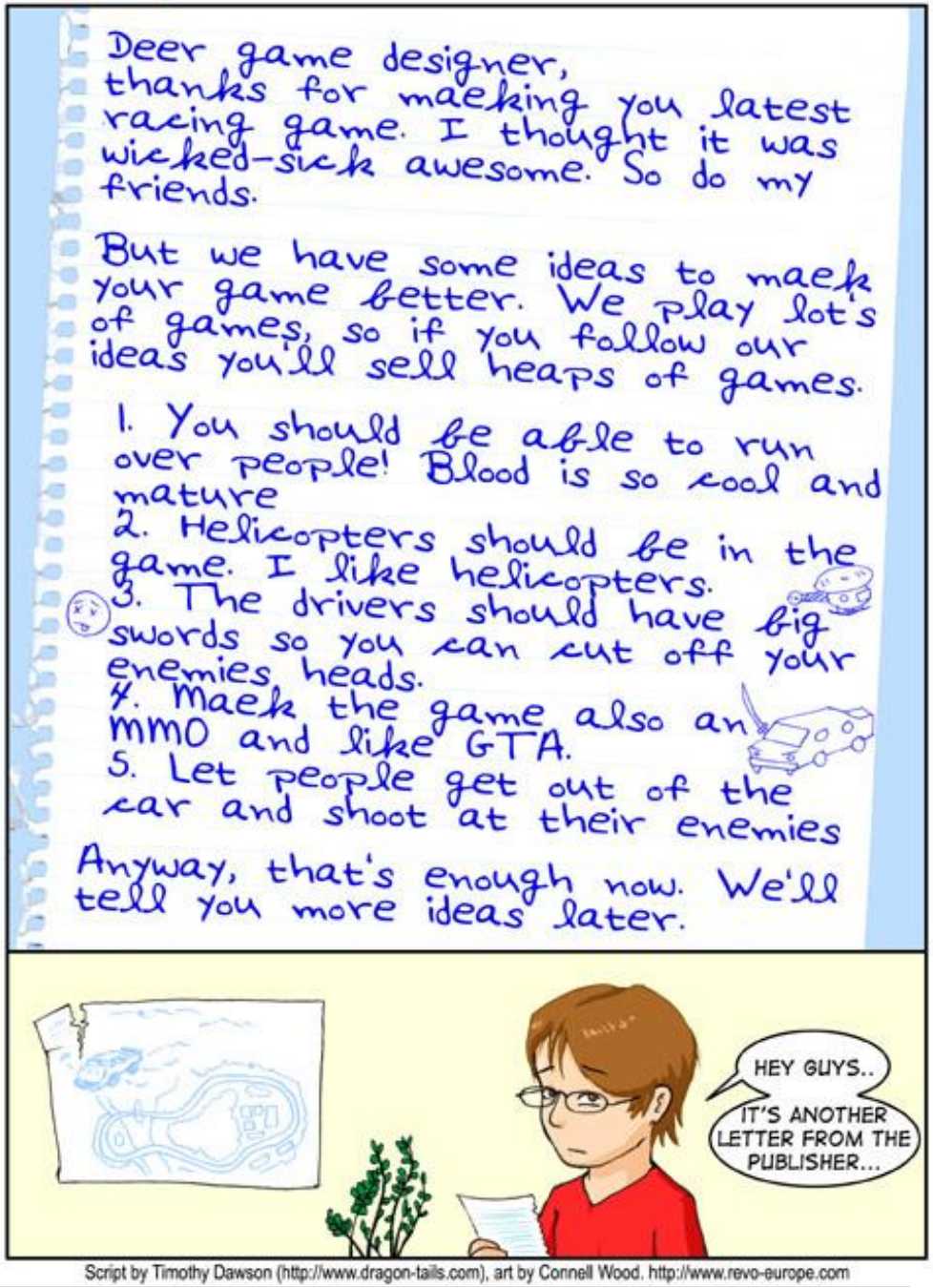
- Finance
- Marketing
- Inspiration

Potential conflicts

- Minimize risk
- Innovation vs. „guaranteed success“
- Sequels vs. new IP

Tony Key (Ubisoft, 2013):

“That's what all our games are about; we won't even start if we don't think we can build a franchise out of it. There's no more fire and forget – it's too expensive.”



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Publishers – An example

- “The Sims” by Will Wright
- Allegedly, Maxis didn‘t want it at first
- *SimCity, and the company that developed it, Maxis, was Wright's first taste of success. But as we chronicled four years ago in our previous ‚Behind the Games‘ feature on Maxis, SIMply Divine, Wright went through many turbulent times at Maxis. The company went public, the product flow wasn't there, and Wright felt constricted. While Wright had many new game ideas after SimCity, he could never get them off the ground – especially his idea for a dollhouse game, which he had originally dubbed “Home Tactics: The Experimental Domestic Simulator.”*

Source: www.gamespot.com/gamespot/features/pc/simsonline/1.html

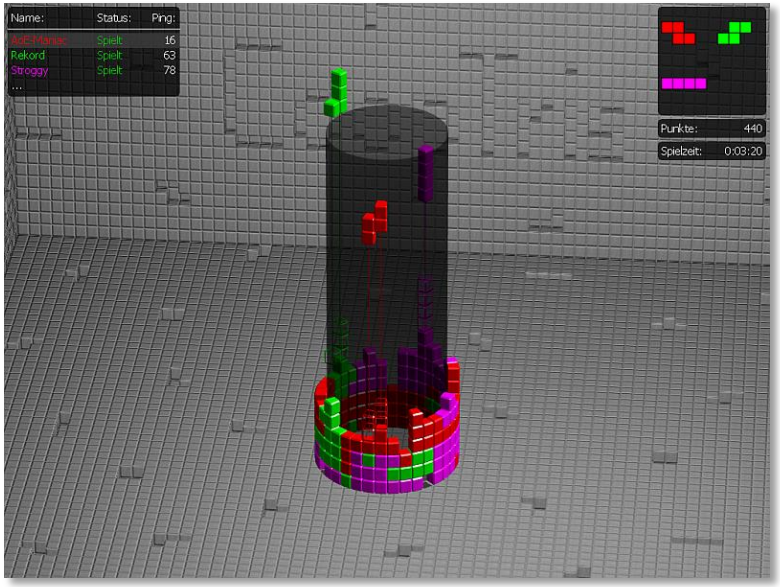
Production – Indie Games

Simple / free tools available

- Game Maker, Unity, …

Focus to minimize effort

- Variations of simple games
  - Pac-Man, Space Invaders, Tetris, …
- Story, innovative gameplay-mechanic, …
- No 3D graphics / huge worlds



CoopTris, 2011

Financing

- Own budget
- Kickstarter (trendy, but initial investment and unclear outcome)

Enabled by digital distribution

- Steam, Desura, Xbox LIVE Indie Games, Appstore, …

Low risk, more innovation?

- Must not appeal to mass market (higher difficulty, difficult subject matters)
- Also important for Serious Games

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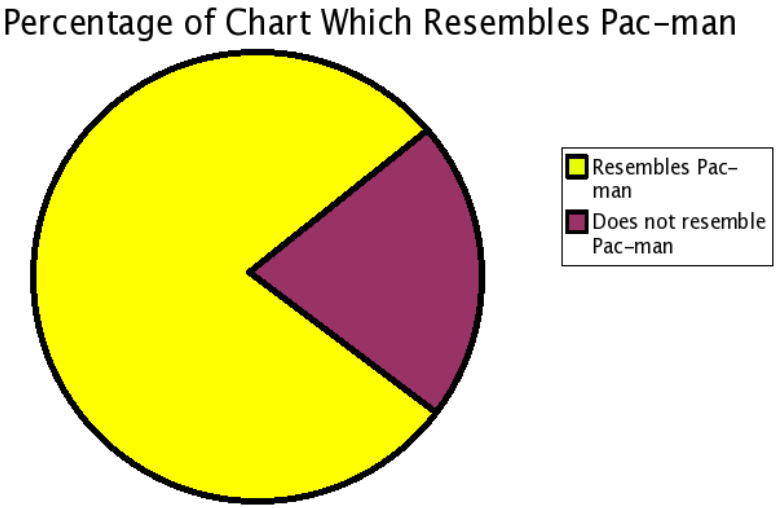
Creative Process

- Game concept, core elements and structure
  - Setting
  - Gameplay mechanics (interaction, rules, scoring)
  - Environment (audio-visual)
  - Storyline (story model)
  - Characters
- Includes art work
- Guarantee playability and balance
- Everything must fit together
- Consider tech. limitations and costs
  - Can become a strong point of the design
  - E.g. fog allows to reduce rendering distance while establishing a spooky mood
- Paper document, no programming



Game Design – Rules

“Meaningful Play”

- Actions have perceivable outcomes
- Outcomes are relevant to game context

Choices

- Micro-level (brake now or later?)
- Macro-level (which skill to level-up?)
- Interesting, i.e. trade-off of risk / reward
- But don’t overburden the player
  - To many, unclear or inconsistent results

Players might interact unexpectedly

- Trying to break rules
- Using only "optimal strategies“ if available

BioShock Infinite, 2013

Based on: Salen, K., & Zimmerman, E. (2004). Rules of play: Game Design Fundamentals. The MIT Press.

Game Design – Interaction

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Input

- Direct or indirect control
- Device-dependent
  - Keyboard and Mouse
  - Gamepad
  - Kinnect, Move, …
  - Tablet

Kinect, 2010

Output

- What information is exposed?
- How (fast, clear) is it visualized?
- Device-dependent
  - Screen size
  - Lots of new challenges in VR (Oculus Rift)

SimCity, 2013

Game Design – Pacing

On different levels

- Macro: overall progression, story
  - *More in upcoming lecture…*
- Micro: individual level design, dialogues

StarCraft II: Wings of Liberty, 2010

High intensity moments

- Action, adrenalin

Low intensity moments

- Relax
- Gives context / meaning to high intensity moments

Methods

- Not simply “more” (shorter time limits, tougher enemies)
- Instead varying gameplay / mood / difficulty
  - New mechanics
  - Even better: known mechanics in new context
- Examples: stealth section in action game, strategy game with hero units

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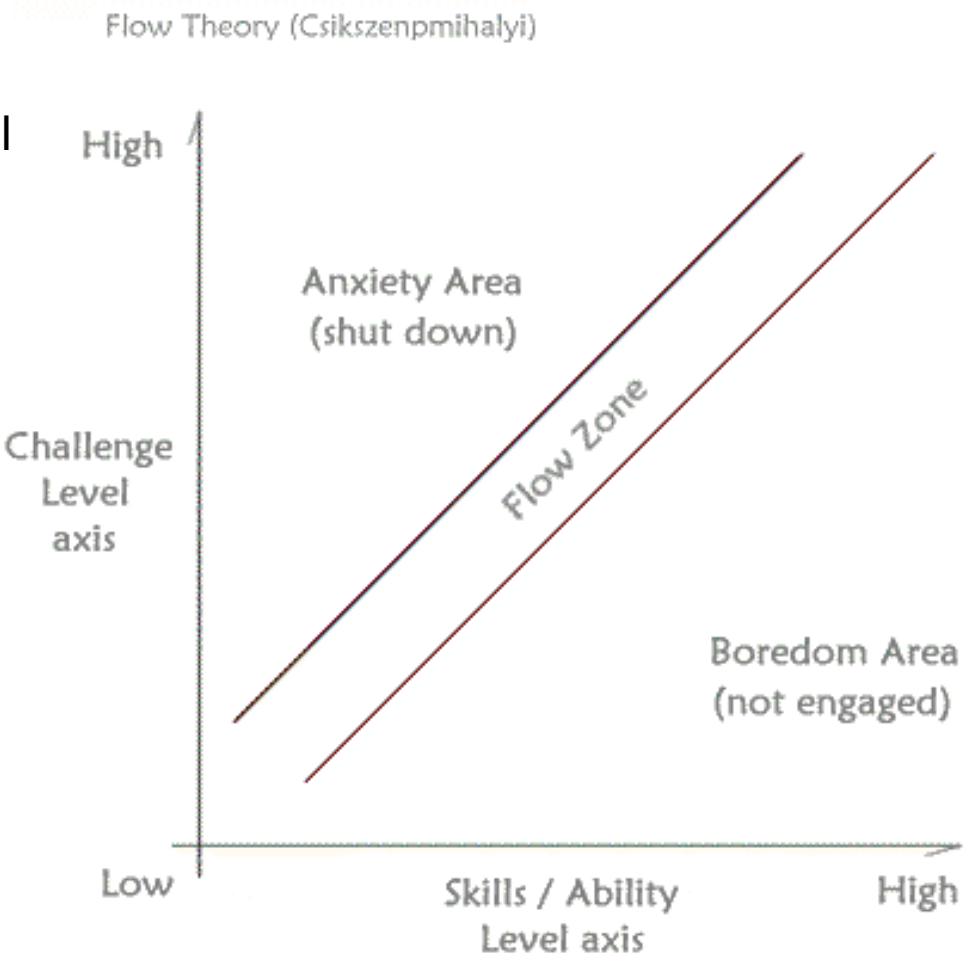
Difficulty

- Different expectations
  - Casual vs. hardcore
- Dependent on business model
  - Free-to-play vs. pay-to-win

Flow

- Right difficulty at right time
  - “Hard but fair”
- Needs flexible, adaptive systems
- Personalization
  - Allow different play styles



Example decision: Player character

- Predefined (name, face, voice)
- Character-builder
- “Blank slate”

What are the implications?

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Example decision: Player character

- Predefined (name, face, voice)
  - Grounded in story
  - Can carry interesting traits
  - Exploitable in Marketing
  - Might alienate if done “wrong”
- Character-builder
  - Lots of effort required [1]
  - Game must respect all possibilities
- “Blank slate”
  - Player may project himself
  - Immersion
  - Saves cost

Brink, 2011

Brink, 2011

[1] “Punching Above Your Weight: Small Art Teams, Big Games” - Tim Appleby and Paul Greveson (www.splashdamage.com/publications)

Example decision: Health system

- Health pickups
- Regenerating health
- Health pickups & regenerating shield

What are the implications?

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Example decision: Health system

- Health pickups
  - Interface vs. Immersion
  - Allows secrets
  - Can lead to “special” moments
- Regenerating health
  - More predictable
  - Smother difficulty
  - Easier level design
- Health pickups & regenerating shield
  - Combines both

Half-Life, 1998

Game Design Document

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Description of main elements (example)

- Game synopsis (incl. setting, story)
- Game objects (incl. behavior, PC/NPC)
- Graphics (incl. 2D / 3D, art-style)
- Sound (incl. effects, music)
- Controls (incl. interface)
- Game flow (incl. gameplay, rules, scoring)
- Levels (incl. balance)

For Serious Games

- “Serious” / learning content (incl. topics, skills)
- Didactics (incl. learning method, interaction, assessment)

Additionally

- Audience, motivation, market research, pricing

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Example “First Game” (Game Maker)

- “Catch the Clown”

Catch the Clown

Catch the Clown is a little action game. In this game a clown moves around in a playing field. The goal of the player is to catch the clown by clicking with the mouse on him. If the player progresses through the game the clown starts moving faster and it becomes more difficult to catch him. For each catch the score is raised and the goal is to get the highest possible score. Expected playing time is just a few minutes.

Game Design Document

Catch the Clown *design document*

Game objects

There will be just two game objects: the clown and the wall. The *wall* object has a square like image. The wall surrounding the playing area is made out of these objects. The wall object does nothing. It just sits there to stop the clown from moving out of the area. The *clown* object has the image of a clown face. It moves with a fixed speed. Whenever it hits a wall object it bounces. When the player clicks on the clown with the mouse the score is raised with 10 points. The clown jumps to a random place and the speed is increased with a small amount.

Sounds

We will use two sounds in this game. A bounce sound that is used when the clown hits a wall, and a click sound that is used when the player manages to click with the mouse on the clown.

Controls

The only control the player has is the mouse. Clicking with the left mouse button on the clown will catch it.

Game flow

At the start of the game the score is set to 0. The room with the moving clown is shown. The game immediately begins. When the player presses the <Esc> key the game ends.

Levels

There is just one level. The difficulty of the game increases because the speed of the clown increases after each successful catch.

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Implementation of Game Design

- Must fit to design
- Using a specialized engine…
- … or building one from scratch
- *More in upcoming lecture…*

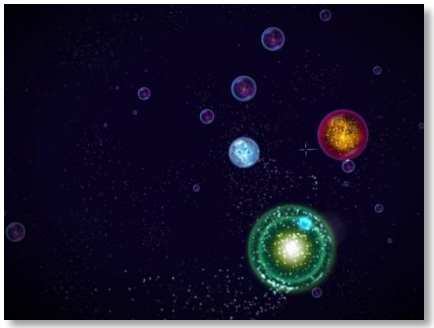
3D High-End

Far Cry 3, 2012

3D Low-End

Warcraft III: Reign of Chaos, 2002

2D High-End



Osmos, 2009

2D Low-End

VVVVVV, 2010

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Game Development for Serious Games

- Additional constraints
- Design: storytelling, learning and gaming
- Rules for Serious Games Production

Getting into Game Development / Design

- Working with existing games
- Developing your own game(s)

Game Development for Serious Games

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Similar to indie games

- Small teams
- Small budget
- Small target audience

Even more interdisciplinary

- Educators, subject matter experts

“Serious” content

- Fixed in advance
- Has to be worked into the game
- Must not clash with “fun”
- Should have noticeable effects

TechForce, 2008

Design: Storytelling, Learning and Gaming

Design: Storytelling, Learning and Gaming

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Learning theories

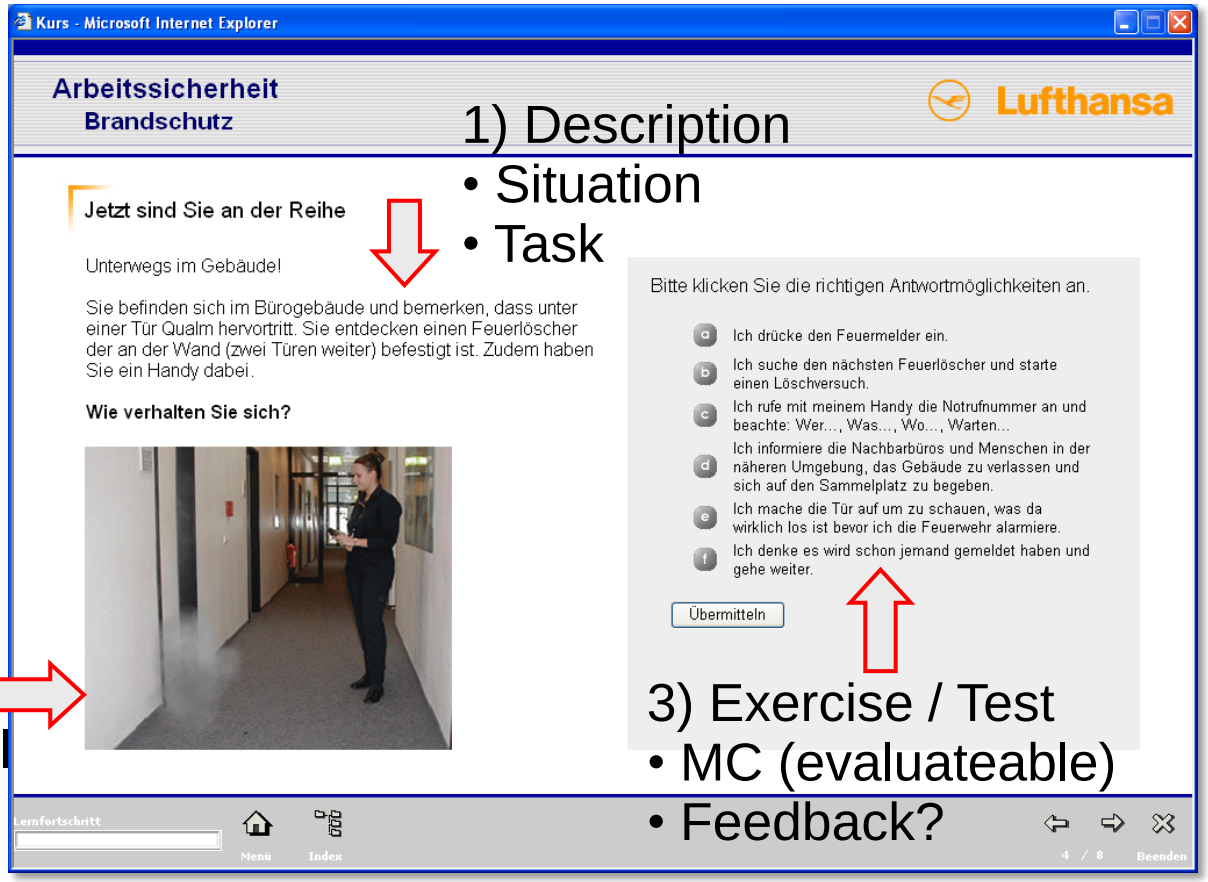
- Behaviorism
- Cognitivism
- Constructivism

Didactic models

- Drill-and-practice
- Tutorial concept
- Explorative concept

Role of teacher/learner

- „Who is the boss?“



1) Description
- Situation
- Task

2) Media
- Audio-visual
- Passive

3) Exercise / Test
- MC (evaluateable)
- Feedback?

Design: Storytelling, Learning and Gaming

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Game-based Learning

- *"Game-based Learning is a branch of serious games that deals with applications that have defined learning outcomes. Generally they are designed in order to balance the subject matter with the gameplay and the ability of the player to retain and apply said subject matter to the real world."* – Wikipedia

- Edutainment (EDUcation + enterTAINMENT) combines

Game Software
- Fascination
- Fun
- Eagerness
- Emotion

Learning Software
- Effectiveness
- Learning success
- Applicability
- Methodic & didactic

Design: Storytelling, Learning and Gaming

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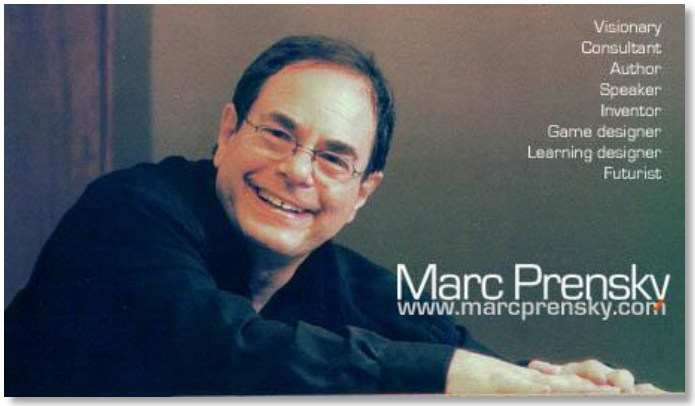
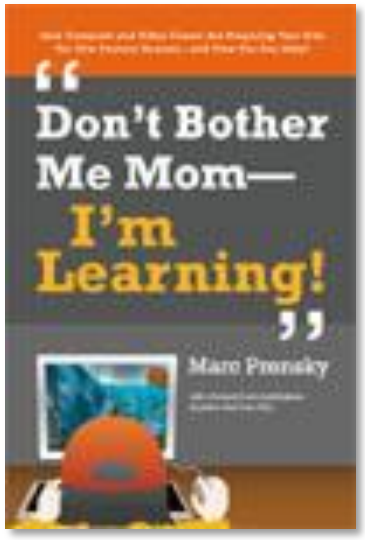
Digital Immigrants

- Printing emails, “real life” takes place off-line, …

Digital Natives / Twitch Speed Generation

- 10.000 h videogames, 200.000 emails, …
- Twitch speed vs. conventional speed
- Parallel processing vs. linear processing
- Random access vs. linear thinking
- Graphics first vs. text first
- Connected vs. stand-alone
- Active vs. passive
- Payoff vs. patience
- Technology as friend vs. technology as foe
- *“And I submitted that learning via digital games is one good way to reach Digtial Natives in their ‚native language‘.”* – Marc Prensky





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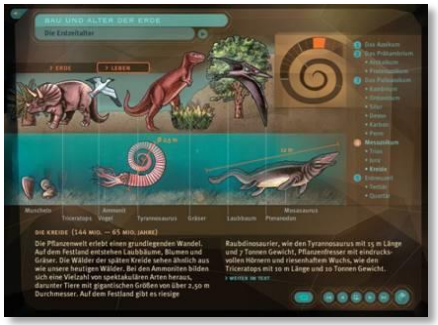
Examples

- Statetris (Geography)
- Lernadventures by BrainGame
  - Geograficus
    - Rescue Dragon Balwin
    - Solve Quests, Tasks, Puzzles, etc.
    - “Hero‘s Journey” (→ Storytelling)
  - Physicus
  - Chemicus
  - Mathica

Statetris, 2007

BrainGame



Geograficus, 2005

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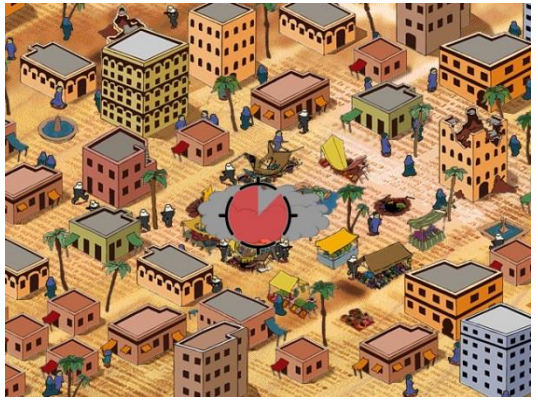
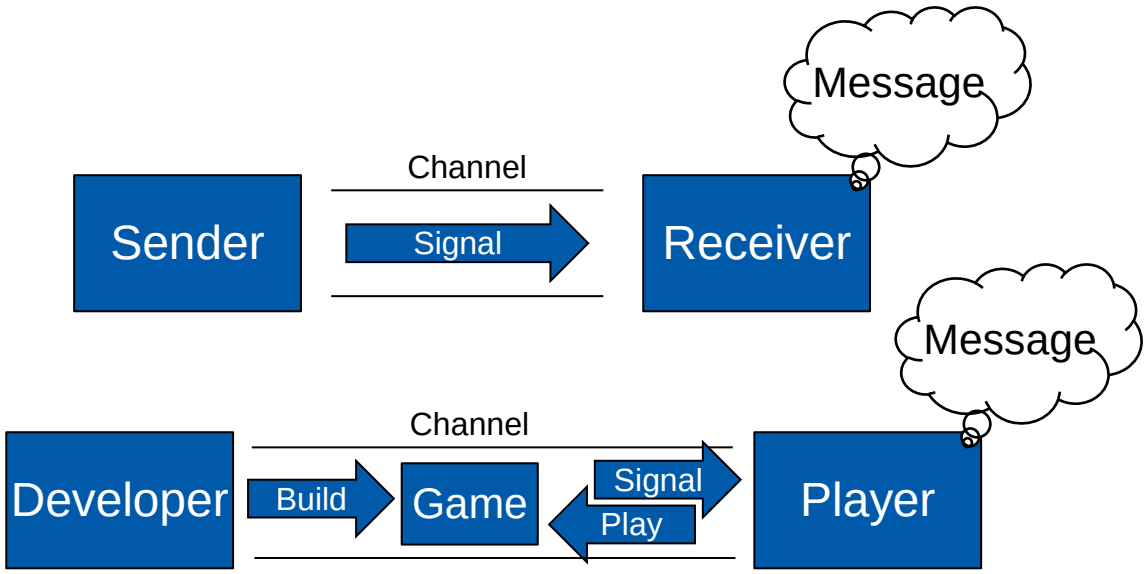
(Serious) Games as a communication medium

- Developers build games to send messages
  - Learning content, political statements, adverts
- Games produce signals during play
- Players interpret these signals as messages
- But is this message the intended one?
  - Design game (mechanics) accordingly



September 12th, 2003

Papers, Please, 2013



Based on: Adams, E., & Dormans, J. (2012). *Game Mechanics: Advanced Game Design*. New Riders Publishing.

Rules for Serious Games Production

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Noah Falstein (Monkey Island, ReMission):

- Accessible (simple interface), but not simple content
- Many prototypes, fast iterations
- Games always teach something, which can be a source of “fun”
- Respect every team member, especially from other fields
- Choose the genre by its properties, not its popularity
- Never underestimate the “potential fun” of serious topics
- Subtle introduction of learning content
- Testing is important and must be planned accordingly
- Different cultures may require different games
- Clearly define the roles of team members, fitting their expertise

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Getting into Game Development / Design

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Studying Games

- Demand of customers (= students)
- Demand of industry?
- Trade-off between technical and artistic side
- *“(Too) general game design degree programs remain questionable, as those breed all-round-talents instead of specialized team players with deep expertise in their specific domain.”* - Elia (former student S. Göbel, industrial placement at ZEAL, 2007)

Practical experience

- Rated higher by many companies
- Start your own projects!
  - Smaller games
  - Mods

But keep in mind

- Industry not „scientific“ settled
- Salary not that high

Understanding existing games

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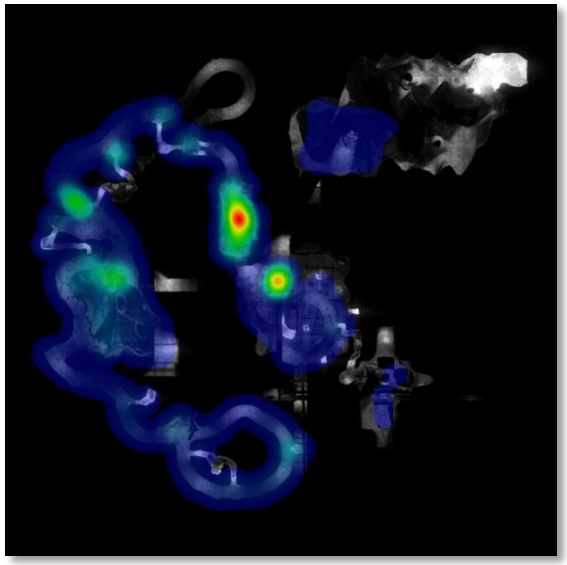
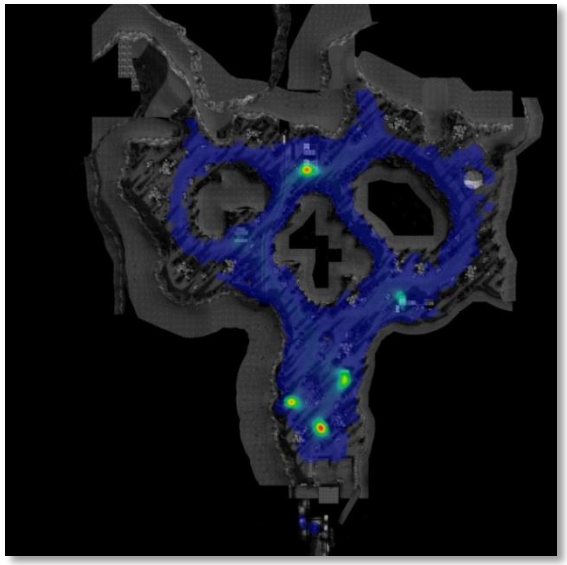
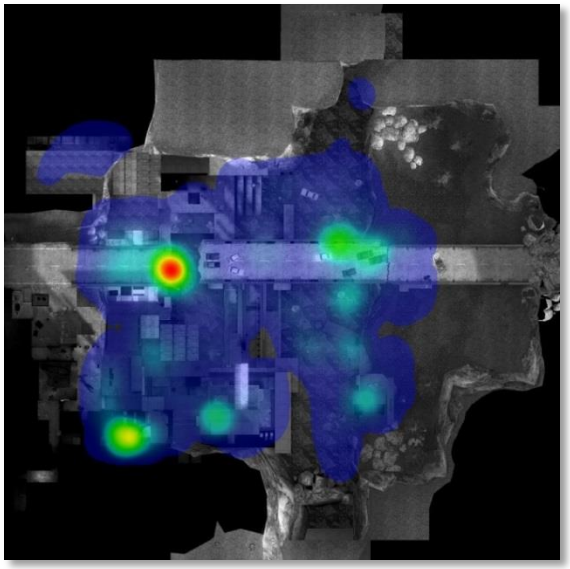
Try to analyze while playing

- How are the core mechanics taught?
- How does the game react to my actions? Can I find actions that break the it?
- Does the game establish a certain mood? Can you figure out how?
- Is it possible to see which elements pose a thread and why?
- How do AI-Players react to my actions? Are their strategies sound?
- Why is the level build that way?
- …





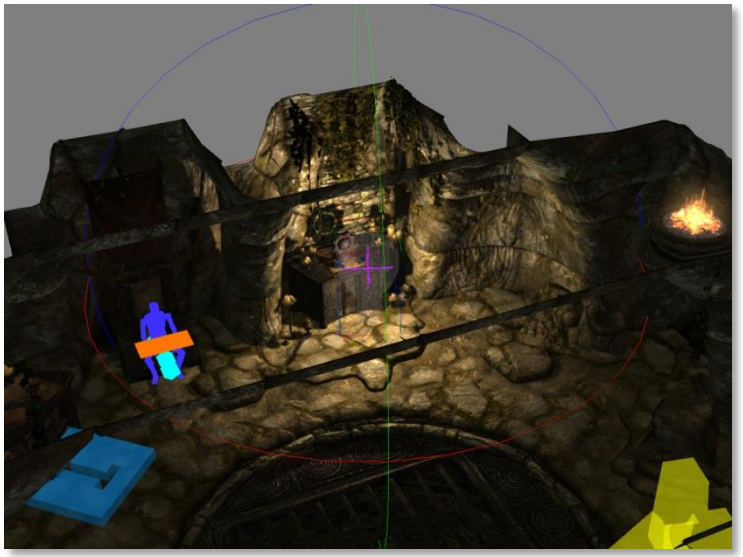


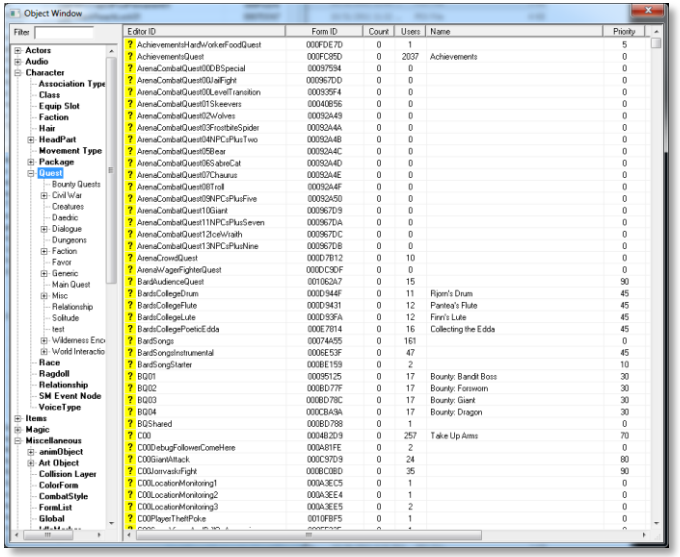
Half-Life 2: Episode Two, 2010

Modding existing games

Many games include modding tools

- Modify parameters and observe the results
- Sometimes “official” examples available
- Create new levels / characters / …
- Or even a different game (total conversion)
- Some games / studios started this way
  - Counter-Strike (Half-Life)
  - DayZ (Armed Assault 2)
  - Defense of the Ancients (WarCraft 3)
  - Team Fortress (Quake)





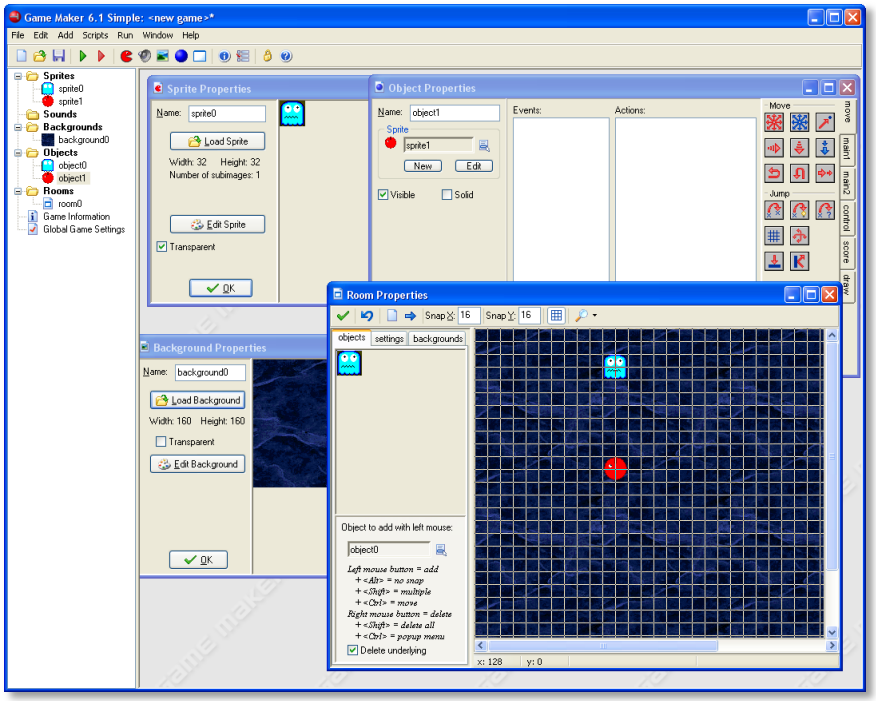
The Elder Scrolls V: Skyrim, 2011

Developing your first game(s)

Game Maker

- Marc Overmars (University of Utrecht)
- Implemented in Delphi, Windows only
- Widespread use in academia
  - Playful teaching/learning of OO
  - Reduces effort for creating games
- Later published by YoYo Games

"Playing computer games is fun. But it is actually more fun to design your own computer games and let other people play them. Unfortunately, creating computer games is not easy." – M. Overmars



Developing your first game(s)

Game Maker

- For smaller games (Pac-Man, Space Invaders, Tetris, …)
- Drag-and-drop interface
- Import images, sprites, sounds..
- Define objects and behaviors
- With no programming skills…
- ... but with creative ideas & concepts
- Used in (few) commercial projects

Developing your first game(s)

Unity

- Professional level game engine
  - 3D graphis, physics, …
- Multiplatform (web, mobile, …)
- Easy to use
  - Visual editor
  - Asset store
  - Learning resources provided
  - Big Community
- Free version available
- *Used in our exercises… :-)*

Rochard, 2011

Thomas Was Alone, 2012

Developing your first game(s)

Game Jams

- Game development contest
  - Vague theme (e.g. “10 seconds”)
  - Tight time constraints (e.g. 48 h)
  - Starting from scratch (design, assets, code, …)
  - Popular: Unity
- No excuses – just submit something…
  - Good feedback from community
- Examples: Global Game Jam / Ludum Dare

The Head Wizards Course, 2014

Ludum Dare 27 @ TUD, 2013

A Maze Thing, 2013

10 Seconds to Apocalypse, 2013

Game Jams@TUD

- We regularly take part in game jams
- Students, scientists and industry
- Look out for announcements or send me an E-Mail

10sion, 2013

10Up Experiments: Mountain Brew, 2014

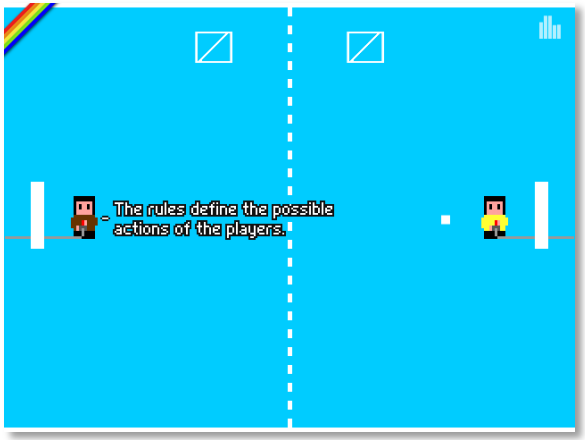
The Most Important 10 Seconds Of Your Life, 2013

As We Are, 2014

Further information

If you are interested in this topic

- Videos with lots of ideas / practical insights
  - http://extra-credits.net
  - http://extra-credits.net/episodes/so-you-want-to-be-a-game-designer/
  - http://extra-credits.net/episodes/so-you-want-to-be-an-indie/
- Games about Game Design: „Understanding Games“
  - http://www.kongregate.com/games/pixelate/understanding-games-episode-1
  - http://www.kongregate.com/games/pixelate/understanding-games-episode-2
  - http://www.kongregate.com/games/pixelate/understanding-games-episode-3
  - http://www.kongregate.com/games/pixelate/understanding-games-episode-4



Understanding Games: Episode 1, 2007

References

Game Maker + Tutorials

- http://www.yoyogames.com/gamemaker/

Unity + Tutorials

- http://unity3d.com/learn/

Game Design Document(s)

- http://www.runawaystudios.com/articles/chris_taylor_gdd.asp
- http://www.gamedev.net/forum/17-game-design/

Teaching Game Programming

- Power and Peril of Teaching Game Programming – Maic Masuch and Lennart Nacke, Games Research Group, Department of Simulation and Graphics, University of Magdeburg

References

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Books

- “Rules of Play: Game Design Fundamentals” – Katie Salen and Eric Zimmermann
- “Andrew Rollings and Ernest Adams on game design” – Ernest Adams and Andrew Rollings
- “Game Mechanics: Advanced Game Design” – Ernest Adams and Joris Dormans
- “Game Design” – Bob Bates
- “Game development and production” – Erik Bethke
- “The Game Design Reader: A Rules of Play Anthology” – Katie Salen and Eric Zimmermann
- “The Art of Computer Game Design” – Chris Crawford

Industry articles

- www.gamedev.net
- www.gamasutra.com
- www.devmaster.net