



Centrum Wiskunde & Informatica



Hogeschool van Amsterdam
Amsterdam University of Applied Sciences

Adapting Game Mechanics with Micro-Machinations

Seminar Automated Game Design

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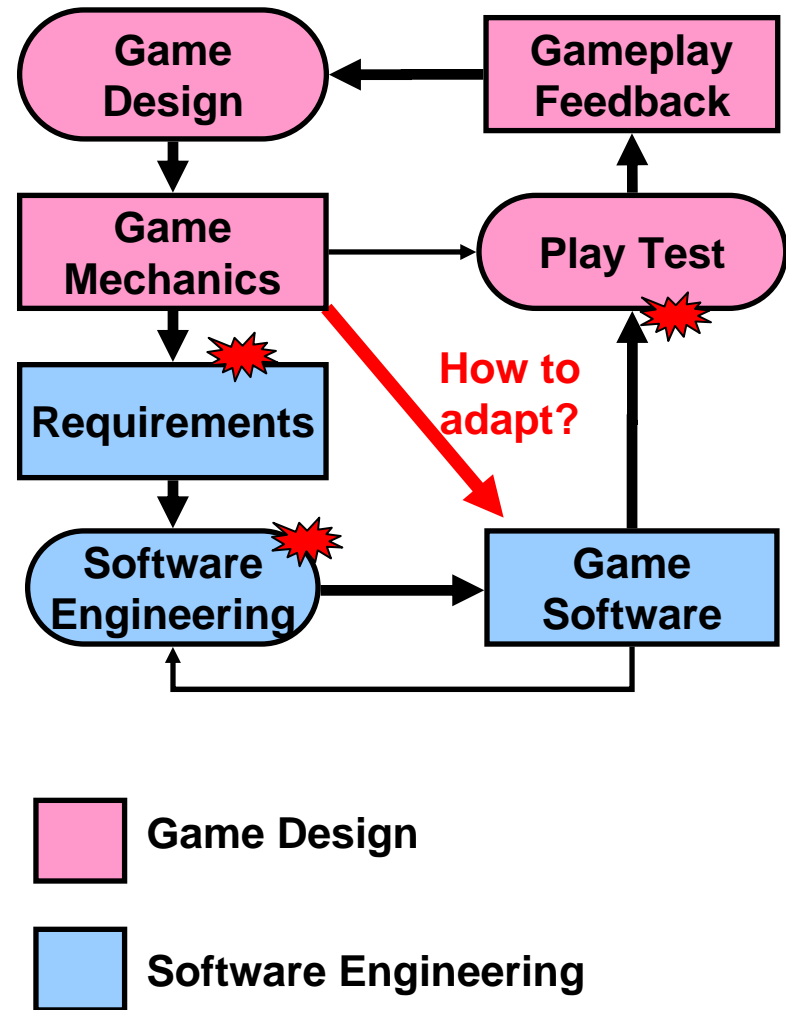
HvA / Create-IT applied research &

CWI / Software Analysis and Transformation (SWAT) group

Joint work with
Joris Dormans

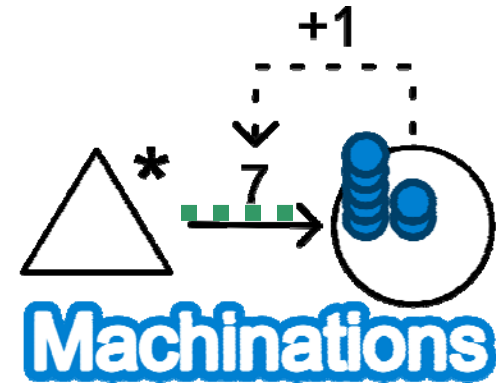
Problem Statement, Objectives and Approach

- Problem
 - Long design iteration times because designers lack a means of adapting game mechanics in software
- Objectives
 - Reduce game design iteration times
- Approach
 - Live adaptation of game mechanics with Micro-Machinations



Machinations Background

- Visual modeling language for game design
- Diagrams are directed graphs
- Expresses game mechanics
 - Depicts internal economy
 - Makes feed-back loops explicit
- Works by redistributing resources between nodes along the edges



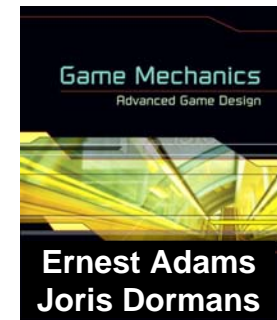
The Machinations logo contains a feed-back loop

state	0	1	2	3	4
amount	7	14	28	56	112
flow	7	14	28	56	112

Machinations Language Evolution

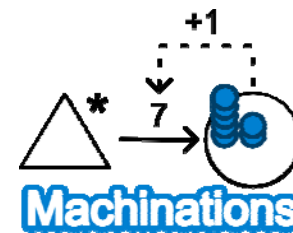
1. Game Design Aid

- Prior work of Ernest Adams and Joris Dormans
- Helps understand how rules affect play
- Limited to game design



2. Analyze Micro-Machinations

- Prior work with Paul Klint
- In MM we formalized Machinations' meaning and extended the language
- Added a textual notation



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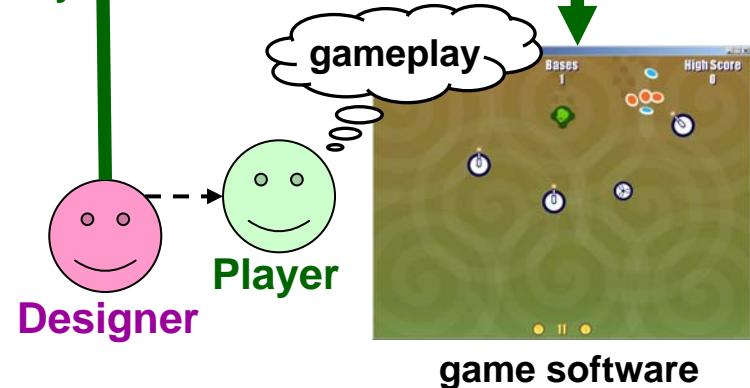
auto source s
pool p at 7
flow: s -p-> p

Modify

Modify

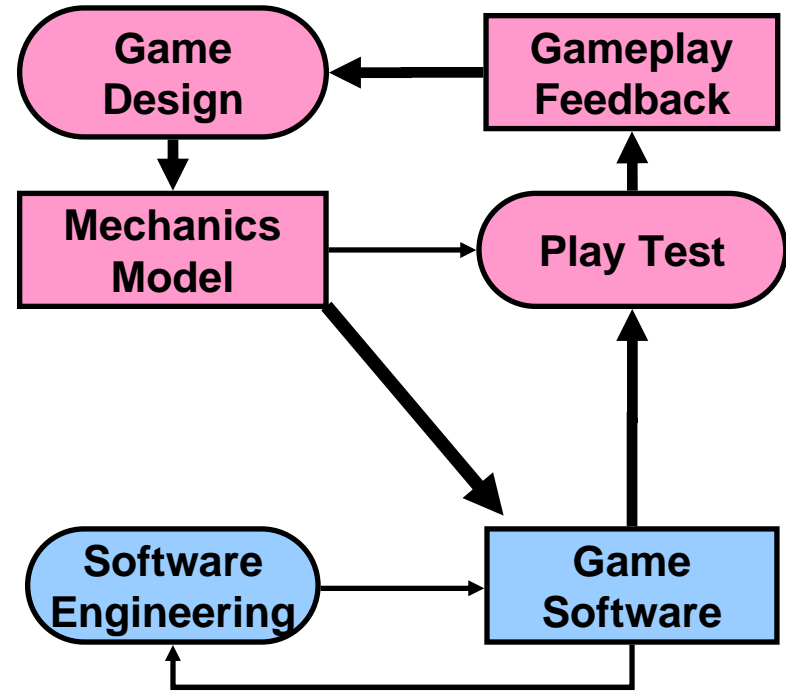
3. Live Adaptations

- We make MM embeddable in game software and modifiable at run-time
- We provide the embeddable MM Library and language extensions for modifications
- Helps experiment and play test for gaining immediate feedback



Why Live Adaptations?

- **Speed-up** of game design
 - reduced game design iteration times
 - immediate feedback in play testing
- **Quality and Productivity** improvement opportunities
 - short iterations → more improvements possible
 - software reuse → lower chances for new bugs



AdapTower: Workshop Teaser

- Creeps spawn into the world
- Two kinds of buildings
 - Towers
 - kill creeps
 - produce essence
 - Bases
 - catch essence
 - produce gold
- Players can spend gold
 - Buy a tower for 20 gold
 - Buy a base for 50 gold



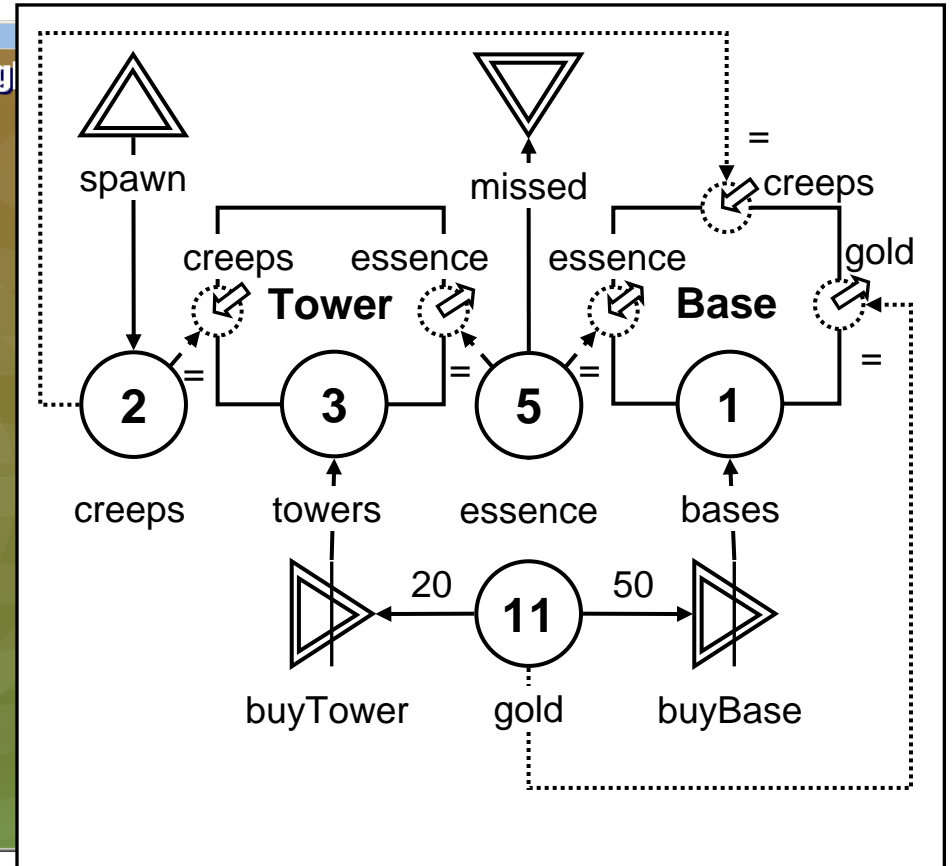
Workshop Teaser: Demo



AdapTower: Internal Mechanics



Let's count the number of creeps, towers bases, essence and gold



Visual Micro-Machinations run-time state

Workshop

- Goals
 - Share information about Micro-Machinations
 - Demonstrate interactive game adaptations
 - Think about practical applications
 - Discuss limitations
 - Discuss future directions

Conclusion

- Micro-Machinations Library
 - Open source
<https://github.com/vrozen/MM-Lib/>
- Collaboration with IC3D Media
 - Loren Roosendaal
 - Early quality assurance in software production
- Future work
 - Generalize results Micro-Machinations
 - Procedural Game Mechanics and Gameplay

