

Game Engineering

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Agenda

- Motivation
- What is Game Design?
- Roles
- What is Game Engineering?
- Genres
 - Action Games
- Conclusion
- Perspective

Motivation

- General interest in game development
- Bridge the gap between art (game design) and technology (programming)
- Emerging industry
- Only few established processes
- Project and master thesis topic

What is Game Design?

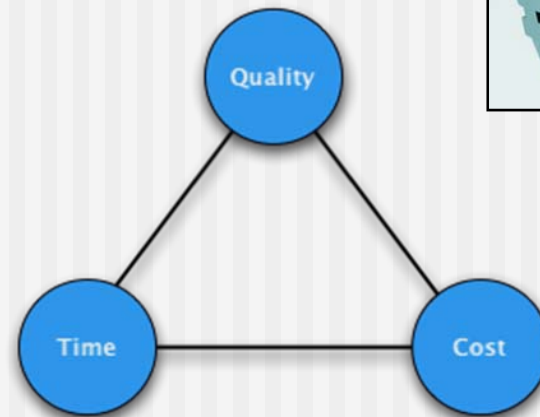
- Creation of ‚Entertainment Software‘.
- Theoretical conception of game idea, game world, rules and characters.
- Result: game design document
- But often also: prototypes
- Game design is *interdisciplinary*

Roles

- Many Roles
 - Producer
 - Designer
 - Artists
 - Programmer
 - Tester

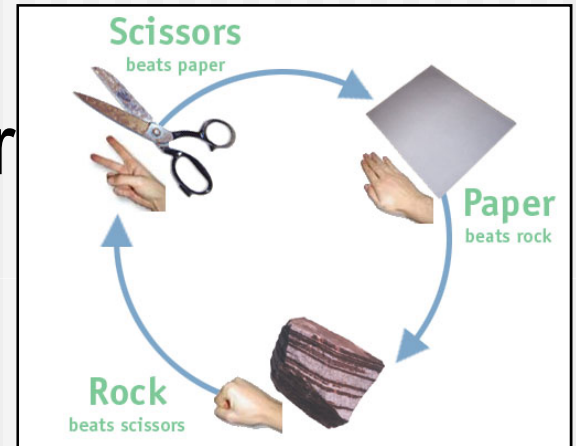
Roles (1) Producer

- Management of Projects
- Planning, controlling and execution of the project in a profit-producing manner
- Different types
 - Line Producer
 - Associate Producer
 - Executive Producer



Roles (2) Designer

- Design the game idea
- Different types of designer
 - Lead Designer
 - Core Mechanics Designer
 - Level/Mission Designer
 - Story and Dialogue Writers



Roles (3) Artists

- Emerging part of game design
 - Art Director
 - Concept Artist
 - 2D Artist / Interface Designer
 - 3D Modeller
 - Character Modeller
 - Texture Artist
 - Animator / Motion Capture
 - Audio
 - Voices / Sound Effects / Music

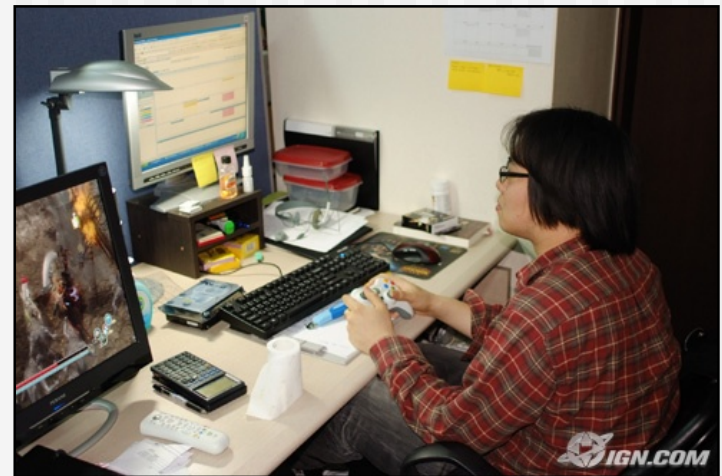


Roles (4) Programmer

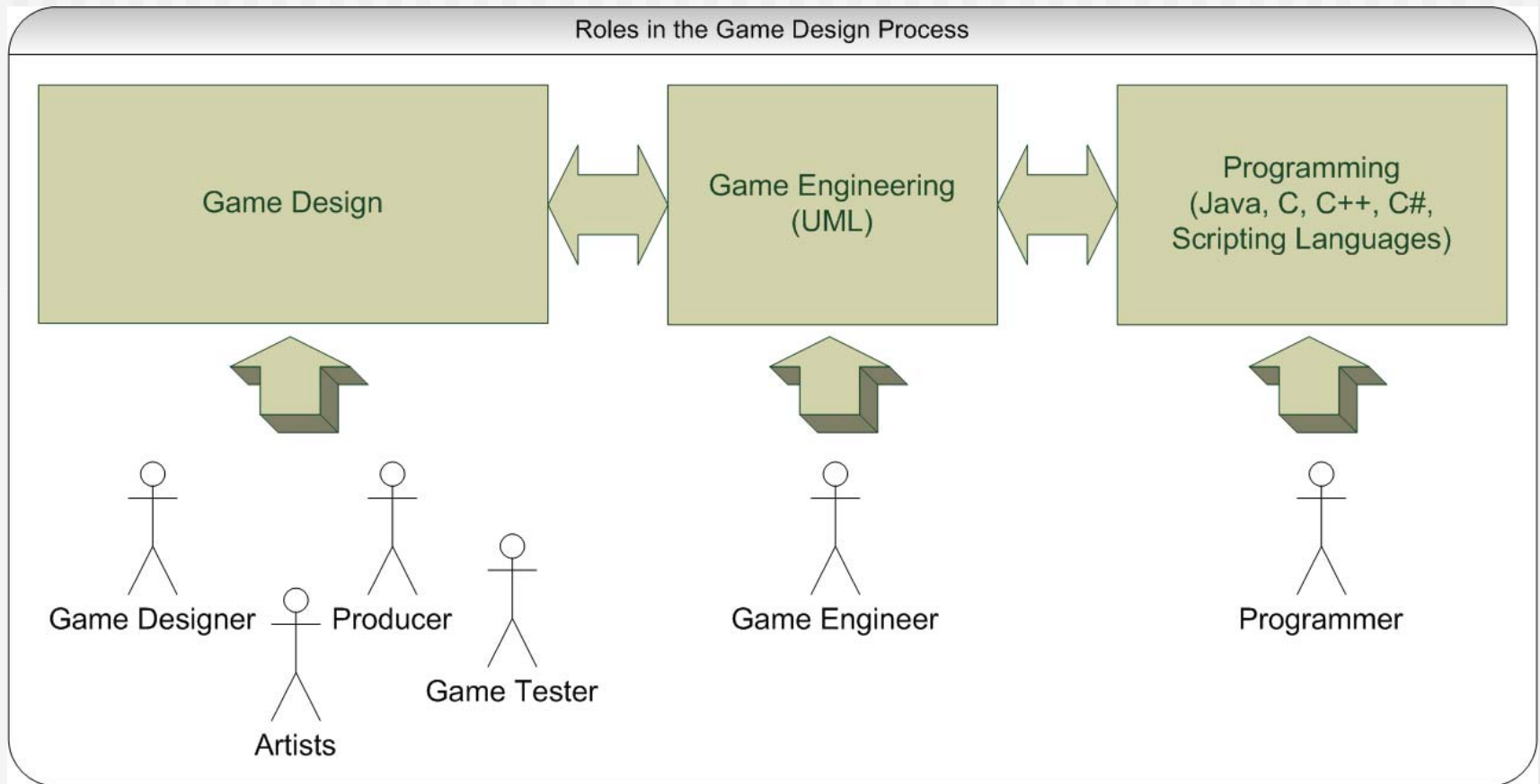
- Code all the design work
- There is a lot of different code to be written
 - Technical Director
 - Lead Programmer
 - Game Mechanics Programmer
 - 3D Graphics Programmer
 - Artificial Intelligence Programmer
 - User Interface Programmer
 - Audio Programmer
 - Tools Programmer
 - Level Editor Programmer

Roles (5) Tester

- Testing the game / parts of the game
 - Software Tester
 - Beta Tester
 - Quality Assurance



Roles Overview



What is Game Engineering?

- Technical creation of ,Entertainment Software‘.
- Practical construction of game idea, rules, characters and game world.
- Result: Video game
- Game Engineering has an interface to game design.
- Interface depends on genre of game

Adventure Games



Adventure Games

- Game world sets

- Characters
- Objects

- Core Mechanics

- Story
- Puzzles
 - To solve by manipulating and combining objects and characters

Strategy Games



Strategy Games

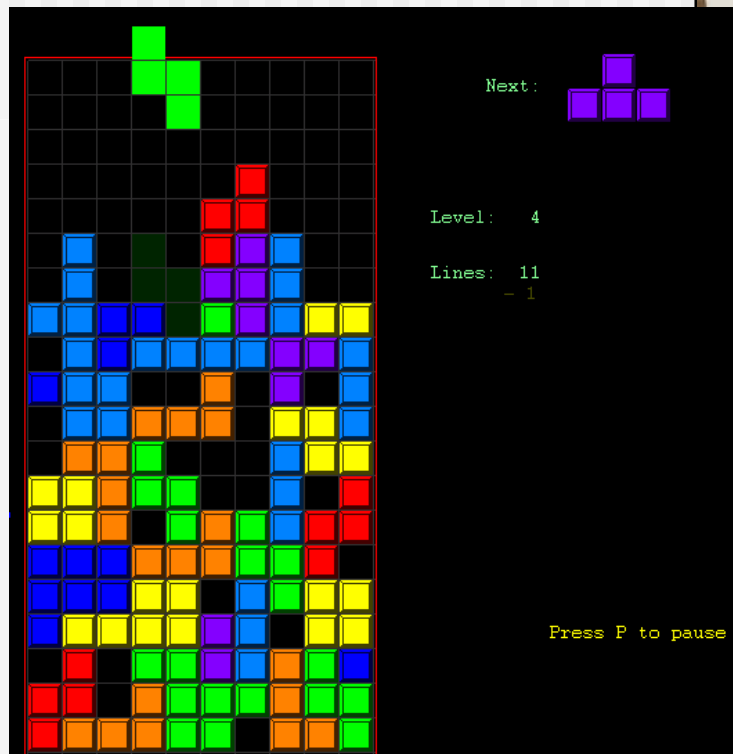
■ Game world

- Units
 - movable, stationary, transporting, fighting, scouting, patrolling, constructing ...
 - Agents
- Factories
 - To produce units

■ Core Mechanics

- Fighting
- Alternatives:
 - Diplomacy, Espionage, Religion, Culture ...

Puzzle Games and Artificial Life



Puzzle Games and Artificial Life

■ Puzzle Games

- Puzzle solving
- Appear in other genres

■ Artificial Life

- Person, Pets ...
 - Fulfil needs
 - Train skills
 - Expand personalities

Construction and Management Games



Construction and Management Games

■ Game world

- Environment

- Buildings, parks, factories, streets, railways, river, seas ...

- Characters

- Consultants
 - Citizens, peasants, workers ...

■ Core Mechanics

- Simulation of market, population, economy, production, disaster, culture, entertainment ...

Sports Games



Sports Games

■ Game world

- Environment
 - Fields, courses, courts ...
- Characters
 - Player, opponents, teams

■ Core Mechanics

- Physics
 - Simulation of body movement to weather conditions
- Game rules

Vehicle Simulation



Vehicle Simulation

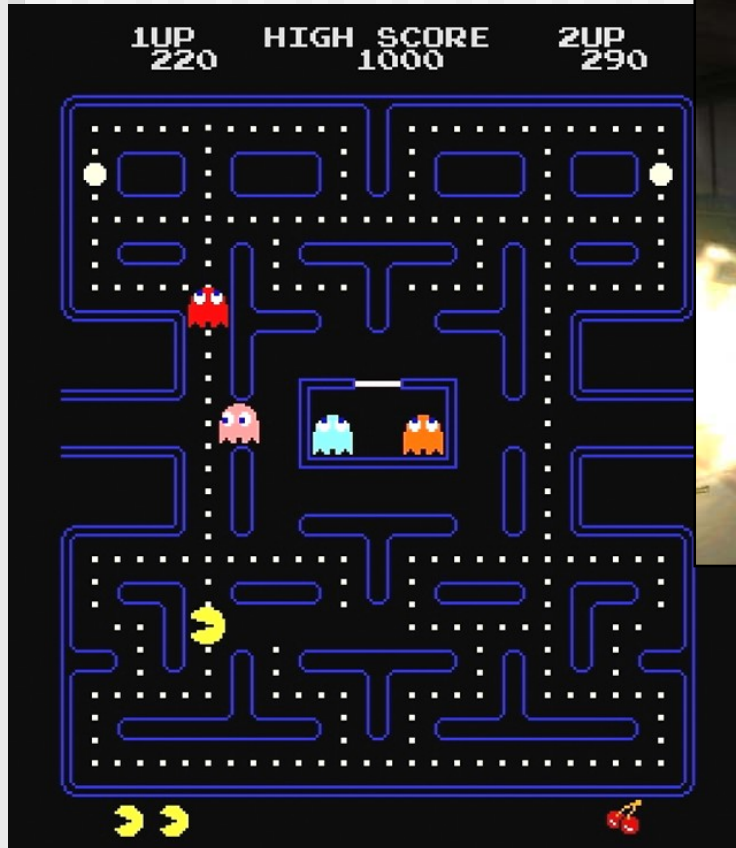
■ Game world

- Environment
 - Race Courses, particular or whole representation of the earth
- Vehicles
 - Cars, Airplanes, Trains, (Space-)Ships ...

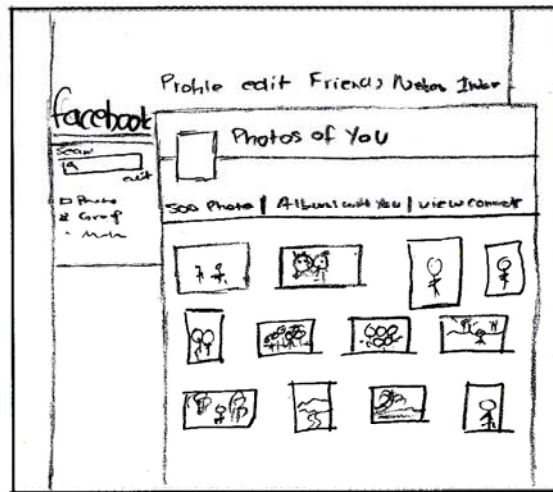
■ Core Mechanics

- Physics

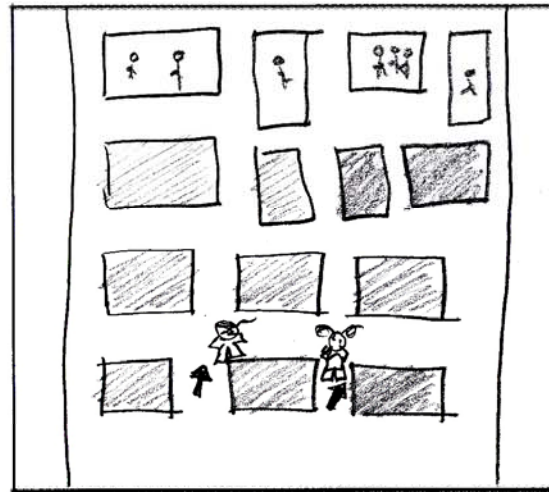
Action Games



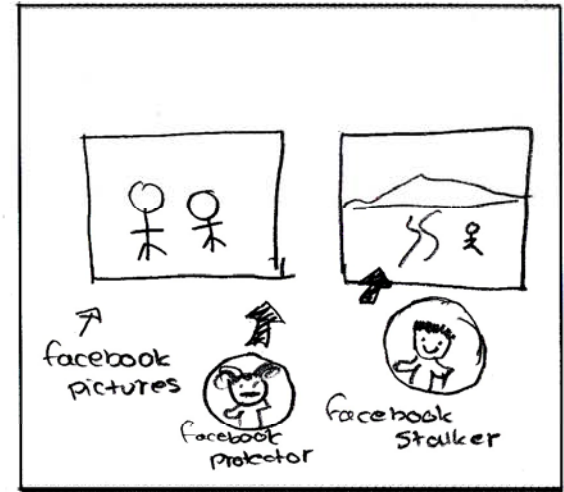
Action Games - Example Storyboard



Using Facebook's Photo page we will create the layout of our game.



Aim of the game is to steal as many pictures as you can while avoiding the distraction from the "facebook" protector.



Facebook Stalker becomes happy when he successfully steals a facebook picture.

Action Games - Elements

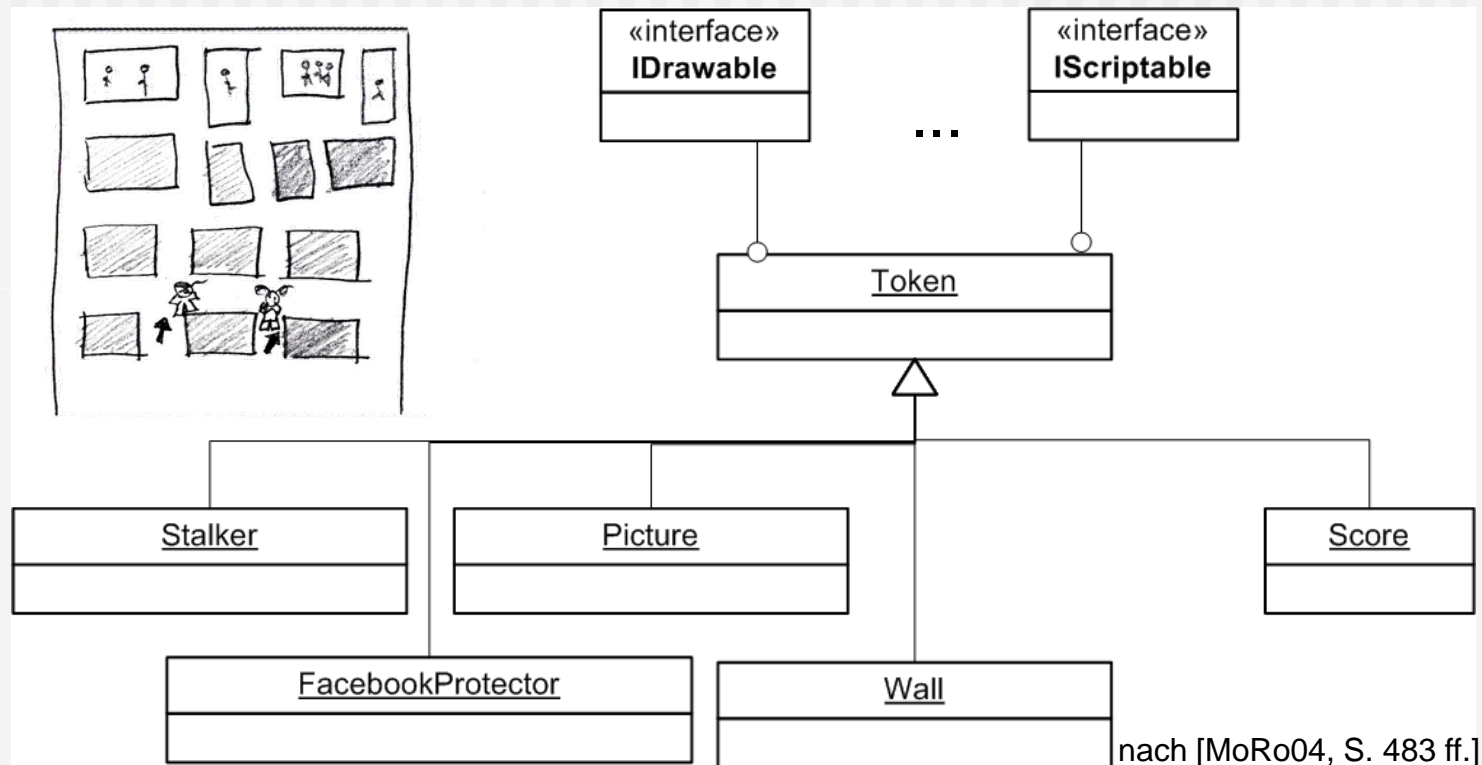
■ Game world

- Levels
- Enemies (mobile, stationary, active and passive)
 - Spawnpoints / Generator
- Checkpoints
- Teleporter / Level Warps / Level Exit
- Collectibles (Keys, Power-Ups, ...)

■ Core Mechanics

- Lives / Energy
- Time Limit
- Score

Action Games - Identifying Tokens



Die ‚Objekte‘ eines Spiels werden Token genannt,
um die Verwechslung mit C/C#-Objekten zu vermeiden [MoRo04]

Action Games - Interaction Matrix

	Stalker	Protector	Picture	Wall
Stalker	X			
Protector	Death Event	X		
Picture	Score Event	-	X	
Wall	Collision Event	Collision Event	-	X

nach [MoRo04, S. 484 ff.]

- Token Interaction
- Many tokens
 - high complexity
- Good overview
- Easy to understand

Action Games - Interaction Matrix

		Stalker	Protector	
Stalker	X			
Protector	Death Event	X		
Picture	Score Event	-	X	X
Wall	Collision Event	Collision Event	-	X

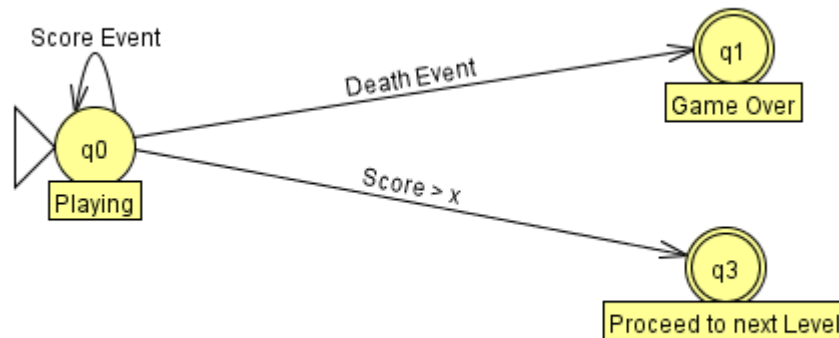
IF (stalker collides with protector)
THEN die AND show 'game over' screen;

IF (stalker moves over picture)
THEN show picture AND score++;

IF (stalker collides with wall)
THEN stop movement into this direction

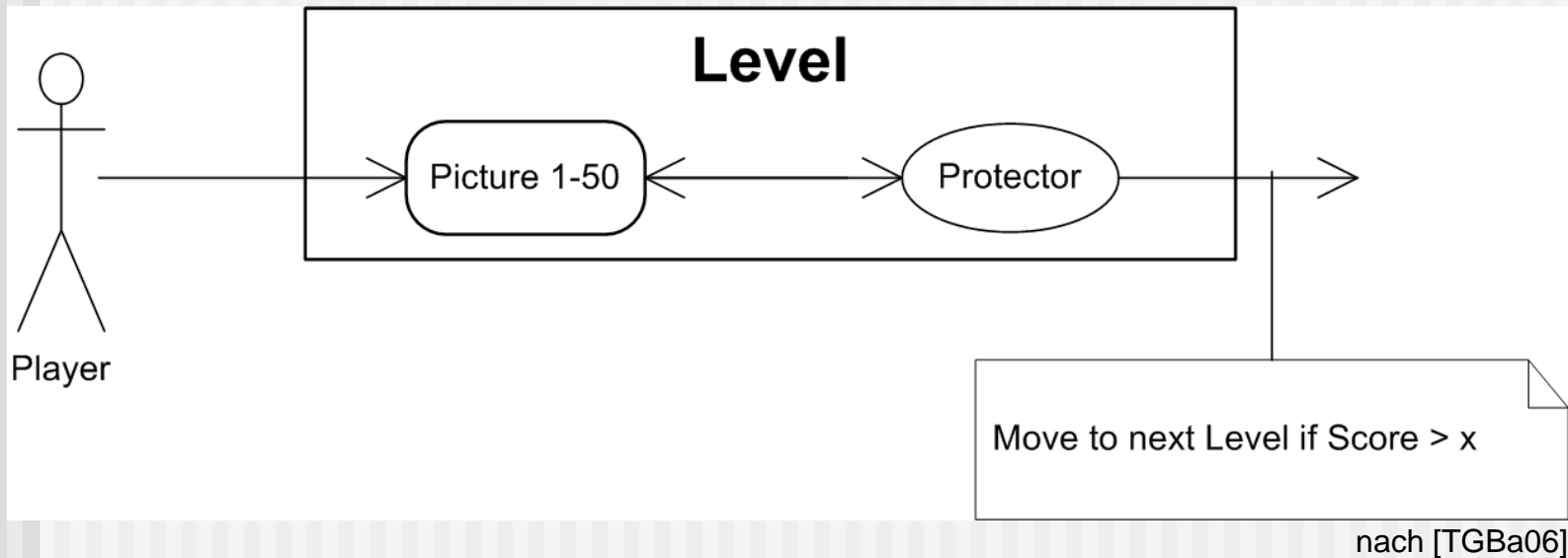
nach [MoRo04, S. 484 ff.]

Action Games - Finite State Machine



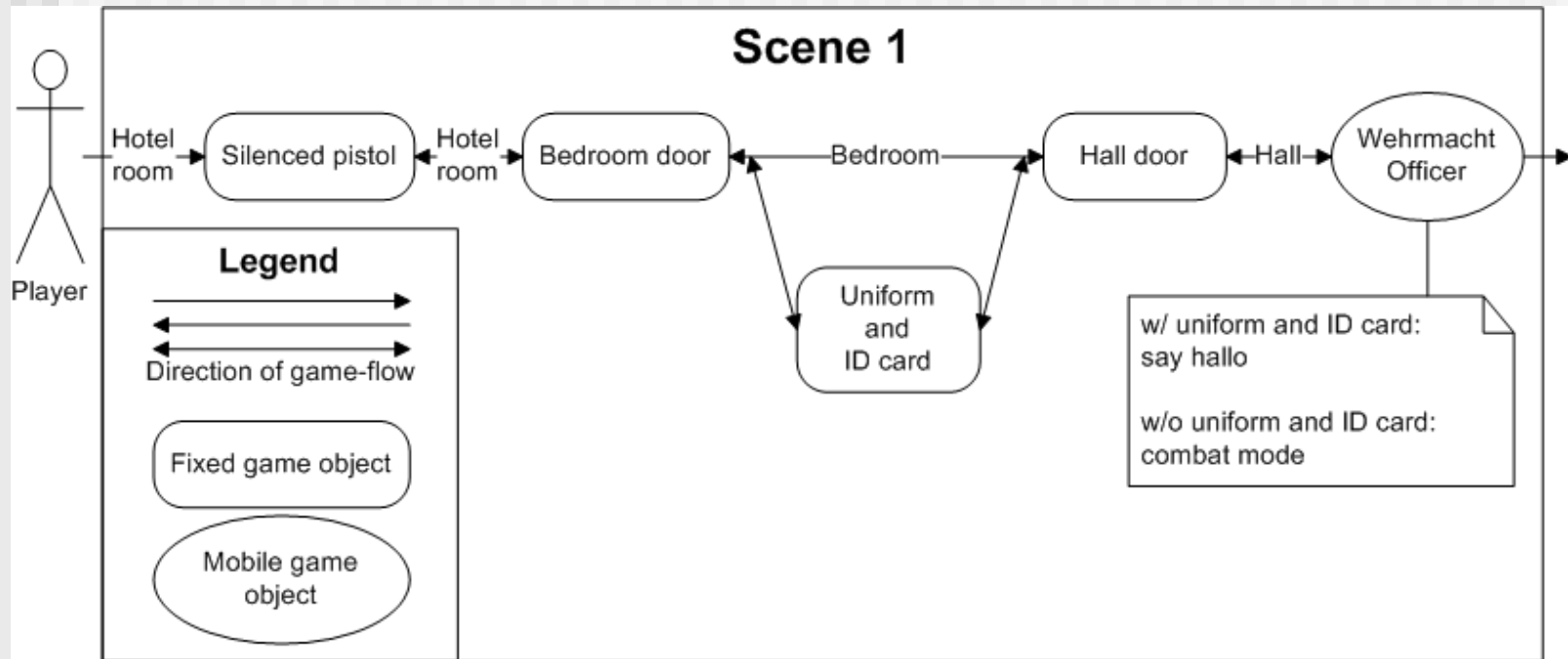
- Token Behaviour
- Detailed view
- Hierarchical
- Very formal
- Good in combination with interaction matrix

Action Games - Game Flow Diagrams (1)



- Game flow, scripting and story telling
- Hierarchical
- Easy to understand
- Easy to translate into programming language

Action Games - Game Flow Diagrams (2)



aus [TGBa06]

Action Games - Game Flow Diagrams (3)

```
IF player moves over silenced pistol
    THEN add silenced pistol to inventory
//Bedroom door:
IF player presses activate button
    THEN open door
//Uniform and ID card:
IF player presses activate button
    THEN add uniform and ID_card to inventory
//Hall door
// ...see above... door opening
//Wehrmacht officer:
IF uniform and ID_card activated
    THEN play sound ,Guten Tag Herr Oberfeldwebel`
    ELSE combat mode
```

Conclusion

- Many aspects of games to analyze
 - Audio, graphic, mechanics, scripting, user interface, artificial intelligence
 - Different genres are different 'domains'
- UML is applicable to games
 - But should be adapted
 - Different genres need different diagrams
 - Could designer use UML?

Perspective

- Modelling of intelligent agents
 - Facade
 - Only attributes to set
- Automation from the design to the code
 - Storyboarder tool?
- Upcoming project with media designers

Ende!

Vielen Dank für Eure
Aufmerksamkeit.

Literature Index

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