Gamification in Software Engineering

Prof. Dr. Ulrike Hammerschall
University of Applied Sciences Munich
Department of Mathematics and Computer Science

About me

- Work experience as a software engineer at sd&m (now Capgemini).
- PhD at Technical University Munich (TUM).
- Since 2009 at University of Applied Sciences in Munich.
- Teaching:
  - Programming (in Java), Software Engineering, Requirements Engineering
- Research:
  - Requirements Elicitation, Process Models, Agile Software Development …
The question ...

Can we use gamification to improve the software development process?

Gamification in the Gartner hype cycle - is the hype over?
Topics

- What is gamification?
- Dynamics, mechanics and components
- Why gamification works
- The gamification process

What is gamification and what is it for?

„The use of game elements and game-design techniques in non-game contexts.“

[Werbach, 2012]

- Motivate behaviour change
- Motivate engagement
- Motivate learning processes
- Motivate problem solving (in teams)
Stack Overflow – ask, help … and get recognized

http://stackoverflow.com/

Planning Poker – estimate user stories

Game duration up to three rounds per user story
The Quality Language Game – improve application quality

Find localization bugs in Graphical User Interface


Topics

- What is gamification?
- Dynamics, mechanics and components
- Why gamification works
- The gamification process
Game elements - Dynamics

Dynamics: large-scale objectives of the game

- Constraints
- Emotions
- Narrative
- Progression
- Relationships

Game elements - Mechanics

Mechanics: basic processes to drive the game

- Challenges
- Chance
- Competition
- Cooperation
- Feedback
- Resources
- Rewards
- Transactions
- Turns
- Win States

Department of Computer Science and Mathematics
### Game Elements - Components

<table>
<thead>
<tr>
<th>Components: basic building blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievements</td>
</tr>
<tr>
<td>Collections</td>
</tr>
<tr>
<td>Leaderboards</td>
</tr>
<tr>
<td>Social Graphs</td>
</tr>
</tbody>
</table>

### Game elements - EpicWin

<table>
<thead>
<tr>
<th>Dynamics: large-scale objectives of the game</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationships</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanics: basic processes to drive the game</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Components: basic building blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collections</td>
</tr>
<tr>
<td>Leaderboards</td>
</tr>
</tbody>
</table>
Game elements – Stack Overflow

**Components**: basic building blocks
- Leaderboards
- Levels
- Badges
- Points

**Mechanics**: basic processes to drive the game
- Feedback
- Rewards

**Dynamics**: large-scale objectives of the game
- Constraints
- Progression

Game elements – Planning Poker

**Components**: basic building blocks
- Combat
- Teams
- Points

**Mechanics**: basic processes to drive the game
- Feedback
- Turns
- Cooperation

**Dynamics**: large-scale objectives of the game
- Constraints
- Relationships
Game elements – Quality Language Game

Topics

- What is gamification?
- Dynamics, mechanics and components
- Why gamification works
- The gamification process
Motivation – a driver for gamification

Positive intrinsic motivation: I really want to read this book.

Positive extrinsic motivation: I want to read the book, because I want to impress my friends.

Amotivation: I don’t care about reading or not this book.

Negative intrinsic motivation: I don’t want to read this book.

Negative extrinsic motivation: I have to read this book, or I will fail class.

Gamification helps to increase motivation.

Self-Determination Theory – a theory on intrinsic motivation

- SDT: Human beings are inherently proactive with a strong desire to growth.
- Precondition is a feeling of
  - Competence
  - Autonomy
  - Relatedness
- Intrinsic motivators!

[Ryan, 2000]
Game elements as intrinsic motivators

- Competence: learning, self-improving
  - progression
  - rewards, challenges, feedback
  - quests, points, badges, levels

- Relatedness: interaction, sharing, social connections
  - relationships
  - competition, cooperation
  - leaderboards, teams
  - sharing in social networks

- Autonomy: control, choice, decisions
  - free choice to enter the game.
  - free choice how to play the game.
  - different story lines based on decisions.

Back to my question ...

Can we use gamification to improve the software development process?
… and a possible answer

- Whenever a high motivation would improve results and the task that has to be done is not motivating by itself.
  - find and validate the best requirements for your system.
  - improve the quality of your artefacts (software / documentation).
  - find in a team the best solution for a problem that cannot be solved by automation.
  - encourage team building and working in a team.
  - share and improve knowledge in a team.
  - …

**Topics**

- What is gamification?
- Dynamics, mechanics and components
- Why gamification works
- The gamification process
Things that good games do well

- Encourage problem solving
- Sustain interest from novice to expert to master
- Break down challenges into manageable steps
- Promote team work
- Give players a sense of control
- Personalize experience to each participant
- Reduce fear of failure
- Cultivate a confident and optimistic attitude

Process to gamification [Werbach, 2012]

- Define your (Business) goals
- Delineate target behaviour
- Describe your players
- Devise your activity cycles
- Don’t forget the fun
- Deploy the tools
A few thoughts on gamification

- Gamification is not only about points, badges and leaderboards.
- Gamification can be a powerful instrument if properly applied.
- Gamification can be discouraging if used in a wrong way.
- Any game – even the best - gets boring after a while, if there are no changes.
- Use game elements but don't talk about it!

Research into human motivation demonstrates that people will feel motivated by well-designed game features.

[Werbach, 2012]
A good start to learn more about gamification...

References

Thank you for your attention!