Goal Models for Acceptance Requirements Analysis and Gamification Design

Luca Piras, Elda Paja, Paolo Giorgini and John Mylopoulos

University of Trento, Trento (Italy)
{luca.piras, elda.paja, paolo.giorgini, john.mylopoulos}@unitn.it

36th International Conference on Conceptual Modeling (ER-2017)
November 7, 2017, Valencia (ES)
Outline

Software Acceptance and Gamification

Agon: an Acceptance Requirements Framework

Agon in Action: the PACAS Case Study

Conclusions
Software Acceptance and Gamification

Agon: an Acceptance Requirements Framework

Agon in Action: the PACAS Case Study

Conclusions
Gamification

- “The use of game design elements in non-game contexts” [Deterding ’11]

Gamification concepts:
- Core:
  - Points
- Badges
- Leaderboards
- Advanced:
  - Levels, paths, challenges, stories, feedback, progress, ...

Gamification Best Practices, Guidelines, Design Patterns, etc.

Case studies:
- [Hoh ‘12]
- [Kazhamiakin ‘15]
- [Cowley ‘11]
- [Walsh ‘12]

Success cases:
Gamification Engineering

- Complex: Incentive Mechanisms
  - Which gamification concepts should I use?
  - Which parts are to be gamified?
  - How could I put together gamification concepts?
  - Which are the best practices/design patterns?

User Characterization and Psychological Factors

- Heterogeneous professionals:
  - How could I motivate particular kinds of Users/Players?
- Time-consuming
- Not automatized
- High-costs -> Expensive
What do we need?

- Models (acceptance and gamification knowledge)
- Methodology: A Systematic Acceptance Requirements Analysis Based on Gamification
Outline

Software Acceptance and Gamification

Agon: an Acceptance Requirements Framework

Agon in Action: the PACAS Case Study

Conclusions
Agon: an acceptance requirements framework

A special Class of Quality Requirements [Li ‘14] -> Acceptance Requirements:

\[ \text{Acceptance} [\text{Functions, Participants}] \geq N\% \]

The framework offers a metamodel for acceptance requirements, gamification solutions and the links in-between

- **Acceptance model** – considers psychological factors and how to address them
- **Tactical model** – links acceptance problems to gamification solutions
- **Gamification model** – describes gamification solutions along multiple dimensions, e.g., user profiles, gaming concepts, best practices/guidelines
Goal Models for Acceptance Requirements and Gamification

- https://pirasluca.wordpress.com/home/acceptance/
- Goal Modeling techniques (NFR Framework) [L. Chung, B. Nixon, E. Yu, and J. Mylopoulos ‘12]

**Acceptance model** – encompasses several models from the literature:
- Unified Theory of Acceptance and Use of Technology (UTAUT),
- the Technology Acceptance Model (TAM2),
- the Theory of Reasoned Action (TRA),
- the Theory of Planned Behavior (TPB),
- the Combined TAM and TPB (C-TAM-TPB),
- etc.

An extract of the model
Metamodels

- https://pirasluca.wordpress.com/home/acceptance/

Gamification model:
- point systems (i.e., experience, redeemable, skill, karma, reputation and training points), badges, leader–boards, levels, paths, gamified training (i.e., suggestions, tricks, tours, tutorials, training paths), gamified market (i.e., rewards and market policies of redeeming, making gifts, purchasing), game roles, powers, unlockable powers, etc.
- best practices/guidelines
Goal Models for Acceptance Requirements and Gamification

- Tactical model:
captures alternative tactics for fulfilling acceptance requirements by using gamification requirements; provides our framework with enough flexibility to add alternative solution models (serious games model, tangible incentives model, ...)

- Context model - User Context Model and Context Dependant Rules:
critical user dimensions, adopted from the literature [6], [9], [17], [18], that in the real life make difference in the way of people reacting to acceptance and gamification techniques
Metamodels and the context model (2)

https://pirasluca.wordpress.com/home/acceptance/

- Statistics: 352 goals, 487 relationships (refinements, operationalizations, positive/negative contributions, …)
Gamification of Complex Systems

- Participatory Architectural Change Management in ATM Systems (PACAS) (http://www.pacasproject.eu/):

  - Innovation of current ATM procedures
  - A Decision-Making platform for Air Traffic Management (ATM)
  - Decision makers
  - Engagement

- Agreement
  - Security
  - Safety
  - Economic
  - Organizational
An extract from the PACAS Case Study

Challenges, Paths, Levels, Badges, etc.  

Acceptance[Functions, Participants] ≥ N%
Conclusions

- **Agon: an Acceptance Requirements Framework based on Gamification:**
  - Support for the requirements analyst
  - A Systematic Acceptance Requirements Analysis
  - Agon Meta-Model
  - Gamification Solutions

- **PACAS Case study:**
  - Gamification of the decision making PACAS Platform
  - Evaluations with Experts and Non-experts

- **Ongoing and future work:**
  - Evaluations with Experts and Non-experts
  - 5 case studies
References (1)


References (2)


References (3)


Thanks for your attention

Luca Piras
University of Trento, Trento (Italy)
https://pirasluca.wordpress.com/home/acceptance/
luca.piras@unitn.it