Making your semantic application addictive: incentivizing users!

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What is different about semantic systems?

- Semantic Web tools vs applications
  - Intelligent (specialized) Web sites (portals) with improved (local) search based on vocabularies and ontologies
  - X2X integration (often combined with Web services)
  - Knowledge representation, communication and exchange
What do you want your users to do?

• Semantic applications
  – Context of the actual application
  – Need to involve users in knowledge acquisition and engineering tasks?
    • Incentives are related to organizational and social factors
    • Seamless integration of new features
• Semantic tools
  – Game mechanics
  – Paid crowdsourcing (integrated)
Limitations of crowdsourcing

- Tasks and application domain (decomposable, verifiable, skills/expertise)
- Complex workflows need to integrate results from various crowdsourcing projects
- Overhead related to game interface design and further development
- Privacy concerns related to microtask platforms (anonymous crowd)
- Acceptance issues with games in a productive environment
Interplay of incentives and motivation achieves maximal results

• Focus on the actual goal and incentivize related actions
  – Write posts, create graphics, annotate pictures, reply to customers in a given time...

• Build a community around the intended actions
  – Reward helping each other in performing the task and interaction
  – Reward recruiting new contributors

• Reward repeated actions
  – Actions become part of the daily routine
What does motivate people then?
Theories of motivation *(latin move)*

Performance : \( f(\text{ability} \times \text{motivation}) \)
Incentives $\rightarrow$ Motivation $\rightarrow$ Performance

Content theories of motivation
- Need theories
- Herzberg’s “two factor” theory
- McClelland’s achievement-power-affiliation theory

Job characteristic approach
(Skill variety, autonomy, .. )

Psychological meaning:
Internal mental state pertaining to:
- initiation,
- direction,
- persistence,
- intensity and
- termination of behavior

Process Theories of motivation
- Reinforcement theory
- Goal setting theory
- Expectancy theory
- Organizational justice theory,
- .., .., ..
### Intrinsic / Extrinsic motivations

<table>
<thead>
<tr>
<th>Paper</th>
<th>Focus</th>
<th>Intrinsic Motivation</th>
<th>Extrinsic Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Enjoyment Based Motivation</td>
<td>Community Based Motivation</td>
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<td></td>
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<td>Immediate Payoffs</td>
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<tr>
<td>(Leimeister et al., 2009)</td>
<td>Idea Competition</td>
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<td>(Brabham, 2008)</td>
<td>Content Market</td>
<td>“Creative outlet”; “Fun”; “Produce [content] that I like”; “Passes the time when I am bored”</td>
<td>“Build a network of friends”</td>
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<tr>
<td>(Brabham, 2010)</td>
<td>Design Competition</td>
<td>-</td>
<td>“Love of community”; “Addiction to the community”</td>
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<tr>
<td>(Ipeirosits, 2010)</td>
<td>Mechanical Turk</td>
<td>“Fruitful way to spend free time”; “To kill time”; “Tasks are fun”</td>
<td>-</td>
</tr>
<tr>
<td>(Organisciak, 2008)</td>
<td>Crowdsourcing</td>
<td>Fun; Boredom; achievement (by the action); Interest (curiosity)</td>
<td>Charity; Academia; Participation (Social Human Interaction)</td>
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</table>

Table 1. Motivation constructs mentioned by a sample of related literature

Kaufman, Schulze, Veit (Mannheim University)
Types of motivations

<table>
<thead>
<tr>
<th>Motivations</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person</td>
<td>(embedded in structure, e.g., task, tools)</td>
<td>(additional to structure, external re-inforcements)</td>
</tr>
</tbody>
</table>

**Intrinsic**
(predispositioned in person, e.g., drives, needs, desires)

- Fun, joy, gaming, interest, satisfaction, self-actualization, self-reinforcement
- Social appreciation, reputation, love, trust, social capital, community support

**Extrinsic**
(additional to personal predispositions, extern re-inforcements)

- Usability, sociability, Design-for-fun, curiosity, community-building support
- Material/financial capital, money, rewards, prices, medals, credit points

*Our elaboration on motivation for contribution in FLOSS software (Insemtives.eu)*
So how do we incentivize a tool?
## A framework of analysis

<table>
<thead>
<tr>
<th>Goal</th>
<th>Tasks</th>
<th>Social Structure</th>
<th>Nature of good being produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication level (about the goal of the tasks)</td>
<td>High</td>
<td>High</td>
<td>Public good (non-rival non-exclusive)</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td></td>
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<tr>
<td></td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Participation level (in the definition of the goal)</td>
<td>Variety of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Clarity level</td>
<td>Identification with</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Required skills</td>
<td>Highly specific</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Trivial</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Common</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Hierarchical</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Private good (rival, exclusive)</td>
</tr>
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</table>
A framework of analysis

• You don’t have to be an expert in mechanism design to use it but you need to:
  – identify a set of games that better represents your situation
  – see recommendations in the literature
    • translate what economists do into concrete scenarios
    • assure that the economists’ proposals fit to the concrete situation

• Impacts of mechanism design:
  – HCI (interface and services) requirements
  – Process of interaction with the tool
  – Social implications and requirements
  – Backend requirement (data that needs to be stored)
Our approach:

Ideally: field \(\rightarrow\) desk \(\rightarrow\) lab \(\rightarrow\) field

A procedural ordering of methods to develop incentive compatible applications

1. **First phase**
   - Field and domain analysis

2. **Second phase**
   - Workshops
   - Interviews

3. **Third phase**
   - Data analysis & Requirements identification

4. **Fourth phase**
   - Prototype creation
   - HCI analysis
   - PD Workshops
   - Laboratory Field Experiments

5. **Fifth phase**
   - Prototype refinement
   - Incentivized tool

Site visits
Etnography
f2f interview
Questionnaires
Quantitative analysis

Participatory Design,
User Experience Design
Video/audio,
User Tests, Walkthroughs
Taste it! Try it!

A case study
Taste It! Try It! app

• Semantic Web and Social Web Recommendation System
  – Focus on venues: restaurants, cafes, pubs...

• Goal
  – Enable users to contribute to semantic content creation
    • using both a mobile and WWW interface
  – Provide users with personalized semantic enabled recommendation process
Scenario

A user goes to a restaurant...

Points to consider?

**Development of a tool** and appropriate algorithms/mechanisms as well as integration of **motivational dimensions** within the application.
### 1st and 2nd phase: Field and domain analysis

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<td></td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>Hierarchy neutral</td>
<td>Private good</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td></td>
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<tr>
<td>Low</td>
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<tr>
<td>Clarity level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>Hierarchical</td>
<td>Common resource</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td></td>
<td>Club good</td>
</tr>
</tbody>
</table>

**Tasks**
- Variety of
- Specificity of

**Social Structure**
- Hierarchy neutral
- Hierarchical

**Nature of good being produced**
- Private good
- Public good (non-rival non-exclusive)
- Common resource
- Club good

**Diagram**
- Field and domain analysis
  - Workshops
  - Interviews
  - Both management and computer science competences are required
  - Users are involved
  - Quality, innovation, performance, and technical constraints are set
  - Relationships are able to use the prototype
  - The prototype is finalized and the toy is finally sold
3rd phase: Prototype creation
4th phase: analysis and refinement

- Usability – e.g., ease of creation, background processing
  - Semantically enhanced but still user friendly app on a mobile device
- Social aspect – keeping a user entertained
  - Facebook, badges, points
- Additional benefits – personalized semantic-aware recommendation process
4th phase: analysis and refinement (1)

- Two experiments – 150 and 30 students
- Scenario:
  - Granting an access to the application (mobile, WWW)
  - During the registration process, students were randomly assigned to one of five groups we created - each group had been presented with different information views
  - During the experiment, an extensive logging procedure has been used, and all interactions with the application were stored
  - At the end of the testing period, all users were asked to answer a set of questions
4th phase: analysis and refinement (2)

• Hypothesis
  – Points vs. Badges?
  – No information about others vs. Information about others
    • Neighborhood, median or maybe the entire ranking?

• Division of participants into a number of treatments with different information visible

• Conclusions
  – Presenting information on performance of peers helps to increase the number of reviews
  – Within the treatments with badges individuals tend to contribute more compared to treatments without assignment of badges
To what extent was it fun to use the application?

How much fun was it to use the application?

- 1 (no fun at all): 2%
- 2 (fun to some extent): 8%
- 3 (medium fun): 18%
- 4 (much fun): 25%
- 5 (lots of fun): 47%

How much fun was it to use the application?

- 1 (no fun at all): 5%
- 2 (fun to some extent): 32%
- 3 (medium fun): 27%
- 4 (much fun): 36%
- 5 (lots of fun): 0%
Open question – What was the most appealing aspect of the application?

- Badges and ranking (50% of students who have seen it)
- Assigning stars to places I like/dislike
- Expressing own opinions
- Interface – mobile, location
- Motivation to visit restaurants
- ...
Demo – a mobile and WWW interface
What should you take home?
10 ways to make your app addictive!

1. Design your App Useful: Purpose, Impact, Meaning
2. Design your App for reaching your goals: Goals, Utility
3. Design your App Usable: Effectiveness, Efficiency, Satisfaction
4. Design your App Enjoyable: Joy of Use, Pleasure
5. Design your App for Visibility: Identity, Belonging, Status, Reputation
6. Design your App Sociable: Community, Contribution, Interaction
7. Design your App Valuable: Personal Values, Egoism, Altruism, Collectivism
8. Design your App Explorative: Experiencing, Testing, Trying
9. Design your App Flexible: Adaptability, End User Development
10. Design your App in a Participatory Way: User-centered, Needs-Oriented, Practice-Based
THANK YOU