Social Threats and the New Challenges for Requirements Engineering

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Outline

- Social computing: a viewpoint
- The new wave of social threats
- New challenges for Requirements Engineering
Social computing: a viewpoint
The social layer

- Computing heavily relies on technical layers
  - To simplify the engineering of complex computing artefacts
  - e.g. network stacks, architectures

- People use computing artefacts to interact with other people
  - A social layer virtually exists on top of technical layers!
  - However, such layer is not part of current computing paradigms
The social layer exemplified

Jim places a bid in an eBay auction

Jim's PC -> eBay server -> Auctioneer's PC

HTTP request/response

Technical layer

I will pay 10€ for the book you are selling on eBay (auction ID xyz)

Social layer
Social computing

- We understand social computing as a computing paradigm founded upon the social layer

- Social computing is conceived in terms of social primitives
  - Roles, agents, and commitments
  - Trust and reputation
  - Identity

Example: Agent Jim playing role buyer takes the commitment to sell a book by Mark, playing seller, only if Jim trusts Mark and has proofs of the authenticity of the seller's website
The new wave of social threats
Social threats

- Technical threats affect technical layers
  - By exploiting vulnerabilities: DDoS, virus & worms, etc.
- On the other hand, social threats
  - Affect social relationships and artefacts
  - Are enacted via social mechanisms

Many social threats are not new, but they will become of utmost importance with the advent of social computing!
## Social threats (1)

<table>
<thead>
<tr>
<th>Name</th>
<th>Affects</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1. Fake reporting</td>
<td>Reputation</td>
<td>Jim rates Mike as a bad seller even if Mike has delivered the goods on time</td>
</tr>
<tr>
<td>T2. Decreasing reputation</td>
<td>Reputation</td>
<td>Jim is waiting for some service to be delivered by Mike; however, Mike's reputation is becoming lower and lower</td>
</tr>
<tr>
<td>T3. Lack of trust</td>
<td>Interaction</td>
<td>Mike offers a service to the general public. Jim decides to take such service; however, since Mike does not trust Jim, he does not want to interact with Jim</td>
</tr>
</tbody>
</table>
## Social threats (2)

<table>
<thead>
<tr>
<th>Name</th>
<th>Affects</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4. Untrusted delegation</td>
<td>Trust</td>
<td>Jim delegates some service to Mike; Mike delegates such service to Laura. Jim does not trust Laura</td>
</tr>
<tr>
<td>T5. Dissolved redundancy</td>
<td>Reliability</td>
<td>Jim relies on Mike and Tony for the redundant delivery of a service. Both Mike and Tony delegate the task to Laura.</td>
</tr>
<tr>
<td>T6. Incompatible laws</td>
<td>Compliance</td>
<td>Mike deploys a service that complies with privacy laws. However, stricter laws are introduced and, now, the service is not compliant anymore</td>
</tr>
</tbody>
</table>
New challenges for RE
New challenges for RE

- Requirements Engineering (RE) is about eliciting, analysing, and specifying requirements for (software) artefacts

- Which are the artefacts these threats introduce?
  - Engineering requirements for these artefacts will be the challenge!
  - These challenges are not only for RE, but also for later stages in Software Engineering
# Challenges for RE (1)

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Addressed threats</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trustworthiness management systems</td>
<td>T1, T2</td>
<td>Robust mechanisms to compute trustworthiness of actors based on opinions by peers, compliance, certificates.</td>
</tr>
<tr>
<td>Service interface specification and monitoring</td>
<td>T4, T5</td>
<td>Represent the commitments the provider makes to the consumer while ensuring flexible negotiation, access control policies, accountability, compensation rules</td>
</tr>
</tbody>
</table>
# Challenges for RE (2)

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Addressed threats</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptation mechanisms</td>
<td>T2, T5</td>
<td>Logically distributed adaptation, from the perspective of a single agent; social threats trigger adaptation; incremental planning to deal with volatility</td>
</tr>
<tr>
<td>Early warning and response mechanisms</td>
<td>T2</td>
<td>Enable software to prevent bad events (e.g. via risk assessment) and switch to a different configuration</td>
</tr>
</tbody>
</table>
### Challenges for RE (3)

<table>
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<tr>
<th>Challenge</th>
<th>Addressed Threats</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law representation and compliance</td>
<td>T6</td>
<td>Software shall be able to understand and check compliance with laws (e.g. data confidentiality restrictions). Also, enforcement is a hot topic</td>
</tr>
<tr>
<td>Identity management systems</td>
<td>T1, T3</td>
<td>Develop robust identity management systems so unequivocally bind software systems to an accountable legal entity</td>
</tr>
</tbody>
</table>
Conclusions

- Social computing is centred around the **social layer**
  - The social layer captures the **business meaning of computing**
- **Social threats** will be pervasive
  - We presented/reviewed some of them
- These threats originate new challenges for RE
  - Resulting in **new artefacts to design**
Thank you!

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