Architectural Approach for Quality and Safety Aware HealthCare Social Networks

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Problem: Privacy and Information Quality Concerns

“41% of e-patients say their most recent inquiry had no impact, 44% say it had a minor impact.”. *The Social Life of Health Information, PEW Survey 2011*

Several quality and safety limitations in online SNS exist: lack of alignment clinical practice guidelines, accuracy, misinformation, accessibility and readability of privacy policies (Weitzman, 2012)

Objective

The objective of the paper is to contribute to the architectural analysis and development of online SNS, by formally addressing information quality and privacy aspects.
Materials and Methods

Any social system - and its network of interrelations - can be analyzed as a real world system; therefore it is possible to formally model its architecture.

The Generic Component Model (GCM), After Blobel (2009)
1. Revision of privacy policies (national/international)
   - Examples for privacy and safety policies were found in the literature (Web, some Social Media policies for Employees)
     - Components: access control, privacy/confidentiality, protection against inappropriate use of information, users responsibility.
   - Detailed rules: [www.tudiabetes.com](http://www.tudiabetes.com) policy (25,132 members)

2. Creation of a Basic Policy Document, Components, rules
1. Revision of privacy and safety policies, frameworks, criteria, metrics (national/international)
   - eEurope 2002: Transparency, authenticity, privacy, updating, accountability, and accessibility.
   - HONcode Web 2.0, Tools
   - Professional associations: AMA, APHA
   - Quality criteria: NLM, CDC, HealthTrust, Projects: Film Trust[24], Trust Mail[25], Advogato.

2. Define Basic IQ Policy (Principles, Criteria/Metrics)
   - Credibility, completeness, relevance, readability (presentation)

3. Validated with a Domain Expert (Public Health)
Development Process Dimension: Business, Information, Computational VP

- **Business Modeling:**
  - Online SN, health promotion and disease prevention University Medical Service (12700 potential users)

- **Information Modeling:**
  - A needs assessment (181 responses) on interest topics:
    - Nutrition (69%), sexually transinfections (62%), contraception (62%), gastritis (61%), breast cancer (54%) and early childhood intervention (50%)
  - Selection of initial structure and content (6 Groups, 50 Blogs) (+ QI criteria)

- **Computational Modeling:**
  - Service Oriented Architecture (SOA).
  - Basic services: user’s profile, registration and invitation management, Blogs, Chat, Groups, Twitter and e-mail.
Architecture Implementation
(Platform Specific Model). SNS based on Elgg
Quality Policy Evaluation

- Collaborative Quality Assessment Service
Evaluation Results
(79 responses, 315 quality evaluations)

User's Quality Evaluation

<table>
<thead>
<tr>
<th>Quality</th>
<th>Relevance</th>
<th>Readability</th>
<th>Credibility</th>
<th>Completeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>3.86</td>
<td>3.89</td>
<td>4.20</td>
<td>3.86</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>4.20</td>
<td></td>
<td></td>
<td>4.21</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td>4.580</td>
</tr>
<tr>
<td>Very High</td>
<td></td>
<td></td>
<td></td>
<td>4.180</td>
</tr>
</tbody>
</table>

User vs Expert

One-Sample Test

<table>
<thead>
<tr>
<th>Quality</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance</td>
<td>0.620</td>
<td>314</td>
<td>0.530</td>
<td>0.030</td>
<td>-0.06</td>
<td>0.12</td>
</tr>
</tbody>
</table>
Conclusion

- A formal architectural analysis of healthcare SN and online SNS has been presented.
- Basic Privacy policy: Components, rules:
  - access control, privacy and confidentiality, users’ responsibility
- Basic Quality policies: Principles, IQ attributes/metrics.
  - Credibility, completeness, relevance, readability
- After the policies, an online SNS was developed.
  - Collaborative evaluation service integrated into the Elgg platform.
- A formal evaluation of the QI policy (attributes) was provided.
- Future: Semi-automatic quality assessment/filtering service
Thank you for your attention!

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Acknowledgment
This work was founded by the US National Institutes of Health (QUIPU Program Grant: 1D43TW008438-0109), the German Academic Exchange Service DAAD and Colciencias (Fondo Francisco José de Caldas Contract 567-2011), the eHeath Competence Center Regensburg, and University of Cauca (Vicerrectoría de investigaciones Project ID 3286).
Mayo Clinic has 180,000 followers on Twitter and 54,000 “likes” on Facebook. The Larger YouTube channel of any medical provider: 6,000 to 8,000 video views a day.