Strengths, weaknesses and barriers to adoption of Open Source Software in a clinical setting as seen by hospital CIOs

Results of qualitative expert survey on basis of an interview guideline

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Outline

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Overview
Subject and Objective

Subject
Open Source\(^1\) software in terms of professional software and supporting components that are used in health care, especially in a clinical setting.

Objective
Gain knowledge about the awareness, acceptance and usage of Open Source software in health care and identify the strengths, weaknesses, opportunities and threats to adoption as seen by IT executives of German and European hospitals.

\(^1\)as defined by the “Open Source Definition” of the Open Source Initiative, see http://www.opensource.org/osd.html, last accessed 2012/03/24
Advantages and disadvantages of Open Source software are primarily discussed quite generally without or only by slightly taking the specific aspects of health care and the requirements of a clinical setting into account.

Whilst Open Source is well-established in other fields of application like the Web or Research, it appears that it is still in its infancy regarding its utilization in clinical routine.

...although considerable benefits of Open Source compared to proprietary software have been shown in theory, e.g. Karopka et al. [1].

Who should know better than the key persons in charge of procurement, implementation and management of software at hospitals: its IT executives.
Literature review
Publications with similar scope

- Paré et al. 2009 “Barriers to open source software adoption in Quebec’s health care organizations.” [2]
  - Goal: Identify barriers to adoption by conducting interviews of decision makers and correlating them to literature
  - Interviewed 15 CIOs of health care institutions within Quebec, Canada in 2007

- Hohenwarter 2010 “Marktanalysen für Open Source Software im österreichischen Gesundheitswesen” [3]
  - Goal: Market analysis of Open Source software in Austrian health care, interviews were performed to empirically verify the hypothetical SWOT analysis
  - Interviewed 5 Health IT experts in leading positions at health care institutions (incl. one independent consultant)
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Methods

- Semi-structured expert interview [4] with 15 open, non-suggestive questions
- Grounded theory and qualitative analysis [5],[6]
- SWOT [7] analysis
  - Strengths, Weaknesses (internal factors)
  - Opportunities, Threats (external environment)
- Objective: *Utilization of Open Source in Health Care*
- Mind mapping\(^2\)

\(^2\)using FreeMind http://freemind.sourceforge.net/, last accessed 2012/03/24
Procedure
Data collection

Interviews:

- 28.10.2011, ALKRZ\(^3\) meeting in Frankfurt: 8 interviews (German)
- 21-22.11.2011, HIMSS\(^4\) CIO Summit in Geneva: 11 interviews (English)
- In person and via telephone, both tape recorded and afterwards transcribed
- Length: 9-34 min., \(\bar{\sigma} 17\) min.

\(^3\) ALKRZ is the professional society of CIOs of German university hospitals

Procedure
Length of interviews

**ALKRZ meeting, Frankfurt (German), ∅ 19 min.**

- Length of interviews:
  - Length in minutes: 9, 20, 20, 23, 14, 20, 18, 25
  - Number of interviews:
    - 1, 2, 3, 4, 5, 6, 7, 8

**HIMSS CIO summit, Geneva (European), ∅ 16 min.**

- Length of interviews:
  - Length in minutes: 16, 13, 21, 22, 34, 13, 13, 12, 13, 9, 14
  - Number of interviews:
    - 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
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Interviewee demographics

ALKRZ meeting, Frankfurt *(German)*

- 8 IT executives
- all at university hospitals
- 7 with IT budget responsibility, 1 without
- all from Germany

HIMSS CIO summit, Geneva *(European)*

- 11 IT executives
- 6 at university hospitals, 2 at public hospitals, 3 at regional or national level
- 8 with IT budget responsibility, 3 without
- from Belgium (1), Denmark (1), England (1), Finland (1), Scotland (1), Spain (1), Sweden (2), Switzerland (3)
Quantitative information
Attitude towards Open Source

<table>
<thead>
<tr>
<th>Attitude of</th>
<th>German (in %)</th>
<th>European (in %)</th>
<th>Total (in %)</th>
<th>Ge./Eu. n=</th>
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<tbody>
<tr>
<td></td>
<td>+</td>
<td>0</td>
<td>–</td>
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<td>IT executive</td>
<td>50</td>
<td>37.5</td>
<td>12.5</td>
<td>66.7</td>
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<tr>
<td>Board</td>
<td>25</td>
<td>62.5</td>
<td>12.5</td>
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<td>User</td>
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<td>100</td>
<td>0</td>
<td>27.3</td>
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<tr>
<td>Participate in</td>
<td>62.5</td>
<td>12.5</td>
<td>25</td>
<td>40</td>
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- IT executives are mostly in favor of Open Source
- Estimated attitude of board: in general neutral, with a slight tendency towards Open Source primarily due to cost savings
- Estimated attitude of users: neutral, they do not care and are just interested in functionality
- Many IT executives would participate in an Open Source project, some after careful consideration and some would not due to missing resources
Procurement Criteria
Top 5 procurement criteria for software in general

1. Integration in existing infrastructure and standardized interfaces
2. Costs (cost/performance ratio, follow-up costs, overall . . .)
3. Continuity in form of long-term support and development
4. Offered functionality
5. Operational availability/robustness
SWOT-Analysis - Strengths

Top 5 of in total 14 strengths

1. Price, primarily license costs
2. Aspects of collaborative development
   - Crowd sourcing
   - Share and participate
   - Open knowledge exchange
3. Flexibility in form of customization
4. Independence from vendors
5. Market-oriented development
SWOT-Analysis - Weaknesses
Top 5 of in total 15 weaknesses

1. Lack of support
2. No liability and accountability
3. Advanced skills required
4. Costs for in-house support, development, training, management of organizational changes
5. Integration capabilities

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5 One German and one European interviewee have indicated that they see the level of support as strength of Open Source, in case of a big community.
1. Dissatisfaction with and counter-pole to commercial vendors
2. Power of the community and its enthusiastic developers
3. New business model for hospitals to sell service and skills to each others
SWOT-Analysis - Threats
Top 5 of in total 10 threats

1. Legal regulations
2. Obscure Open Source market
   - What products? Which functionality?
   - Governance is unclear
3. Specialty of the Health IT
   - unique requirements
   - limited number of people for potential community
4. Commercial vendors do not support integration with Open Source components
5. Commercialization of successful/popular Open Source projects

<table>
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<th>Threat</th>
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<td>1</td>
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<tr>
<td>5</td>
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Top 5 of in total 10 threats
see given weaknesses and threats

1. Legal regulations
2. Missing marketing
3. Very limited range of medical Open Source Software available
4. Lack of support
5. Architectural considerations like not too many subsystems and seamless integration
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Discussion
Survey and results

- Theoretical saturation [6] could be reached
- Mostly limited time for interviews, hindered detailed 'interrogation' and convenient access to implicit/tacit knowledge
- Offers brief insight, only representing major (university) hospitals in Germany and Central Europe
- Aspects generally in-line with results of Paré et al. [2] and Hohenwarter [3], differences in extent of concepts and its valuation by interviewees
Promising future if a working ecosystem can be established that will attract more companies to offer professional service

Challenge will be to adequately address legal regulations that apply to medical software

For example Medfloss.org\textsuperscript{6} [8],[9] provides a comprehensive, structured overview of available projects and service providers

\textsuperscript{6}http://www.medfloss.org/
Outlook
Online survey and publication

- Online survey
  - to quantitatively evaluate identified concepts
  - to include all types of institutions
  - to include all stakeholders

- Detailed publication
Thank you for your attention!

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