Open Source as an Alternative for Clinical Information Systems Adoption

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Agenda

- Context

- Research Questions

- Conceptual Background

- Research Method

- Results

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- Conclusion

Context

- *Electronic Health Records* (EHR) are at the heart of most health system reforms
  - "Mission-critical" applications for hospitals
- High costs and low level of interoperability of commercial EHR software has led a growing number of hospitals to adopt *open source software* (OSS) solutions
  - Examples of OSS EHR: VistA, Oscar, GNU Med, OpenEMR and OpenMRS, etc.

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Research Questions

- *What can motivate a Hospital to adopt an Open Source EHR ?*

- *What are the main challenges faced by a hospital adopting an Open Source EHR ?*

- *What can be done to deal with these challenges ?*

Conceptual Background

- Motivations to adopt an Enterprise System by healthcare organizations (Poba-Nzaou et al., 2014)
  - Strategic (Clinical vs. Managerial)
  - Operational (Clinical vs. Managerial)
  - Financial
  - Technological

- Hybrid organization
  - "Organization that combine different institutional logics in unprecedented ways" (Scott and Meyer 1991)
    - E.g.: integration of not-for-profit and for-profit logics (Battilana et al., 2012)
  - Challenges faced by Hybrid Organizations in search of sustainability (Battilana et al., 2012)
  - #1: Legal Structure
  - #2: Financing
  - #3: Customers and Beneficiaries
  - #4: Organizational Culture and Talent Development

Conceptual Background (continued)

- OSS governance models
  - "the means of achieving the direction, control, and coordination of wholly or partially autonomous individuals and organizations on behalf of an OSS development project to which they jointly contribute" (Markus, 2007)

- "community managed" vs. "non community managed" OSS projects
  - "community managed is an open source software project initiated and managed by a distributed group of individuals who do not share a common employer" (West and O'Mahony, 2005, p.1)

Research Method

- Single case study of an open source EHR project
  - In the *interpretive* tradition of IS (Klein and Myers, 1999)

- Inductive approach (no initial theory)
  - Emergence of theoretical concepts at different stages of the research (Walsham and Sahay, 1999)

- Case site: Alpha Hospital (pseudonym) in Canada
  - University hospital (1,000 beds, 1,000 physicians, 3,000 nurses)
  - IT infrastructure (600 servers, 9,910 desktop computers, 16 IT staff)

Research Method (continued)

- Data collection
  - Interviews of key informants (11)
  - Organizational and EHR project documents (66)
  - 1,405 pages of verbatim interview transcripts and documentation
- Data analysis
  - *Hermeneutic circle*
  - Narrative strategy (the "story": 40 page case report presented to Alpha Hospital for validation purposes)
  - Temporal bracketing
  - Interpretive principles of abstraction and generalization

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Results

Motivations to adopt an OSS EHR

Poba-Nzaou et al. (2014)	Alpha motivations to adopt an OSS EHR
Strategic-Clinical	-Sustain the merger of the three newly merged hospitals that formed Alpha Hospital by normalizing and standardizing clinical data repositories
Strategic-Managerial	none
Operational-Clinical	none
Operational-Managerial	none
Financial	-Inability to afford the initial cost associated with the acquisition of a commercial EHR estimated at 1 million dollars with recurring costs of about $350,000 per year -Huge budget shortfalls at Alpha for many years
Technological	-Plan to acquire an EHR system in 1999 to fix Y2K bug

Results

The OSS EHR

- Homegrown EHR system developed by Beta Hospital (pseudonym) in Europe

- De facto non community managed OSS project

- Alpha Hospital represents a good illustration of a **hybrid organization**
  – combine three distinct logics: *care providing, software publishing and software integration*

- The main challenge: the **sustainability** of the combination of the three logics

Results

Challenge #1: Legal Structure

Initial solution

- Informal/unstructured then structured between Alpha and Beta Hospitals
  - Contract allowing the internal free use by Alpha of the OSS EHR
- Ownership of assets retained by Beta Hospital

Current solution

- Exclusif partnership with a private consulting firm
  - Software Publishing and Software Integration
    - Handle the first level support of the EHR maintenance
    - Manage the marketing and sales (attracting other hospitals)
- Informal/structured within Alpha Hospital then between Alpha and the private IT firm partner
  - Agreement for Alpha to act as software publisher and integrator for the OSS EHR
    - distribute the EHR and create a Canadian community
- Ownership of assets retained by Alpha Hospital in Canada

Results

Challenge #1: Legal Structure **(continued)**

Envisioned solution

– Creation of a separate not-for-profit legal entity that will handle the Software Publishing and the Software Integration in lieu of Alpha Hospital

Results

Initial solution

– Sharing of human resources (HR) for the Software Publising activities between Alpha and Beta

– Marketing and promotion expenditures in Canada are financed internally by Alpha

Current solution

– Sharing of HR and/or costs for the Software Publising activities between Alpha

  • the private IT firm partner

  • customers/beneficiaries (other hospitals)

– Software integration activities led by the IT partner

  • On behalf of Alpha

– Marketing and promotion expenditures financed by the private business partner

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Results

Challenge #2: Financing **(continued)**

Envisioned solution

– Creation of a separate not-for-profit legal entity that will
handle financing-related matters in lieu of Alpha

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Results

Challenge #3: Customers and Beneficiaries

Initial solution

– Internal "customers" only: clinics within Alpha Hospital

Current solution

– Customer/supplier: the private IT consulting firm partner

– Customers/beneficiaries (customers++/beneficiaries+-)

  • other hospitals' clinics
  • other hospitals' IT members
  • other hospitals' management
  • Nursing schools, local colleges

– Low attraction rate of customers/beneficiaries

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Challenge #3: Customers and Beneficiaries (continued)

Envisioned solution

- Adding individuals as beneficiaries
- Adding teaching and/or research institutions as "beneficiaries only"
- Finding a more balanced status for other hospitals (customers vs. beneficiaries)
  - Clarification of beneficiaries role with regard to project leadership and decision making process
- Allowing other private firms to act as partners for both activites (Software publishing and software integration)

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Discussion

- In search of the "hybrid ideal" (Battiliana et al. 2012)
  - Alpha Hospital orchestrated actions to **sustainably** integrate the three distinct logics in unprecedented ways (Scott and Meyer 1991) *care providing, software publishing and software integration*
    - By developing a "supportive ecosystem" (Battiliana et al. 2012)
      - Building a local community, partnering with a private IT firm, nursing schools, colleges, etc.
- This research provide rich insights on challenges associated with the adoption of OSS, especially for non community managed OSS projects and mission-critical systems (EHR)

Conclusion

- Our research suggests that OSS EHR constitutes a valuable alternative to commercial EHR for hospitals

- Our results allow hospital practical managers to compare their own experiences and gain knowledge

- The insights gained from this single case study can be complemented by others cases and multiple case study approach

- Encourage other researchers to further scrutinize this important yet relatively new phenomenon

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Appendix

Hospital	Type of Hospital	Tax status	EHR Open source system	Size (# beds)	# of Clinics	Size (# of employees)	# of Physicians	Revenue	Cost of the implementation project (US $ million)
OPEN SOURCE EHR (USA)									
Oroville	acute care facility	private, non-profit corporation	VistA	153	20	*1, 4000	More than 130	*$151,060,250	Less than 8 $
Midland Memorial Hospital	acute care facility	public non-profit district	VistA	371	3 campuses	1, 6000	204	$716,008,512	*7.1$
Kern Medical Center	acute care academic teaching	County owned	VistA	222	*3	1,300	65 Full-time faculty	$639,875,280	*11$