

Motivation / Problem

US Healthcare Industry at a glance:

- > In 2005 expenses were more than **16%** of the GDP, and hospital care alone accounted for the largest portion of expenditure, **30.8%**.
- > In 2000 medical errors in hospitals are suggested as the **3rd** leading cause of death in the nation (as many as **98,000** a year).

The Healthcare industry is a complex socio-technical system:

- > Comprised of multiple stakeholders driven by incentives which often times are not aligned with one another.
- > With compromised ability to deliver to the patient the appropriate care, at the appropriate time, at the appropriate location, and at an adequate cost.

Hospitals find themselves scrambling to cope with:

- > A broken system that continuously issues new requirements and shortens available budgets while demanding the latest innovations.
- > The absence of a systematic approach that encompasses the whole enterprise, both within and outside immediate boundaries of control.

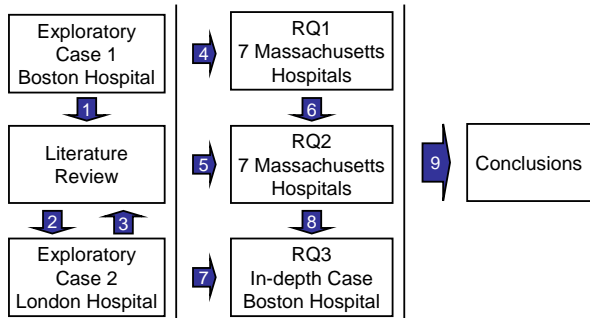
Key Questions

RQ1: How is hospital enterprise performance currently measured?

RQ2: How could hospital enterprise performance measurement be improved using lean enterprise principles?

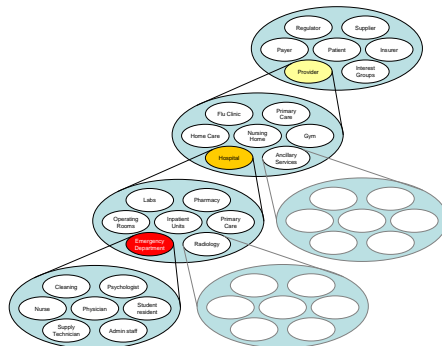
RQ3: How does hospital enterprise architecture relate to hospital enterprise performance?

Research Roadmap



The Research

Early 2007, an integrated multi-specialty group practice and academic medical center, voiced concern about its Emergency Department (ED).



Study results yielded:

- > Tactical mindset and change initiatives had led to local sub-optimization
- > ED did not operate in a vacuum and competed for resources elsewhere in the hospital
- > Disparate electronic medical records crippled the organization
- > Significant problems were beyond immediate organizational control

Hypothesis: Multiple configurations of Enterprise Architecture exist within a single hospital yielding varying degrees of performance

RQ1:

- > 7 leading hospitals in Massachusetts (stratified random/convenience sample)
- > Interviewed CEOs and administered two quantitative research instruments informed from literature (100+ paper longitudinal analysis)
- > Analysis of strategic/operational documents, public data, observation, etc.

- > Derived lean enterprise principles and best practices from multidisciplinary literature (100+ papers)
- > Analysis of RQ1 hospital data in terms of strategy / metrics alignment and lean enterprise principles
- > Derived empirically and theoretically based holistic performance measurement for hospitals

RQ3:

- > Theoretically augmented Nightingale & Rhodes Enterprise Architecture Framework (400+ paper longitudinal analysis)
- > In-depth study of leading multispecialty academic medical center using framework, RQ2 performance measures, and service unit matrix
- > Systematic and iterative use of hybrid research design to characterize different Enterprise Architecture configurations and measure their performance

Preliminary Results

Six months of exploratory research conducted at two leading hospitals, one in the UK and another in the US:

- > Despite very different regulatory and payment environments both sites exhibit similar operational and strategic issues (i.e. overcrowding; clinical and management silo behavior across departments; weak informational flow beyond hospital boundaries serving local community vs. national/international; etc)
- > Different aspects of Enterprise Architecture prevalent at each site
- > Multiple configurations of Enterprise Architecture were present within each single hospital and vary in performance

Hospital performance measurement literature compare and contrast with empirical data:

- > Contrary to predominant literature, hospitals do adopt multidimensional performance measurement practices but these are mostly set from external entities and in silo fashion.
- > Literature and empirical data agree in the top 3 and lower 3 preferred performance dimensions

Publications

Oliveira, J. and Nightingale, D (2007) "Adaptable Enterprise Architecture and Long Term Value Added Partnerships in HealthCare." *15th European Conference on Information Systems*, St. Gallen, Switzerland, June 7-9.

Oliveira, J., Nightingale, D., and Wachendorf, M. (2009) "High Performing Hospital Enterprise Architecture: insights from a multi-method exploratory case", *1st Global Conference on Systems and Enterprises*, Washington DC, December 3-4.

Oliveira, J., Nightingale, D., and Wachendorf, M. (2010) "A Systems-of-Systems Perspective on Healthcare: Insights from two multi-method exploratory cases of leading UK and US hospitals", *5th IEEE International Systems Conference*, San Diego CA, April 5-8.

Acknowledgments

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