Adapting the STARE-HI Guidelines for the Evaluation of Home Care Telehealth Applications: An Interpretive Approach

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classification of evaluation approaches

according to the meaning that evaluators and stakeholders attach to telecare applications

- telecare as a 'drug' or 'therapeutic agent'
- telecare as a technical and/or managerial innovation
- telecare as an information system embedded in a clinical/social context
telecare as a drug

- seems to be the most dominant view in literature

- draws on medical tradition of evaluation

- uses Randomised Control Trial (RCT) as the most legitimate and credible evaluation technique

- evaluation schemas based on gold standard of proof

- RCT presented as the most (or even the only) legitimate evaluation technique
critique

■ is telecare a drug? can telecare be prescribed in practice? does it have an immediate effect on patients' health?

■ telecare as a drug...
  ➤ in the case of drugs, patients have two options: to obey to the prescription or ignore it
  ➤ in the case of a telecare service, patients interact with it, influence it and get influenced by it

■ RCT focuses on predefined outcomes
  ➤ ignores patients’ interaction and reaction
  ➤ ...which could answer the 'why' of RCT results in telehealth
telecare as technical/managerial innovation

- a slightly more expanded view

- telehealth as an innovation that can:
  - reduce cost of healthcare delivery
  - raise physicians’ productivity
  - increase patients’/customers satisfaction

- telehealth as a funded short-term research project

- evaluators draw on economic theory to check cost effectiveness and productivity

- quick evaluation till the end of the project, using methods that allow comparison and often serve publication purposes
critique

- measure whatever is easiest
- measure whatever gives the desired results
- ignore difficulty to measure variables
  - patients’ time and effort
  - value of information
  - physicians’ productivity
- try to quantify variables that cannot be measured (e.g. quality of life, cost of human life, etc)
- short term pilot deployment to assess long term value
roots of both views

both views draw on positivism (objectivism):

- origins in natural science
- based on the traditional scientific method (formal propositions, quantifiable measures, hypothesis testing, etc.)
- attempt to generalize findings
- attempt to prove
telecare as an IS within a clinical context

“information systems are social systems whose behaviour is heavily influenced by the goals, values and beliefs of individuals and groups, as well as the performance of the technology.” (Angell & Smithson 1991)

components of an information system, and, therefore of a telecare service

- technology
- people (patients, physicians, administrators)
- organisation (i.e. context)
telecare as an IS within a clinical context

evaluation draws on interpretivism (subjectivism):

- there is NO objective, single reality
- the social “reality” is constructed by each person according to the meanings and beliefs they hold
- “research becomes more a case of trying to understand the context of the information system, and the process whereby the information system influences and is influenced by its context” (Walsham 1993)
- research methods: case study, institutional ethnography, ...
- research techniques: observation of the different stakeholders groups, unstructured and semi-structured interviews, documentation review and researchers’ interaction with the technology used
the interpretive approach

- a new school of thought in telehealth, but not in information systems research

- current problem: most of telehealth researchers do not use any theoretical framework to guide their qualitative research and draw their conclusions

- result: their research is often seen as barely credible

- however, doing interpretive research requires adopting a theoretical model in order to
  - present which aspects the evaluator wishes to study
  - to structure the report of stakeholders’ experiences
  - to interpret them in a way that general patterns of interaction can be derived
**evaluation framework by Cornford et al**

<table>
<thead>
<tr>
<th>Structure</th>
<th>System functions</th>
<th>Human perspectives</th>
<th>Organizational context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>technical detail</td>
<td>changed work</td>
<td>sustainability,</td>
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<td>conditions and</td>
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<td>correct and valid</td>
<td>interaction</td>
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<td>Outcome</td>
<td>relevant,</td>
<td>quality of service</td>
<td>effect in the world</td>
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<td></td>
<td>applicable,</td>
<td>and outcomes</td>
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<tr>
<td></td>
<td>reliable</td>
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*Cornford T, Doukidis GI, Forster D. (1994)*
evaluating home telehealth

much more complicated than evaluating other telehealth applications ...

- nature of stakeholders
  - diverse group, different value systems, expectations, perceived risks, cost burden, etc

- nature of application context
  - diverse surroundings of patients’ home

- engagement (or lack of) patients in the design process
  - patients’ view during design is usually expressed by doctors and nurses
Adapting the framework for home telehealth

<table>
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</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td><em>what are the real hardware and software</em></td>
<td><em>physicians</em></td>
<td></td>
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<td></td>
<td>requirements; does the full set of system</td>
<td><em>patients</em></td>
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<td>components work together in a technical</td>
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<td>sense?</td>
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<td><strong>Admins.</strong></td>
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<td><strong>Could such technology be</strong></td>
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<td><strong>sustained and supported within the</strong></td>
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<td><strong>organizational</strong></td>
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<td><strong>context?</strong></td>
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<td><strong>Process</strong></td>
<td><em>is the method by which the system</em></td>
<td><em>how was the user</em>s mode of operation*</td>
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<td>transforms its data, the information</td>
<td><em>how is the patient</em>s experience of health*</td>
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<td>processing, correct and valid?</td>
<td>care altered at the point of contact with</td>
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<td>the system?</td>
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<td><strong>Does it meet the requirement</strong></td>
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<td><strong>specifications?</strong></td>
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<tr>
<td><strong>Outcome</strong></td>
<td><em>are the results relevant, applicable and</em></td>
<td><em>does the use of the system result in</em></td>
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<td></td>
<td>reliable?</td>
<td>changes in the quality of service and</td>
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<td>Does it meet the requirement specifications?</td>
<td>better health for the patient?</td>
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<td><strong>Does the system improve specific health</strong></td>
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<td><strong>provision on a reasonable</strong></td>
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<td><strong>metric?</strong></td>
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<td><strong>Could such a system improve the health</strong></td>
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<td><strong>status and potential of the population it</strong></td>
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<td><strong>serves?</strong></td>
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evaluating in phases

phase 1
- understand system functionality & include patient in the design during design, development and prototype pilot implementation in the lab & in a controlled environment

phase 2
- assess user satisfaction, interaction in real environment during deployment as experimental clinical protocol in the real environment

phase 3
- clinical/social outcome, sustainability and potential long term application in the real environment & in more than one deployments
reporting on evaluation: STARE-HI

- comprehensive list of principles for properly presenting Health Informatics evaluation reports

- a collection of items to report about, organized in groups:
  (1) title; (2) abstract; (3) keywords; (4) introduction;
  (5) study context; (6) methods; (7) results; (8) discussion;
  (9) conclusion; (10) authors’ contribution;
  (11) competing interests; (12) acknowledgements;
  (13) references; (14) appendices;

(Talmon, Ammenwerth et. al., 2009)
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(Talmon, Ammenwerth et. al., 2009)
adapting STARE-HI

6.1: study design

- qualitative research, in-depth analysis of small groups, examination of the meaning stakeholders give to telehealth, inclusion of the evaluator as a stakeholder

6.2: theoretical background

- present the framework in detail

6.3: participants

- patients - doctors/nurses - administrators - technicians
- ethical issues in involving patients in the design - prototyping
adapting STARE-HI

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adapting STARE-HI

6.4: study flow

- evaluation that spans through phases, from design to pilot deployment to long term application

6.5: outcome measures

- identify key themes under research as presented in the framework and describe them in detail

6.6: methods for data acquisition and measurement

- observation of stakeholders, unstructured and semi-structured interviews, documentation review, interaction with the technology

- researcher's bias and competing interests
adapting STARE-HI

6.7 methods for data analysis

- organization of results based on identified key themes
- analysis of inter-relationships and interactions
- attempt to identify reasons that cause the above
acknowledgement

work spawned by:

evaluating PERKA

- web-based telehealth service for home monitoring of patients with renal disease
- monitoring biometric data, vital signs, dialysis parameters
- initially for patients on peritoneal dialysis, extended for patients with renal disease, transplanted, etc

evaluation status

- evaluation phase 1 concluded
- currently in evaluation phase 2: deployment for 10 patients for 1 year (currently on month 8)
server application - patient data
server application - measurement definition

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Unit</th>
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<tbody>
<tr>
<td>TempC</td>
<td>Temperature Celsius</td>
<td>°C</td>
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<td>PressmmHg</td>
<td>Pressure</td>
<td>mmHg</td>
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<td>VolSm</td>
<td>Volume</td>
<td>m³</td>
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<tr>
<td>TempF</td>
<td>Temperature Fahrenheit</td>
<td>°F</td>
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<tr>
<td>Weight</td>
<td>Weight</td>
<td>kg</td>
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<tr>
<td>Pulse</td>
<td>Cardiac Rate</td>
<td>beats/minute</td>
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<tr>
<td>BodGlucose</td>
<td>Blood</td>
<td>glucose</td>
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<tr>
<td>Date</td>
<td>Date</td>
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</tbody>
</table>
server application - measurement definition
server application - PD prescription
server application – telemetry data view
patient unit - PDA
patient unit - PC

Greek text:
Εκκίνηση Μετρήσεων
Έκτακτη Μέτρηση
Ρυθμίσεις Παραμέτρων
Καθαρισμός Αρχείων

Greek text in the screenshot:
Download Configuration Success Download Measurements Success

Greek text:
Πέμπτη 28 Αυγούστου 2008 06:00

Greek text:
Μέτρηση: Συνεχής φορητή περιποναίκη κάθαρση

Greek text:
Υποδιάγραμμα

Greek text:
0 1 8

Greek text:
Προηγούμενα  Επόμενα  Ακύρωση  Τέλος

Greek text:
Εξόδος  Εκκίνηση Μετρήσεων  Αναβάθμιση Μετρήσεως
patient unit - PC

\[
\begin{array}{c}
\text{DownloadConfiguration Success DownloadMeasurements Success} \\
\text{Πέμπτη 28 Αυγούστου 2008 06:00} \\
\text{Μέτρηση : Βάρος Σώματος} \\
\text{Kilogramms} \\
\text{98, 500} \\
\text{Ανεβείτε στην ζυγαριά και εισάγετε το βάρος σας.}
\end{array}
\]
acknowledgement

work partly funded under the R&D grants:

- “PERKA: Telecare Service for Peritoneal Dialysis”, Regional Operational Programme, East Macedonia and Thrace, Ministry of Development, Greece & the European Regional Development Fund

- “Novel System for Monitoring Renal Failure”, Desmi 2008, Republic of Cyprus & the European Regional Development Fund
cite as: