

# 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

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- 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

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- 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

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- 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

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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

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- 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

	System functions	Human perspectives	Organizational context
Structure	technical detail	changed work conditions and implied requirements	sustainability, opportunity costs, management needs, skill requirements
Process	information processing correct and valid	human participation in tasks; social interaction	altered delivery and practice
Outcome	relevant, applicable, reliable	quality of service and outcomes	effect in the world

*Cornford T, Doukidis GI, Forster D.(1994)*

# evaluating home telehealth

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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

	System functions	Human perspectives			Organizational context
		Physicians	Patients	Admins.	
<b>Structure</b>	<i>what</i> are the real hardware and software requirements; does the full set of system components work together in a technical sense?	<i>what</i> are the changes to working conditions and practices, in terms of the physical, environment and skill requirements?	are patients required to modify their behaviour in any way?	is the system a reasonable, cost-effective alternative to existing tools or materials in use?	Could such technology be sustained and supported within the organizational context?
<b>Process</b>	<i>is</i> the method by which the system transforms its data, the information processing, correct and valid?	<i>how</i> was the user's mode of operation changed? Are these changes seen as desirable to the user as an individual, and in general to the user's organizational role?	<i>how</i> is the patient's experience of health care altered at the point of contact with the system?	<i>does</i> the system imply change in the health care delivery activities for which the administrator is responsible? Does it change the character of the administrator's job?	Could such a system function within the confines of broader health policy?
<b>Outcome</b>	<i>are</i> the results relevant, applicable and reliable? Does it meet the requirement specifications?	<i>was</i> the overall effectiveness of the clinician within the health care system enhanced?	<i>does</i> the use of the system result in changes in the quality of service and better health for the patient?	<i>does</i> the system improve specific health provision on a reasonable metric?	<i>could</i> such a system improve the health status and potential of the population it serves?

# evaluating in phases

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## 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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# adapting STARE-HI

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## 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

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## 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

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## 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

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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

Καρτέλλα Ασθενή - Windows Internet Explorer

https://portal.pe-ka.gr/Default.aspx?caid=66&EntityId=128&EditMode=0

Home Ασθενείς Μετρήσεις Ειδιοποιήσεις - Συναγερμοί Ρυθμίσεις Προσωπικό Email

Ελληνικά (Ελλάδα) Admin

Οδηγός

Στοιχεία Ασθενή

- Γενικά Στοιχεία
- Ιατρικά Στοιχεία
- Στατιστικά Στοιχεία
- Ειδική Ανάγκη

Ειδιοποιήσεις - Συναγερμοί

Λίστα Μετρήσεων

Συνταγές Μέτρησης

Φίλιππο Καρέντα Από 27/7/2008 Έως 27/7/2008

Περιγραφή	Ομάδα Ασθενών	Προγρ. Ημερομηνία	Ημερομηνία Τέλους
Αλλαγή ΠΔ 6ημ		18/06/2008	18/06/2008
Αλλαγή ΠΔ 12μ		18/06/2008	18/06/2008
Αλλαγή ΠΔ 6ημ		18/06/2008	18/06/2008
Αλλαγή ΠΔ 12μ		18/06/2008	18/06/2008
Βασική Ημερήσια Μέτρηση		18/06/2008	18/06/2008

Φαρμακευτική Λγωγή

Φάρμακο Δόση Είδος Δόσης ml

https://portal.pe-ka.gr/Default.aspx?caid=73



# server application - measurement definition

Κατάλογος Μετρήσεων | Κατάλογος Προγραμ. Μετρήσεων

Οδηγίες

Η εφαρμογή χρησιμοποιεί διάφορους βοηθητικούς πίνακες για τον ορισμό χρησιμων παραμέτρων όπως οι:

- Υπομετρήσεις
- Μονάδες Μετρήσης
- Τύποι Συσκευών
- Πρωτόκολλα
- Ασθενείς
- Λίστες Φαρμάκων
- Ομάδες Ασθενών

Επιλέξτε στο πεδίο "Επιλογή Πίνακα" τον βοηθητικό πίνακα που θέλετε να εμφανιστεί.

Επιλογή Πίνακα: Μονάδες Μέτρησης

Κωδικός: [ ] Περιγραφή: [ ] Σύντομηση: [ ] Τύπος: Δεκαδικός

Κωδικός	Περιγραφή	Σύντομηση	Τύπος
TempC	Temperature Celsius	oC	decimal
PressuremmHg	Χιλιοστά στήλης υδραργύρου	mmHg	decimal
Bts/min	Bts/min	Bts/min	integer
Weightkg	kilograms	Kilos	decimal
%	Percent	Percent	decimal
Cardio	Cardiograph	Cardio	Binary
Cm	Κατοστά	cm	decimal
BloodGlucoseCm	Γλυκόζη αιμάτιος	Mg%	decimal
Decimal	Δεκαδικός Αριθμός	Decimal	decimal
Date	Ημερομηνία	Date	datetime

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# server application - measurement definition



Ρυθμίσεις Τύπων Μέτρησης - Windows Internet Explorer

https://portal.perka.gr/Default.aspx?tabid=71

Κατηγορία: Ρυθμίσεις Τύπων Μέτρησης

### Τύποι Μέτρησης

Κωδικός  Ονομασία

Κωδικός	Ονομασία
BodyTemperature	Θερμοκρασία σώματος
BloodPressure	Πίεση Αίματος
Weight	Βάρος Σώματος
OxygenSaturation	Κορεσμός Οξυγόνου
Pulses	Σφυγμοί ανά λεπτό
PST	Τέστ Περιτονίτιδας
BloodGlucose	Σάκχαρο Αίματος
APD	Αυτοματοποιημένη Περιτοναϊκή Κάθαρση
CAPD	Συνεχής φορητή περιτοναϊκή κάθαρση
INFLAMMATION	Φλεγμονή Αντιστομίου

### Παράμετροι Τύπου Μέτρησης

Υπομέτρηση: Temperature | Μονάδα Μέτρησης: TempC

Υπομέτρηση	Μονάδα Μέτρησης	GUID	Ελάχιστη Τιμή	Μέγιστη Τιμή	Βήμα
Διάρκεια Αλλαγής	Integer	7e19c101-4fef-4c0e-b68e-4e8d21c3eb1e	30	120	5
Υπερδιήθημα	VolumeLt	f2eb65a8-602e-4151-b95f-3d01b6351565	0	5	0,1
Είδος Διαλύματος	%	3bd3ea03-31b1-457b-844a-629f4f0a9b13			

### Τιμές Μέτρησης

Περιγραφή  Τιμή

Περιγραφή	Τιμή
Αραιό	1,5
Μέτριο	2,5
Πυκνό	4,5
Kodextrin	7,5



# server application - PD prescription

Παραγγελία Μέτρησης - Windows Internet Explorer

https://portal.perka.gr/Default.aspx?tabid=638&EntityId=388&EditMode=2

Mode: View Edit

Show Control Panel?

Log Out | Super User Account

Home Ασθενείς Μετρήσεις Επιδοποιήσεις Συναγερμένοι Ρυθμίσεις Προσωπικό Email

Υποστήριξη

Ελληνικά (Ελλάδα) Admin

Ορισμοί Συντηγμάτων

### Συντηγή Μέτρησης

Επίγινσσα Μέτρηση: Κανονικό

Ομάδα Ασθενών: [REDACTED]

Ασθενής: [REDACTED]

Περιγραφή: Αλλαγή ΙΔ 12πμ

Ημερομηνία Έναρξης: 18/08/2008 12.00

Τύπος Πραγματοποίησης: Εβδομαδιαίο

Sunday  
 Monday  Tuesday  Wednesday  
 Thursday  Friday  Saturday

Καθε: 1.00 Εβδομάδες

Έδος Λήξης: Χωρίς Τέλος

Τύπος Μέτρησης	Υποχρεωτική Μέτρηση			
Συνχής φορητή περιτοναϊκή αέθραση	<input type="checkbox"/>			
Περιγραφή	Μον. Μέτρ.	min	max	Ενδ. Ιμμή
Διάρκεια Αλλαγής	Integer	30	120	
Υπερήλιθμικ	It	0	5	
Είδος Διεύθυνσης	Percent			



# server application - telemetry data view

**Καρτέλλα Ασθενή - Windows Internet Explorer**

URL: <https://portal.per.ku.gr/Default.aspx?zoid=668&EntityId=128&EditMode=0>

**Οδηγίες**  
Εμφάνιση της καρτέλλας του Ασθενή

**Στοιχεία Ασθενή**

- ↑ Γενικά στοιχεία
- ↑ Ιατρικά στοιχεία
- ↑ Στατιστικά στοιχεία
- ↑ Επαφή Άναγκης

**Ειδοποιήσεις - συναγερμοί**

**Λίστα Μετρήσεων**

Από: 22/08/2008 Έως: 22/08/2008 Τύπος Μετρήσης: (Όλες οι μετρήσεις) Κατάσταση: Κλειστή

Περιγραφή Παροχολογίας	Προγρά. Ημερομηνία	Ημερομηνία Μέτρησης	Τύπος Μέτρησης	Τιμή Μέτρησης
Αλλαγή ΠΔ όπυ	22/08/2008 06:00	22/08/2008 10:38	Διάμετρο Αλλαγής	
Αλλαγή ΠΔ όπυ	22/08/2008 06:00	22/08/2008 10:38	Υπερδύθνη α	
Αλλαγή ΠΔ όπυ	22/08/2008 06:00	22/08/2008 10:38	Εύρος Διαλύματος	2,5
Βασική Πρωινή Μέτρηση	22/08/2008 06:00	22/08/2008 10:39	Kilograms	
Βασική Πρωινή Μέτρηση	22/08/2008 06:00	22/08/2008 10:39	Όδημος	0
Βασική Πρωινή Μέτρηση	22/08/2008 06:00	22/08/2008 10:40	Φλεγμονή Αντιοξειδω	0
Βασική Πρωινή Μέτρηση	22/08/2008 06:00	22/08/2008 10:42	Συστατική Πίεση	12,0
Βασική Πρωινή Μέτρηση	22/08/2008 06:00	22/08/2008 10:42	Διαστατική Πίεση	6,4
Βασική Πρωινή Μέτρηση	22/08/2008 06:00	22/08/2008 10:42	Σφύξεις	60
Βασική Πρωινή Μέτρηση	21/08/2008 06:00	21/08/2008 10:55	Kilograms	

> >>

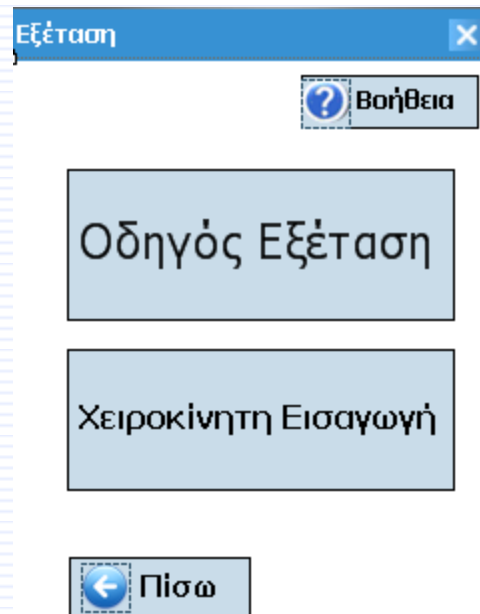
**Συνταγές Μέτρησης**

**Φαρμακευτική Αγωγή**

Φάρμακο:  Δόση:  Είδος Δόσης: ml



# patient unit - PDA



# patient unit - PC



Form1

- 1 Εκκίνηση Μετρήσεων
- 2 Έκτακτη Μέτρηση
- 3 Ρυθμίσεις Παραμέτρων
- 4 Καθαρισμός Αρχείων

EXEDRON  
creating solutions

Form1

DownloadConfiguration Success DownloadMeasurements Success

Πέμπτη 28 Αυγούστου 2008 06:00

**Μέτρηση : Συνεχής φορητή περιτοναϊκή κάθαρση**

Υπερδιήθημα

0 1 , 8

UFExchangeVol

Προηγούμενο Επόμενο Ακύρωση Τέλος

Form1

DownloadConfiguration Success DownloadMeasurements Success

Πέμπτη 28 Αυγούστου 2008 06:00

**Μέτρηση : Συνεχής φορητή περιτοναϊκή κάθαρση**

Εξοδος Εκκίνηση Μέτρησης Αναβολή Μέτρησης

# patient unit - PC

Form1

DownloadConfiguration Success DownloadMeasurements Success

Πέμπτη 28 Αυγούστου 2008 06:00

**Μέτρηση : Βάρος Σώματος**  
Kilogramms

9	8	,	5	0	0
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Ανεβείτε στην ζυγαριά και εισάγετε το βάρος σας.

← Προηγούμενο   Επόμενο →   ⓧ Ακύρωση   ✓ Τέλος



# acknowledgement

work partly funded under the R&D grants:

- “PERKA: Telecare Service for Peritoneal Dialysis”,  
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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



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