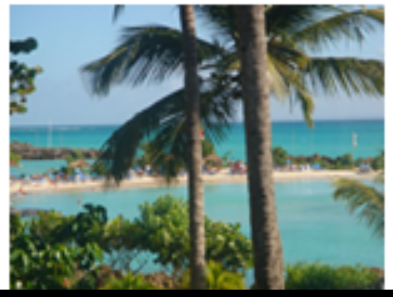
UNIVERSITY OF TWENTE.

Grounding eHealth

The need for a Human centered and Value-driven approach

Lisette van Gemert-Pijnen



The Fifth International Conference on Digital Society

eTelemed

February 23-28, 2011 - Gosier, Guadeloupe, France

Center eHealth Research & Disease Management

Guadeloupe, February 2011

IBR
RESEARCH INSTITUTE FOR SOCIAL SCIENCES AND TECHNOLOGY

University of Twente – Le Gosier

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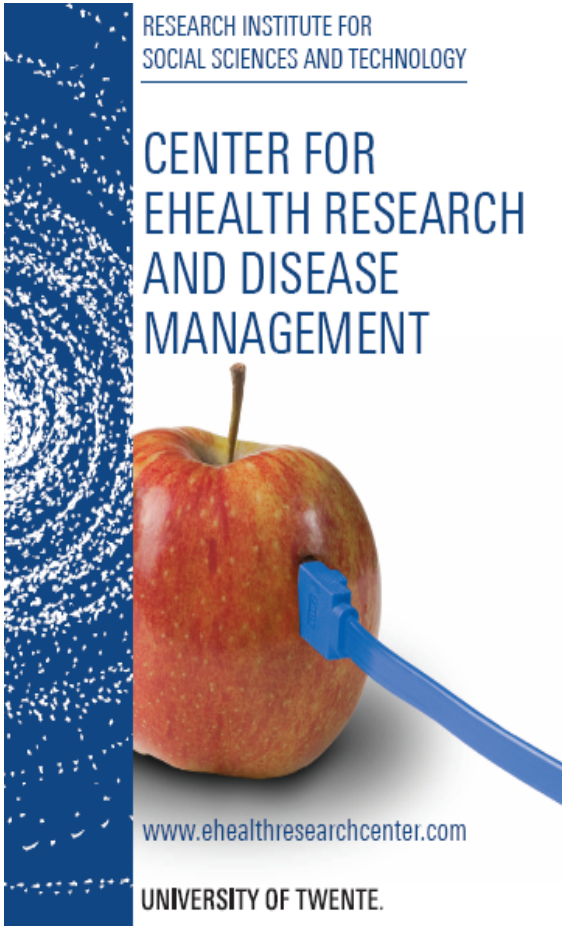
Institute for Social Sciences and Technology



- to create and share knowledge about social and behavioural aspects of technology in health care
- to translate knowledge into useful guidelines and concepts for (re)designing and implementing technology in healthcare
- to intensify cooperation with international research centres and healthcare institutes
- to strengthen the relationship between research, policy and practice
- to contribute to the solution of global health problems, like ageing and chronic care, via a multidisciplinary approach (social sciences & technology)

Presentation outline

- Why do we need to innovate Healthcare & eHealth?
  - Problems with the uptake of eHealth technologies
    - Low Adherence to eHealth technologies
    - Limited Value of eHealth technologies
- A new approach to ground eHealth in a digital society
  - How it works, and Benefits

➢Why do we need to innovate Healthcare?

- ↑ elderly people
- ↑ healthcare associated infections (MRSA, Swine Flu etc)
- ↑ chronic diseases; comorbidity
- ↓ healthcare professionals
- ↓ budget

Figure 1 **The growth in numbers of people with dementia (in millions) in high income countries, and low and middle income countries**

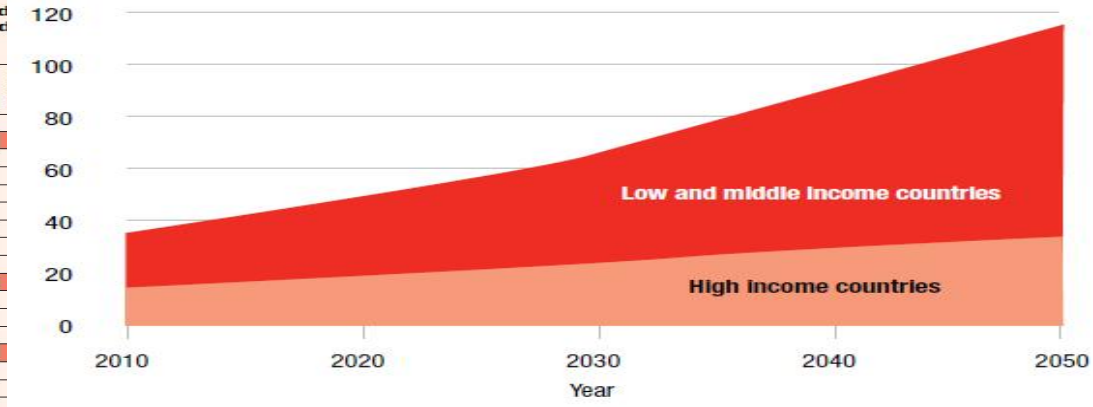


Table 3 **Total population over 60, crud people with dementia (2010, 2030 and GBD world region**

GBD Region	Over 60 population (millions)						
	2010						
ASIA	**406.55**						
Australasia	4.82						
Asia Pacific	46.63						
Oceania	0.49						
Asia, Central	7.16						
Asia, East	171.61						
Asia, South	124.61						
Asia, Southeast	51.22						
EUROPE	**160.18**						
Europe, Western	97.27						
Europe, Central	23.61						
Europe, East	39.30						
THE AMERICAS	**120.74**						
North America	63.67						
Caribbean	5.06						
Latin America, Andean	4.51						
Latin America, Central	19.54	6.1	1.19	2.79	6.37	134	435
Latin America, Southern	8.74	7.0	0.61	1.08	1.83	77	200
Latin America, Tropical	19.23	5.5	1.05	2.58	5.54	146	428
AFRICA	**71.07**	**2.6**	**1.86**	**3.92**	**8.74**	**111**	**370**
North Africa / Middle East	31.11	3.7	1.15	2.59	6.19	125	438
Sub-Saharan Africa, Central	3.93	1.8	0.07	0.12	0.24	71	243
Sub-Saharan Africa, East	16.03	2.3	0.36	0.69	1.38	92	283
Sub-Saharan Africa, Southern	4.66	2.1	0.10	0.17	0.20	70	100
Sub-Saharan Africa, West	15.33	1.2	0.18	0.35	0.72	94	300
WORLD	**758.54**	**4.7**	**35.56**	**65.69**	**115.38**	**85**	**225**

Alzheimer's Disease International

Society for Participatory Medicine

Bringing together e-patients and health care professionals.

Participatory Medicine is a movement in which networked patients shift from being mere passengers to responsible drivers of their health, and in which providers encourage and value them as full partners.

Welcome

Participatory Medicine is a cooperative model of health care that encourages and expects active involvement by all connected parties (patients, caregivers, healthcare professionals, etc.) as integral to the full continuum of care. The 'participatory' concept may also be applied to fitness, nutrition, mental health, end-of-life care, and all issues broadly related to an individual's health.

The Society was founded to learn about and promote Participatory Medicine through writing, speaking, social networking, and other channels. **Join us!**

The Society

- A Declaration of Participation
- About Us
- Journal of Participatory Medicine
- Join Us

The Journal

- About the Journal

Technology can help,
but what interventions do or do not work? And WHY

eDecision Aid

eAwareness

eMonitoring

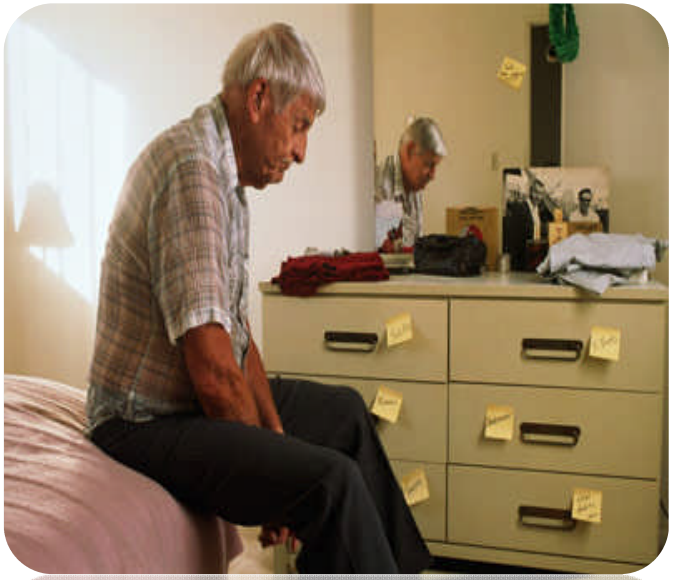
eCoaching

eLearning

eLogistics

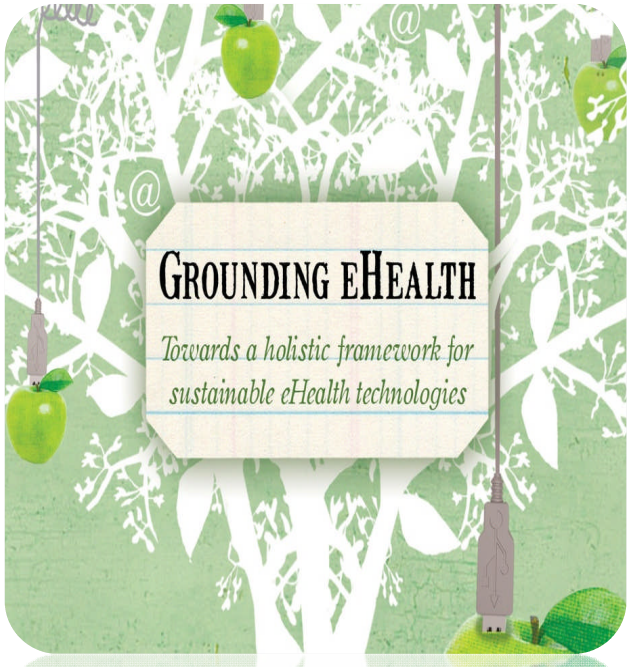
Dementia

Diabetes



➢Problems with the uptake of eHealth technologies

- Slow diffusion
- Low acceptance
- Lack of adherence



Nicol Nijland,
J van Gemert-Pijnen, 2011

systematic review diabetes care;1994-2009 (90 studies included) , barriers for the uptake of eHealth

Journal of Diabetes Science and Technology
Volume 4, Issue 3, May 2010
© Diabetes Technology Society

REVIEW ARTICLE

Asynchronous and Synchronous Teleconsultation for Diabetes Care: A Systematic Literature Review

Fenne Verhoeven, Ph.D.,[1] Karin Tanja-Dijkstra, Ph.D.,[2] Nicol Nijland, M.Sc.,[1] Gunther Eysenbach, M.D., M.P.H.,[3] and Lisette van Gemert-Pijnen, Ph.D.[1]

Abstract

Aim:

A systematic literature review, covering publications from 1994 to 2009, was carried out to determine the effects of teleconsultation regarding clinical, behavioral, and care coordination outcomes of diabetes care compared to usual care. Two types of teleconsultation were distinguished: (1) asynchronous teleconsultation for monitoring and delivering feedback via email and cell phone, automated messaging systems, or other equipment without

eHealth Technologies, low impact

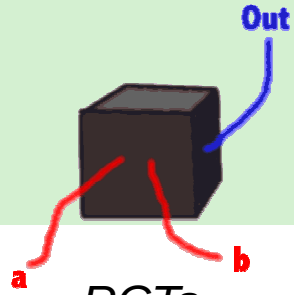
- Insufficient capacities
  - Lack of training, education staff
  - No integration offline-online
- Lack of project management
  - case manager, nurse, GP, specialist, patient ????
- Unclear insight in benefits (cost/benefits for whom?)
  - Bias in population (no complications)
  - Bias in publication, no report of drop outs

Technology, not human centered

- Usability problems
- Ceiling effect (ill-management; task-related eHealth systems)
- Lack of push factors (triggers for motivation, like fun, entertaining, incentives, rewards)
- Template medicine, Lack of tailor-made advice to support well-being

Research, limited power

- Lack of longitudinal studies, no focus on usage over time
- Lack of process evaluations about real-time usage
- Medical research, focus on classic trials, no evidence about HOW and WHY technology works in practice
- Technology is a black box in research > no evidence
- Underestimation of impact eHealth interventions



RCTs

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

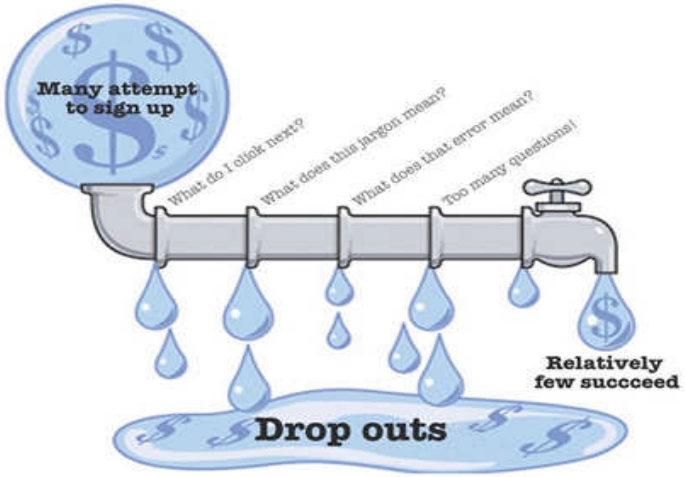
Telemonitoring in Patients with Heart Failure

Sarwat I. Chaudhry, M.D., Jennifer A. Mattera, M.P.H., Jeptha P. Curtis, M.D., John A. Spertus, M.D., M.P.H., Jeph Herrin, Ph.D., Zhenqiu Lin, Ph.D., Christopher O. Phillips, M.D., M.P.H., Beth V. Hodshon, M.P.H., J.D., R.N., Lawton S. Cooper, M.D., M.P.H., and Harlan M. Krumholz, M.D.

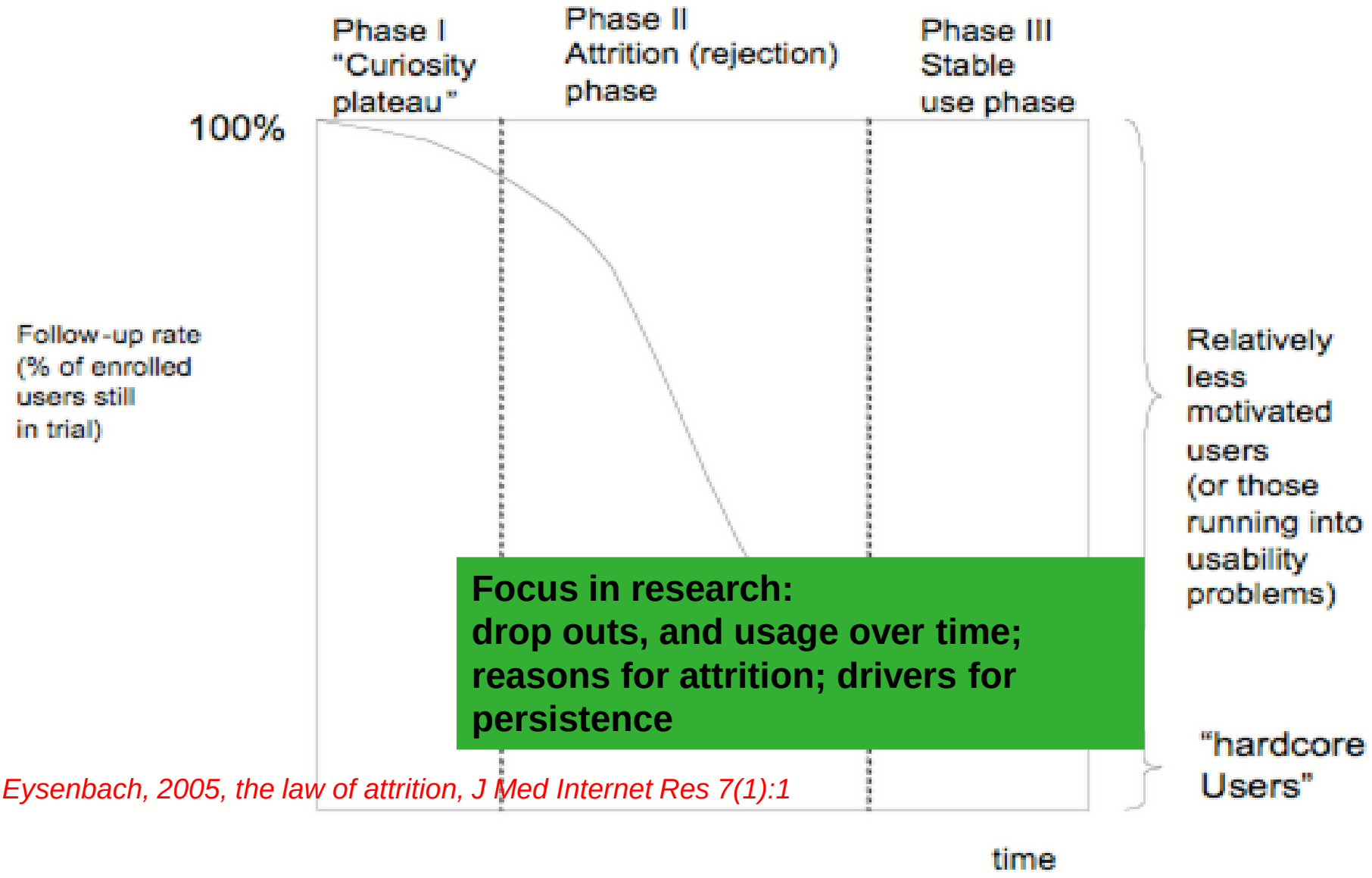
eHealth, No impact?

- Patients and caregivers never used the technologies as expected
- These publications demand for a new approach to ground eHealth interventions (to increase adherence) and
- to measure the overall impact of eHealth in practice (clinical, behavioral, care coordination)

Low Adherence to eHealth technologies



Lack of Adherence, a global problem

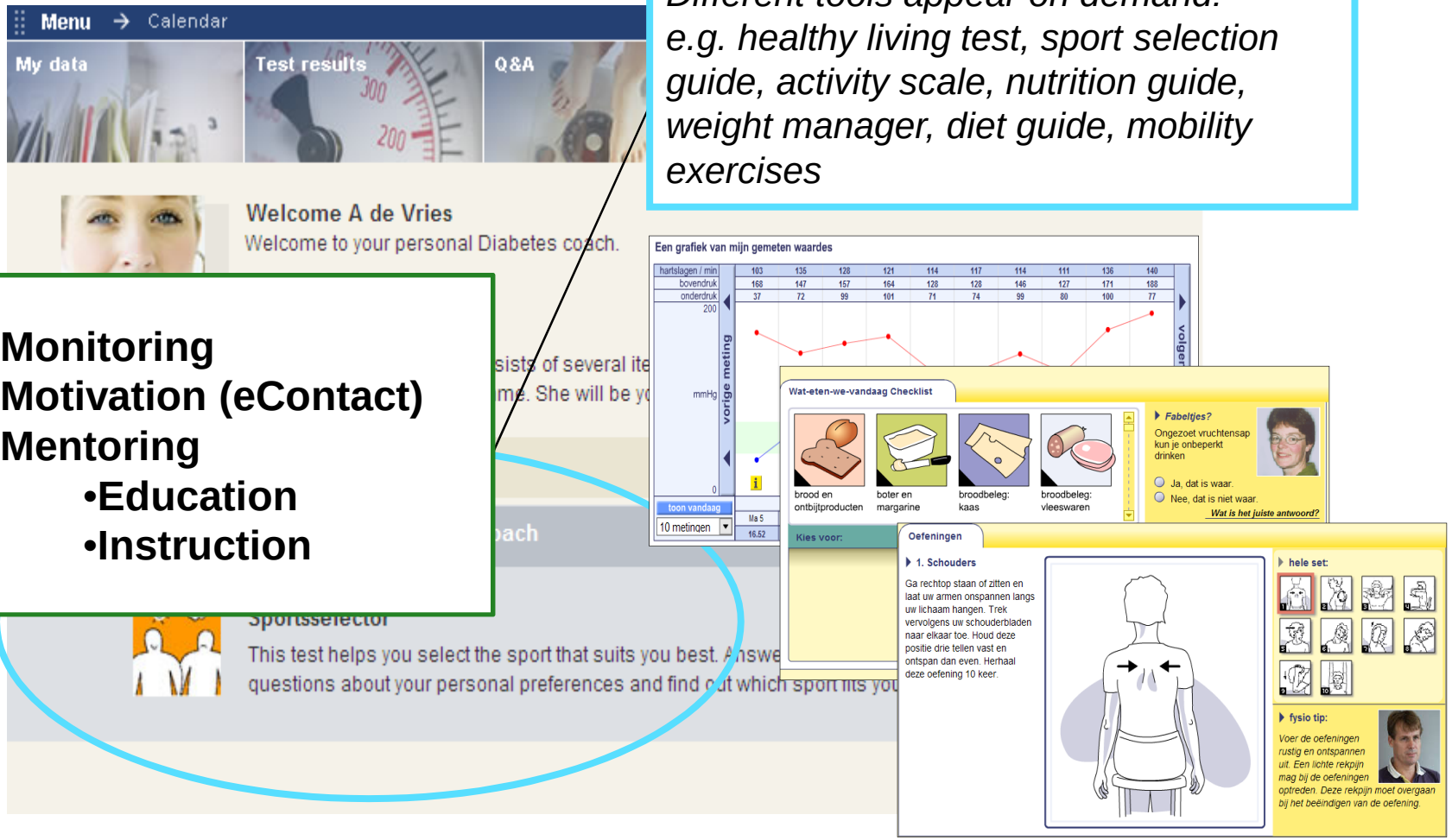


Eysenbach, 2005, the law of attrition, J Med Internet Res 7(1):1

Adherence to a web-based coach DM II, self-care
Usage, Users, Drop-outs?

Different tools appear on demand: e.g. healthy living test, sport selection guide, activity scale, nutrition guide, weight manager, diet guide, mobility exercises

Monitoring
Motivation (eContact)
Mentoring
- **Education**
- **Instruction**



Usage of the web-based Diabetes coach, during 2 years

Appendix X. Overview of activity patterns in months

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
H	1	19	34	11	27	13	10	34	16	9	47	32	29	51	9	10	3	8	4	35	16	12	14	0	0
H	2	8	39	7	1	8	2	8	2	0	45	5	2	2	1	0	20	2	0	2	2	0	0	0	0
H	3	11	50	5	1	20	2	5	15	0	2	2	2	2	16	0	1	2	7	2	5	3	0	0	0
H	4	10	50	9	1	20	5	6	49	3	2	11	44	0	11	0	1	2	12	2	8	0	0	0	0
H	5	81	69	33	1	11	14	0	0	4	7	20	43	1	0	1	2	34	88	5	14	9	0	0	2
H	6	44	43	17	30	10	24	0	5	2	4	2	0	1	1	1	3	0	6	2	0	2	0	0	2
H	11	27	41	3	0	55	8	0	0	4	75	86	52	10	36	29	58	15	26	3	2	13	21	29	0
H	12	13	147	58	34	110	6	0	6	13	4	10	2	0	15	5	12	9	0	19	2	0	21	0	0
H	21	8	36	24	12	35	19	14	20	14	10	24	17	8	20	15	17	13	6	24	15	19	16	21	4
H	24	4	159	257	198	55	47	43	96	37	28	35	23	9	8	32	16	20	24	13	68	0	14	16	6
H	27	61	60	[illegible]	9	34	73	70	59	55	34	37	8	42	52	6	17	15	22	12	21	4	0	6	0
H	31	48	27	[illegible]	18	83	3	[illegible]	61	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	2	0	0	0
H	44	51	142	10	109	[illegible]	[illegible]	6	[illegible]	9	[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	8	6	0	0
H	47	34	161	[illegible]	9	[illegible]	[illegible]	2	59	[illegible]	13	9	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12	20	0	3	0
H	48	24	22	[illegible]	30	[illegible]	37	[illegible]	10	[illegible]	[illegible]	[illegible]	8	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	0	0	0	3
H	49	44	40	12	27	26	16	3	6	13	12	11	9	3	10	3	3	0	13	0	0	11	0	9	3
L	7	33	57	16	6	8	[illegible]	0	0	38	0	0	0	1	0	1	2	0	2	2	0	0	0	0	4
L	8	10	27	10	7	7	1	0	0	87	27	0	0	1	6	6	20	2	2	2	0	0	0	0	2
L	9	11	44	6	3	18	5	0	0	3	2	2	0	1	0	1	2	0	2	2	0	0	0	0	2
L	10	12	11	2	2	0	7	0	0	22	2	3	6	0	0	1	2	0	2	2	1	0	0	0	2
L	13	10	14	0	0	3	0	0	0	3	0	1	2	0	2	2	0	0	0	0	2	0	0	0	0
L	14	2	12	0	0	20	0	0	0	3	25	1	2	0	2	13	0	0	0	0	2	0	0	0	0
L	15	27	0	0	2	0	0	0	2	0	1	2	0	2	0	0	0	0	0	2	0	0	0	0	0
L	16	6	4	0	55	20	0	0	3	1	2	2	0	2	2	0	0	0	0	2	0	0	0	0	0
L	17	38	41	8	0	68	2	0	0	1	0	0	2	0	2	13	0	0	0	0	2	0	0	0	0
L	18	7	0	0	1	2	4	0	2	3	2	2	0	71	5	0	0	0	0	17	0	0	0	0	0
L	19	53	3	21	90	5	1	2	3	26	12	42	0	0	0	9	0	0	0	4	1	20	0		
L	20	6	7	0	20	5	0	56	12	0	4	22	9	43	9	2	0	0	0	0	8	9	14	0	0
L	25	1	84	4	1	0	45	15	11	7	0	1	4	0	0	0	0	0	0	5	8	0	12	0	0
L	28	1	0	0	1	0	11	0	0	43	0	3	0	0	4	0	0	0	0	0	0	4	0	0	0
L	32	28	3	3	11	30	3	1	10	2	1	14	3	8	0	0	0	7	0	0	0	0	0	0	0
L	38	9	0	8	4	17	90	43	4	0	7	3	0	0	0	0	0	0	0	5	0	0	6	6	0
L	39	5	0	0	31	19	0	15	105	89	155	104	30	17	0	14	0	0	0	4	0	0	0	0	0
L	40	12	0	0	30	18	11	8	19	19	1	4	0	0	13	0	0	0	4	0	0	0	0	2	0
L	45	22	28	33	41	59	40	24	23	24	24	6	9	29	6	3	9	0	0	0	0	0	0	0	0
I	22	6	0	0	3	2	14	12	0	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0
I	23	15	8	0	0	3	7	16	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
I	26	76	24	10	18	0	16	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
I	29	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	30	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	33	11	0	7	6	5	0	4	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	34	30	12	5	0	6	19	29	44	9	1	14	78	15	9	0	3	0	0	0	0	0	0	0	0
I	35	6	4	1	27	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	36	22	18	3	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	37	20	0	3	31	1	1	3	1	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	41	3	0	3	6	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0
I	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	43	24	6	0	19	29	27	74	35	13	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	46	22	3	0	0	0	4	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
I	50	38	0	33	5	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Stop and restart

Column 1: H=highly active, L=low active, I=inactive

Column 2: patient number

active

nonactive

eHealth personalities?

Discontinued users (web-based systems)

Value of eHealth interventions?

eHealth gives us the best means of providing accessible health care to the poorest and most vulnerable (TUTU)

V*ulnerable* patients → Dementia

- Safety support, care coordination (*observation*)
  - GPS track and trace
  - ADL-sensor technology (daily activities)
- Support for self-care, well-being (*inter-active*)
  - Touch screen & Video contact
  - Chitchatters (contact apps “ songs from the Past”)

De Klessebessers

Handyman technologies for dementia , limited value

y for [redacted]

Activity	19-09-2010	last 7 days	last 28 days
Slaapkamer	19.0	12.0	11.4
mat	7.0	4.6	5.1
erkoker	3.0	2.4	2.5
Keuken	25.0	15.6	14.7
rdeur	5.0	4.6	4.1
kast	14.0	11.4	14.2
r Badkamer / Toilet	8.0	7.0	5.8
l	4.0	7.1	7.3
r Slaapkamer	2.0	1.1	1.3
Berging	5.0	2.0	1.9

Patients & carers have different needs

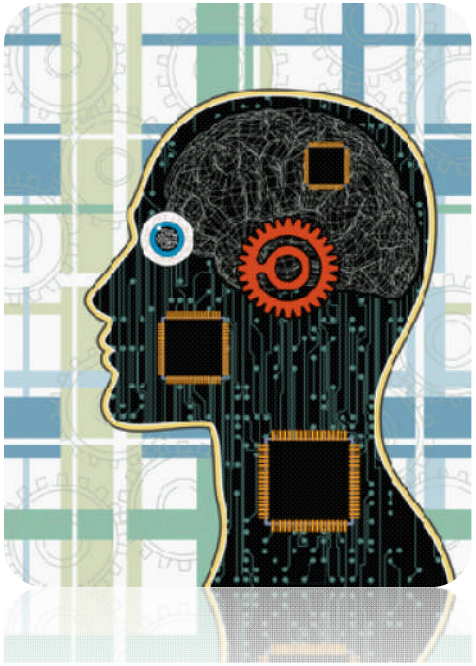
Patients want a view on the world outside

caregivers and family carers want technology for safety control, care planning (interest)

Patients want narrative

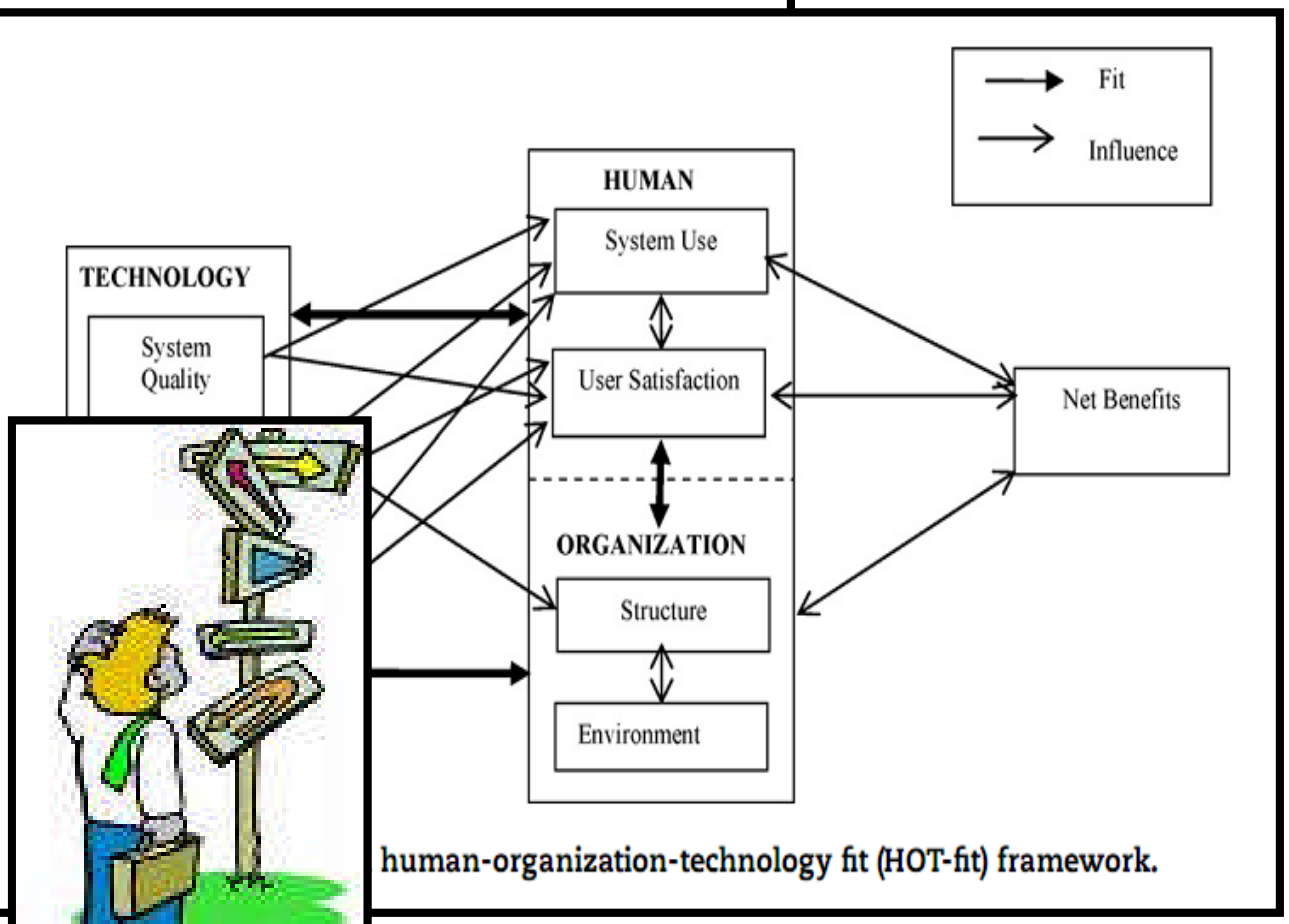
Technology, stories, songs, news from the past

What models underpin eHealth interventions?



Review current models, frameworks

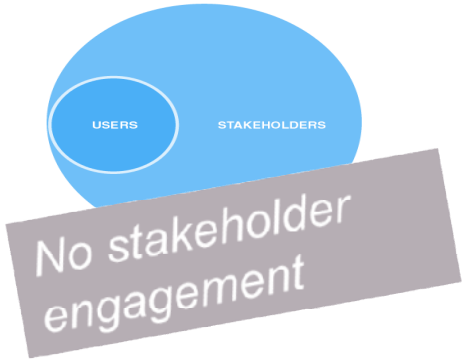
Figure 2. Key softw

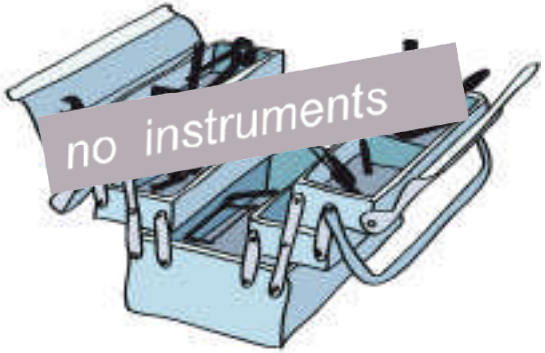


human-organization-technology fit (HOT-fit) framework.

eHealth frameworks not advanced enough to develop technologies that make sense

- Unclear theoretical grounds, no clear visions about how technology can improve healthcare
- No empirical evidence for the benefits of using these models; Lab-models
- Focus on evaluation OR development OR implementation

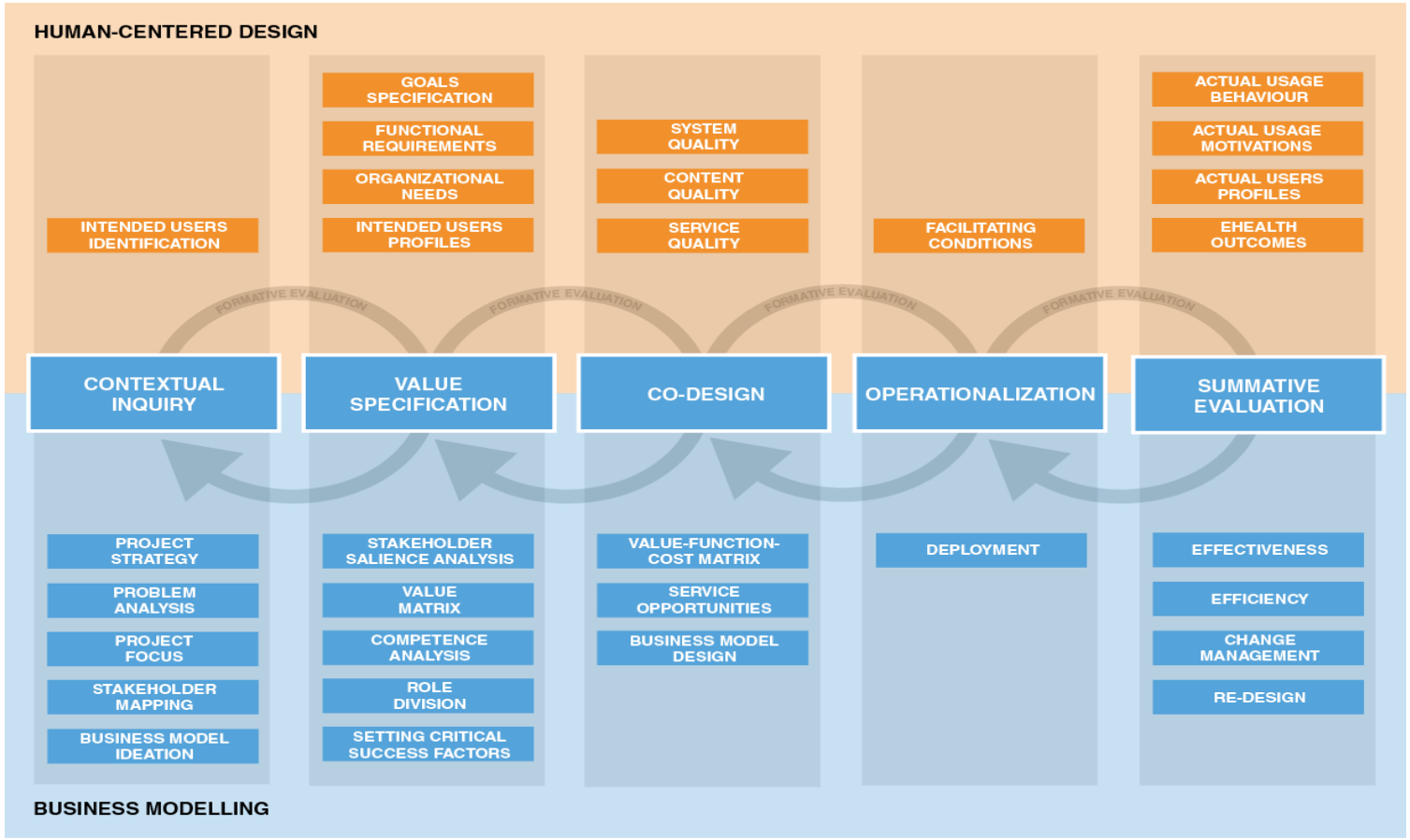




A Human centered, value driven approach

Need for holistic models to achieve technologies that are human centered, fit for context, and that have value for all stakeholders

Framework to ground eHealth interventions(2011)



Thesis Nijland, 2011

Principles eHealth framework

- Holistic approach to understand the overall impact of eHealth interventions on healthcare
- Multidisciplinary project management
- Participation of stakeholders throughout development process
- Implementation no afterthought; interwoven with development
- Continuous Evaluation, no fixed-end
- Advanced methods to study process and outcomes

Contextual inquiry - Ehea...

ehealthresearchcenter.org/wiki/index.php/Contextual_inquiry

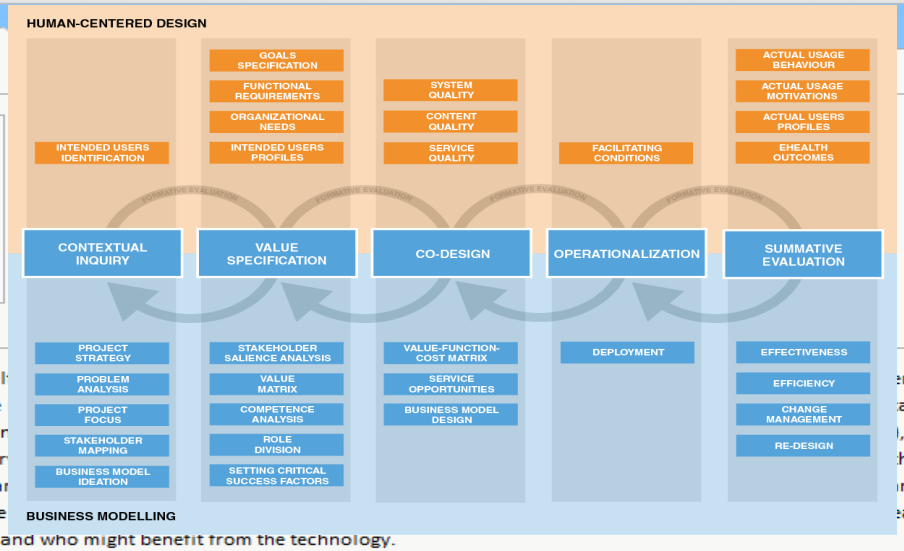
eHEALTH wiki

page | discussion | edit | history

Contextual inquiry

Contents [hide]

1 Research activity
2 Research methods
3 Research criteria
4 Example
4.1 Doctors should be easier to reach



Research activity [edit]

Ideally, the development process of an eHeal ering from the environment in which the technology will be asks or actions that are relevant to support the techr , identify problems with the current healthcare deliver his, they define who the owners of the key problems ar nt that the needs and demands of all those involved are ealthcare are, what the contribution of technology can be, and who might benefit from the technology.

Research methods [edit]

Several research methods can be used to perform a contextual inquiry, including observations, focus groups (stakeholder meeting) [5,8]. A focus group brings together a cross-section of stakeholders in a discussion group format. This method is useful for addressing all the points of views of different stakeholders. The general idea is that each participant can act to stimulate ideas in the other people present, and that, through a process of discussion, a collective view becomes established which is greater than the individual parts. The focus group method, which is also called group interviewing, is an excellent method to obtain a lot of information in a short time about the underlying motivations and needs of different stakeholders about a particular subject.

Research criteria [edit]

See Guideline, Contextual inquiry.

Example [edit]

Doctors should be easier to reach [edit]

General Practitioners (GPs) are unacceptably hard to reach in an emergency. This is the view of the Public Health Inspectorate (IGZ) in the Netherlands and the Dutch Federation for Patients and Consumers (NPCF). In non-emergencies too, GPs are difficult to reach. More than one quarter of the callers cannot get through to the GPs' emergency numbers. By the end of the afternoon, this will have risen to 40% of all callers. Furthermore, many GPs do not even have an emergency number or, if they do, their patients do not know this number. This applies to more than half of the callers. And in seventeen percent of the cases an answering machine is attached to the emergency number. IGZ and NPCF believe that GPs should answer their phone within 30 seconds of receiving an emergency call. In more than one third of all cases this does not happen. It is not much better in the case of non-emergency calls. Forty percent of the callers have to wait for more than ten minutes before they get anyone on the line. IGZ and NPCF believe that non-emergency calls should be answered within two minutes, but half of all callers have to wait longer. (http://nos.nl/artikel/76774-bereikbaarheid-huisartsen-moet-beter.html)

eHealthwiki.org

About Ehealthwiki UNIVERSITY OF TWENTE. IBR MediaWiki

How the framework works… several studies

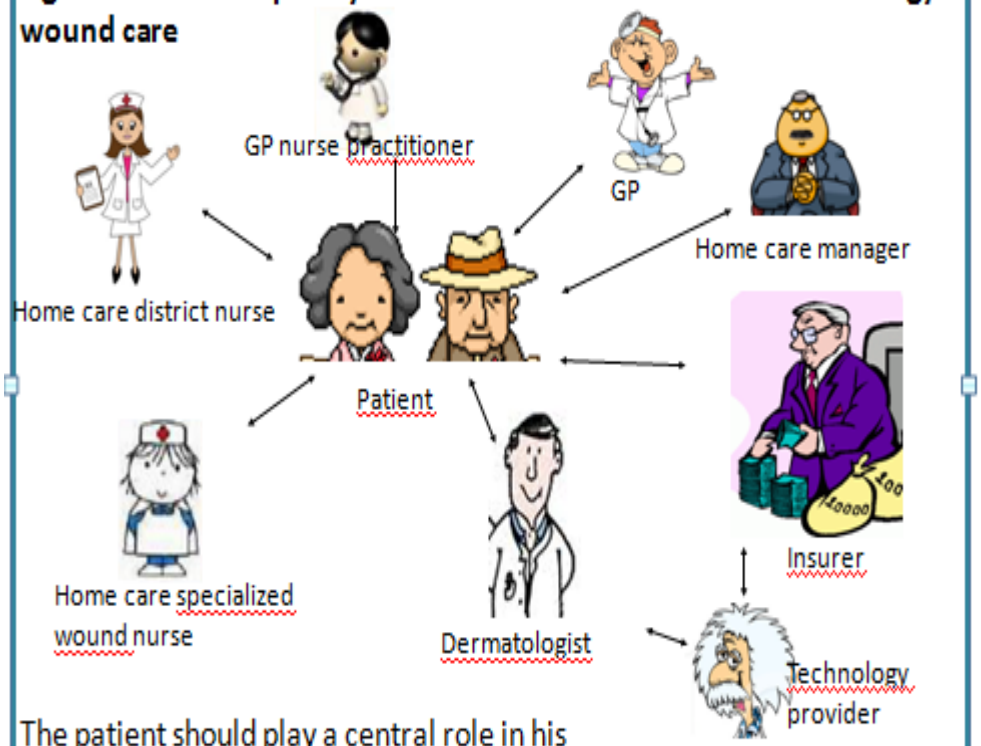
- Chronic Care Platform eCoaching
- Teledermatology (wound care; diabetic foot)
- Infection control (www.eursafety.eu)
- Dementia & Safety and Daily activity support
- Mental Health via online Therapy

1 Teledermatology (wound care)

CONTEXTUAL INQUIRY	VALUE SPECIFICATION	CO-DESIGN	OPERATIONALIZATION	SUMMATIVE EVALUATION
Problem identification *Actor mapping*	*Selection actors* *Values* *Functional requirements*	*Design requirements* *Technical feasibility*	*Infrastructure wound care* *Business logic*	*Assess* *Effects*

CONTEXTUAL INQUIRY | VALUE SPECIFICATION | CO-DESIGN | OPERATIONALIZATION | SUMMATIVE EVALUATION

Figure 1. Multidisciplinary network of stakeholders in the dermatology wound care



The patient should play a central role in his own healthcare process by self-care and self-monitoring.

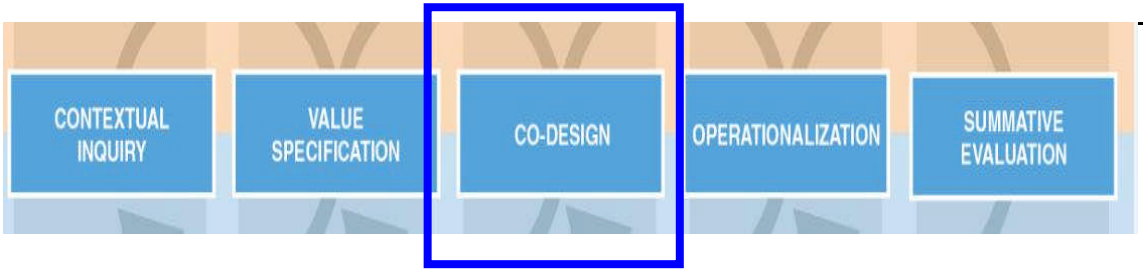
Identification of problems

- Inadequate diagnosis and monitoring
- Lack of coordination
- Miscommunication
- Unclear financial structure
- Lack of practical guidelines

Stakeholders' perspectives on the values of eHealth technology

- *is there any need for a new system?*
- *what are the benefits, given the observed problems?*
- *what are the critical design factors?*
- *what are the conditions for implementation?*
- *SPACE for INNOVATION*

RESULTS: Design requirements



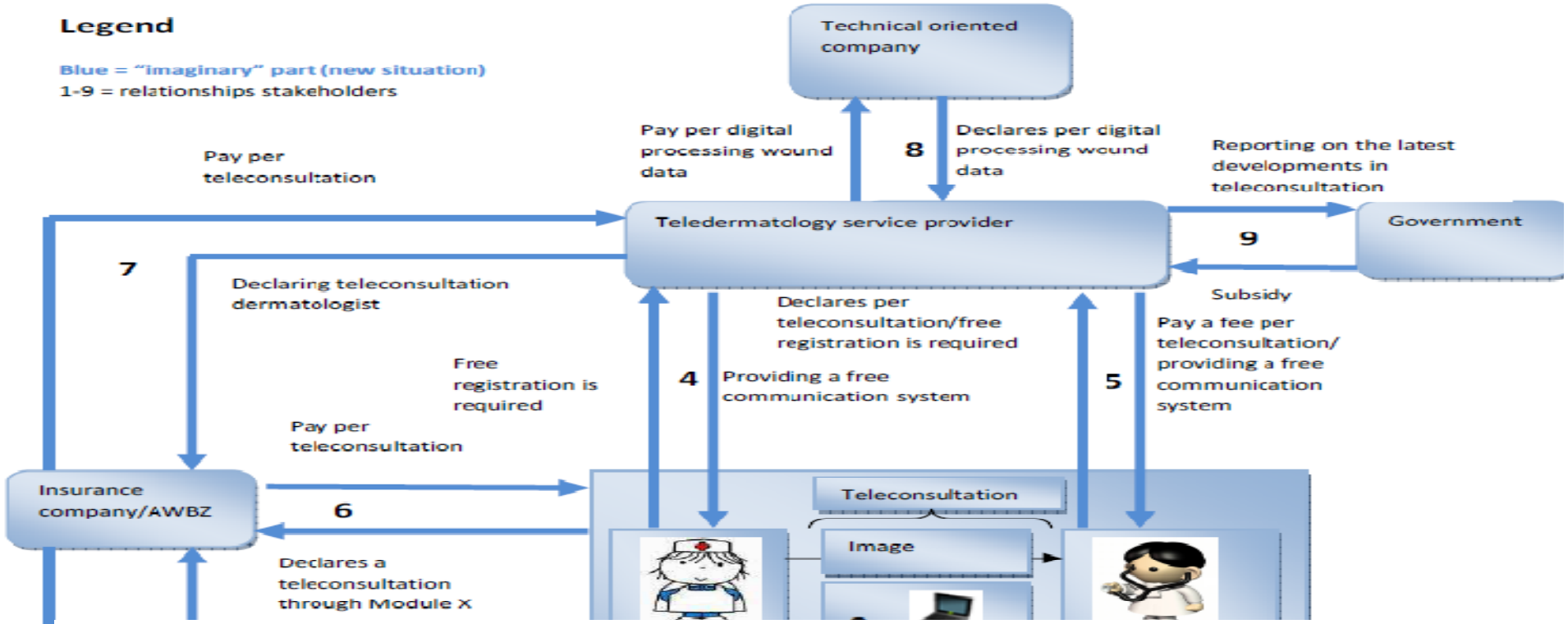
Specialized wound care nurse: "It would be excellent to use a tool to consult the GP"

Dermatologist: "Technology shall help with coordination of work

FIT

Manager home care: "A patient file (EPD) especially for wound care."

Health-technology-development is more than designing, engineering a good "thing" or stand alone device, it is about creating *an infrastructure* for communication and the organization of care



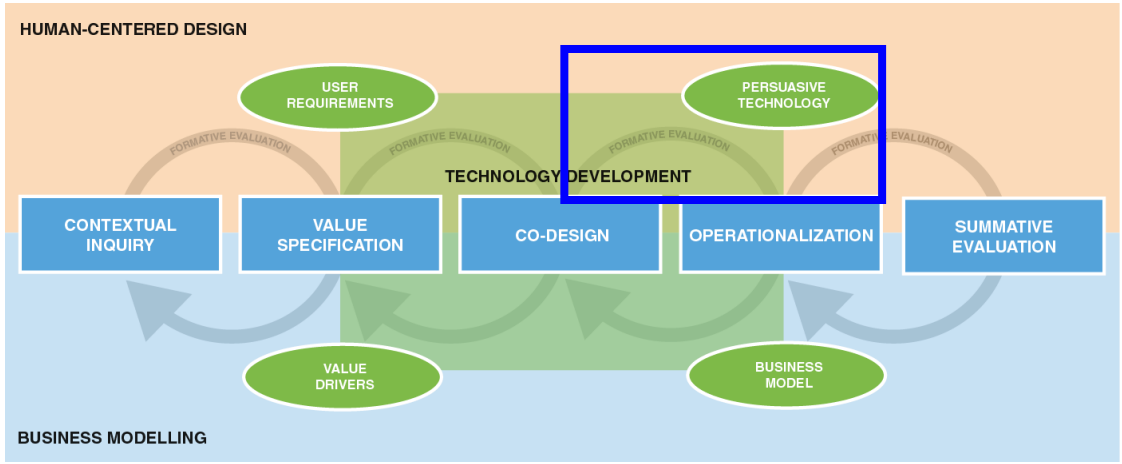
Technology a catalyst to create an infrastructure for improving service; technology not a purpose in it self

Editorials and Commentary

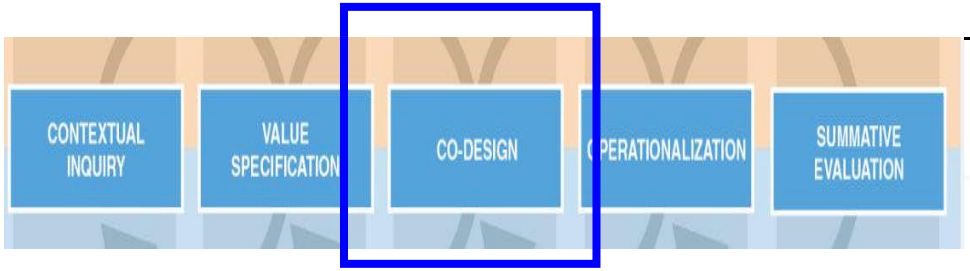
Answering the "What Works?" Question in Health Behavior Change

Gregory J. Norman, PhD

What are the capacities of technology to motivate, inspire?



2 Persuasion via social media..



- Persuasive technologies to increase adherence, SOME to trigger, to remind, to educate

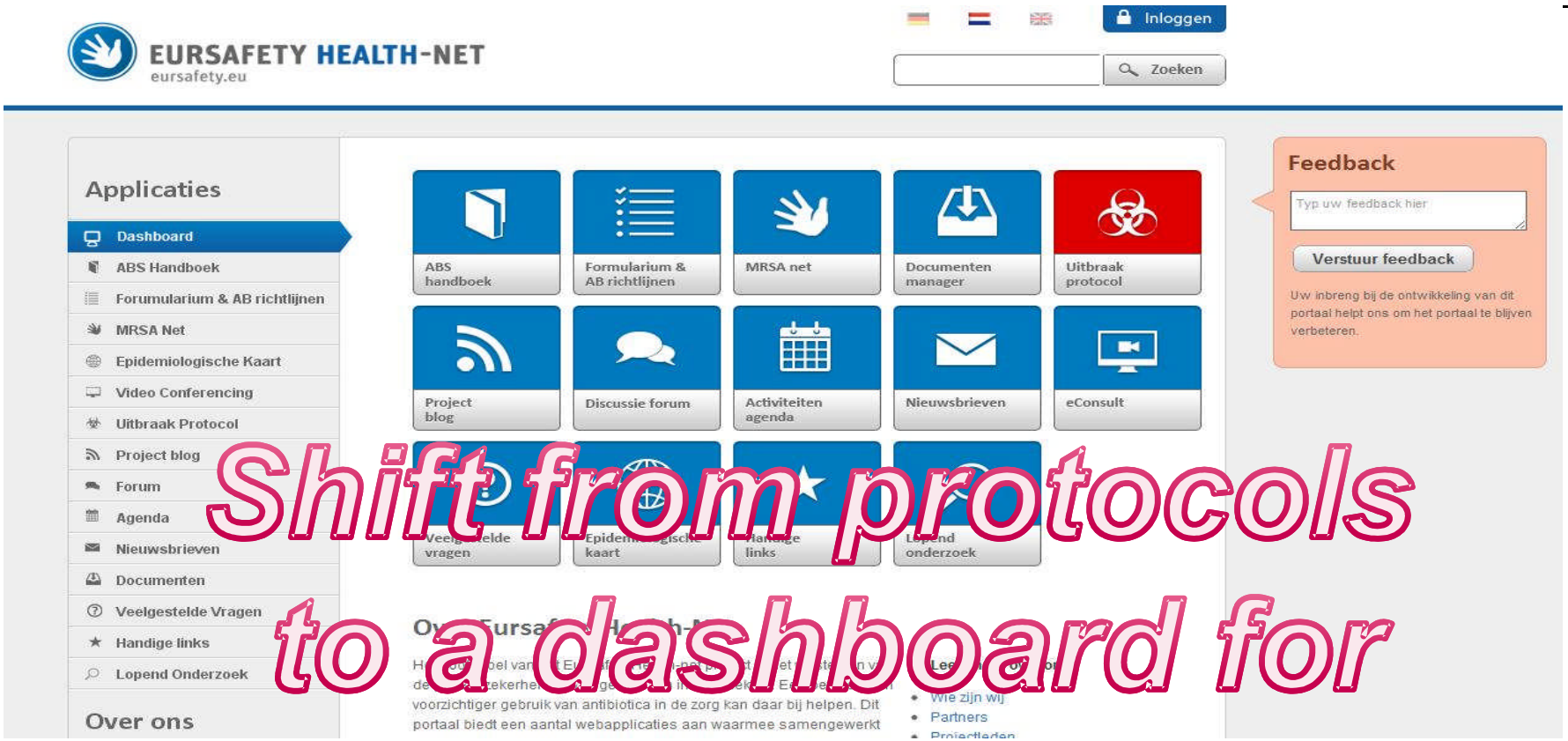
- “Healthy Mouth Means Healthy Life, and
- Healthy sex ”

IMPACT ON ADHERENCE VIA PERSUASIVE TECHNOLOGY

3 Technology that inspires and motivates to safe behavior

3

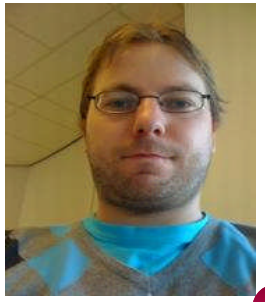
Co-creation of an Antibiotic Stewardship Program

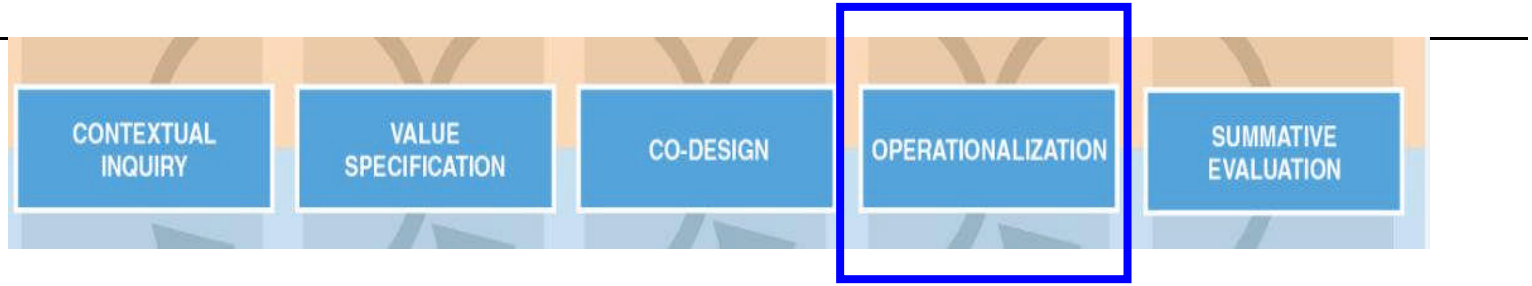


Shift from protocols to a dashboard for communication

Co-design, [illegible]
-awareness, education, cooperation, outbreak management

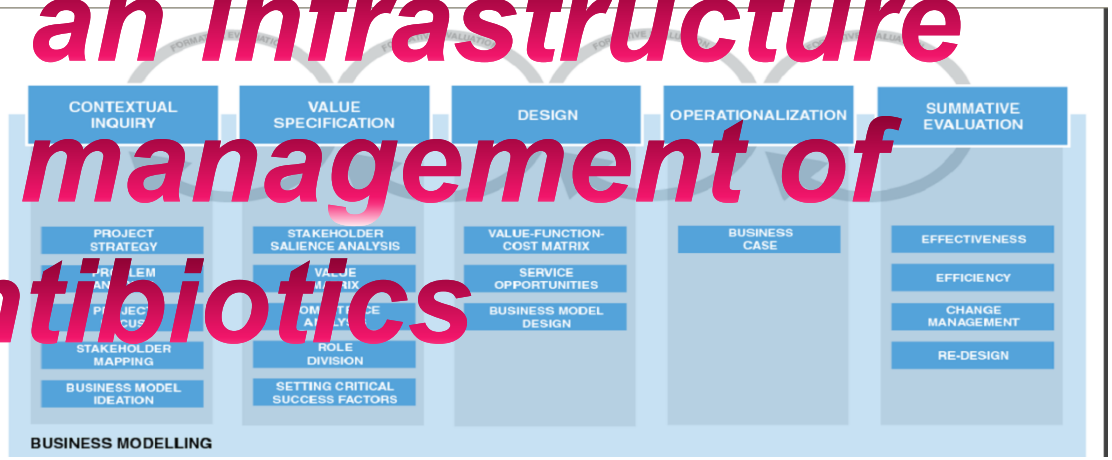
Implementation of an Antibiotic Stewardship Dashboard





Shift from protocol-driven thinking to an infrastructure for better management of antibiotics

- **Business Modelling**
- Critical factors to achieve, risks, and costs
- Establishing the business case



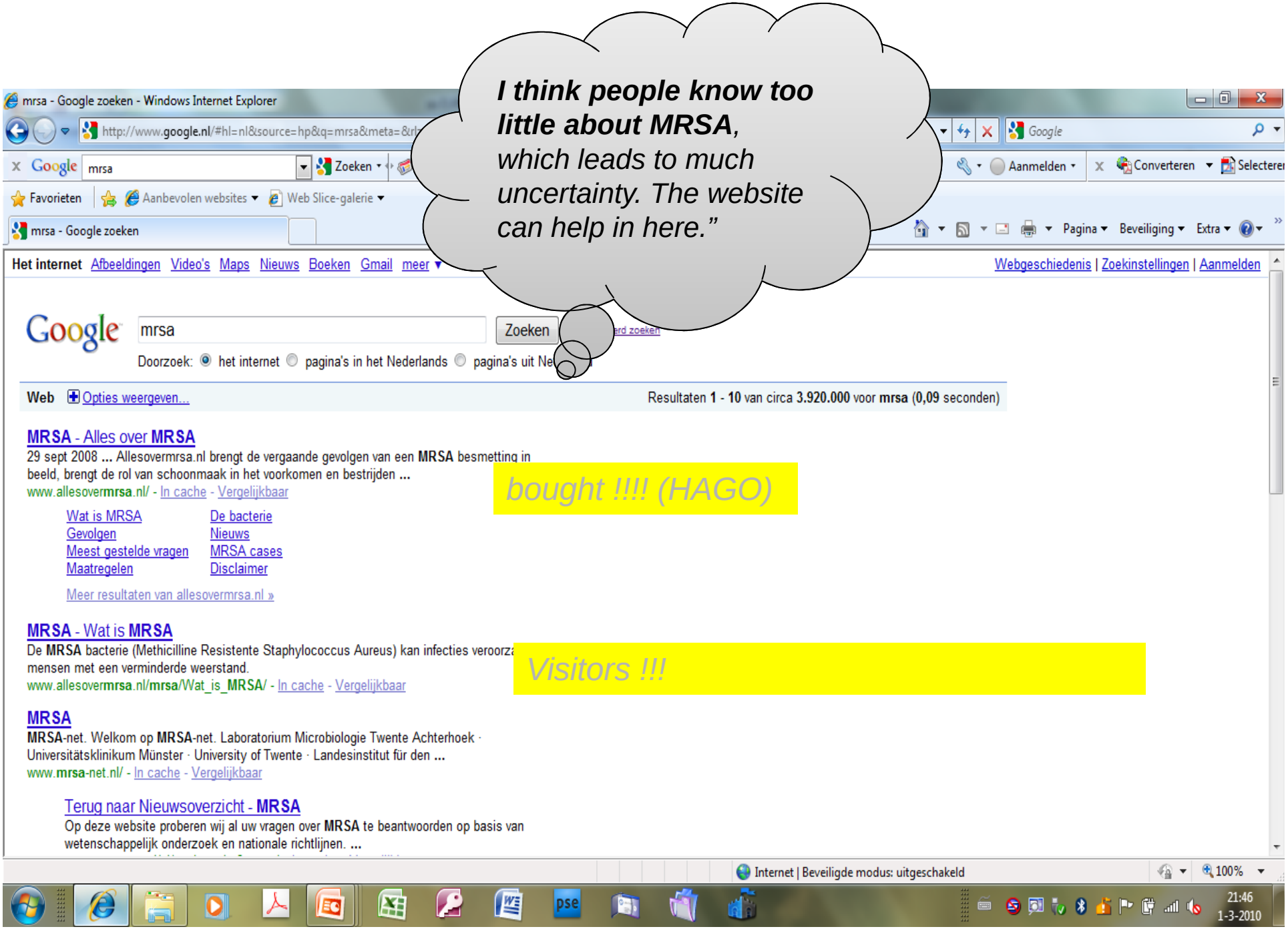
Methods To ground eHealth

To know Why and How technology can make a difference- or not- in healthcare:

- ❖ longitudinal process studies (focus on drop-outs & persistence)
- ❖ observations of real-time usage (user-profiles)
- ❖ evaluation methods to know how technology evolves over time
- ❖experiments to put persuasion into technology (tech-profiles)
- ❖Robust evaluation methods to measure effects; a bird's eye view on the impact of technology on healthcare (human, legal, ethical challenges, cost-benefits)

Benefits of the Framework MRSA-NET.NL

CO-CREATION OF A WEB-BASED COMMUNICATION SYSTEM ; 2008


I think people know too little about MRSA, which leads to much uncertainty. The website can help in here."
mrsa - Google zoeken - Windows Internet Explorer
http://www.google.nl/#hl=nl&source=hp&q=mrsa&meta=&rl
Google
mrsa
Zoeken
Aanmelden
Converteren
Selecteren
Favorieten
Aanbevolen websites
Web Slice-galerie
mrsa - Google zoeken
Pagina
Beveiliging
Extra
Het internet
Afbeeldingen
Video's
Maps
Nieuws
Boeken
Gmail
meer
Webgeschiedenis | Zoekinstellingen | Aanmelden
Google
mrsa
Zoeken
Doorzoek: het internet pagina's in het Nederlands pagina's uit Ne
Web
Opties weergeven...
Resultaten 1 - 10 van circa 3.920.000 voor mrsa (0,09 seconden)
MRSA - Alles over MRSA
29 sept 2008 ... Allesovermrsa.nl brengt de vergaande gevolgen van een MRSA besmetting in beeld, brengt de rol van schoonmaak in het voorkomen en bestrijden ...
www.allesovermrsa.nl/ - In cache - Vergelijkbaar
Wat is MRSA
De bacterie
Gevolgen
Nieuws
Meest gestelde vragen
MRSA cases
Maatregelen
Disclaimer
Meer resultaten van allesovermrsa.nl »
bought !!!! (HAGO)
MRSA - Wat is MRSA
De MRSA bacterie (Methicilline Resistente Staphylococcus Aureus) kan infecties veroorza
mensen met een verminderde weerstand.
www.allesovermrsa.nl/mrsa/Wat_is_MRSA/ - In cache - Vergelijkbaar
Visitors !!!
MRSA
MRSA-net. Welkom op MRSA-net. Laboratorium Microbiologie Twente Achterhoek · Universitätsklinikum Münster · University of Twente · Landesinstitut für den ...
www.mrsa-net.nl/ - In cache - Vergelijkbaar
Terug naar Nieuwsoverzicht - MRSA
Op deze website proberen wij al uw vragen over MRSA te beantwoorden op basis van wetenschappelijk onderzoek en nationale richtlijnen. ...
Internet | Beveiligde modus: uitgeschakeld
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1-3-2010

Benefits of the eHealth framework

- Technology no stand alone device, but a catalyst for innovations, new way of thinking how to support healthcare via technology in a Digital Society
- Better adherence to safe behavior via co-creation
- Better implementation via stakeholders' involvement /investment
- Staff, patients can manage IT; participation=motivation
- eHealthwiki, instruments to judge the true value of eHealth interventions (overall impact)
- eHealth-education-roadmap (students & caregivers, developers)

Thanks..

IBR
RESEARCH INSTITUTE FOR
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www.ehealthresearchcenter.nl

Leaflets CeHRes (registration desk)

EVERYTHING THESE DAYS IS DOT-COM THIS AND DOT-NET THAT! I JUST CAN'T STAND IT ANYMORE!!!
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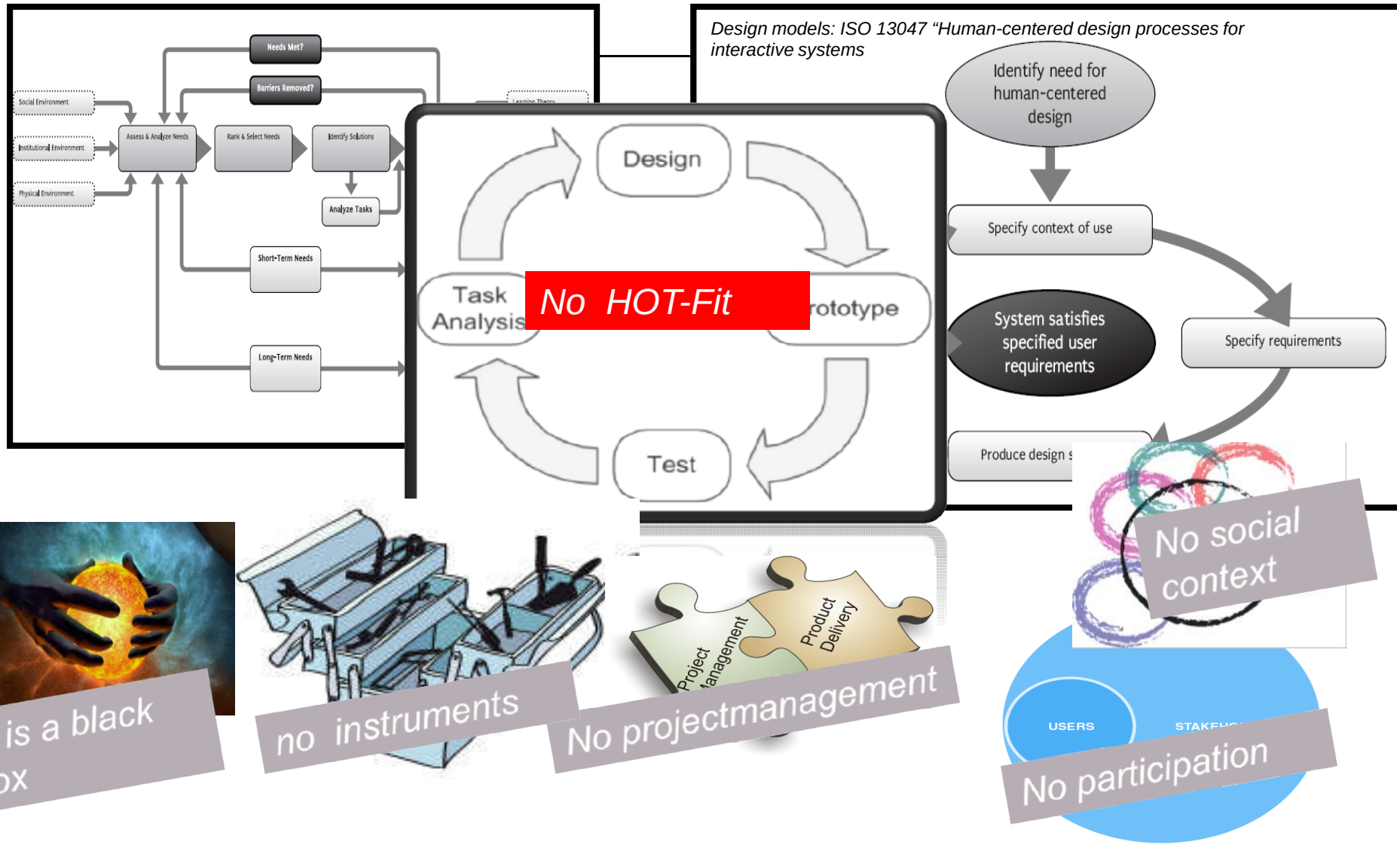
Expert driven eHealth models
(review Van Gemert-Pijnen, Nijland et al)



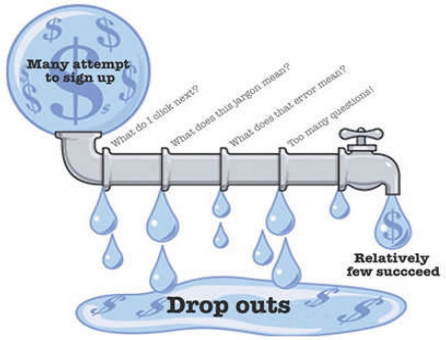
Benefits of the eHealth framework

- Technology no tool or end in it self, but a catalyst for innovation
- Investments through stakeholder-engagement (commitment, trust, power)
- Participatory development (staff, patients that can manage IT)
- Human touch, High Impact via user-engagement
- eHealthwiki, instruments to judge the true value of eHealth interventions (overall impact)

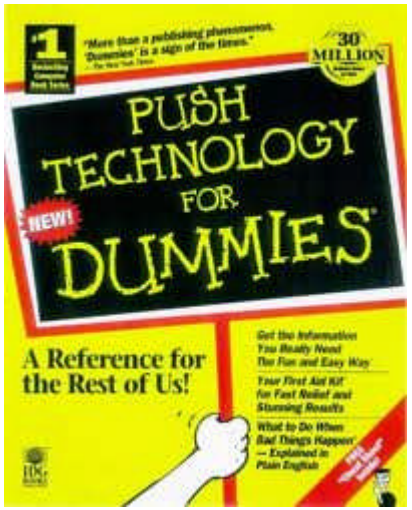
Benefits, human centered and value driven framework

- Technology no tool or end in it self, but a catalyst for innovation,
- Development= creating an infrastructure for service management
- Human touch, High Impact via engagement
- eHealthwiki, instruments to judge the true value of eHealth interventions (total impact)

Why Technology has limited value..



- Supply-driven technology disregards needs and demands (frustration)
- Medical-driven technologies have a focus on ill-management apps, not on well-being and lives to live (ceiling effects; drop outs)
- Absence of adequate business models hinder up-scaling (unclear who benefits)
- Shortage of fully qualified eHealth professionals (no fit between offline-online care;)
- Lack of HOT-fit (shadow-organisation)



Persuasive technology and personalities (Halko&Kientz, 2010)

- More or less persuadable (Big Five Personalities)
- Conscientiousness successful for tech-persuasion (realising goals)
- Extraversions hard to persuade via tech
- Openness more likely to favour competitive or authoritative tech
- Agreeableness not very successful to persuade via tech
- Neuroticism no cooperation, enjoyment of negative reinforcement

Technology fits with personalities

Need for participatory development

- “ success in achieving change is enhanced by the active participation of members from the target user groups […] to ensure that planners have a structure in place to engage system end-users effectively from the start.” (Kukafka, 2003)

- “There is a need for evaluation research at each stage of development and implementation, from conception to the routine operational use ” (Kaufman, 2006)

- The ability of eHealth to empower consumers, support dynamic information exchanges among organizations, and “flatten” organizational hierarchies might result in a need for new organizational strategies, business models, service delivery models, and management mechanisms.” (Ganesh,2004)

Co-creation via participation of users, stakeholders

- **Human-centered**
  - Usability theories (smart, simple)
  - Persuasive technology (motivation, empathy)
  - Health behavioral theories (self-control, adherence)

- **Value-driven**
  - Holistic model (*fit between human, technology, organization*)
  - Business modelling for value creation
  - Participation of key-stakeholders during development process

Integration of 4 levels; holistic approach eHealth

Table 1
Challenges associated with eHealth research

Dimension	Major challenges
Design and methodology	Deductive vs. inductive approach
	Randomization of subjects and/or technology
	Clinician buy-in and commitment
	Recruitment of subjects
	The "digital divide" as a source of bias
Technology	Technical requirements related to the hardware and software
	Infrastructure and resources needed to support the technology
	Vendor relations and support
	Staff, subject training
	User satisfaction with the system and the project
	Overall system maintenance
Environmental	HIPAA regulations
	IRB requirements
	Funding/reimbursement for services provided
Logistical	Roles and responsibilities of a multi-disciplinary team
	Procedures for data collection
	Communications

HIPAA, Health Insurance Portability and Accountability Act; IRB, Institutional Review Board.

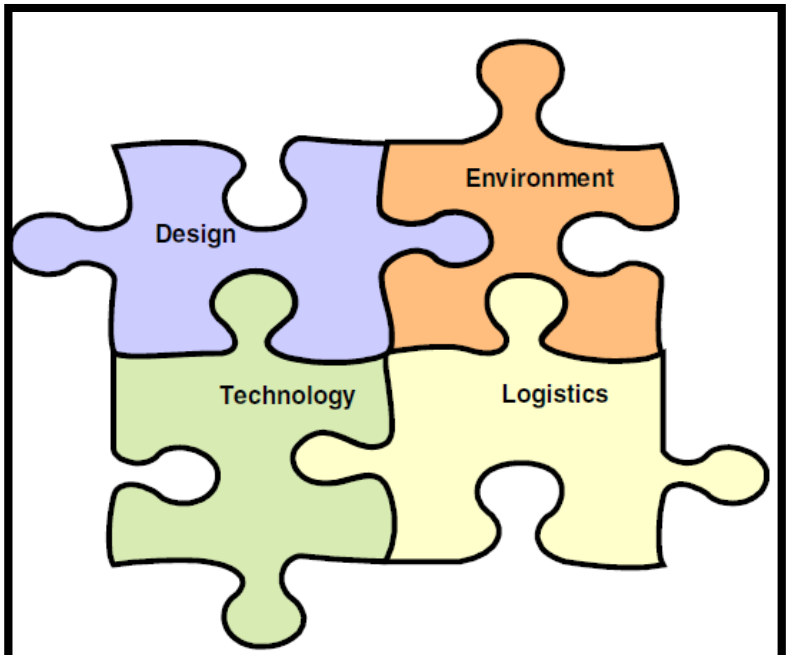


Fig. 1. Dimensions of eHealth research.

K.H. Dansky et al, 2006

eHealth "a way of thinking about supporting health by technology"

- "eHealth is not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology." (Eysenbach, 2001)

IMPACT ON ADHERENCE VIA PERSUASIVE TECHNOLOGY

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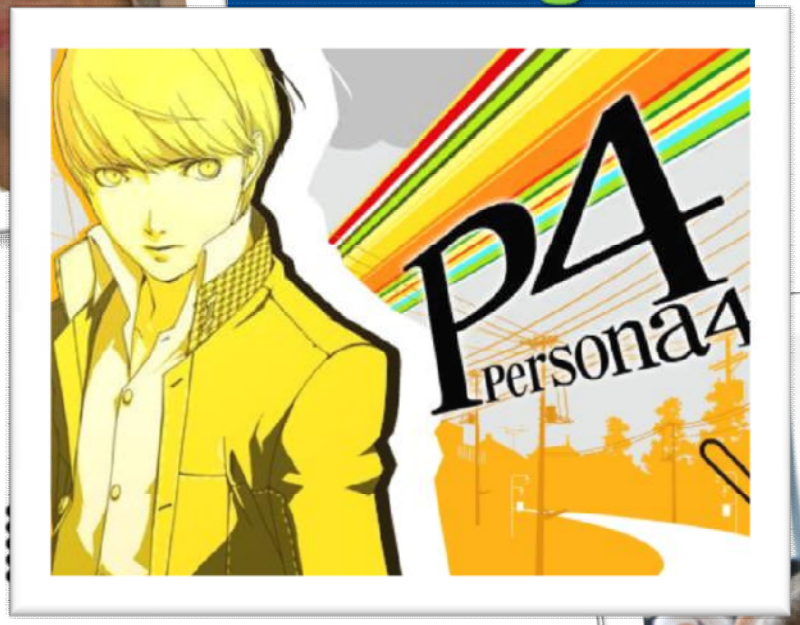

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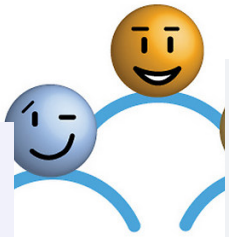

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