

IIT-SRC16

Bratislava 28 June 2016

How can we re-interpret 'requirements engineering' in this age of 'computers everywhere for everyone'?

**Geraldine Fitzpatrick**

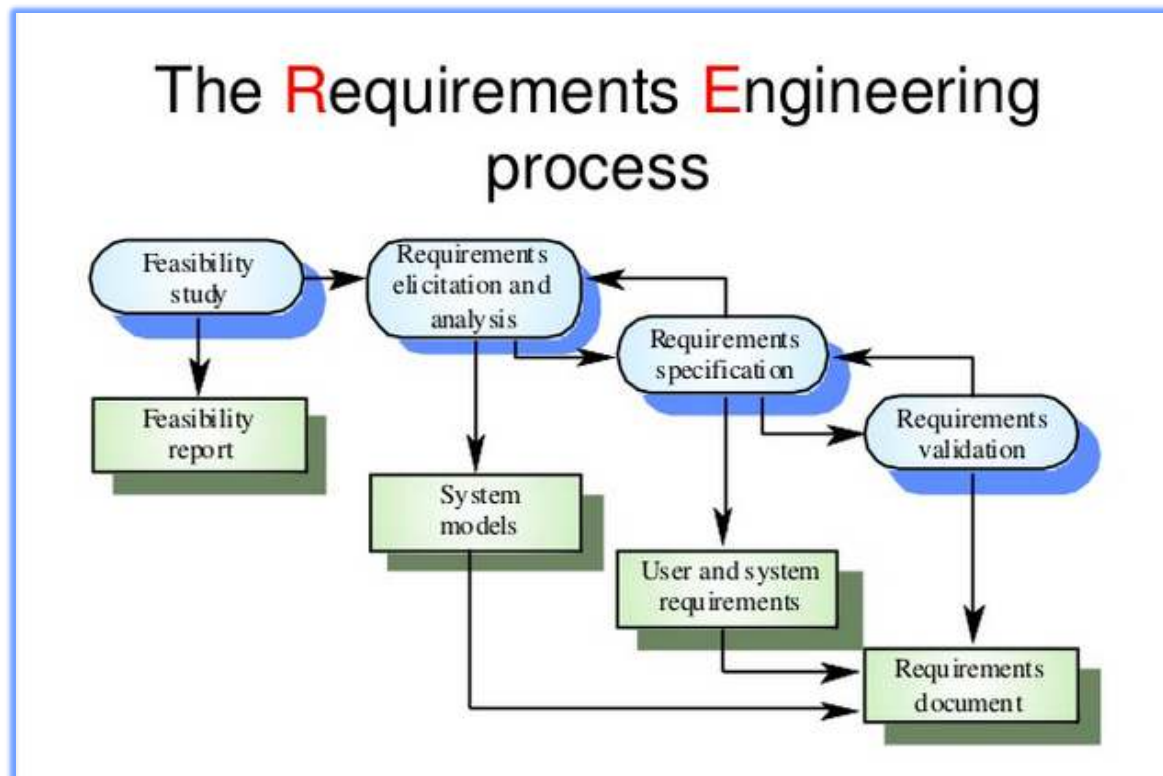
Institute of Design and Assessment of Technology – HCI Group  
Vienna University of Technology [TU Wien]

<geraldine.fitzpatrick @ tuwien.ac.at>

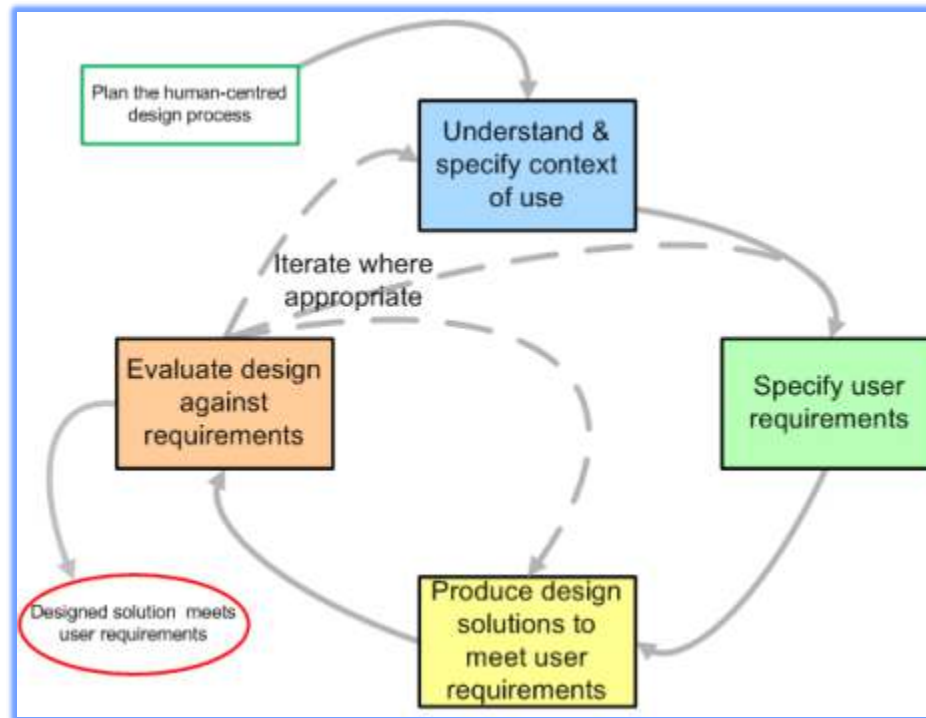


“... requirements involves finding out what want from a computer system, and understanding what it means in terms of design”

[Sutcliffe 2014]



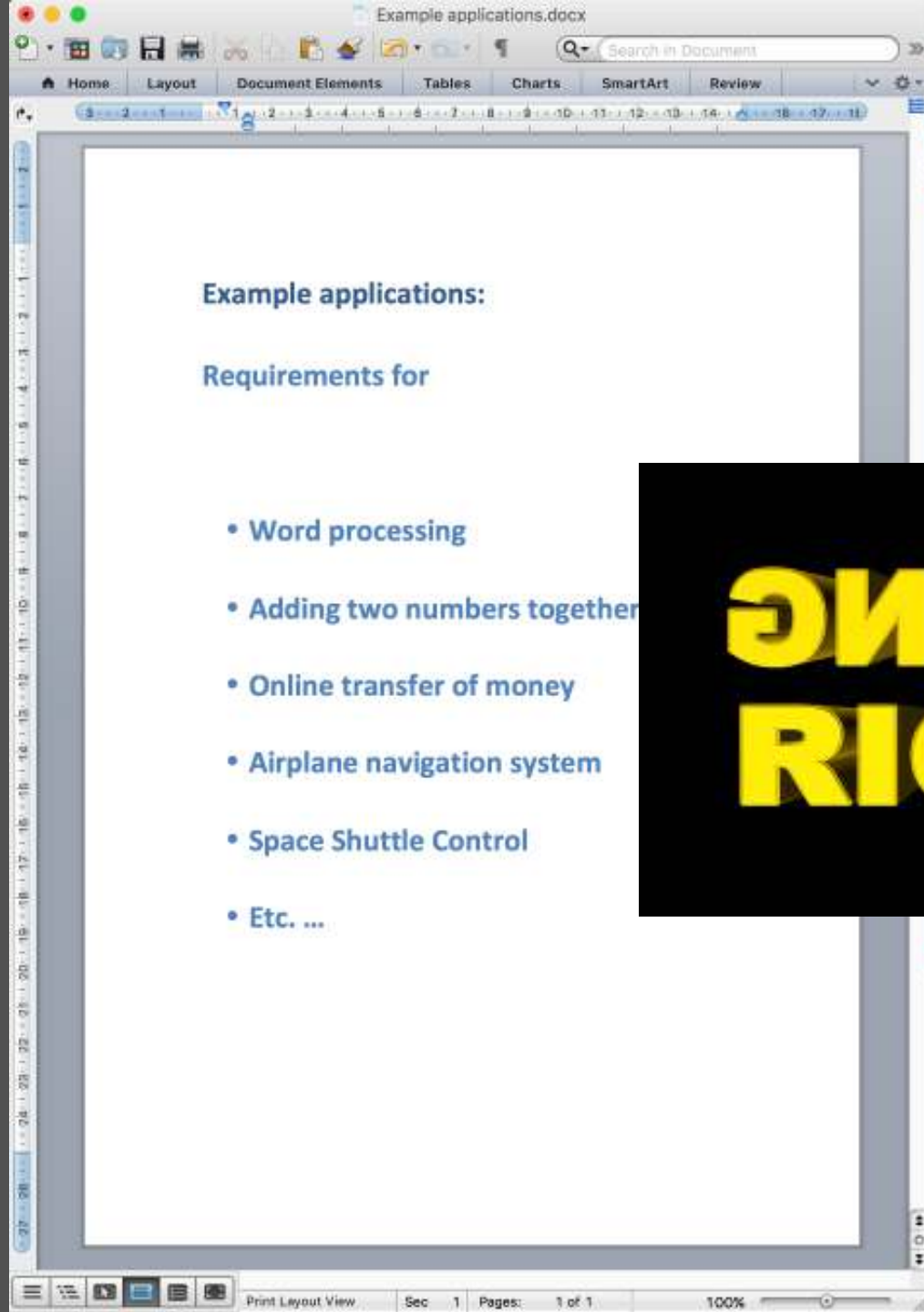
## Human-centred design (HCD Standard) for interactive systems





Erik Pitti (Flickr: IBM System/360 Mainframe)  
[CC BY 2.0 (<http://creativecommons.org/licenses/by/2.0>)],  
via Wikimedia Commons

PC Photo: Jim Merithew/Wired –  
[http://www.wired.com/2012/12/the-decades  
-that-invented-the-future-part-8-1981-1990/](http://www.wired.com/2012/12/the-decades-that-invented-the-future-part-8-1981-1990/)



**WRONG**  
**RIGHT**



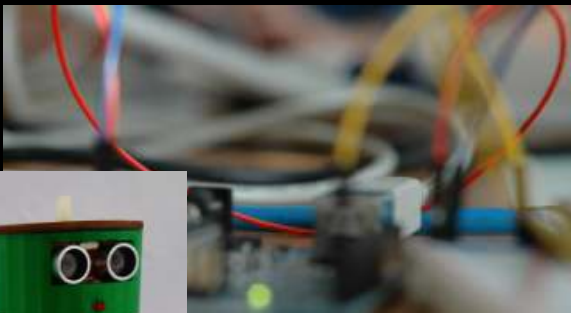


Bild 9: Sensorknoten über dem Herd.



Bild 8: Wohnungsskizze mit eingezeichneten Systemkomponenten.



# Requirements?



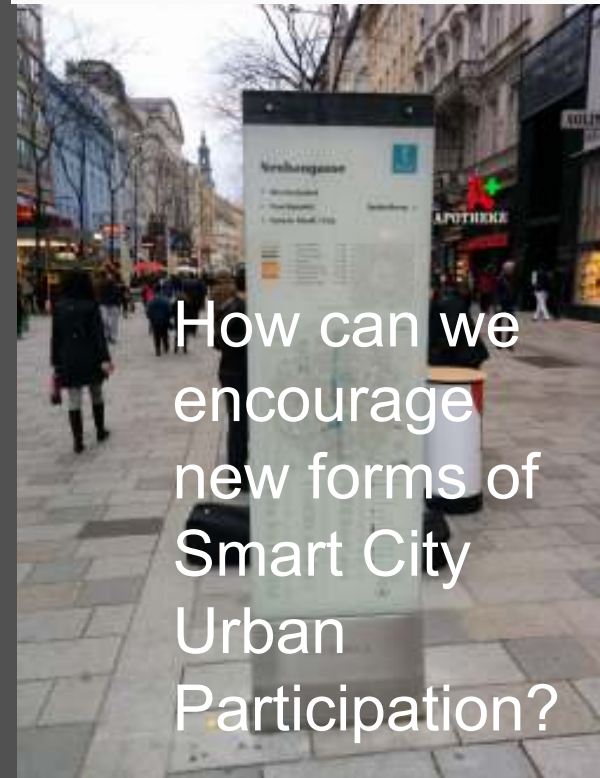
# SERIOUS BEATS

Internet Use and Friendship Structures of young migrants in Vienna: the Question for Diversity within Social Networks and Online Social Games.

*"Can an online social music game allow Viennese teenagers to change their understanding of cultural diversity in order to overcome ethnical boundaries?"*

# GIVE & TAKE

How can we make giving and taking easier for senior citizens?



How can we encourage new forms of Smart City Urban Participation?



Older definitions imply:  
requirements waiting to be picked, gathered?



Maybe with a bit more effort ...  
but still 'there' waiting to be found?





# 'Requirements' in the age of 'computers everywhere'?



*Endless Possibilities*

Even if we think some 'requirements' are straight forward and clear

....

# **CASE STUDY 1**

## **ELECTRONIC HEALTH RECORDS**

# From early pilot Electronic Patient Records...

1960s Dr Lawrence Weed - PROMIS project [[video](#)]

*“it is going to be possible to... relieve the nurses and the doctors of some paperwork ... do correlation of diseases ... eliminate errors in medication”*



**1961 electronic medical records**



## ...to large scale eHealth Record Initiatives

- Australia: 2001 National eHealth Project **AU\$1 billion**
- UK: 2002 National Programme for IT **£12-14bill**
- US: Nationwide Health Information Network **US\$20 billion**
- Canada: 2001 Canada Health Infoway **CAD\$2.1 billion**
- Austria: Elga etc
- 2012 WHO National eHealth Strategy Toolkit



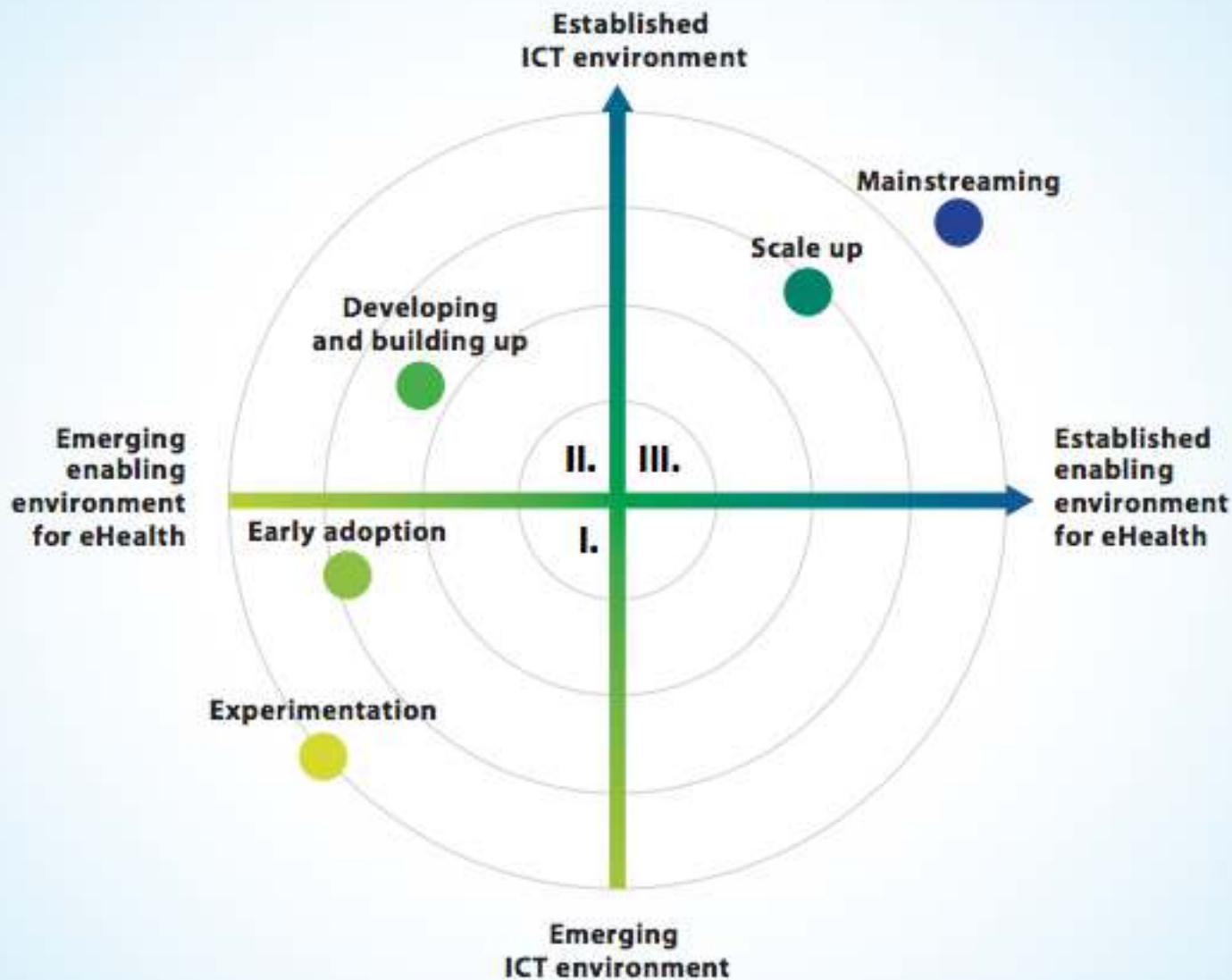
# WHO: Toolkit components



<http://www.who.int/ehealth/publications/overview.pdf>

# WHO National eHealth Strategy Toolkit

Figure 1. National context for eHealth development



# Australian eHealth Record

news.com.au

news.com.au | health

## Doctors and hospitals barely using \$1 billion e-health record

BY: SUE DUNLEVY NATIONAL HEALTH REPORTER

FROM: NEWS CORP AUSTRALIA NETWORK

4 MONTHS AGO NOVEMBER 21, 2013 8:00PM



Former AMA president Dr Mukesh said many hospitals and specialists lacked the proper software to read the summaries. Source: News Corp Australia

**JUST one per cent of the patients who have signed up to the Government's \$1 billion e-health scheme have a doctor's clinical summary on their record - which is the point of the initiative.**

The scheme has been going for 17 months but some hospitals in Queensland and NSW have only been able to read the records in the past few weeks.

Despite the glacial uptake of the record Health Department chief Jane Halton says the progress being made "is reasonable".

# NHS hit by new tech failure as it scraps patient booking system

Cost £356m since 2004

Choose and Book outpatient appointments system set to be replaced by a potentially more expensive e-referral scheme



MPs were told by NHS staff that while some GPs liked Choose and Book, many did not, and that not all appointment slots were available on it. Photograph: MBI /Alamy

<http://www.theguardian.com/society/2014/may/10/nhs-online-choose-and-book-system-scraped>

**Toby Helm and Denis Campbell**

Saturday 10 May 2014 21.53 BST



18 May 2011 Last updated at 09:35 GMT

195 [Share](#) [f](#) [t](#) [✉](#) [🔒](#)

## £7bn NHS electronic records 'achieving little' for patients

By Nick Triggle

Health correspondent, BBC News

**Patients are getting "precious little" from the NHS electronic care records system in England, a watchdog says.**

The £7bn system to replace paper files is falling further behind schedule and in places where it has been introduced it is not working as it should.

The National Audit Office also said some patients would not even get one as large chunks of the NHS had pulled out.

In conclusion, the NAO said the system was not providing value for money - something the government rejected.

Electronic care records are the key part of the overall £11.4bn NHS IT project.

The scheme was launched in 2002 with the aim of revolutionising the way the health service uses technology and also includes developments such as digital x-rays and fast internet connections.



Paper records will be uploaded

### Related Stories

[GP warning over database access](#)

[Fresh debate over medical records](#)

[Temporary halt to NHS care record roll-out](#)



# Example: requirements Medication sheet

Handwritten medication sheet with a grid. The first entry is for 'gutt xalcin eye drops' with a dose of 'i' and frequency of 'note'. The second entry is for 'chloramphenicol eye drops' with a dose of 'ii' and frequency of 'q4h'. A handwritten note on the right says: '? this order should be re-written for xalatan'. A handwritten note on the left says: 'does this order work?'. The grid contains various handwritten notes and signatures.

**REGULAR PRESCRIPTIONS**

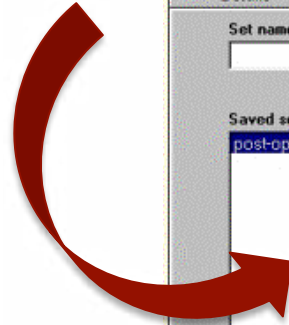
U.R. No.: \_\_\_\_\_ D.O.B.: \_\_\_\_\_

NAME & ADDRESS: \_\_\_\_\_ WARD: \_\_\_\_\_

Affix patient identification label here

YEAR	DATE & MONTH	TIMES

DRUG, DOSE & FREQUENCY	Pharmacist	
	Route	
	I.V. Method	
	First Dose Date	
	M.O. Signature & Date	
DRUG, DOSE & FREQUENCY	Pharmacist	
	Route	
	I.V. Method	
	First Dose Date	
	M.O. Signature & Date	



Software interface for managing prescriptions. It features tabs for 'Drugs', 'Procedures', 'Details', 'Doctors', 'Clinical', 'Diagnoses', 'Letters', and 'Prescribe'. The 'Prescribe' tab is active, showing a 'Set name' field with 'Acetylcysteine 10% eye drops' and a 'Find' button. Below this is a table of saved sets:

Date	Drug	Frequency	Route	Duration
02/03/01	Chloramphenicol eye drops			
02/03/01	Dexamethasone 0.1% eye drops	qid	RE	
02/03/01	Cyclopentolate HCl 1% e/d	qid	RE	
02/03/01	Acetylcysteine 10% eye drops		RE	

Buttons for 'Delete Set', 'Save Set', 'Clear', 'Repeat', and 'Print' are visible. A note at the bottom states: 'Please note that prescriptions are only saved when printed.'



# But how is the medication sheet actually used?

Drug		Route	
gutt xalcan eye drops		top.	
Dose	Frequency	Start Date	
i	nocte	18/4	
M.O. Signature		Pharmacist	
		OWN - NOT AVAILABLE AT PHARMACY	
Drug		Route	
chloramphenicol eye drops		0400 / VA 113	
Dose	Frequency	Start Date	
ii	q4h	25/4	
M.O. Signature		Pharmacist	
		2000	
Drug		Route	
maxolon higher		D	

? this order should be re-written for xalatan

does this order need to be written in the notes?

- Just in time, just in place communication

## Main message

*Even if we think some 'requirements' are straight forward and clear .... We need to understand how the technologies will fit into everyday practices*

Medical record as ...



Information object, archival record of a medical encounter?



Enabling communication & cooperation among clinicians caring for a patient?



How we conceptualise the issue, who we think we are designing for ...

# **CASE STUDY 2**

## **OLDER PEOPLE**

# Physiological changes with aging



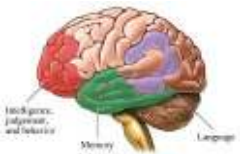
Vision



Hearing



Body/motor



Cognition





W3C Home

**Web Accessibility Initiative (WAI)  
Home**

Getting Started

Designing for Inclusion

- How People with Disabilities Use the Web
- Web and Older Users
  - **How WCAG 2.0 Applies**
- >> ▪ Literature Review
- Mobile Web

Guidelines & Techniques

Planning & Implementing

Evaluating Accessibility

Presentations & Tutorials

Getting Involved with WAI

*Discover new resources for people with disabilities, policy makers, managers, and you!*

ଅମୃତକାନ୍ତ Translations

## Developing Websites for Older People: How Web Content Accessibility Guidelines (WCAG) 2.0 Applies

An extensive [literature review](#) identified that existing standards from the W3C Web Accessibility Initiative ([WAI](#)) address the accessibility needs of older web users. This page introduces how to use Web Content Accessibility Guidelines (WCAG) 2.0 to improve the accessibility and usability of websites and web applications for older people.

Please see [Web Accessibility and Older People: Meeting the Needs of Ageing Web Users](#) for additional background and resources on the overlapping needs of older people and people with disabilities.

### Page Contents

- [About WCAG 2.0](#)
- [How WCAG 2.0 Applies to Older People](#)

#### Perceivable information and user interface

- [Text size](#)
- [Text style and text layout](#)
- [Color and contrast](#)
- [Multimedia](#)
- [Text-to-speech \(speech synthesis\)](#)
- [CAPTCHA](#)

#### Operable user interface and navigation

- [Links](#)
- [Navigation and location](#)
- [Mouse use](#)
- [Keyboard use and tabbing](#)
- [Distractions](#)
- [Sufficient time](#)

#### Understandable information and user interface

- [Page organization](#)
- [Understandable language](#)
- [Consistent navigation and labeling](#)
- [Pop-ups and new-windows](#)
- [Page refresh and updates](#)
- [Instructions and input assistance](#)



# Design for aging

Eg Amplicom phone



Eg Eldy software



Eg Tunstal

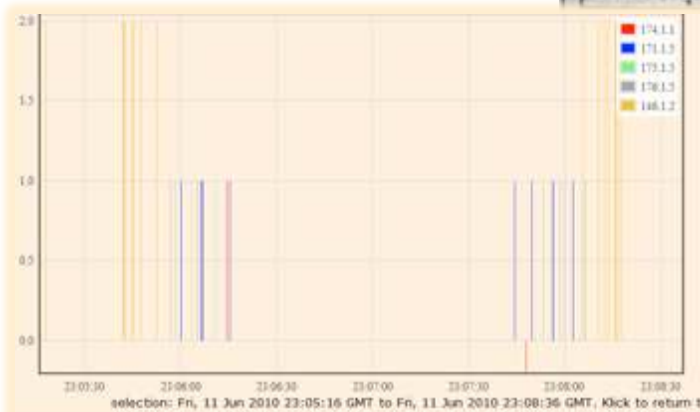
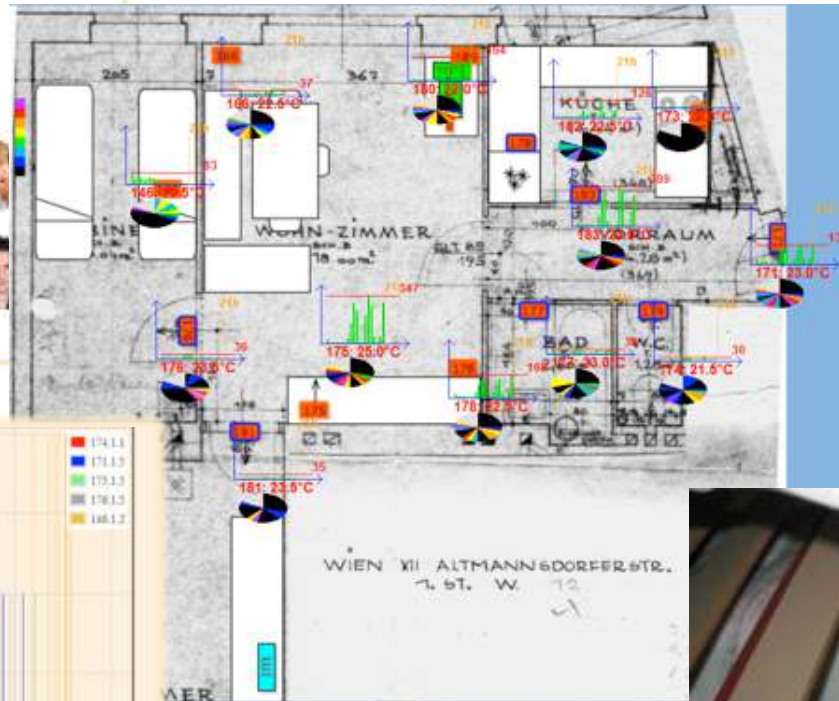
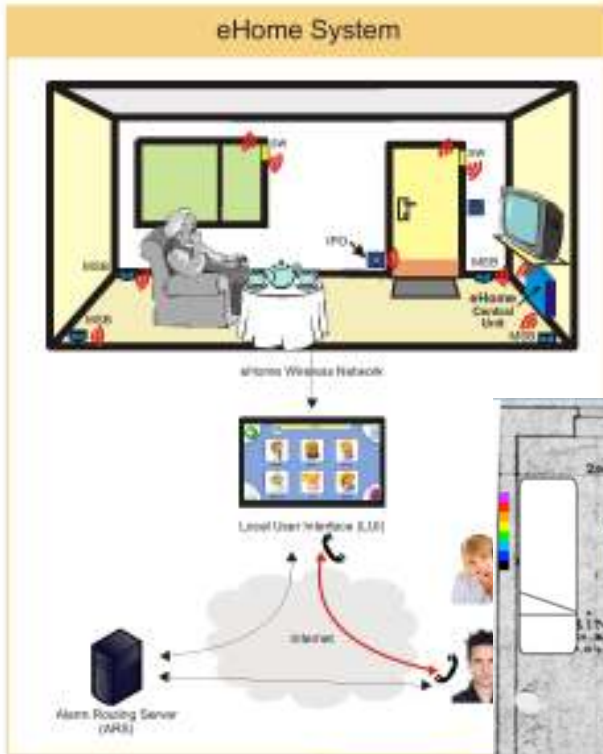


Eg Docobo Home monitoring



# Smart homes

e.g., eHome Activity Monitoring Project



## What outcomes for whom?

Highest  
category of  
logged calls?

false alarms



# What spaces are we designing for?

Lesley Axelrod et al



Kitchen

↪ bathroom



## Sam's house



Sitting room

↪ bedroom





# Understanding taking medication at home

## ... Integrating with spaces & routines

- Eg Medication taking

Drug	guttaxalin eye drops		Route	top.					
Dose	1	Frequency	4	Start Date	18/14				
M.O. Signature		Pharmacist							
Drug	chloramphenicol eye drops		Route	0400 / VA					
Dose		Frequency		0800 / 1200					
M.O. Signature		Pharmacist							
Drug			Route						



[Photos courtesy of Stinne Aaløkke Ballegaard]



# Man vs. Smart House: A Cautionary Tale

Noémie Jennifer — Jul 6 2015



<http://thecreatorsproject.vice.com/blog/man-vs-smart-house-a-cautionary-tale>


# What do older people say they want?

– From studies of people learning to use computers (Jose Rojas, Dave Harley, AC Silver Surfer Week reports, Goodman et al, etc)

- Keeping in touch – family, friends
- Work, business, study
- Hobbies, interests, ongoing learning
- Information seeking
- Connecting with family history, life stories
- Contributing, volunteer work
- Not AT/AAL etc ...



# How do older people see themselves?


A photograph of an older man and woman standing on a wooden pier. Both are wearing black wetsuits with yellow and blue accents. The man has his arm around the woman's shoulder. They are both smiling. In the background, there is a body of water, palm trees, and a building with a thatched roof.

“And I’ll get old later but on my terms if I can keep learning and adapting and if we can keep compensating for the things that happen” [Jim]

Reflects newer ‘developmental’ theories of aging



What about connecting, contributing  
instead of monitoring?



Huge evidence base  
associating better health and well being  
with active participation  
and giving, volunteering.





Peter Oakley

# The Internet Granddad



<https://www.youtube.com/user/geriatric1927>



geriatric1927

Home Videos Playlists Channels Discussion About



Series 2 - In conclusion  
115,969 views • 2 years ago



Telling it all series 2 - The course at Robert Gordans College ...  
7,092 views • 2 years ago



Telling it all series2 - A move to the next "ship"  
3,632 views • 2 years ago



Tellint all series2- I get called for the medical.  
3,308 views • 2 years ago



Telling it all series2 - School days over I start work.  
2,327 views • 2 years ago



Telling it all series 2 - some pictures from previous events.  
2,273 views • 2 years ago



days  
3,202 views • 2 years ago

war years  
4,694 views • 2 years ago

9.8 million views



Telling it all Series 2 - An introduction  
51,929 views • 2 years ago



2013 11 13 20:32:13  
3,818 views • 2 years ago



Rumours  
5,262 views • 2 years ago



Apples and Charities  
2,579 views • 2 years ago



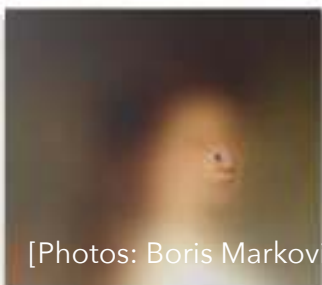
Linked Accounts  
1,900 views • 2 years ago

[Dave Harley - PhD]





Exploring values  
'what is for me'





## Main message

*How we conceptualise the issues matters.  
Sometimes we need to re-think who and what we are  
designing for, whose 'needs' we listen to...*



Designing for 'needs'  
Saving money for the health  
care system



Designing for possibilities,  
re-thinking technology uses  
Connecting to quality of life



That we're not just designing a technology...

# **CASE STUDY 3**

## **COMMUNITY BUILDING**



How can we make giving and taking easier for senior citizens?

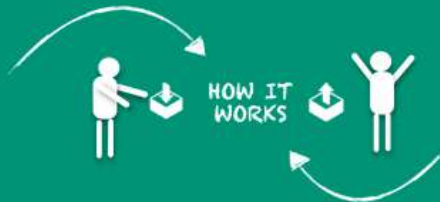
The Give&Take project aims at allowing senior citizens to exchange skills and services in their local community.

Our vision is to create a collaborative network for a better and engaged life for senior citizens.

### THE IDEA

#### GIVE WHAT YOU CAN

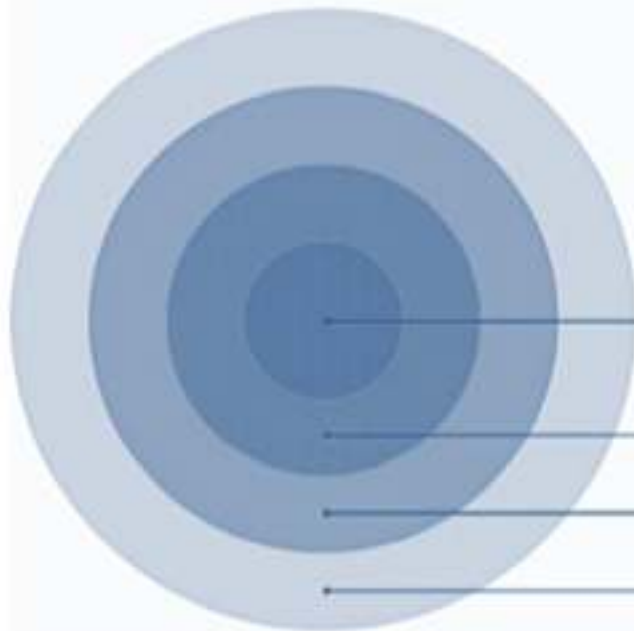
GIVE YOUR TIME, SKILLS OR RESOURCES TO HELP SOMEONE IN YOUR NEIGHBOURHOOD



#### FIND THE HELP YOU NEED

FIND HELP IN YOUR LOCAL COMMUNITY WHEN YOU NEED IT

# User research & participatory design process



**Members** (Participate and contribute)

**Volunteers** (Guide and maintain)

**Coordinators** (Initiate and support)

**Owner** (Make available and pay for the service)



# Encourage people to act themselves

(AUT)



**Volunteers**  
(guide and maintain)

**Members**  
(participate and contribute)



Sibylle, social worker

It is the crowd that makes it work



Sigrid, social worker

It would be great if the platform helps to create a network between the people living in this residential area

(Make available and develop)



# Connect the unconnected (AUT)



Friedrich, member

Older people still like paper a lot. How can those people be reached?



Anna, member

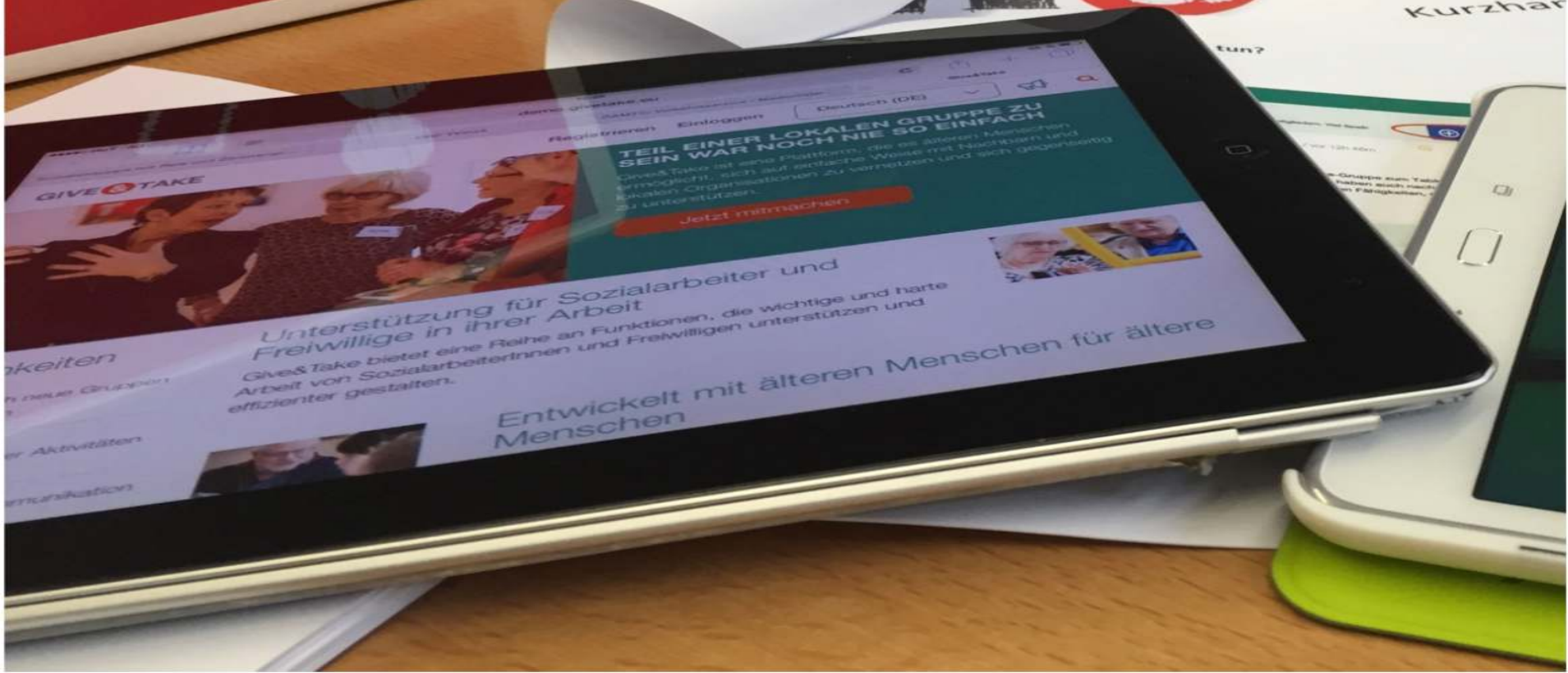
In my opinion contacts are the most important thing.



Members

Yes, but you have to coordinate this. But who will do this?









# The rise of the sharing economy



On the internet, everything is for hire

## SHARING ECONOMY AUSTRIA 2015

**ROOMS**

roumdirekt  
Kinder-Darwin-Arbeitsraum  
KEY TO»» OFFICE  
branchenfrei | jat  
share&spaces.at

**FLATS**

9flats.com  
KURZZEITWOHNEN.COM  
airbnb  
WG-KLICK  
EasyWG  
couchsurfing  
Interhome  
HomeAway  
Wimdu  
Find My Home.at  
HOUSE TRIP

**GOODS**

shpack  
Kleider Kresel  
Kleidermarkt.at  
usetwice  
boxx  
WILKINSEN AT  
Lala  
PDXKERS  
offener Bucherschrank  
book2stock  
teil bar  
VERUMTEILT  
möbelbörse

**FINANCE**

1000x1000.at  
„damit es nicht nur bei einer Idee bleibt“  
CONDA  
Respekt.net  
we  
ES GEHT!  
GREEN ROCKET  
crowd capital  
INJECTPOWER

**TRANSPORT**

CAR EGO  
Carsharing.at  
checkrabi.com  
Flinkster  
car2go  
cristallo.vi  
cb  
Shuttle  
DriveNow  
mitfahrgelegenheit.at  
Bla Bla Car  
share me

**FOOD**

EatWith  
POMODO

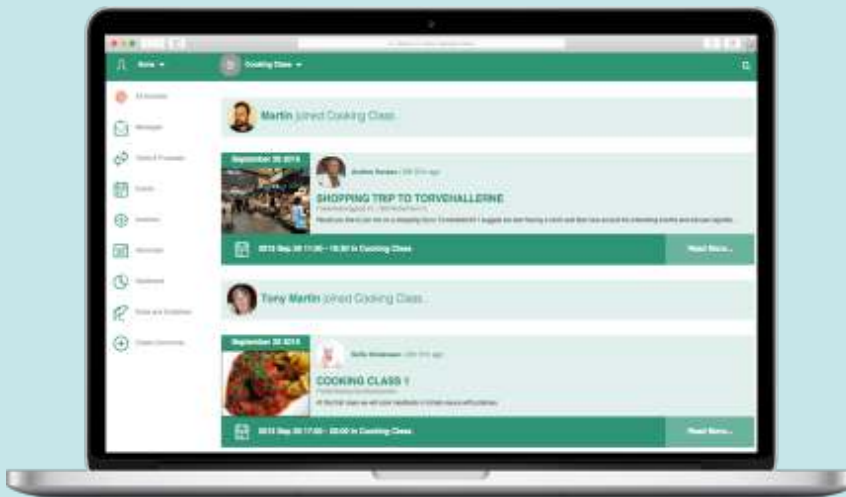
**COWORKING**

HERMINEN GASSET  
popustudios  
smarispaces.it  
Daxbau  
mingo  
TREIB HAUS  
synergy 7  
L'OFFICE COWORKING  
gemeinschaftsbuero.at  
HUB Vienna  
Coworking Wien  
MANAGERIE  
CONVO  
BIZFARM  
NEN  
AWERNER  
PRISMA  
dieBOX  
AXIS  
Basis Lager  
FUNKEN SPRUNG  
dieBOX  
BOX OFFICE  
CONWORKING  
COOPATE

# Main message

*We're not just designing a technology platform, we're designing / enabling new forms of community participation, changing social relationships –*

## **SOCIO-TECHNICAL**



Designing a technical platform  
Platform functionality, usability...



Designing community

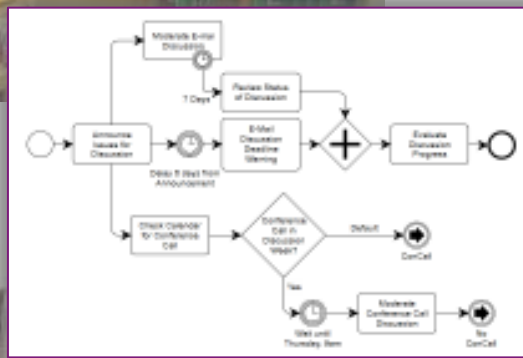
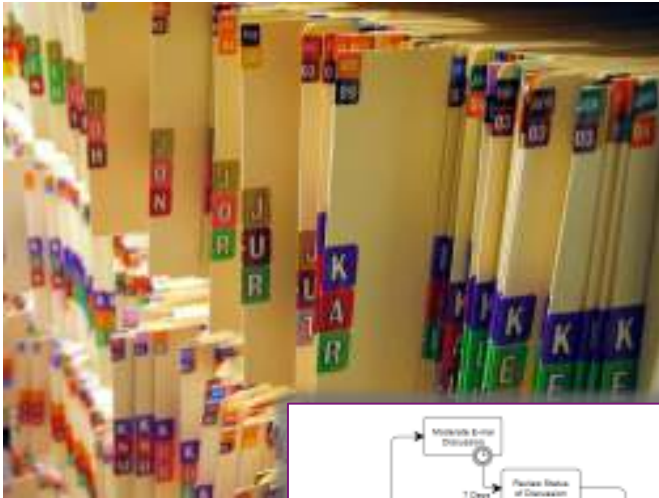
Challenges of critical mass, culture change... The work to put them to work!

# IN CONCLUSION...





# Closed Technical World



Neat Models

Verifiable requirements



# Open Socio-technical configurations



Drug	Route	Time	Frequency	Start Date	End Date	Notes
gabapentin eye drops	Topical	15/14	1000mg	15/14		? this order should be re-written for xalatan
chloramphenicol eye drops	Topical	15/14	1000mg	15/14		
maxolon	Oral	15/14	1000mg	15/14		



Messy reality!  
Quality of Life



Conflicting, negotiated, emergent ...





# Re-interpreting requirements engineering 1

- Conceptual challenges
  - Shift from ‘engineered’, strong requirements, knowability
  - To deep understanding, co-exploration, imagination
  - Considering whole of context, qualities of experience etc
  
- Methodological challenges
  - Not there to be ‘extracted’
  
  - Requires deep people skills
    - Good exploratory interview techniques
    - Going into settings, observing, learning ...
  - Learning by doing and reflecting
  
  - Role of technology ‘probes’ to help explore, learn

# Re-interpreting requirements engineering 2

- Process challenges

- Negotiating competing concerns
- Looking for different voices, perspectives
- Asking ‘what if’, exploring possibilities
  
- Prototyping technology & rehearsing new social configurations
  
- Finding value
  - Critical mass
  - Adoption, appropriation, exploration of value over time