



COGKNOW

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Helping people with mild dementia navigate their day

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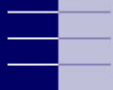
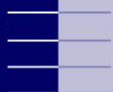
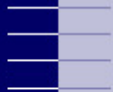
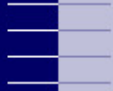
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- **Mission** *“to strengthen the competitiveness and innovation business, as well as improving the quality of our society through the proper application of Information and Communication Technology (ICT)”*
- **Not-for-profit** organisation (foundation)
- **Public-private partnership** between the business community, research centres and dutch government
- The **emphasis** is on rapidly translating fundamental knowledge into market-oriented applications.
- **Key figures:** 17 M € turnover, 180 FTE research-power (40 companies, 60 universities, 80 central organisation), started 1998
- **Central organisation** is located in Enschede (NL)
- **Employees:** most PhD, technical (60%) + life sciences + business





Content of Presentation

- Background
- Aims
- Method
- Field test
- Short video
- Evaluation
- Navigation service
- Conclusions



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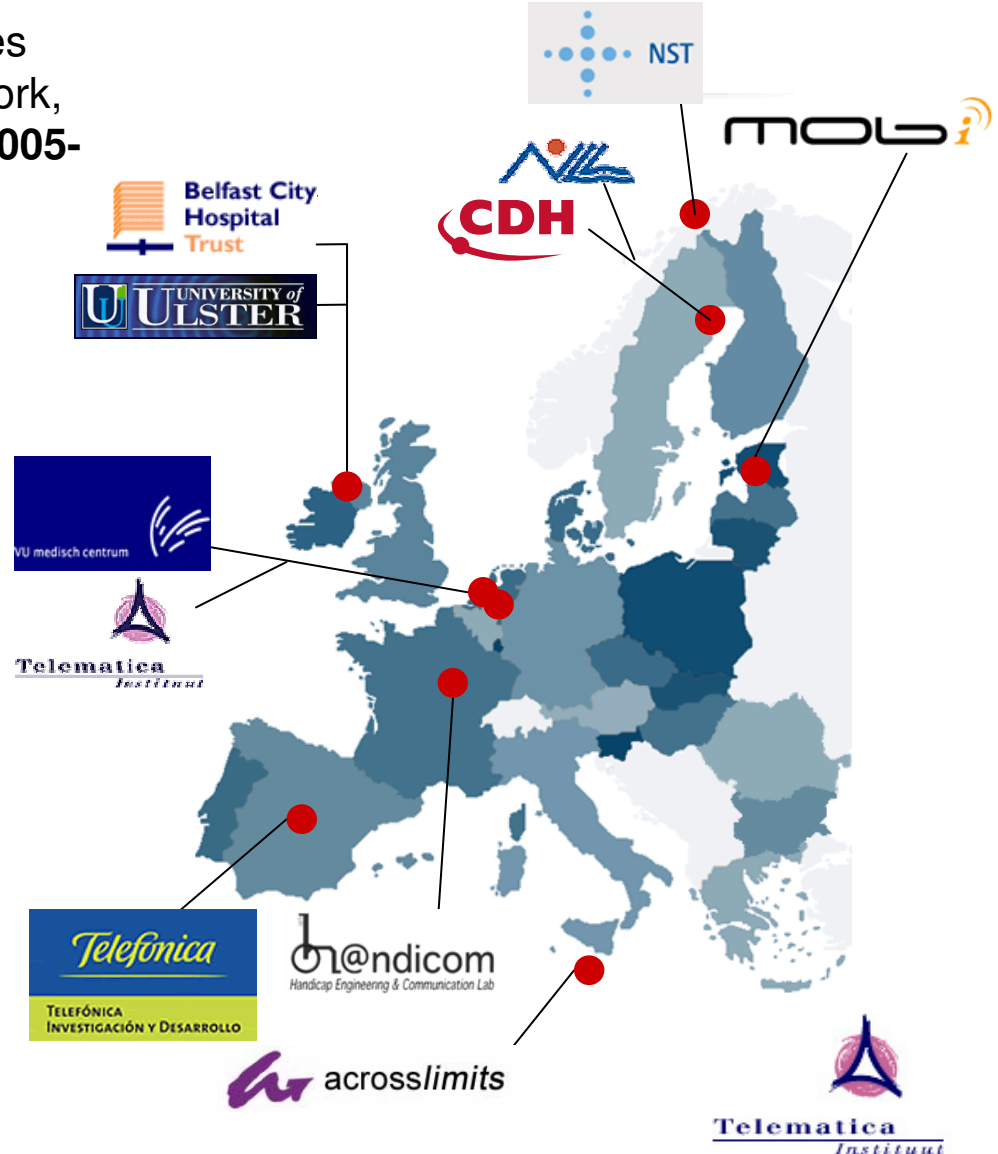
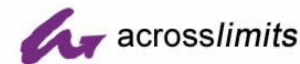


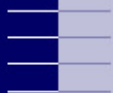
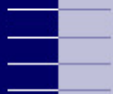
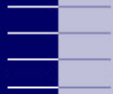
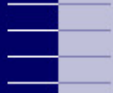
Consortium

- Consortium of 11 organisations in 8 countries
- **STREP** EU:s 6:e Framework,
- **STREP IST Call 5 (FP6-2005-IST-5)**
- 2006-2009 (36 Month) –
- Total budget – 2,7 million Euro



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Aim

To develop and evaluate a user-validated remotely configurable **cognitive prosthetic device** with associated services for people with **mild dementia**

To help people to experience greater **autonomy** and feelings of **empowerment**, and to enjoy an enhanced **quality of life**

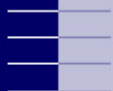
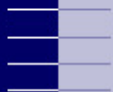
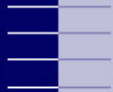
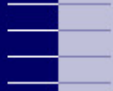
To get **knowledge** and better **understand** the actual use of cognitive assistive devices

To **identify important factors** for considerations in the process of delivering assistive devices to persons with cognitive impairment cause by dementia



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Impact

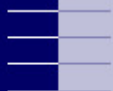
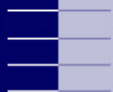
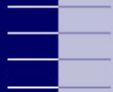
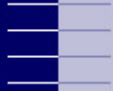
- Approximately 1,9 million elderly people in Europe experience mild dementia. This is the potentially excluded section of Europe's population that we seek to assist.



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Focus in COGKNOW: Areas of cognitive empowerment

Developing a prosthetic device to help people:

- Helping to remember
- maintain social contacts
- perform daily activities
- enhance feelings of safety



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Focus in COGKNOW

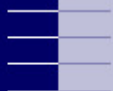
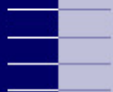
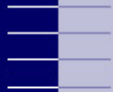
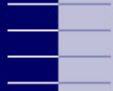
Four domains of life. Why?

Selection based on literature and field study VUmc among 231 PwD in the community & 321 carers. Most frequently mentioned areas of unmet needs

- | | | |
|-----------------------------|---------------------|-------------------|
| – <i>Memory</i> | <i>47% patients</i> | <i>55% carers</i> |
| – <i>Daily activities</i> | <i>25% patients</i> | <i>50% carers</i> |
| – <i>Communication</i> | <i>13% patients</i> | <i>23% carers</i> |
| – <i>Feelings of safety</i> | <i>12% patients</i> | <i>23% carers</i> |

Reference: Van der Roest et al. International Psychogeriatrics, 2007 (FRUX-project)





Innovations

- Technical Innovation
 - *Integrated assistive technologies*
 - *Context-aware, multi-modal reminders*
 - *RFID-based item location*
 - *Personalised service delivery*
- Service Innovations
 - *Integrated services in four areas*
 - *Remote and mobile configuration by carers*
- Innovation in Methodology
 - *User-centered iterative development paradigm*



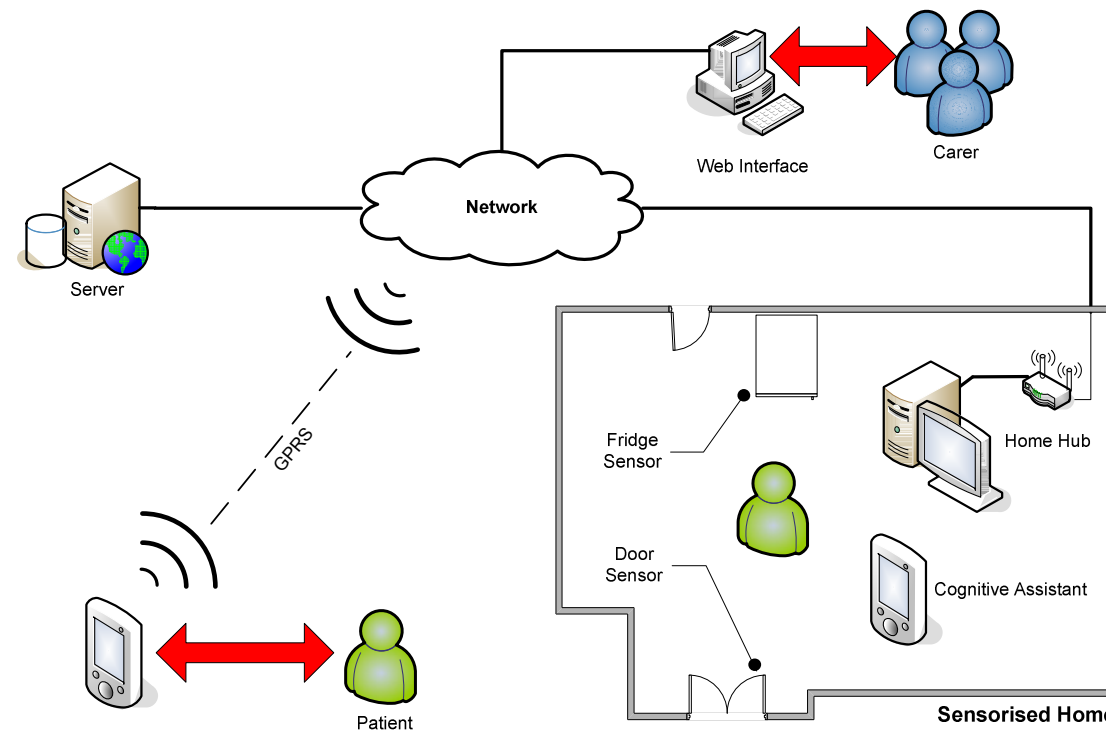
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Project vision – System architecture

- *Hardware:* mobile device, stationary device (touch screen), a few home sensors and the COGKNOW server
- *Software:* Running on the mobile device, stationary device and/or server.
- *Services:* E.g., internet connectivity, mobile phone service, emergency service.





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Project Iteraties

Approach: three cycles of development, testing, evaluation and update of requirements.

Research Questions of Usability and Usefulness of Prototype

Technical Development
Field Trial #1 and Evaluation

Results from Field Trial #1 to inform 2nd stage of Technical Development

Research Questions of Impact on Quality of Life

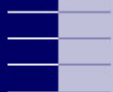
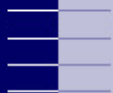
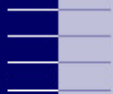
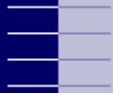
Refine Technical Development
Field Trial #2 and Evaluation

Results from Field Trial #2 to inform 3rd stage of Technical Development

Research Questions of Impact of technological support for persons with mild dementia

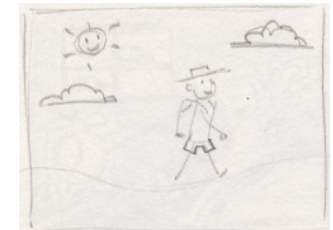
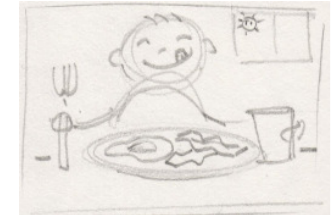
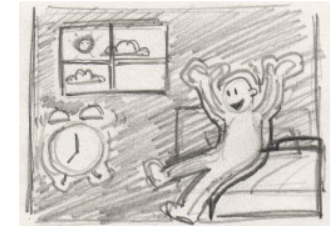
Final Technical Development
Field Trial #3 and Evaluation





Methods first year

- Literature review on effective ICT solutions
- User-driven development at three test sites (Amsterdam, Belfast, Luleå) (6 patient-carer dyads per site, workshops, interviews)
- Research questions for field trial #1
- Discussions clinical experts and technical providers
- Top 4 selection of ICT solutions for first field test
- Functional requirements specification
- Development & evaluation of first prototype
- Two more iterations in 2008 and 2009





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Result of workshops 1

Amsterdam	Belfast	Luleå
COGKNOW area: Support for memory		
Reminder for not forgetting activities/ appointments/take medicine/to take things outdoors, like key, mobile phone	Item locator, misplacement of items is a key early, and almost universal, symptom of a dementia	Activity reminder/electronic calendar, stationary device with touch screen
COGKNOW area: Support for social contacts		
Picture dialling function on touch screen integrated within the screen of the stationary device of reminding system	Electronic calendar with emphasis on appointments and social activities pending.	Picture dialling function on touch screen integrated within the screen of the stationary device of the reminding system
COGKNOW area: Support with daily activities		
Support for activities for pleasure: f.i. picture gramophone ENABLE-project	Pill dispenser – medication management issue identified as an important “daily activity”	Support for activities for pleasure: f.i. picture of TV on touch screen of the stationary device that starts TV when touched
COGKNOW area: Enhance feelings of safety		
Support during cooking Or Warning to close door/ take things outdoors such as keys or simple mobile phone	Picture telephone identified in workshop discussions	Reminder to turn devices of on stationary device Or Direct or easy contact possibilities to a service or emergency line





Functionalities field test 1

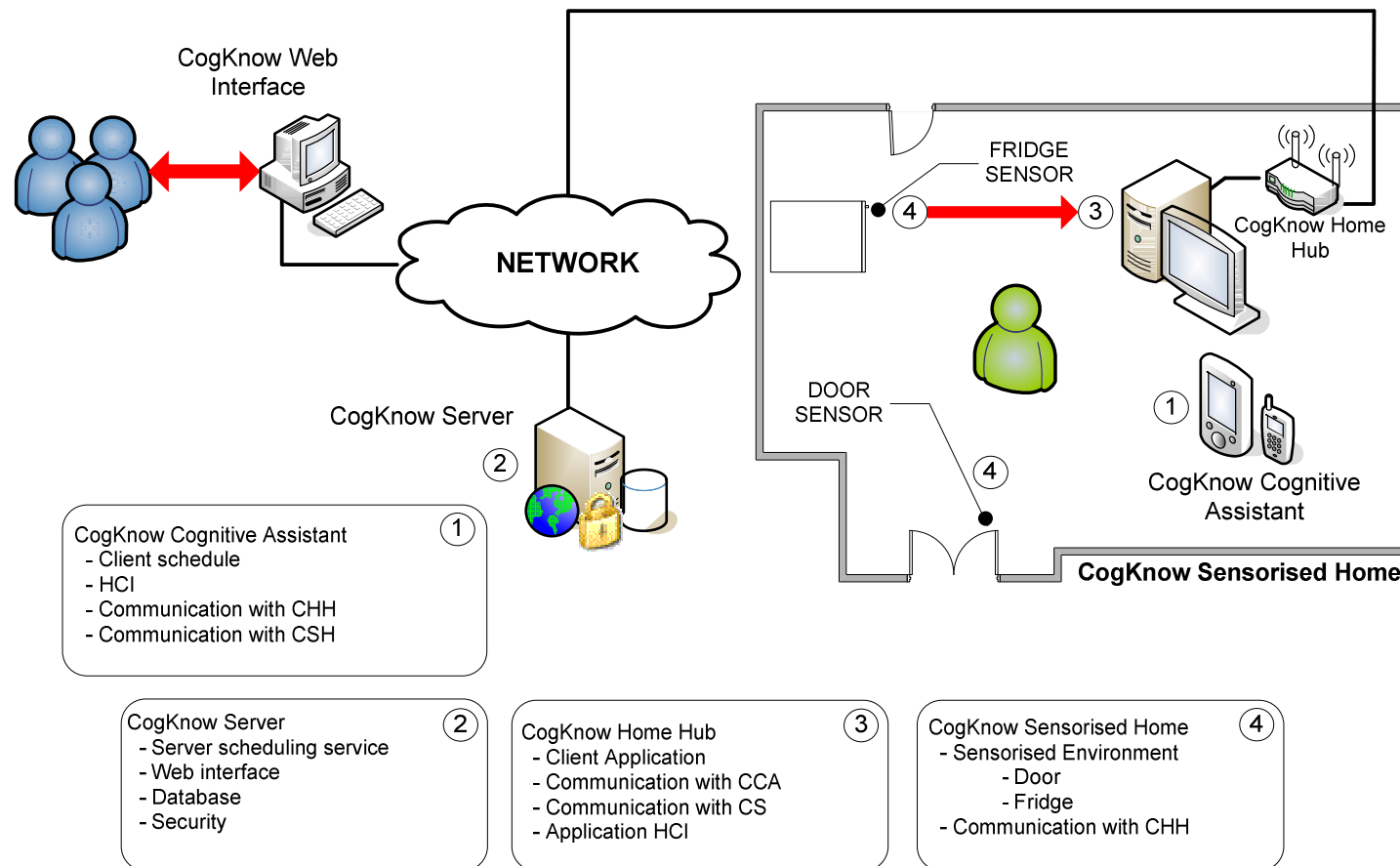
- **Support for memory:**
 - Day and time indication
 - Reminders for taking meals
 - Reminder for brushing teeth
 - Mobile device location request
- **Support for social contacts:**
 - Picture dialing function on stationary device and mobile device
- **Support with daily activities:**
 - Play music on stationary device
 - Turn radio on and off
- **Enhance feelings of safety:**
 - Safety warning door left open
 - Easy emergency contact



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Technical components within the system





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Development and evaluation perspectives

Evaluate whether or not the COGKNOW service, device and platform met their objectives based on the functional and technical requirements.

1. **Human factors**

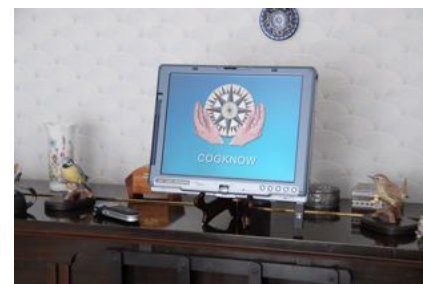
Insight into needs; evaluate the user-friendliness, usability, usefulness and the impact in the selected COGKNOW domains, on autonomy and quality of life

2. **Technical factors**

Advance the state-of-the-art in e.g.: use of multi-modal services, predicting context, deployment of we-centric services

3. **Business factors**

Check the viability of COGKNOW business opportunities, and to identify critical business success factors





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Human factor evaluation

Field Test	Human Factors evaluation focus			COGKNOW DayNavigator functionality focus			
	User friendliness	Efficacy	Useful-ness	Remem-bering	Social contact	Activities Daily Life	Feeling safe
#1 1 day	✓		✓	●	●	●	●
#2 1-5 weeks	✓		✓	● ● ●	●	● ●	● ●
#3 1-2 month	✓	✓	✓	● ● ●	● ●	● ●	● ●



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Technical Factor In-Situ measurement

Aim

To collect data in a naturalistic setting

Methods:

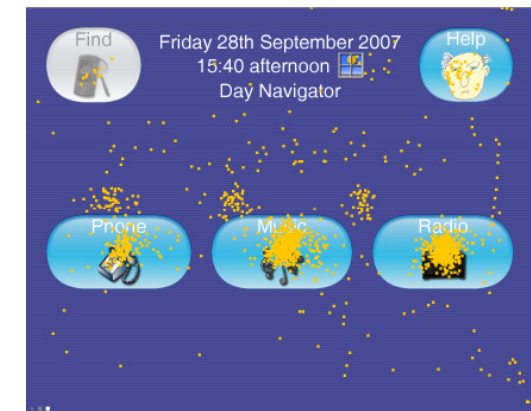
SeniorXensor user experience measurement software modules



Amsterdam field test.



Belfast field test.



Luleå field test.

In-Situ measurement (2)

Methods:

SeniorXensor user experience measurement software modules (FT#1)

- **Xensor Engine** suitable for the COGKNOW mobile device
- **BatteryXensor** module (reported percentage of battery power left every minute)
- **BluetoothXensor** module (reported names and address of nearby discoverable Bluetooth devices every five minutes)
- **PhoneXensor** module (reported events related to usage of the mobile phone function of the device who called whom, when for how long; NOT the content of the calls)
- **A-GpsXensor** module (reported GPS location, speed and satellite signal quality every 5 minutes)
- **DayNavigatorUsageXensor** (recorded events logged by the DayNavigator application of the mobile device about reminders: when they are notified, how long, when they were acknowledged)
- **AudioDiaryXensor** module (could be used by the person with dementia or the caregiver to record an audio comment for the researchers, thus supporting the bottlenecks list)

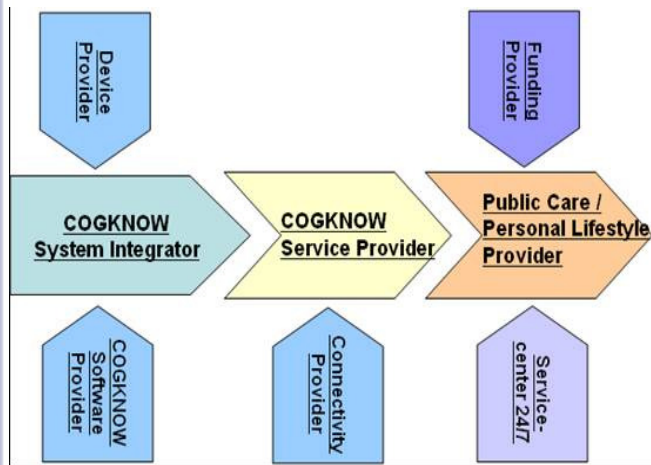


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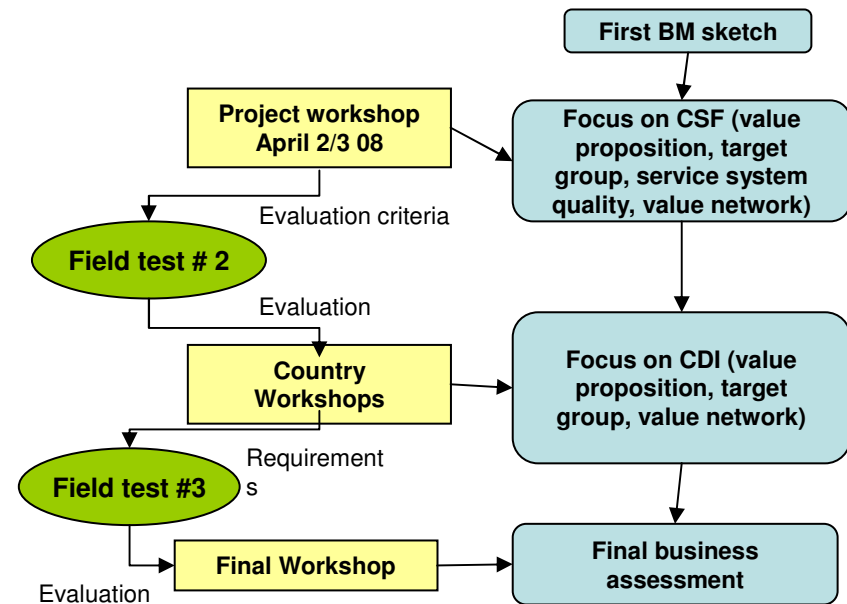
Business factors

Aim

- to identify viable COGKNOW business opportunities, i.e. researching what a viable business model for these business opportunities could look like
- to identify business factors that feed back into the development of COGKNOW services



Evaluate critical success factors in the financial and organization domains.



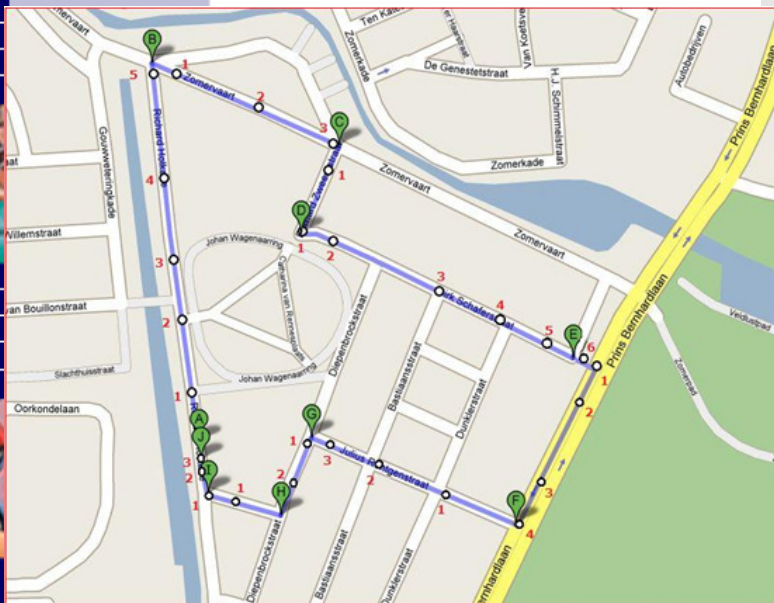
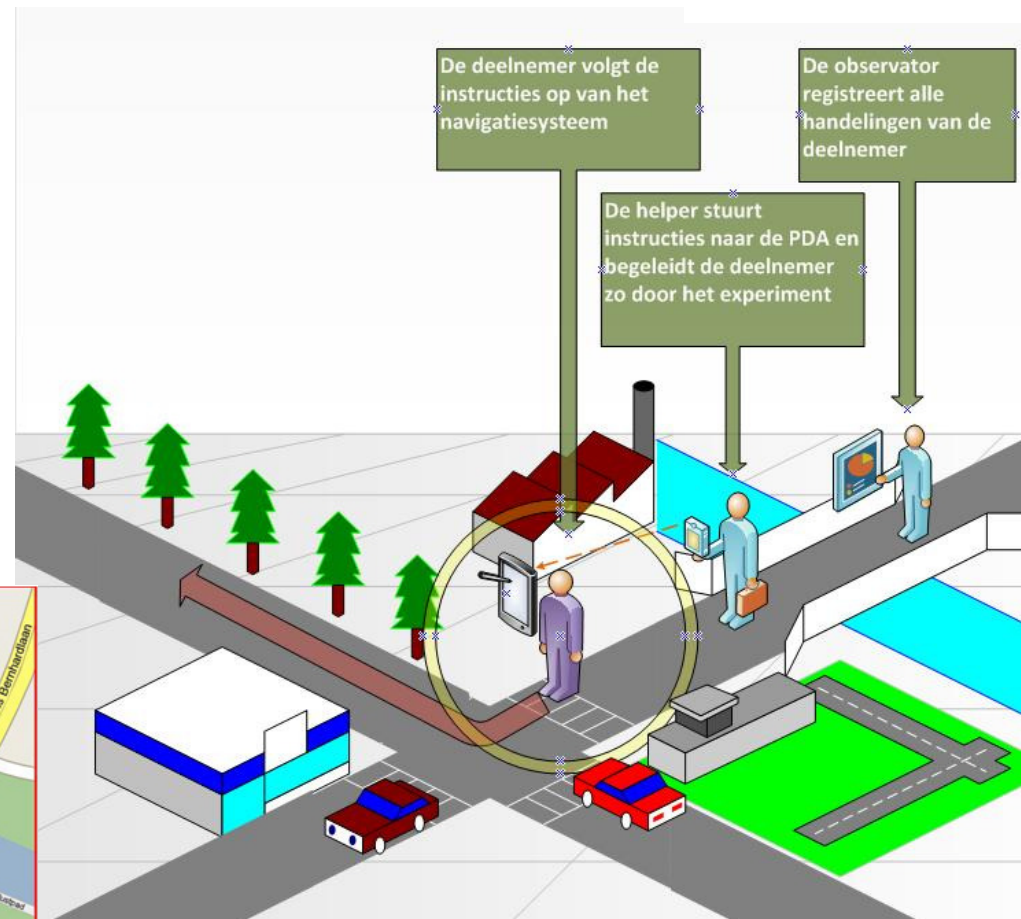
Business perspective planning

BM: Business Model CSF: Critical Success Factors CDI: Critical Design Issues

Navigation service



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Cogknow Video

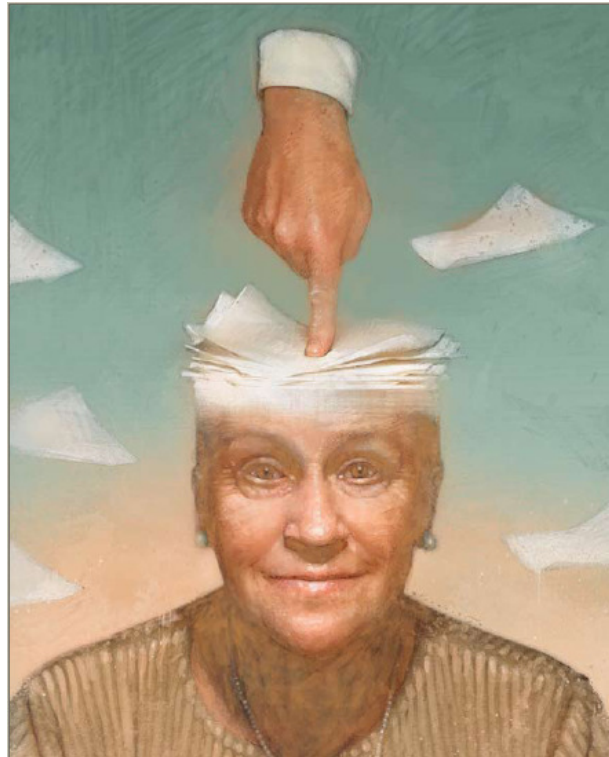
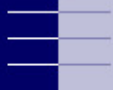
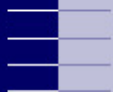
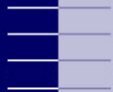
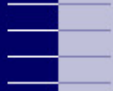


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Conclusions and outlook 2008

- COGKNOW approach anticipates to result in a cognitive prosthetic device and associated services for elderly people with mild dementia
- Based on real user needs, wishes and demands
- Enhance technical innovation
- Iterative development between users and technical providers
- Offers a complex integrated product-service mix which can be marketed successfully
- Project is in an early stage... market analysis and business modeling starting





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Thank you for your attention

Further information

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