

Navigation for People with Mild Dementia

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COGKNOW

Helping people with mild dementia
navigate their day



Dementia

- a progressive disease affecting cognitive functions
- most commonly known symptom is the loss of memory
- also: loss spatial and topographic orientation
- interpreting a map is not feasible
- hence: an informal carer has to accompany the person with dementia (PwD)



Overall research question:

Can GPS route navigation assist people with mild dementia in finding their way?

Three small scale exploratory studies:

1. pre-study
2. study on preferred audio conditions
3. study on safety



Pre-study: methods

- literature study
- interviews with 23 people with mild dementia and their informal carers
- small experiment with 2 participants using Wizard of Oz method



Pre-study: main outcomes

- patients (16/23) and carers have a need for navigation support
- patients have a preference for a visual interface with landmarks (11/23)
- patients seemed able to operate the navigation support (2/2)
- patients reached their destination (2/2)



NB:
outcomes are indicative due to the small scale exploratory nature of study



Pre-study: indications for follow-up research

Question:

Which type of audio support is most beneficial?

Concern:

How safe is it for people with mild dementia to operate a mobile device while participating walking along the street?



Audio study - Main Research Question

Which type of audio guidance is most beneficial to persons with mild dementia using navigation support?

- familiar voice (e.g. of informal carer) versus unfamiliar (default) voice
- with versus without a warning sound before a spoken instruction



Audio study - Design

- 4 participants (MMSE 17-25) each walked 4 pre-defined routes with randomly assigned audio conditions
- observation of errors and assistance requests by participants
- after each route: questionnaire on satisfaction and experienced workload (NASA Task Load Index)
- used technology: PDA's with TomTom 6, adapted for maximum simplicity

	Voice only	Voice + warning
Unfamiliar voice	U (CONTROL)	UW
Familiar voice	F	FW



Audio study - Results on Effectiveness

variable			results per audio condition per route (14 routes by 4 participants)			
			unfamiliar voice	familiar voice	without warning sound	with warning sound
<i>Effectiveness</i>	<i>Task duration</i>	<i>walking time [min:sec]</i>	16:53	16:27	15:53	16:58
	<i>Errors</i>	<i>number of route deviations</i>	1.00	0.67	0.43	1.29
		<i>number of repeated instructions</i>	1.50	1.00	1.00	1.57
	<i>Requested assistance</i>	<i>number of asked questions</i>	1.67	1.33	2.14	1.00

indicative conclusions:

- familiar voice is more effective than unfamiliar voice
- the use of warning sounds has a negative influence on effectiveness



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Audio study - Results on Cognitive Load

variable			results per audio condition per route (14 routes by 4 participants)			
			unfamiliar voice	familiar voice	without warning sound	with warning sound
<i>Load on working memory</i>		<i>TLX score [5–25 points]</i>	13.58	13.09	13.74	13.70

indicative conclusion:

- audio condition has no effect on Cognitive Load



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Audio study - Results on User Satisfaction

variable			results per audio condition per route (14 routes by 4 participants)			
			unfamiliar voice	familiar voice	without warning sound	with warning sound
<i>User satisfaction</i>		<i>average preferences [1–5 points: from very negative to very positive]</i>	3.67	3.67	3.51	3.74

indicative conclusions:

- no preference for familiar voice or unfamiliar voice
- small preference for warning sounds



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Safety study

Research Goals:

- Develop an exploratory understanding of safety risks for our target audience in using a navigation device in a residential neighborhood.

Research methods:

- Literature review
- Observational research study (experiment):
 - data collected by observation and video-analysis (2h 36 min) during the Audio Study
 - 3 people with mild dementia walked in total 4 different routes of approximately 1 km
 - two observers: one to guarantee the safety of the participants



Safety study - outcomes literature study

- unable to find:
scientific studies on safety issues of using portable navigation devices by people with mild dementia or elderly
- new focus:
cognitive impact of dividing attention between two tasks (operating device, walking, paying attention to traffic)
- conclusion:
senior citizens – and especially senior citizens with cognitive impairments – suffer diminished task performance in dual-task scenarios
- expectation:
participants may experience “cognitive overload” symptoms when operating the navigation device and simultaneously paying attention to traffic and pavement



Safety study - outcomes experiment

- at no time it was necessary to interfere to guarantee the safety of the participant
- dual task implications:
 - stopping during device use: after 17% (21/123) of the voice prompts
 - difficulties in walking: only one observation, not during device use
 - navigation instruction while crossing: no stopping, no slowing down
 - looking before crossing: in 84% (41/49) participants explicitly looked before crossing (control group without navigation device: 79% (15/19))
- conclusions:
 - no evidence of unsafe walking behaviour with navigation support
 - operationalising the concept of Safety is quite complex



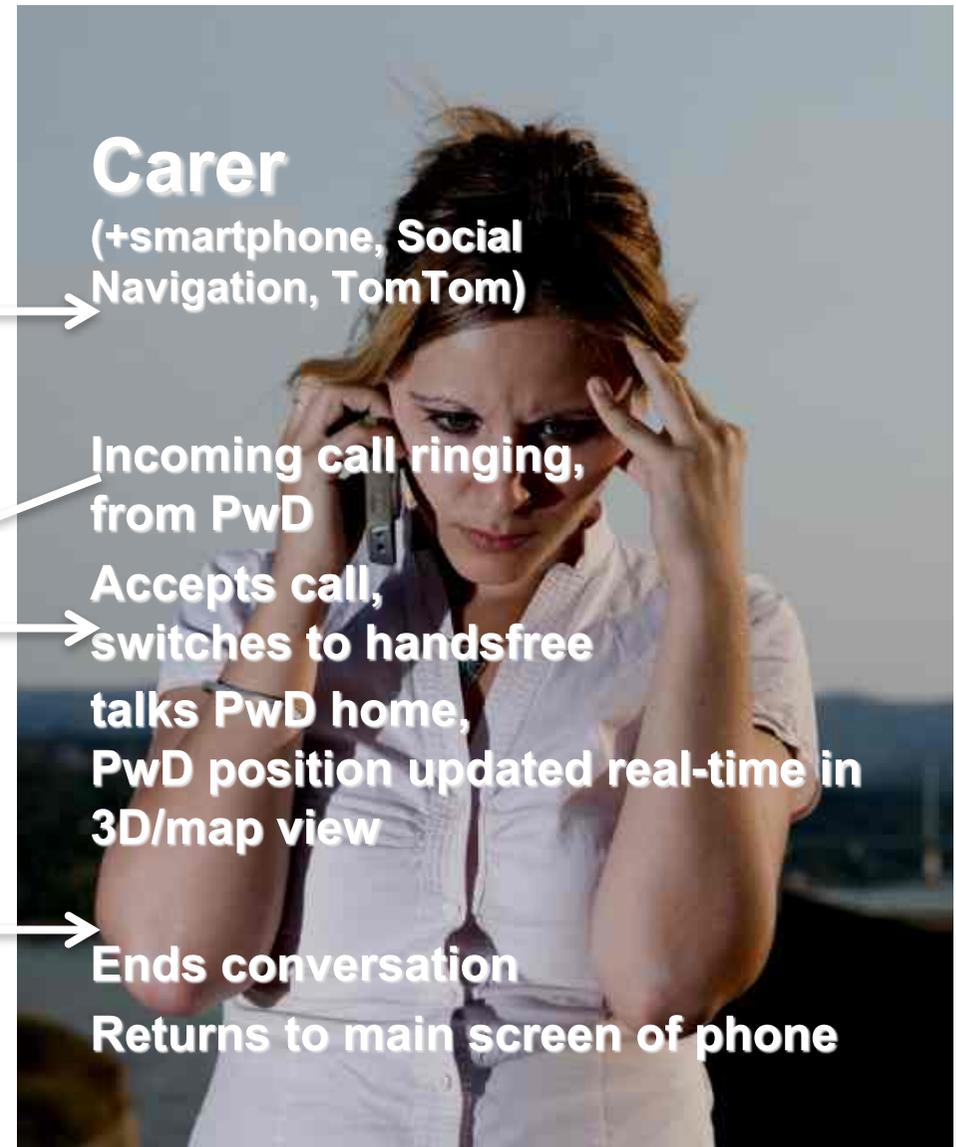
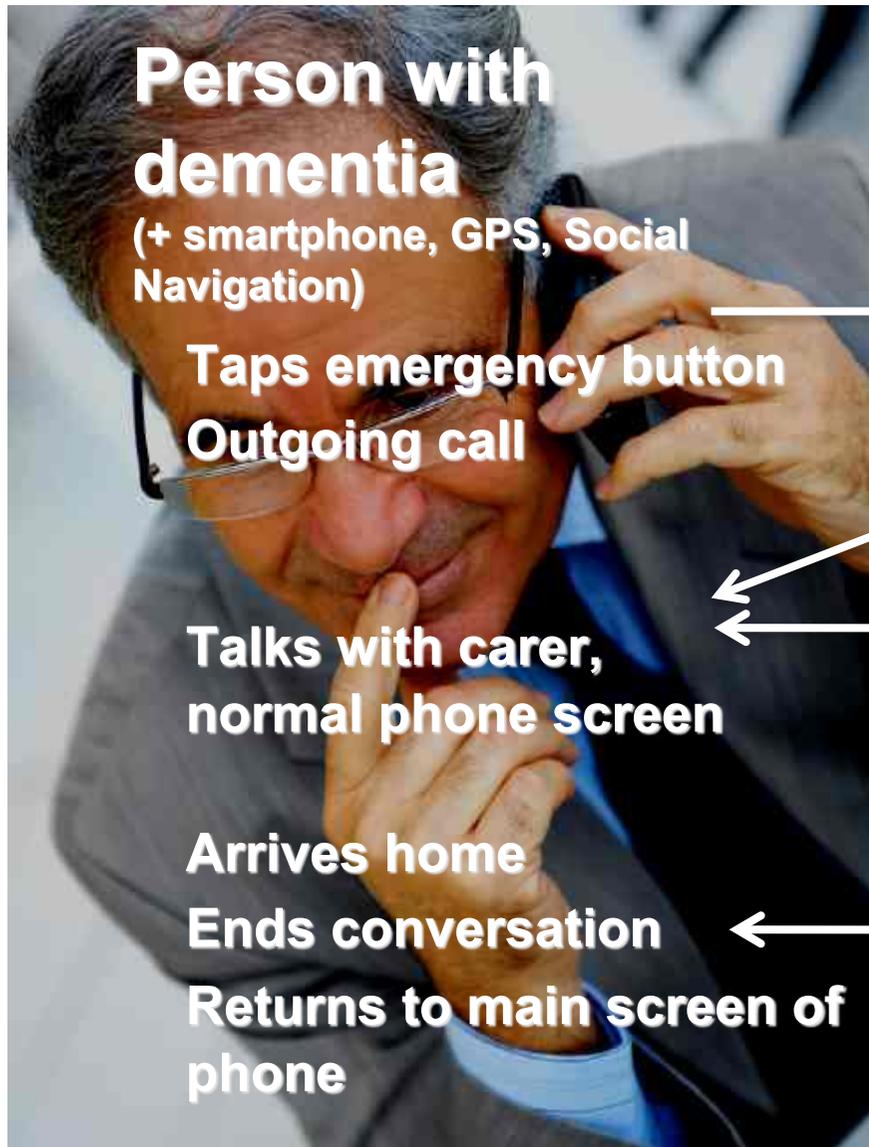
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What is next?

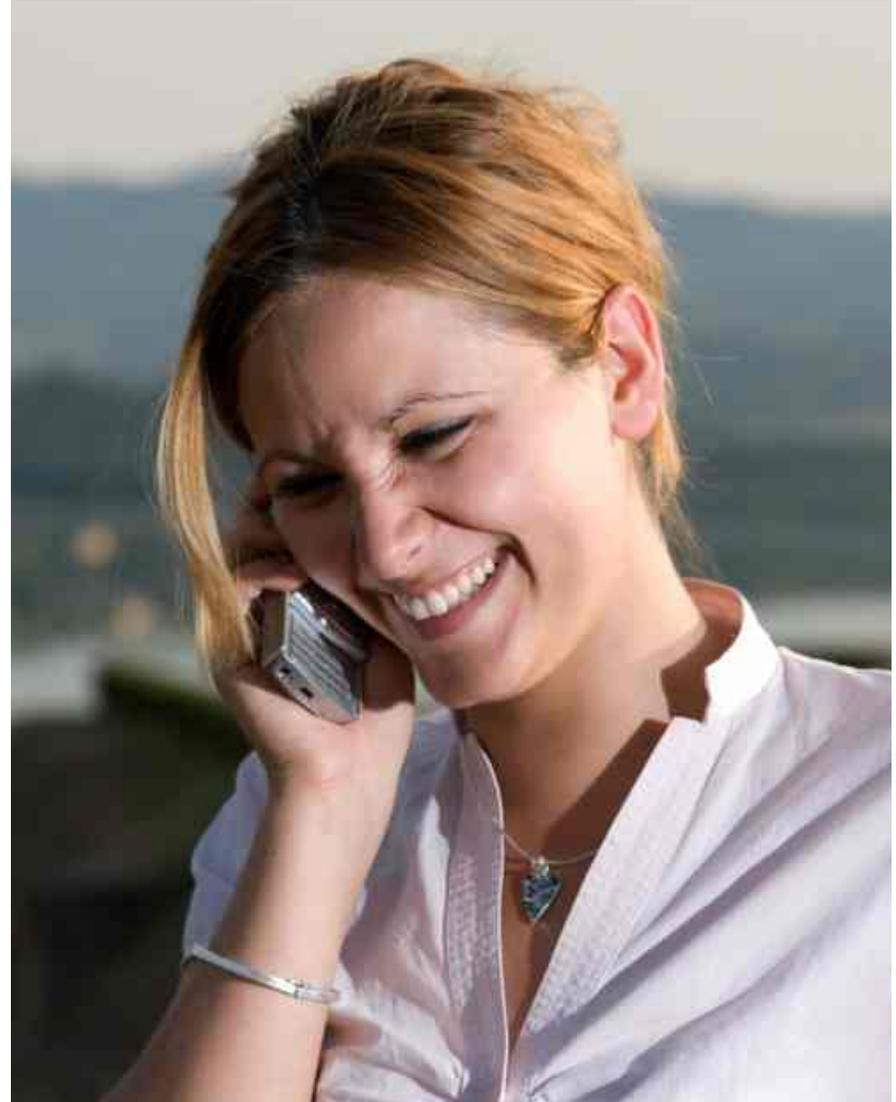
- large scale experiments on safety
- research project on Social Navigation Support



Social navigation support



Social navigation support



Project approach Social Navigation

Goal:

- design, develop, and test Social Navigation for people with mild dementia

How: in a user-centered design project

- involving users from the start
- experiments in lab setting
- field studies

Special attention to bridging the gap between project and practice

- involvement of stakeholders like a call center
- following a business model approach
- anticipating on structural financing

Current hurdle to take: projectfinancing...

