

- involvere
- innovere
- implementere

The Flex-Control project

2010

Project partners

- Caretech Innovation, The Alexandra Institute
- Engineering College of Aarhus  | ENGINEERING COLLEGE OF AARHUS
- Aarhus University  DEPARTMENT OF COMPUTER SCIENCE
FACULTY OF SCIENCE
AARHUS UNIVERSITY
- Flex-Control  flex-control
Online comfort and security



Project partners

- Caretech Innovation



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Project duration

1st February 2010 - 30th November 2010

Funding

745.000 dkk

The project was funded by The Central Denmark Region and EU via Caretech Innovation

Project vision

The Flex-Control project's goals were to transfer knowledge and products from the company Flex-Control into the health care market.

Specifically Flex-Control's and similar companies' products aiming at the intelligent home market can aid ambient assisted living in private homes and assisted living contexts.

Project background

Case of Aarhus Municipality:

The number of elderly persons in Aarhus is growing fast, especially the oldest group of the elderly people. In Aarhus, it is the responsibility of the municipality to offer housing to elderly and persons with disabilities.

Therefore the municipality plans to build and renovate a number of housing facilities.

Currently the municipality owns 4000 housing units. It is a big improvement to the houses if intelligent sensor-based systems can be installed as standard equipment in the housing units. Therefore the market for these solutions is growing quickly.

Project background

Demographics and costs – elderly and dementia:

Currently there are over 900.000 persons over 65 living in Denmark; in 2020 the projection forecasts over 1.100.000.

Expenditure in Denmark on “nursing and care etc. for the elderly and the handicapped” amounted in 2010 to approximately 38 billion DKK.

Regarding dementia, there are between 70,000 to 80,000 persons living in Denmark with dementia.

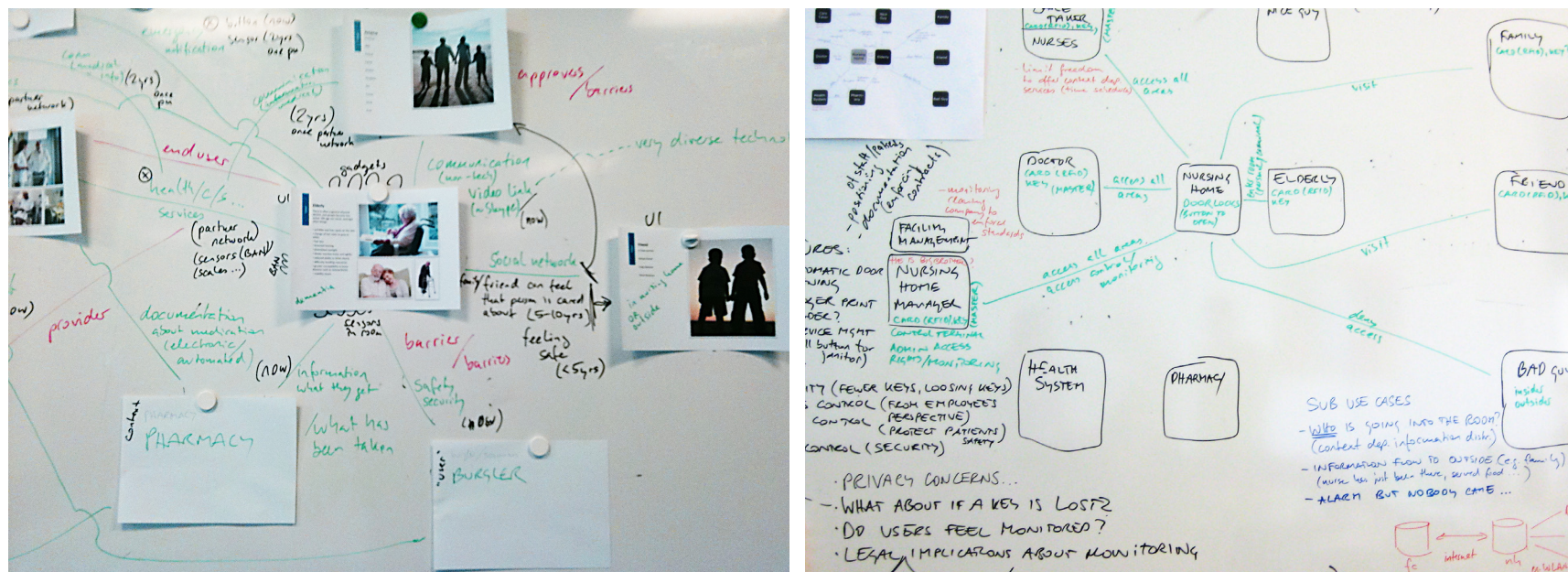
Project objectives

The objectives were to:

- Analyse the current technologies offered by Flex-Control
- Create use case scenarios in the health care sector, specifically aiming for assisted living
- Perform a gap analysis and provide a set of requirements
- Identify a suitable context for prototype deployments and testing
- Perform ethnographic studies to analyse the context of a deployment
- Develop a prototype and deploy the prototype
- Study the impact and evaluate the deployment
- Provide a set of recommendations based on the knowledge gained in the project

Participatory design

Future workshops:
Over 50 new use cases, including solutions for security, safety, medication and access



Ethnographic studies (CARITAS)

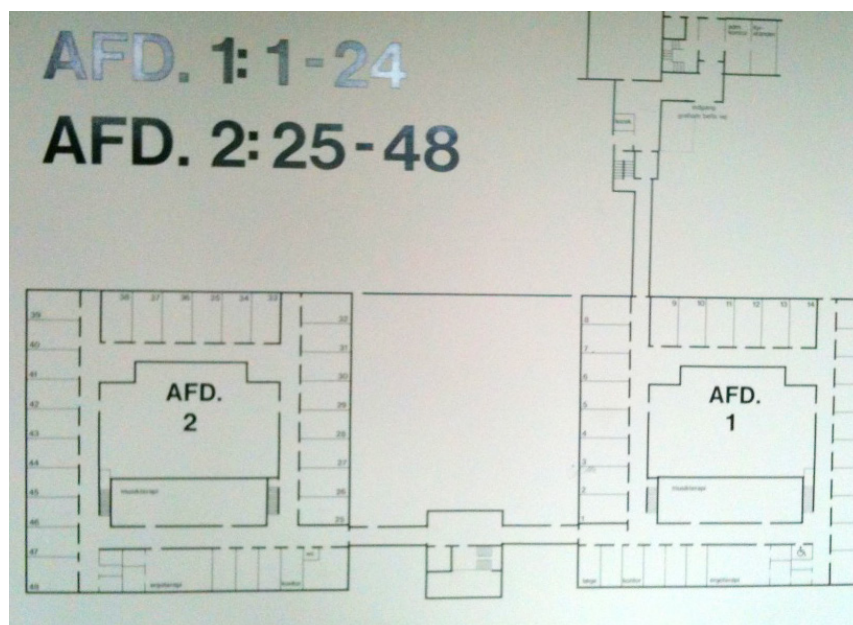
About CARITAS

Caritas is a special nursing home for people with advanced dementia. Residents are provided with a room only after they have been diagnosed with advanced dementia.

There are four main departments at Caritas with approximately 25 residents each. Each department has its own team leader and staff.

This means that each department to some degree has its own way of organizing daily life and work. Moreover the day is structured based on the individual residents living in the department and their special needs.

Ethnographic studies (CARITAS)



Ethnographic studies (CARITAS)

The residents at Caritas

A dementia coordinator refers demented citizens to come and live at Caritas.

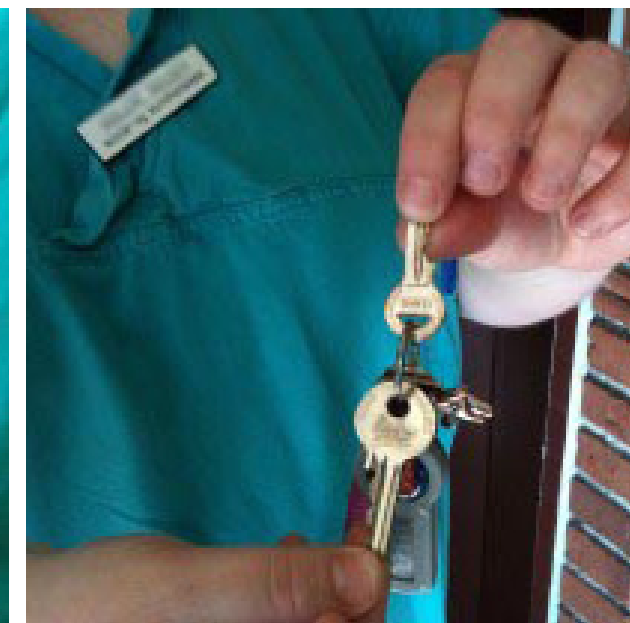
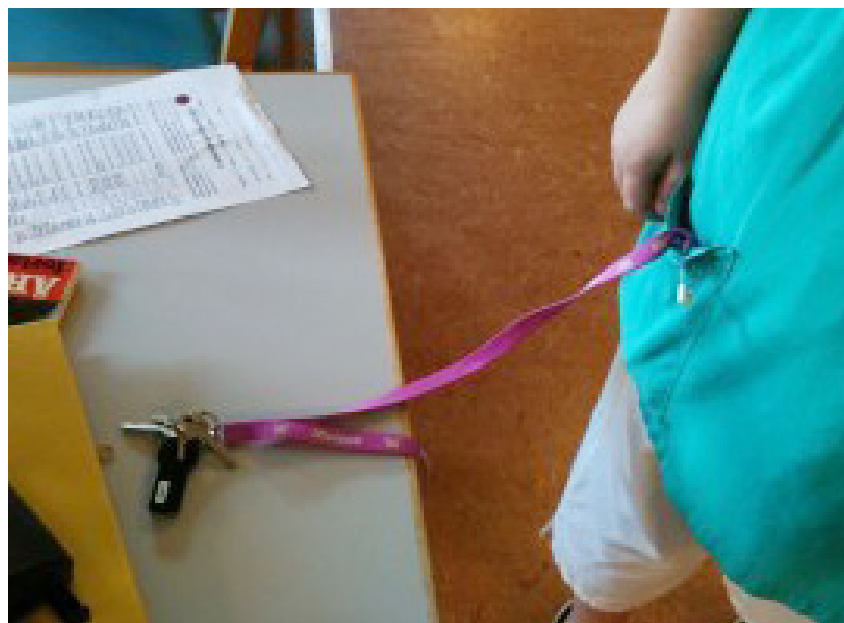
Many people think that dementia is an old person condition – it is not only.

At Caritas they have several residents in their 50's. A requirement is that they suffer from advanced dementia and that they are not suited for an ordinary nursing home.

Ethnographic studies (CARITAS)

Doors, locks and keys...

Doors, locks and keys take up much time, energy and thoughts in everyday life and work at Caritas. There are many different doors, locks and systems for handling entering and exiting of rooms and departments.



Ethnographic studies (CARITAS)

Doors, locks and keys...

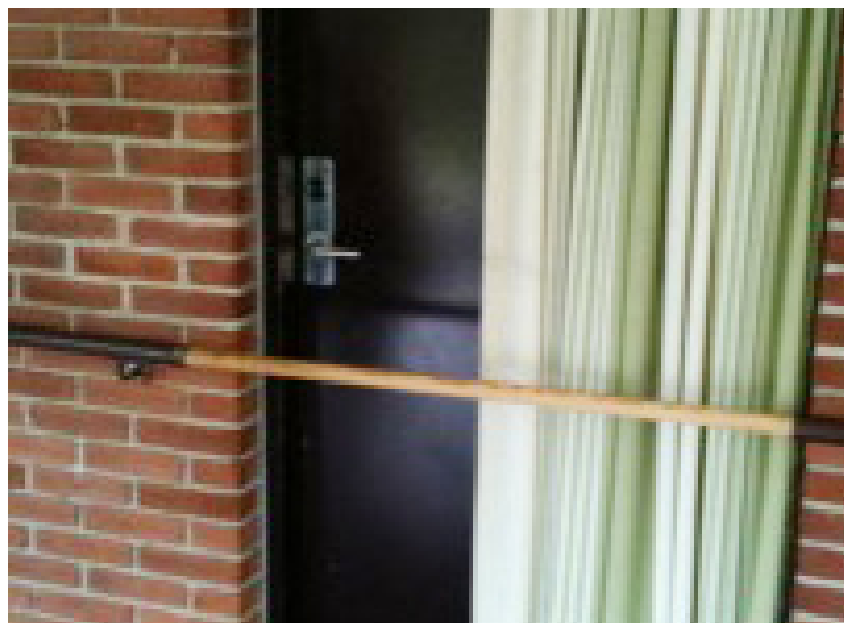
“In a period of two hours I was responsible for the keys when accompanying a social and health care assistant. I used the keys at least 16 times during this period.”



Ethnographic studies (CARITAS)

Doors, locks and keys...

The keys are used for locking and unlocking of resident rooms, medicine boxes and in some rooms also cupboards as well as offices, storage rooms, etc.



Business perspective

Market size:

- 75,000 potential sites to install the solution
- 5,600 of the units are allocated persons suffering from dementia.*

* Ref: <http://www.aeldreviden.dk/faq/>

Unique selling points, e.g.:

- Modularity of the software and hardware components
- Simple to use system
- Robustness
- Price

Business perspective

Conclusions:

There is a market for a modular software and the hardware platform within the elderly care sector, but the product is still in a phase of defining specific features and services that addresses specific market needs.

The access control solution is an important step towards a product that can be commercialized. Now additional features and services must be defined to display the value created for the users by the offering based on the technology.

The size of the Danish market is significant and the demand for technology that supports the demand for efficiency improvements is big and increasing.

Prototyping

Primary field trial scenario: door access

Ted is working at the nursing home.

He needs to get into different rooms quite often. However the rooms are locked from the outside as wondering residents might just walk into any of the rooms if they were unlocked.



Prototyping

Primary field trial scenario: door access

Ted is fitted with an RFID tag on his name badge that gives him access to all of the rooms in the home. He needs to see Karina – she has rung for him to come.

Ted has both hands full, carrying a clipboard and a cup of water that he picked up earlier on.



front

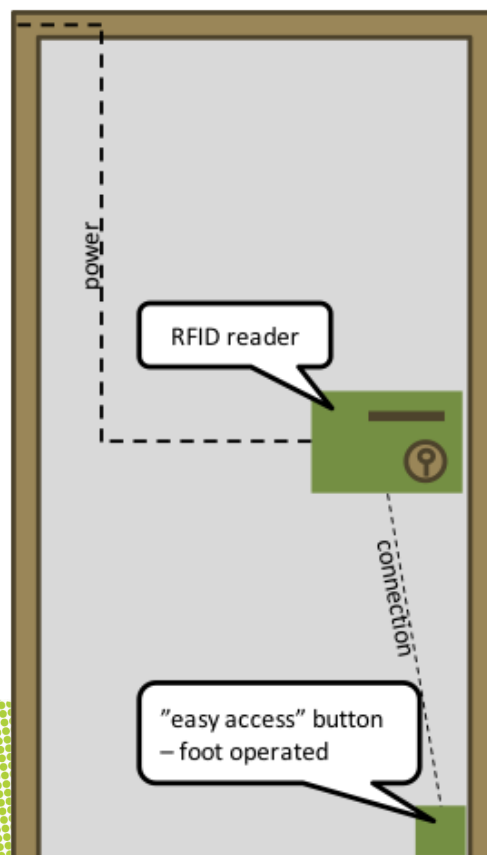


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Prototyping

Primary field trial scenario: door access

As he approaches Karina's room, the RFID reader in the door reads his tag and enables the button on the bottom of the door.



Prototyping

Primary field trial scenario: door access

Ted presses the button with his foot and the door unlocks. He can now lean against the door to open it and walk into the room without having to use his hands.



Prototyping

Going live!

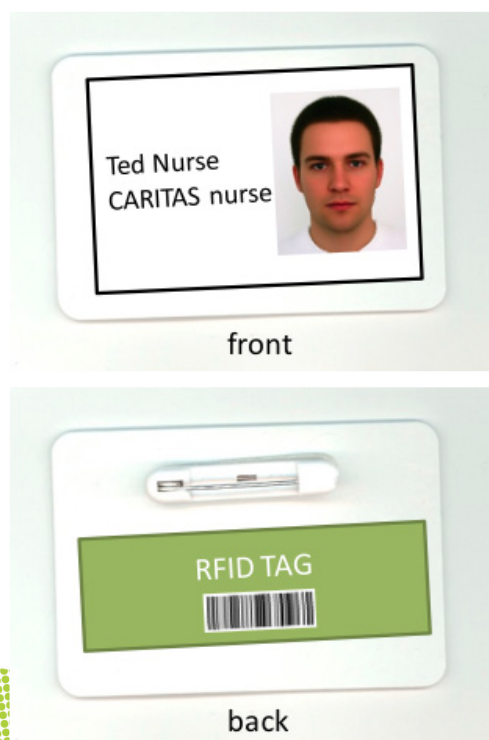
An antenna was placed on the wall next to the doorframe – on the kitchen door it was placed opposite the door handle and on the resident door adjacent to the door handle.



Prototyping

Going live!

Most regular staff has been given an RFID tag (a little bigger than the size of a credit card). Some of them have placed the tag in their chest pocket and some have placed it in another pocket.



Prototyping

Going live!

Common for all is that they have to perform an active action in order to activate the antenna and thereby opening the door. Either they push their chest forward or they take out their tag and place it in front of the antenna.



One of the employees at Caritas is using the prototype

Prototyping

Going live!

Many still use the handle in order to open the door – however some do use their foot or shoulder in order to open. Exiting the kitchen they have to grab the handle and close the door with a firm jerk.



Prototyping

Results and ideas

Most staff's first reaction to the system is that it is “*ingenious*” and “*great*” – “*when it works!*”. According to staff the system sometimes does not work – however it always resumes working after a while.



Prototyping

Results and ideas

Most staff's first reaction to the system is that it is “*ingenious*” and “*great*”
– “*when it works!*”. According to staff the system sometimes does not work
– however it always resumes working after a while.

Observations and comments from staff show a number of issues or requirements of relevance to the onward development of the system. Overall there is a need to consider size, range and placement of tag and reader.

Prototyping

Staff – system interaction

- The system works well with your hands full
- The positive hygienic aspects are emphasised – however the prototype system still requires that you close the door using the handle
- The size of the “black box” (the antenna): It is big and very visible
- The placement of the “black box”: It should be placed close to the handle
- The range from the antenna to the RFID tag should be wider so an active action is not needed in order to activate the system
- Risk of losing a tag
- The system is unstable which entails mistrust in the system
- Especially the female staff worry that the radiation from the tag can cause (breast) cancer.

Prototyping

Resident – system interaction

- The use of tags necessitate an active action in order for the resident to activate the system – this is not suitable for demented people who need a system that works without them having to think about it
- The use of loose tags entails the risk of tags getting lost and exchanged – an idea might be to sow a chip into the clothes or in the shoes
- For the residents to use the installed prototype it is a great pedagogical task
- For the residents there exists a need for individual, flexible solutions / options concerning placement of tag

Prototyping

Conclusions:

- There is a need for two variations of the system: One that works for the staff and another more flexible solution that works for the residents
- For the resident it might work better if the door automatically opened when their tag activated the system

Prototyping

Conclusions:

- For most of the residents to find their way “home” they need to be indirectly guided to the right place. This could be done by having the door opening automatically and /or a voice saying “welcome home Lise, please come inside” or a small individually chosen melody or tune playing when the lock is activated

Prototyping

Conclusions:

The possibility of automatic logging of data could be used for saving time on documentation e.g.:

- Salary calculation - The automatic logging of data concerning entries and exits could be used in salary calculations – the system should automatically log data concerning overtime work and thereby save time on manual documentation
- Care plan and medicine registration – A touch screen installed in each resident room could show an updated care plan with highlights of new adjustments concerning medicine or care and the possibility for the employee to tick off things done
- Medicine – registration of who has accessed the medicine box

Project reports

Use case portfolio

A use case portfolio document [1] has been assembled, based on the results of two joint workshops involving all of the consortium partners (CS/AI, IHA and Flex-Control) as well as ethnographic studies that were performed at the Caritas nursing home.

The use case portfolio describes different scenarios of the usage of the Flex-Control system in the Healthcare sector, split into different timelines for development ranging from currently possible to future use cases requiring major changes and adaptation of the Flex-Control system.

Project reports

Requirements and technical recommendations

A short document with a list of requirements [2] for the Flex-Control system derived from the use case scenarios describes functional and non-functional requirements for the system.

Another document “Flex-Control technical recommendations” [3] describes possible solutions including both hardware and software aspects in relation to supporting the healthcare application domain in a future control-box to be installed in private homes.

The recommendations are based on discussions and project meeting with members from Flex-Control and with the other partners.

Project reports

Ethnographic study

Ethnographic studies [4] were performed at the Caritas nursing home in Skejby.

These studies were performed in an earlier stage of the project in order to collect ideas on how the Flex-Control system could assist both staff and patients in their daily basis.

More ethnographic studies were performed to evaluate the deployment of a field trial prototype of the Flex-Control system at the nursing home.

Project reports

Field trial prototype

A field trial prototype was deployed at the Caritas nursing home [5], this field trial focussed on the door logging use case.

Project reports

Business evaluation

For the business perspectives a document describing the knowledge created in the Flex-Control project and its transformation into specific suggestions on how Flex-Control should put their solutions into the Healthcare sector [6].

References

- [1] Flex-Control-UseCasePortfolio, Ver. 06.12.2010:
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- [2] Flex-Control-Requirements, Ver. 03.12.2010:
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