

Taking the Gloucester Smart House from the Laboratory to the Living Room

Work in progress bringing smart house technology for people with dementia to its intended users.

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Abstract. A paper describing the process of the development and implementation of smart house systems for people with dementia under the Gloucester Smart House project. The Bath Institute of Medical Engineering (BIME) has partnered commercial and non-profit organisations to bring about these systems, and is now working towards their introduction into the marketplace.

1 Introduction

This paper describes progress made by Bath Institute of Medical Engineering (BIME) towards bringing systems designed to support people with dementia to market. The Gloucester Smart House project has the aim of developing systems to support people with dementia at home, maintaining independence and quality of life.

2 Consortium Partners

The Gloucester Smart House consortium was formed from Dementia Voice, Housing21 and BIME. It was funded for its pilot year by Gloucestershire Social Services and the Barnwood Trust, and then by the the UK Government Engineering and Physical Sciences Research Council (EPSRC). [www.epsrc.ac.uk].

2.1 Housing Developer and Operator: Housing21

Housing21 are a major UK housing association. They build and operate sheltered housing across the UK. Housing21 provided a house for the Gloucester Smart House Project and a public relations consultant at the launch of the project in June 2000.

[www.housing21.org.uk]

2.2 Dementia Care Advice: Dementia Voice

Dementia Voice are the dementia care services centre for the South West of England. They provide training and information to professionals working in dementia care. Dementia Voice have advised BIME and Housing21 on the design of the interior of the house and the interfaces of systems installed in the house.

Dementia Voice also managed the ENABLE project¹ in the UK, visiting and interviewing evaluators for the duration of the project.

[www.dementia-voice.org.uk]

2.3 Bath Institute of Medical Engineering

BIME has developed systems and devices for people with dementia. It has worked with Housing21 and other technical partners towards the creation of an integrated smart flat for people with dementia in a sheltered or very sheltered housing development available for people with dementia to live in. This aim is now close to being achieved.

[www.bime.org.uk]

3 Other Partners

3.1 Dome Systems

Dome Systems approached BIME expressing interest in including BIME smart house systems in the range of products that they offer as a smart home system integrator and installer. Dome are working with BIME to bring smart house products to market.

[www.domesystems.co.uk]

3.2 Gloucester and Poole Social Services Mental Health Teams

The Gloucester and Poole Social Service have supported the Gloucester Smart House and ENABLE projects by linking BIME and Dementia Voice with potential evaluators. They are advocates of assistive technology for people with dementia particularly where such technology can support people at home.

4 Systems and Devices

The Gloucester Smart House project has developed several integrated and stand-alone smart house systems that are installed in the Gloucester Smart House and the Housing21 pilot flat in Deptford, London.

At the beginning of the Gloucester Smart House project, the European Installation Bus (EIB) was selected to provide a control network for the house. It is built on an open European standard. Integrated systems are dispersed around the building and use EIB to communicate.

¹ The ENABLE project was a European project that evaluated equipment for people with dementia by people with dementia. The project was funded by the European Commission

The Bath and Basin Monitor is a system that prevents floods occurring. On detection of a certain water level it reminds the user that the taps are on and should be turned off. If the user does not turn off the taps within a short time, the system does so automatically and informs the user. It does not prevent further use of the taps unless the water is close to the top of the bath or basin.

The Night Light provides gentle lighting to residents at night. It uses a bed occupancy sensor to detect the user getting up, and then uses the EIB to turn on the light in the bedroom and bathroom. Motion sensors ensure that the user's path is always lit.

The Time of Day (TOD) voice reminder provides messaging through voice units distributed around the house. It has a seven day calendar which provides reminders such as "your daughter is visiting in half an hour" at preprogrammed times. The system also provides messaging for systems such as the bath monitor.

The Cooker Monitor and Cooker Minder monitor a cooker and turn it off if smoke or gas is detected. The Cooker Monitor physically turns off the cooker knobs then allows the user to continue using the cooker. The Cooker Minder warns the user of smoke detection with a voice message. If the user does not turn off the cooker within a short time, it isolates the cooker, requiring a reset for further use.

5 The Development Process

The project began with a set of detailed questionnaires and interviews. Information gathered from carers and advice from Dementia Voice ensured that the devices developed meet real needs.

Much of the evaluation of the Gloucester Smart House systems has been under the ENABLE project. Stand-alone versions of systems were evaluated by people with dementia in five European countries. The impact of the devices on quality of life was measured using the DQoL[1] instrument.

5.1 Pilot Implementation

The first integrated implementation of the Gloucester Smart House devices in a very sheltered housing development is in Cinnamon Court in Deptford, London.

After construction of Cinnamon Court had begun, BIME were asked to recommend options for EIB installation. Housing21 chose to install a minimum of additional infrastructure and wire their buildings conventionally. This resulted in little additional cost to Housing21 and reduced their risk, but made activation of the EIB difficult. BIME discussed the installation of the EIB cable with Housing 21's electrical contractor.

1. One electrician should be sent on the EIB installers course. This was to ensure that the EIB cable was installed in compliance with the EIBA² standards.
2. EIB cable should be placed in all locations where a smart device will be installed.
3. The lighting wiring should be configured using a star system rather than a ring main. This would significantly reduce the cost of implementing EIB lighting control.

In February 2004 BIME began activation of the EIB network in Cinnamon Court. Flat 15 is a pilot for future implementations of smart house technology. It is a transitional flat where people stay for six weeks before moving into permanent accommodation.

Housing21 did not closely follow BIME's recommendations. EIB cable was installed, but it was not documented. Neither was it placed in all the locations requested. The use of a lighting ring main made activation of the EIB costly.

Another issue that has delayed use of the flat is the grant of ethical approval by the local Social Services department. Housing21 has a dementia care adviser who is working closely with Social Services in Deptford to achieve ethical approval and develop procedures for working with the installed equipment. The flat is expected to be in use in the Autumn of 2004.

5.2 Full Scale Implementation

Housing21 are early adopters of smart technology for people with dementia. They have taken a risk and installed technology in several new developments around the UK. They are keen to exploit its advantages to support people with dementia. Initially they have been conservative in their implementation, installing a minimum of infrastructure alongside conventional wiring. Developments scheduled for 2005 are expected to have a full EIB installed and activated on construction.

The Hanover housing association decided to implement technology seen at the Gloucester Smart House. BIME recommended that they employ the EIB system integrators Dome Systems. BIME supplied bed occupancy sensors to Dome Systems who implemented a Night Light system. Hanover's electrical contractor at the development expressed scepticism at the need for the smart lighting control and its maintainability.

6 Recommendations

Work with a housing provider from the beginning so that the housing provider has some ownership of and commitment to the technology. Housing21 have been very supportive of the Gloucester Smart House project and see their involvement in this research as good for them and their image as well as their customers.

² EIBA: The EIB Association - a non-profit organisation that maintains EIB standards for installations, devices and training.

Work with experts in dementia care and build a collaborative relationship early on in a project. BIME's relationship with Dementia Voice has provided good advice on ethics, system design, and the design of dementia friendly interior and exterior environments; as well as contacts with dementia care professionals.

Establish a good relationship with local Social Services departments as soon as possible. The Gloucester Smart House project has benefited greatly from the original endorsement made by Gloucestershire Social Services when they financed part of the pilot year. That funding gave the Gloucester Smart House credibility with major research sponsors.

Work with a smart house system integrator. The system integrator is an important link between the property developer's electrical contractor and the researcher seeking to promote and exploit their research. BIME took too long to establish a working relationship. Had such a relationship been established sooner, some of the difficulties experienced may not have happened as Dome Systems or a similar company would have liaised with Housing21 and their electrical contractor.

Maintain communications between researchers and infrastructure installers. BIME should have monitored the design and installation of EIB infrastructure in Housing21 properties more closely. Maintaining communication would have resulted in the EIB wiring in Cinnamon Court being more suitable and BIME's recommendations being more closely followed.

Establish a media presence early in a project. The Gloucester Smart House project has been covered by national and international news media. This has given the project a good profile amongst dementia care professionals in the UK. Initial media coverage was achieved by a public relations consultant hired by Housing21. Subsequent awareness of the project has been achieved through a combination of conference presentations, further news media coverage, articles in magazines and journals and visits to the Gloucester Smart House.

7 Conclusions

This work is very multidisciplinary. It requires the coordination of many agencies from electrical contractors to social workers and ethics committees. This complexity requires good communication between agencies at strategic and day to day levels so that efforts are coordinated and effective. When attempting to research and implement smart house technology in a caring context, it is important that the researchers establish certain key relationships as soon as possible. These relationships are with the housing provider, the system integrator and strategic and frontline staff in a local social services department.

8 Acknowledgements

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References

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