Designing Dependable Systems
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Systems in the home of older and disabled people, must be appropriate, and this means they are required to be accepted by the user (so they will be used), trustworthy (so they do not breakdown or fail), adaptable (so they can be added to in the future and reset as the person's needs change as well as being "fit for the purpose", by which we mean they do what they say on the packet, they do what the user expects them to do, when the user expects them to do it, in the manner the person expects them to do it.

The DIRC and Equator projects are UK University based projects that are working throughout the UK.

For more information on these initiatives see the individual sites or check out www.smartthinking.ukideas.com for more information.

Designing systems for people with disabilities is not an easy thing to do (See Dewsbury et al: Hometoys: Dec 2001 / Jan 2002). There are many pitfalls and problems that the Home Automator should consider. Daniel E. Fulmer's article "Automating for Disabled Clients" (Hometoys: June 2002) made an interesting series of points in the final paragraph:

"This is a very rewarding implementation of home automation and can also be lucrative. The caveat is to be sure to install a system that will be extremely reliable. If you are unsure of your abilities to offer this level of performance, leave it to someone else. If these systems fail, the call back will be 24/7 and you could open yourself up to liability of you endanger or cause a health risk. Worse, you could be making life harder for someone who all ready has it tough. Obviously not the goal or image our industry wants to portray"

My experience is similar to that of Daniel, system reliability is critical. As people will depend on the system 24/7 and it will become part of their everyday life experience. Designing for disable people is rewarding, taxing, difficult and most importantly, it is a serious business as failure to account for all the needs of the person can mean a system that is not used or rejected by the potential user. The designer needs to ask themselves:

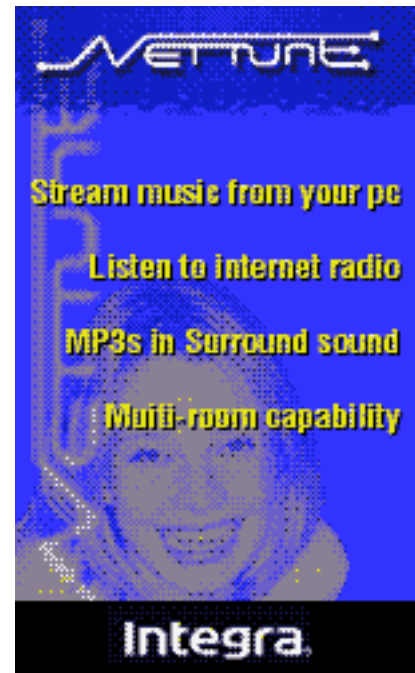### Is the system right/appropriate?

Is it the right/appropriate system?

Is the system predictable and usable?

Is the system robust and reliable?

How is the system to be used?

How is the system likely to be changed?

How robust and reliable is the system?

Recently work that has been undertaken by the DIRC (www.dirc.org.uk) and the Equator (www.equator.ac.uk) initiatives in the UK have begun to consider the real aspects of designing for older and disabled people.   The projects specialize in real-world designs where real people have real systems designed specifically for them and then live with these systems, as opposed to designing and installing demonstrations houses. A key focus of the DIRC initiative is to look at "Dependability" of systems, especially RF systems in the home to assist people. The team have found that traditional notions of dependability fail to meet the needs and expectations of the users, as the systems originally were ones in which the users had to adapt to the new technology.

Critical System Dependability Characteristics		
Acceptability Attributes	**Reliability Attributes**	**Other Considerations**
Aesthetics	Availability, Efficiency of Use	Cost Models Financial Considerations
Understandability, Ease of Remembrance and Learnability	Integrity, Configurability, Consistency, Interoperability	
Patterns and Routines Support	Extensibility	
Process and Timing Support	Few Errors, Repairability Predictability	
Support for user and carer	Provides Feedback and Verification	
	Safety	
	Privacy	

Figure 1: More things to keep in mind

Currently, the team are exploring ways in which we can harness the latest technology to assist people in their homes whilst redefining how systems designed in the first place. We are working on a model to illustrate this which currently looks like this:
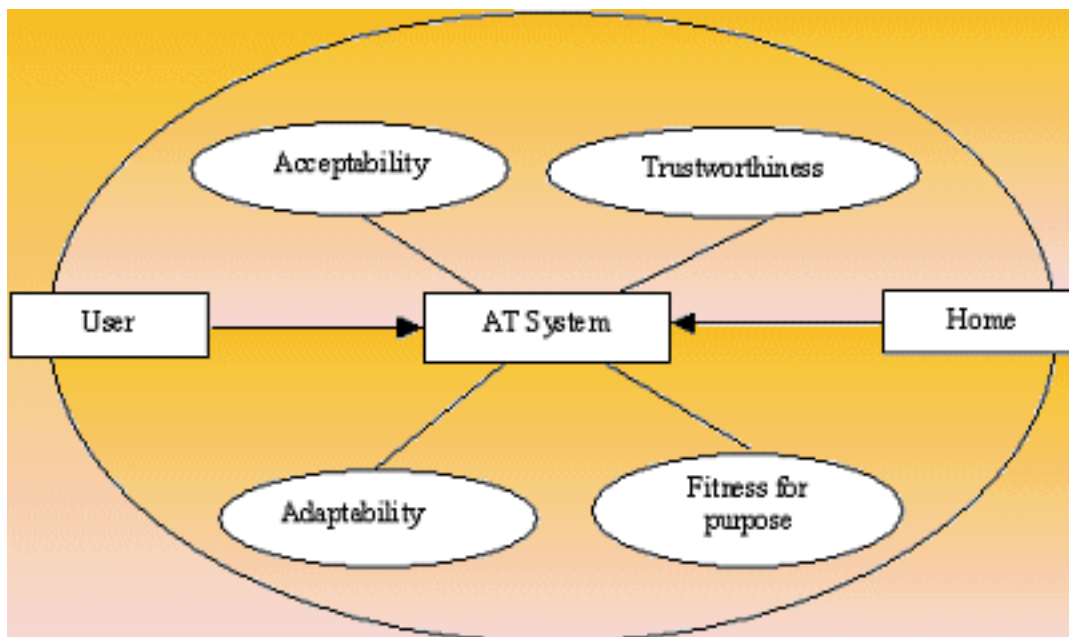
Figure 2: The Interdependent Model

This diagram attempts to show that automated systems require the needs of the user, as well as the home contexts (activities and actions of the persons) to inform the AT (Assistive Technology) design. There are also four pivotal points, acceptability, trustworthiness, adaptability and fitness for purpose that influence the overall design. Systems in the home of older and disabled people, must be appropriate, and this means they are required to be accepted by the user (so they will be used), trustworthy (so they do not breakdown or fail), adaptable (so they can be added to in the future and reset as the person's needs change as well as being "fit for the purpose", by which we mean they do what they say on the packet, they do what the user expects them to do, when the user expects them to do it, in the manner the person expects them to do it. The project has also developed a model that could be of use to installers and HA specialists who are involved in working with older or disabled people. The projects are ongoing and much more is likely to be coming from them in the near future.

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