The Dependability Telecare Assessment (DTA) Tool

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Abstract: This paper considers development and application of the Dependability Telecare Assessment tool (DTA) and the Telecare Assessment process. This tool was developed as a result of extensive research with older people and professionals who have informed the design. The tool also has been developed from a method: the Method for Dependable Domestic Systems (MDDS) and a model: the Dependability Model of Domestic Systems (DMDS).

Keywords: Telecare, Person-centred design, Dependability, Older people, Design.

1. Introduction

Telecare technology is designed to support people in their own home. This paper considers development and application of the 'Dependability Telecare Assessment' tool (DTA). This tool was developed as a result of extensive research with older people and professionals who have informed the design. The tool also has been developed from a method which was called 'the Method for Dependable Domestic Systems (MDDS)' and a model called 'the Dependability Model of Domestic Systems (DMDS)' [1] [2]. The paper explores different Telecare assessment types and advocates a person-centred Telecare assessment which can be assisted by the use of the DTA tool.

2. Background to the DTA tool

DTA was developed after extensive research with older people. This was conducted in a number of different environments throughout England and Scotland and employed a modified form of cultural probes. Cultural probes were initially conceived by William Gaver et al [3] [4] as part of the Presence project which was dedicated to developing technologies for the elderly, as a way of facilitating collaborative design with end-users.

Probes are utilised as agent provocateurs, and Gaver et al [5][6] emphasise that the probes should be used in a speculative manner in which the emergence of new technology designs is ad hoc but loosely based on Probe results. Their use is inspirational and the product of the probes should produce inspired designs in the designers providing "inspiration-clues" [7] about attitudes, aesthetics and desires. This inspirational quality destigmatises the probes to the participants and attempts to elicit a dialogue with older people. The probes also attempt to assist in de-stereotyping conceptions of older people, avoiding the placement of labels and restrictions on the manner in which the research team conceptualise the participants.

The probes packs, whilst consisting of many of the same artefacts, perform a different function to Gaver's Cultural Probes [8]. Where Gaver's probes are intended to reflect participants local cultures

in material detail and in that detail somehow - but unaccountably just how - inspire design, which contrast with the researchers probes which are intended to meet the more modest and traceable aim of supplying information to inform and shape design. While inspiration would undoubtedly be a bonus, the prime concern was informational – a matter of gaining insights into how people live their lives, their everyday circumstances, their routines and rhythms, their practical concerns, and so on.

The author's probes pack differs from Gaver's in design and delivery [9] [10]. In contrast to Gaver's approach, rather than being treated as 'reflections' of participant's local cultures, the materials returned by the probes were instead treated as design resources facilitating cooperative analysis using the materials to facilitate and focus various user workshops [11]. These in turn supported the 'co-realization' [12] of design solutions supporting and attuned to their needs and reflecting some of the processes of 'domestication' and 'innofusion' [13] [14].

2.1. Dependability

The probes were analysed and themes were elicited from the material. The themes were refined and classified into groups. Through this classification process it became evident that the themes were mirroring the classifications advanced by Laprie et al [15] applied to the dependability of computer systems. MDDS and DMDS developed a matrix of social dependability characteristics that can be applied to assistive technology systems. These matrices acted as a socio-technical springboard for designers to consider assistive technology in relation to dependability criteria and person-centred design. They provide a framework from which smart and ubiquitous systems can be analysed within social dependability criteria. DTA is a condensed and honed version of MDDS, which was developed specifically for assessing Telecare as MDDS and DMDS are too complex for the time allocated to assess for Telecare.

3. Underlying Principles of the DTA tool and Person-Centred Design

The DTA tool and person-centred assessment rests on 5 main principles:

1. A good Telecare Assessment can enable a person to enhance their quality of life and encourage independence. If a person has the wrong Telecare provision then there are a number of inefficiencies that have been documented and are apparent. False alerts resulting from poorly specified Telecare can have a number of negative outcomes, such as a client's loss of confidence in Telecare, Professional's loss of confidence in Telecare, and an increase in costs and rejection of Telecare. This also means that a second or duplicate assessment is required to be undertaken before the new Telecare is provided, so extra resources are incurred.

2. A poor Telecare Assessment can disable the person and reduce their quality of life and lessen independence. High-quality Telecare provision should enable a person to undertake activities and have an enhanced quality of life. It should delay a person from accessing more intensive services and allow them to have the choice to stay at home. Telecare following an enablement model has savings all around. Short cuts can be containing and expensive. So which is the best method of providing Telecare or social or health care for that matter?

3. Telecare is a safety-critical system – if the system fails a person might die through not getting assistance when needed.

4. It is important to note that Telecare takes the place of the carer: their eyes; their ears; their nose and their intuition.

5. The DTA tool and person-centred Assessment are adapted from a full Assistive Technology Assessment model called DMDS and a method called MDDS. DTA is suitable for all Telecare assessments where more complex Telecare is likely. It is not always required to employ this tool for simple pendant alarms specification.

4. Telecare Assessments

The author argues that there are two methods of Telecare assessment: Technology Focused or Person-Centred. These assessment types are now explored in more detail and contrasted.

4.1. Technology Focused Telecare Assessment

It is argued by the author that the technology focussed Telecare assessment follows a simple linear equation.

Available Telecare equipment + Risk (floods, falls, dementia etc) = Telecare solution

It should be noted that within this method of assessment the person has been relegated to being a set of risks. The main focus of the assessment is considering things in relation to the potential telecare that can be supplied. If there is a limited supply of Telecare, such as a catalogue, then the assessor will be considering the technology from this catalogue in relation to mitigating the risks for a person.

The author suggests this could also be called risk averse Telecare Assessment

The potential outcomes of this type of assessment include:

1. Mass produced Telecare packages for people (i.e. Falls, Mental Health etc).
2. Computer programmes - that provide a 'best guess' approach to risk assessment.
3. Remote assessments - can be done over the phone – Presents safeguarding issues as no home visit.
4. Self assessments – Client selects their own Telecare solutions from a list – Again possible safeguarding issues here.

The generic quality of this assessment method has increased popularity as there is little training required, home visits are mineralised and people can pick their own Telecare solutions from a catalogue. This is potentially a cost effective solution in the short term.

4.2. Person-Centred Telecare Assessment

The author argues that the Person-Centred Telecare Assessment follows a simple linear equation.

Person + Needs and Risks + Living environment + Support = Potential Telecare solution

The person is fully integrated throughout the process and not relegated to a label.

The author suggests this could also be called a needs based Person-Centred Telecare Assessment.

Person-Centred Telecare Assessment comprises of a number of stages that begin with the person's needs and expectations of solutions. The Person-Centred Telecare Assessment then considers the property layout and the way in which the person lives and advocates a whole house tour. This is followed by considering of the dependability aspects of the person, the home, carers and other factors, such as other support packages.

A strength of the Person-Centred Telecare Assessment is that as a result of the assessment the final outcome could be that "No Telecare" is suitable for a person and may instead generate an urgent referral to other services. Often an initial specification cannot be achieved due to the person's living environment and other external factors (e.g. health, pets, family members etc). As a practitioner the author has had many occasions when a discussion with a person on the telephone has suggested a number of Telecare devices that could be useful and support the person, but on the visit to the person's house these are found to be unrealistic or impractical for a range of reasons and therefore Telecare is not considered to be suitable to support the person and other services are therefore triggered.

5. Person-Centred Assessment

The person-centred assessment is critical for person-fit and sustainability of technological introduction into people's home [16] [17] [18]. An important aspect of all person-centred assessment are that the user's view of what they consider to be the problem, family / Carer's should be consulted if available. A whole house approach, in which the assessor walks around the house and discusses where difficulties might occur, ideally with the person being assessed is also essential as this is where a visual inspection can occur and a determination of potential technological solution is made. All assessments must be activity pattern based which means knowing what the person does, when and with whom, what support is required and given etc. A person's activities will influence the potential Telecare outcome. To illustrate this, let's take a wandering sensor, which is effectively a timed magnetic reed switch on the door. The wandering sensor might be suitable for some people unless they are a lot of people entering or leaving the property, as this would potentially trigger alerts each time the door is open.

A discussion of what other services the person is receiving is a very important aspect to person-centred assessments. Other forms of care provision might affect the Telecare outcomes.

A discussion of any Telecare solution recommended insuring the client is happy with this solution. This is important as the person or an advocate must have the capacity to have some idea what is being installed and ensures a level of compliance with the decision maker. Similarly a discussion on finances and payment if applicable is important so that the person does not find out in retrospect that there is a financial implication to the introduction of the Telecare solution.

Telecare is considered to be safety-critical; it must work, in the expected manner every time for it to be dependable and provide the reassurance required. Technology alone is not the answer to a dependable Telecare service; the response service is also safety-critical. If an alert occurs and nothing happens then the dependability of the system fails. Similarly if the Telecare device is not suitable for a person, i.e. they cannot press a button or pull a cord etc., then the dependability criteria are not met.

This paper therefore suggests that the person-centred approach should be advocated in preference to the technology focused Telecare Assessment (table 1). The Technology – focused Telecare

Assessment is likely to be adopted, in the UK at least, as it is cheap, simple and gets the technology out there, but at what price? Especially when there is a clear alternative which this paper proposes.

Table 1. Comparing the Technology-Focused Assessment with the Person-Centred Assessment

Technology Focused	Person-Centred
Technology based	Person focused throughout
Can be mass produced	Requires a home visit
Can be made in to simple Computer programme	Reliable and tested
Does not require home visit	Requires Home tour
Easy for non-experts to use	Requires good Telecare knowledge
Possibly poor results	Good results
Possibly misses many factors	Inclusive
Possible Safeguarding issues	Safeguarding embedded
Possibly costly in long term	Cost saving in long term
Likely to be limited to catalogue	Can easily go off catalogue
Generic Telecare assessment	Personalised Telecare assessment

6. The Dependability Telecare Assessment (DTA)

DTA has been developed over nine years by the author at Lancaster University. As a modification from the detailed MDDS and DMDS, it refines social dependability characteristics. DTA considers the essential factors that should be taken into account in the process of an Assessment for Telecare equipment.

DTA is based on the premise that the person is integral within and to the overall system. The system is not a technological system it is a human system that has feelings and emotions, hence the use of the word person not human, it avoids depersonificaton.

The DTA tool uses an onion layered approach to assessment that comprises of many layers. The main elements of a Telecare assessment comprise of four things (figure 1):

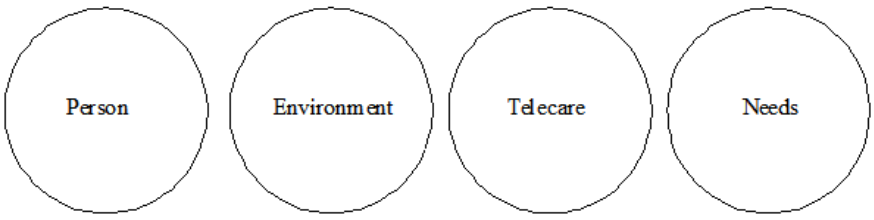
1) The person

2) Their living environment and activity patterns

3) The Telecare options/ potentials

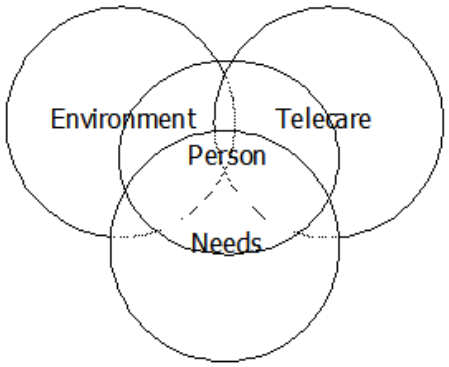
4) The person's perceived and actual needs.

Figure 1. The four elements that comprise the DTA tool.



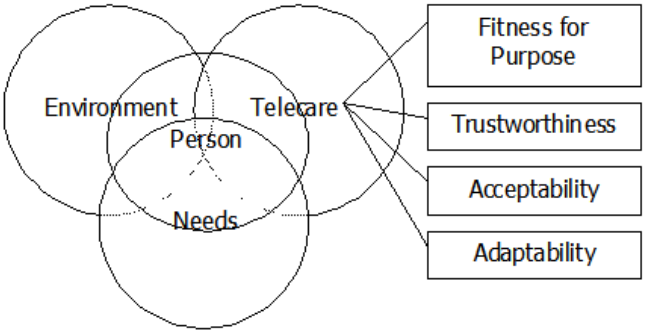
These elements combine and the person is at the centre of the assessment process. The combination is centred on the person such that all a linked together with the person at the centre (figure 2).

Figure 2. The combined four elements that comprise the DTA tool.



When conducting the assessment the assessor considers all the above factors. Whilst considering Telecare they should also consider the dependability properties of the system. These dependability properties relate directly to the Telecare but also influence and are influenced by the needs and environmental factors.

Figure 3. The combined four elements of the DTA tool with the dependability properties added.



The four key properties of Dependability are 'Fitness for Purpose', 'Trustworthiness', 'Acceptability' and 'Adaptability' (figure 3) [16]. Each of these dependability properties has elements within them that form the DTA tool. These elements also have suggested questions to follow the element that comprise the tool (table 2).

Table 2. The DTA tool with the dependability properties expanded.

<table>
<tr><td>FITNESS FOR PURPOSE
Does/will the Telecare meet the broad needs of the person</td><td>TRUSTWORTHINESS
Can the person trust the Telecare to do what is expected</td><td>ACCEPTABILITY
Does the person find the Telecare an acceptable addition to their lifestyle</td><td>ADAPTABILITY
Is the Telecare Flexible enough to cope with the person’s changing needs</td></tr>
<tr><td>Portability
Can the Telecare be carried by the person</td><td>Reliability
How reliable is the Telecare for the person</td><td>Usability
How practical is the Telecare solution for the person</td><td rowspan="5">Aesthetics
Does the Telecare look good and blend with the person’s surroundings</td></tr>
<tr><td>Comfort
How comfortable is the Telecare for the person to wear for long periods</td><td>Safety
How safe is the Telecare for the person – Does it mitigate risk or potentially cause more</td><td>Learnability
Is the person able to learn how to use the Telecare appropriately</td></tr>
<tr><td>Timeliness
Does the Telecare work in appropriate time frames</td><td rowspan="3">Maintainability and serviceability
– How easy is the Telecare equipment to get serviced or maintained
- Does the person need to be involved in this process
- Is the person capable in being involved in this process</td><td rowspan="3">Compatibility
Does the Telecare solution work well with other existing technologies – is it interoperable</td></tr>
<tr><td>Utility
How useful is the Telecare solution for the person</td></tr>
<tr><td>Responsiveness
Does the Telecare device produce the correct response</td></tr>
</table>

By following the questions and considering each property, the overall dependability of the Telecare system is maintained. Due to the qualitative nature of the DTA tool, it is impossible to objectively ensure that people follow the tool in the correct manner and therefore it is open to some potential operational flaws. Using DTA is potentially cost effective in the long term as the technology is likely to be better suited to the real needs of the person. This means there is less rejection or non-use of the Telecare provided. This alleviates the dependency of Telecare and puts the emphasis and control with the person who is assessed. Using DTA should also stop people being impaired through over-ordering of Telecare as too much telecare will mean one of the elements above will not be complied with. The DTA tool has been employed by one London Borough for its Telecare Assessments.

7. Conclusion

This paper has outlined the DTA tool from development to application and its usage in Person-Centred Assessments for Telecare. It has also stressed that Person-Centred Telecare assessments which are based around the DTA tool could provide a cost effective traceable person-focused assessment. The results are consistent and the overall use of the tool can mean that people receive the correct Telecare to meet their needs and mitigate against risks. Adopting DTA and the principles of Person-Centred Assessment is a quality – quantity argument, one that is likely to occur in the near future within the UK, DTA along with DMDS and MDDS are available to take the side of quality. DTA is not fool proof and does rely on the ability of the assessor to do their job.

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