

# A Study of User Needs for the ‘Techno Kitchen’

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**Abstract.** A project, Transitions in Kitchen Living (TiKL) has been conducted to study kitchen histories and current use by older people. A multidisciplinary team developed a common interview methodology to collect people’s personal kitchen histories and their views on their current kitchen. Now and in the future ambient assistance and applied electronic technology might provide additional functionality to make kitchens easier to use for all ages. This paper relates some of these technical developments to user needs identified in the TiKL project and reports on the results of a survey to obtain older people’s views on them.

**Keywords:** kitchen, advanced technology, older people, people with disabilities.

## 1 Introduction

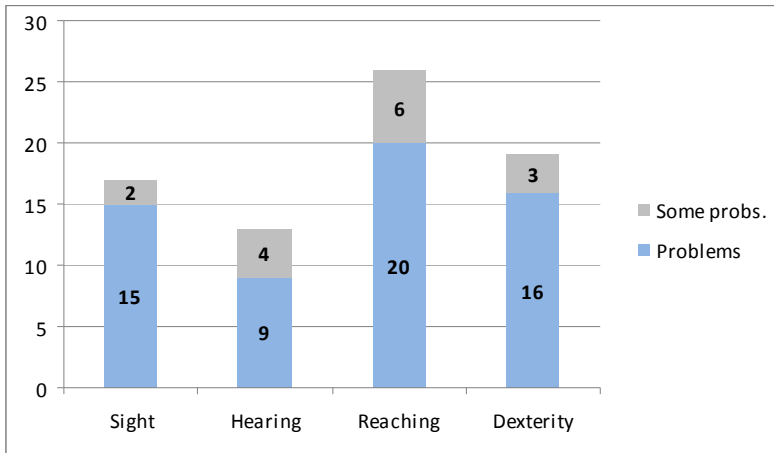
The kitchen is an important space in the home. In order to support easier use and independent living for older people, it is desirable to provide, a kitchen environment that is comfortable so that tasks can be performed with a minimum amount of unnecessary effort and strain. Good design and physical ergonomics can help to achieve this. However to expand the possibilities to support people as they age, computer technology, if developed in a subtle and sensitive way can help people to conduct tasks in the kitchen. They can also help to monitor a person’s well being to detect if someone has fallen and needs help. There are many issues related to ethics, privacy, intuitiveness and ease of use that need to be considered before such systems are implemented [1]. It is well known that such technological developments are no substitute for an older person at home having human contact and support from friends and family.

This paper develops the work of a project (Transitions in Kitchen Living - TiKL) conducted by social gerontologists at the Open University and ergonomists at Loughborough University in England and funded by the UK’s New Dynamics of Ageing Programme, to study people’s lives in relation to the kitchen [2, 3]. Forty eight older people, living in a range of accommodation in Bristol and Loughborough, took part. Each participant was interviewed about their ‘kitchen history’ – all the different kitchens they have experienced in their lives, and also their abilities, needs, likes and dislikes in relation to their current kitchen. Many of the participants had

developed simple and practical solutions to overcome the problems they faced. These included adapting cupboards for easier access, installing task lighting in dark corners, erecting lower work surfaces for use while seated (possibly in a wheelchair) and repositioning plugs for easier access. Smaller appliances such as table top dishwashers and microwave/cooker combinations were also found suitable when there was little space available. All these ideas were assembled and incorporated into a ‘Kitchen Living Guide’ to help other people adapt their kitchens to better meet their changing needs as they grow older. A natural extension of this study was to review the possibilities of using more advanced technology to make kitchen life easier. A small survey was also conducted with a group of older group of people to obtain their reactions to some of the ideas and concepts behind the ‘techo kitchen’.

## 2 General Problems and Requirements in the Kitchen

The TiKL kitchen study reviewed the current kitchen environment and identified a range of general problems that people faced. Participants were asked about their capabilities with respect to kitchen activities. The following chart (Figure 1) shows the number of participants who did have specific capability problems.



**Fig. 1.** Numbers of participants experiencing physical limitations out of total of 48 (‘Some problems’ indicates those saying they had no problems but then described problems or coping strategies)

It can be seen that the physical limitation of reaching (up, down or in front) affected 26 people (54% of the sample), while problems of lack of dexterity and strength, poor sight and hearing also affected significant proportions of the sample. The interview study identified specific task related problems in the kitchen resulting from these physical limitations as described by the project participants. It also recorded solutions that people had adopted and provided a stimulus to think about new possible solutions.

Table 1 below lists 16 common problems that people might face in the kitchen (both older and younger people) alongside solutions that could be adopted to address them. The second column shows traditional kitchen design and ergonomic solutions that arose during the study. The third column presents more advanced technological solutions that could be adopted or developed.

**Table 1.** Comparison of possible ‘low tech’ and ‘hi tech’ solutions to problems identified in the kitchen study

<b>Problem</b>	<b>Possible ‘low tech’ solution</b>	<b>Possible ‘hi tech’ solution</b>
1. Poor lighting in parts of kitchen for doing tasks	Install under cupboard lights or table lamps with switches	Activity is sensed and light is turned on automatically
2. Tiredness and needing to sit down to carry out tasks	Table or lower work surface for sitting or perching stool	Work surface motorized so can be raised or lowered
3. Difficulty in reaching window or blind over sink	Reposition catches to be at bottom of window frame	Remote control opening and closing of windows/blinds
4. Bending down to low or reaching up to high shelves.	Relocate shelving height. Pull out or carousel shelving.	Motorised cupboards that can be moved up and down
5. Reading small instructions on packaged food.	Improved lighting to read instructions or magnifier	Gadget to scan and read instructions aloud.
6. Bending down to check cooking in oven/take out pan	Oven placed at waist height. Light- check without opening	
7. Transporting food from oven to work surface or table.	Trolley to help transfer items between kitchen-dining room	‘Robot’ to transfer items between kitchen-dining room
8. Drudgery of washing up	Wash up in stages	Dishwasher installed (perhaps small unit)
9. Concern that iron, oven or kettle left on when out	Return to house or contact neighbour to check	Auto shut off of these items if left on too long or if go out
10. Hearing door bell or phone with kettle on		Visual alert if door bell pressed or phone rings
11. Needing help with shopping.	Neighbour, friend or relative helps with transport.	Online shopping service. Fridge notifies of items need.
12. Lack of space for ironing board in the kitchen	Additional space (e.g. utility room) for board to be set up.	Pull out ironing surface built into kitchen units.
13. Lack of plug points.	Additional electricity points installed	Future gadgets may be powered wirelessly
14. Kettle too heavy to lift to tap to fill.	Smaller kettle that can be lifted more easily.	Hot water unit to provide hot water ‘on tap’
15. Wash basket too heavy to take outside.	Lighter washing basket. Use with smaller loads.	‘Robot’ to carry clothes to outside
16. General cleaning (floor, on cupboards, behind units)	Easy clean floor and work surfaces.	‘Robot’ kitchen cleaner with access behind units

### 3 Survey to Explore Requirements for Technological Support

Drawing upon the list of possible innovations in Table 1, a similar group of older people (21 in total, 16 females, 5 males, from 50 to 85 and an average age of 71) were surveyed to think about a range of possible technological enhancements that might support them in the kitchen. Each respondent was asked to state whether they would want each innovation or not. A summary of the survey results are shown in Table 2.

**Table 2.** User reactions to ‘hi-tech’ innovations in the kitchen (N=21)

<b>Innovation</b>	<b>% Approval</b>	<b>Comments</b>
1. Press button on fridge to read out food items present or run out of.	33%	Would help with shopping. Good idea for freezer where more food stored. Opening door less saves energy. Unsure of technology behind it. Would you trust it? Would also need to know if items in date. Would need to log food items in and out.
2. Sensor alert if smoke, CO, fire or gas leak when you are out.	76%	Would help with safety. Good idea. Who would come to deal with it? If return to house and has been leak, putting on light could cause fire.
3. Quick cooling oven hob.	76%	Would be safer especially for grand children. Good idea – have sometimes been caught out by residual heat on ceramic hob.
4. Shut off electrical equipment when you leave the house.	90%	Yes it is easy to go out and forget that things still on. Would be safer. Save money on electric not being used. Peace of mind.
5. Washing machine has only 6 buttons for easy use.	75%	Only use 2 or 3 programmes most of time. Less confusing. Too many programmes never used. Am happy with dial and choice.
6. Open/close windows and blinds with button press.	76%	Would be handy as window situated over sink. Would make life easier often have to stretch to close them. Would be safer. Blind may hit items on window sill. Would make us lazy.
7. Water sensor welfare alert if taps not run for some time.	43%	Daughter regularly checks I’m OK. Useful for emergencies e.g. if someone has fallen. You would have to be able to cancel the system if went on holiday.

**Table 2.** (Continued)

<b>Innovation</b>	<b>% Approval</b>	<b>Comments</b>
8. Automatic task light when working in dark corner.	71%	Very useful. Could see better and avoid eye strain. Could save energy. Safety and emergencies in the dark. I wouldn't need to stay in the corner. Need good light all the time.
9. You or others alerted if water on floor indicates possible flood.	75%	Useful – water can run a long time before noticed. Would be safer and avoid waste. Too many alarms may make you worry about too many minor things.
10. Simple touch screen to order shopping and have delivered.	24%	Save carrying heavy shopping. Like the choice or to check quality in store. Feel too complicated for the people intended to help. If became disabled friends would assist.
11. Recipe display on wall so easier to follow when cooking.	52%	May make it more efficient and save writing recipe's down. Don't follow recipes. Prefer to print with large font. Interested to see prototype.
12. Instructions read out about food preparation and cooking actions.	24%	Cooking an effort so could help if tired. Would be useful if can't read cooking instructions label. I know how to cook things. Prefer to cook at my pace.

There was also some interest in adjustable wall cupboards that could move up and down (42% approval) electrically on runners for easier access to higher cupboard shelves. One person stated that “As a 4 foot 11 inch person this would be wonderful and would suit households with people of different heights and reach capability”. Another said that this “Would bring the cupboard down to their eye line and reach”. There was keen interest in a worktop that can be lowered temporarily for use while seated (67%). It was thought that this “Would keep people's interest in cooking and independence later in life”. However it was also said that this could reduce cupboard space potential in the kitchen. Another idea was a facility in the kitchen to read out the small print (instructions, ingredients) on food packaging or other products (50%).

Participants were also asked to propose their own innovations. There was a requirement from two people for more help to be energy or water efficient in the kitchen, for example, a plug to cut down on energy use in the kitchen by avoiding standby or a better mixer tap so that hot water was delivered quickly rather than running it until it warmed up. Three people suggested a facility (perhaps in the fridge) to help assess food quality e.g. “Has egg or cheese gone off?” Some people wanted to hand over complete tasks to technology: “Something to do the ironing” and “A robot that could cook, clean, serve food, do the shopping and the washing and drying up!”

The results of the survey show that there is enthusiasm for certain types of technological support in the kitchen provided it is well thought through and designed

to meet people's needs. An understanding of older people's viewpoints is important to ensure that such developments are useful and practical to kitchen users in the future.

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