ICT response to elderly baby boomers

Peter Brook
Department of IT and Electrotechnogy
Otago Polytechnic
Dunedin, NZ
peterb@tekotago.ac.nz

After World War II there occurred a large bulge in the birth rate that had dislocating consequences to New Zealand's systems in housing, education and welfare. The next impact of this bulge will start to occur in about ten years time as the baby boomers move into the elderly category. The proportion of aging people will continue to grow until a full quarter of New Zealand's population are in the over 65 category in about 2050. The costs to care for this cohort will be huge and especially if we rely on traditional institutional and geriatric care. This paper asserts that it is better both socially and economically to care for older people in their own homes. The ICT challenge is to retrofit current houses with enabling intelligent devices as well as embed an "ambient intelligence" into our daily tasks. An example of a design of a relevant device is given as well as a report of the European ISTAG group's depiction of an ambient intelligent world.

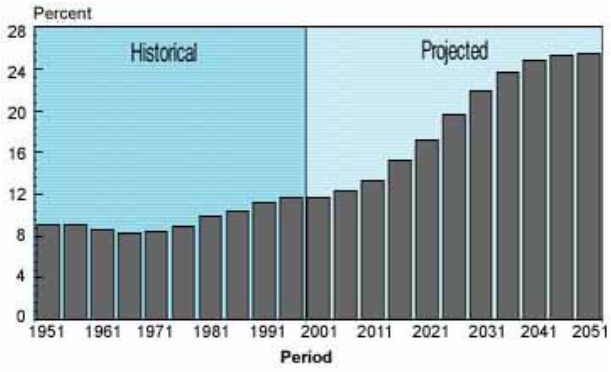
1. INTRODUCTION

Today's baby boomers are well into their 50's and taking on senior roles in our society. But they are getting older and a huge proportion of our health budget may be required to maintain this bulge of elderly and infirm people well into the 2040's. By 2050 there will be 250 000 people in New Zealand over the age of 85. A large proportion of these will need help in carrying out their daily tasks and about 20% will be suffering from a form on dementia. This paper examines possible ICT responses to such an impending inevitable issue. One such approach involves the use of Ambient Intelligence (AmI) as promoted by the European ISTAG group. This involves a world where older people move around amongst layers of invisible embedded computers that assist and report. This, in turn, raises issues for older people that will include relinquishing control, privacy and dignity in return for a safer environment.

2. DEMOGRAPHIC CHANGE

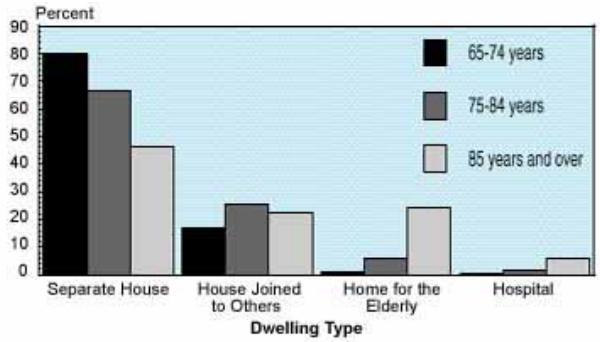
In this country, and in many other western countries, there was a large bulge in births after World War II. If we take the centre of the baby boomer bulge to occur in 1949 then such a birth today is represented by a 54 year old just hitting middle age and thinking about the last part of a career leading to retirement. Such people have leadership roles in our society and dominate part of western culture. It is no coincidence that conservatism is a valid political and social mode especially in the United States. Features associated with the old like baldness, glasses, and overweight while not at the cutting part of fashion do have their place amongst youth culture and in the rest of our societies. As for ICT usage, the baby boomers were the first to engage in personal computing and they readily accept most aspects of IT. A world of ubiquitous computing would hold few fears for the baby boomers.

In 2010, in New Zealand, the first of the baby boom generation will get to 65 years old and herald the start of the greying of the demographic bulge whose post war fertility was not continued into subsequent generations. According to Statistics New Zealand (2004, Figure 1), there will occur a dramatic increase in elderly people peaking in about 2050 where a full quarter of our population will be at least 65 years old, a cohort of about 1.145 million. In 1961 the equivalent group's proportion was 8%. The greatest rate of change of the proportion of elderly people will be in the two decades 2010 to 2030. Not only are there more old people during



Source: Statistics New Zealand, Census of Population and Dwellings, 1951-1996; Population Projections

Figure 1: Elderly people in the population 1951-2051



Source: Statistics New Zealand, Census of Population and Dwellings, 1996

Figure 2: Dwelling type by age group, 1996 census

that period, they will live longer, but, and here is the catch, not always in good health.

It is the health issues, birth rate and pension sustainability that worry politicians in our country and others similar to it. Taking each in turn we can state the principal issue to be these:

- Health. The aging of the baby boom bulge will cause large financial dislocations.
- Birth rate. First world populations will actually decrease for the first time.
- Pensions. The number of wealth generating people can't sustain the elderly boomers.

This paper will look at some of high-tech approaches to sustaining an elderly population increasingly in need of care and living to an old age in a world that is confusing and dangerous to them.

If we assume that 6% of the post 65 year old population requires institutional care through physical health problems or dementia and confusion then huge sums of money will be required to sustain such an institutionalised caring regime. If we take the projected population of elderly people in 2050 as above then it will cost around $2.4 billion annually to institutionalise our older generation at a conservative $35000 per anum, a typical amount for keeping someone in appropriate care. Far better, surely to keep as many as possible in their homes under the watchful eye of human or artificial carers.

In the 1996 census over 70% of older people (those aged 65 and over) lived separate houses and 20.2% lived in flats joined onto other dwellings (Figure 2). It is sensible financially and socially to find ways to keep our elderly people in such dwellings and delay as long as possible the requirement for institutionalisation.

ICT has a role to play in keeping as many of the elderly baby boomers in their houses or at least out of institutional care. One approach is to make gadgets that will help an elderly person go about day to day tasks. A large market is building up in the United States for such products. These include safety devices, dementia aids and people locators. Many elementary devices are on the market but are merely piecemeal, incoherent responses to a wider issue.

A successful plan that might meet the baby boomers' aging crisis would involve at least a three pronged attack consisting of (a) appropriately retrofitted gadgets for the elderly (b) house and workplaces designed especially for the boomers and (c) a milieu of ubiquitous computing described further below.

The challenge is how to start now to prepare for dislocation that will come with the greying of New Zealand. The focus should be on enabling technologies designed especially for the elderly target clientele. This includes software that allows alternative inputs including gesture, voice, hand and head movements to be attached to traditional applications. Most computing, it has often been predicted will not take place on the desktop rather embedded into walls, appliances, beds, vehicles and the like and will work in a coherent way. For instance cheap, reliable, slow, safe urban vehicles will interact with house appliances like refrigerators for a list of supplies and groceries that are running short. Timely alerts will enable the elderly driver to stop on time to pick up these goods waiting for him/her at the collect point. The implication here is that there will be a pervasive

network of networks broadcasting queries and information packets around the urban centres initially then later in the rural areas. Mobile wireless will deliver a mixture of WiFi, Bluetooth, TCP/IP, cellular phone standards and other protocols. We already have most of the infrastructure, standards and technologies to do this. It just requires integration of the multiplicity of standards into simple devices and smart software to interpret and prioritise such varied streams. The issue is not so much technical as socio-political.

3. RESPONSES

These socio-political issues come down to three responses to the baby boomer demographic blip:

Response 1. Accept a decline in elderly care. This is unlikely as such a large portion of the voting public will come from the 65-plus group. This country has a proud history of old-age care and each citizen will have contacts into this age group and hence could personalise abstract concerns into real life stories. The proportion of the budget spent on institutionalising our elderly, if maintained will lead to a real decline in elderly care.

Response 2. Continue with the status quo. Hospitalise those who need medical and geriatric care and institutionalise those who need more simple daily care. Finally, give minor encouragement to those who can stay in their own homes. As discussed above this option is only possible at extreme cost and would require a major building initiative constructing old-peoples' homes and geriatric wards and hospitals.

Response 3. Adopt a plan to minimize the number of older people entering into institutional care. Acknowledge that much of the care is helping people through simple daily tasks and providing a safe environment. This may range from delivery of meals to wearing smart devices. The ICT community will provide many of the solutions to the problem of keeping elderly people in their own homes by proving devices and networks that are part of the world of ubiquitous computing envisaged by the European ISTAG group and discussed below.

4. AMBIENT INTELLIGENCE

In Europe there has been considerable research into the likely societal changes in activity once "ambient intelligence" is thoroughly integrated. The ISTAG group is part of the European Commission's Joint Research Centre and collaborates with experts and ICT societies and companies across Europe. Angelo Airaghi, the ISTAG chair summarises the thrust of their research: "Change is fast and it is up to us as entrepreneurs and technologists to engage in constructing the future so that this won't happen automatically" (ISTAG 2001). They present a series of scenarios where people go about their daily tasks surrounded by intelligent objects and messages. In furniture, cars, houses, walls, tiny PDAs and communications devices, decisions are made and actions initiated in a matrix of intelligence mediated by well designed protocols. Although not specifically featured in their research documents an intelligent ambience would be highly appropriate to carry out the goals mentioned above: namely, keeping elderly baby boomers in a safe caring environment in their own homes and new smart apartments. The ISTAG group identifies social and political aspects of ambient intelligence that our New Zealand communities would need to endorse or perhaps provide a local version. These factors that are precursors for eventual societal acceptance are:

- AmI (ambient intelligence) should facilitate human contact.
- AmI should be oriented towards community and cultural enhancement.
- AmI should help to build knowledge and skills for work, better quality of work, citizenship and consumer choice.
- AmI should inspire trust and confidence.
- AmI should be consistent with long term sustainability – personal, societal and environmental and with life-long leaning. In essence, the challenge is to create an AmI landscape made up of "convivial technologies" that are easy to live with.

The ISTAG reports outline scenarios where baby boomers in New Zealand live safe, enriched lives in their own homes. This is desirable socially and financially. The challenge for the ICT community is to provide a New Zealand plan for universal ambient intelligence to respond to the boomer bulge before it is too late and dislocating change will be forces on us.

5. LOCATION DEVICE

As an example of assisting devices that are currently in the pipeline the following work in progress is reported. The author is a member of a team building a prototype of a location device designed for elderly people with the following characteristics:

- Wearable and non-invasive
- GPS reception and logging
- Bio-data collecting
- Communication with associated helpers' devices
- Alarms and alerts
- Burst downloadable
- Cheap and rugged
- Low power
- Fashionable

The main function of this device is to store the current position of the wearer and alert appropriate people when the user is in a previously perceived dangerous position. An OEM GPS unit is installed next to a small microprocessor and a once-per-second GPS reading is taken of the user's position via overhead satellites. The readings are stored for later downloading if necessary but usually ignored so long as the user does not transgress into any designated unsafe areas. While pottering around the home there will usually be no alerts but once the processor finds positions out of the range of allocated ones it sends out a signal that causes an SMS text message to be sent to interested parties, for instance a carer, a security firm or a relative.

The smart part of the device is its ability to make decisions about that which constitutes a dangerous place. For instance anywhere a certain distance from the house is fine except for the garage where a car, now that driving is a forbidden activity, is stored off limits. Another use could involve going into town with a carer who would wear a corresponding device. So long as the distance between the carer's device was not more than, say, a hundred metres there would be no alerts created. When the distance, however was greater than the trip point the carer would receive an alarm plus information as to the current position and likely track of he elderly person.

In the current prototype there is provision for data dumping in burst mode. This is where the logged data on the elderly person's device is regularly quickly downloaded into a larger intelligent fixed unit which is capable of further analysis as well as being connected to the Internet. This allows periodic review of a mobile and vulnerable person's movements and bio-data, currently heart rate only. In this way, an elderly person's proclivities and habits can be built up into a pattern of GPS positions over a daily cycle. Therefore departure from such patterns can be noted as possible emergencies. For instance, lack of movement indicated by constant GPS positions after lunch could mean a normal snooze or an out-of-character stillness that could indicate a fall. Further desirable features tagged for future models include:

- Integrating the device into clothing
- A two way channel for spoken messages
- Power scavenging, perhaps recharging via movements of the wearers.

6. CONCLUSION

This issue of a large cohort of elderly people will not go away. We probably cannot afford to simply increase the current institutionalisation policies until a monolithic system is servicing up to a quarter of the population. Dementia and confusion are concomitant phenomena associated with aging. Therefore some sort of people-locating plan would save both money and anxiety in the future, especially if we started planning now. The ISTAG group has shown the way forward to a caring world powered by ambient intelligence. While this is an excellent vision, we also need a range of practical ICT devices, like the one described above. There is time to direct research resources towards such devices and to plan for their integration into a world of ambient intelligence where old people are cared for with dignity.

REFERENCES

ISTAG (2001) Scenarios for Ambient Intelligence in 2010" Final Report of the ISTAG European Commission Group February 2001. http://www.cordis.lu/ist/istag.htm

Statistics NZ (viewed 2004) http://www.stats.govt.nz/domino/external/web/nzstories.nsf/092 edeb76ed5aa6b cc256afe008 1d84e/8ee6042f96663e7d cc256b 180003e81 c?OpenDocument