



# Age in the future

**How upcoming developments will affect older people**

**A Futurizon Report**

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## EXECUTIVE SUMMARY

Technology development will continue to accelerate for decades to come. Developments will affect everyone, but older people will often be affected differently. In a few cases, there will be particular problems for older people as a consequence of new technology, but fortunately, most expected changes will be beneficial. So in spite of a few challenges, the future looks good for older people.

The main problems will include:

Stress caused by accelerating change;

Inter-generational conflict resulting from high pension and health care costs for older people

The main areas of improvement will include:

Increasing longevity and quality of health into final years, mainly enabled by better drugs and IT;

Improved medical technology that will increase independence and higher quality of life for people who would otherwise need to move to a care home;

Significant improvements in ease of use of electronic equipment and services

Smaller, easier, cheaper IT such as electronic jewellery, enabling effective social and political inclusion

Easier everyday tasks such as shopping and travelling;

Improved social inclusivity and reduced loneliness;

Changes in the nature of work in favour of older workers;

Easier and more powerful political involvement

Many of these changes are caused by wider market and social forces, but appropriate action and intervention could reduce the adverse effects of the problems on older people and increase the benefits. At least in the case of technology change, older people can be helped by better design of new technology that takes greater account of their needs. IT companies should be encouraged to address older people as a primary market, especially as this group accounts for an increasing proportion of the economy. This could be a voluntary measure applied by forward-looking, socially responsible companies, encouraged by government, or forced by greater consumer pressure, eventually applied by older people themselves.

Greater discussion of the likely causes of inter-generational conflict is needed so that the whole population feels involved. Everyone is a stakeholder in achieving and maintaining good relations between generations. Otherwise, conflict is inevitable as tensions increase, especially as the pensions crisis materialises.

It will become much easier for older people to organise and apply their increasing political power, thanks to the web and the development of a wide range of powerful, but tiny, mobile IT devices, more like jewellery than today's phones or gadgets. If government and businesses do not take adequate account of their needs, they will be in a much better position to force them.

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## INTRODUCTION

There have always been older people, but in the future, there will be rather more of them relative to the population as a whole. The rapidly changing world will affect everyone, but older people will not always feel the same effects as younger people. New stresses will come from changing society and changing technology. But there is no cause for pessimism. In spite of some increasing problems, many more things will get better for old people than will get worse, and while we are certainly not heading towards utopia, the overall quality of life for the ageing population will be significantly better in the future than it is today. This report starts by listing a few of the obvious problems, and then the far greater number of beneficial changes.

## STRESS FROM ACCELERATING CHANGE

Technology change will continue to accelerate for at least another two decades, and will remain rapid for much longer. Many people, especially older people, already feel stressed by the pace of change, so this will undoubtedly become a bigger problem. Of course, it is not only technology that is changing quickly. Demographic changes will increase, as will problems such as rising crime, social breakdown, a feeling of overzealous surveillance. Meanwhile, the whole world will be undergoing major global changes, with rapidly changing economic power distribution, leading to rising and falling empires, mass migrations, increased competition for limited resources such as food and oil, with consequent rises in prices, new conflicts brewing over water supplies, and of course global reaction to climate change. All of these will create new or growing problems for everyone, but many older people have to survive on lower incomes, so will be affected badly by these. Increased physical vulnerability generally accompanies ageing too of course, and this will make violent crime a stronger issue for older people. Indeed, the surveillance systems that younger people might often resent for impeding their freedom and privacy, might make older people feel more secure. This in itself could become a source of division between the old and the young.

## INTER-GENERATIONAL CONFLICT

With an ageing population, younger people will have to put up with a society where older people hold an increasing proportion of political influence, so politicians will want to be seen to support them, even sometimes at the expense of younger people. The pensions problem will be just one of the causes of resentment between young and old. Increasing numbers of older people, with their slower pace and slower reactions, will slow down young people and cause frustration. They will have more political power, nationally and locally, impeding the aspirations of younger people to change the world to their tastes.

But the pensions problem is certainly the biggest likely cause of conflict. It has already had a large effect on political decisions, with immigration encouraged to fill the perceived hole in the economy, and of course this in itself is now causing some tensions. However, future medical technology and advanced IT are likely to increase longevity even further than current estimates, which take little account of future technology advances. The positive feedback loop within AI, biotech and nanotech will accelerate technology exponentially with enormous benefits for health and lifespans.

Although this is of course good news in one sense, it simply hasn't been paid for in terms of pensions investments. Although this same technology will certainly have beneficial economic effects too, helping economic growth and our ability to pay, this might not be sufficient to balance the increased pension costs. Tax will have to rise to fill the gap, and this will of course have to be paid by a smaller number of young people, who will realise that they will not receive similar benefits.

Tax rises, with no promise of personal repayment, and a feeling of disenfranchisement will create negative feelings in the younger working population towards older people.

This effect is already visible today, with pension-related taxes becoming more of an issue every month. But it will increase as the problem takes a stronger hold.

A new effect will soon become apparent though. As China, then India, Brazil, Russia, and eventually many other countries, all come on stream economically, there will be very little incentive for the bright young people to live in a 'retirement home UK'. They will be globally mobile, with many destination countries having younger populations and consequently much better worker to non-worker ratios. Furthermore, immigrant populations, attracted here by a country eager to plug a pensions hole, might not want to stay once their homelands can offer more attractive lifestyles. Indeed, we will very likely soon see mass 'remigration' of Indians and Chinese, with enormously harmful consequences for our own pool of suitably skilled workers. AI and robotics will alleviate this to a degree, but it is impossible to predict whether this will be sufficient. The emigration and remigration brain drain might mean that the only people left are the retired and those with insufficient skills for other countries to want them.

## INCREASING LONGEVITY

Medical advances are already promising increasing life spans. More importantly, it will be possible to stay healthier for longer, with a sharp decline at the very end of our lives instead of a gradual decline over a long period. Apart from obvious improvements in drugs and medical understanding, appropriate use of unintrusive IT will continuously monitor our body functioning and give us advanced notice of developing health problems so that they can be prevented, reducing health care costs and improving health. Similarly, the availability of effective monitoring services for the home will allow people to retain a good measure of independence in their own home instead of having to move to care homes, again improving quality of life whilst reducing costs.

## IT IMPROVEMENT – EASE OF USE

Most of the progress in IT in the last few decades has been in increasing processing power, storage, and reducing size. Spurred on by recent success such as Apple's iPod and more recently, their iPhone, IT companies are now placing far more emphasis on ease of use, mostly afforded via elegant and simple design of both hardware and software. The next decade will therefore bring many more devices that are designed well and are easier to use. These devices will mostly be

lighter weight, more ergonomic, and more visually appealing. They will be designed to offer the functions that people want in ways that people can relate easily to, instead of adding extra functionality for the sake of it, at the expense of usability, as has too often been the case in the past.

This new design ethos will hopefully permeate the whole IT world, improving software and hardware, improving reliability, security, privacy, cost, and ease of use all at the same time.

## ELECTRONIC JEWELLERY

Progress in information technology will accelerate for many more years. Improved miniaturisation will lead to very small devices with very high functionality and low impact on resources. A lot of functionality may be condensed into pieces of jewellery. Since some items of jewellery such as ear rings and wristwatches are in close contact with the skin, this will enable an ideal platform on which to build medical monitoring applications.

Electronic jewellery would not just be ornamental. Almost any of today's electronic gadgets such as phones, cameras, MP3 players and PDAs could be condensed down to jewellery the size of lapel pins, ear rings and necklaces, and certainly into wristwatches or bracelets. The wide range and low costs of highly portable functionality will lead to improvements across a wide range of personal, social, governmental and business services.

A good example of potential electronic jewellery is the 'ego badge'. This would be a lapel pin or brooch that contains enough memory to hold a substantial personal profile (such as people often include today on their web sites), some basic processing, and short range radio communication. People could be automatically identified to electronic equipment in shops, banks, pubs and offices, and introduced to other people with whom they have some mutual interest, based on simple profile matching such as is used on many dating sites today. Jewellery could therefore act as a useful social networking tool to help combat loneliness, as well as facilitating interfaces to public information and services.

Evidence from the first decade of the world wide web suggests that while older people are generally less interested in technology for its own sake, they are willing to embrace new technology when it offers clear and sufficient benefits. Since many older people find themselves less connected into society after retirement, such enhancement of socialisation and networking technology might be very welcome to them.

Internetworking of electronic jewellery will enable an efficient mobile information distribution platform. For example, instead of having to manually download a radio show by logging on to a web site, it might simply transfer onto a person's badge as they walk past a stranger who happens to have it on theirs, based on the wearer's preferences and tastes. This organic 'context-based' distribution of data could be a very effective evolution of today's podcasts, making it much easier to get access to information and entertainment without needing IT skills or having to spend time searching manually on the web.

Personal devices such as ego badges could also link the wearer automatically into local networks of interest to them. Appropriate information (e.g. tourist info, bus times, local club bulletins etc) could be relayed to the wearer even when they are away from their own locality, making it much easier for people to get around and find what they are interested in. They also will have uses in political domain too, and this will be addressed later.

## MEDICAL MONITORING

Electronic jewellery could be used in medical monitoring, especially relevant to older people. A range of health monitors already exists, but as technology advances, the range of capabilities will increase, size and cost will fall, and usability, reliability and transparency will all improve. There is of course a natural synergy between people's desire to stay healthy and the taxpayer's need to keep healthcare costs down. This would find electronic jewellery a useful tool.

Telecare systems are already being implemented today, with a range of home sensors unintrusively monitoring a person's everyday activity of the person. BT offers an excellent example of a large company using advanced technology to try to improve lives of older people and many other companies are also working on advanced systems. The range of sensors and the sophistication of the monitoring software and systems will gradually increase. Of paramount importance in the design is respecting the privacy of the person being monitored. Typically, all the system tries to identify is whether the person is having a reasonably typical day, or whether there is likely to be a problem that needs external intervention. Wearable devices such as electronic jewellery could also monitor a wide range of body functions such as blood pressure, temperature, heart rate and behaviour, nervous system activity, stress levels, blood sugar and oxygen levels and so on. They can relay the information direct to health service computers for analysis, with appropriate alarms raised where necessary. With such supervision, many people who might otherwise need to be kept in care homes, could be allowed to live in their own homes with a higher degree of autonomy, safe in the knowledge that should a problem develop, the authorities would be alerted. Of course they might personally receive warnings and advice too when appropriate, helping them to maintain their own health. It is likely that this kind of capability would encourage people to take more responsibility for their own health.

## ACTIVE SKIN

As miniaturisation advances, and as biotechnology and information technology begin to converge, it will become possible to print electronic circuits onto thin plastic membranes or even straight onto the skin surface. A multi-layer circuit architecture is possible in which bulky electronics sits in a wearable device such as a wristwatch or drug container. This would be worn over another layer which would be a thin polymer membrane stuck on the skin surface (in much the same way as children's temporary tattoos, i.e. using a paper backing which is moistened and then peeled off, leaving the membrane attached to the skin). Such membranes could house factory-printed electronics or other miniature devices. A typical application might be a membrane with controllable pores, so that drugs could be allowed to diffuse into the skin under electronic control.

The skin surface itself would be useful for locally printable circuits. For example, electronic makeup could be controlled by invisible circuits on the skin surface, or a temporary ID circuit could be printed for security or ticketing. Finally, very small (of the same size order as skin cells) capsules of electronic components could be blasted into the skin surface using compressed air jets (this can already be done today, as a form of 'painless injection' for people who are squeamish about needles.) Self-organisation technology, currently under rapid development in the IT world, would allow a number of circuit capsules to be implanted over an area, linking via infra-red to form sophisticated circuitry.

If capsules are blasted just into the skin surface, they would wash or wear away after a few days, making this an ideal solution for short term security ID or short term medical monitoring. If they are

blasted deeper into the skin, they could stay there indefinitely, making this an option for lifetime ID, or for permanent monitoring or control. Deep in the skin, capsules would be able to directly monitor blood chemistry and nerve activity, with both medical and IT applications.

A typical medical application for active skin might be diabetes control, whereby blood sugar levels are monitored, the signals sent to a clinic, and then an electronic membrane allowing the right amount of insulin to diffuse from an off-the-shelf container worn like a wristwatch.

## NERVOUS SYSTEM LINKS

The nervous system is essentially the body's own IT, so it is not surprising that electronic devices can sometimes be used to counteract nervous system ailments. Most nervous system disorders occur as people age. Millions of people already have cochlear implants, giving them back acceptable hearing, and many more have simple hearing aids. For some years now, electronic implants have been used to effectively control at least some instances of Parkinson's disease, returning relatively normal function to its victims by transmitting regular signals into their nervous systems. More recently, retinal implants have successfully been used to return at least rudimentary vision to some blind people. Eventually, it will be possible to use IT to restore any sensory functions to their normal levels, or even superior level. This is because nanotechnology will enable a strong convergence between information technology and biotechnology, with parallel progress in understanding our cognitive systems, so that electronic sensors and systems can in the future be linked to our own nerves. Indeed, synthetic version of some small regions of the brain (e.g. the hippocampus) have already been constructed and demonstrated to perform identically to the natural original. Understanding of memory processes is also progressing rapidly, and memory replacement or augmentation is highly likely to be feasible in a couple of decades time. In due course, external sensory and processing capability will routinely be linked to the brain to compensate for functional losses due to strokes or Alzheimer's disease. But although these technologies will develop for treatment of medical conditions, it is also possible that they could become routinely available to offset quite normal levels of degradation of mental agility and performance associated with ageing. Indeed, the debate is more likely to be whether we should permit 'brain add-ons' as a cosmetic or lifestyle choice enhancement of performance.

## VIRTUAL WORLDS AND AUGMENTED REALITY

Most young people (and many not so young) already spend a great deal of time socialising and making friends in social networking sites such as Bebo, Facebook, Myspace and Second Life. These are enhanced versions of long-existent chat rooms. Alongside are networked game environments such as World of Warcraft. These are all major businesses today, and capitalise on the simple fact that in spite of millennia of technology development, people still have the same basic biological urges as their caveman ancestors, and socialisation, making friends and dating are among the strongest.

Some of these sites are simple networking sites, allowing people to keep in touch with their friends and to make new ones. Others combine with computer game technology to allow this networking in 'virtual' worlds. These worlds not only allow people to meet others, but also to indulge their urge to play, to fantasize, to indulge their creativity, and to explore their imaginations and those of others. This is all well-proven business today.

Over the next few years, it is expected that mobile communication and games technology will link to accurate positioning systems and video glasses to overlay these imaginary worlds onto the real world. Video glasses originated as head-up display goggles (with built-in video displays), originally developed for fighter pilots, but increasingly permeating the computer games world. Today, cheap consumer versions are too low resolution to have much market impact, but this will change soon, and it is expected that many people will start wearing video glasses for long periods during the day. They might watch videos while commuting, deal with their email, or see navigation information as they wander around. Obviously, semi-transparency will be an essential feature, or people would be oblivious to real world events and bump into things!

Initially, the data overlaid might be useful information and visual enhancement, as illustrated in sci-fi such as Robocop or Terminator. With this, people could deal with messaging, tourist information and navigation. This already presents a useful marketing platform of course, and people could be presented with special offers as they wander around shops, or be linked into information from local clubs and societies, even local authority information services.

As technology develops a few more years, video glasses would be able to augment the real world significantly. Augmented reality is a long-promised service that allows the user to overlay computer-generated images over those from the real world. The images could be enhancements of what is actually there, such as changing the appearance of buildings, cars or people, or they could be overlays of totally imaginary worlds onto real world geography. This would allow people to interact with virtual worlds by moving physically, but more importantly, to see virtual items in the real world field of view. So we may see virtual characters, avatars of real people, plants and animals, overlaid onto our city streets. People need never see the real world as it actually is, but could always see a visually more attractive world instead.

For most people, this represents a wide range of new entertainment possibilities, new marketing platforms and new ways to indulge their creativity, network and publicise themselves. But as well as adding functionality, this can also be used to create a simpler world, where clutter and noise is filtered out, providing an uncluttered, simplified, even sanitised visual input that would be easier to navigate and cope with than the real world. This may well offer additional attractiveness for older people that are suffering from information overload.

Virtual worlds are a source of stimulation in themselves, providing a whole alternative world, ready to be explored, showcasing other people's imaginations, and much easier to explore than the real world. Such environments could offer much more stimulating activity than TV, without the need to be physically agile. A person could explore them via the computer display or video glasses, using a variety of physical navigation tools. The 3D interfacing enabled by the Nintendo Wii machine would be an excellent starting point, and there are already some games targeted at this sector. It should be expected that the sector will soon address older people as a specific market.

Indeed, linking computer games to physical activity has already shown some medical spin-off benefits. The Nintendo Wii machine is already being adopted in some medical establishments for physiotherapy and stroke treatment, providing effective, low impact physical activity and retraining.

## ACTIVE CONTACT LENS

As video glasses display technology inevitably progresses, the same levels of miniaturisation as enable digital jewellery will also enable active contact lenses, with all the circuitry needed to create

an image directly on the retina using tiny lasers and micro-mirrors. A fully immersive high definition 3D display would be possible as a general purpose visual interface. Of course, it could still act as an ordinary contact lens to correct vision problems. However, unlike ordinary contact lenses, it might also be possible to zoom in, or record vision. Excitingly, it could also allow an extension of normal vision to include infrared or ultraviolet, or indeed anything that any sensor can pick up, such as magnetic field, radiation etc. However, the most useful function would be to replace and enhance the capability of video glasses.

## DIGITAL BUBBLES

Augmented reality presents many opportunities to market to people, to distribute information to them, or to enable a convergence of computer games and the web with everyday walking around a city. People might be fully aware of their physical surroundings, but also inhabit a virtual world overlay, initially on video glasses and later on active contact lenses.

It is sadly obvious that some marketers would abuse the opportunity, creating the visual equivalent of the junk mail problem. A digital bubble would quickly become an essential single point of contact between a person's devices and the rest of the world, acting as a personal profile and context based filter, allowing through the right information for the person at that time in that location in those circumstances. This use of 'context' is expected to be a significant business area soon, so devices like the digital bubble are very likely.

## USING AUGMENTED REALITY

Superimposing images onto a person's field of view could be extremely useful. Navigation, tourist information, information about sales and events or social functions, business and social networking and many other services could make good use of this platform. High street shops could choose different images for how they want their shops to be presented in the virtual overlay to different customer groups. Dual appearance could also work well for internal appearance, staff uniforms, and allow many levels of virtual shops to be superimposed onto the physical one, potentially extending the range of stock dramatically. Indeed this could be an easier and more intuitive way to shop on the web, physically wandering around a real shop to browse virtual products, with home delivery being used for the physical distribution.

Additionally, many people could add their own contributions to the virtual overlays, just as they already do on Google Maps today for example. People could use this environment to display their works of art, publish their visual blogs, market their own services, or provide entertainment or other socially useful functions. And of course, only the people that want to see them would do so. For example, virtual buskers might be a lot more appealing than some real ones. They could appear simultaneously at many different locations, but be invisible to people that are not interested in them, instead of irritating many people to attract donations from a small proportion. And of course, the progress in electronic cash will soon replace the traditional hat or tin for collecting money, and electronic cash can be donated from anywhere.

Augmented reality could make it much easier for older people. They might be given quite a different view of the world from younger people. Of course a wide range of commercial, social and governmental services would be targeted specially at older people on such a platform. And many other services could be customised to make them easier to use, less cluttered and generally more age-aware.

## SHOPPING

Being able to combine web shopping with real shopping via augmented reality would allow people to buy items in real shops without having to carry them home, a big advantage for older people, especially if the items are hard to carry or they have to use public transport. In any case, as manufacturing technology improves, clothes are likely to be customised more frequently in the future, with people presenting their measurements at the till, the item going back on the rack, and a made to measure copy run up and delivered promptly via home delivery. Their measurements would be obtained by occasional laser body scans, perhaps incorporated into changing room booths, stored wirelessly on their customer card as they leave the booth.

## LONELINESS AND THE VIRTUAL GRANNY FLAT

Large computer displays, the increasing availability of high speed broadband connectivity and the ease of use afforded by home wireless networking are all enabling the domestic use of video communications. As TVs increasingly come with PC connections, this communication is also likely to migrate to the TV set, permitting life-sized pictures and the improved communication quality arising from being able to convey body language adequately. It will thus be possible for people to have a cup of tea with a friend over a video link almost as if they were in the same room. Sadly, they would have to make their own tea of course. The same technology would enable a virtual 'granny flat' by linking via webcam into relations' living rooms, or indeed even to other caring people from the community. And of course, it could also be used for telecare purposes, allowing carers to chat easily with older people without them having to travel to a clinic. There have already been successful implementations of such telecare systems, but they will undoubtedly become more important in the future as technology becomes a more viable and cost saving solution for elderly care.

With such easy-to-use technology coming quickly now, it will be possible to make a significant impact on the loneliness afflicting many older people. They will be able to participate much more in the everyday lives of their families, even if they have moved far away, keep in touch with friends even when they are housebound, and to join in with local community activities via the same technologies.

Of course, it should be relatively simple for local councils and other organisations to allow people to participate via the network in this way, opening up local politics and activities, not just for older people, but for everyone, regardless of their location and mobility.

## MOBILITY, NEW TRANSPORT SYSTEMS

A range of mid-term and long-term technologies will inter-work to greatly improve travel, in spite of the clear gradual degradation we all suffer currently. The main forces governing these are increasing congestion (due mainly to increasing wealth, declining public transport and the lower relative costs of cars), increasing population, which is creating greater demand, and the demand for solutions that make less adverse impact on the environment, especially with regard to climate change. Other lesser design factors include an ageing population.

Climate change has already meant that governments will introduce much stricter regulations governing carbon dioxide (CO<sub>2</sub>) emissions. Hybrid and electric cars will become more popular.

However, one of the most important developments, that can address both congestion and CO<sub>2</sub> emissions, is that of electronic highways, on which electronic cars will be able to drive themselves.

Although reaction times mean that people have to drive well behind the car in front, electronic cars can link their acceleration and braking, and of course electronics can respond thousands of times faster than a human so could potentially drive just centimetres apart. This in itself will greatly increase the capacity of roads. A further congestion improvement comes at junctions, where vehicles can talk to each other well before they arrive at a junction, and adjust their speeds so that they can interleave efficiently with minimal delays. As well as improving junction and road capacity, electronic drive would also reduce emissions since vehicles would not have to brake and accelerate as often and could do so more gently, improving both energy efficiency and passenger comfort without compromising journey time.

Another useful consequence is that with electronically driven vehicles, there is no need for a human driver, so older people who are no longer permitted to drive, or who simply do not want to, can still travel easily. This also removes the current problem caused by widely varying human ability (and patience), effectively levelling the playing field and putting older vehicle occupants on a par with the boy racer.

These developments would ripple through to create second and third order effects. For example, with driving taken out of the hands of the human driver, a lot of the 'fun' would disappear from driving, while accident rates would fall to negligible levels. With less personal control or involvement in the car, it could be expected that the desire for ownership would fall. Also, with no need for a human driver, cars could easily be shared among a large population since they can be made available to anyone once they reach their destination without anyone having to deliver them to the next customer. So the result would likely be that there would be a large incentive for fleet manufacturers to provide pools of publicly owned or fleet managed cars, with personal ownership largely replaced by subscription to a car pool, or indeed public transport, which could itself become a large pool of publicly available vehicles. Furthermore, with large fleets of similar or identical vehicles, under electronic control, it would be relatively easy to provide a power supply, either via numerous recharging points, stores of exchangeable batteries or even using electric power from cables in the roads, rather like trams. If the electricity is produced in green ways, then CO<sub>2</sub> levels from transport could be reduced dramatically, or even eliminated. Since vehicles account for about a third of CO<sub>2</sub> production, this could be a huge contribution to the climate change solution.

If this happens, future travel could be a simple matter of calling for a car via the phone or net, or via a piece of digital jewellery. A car would arrive, the person would use simply voice command to request a destination, and the car could take them there, then being released for someone else's use. Fewer cars, used more efficiently, with extremely low carbon emissions, available to old and young alike regardless of ability or agility, socially inclusive with low cost, high reliability and high safety – this would seem a worthwhile goal, and is entirely feasible in the next few decades.

So, simply as a consequence of tackling climate change by improving transport technology, older people would benefit hugely from increased mobility, social inclusion and personal freedom.

Though it is well outside the scope of this report, even greater capacity improvements are possible on railways, and together with road capacity improvements, congestion could be eliminated from much of the country, though it may still be a problem in some urban areas.

## CHANGE IN THE NATURE OF WORK

Over the next two decades, there will be huge increase in the capability of computers. They will of course become smaller and more powerful and converge with other electronics to make a very wide range of powerful gadgets, but in addition, artificial intelligence will evolve from simple expert systems and neural networks into genuinely smart machines. Although the field is highly controversial at present, many engineers in the field believe that conscious machines with intelligence superior to humans are not only possible, but likely in the next 15 -20 years.

If AI progresses to anything like human levels, and is achievable at relatively low cost, it is obvious that it will have a major impact on the information economy. Many jobs that exist today would be done instead by machines, and large parts of most jobs would be done by machines, meaning that the same corporate output could be achieved with fewer employees. At the same time, robotics will improve dramatically, automating a great many highly skilled manual jobs, even those that require some intellect, such as surgeons. Indeed, some precision operations are already carried out by robots, supervised by a human surgeon. The surgeon will gradually become an irrelevance!

Fortunately, not all tasks that humans do are equally automatable. Intellect, analysis, strategy, financial services, accountancy, travel and estate agencies, administration and even creativity could be largely automated. However, tasks that are dominated by interpersonal interaction, emotional interaction, caring, or otherwise inherently human in nature cannot be. These include many personal services, such as hairdressing, waiting, child care, nursing, teaching, policing, and most entertainment, including sports. There is nothing impossible inherently in automating these, but it is obvious at the outset that people prefer people in these sorts of roles.

This means that the work economy will change in favour of people with human skills. Although many of our abilities decline with age, our human skills generally improve. So as a result of AI, older people will find themselves more able to compete in the workplace, with their superior human skills allowing them to outshine their younger competitors.

This is fortunate indeed, occurring by coincidence in the same time period as the pensions crisis materialises, and as people are forced to work until they are older.

Unfortunately, it will still be an uneven playing field, with a gender divide. It is generally the case that women have superior human skills to men, who had the advantage in the industrial and information ages. So older men might still find it hard, with the bulk of jobs oriented to what they would see as women's skills. On the other hand, more older people are women, and this is still likely to be the case in the future, so perhaps even this is not such a problem after all.

## IMPROVING SCOPE FOR POLITICAL INVOLVEMENT

Of course, older people still have political interest and in the future will have much more scope to get involved. The web of course is a major tool and allows people to find out what is happening, to communicate with others to influence them or find other of like mind, to form networks and pressure groups, and to coordinate demonstrations, campaigns, or direct action. Even on the move, this can also be supported by various mobile devices, including digital bubbles and electronic jewellery that will assist in targeting. Such networking and information distribution capability would be an ideal tool for pressure groups to mobilise grass-roots political campaigns. Ad hoc demonstrations, civil disobedience and many other kinds of networked action could be arranged quickly and easily with

the minimum of notice for the authorities to prevent them. Since it provides an informal means to distribute data, there need be no particular leaders or structure in an organisation. This might make it easier to preserve anonymity, and make it hard to identify ringleaders, which is of itself useful protection. Mobile devices could also provide useful information to people as they go through the day, telling them what their options and rights are in a given situation for example, and enabling people to take greater control. It may be less easy to bully older people when they have constant and easy access to real-time advice and support.

Political pressure groups of all kinds might present new challenges to conventional government when equipped with such electronic tools. Older people with time on their hands might be a major user of such techniques. Not all issues raised by older people are to do with ageing issues of course, and some older people will want to play a part in politics generally, as indeed some do today.

However, as people become more web centred, the nature of politics will change, just as it did when radio and TV came along. The skills needed to influence people on the net are not the same as those needed to perform well on TV. So we should expect a different set of people to reach positions of influence, at least for local issues or those confined to web communities. It would seem likely that this platform will be less affected by age, if for no other reason than the ability to hide behind avatars in communications sessions, and the lower focus on speed and agility. It is likely that the quality of an argument and persuasion skills will dominate instead.

Nevertheless, at some point, politics has to leave the confines of the net and enter TV and radio too, so a blend of skills will be needed to succeed at any significant level.

## RECOMMENDATIONS

Although many of these changes will happen by default as a result of wider market and social forces, appropriate action and intervention could reduce the adverse effects of the problems on older people and increase the benefits. Accelerating change is a fact of life and will not go away, but at least in the case of technology change, older people can be helped by better design of new technology, that takes greater account of their needs. This could be a voluntary measure applied by forward-looking, socially responsible companies, encouraged by government, or forced by greater consumer pressure, eventually applied by older people themselves.

Greater discussion of the likely causes of inter-generational conflict is needed so that the whole population feels involved. Everyone is a stakeholder in achieving and maintaining good relations between generations. Otherwise, conflict is inevitable as tensions increase, especially as the pensions crisis materialises.

Improving IT is still largely targeted at the young and the fit. IT companies need to be encouraged to address older people as a primary market, especially as this group accounts for an increasing proportion of the economy. Their primary needs are ease of use, rather than increased functionality, especially simpler interfaces, even simple changes such as using bigger text instead of trying to look trendy, better ergonomics, greater portability and more use of self organisation instead of manual and highly unintuitive set-up. Greater tolerance of 'user error' would also be beneficial. These changes will be easier to implement as technology gradually becomes smarter and cheaper, but much of what is needed is a basic design ethos that is sadly missing from today's IT in spite of some very praiseworthy development such as the iPod and iPhone. This may (and probably will) change as a result of market pressures, but it could certainly be accelerated if IT companies were encouraged to do more for older people.

Other benefits will similarly be enhanced and even accelerated if such an increased degree of age-awareness and social responsibility is applied throughout every stage of the technology lifecycle.

## ABOUT THE AUTHOR

Ian Pearson graduated in 1981 in Applied Mathematics and Theoretical Physics from [Queens University, Belfast](#). After four years in Shorts Missile Systems, he joined BT Laboratories as a performance analyst, and later worked in network design, computer evolution, cybernetics, and mobile systems. From 1991 until 2007, he was BT's Futurologist, tracking and predicting new developments throughout information technology, considering both technological and social implications. He now does exactly the same things for Futurizon, a small futures institute. As a futurologist and consultant, he lectures widely on his futures views. In between conferences, he writes on topics such as machine consciousness, human evolution, women's issues, ageing, social trends and advanced computing technology.

He has received many awards for his papers, written several books and has made well over 400 TV and radio appearances. He is a Chartered Fellow of the British Computer Society, the World Academy of Art and Science, the Royal Society of Arts, the Institute of Nanotechnology and the World Innovation Foundation. He was recently awarded an Honorary Doctor of Science degree by the University of Westminster.

