

Our future world

Global megatrends that will
change the way we live



The 2012 revision
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SPECIAL DEVOTION

The authors devote this research in particular to the many people facing vision loss and degenerative illness. Your future world is so challenging. But your mega courage is an inspiration to everyone. May you teach us about what matters in this life.

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contents

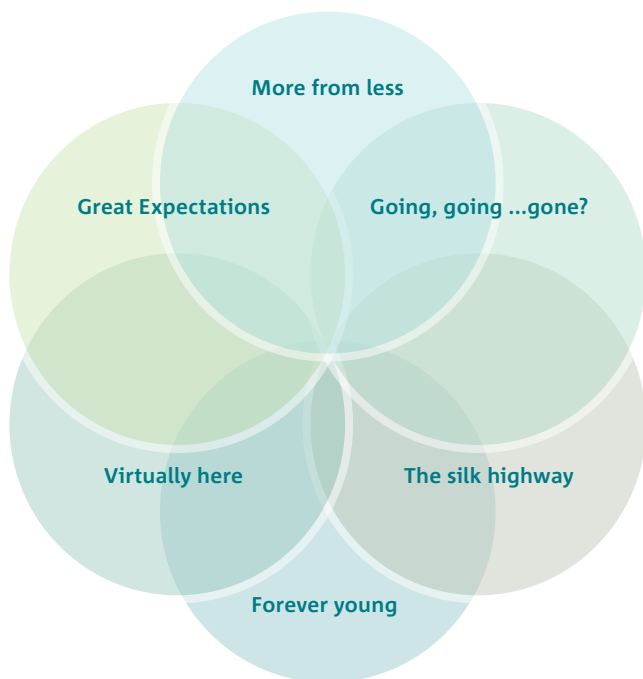
Global megatrends – the 2012 revision	2
Background	4
More from less	5
Going, going gone?	8
The silk highway	11
Forever young	14
Virtually here	17
Great expectations	20
Our methods – foresight and strategy	24
References	27



Global megatrends

the 2012 revision

The narrative of the future presented in this report is constructed from six interlinked megatrends. A megatrend is a significant shift in environmental, economic and social conditions that will play out over the coming decades. The indicative time frame for the analysis is 20 years. The megatrends are shown below using an interlinked venn diagram.



1 More from less

The earth has limited supplies of natural mineral, energy, water and food resources essential for human survival and maintaining lifestyles. Data are revealing many of these resources are being depleted at often alarming rates. At the same time population growth and economic growth are placing upward pressure on demand. The more from less megatrend explores how companies, governments and communities will discover new ways of ensuring quality of life for current and future generations within the confines of the natural world's limited resources. Science, technology, business processes, government policy, lifestyle patterns and cultural norms will all play a role.



2 Going, going, ... gone?

Many of the world's natural habitats, plant species and animal species are in decline or at risk of extinction. The actions taken by human beings in the coming decades will set the scene for global biodiversity over coming millennia. The going, going ...gone? megatrend explores the perilous situation of the world's ecological habitats and biodiversity. This megatrend also captures the issue of greenhouse gas emissions and climate change. Much in the natural world, that humans value and depend upon, is at risk of being lost forever. However, there is a positive story and a potentially bright future. The megatrend is purposefully posed as a question. Whilst the state of biodiversity is in decline and the pressure is rising so too is the human response.



3 The silk highway

Coming decades will see the world economy shift from west to east and north to south. Rapid income growth in Asia and, to a lesser extent, South America and Africa will see billions of people transition out of poverty and into the middle income classes. The powerhouses of the new world economy are China and India. This economic shift will build new export markets, trade relations, business models and cultural ties for Australia. Tourists, funds and ideas will increasingly flow out of Asian countries and into Australia's economy and society. We are stepping into the Asian Century.



4 Forever young

The ageing population is an asset. Australia and many other countries that make up the Organisation for Economic Cooperation and Development (OECD) have an ageing population. Elderly citizens provide a wealth of skills, knowledge, wisdom and mentorship. Nevertheless, there are some challenges associated with an ageing population and associated demographic trends. Two of these challenges include Australia's widening retirement savings gap and rapidly escalating healthcare expenditure. This will change people's lifestyles, the services they demand and the structure and function of the labour market.



5 Virtually here

This megatrend explores what might happen in a world of increased connectivity where individuals, communities, governments and businesses are immersed into the virtual world to a much greater extent than ever before. We are increasingly moving online to connect, to deliver and access services, to obtain information and to perform transactions such as shopping and working. Online retail and teleworking in Australia are forecast to grow rapidly with impacts on labour markets, retail models, city design and transportation systems. Digital media is allowing people to form new connections and selectively access information through multiple channels with subsequent erosion of trust in traditional information sources. The digitally connected world is virtually here.



6 Great expectations

This is a consumer, societal, demographic and cultural megatrend. It explores the rising demand for experiences over products and the rising importance of social relationships. This megatrend also captures the expectation people have for personalised services that meet their unique needs and wants whilst being delivered *en masse*. This megatrend has implications for the Australian retail sector and human service delivery systems of government and private sector organisations. People of the future will have expectations for more personalised, better and faster services. They will seek higher-end experiences due to income growth and the oversupply of mass consumables. Social relationships will hold increased importance given the potential for social media and digital communication burnout and the desire for face-to-face interaction. Conversely, for the billions of impoverished people in the world the expectations are still for the basic necessities of life such as water, food, clothing, shelter and personal security. Many will have great expectations, but many will still have basic expectations.

Background

In 2009 CSIRO started a global foresight project. The aim was to inform internal and long range investment planning choices. However, the work was serendipitously released to the outside world when a videolink to an overseas consulting firm failed at a major conference in Melbourne in early 2010. The CSIRO team was asked to step in and present its own home-grown megatrends. The work received much interest. Due to the external demand for evidence based strategy and foresight consulting a new research team called *CSIRO Futures* was launched.

The members of this team have backgrounds in economics, geography, business management and strategic planning. They draw upon specialised capabilities through CSIRO's extensive internal and external networks containing tens of thousands of world-leading experts in all fields of research. Through foresight and strategy research CSIRO Futures provides industry, government and community organisations with an improved ability to plan for an uncertain world. CSIRO Futures also continues to support internal CSIRO strategy to help ensure every dollar invested purchases the maximum possible benefit.

Our Future World is the flagship publication of CSIRO Futures. This is the second version of the report. The first version was released in draft form in March 2010. The CSIRO Futures team plans to update this report frequently. The report presents a succinct

narrative of the future. The core of the narrative is a set of interlinked global megatrends. They are refined through regular updates to accommodate new issues, new data and new events.

A megatrend is defined as a major shift in environmental, social and economic conditions that will substantially change the way people live. Megatrends are relevant to contemporary decision making and may prompt a rethink of governance models, business processes and social systems. A megatrend occurs at the intersection of many trends. A trend is defined as an important pattern of social, environmental and economic activity that will play-out in the future.

The CSIRO Futures team is building a comprehensive multi-disciplinary trends database relevant to Australian industry, government and community organisations. The work has a global focus because over the long term global forces will significantly

impact the domestic scene. However, it is a view of the world from the perspective of Australia.

Since version one of Our Future World was released in 2010, a vast quantity of information has been provided by experts in academia, industry, community and government networks. Therefore while much of the underlying material is similar there is also much new content and the megatrends have been substantially re-written. However, the content and definition of the megatrends is anticipated to stabilise in coming revisions. Details on the process of updating the megatrends are given at the end of the report.

The approximate timeframe of the megatrends and trends identified in this report is twenty years. So we project the analysis out to the year 2032. Nevertheless, aspects of the megatrends are already occurring and they will still be having impact beyond 2032.



One of the best ways to anticipate change in your sector is to spend time outside of it

Michael Cameron, GPT Group Chief (The Australian Newspaper, 18 May 2012)



More from less

The earth has limited supplies of natural mineral, energy, water and food resources that are essential for human survival and maintaining lifestyles. Many of these resources are being depleted at sometimes alarming rates. Climate change will place pressure on water and food production systems. At the same time population growth and economic growth are placing upward pressure on demand. For some natural resources, demand is going up and supply is going down. Many other resources are under much pressure.



It suddenly struck me that that tiny pea, pretty and blue, was the Earth. I put up my thumb and shut one eye, and my thumb blotted out the planet Earth. I didn't feel like a giant. I felt very, very small.

Neil Armstrong

Despite the challenge, humanity has an incredible ability to innovate and adapt. The More from less megatrend explores how companies, governments and communities will discover new ways of ensuring quality of life for current and future generations within the confines of the natural world's limited resources. Science, technology, business processes, government policy, lifestyle patterns and cultural norms will all play a role.

- ◆ **More people.** According to global demographic models, the world welcomed its seven billionth citizen in October 2011 (UNESA, 2012a). By the year 2025 there will be 8 billion people and by the year 2043 there will be 9 billion people (UNESA, 2012b). The global population is forecast to level-off at over 10 billion people (United Nations, 2011). The world's growing population will place pressure on scarce natural resources.
- ◆ **A bigger world economy.** World economic output in 2011 was US\$78 trillion. The International Monetary Fund forecast growth to US\$111 trillion by the year 2017. The median growth rate for advanced economies will be in the range of 0.8 percent to 2.1 percent over the six year period. In comparison emerging and developing economies will grow 4.1 percent to 4.4 percent per year (IMF, 2012). This will place pressure on scarce natural resources due to the increasing demand from the rising middle class of emerging and developing countries.
- ◆ **Global water scarcity.** The International Water Management Institute (IWMI, 2007) estimates that 1.2 billion people live in regions with insufficient water to meet human needs. It is also estimated that 1.6 billion people live in water-scarce river basins with inadequate financial and human capacity to develop future water resources. Global water demand is forecast to increase by 55 percent between 2000 and 2050, with the largest increases coming from manufacturing, electricity and domestic use (OECD, 2012b). Climate change presents additional concerns about water scarcity over coming decades.
- ◆ **Increasing domestic water demand.** Total water consumption in Australia is forecast to rise by 42 percent by the year 2026 and 76 percent by the year 2056 compared to 2009 levels (WSAA, 2010). The increased demand for water is likely to be associated with price rises.
- ◆ **Increasing energy demand in Australia.** The Australian Bureau of Agricultural Resource Economics and Sciences (Syed et al., 2010) forecasts 35 percent growth in total energy consumption over the period 2008 to 2030. The most rapidly growing sources of energy will be natural gas and coal seam gas (3.4 percent per year) and renewables (3.5 percent per year). Nevertheless, by the year 2030 coal and oil are forecast to continue to supply the bulk of Australia's energy requirements.
- ◆ **Increasing global energy demand.** Worldwide energy usage is forecast to rise by 40 percent between the years 2009 and 2035 by the International Energy Agency (IEA, 2011). All sources of energy are forecast to experience growth. Oil demand increases by 18 percent, coal by 25 percent and nuclear by 70 percent. Despite a rapid growth rate, renewable energy is starting from a small base and will still make only a minor contribution to world energy use by the year 2035.
- ◆ **Energy investment.** During the period 2011 to 2035 the world is forecast to spend some US\$38 trillion on energy supply infrastructure to meet growing demand. Two-thirds of this expenditure occurs in the developing world. Over 90 percent of the growth in energy demanded occurs in developing countries. China is forecast to consume 70 percent more energy than the United States by 2035 (IEA, 2011).

- ◆ **Increasing carbon emissions and new markets.** Rising energy consumption is associated with a 20 percent global increase in carbon emissions. This is forecast to cause a long term average global temperature increase of 3.5 degrees Celsius (IEA, 2011). Carbon markets currently exist in Europe and New Zealand. The Australian Government introduced a carbon price in July 2012 with a starting price of A\$23 per tonne of carbon. By 2015 the price will become flexible and is set by market supply and demand forces (Prime Minister of Australia, 2012). It is possible that coming decades will see rapidly emerging economies such as Brazil, Russia, India and China introduce carbon pricing of some form.
- ◆ **Global food demand and supply challenges.** Based on assumptions about population growth, changing diets and agricultural systems the Food and Agriculture Organisation (FAO) forecast that food production needs to increase by 70 percent by the year 2050 to meet demand (FAO, 2009). This includes growth in annual cereal production from 2.1 billion tonnes to 5.1 billion tonnes and meat production from 200 million tonnes to 470 million tonnes (FAO, 2009). Whilst this is occurring the world loses 12 million hectares of productive agricultural land, capable of producing 20 million tonnes of grain, each year to land degradation resulting from human activities such as over-cultivation and deforestation (UNCCD, 2011). In addition to rising food demand, diets are shifting. People in developing countries are, on average, increasing meat consumption at the rate of 5 percent per year with expectations of future growth ahead (FAO, 2003).

- ◆ **Higher and more volatile food prices.** In 2008 and 2011 global food prices surged to levels higher than experienced for the past thirty years. Today some one billion people are considered hungry. Food price surges throw hundreds of millions of people into malnutrition and are widely considered crises. Factors such as income growth, biofuel production, climate variability, trade distortions, rising oil prices and urbanisation are considered likely to push up food prices into the future (OECD and FAO, 2011).
- ◆ **Increased biofuel production.** Currently one percent of the world's arable land area is devoted to biofuel production. This is forecast to grow to between 2.5 percent to 3.8 percent by the year 2030 (IEA & OECD, 2006). While biofuel may help achieve energy security and climate mitigation outcomes it may also place upward pressure on food prices (Mueller et al., 2011).
- ◆ **Resource conflicts.** As water and other resource become scarce relative to demand the risk of conflict is heightened. Statistical analyses have revealed that countries which share rivers have a statistically higher probability of military disputes (Gleditsch et al., 2006). This conflict may take many forms. For example, in Australia there is much "paper warfare" about the allocation of water resources in the Murray Darling Basin.



- ◆ **Declining mineral ore grades and the rise of recycling.** Mining sector data reveal a gradual and permanent decline in ore grades for major mineral commodities produced by Australia. At the same time ore production is rising sharply (Mudd, 2009). Furthermore, waste generation is forecast to continue to rise into the future on a local and global scale (OECD, 2008). As a consequence waste is increasingly being viewed as resource-rich 'non-waste' from which commodities can be 'mined' (Pongrácz and Pohjola, 2004). Swedish mining company Boliden (2012) has identified that a growing share of the metal production will originate from recycling in the future. Mining in the future may happen above the ground (i.e. recycling) more than below the ground.



Going, going ... gone?

Coming decades will see billions of people added to the world population and the continued rapid industrialisation of the emerging economies. Many habitats, plant species and animal species are in decline or are on the brink of extinction. Greenhouse gas emissions and climate change herald potentially unforeseen consequences on our natural and human systems. The Going, going... gone? megatrend explores the perilous situation of the world's ecological habitats and biodiversity.



The fate of biological diversity for the next 10 million years will almost certainly be determined during the next 50–100 years by the activities of a single species.

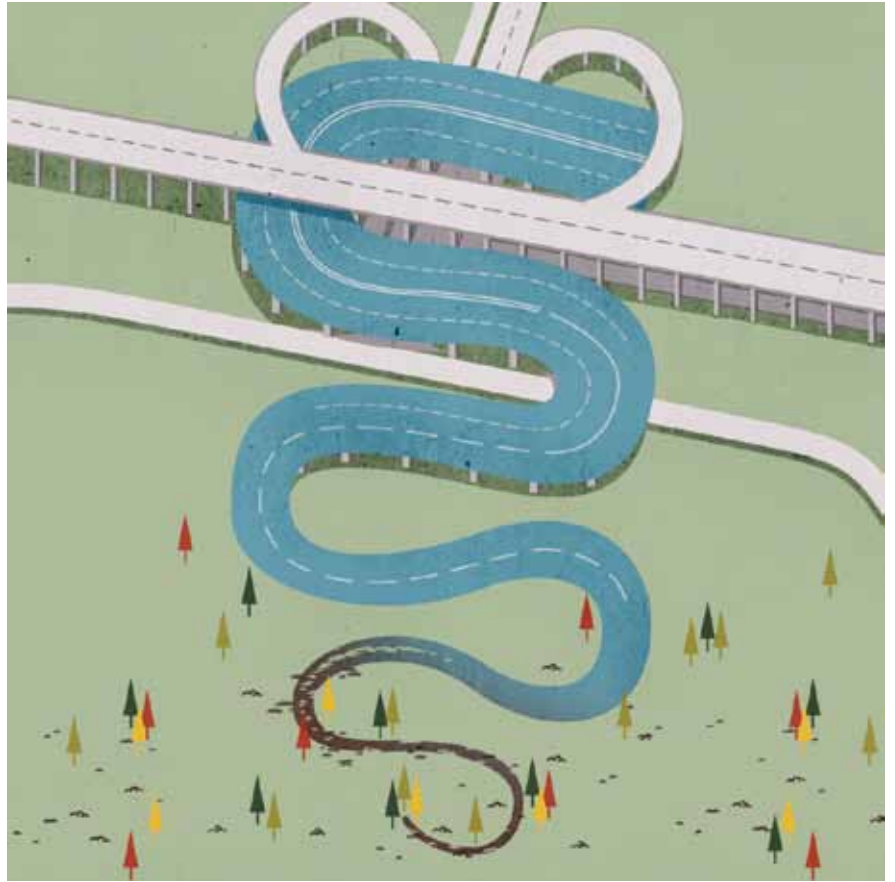
Paul Erlich and Robert Pringle (2008)

Unlike the commodifiable resources discussed in the more from less megatrend, these natural assets are not directly traded in the market place. As a consequence it is often difficult to estimate their value in monetary terms. But in cultural terms they have enormous value. Much in the natural world, that humans value and depend upon, is at risk of being lost forever.

However, there is a positive story and a potentially bright future. The megatrend purposefully ends with a question mark. Whilst the state of biodiversity is in decline and the pressure is rising so too is the human response. Governments, companies and societies are doing more than ever before to protect valuable habitats and reduce greenhouse gas emissions. The name for this megatrend could equally be “a window of opportunity”. The coming decades are our chance to make a difference for the coming millennia.

- ♦ **Biodiversity decline.** There are indications that the three main components of biodiversity - that is genes, species and ecosystems - are all continuing to show signs of decline. Habitat damage, overexploitation, pollution, invasive alien species and climate change are the five principal pressures that are directly driving biodiversity loss. These pressures are remaining constant or increasing in intensity (Secretariat of the Convention on Biological Diversity, 2010). Given the current context and state of biodiversity actions made in coming decades will determine the fate of biological diversity for coming millennia.
- ♦ **No signs of slowing.** The rate of biodiversity loss is showing no sign of slowing despite an international commitment made during the 2002 Convention on Biological Diversity to achieve a significant reduction in loss by 2010 (Butchart et al., 2010). To assess progress 31 indicators covering species population trends, extinction risk, habitat extent, habitat condition and community composition were compiled. In 2010 an assessment of these indicators over the past four decades showed that most had continued to decline. Furthermore, there have been no significant reductions in the rate of decline for most indicators. In comparison indicators of pressures - such as resource consumption, invasive alien species, nitrogen pollution, overexploitation and climate change impacts - have showed increases (Butchart et al., 2010).
- ♦ **Habitat fragmentation.** Extensive fragmentation and degradation of habitats continues to be a leading cause of biodiversity loss and diminished ecosystem services (Secretariat of the Convention on Biological Diversity, 2010). Eighty percent of the remaining Atlantic Forest fragments are less than 0.5 square kilometres in area and 59 percent of large river systems are moderately or strongly fragmented by dams and reservoirs (Butchart et al., 2010).
- ♦ **Deforestation.** Although the rate has slowed deforestation continues to occur. Each year from 2000 to 2010 just under 130,000 square kilometres of forest were converted to other uses or lost to natural causes. This is down from 160,000 square kilometres per year in the 1990s. The large-scale planting of forests in temperate regions has helped slow net loss from approximately 83,000 square kilometres per year during the 1990s to 50,000 square kilometres per year from 2000 to 2010 (Secretariat of the Convention on Biological Diversity, 2010).
- ♦ **Increasing the number of protected areas.** Although the target agreed by the world’s Governments in 2002 was not met the existence of the 2010 biodiversity target has helped prompt action. The number and extent of protected areas has increased, environmental impact assessment is more widely applied and 170 countries now have biodiversity strategies and action plans. Since 2002 more than 210,000 square kilometres have been added to the protected areas network worldwide. The network now covers 21 million square kilometres (Secretariat of the Convention on Biological Diversity, 2010).

- ◆ **Efforts towards the protection of critical biodiversity sites are increasing.** The Alliance for Zero Extinction has identified 595 sites worldwide that are critical to species survival, including sites that collectively contain the entire global population of 794 critically endangered or endangered species. Forty-four percent of the area covered by these sites was protected in 2009, up from 33 percent in 2002. However, much still needs to be done to ensure the protection of these sites as the majority are small and surrounded by intensive human development (Secretariat of the Convention on Biological Diversity, 2010). Unbroken tracts of conserved wild areas are the greatest reservoirs of biodiversity (Ehrlich and Pringle, 2008) and thus should be a focus of conservation efforts.
- ◆ **Climate change impact.** Animal and plant species have already been permanently impacted by climate change (Parmesan, 2006). This has been observed at local and regional scales through field and laboratory experiments and physiological research (Parmesan, 2006). The impacts of climate change on humans will also be far reaching. They will occur through extreme weather events, sea level rise, higher temperatures and changed environmental conditions.
- ◆ **Extent of climate change impacts.** Warming of the climate is now considered unequivocal given increases of global average air and ocean temperatures, widespread melting of snow and ice and rising average sea levels (IPCC, 2007). Of the more than 29,000 observational data series, from 75 studies, that show significant change in many physical and biological systems, more than 89 percent are consistent with the direction of change expected as a response to warming (IPCC, 2007). Examples of such changes include:
 - The annual average Arctic sea ice extent has shrunk by 2.7 percent per decade since 1978;
 - The average annual temperature of the global ocean has increased to depths of at least 3000m since 1961;
 - Global average sea level rose at an average annual rate of 1.8 millimetres per year during the period from 1961 to 2003; and
 - Global surface temperatures during eleven of the twelve years between 1995 and 2006 rank among the 12 warmest years since 1850 (IPCC, 2007).
- ◆ **Emissions and climate change forecast.** Global greenhouse gas (GHG) emissions attributable to human activities have risen by 70 percent between 1970 and 2004. The largest cause of growth during this period came from energy supply and transport and industry (IPCC, 2007). Base case projections predict an increase in baseline global GHG emissions by a range of 25 to 90 percent between 2000 and 2030 (IPCC, 2007).
- ◆ **Impact of climate change on biodiversity.** Climate change impacts have already been sufficient to threaten the survival of some species. Tropical coral reefs and amphibians have been the most negatively affected thus far (Parmesan, 2006, Secretariat of the Convention on Biological Diversity, 2010). The Global Amphibian Assessment lists 427 amphibious species as ‘critically endangered’, 122 of which are ‘possibly extinct’ (Alan Pounds et al., 2006). As interacting species react differently to climate change predators-prey and plant-insect relationships will be disrupted (Parmesan, 2006).



The Silk highway

Coming decades will see the world economy shift from west to east and north to south. Rapid income growth in Asia and, to a lesser extent, South America and Africa will see billions of people transition out of poverty and into the middle income classes.



The Silk Road was [an ancient] loose network of trading routes that extended about 7400 kilometres from eastern China west to the Mediterranean.

National Museum Australia

The powerhouses of the new world economy are China and India. Both countries have continued to grow their economies rapidly during and after the financial crises of the last decade. Strong economic growth is forecast by many analysts to continue over coming decades.

This will build new export markets, trade relations, business models and cultural ties for Australia. Tourists, funds and ideas will increasingly flow out of Asian countries and into Australia's economy and society. Australia's cultural composition will also become more diverse. People with Asian ancestry will make up an increasingly large portion of the Australian population.

We are stepping into the Asian Century, along with the rise of emerging markets in South America and Africa, and Australia is well positioned geographically, economically and culturally to be part of the new world. Today the Silk Road is turning into the Silk Highway and is rapidly taking the world into new places.

- ♦ **The shifting hotspot of world economic activity.** The centre of gravity of the world economy is the geographic hotspot of income generation based on the distance-weighted gross domestic product of 700 locations (Quah, 2011). In 1980 the hotspot was in the Atlantic Ocean midway between the economic powerhouses of Europe and the United States. However, today the hotspot is over Saudi Arabia and by 2030 the hotspot is forecast to shift to a location firmly between India and China. Rapid economic growth in Asia is pulling the whole world economy eastwards.

- ♦ **Near term economic growth forecasts for world regions.** Economic growth is forecast to slow in the short term for Asia and the world. Despite this, the five year outlook by the International Monetary Fund (2012) still has year on year economic growth at 8 percent for the "developing Asia" region compared to economic growth in advanced economies of around 2 to 3 percent. Sub-Saharan Africa, Northern Africa, the Middle East, Latin America and the Caribbean all have growth rates in the vicinity of 4 to 6 percent.
- ♦ **The rise of China.** According to the OECD (2010b), from the early 1990s to the late 2000s China has increased or decreased its share of the world's:
 - Total population from 21.6% to 19.8%;
 - Poor people living on less than US\$1.25 per day from 37.6% to 15.1%;
 - Steel production from 12.4% to 38.8%;
 - Gross domestic product (PPP rates) from 3.5% to 11.4%;
 - Foreign exchange and gold reserves from 2.7% to 21.9%;
 - Trademarks (held by residents) from 5.9% to 31.7%;
 - Internet users from 0.0% to 15.2%;
 - Champagne (imports by volume) from less than 0.1% to 0.3%.
- ♦ **Building a new world economy with BRICS.** China and India have contributed to 20 percent of world GDP over the past 10 years. When combined with Brazil and Russia (to form the BRIC nations), these four countries will have higher economic output than the United States by 2018 (Wilson et al., 2010). By 2030 the bulk of global GDP will be generated from non OECD countries (OECD, 2010b). This is a major shift for the world economy.
- ♦ **A growing middle-class.** Coming decades will see over one billion people in Asia transition out of poverty and into the middle income bracket between US\$6,000 and US\$30,000 per year. As a result, the composition of imports is forecast to shift away from low value add goods towards high value add goods such as cars, office equipment and technology (Wilson et al., 2010). Global demand for high protein foods, tourism services and consumer durables has sharply risen over the last decade (Parkinson, 2011).
- ♦ **Strong economic ties with Asia.** China is Australia's largest trading partner (DFAT, 2011) and Australia's trading links with Asia have been continually growing. Hence the growth of Australia's economy is more closely linked to the growth of China and India's economies in preference to the growth of the OECD7, including US, UK, Japan, Germany, France, Italy and Canada. In 2009-10, Australia's exports to China were worth A\$52,219 million. In the following year of 2010-11, exports to China jumped 35 percent to A\$70,517 million. The total value of merchandise traded between China and Australia has grown at an average annual rate of 22 percent from 1999 to 2009, more strongly than any other trading partner over this period (ABS, 2009a).
- ♦ **Investment into Australia.** The recent "World Investment Report" published by the United Nations lists Australia as fifteenth out of 200 countries for its direct foreign investment potential in the future. This is a major jump from its current rank position of 72 out of 200 (The Conversation, 2012, UNCTAD, 2011). Over the six year period from 2005 to 2010, foreign direct investment outflows from China to the rest of the world increased from US\$12.3 billion to US\$68 billion or average growth of 76 percent per annum (UNCTAD, 2011).

- ◆ **Tourism emerging as a growth export industry for Australia.** China is the third most common country of residence of short term visitor arrivals into Australia, after New Zealand and the United Kingdom (ABS, 2012b). In addition, the arrival of Chinese visitors is growing rapidly. Based on current trends, Chinese residents will be the most common visitor to Australia by 2016. There has also been a significant increase in the number of Indian residents visiting Australia over the last decade. In 2000, 41,500 Indian residents visited Australia (ABS, 2012b). By 2010 this grew to 138,700 (ABS, 2012b) representing an increase of 235 percent over a ten year period. Continuing growth in tourism will provide opportunities to strengthen and diversify trade connections with Asia.
- ◆ **The highs and possible future lows of global commodity prices.** The past decade has seen commodity price growth higher than experienced over the past 40 years. This has been a driving factor supporting the continued prosperity of Australia through the financial crises of the last decade. Many analysts expect commodity prices to decline from 2012 levels due to a slowdown in demand and growth in supply (Fraser Institute, 2012, World Bank, 2012). This will impact the Australian economy which heavily depends on coal, iron ore, gold and other mineral commodities to generate export income.
- ◆ **Economic growth in China forecast to slow – but a soft landing is likely.** Trend growth in China's GDP is forecast to slow in the medium term, down from the peak of 10.7 percent in the previous decade to 7 to 8 percent (World Bank, 2012). Investment in infrastructure is

also forecast to slow down in the near term; possibly by 25 percent (Credit Suisse, 2012). The growth slowdown may mark the transition from an export-led and investment-driven economy to a domestic consumption and services economy. Declining Chinese infrastructure investment will see a slowdown in resource consumption, sourced largely from Australia and thus decreasing demand for Australian mineral exports.

- ◆ **Rate of industrialisation and steel use to slow in China.** China consumed 71 million tonnes of steel for one percentage point of GDP growth during 2011. Steel intensity per GDP unit is a lead indicator of the construction cycle and industrialisation. While Chinese demand for steel is still expected to grow, the rate of steel consumption per unit of GDP is expected to decrease by 2020-2025 (BHP Billiton, 2012b, Credit Suisse, 2012, BHP Billiton, 2012a). This means that China may be moving beyond the phase of rapid industrialisation and into a more services-oriented phase of economic development.
- ◆ **Will India pick up the slack?** There is a possibility that India will enter a rapid phase of industrialisation as China slows down thus ensuring strong sustained demand for commodities on global markets. However, an analysis of refined metal consumption rates in India suggests that India's commodity demand will not be high enough to replace China (BHP Billiton, 2012b). The industrialisation of India has barely begun. It would take nearly two decades of growth at 15 percent per annum for India's refined metal consumption to overtake China's current level of consumption (World Bank, 2012).
- ◆ **Increasing commodity supply from developing countries.** The developing world has vast mineral reserves which are not yet competing to supply global markets because the infrastructure has not yet been developed. However, coming decades may see infrastructure put in place with subsequent supply putting downward pressure on prices. In particular, global supply of iron ore and coal is expected to increase, placing downward pressure on Australia's terms of trade (Australian Treasury, 2011).
- ◆ **The Switzerland of Asia?** Switzerland, like Australia, is a small, stable and wealthy economy with a small population within a much larger region. It does not have commodity exports. It has successfully developed niche industries such as financial services, pharmaceuticals, tourism, watches and chocolates. Is there a possibility that Australia might be able to identify and develop new niche industries that feed into Asian markets?





Forever young

The ageing population is an asset. Australia and many other countries that make up the OECD have an ageing population. Elderly citizens provide a wealth of skills, knowledge, wisdom and mentorship. This resource is not fully utilised by governments, companies, communities and families. This megatrend could have been called “hidden treasure”.



As you grow older, you will discover that you have two hands, one for helping yourself, the other for helping others.

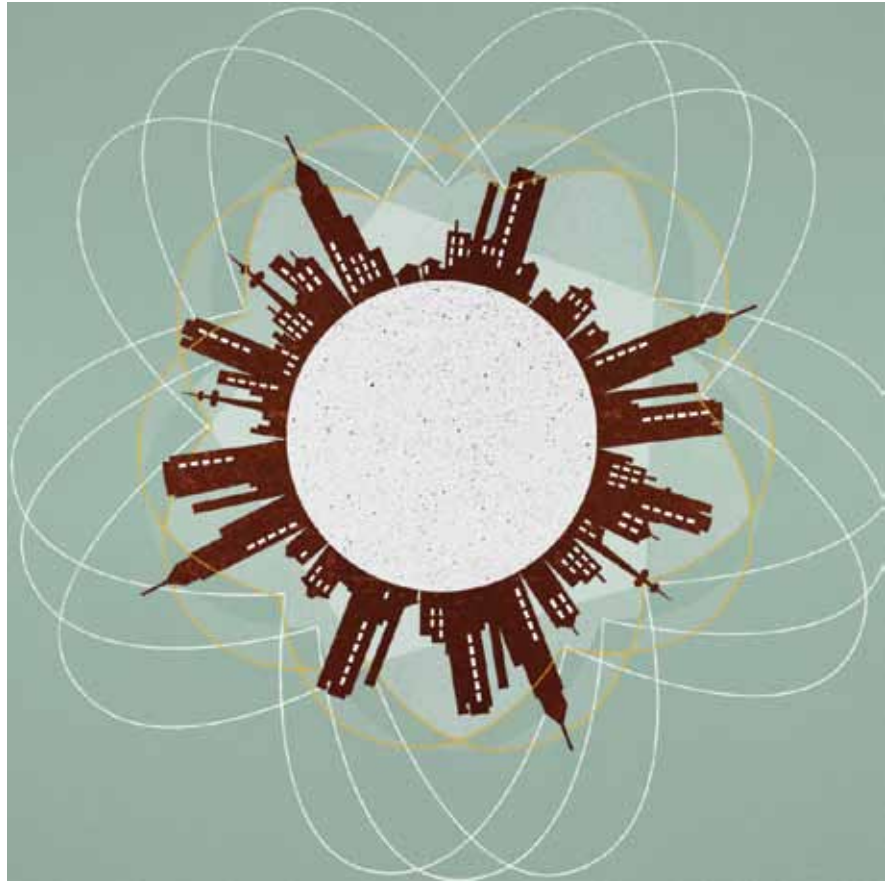
Audrey Hepburn

Nevertheless, there are some challenges associated with an ageing population and associated demographic trends. Two of these challenges include Australia's widening retirement savings gap and rapidly escalating healthcare expenditure. This will change people's lifestyles, the services they demand and the structure of the labour force. *Forever young* explores the likelihood that people will retire later in life, gradually wind back and change duties in a tapered model of retirement and spend increasingly large sums of money through the healthcare system to combat age related illnesses.

The ageing population may be seen as a boon to Australia's economy and society. Older people have a wealth of knowledge and wisdom which may hitherto have been under-exploited. Retaining some level of connection to the workforce later in life, via appropriate tapered retirement models, may lead to better physical and mental health outcomes for individuals. In addition this may open up under-utilised highly valuable knowledge resources.

- ♦ **A new demographic profile.** Demographic forecasts by the Australian Bureau of Statistics reveal the extent of change in the nation's age profile. In 2011 14 percent of the Australian population was aged 65 years and over (ABS, 2011b). By 2056 this proportion is predicted to have risen to between 23 and 25 percent (ABS, 2008). Over the same time period the median age will rise from 37 years to between 41.0 and 45.2 years (ABS, 2008). The relative population engaged in the workforce will also shrink. By the year 2050 there will only be 2.7 people of working age to support every Australian aged 65, compared to 5 in 2010 and 7.5 in 1970 (Australian Government, 2010).
- ♦ **The situation in Japan.** The ageing population is even more pronounced in other OECD countries. Japan has the fastest speed of ageing amongst the world's countries (Japanese Statistics Bureau, 2011). In 1950 4.5 percent of Japan's population was over 70 years old. By 2010 it was 23 percent. By 2050 it is forecast to increase to 40 percent. One study suggests that maintaining the employment to retired ratio within the Japanese economy would require increasing the average retirement age to 77 years (United Nations, 2001).
- ♦ **The whole world is getting older.** The world population as a whole is ageing. In 1950 8 percent of the world's people were over 65 years old. This grew to 11.2 percent by 2011 and is forecast to reach 22 percent by 2050. This means the world will contain more than 2 billion people over the age of 60 years by the year 2050. The extent of ageing is less pronounced in developing countries where 9 percent of the population is over 60 years old today and this is forecast to grow to 20 percent by 2050 (United Nations, 2011).
- ♦ **Longer life spans.** One of the reasons the Australian, and world, population is ageing is because of longer life expectancy. Advances in medical sciences and healthcare over time mean that people will live longer in the future. At the turn of the 19th to 20th century Australian males lived for 51 years and females lived for 55 years on average. At the turn of the 20th to 21st century life expectancy at birth rose to 77 years for males and 82 years for females. Life expectancies are forecast to increase for men and women to 84.5 and 87.8 by 2030. By 2050, life expectancy at birth is expected to increase to 87.7 for men and 90.5 years for women (Australian Treasury, 2010).
- ♦ **Retirement savings gap.** When the ageing population is combined with longer life expectancy we identify an additional challenge – the retirement savings gap. This is the shortfall in savings for the current workforce to have a “comfortable” retirement. An estimate of Australia's retirement savings gap by Rice Warner Actuaries (2011) puts the figure at A\$836 billion as of 30 June 2011 (A\$79,200 per person).
- ♦ **Changed retirement models.** The combined pressures of ageing and the retirement savings gap might redefine the concept of retirement into the future. A study of 200 public sector employees in Australia (Onyx and Baker, 2006) found that both men and women would prefer to maintain a form of reduced employment in retirement rather than cease work altogether. There is a body of research relating to tapered retirement models which may help this transition (Hesketh et al., 2011, Dawis, 2005). These models involve a gradual wind back of an employee's duties and transition into alternative roles such as mentorship and knowledge sharing.

- ◆ **Lifestyle related illnesses.** Lifestyle related illnesses in Australia and worldwide are on the rise. A global analysis finds that the portion of deaths from non-communicable diseases, including cancer and cardiovascular diseases, will increase from 59 percent of total deaths in 2002 to 69 percent of total deaths in 2030 (Mathers and Loncar, 2006). The same study finds that deaths from car accidents will rise from 2 percent to 3 percent of total deaths over the same time period. It also forecasts that deaths from tobacco-attributable causes will increase from 5.4 million persons in 2005 to 8.3 million persons in 2030 (10 percent of all deaths).
- ◆ **Diabetes is on the rise.** In Australia the lifestyle related illnesses of diabetes and obesity are on the rise. A study by Deloitte Access Economics forecasts an increase in the number of obese persons in Australia from 3.7 million in 2008 to between 4.7 to 7.5 million persons by 2028 (Access Economics, 2006). The OECD forecasts a 15 percent rise in the number of obese Australians over the next 10 years (OECD, 2010a). The issue is of particular concern given diabetes rates amongst Australian children. The OECD average for type 1 diabetes in children (aged 0-14 years) is 16.9 cases per 100,000 of population. However, in Australia the rate is 22.4 cases per 100,000 of population (OECD, 2010a). Diabetes is expected to become the leading cause of disease burden by 2023 (Australian Institute of Health and Welfare, 2010).
- ◆ **Fitness trend.** The diabetes and obesity trend is being countered by a fitness trend. People are more aware of health issues and are investing more in fitness. For example, there has been a significant growth in the number of fitness centres (24 percent increase) and their income (131 percent increase) in Australia during 2001-01 to 2004-05.
- ◆ **Healthcare expenditure.** The ageing population and lifestyle illnesses are drivers of growing healthcare expenditure. Health spending is projected to grow from 4 percent of GDP in 2009–10 to 7.1 percent of GDP in 2049–50 (Australian Government, 2010). Over the medium term there is growth in spending on all areas of healthcare: hospitals, medical benefits, pharmaceuticals and private health insurance.
- ◆ **Staying active.** As Australians get older they may still strive to stay physically active and participate in sport. The World Masters Games are an international multisport event that is open to all competitors of 35 years of age and above (or for some sports, competitors over 25 years of age) without competition qualification requirements. The number of competitors in the World Masters has grown for most years and has spiked every time the event has been held in Australia. In Brisbane in 1994 there were 24,500, in Melbourne 2002 there were 24,886 and in Sydney 2009 there were 28,676 competitors (Australian Masters Games, 2012).



Virtually here

The world is becoming more connected. People, businesses and governments are increasingly moving into the virtual world to deliver and access services, obtain information, perform transactions, shop, work and interact with each other.



Online retail and teleworking in Australia represent less than 10 percent of total retail sales and less than 10 percent the workforce composition. But they are forecast to grow rapidly and there is no widely accepted estimate about when they plateau. Both have the ability to change labour markets, retail models, city design and transportation systems.

Digital media is allowing people to form new connections and selectively access trusted information tailored to meet their needs through multiple channels. This is leading to changed societal behaviours with both positive and negative outcomes.

In addition to connecting people, the digital world is building new connections between institutions and gadgets. The rapid growth in connectivity is associated with new meta-level functionality and changed organisational and individual behaviour.

The virtually here megatrend explores what might happen in a world of increased connectivity where individuals, communities, governments and business are immersed in the virtual world to a much greater extent than ever before.

♦ **The rise of the digital world can change business models.**

In 1976 Kodak captured 90 percent of film processing and 85 percent of film camera sales in the United States (The Economist, 14 Jan 2012). In 1996 its annual revenue reached an all time high of US\$16 billion with profits of \$2.5 billion. In 2011 most analysts placed revenue at US\$6.2 billion with a third quarter loss of US\$222 million. Most write-ups (Anthony, 2012) suggest the company failed to act quickly enough to benefit from these disruptive technologies. They had much information early on about the rise of digitisation. It was in 1975 that the company built one of the world's first digital cameras. As with digital cameras in the 1980s and 1990s the world of online retail and teleworking still represents a relatively minor share of total retail turnover and the labour market. The challenging question is how much bigger will it get in the next 5, 10 or 20 years? It will be too late to respond if and when the answer is obvious.

♦ **Structural change in the retail sector fuelled by online competition.**

Changing consumer preferences, shifting expenditure patterns and growing online sales are all contributing to a structural shift within the Australian economy (RBA, 2012, Productivity Commission, 2011, Lim et al., 2012). Official online sales statistics are not yet widely available, however estimates suggest that online retailing accounts for approximately 6 percent of total Australian retail sales (Productivity Commission, 2011). It is expected that online retail will grow by between 10 and 15 percent per annum through to 2013 (Productivity Commission,

2011). Retail trade is an important industry grouping that contributes A\$59 billion to the Australian economy each year (ABS, 2012c) and employs 1.2 million Australians (ABS, 2012a).

♦ **The rise of internet enabled micro-transactions.**

AirBnB, a peer to peer rental network, enabled 5 million bookings in the first 6 months of 2012, compared to 4 million over the whole of 2011 (The Economist, 2012). Through this website users can rent their apartments to others during times of vacancy. Since its launch in 2008 the website has 200,000 properties listed with the spread to other countries propelled by Brazil and France (The Economist, 2012).

♦ **A consumer trend – collaborative consumption.**

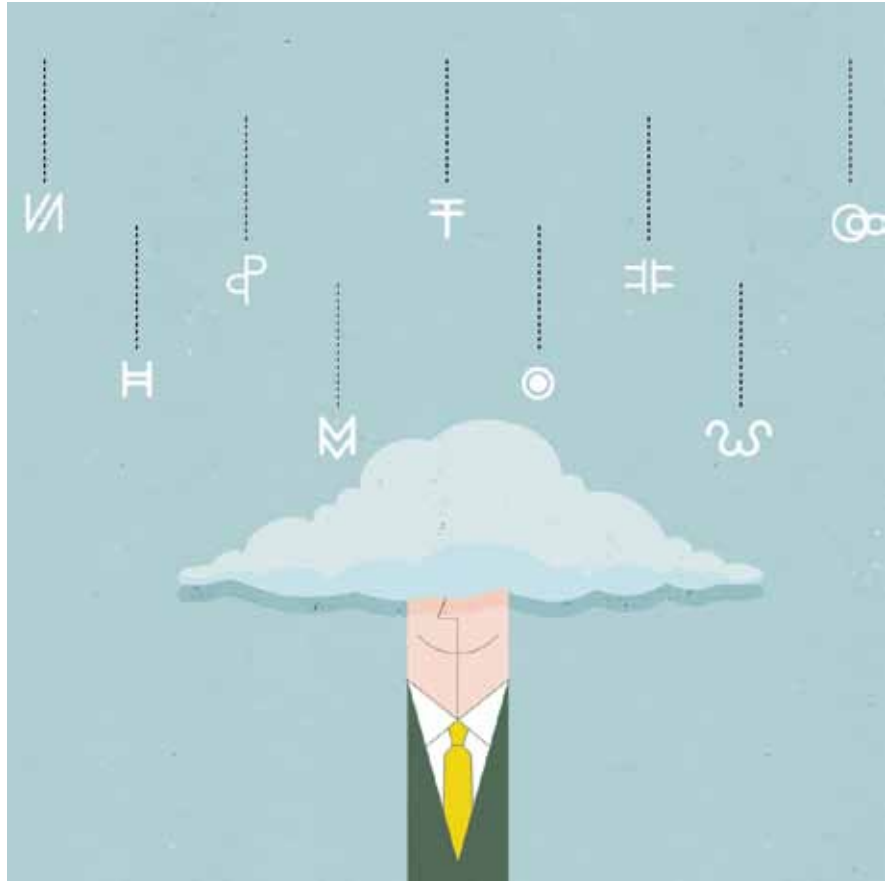
Collaborative consumption occurs when many consumers use the same product via some type of sharing arrangement (Botsman and Rogers, 2010). This can lead to more efficient resource use and cost savings. An example is car sharing. Car sharing is considered to use less street parking, reduces city greenhouse emissions and reduces congestion (City of Sydney, 2011). The first and largest car-share company in Australia, GoGet, has been one of the fastest growing car sharing organisations in the Asia Pacific region with membership numbers doubling every year since its launch in 2003 (Frost & Sullivan, 2012). Collaborative consumption may increasingly spread into other areas (e.g. music, books, bicycles, apartments). It will be boosted by continued development of innovative online transaction platforms.



World's most populous countries in descending order: China (1.3 billion); India (1.2 billion); Facebook (800 million); Skype (521 million); Twitter (380 million); United States (312 million)...

CSIRO Futures

- ◆ **The potential demand for teleworking.** With 63.5 percent of people preferring to commute for less than 20 minutes a day but only 12.3 percent preferring to work from home (Dixon and Ross, 2011) teleworking is well positioned to grow. Any advancement is reliant upon technologies such as cloud computing and the ever-growing connectivity and information flows within networks (Chandler and Ross, 2012, Dixon and Ross, 2011, Rodriguez-Pose and Crescenzi, 2008). By 2020, the Australian Government plans to double the number of teleworkers in Australia so that at least 12 percent of employees have teleworking arrangements (Department of Broadband Communications and the Digital Economy, 2011).
- ◆ **The “Anywhere Working City” (Chandler and Ross, 2012).** Modern information and communication technology will increasingly remove the necessity for many workers to visit a physical location. People can increasingly work from home, cafes, parks, libraries or other public spaces. Often referred to as a “third spaces” – being neither home nor office – these facilities are receiving increased interest and investment from private companies in office property sector (Regus, 2011). They may become popular venues for knowledge and service workers. Given these workers make up the bulk of employees within major Australian cities urban design and transportation systems may change.
- ◆ **From offices, to open plan, to activity based to ...?** In 2009, Macquarie Group shifted into a new activity based office layout in Sydney. In activity based layouts staff may be seated anywhere within the building on any given day. The desks have docking stations for lap-top computers and, upon login, the phone and/or video communications lines are connected to the individual. This reduces the number of vacant desks. The new activity based Macquarie Group offices are reported to require 20 percent less floor space, 50 percent less electricity, 35 percent less paper and save an additional A\$3.1 million due to a reduction in fitout costs and churn each year (White, 2012). Activity based layouts have been tried in previous decades with varying degrees of success. They are likely to succeed in coming decades due to the availability and social acceptance of communications and portable computing technology.
- ◆ **Background operations.** Every time somebody presses “buy” on an online web service a background supply chain is triggered. The growth in logistics is evidenced by parcel delivery rates and supporting industry data. During the year 2010-11 the number of inbound parcels from other countries increased by 56 percent compared to growth of 28 percent in the previous year (Productivity Commission, 2011). The integrated logistics industry – encompassing road, rail and shipping freight – has experienced revenue growth of 6.5 percent per year for the past six years (IBISWorld, 2012). The growth of online commerce is likely to be accompanied by a growth in background logistics operations.
- ◆ **Freelancing models.** Online transactions are enabling domestic and international freelancing models to grow rapidly. In America many firms that deliver online freelancing services such as Elance, oDesk and LiveOps still experienced growth during the financial downturn (The Economist, 13 May 2010). In Australia a company called “freelancer” reports on its website to have 2.4 million projects worth US\$605 million posted since February 2004 (Freelancer, 2012). The rise of freelancing may be associated with the emergence of the portfolio worker which sees a shift away from the corporation and towards an individual (Dixon and Ross, 2011). Portfolio workers supply their services to a range of companies.
- ◆ **Offshoring.** Data from the World Bank, Boston Consulting Group, OECD and the National Association of Software and Services Companies all point towards growth in offshoring of labour. Offshoring is the sourcing of labour from other countries. The OECD estimated that US\$81.4 billion was offshored in 2005 and forecasted growth to US\$252 billion by 2010 (Gereffi and Fernandez-Stark, 2010). The offshoring pressure is likely to intensify into the future as the labour force of the developing world becomes more skilled, technology enables more jobs to be done remotely and the labour cost differential remains high.
- ◆ **Virtual crime and cybersecurity threats.** An inevitable consequence of society’s movement into the digital world is the rising threat of cybercrime. Individuals, organised groups and nation states are increasingly using sophisticated online tools for illegal purposes. These actions are estimated to cost Australia over A\$1 billion per year (Commonwealth of Australia, 2011). During 2006-07 around 14 percent of Australian small businesses experienced at least one computer security breach (Hutchings, 2012) with an average cost of A\$2,431 (Richards and Davis, 2010).



Great expectations

Charles Dickens' famous novel published in the 1860s tells the story of a convict who was forced to live somewhere near the bottom of Maslow's Hierarchy (see right) but obtains riches later in life. He invests his wealth not in material possessions but rather through an endowment to a young man who, as a boy, showed him kindness. He used his wealth to buy an experience – the knowledge that the young man would have a life better than his.



Now, I return to this young fellow. And the communication I have got to make is, that he has great expectations.

Charles Dickens

Great expectations is a consumer, societal and cultural megatrend. It explores the rising demand for services and experiences over products. This megatrend also captures the expectation people have for personalised services that meet their unique needs and wants whilst being delivered en masse. This megatrend has implications for the Australian retail sector and human service delivery systems of government and private sector organisations. We stress that “great” does not always equate to “good” or “better”. However, many of the experiences that people of the future seek will be positive and may include the need for relationships, self expression and morally responsible behaviour.

People’s expectations in coming decades will be “great” in many senses of the word. Expectations will be great because income growth will give people increased discretionary expenditure and a budget to buy experiences. Expectations will be great because the on-demand and instant service offerings we currently have will expand and will be taken for granted. Expectations will be great because people will expect a highly tailored product or service to anticipate needs and wants they may not even know they have. Expectations will be great because consumers are increasingly seeking moral and other “feel good” outcomes. People may also have expectations for improved social relationships and human interaction in an online world where single-person dwellings are the most rapidly growing household structure.

Whilst wealthy people have “great” expectations the billions of poor people in the world have basic expectations. Many of the world’s citizens live in survival mode and have expectations for food, water, clothing, shelter and personal security. In all regions living standards are improving through time. But far too many people still live in poverty and closing the gap will be a priority of the international community for decades to come.

- ♦ **Moving upwards through Maslow’s Hierarchy.** First published in 1943 in a paper titled “A Theory of Human Motivation” Maslow’s Hierarchy is a well established and widely cited concept in the social sciences (Maslow, 1943). In simple terms it tells us that people first meet their basic needs (food, water, shelter) and then go on to meet more advanced needs (social networks, self esteem). In both the developed and developing world incomes will grow considerably over coming decades. In Asia over one billion people will transition out of poverty and into the middle income classes. These people will be in a position to look beyond the basic necessities of life in search for higher level services and experiences.
- ♦ **Declining relative material consumption.** Whilst absolute material consumption is rising in line with economic growth, relative material consumption is decreasing. Relative to population and income growth material consumption is declining in countries with advanced economies. This is due to more efficient production processes and consumer preferences for experiential services as opposed to physical products. As people become wealthier they spend more money on activities such as tourism, education and entertainment. This is because their physical needs are satiated and additional consumption provides diminishing marginal benefit. Data from the OECD supports this observation by showing material consumption has declined on a per-capita and per-GDP basis over the past few decades (OECD, 2011). And it makes sense. Laboratory experiments in the field of psychology have found that people feel happier after an experiential purchase compared to a product purchase (Van Boven and Gilovich, 2003).
- ♦ **Education spending is on the rise.** People and countries often redirect discretionary income towards education services as they become wealthier and grow national income. In 2006-07 education expenditure accounted for 5.3 percent of Australia’s GDP (ABS, 2012c). In five years it has risen to 7.1 percent in 2010-11 (ABS, 2012c). Australian households increased education spending from A\$22 billion in 2006-07 to A\$31 billion in 2010-11 (ABS, 2012c). Exports of education services from Australia to other countries more than doubled from A\$8.3 billion in 2004 to almost A\$18 billion in 2009-10 (ABS, 2012c).
- ♦ **Australians have increased spending on culture and entertainment.** Over the past two decades Australian households have substantially increased weekly expenditure on art, culture and entertainment. Film, digital media and literature have experienced the biggest jumps. Over the six year period from 2003-04 to 2009-10 average household expenditure on cultural services rose from A\$36 to A\$45 per week which represents a 25 percent jump compared to the general consumer price index rise of 19 percent over the same period (ABS, 2011a).

- ◆ **Innovative personalisation.** Marketers have long sought to personalise products and services to increase sales. However, modern technologies are allowing personalisation to leapfrog into new territory. For example, additive manufacturing allows the printing and fabrication of three dimensional objects based on electronic designs. It has been found effective for manufacturing insoles for personalised footwear with positive feedback from participants in a controlled study (Salles and Gyi, 2012). Another example comes from recent software tools designed to make new recommendations based on a person's existing music library.
- ◆ **Tourism bounced back from the global financial downturn.** Even in uncertain economic times people still have an expectation for holidays. The OECD found that 940 million people went on holidays worldwide in the year 2010 which represents a 7 percent increase on the previous year. This has economic significance because tourism pays for 5 percent of jobs and contributes around 6 percent of GDP in OECD countries (OECD, 2012a). The bounce-back has not been so strong for all areas of consumer spending. These data contribute to the evidence that people are seeking experiences.
- ◆ **Retail turnover is growing in the experience oriented sectors and contracting in the products oriented sectors.** Trend estimates over the past decade reveal that monthly turnover has slowed for all Australian retail sectors with the exception of cafes, restaurants and takeaway food (ABS, 2011c). Those sectors with greater online exposure that sell products have slowed more than those sectors selling experiences with lesser online exposure. The Australian Productivity Commission (2011) argues change in the retail sector is more than a short term cyclical pattern associated with consumer sentiment. The retail industry may be experiencing longer term structural change driven by the rise of online offerings and changed consumer spending patterns.
- ◆ **The rising importance of moral and ethical dimensions for consumers.** Recent decades have seen a growth in the number of products labelled as environmentally and socially responsible. The "fair trade" logo is an example. Although fair trade products still comprise a relatively minor share of all consumer products they are growing rapidly (Raynolds, 2009). According to Fair Trade Australia and New Zealand (FTANZ, 2010) in 2010 Australian and New Zealand shoppers purchased A\$149 million of fair trade products representing a 2,000 percent increase from A\$7 million (adjusted for inflation) in 2005. The product with the greatest jump in fair trade sales was cocoa and chocolate moving from A\$5.5 million in 2009 to \$87 million in 2010. There are now 250 businesses in Australia and New Zealand licensed to trade in certified fair trade products representing a 15 percent increase since 2009.
- ◆ **Humans are complex and income growth and class ascendancy can be associated with negative behaviours.** Many of the trends presented thus far under Great expectations give the impression of more desirable behaviours as incomes grow. But there is a negative side to income growth and class ascendancy. Class ascendancy allows people to seek new experiences but scientific studies have revealed that people's motivations and behaviours are not always more honest or desirable. A paper published in the Proceedings of the National Academy of Sciences (Piff et al., 2012) finds that upper-class individuals are statistically more likely to (a) break the law while driving; (b) exhibit unethical decision-making tendencies; (c) take valued goods from others; (d) lie in a negotiation; (e) cheat to increase their chances of winning a prize; and (f) endorse unethical behaviour at work. Similar findings have emerged from other psychological studies which show that unethical behaviour is more likely in the presence of wealth abundance (Gino and Pierce, 2009). Therefore the rising consumer and societal demand for experiences, partly fuelled by income growth, should not be seen as strictly positive or negative. It will have both dimensions.
- ◆ **Loneliness and single person households.** Over the last twenty years the proportion of the population living alone has increased from 9 to 12 percent and is forecast to rise to 16 percent, or 3.1 million people, in another twenty years time (ABS, 2009b). This is associated with delayed partnering, divorce and declining fertility. When connected to the increase in people's screen time, as a proportion of total recreation time, it is likely that a greater value will be placed on the social interaction aspects of office and retail spaces. Loneliness is also more common amongst older people, who will comprise a greater proportion of the workforce in coming years. The office and shopping centre will hold increasing importance as places for social interaction.

- ♦ **The expectation for face-to-face interaction.** Despite the high participation rates in social media, there is still a preference for face to face interaction. In a consumer survey forty-nine percent of American teenagers aged 13 to 17 prefer face to face communication with their friends. Face to face communication was stated as the preferred way of communication because it is “more fun” and people can be understood better. As one surveyed teenager stated, “[face to face communication] is the only real way to be with each other. ‘Moments’ only happen in person” (Common Sense Media, 2012) (Common Sense Media, 2012) (Common Sense Media, 2012). Even more telling is the 43 percent that wish they could unplug for a while sometimes (Common Sense Media, 2012).
- ♦ **The expectation for fewer but stronger social relations.** It is unlikely that social media platforms are able to provide the means by which to establish strong relationships. Social media websites are associated with bridging social capital, that is the ability to access new information through a diverse set of acquaintances, rather than bonding social capital which is based on the emotional support from close friends (Burke et al., 2010). In a survey of students at a large Midwestern University, Ellison et al. (2007) found that the mean number of friends was between 150 and 200, suggesting that networks consist of larger and less intimate relationships rather than tightly-knit small groups. A study of 1,324 self-selected Australian internet users between the ages of 18 and 44 showed that while social media

users are more likely to be extraverted, they also have stronger feelings of family loneliness (Ryan and Xenos, 2011).

An individual can typically maintain at least a dozen friendship ties outside their household and workplace (Garton et al., 1997). This includes at least four ties with socially close intimates and another three ties at least with persons routinely contacted three times a week or more (Wellman et al., 1988). Age impacts what benefits are derived from social networks, with older users reporting lower levels of bonding social capital than younger users (Burke et al., 2010). The growing popularity of social media has potential to lead to isolated groups within society that are unable to derive the necessary bonding social capital. However, there is a possible flipside. Social media may also permit greater connectivity for people isolated from friends due to geographic barriers or physical and mental health restrictions.

- ♦ **Basic (not great) expectations for billions of people.** Much of the world’s population has an expectation for the basic necessities of life. Even though the situation is improving many of the world’s people, including some disadvantaged demographics in Australia, live in survival mode. They have an expectation not for higher-order experiences but for basic necessities (food, water, shelter, clothing, personal safety). Tragically these expectations are unfulfilled for far too many of the world’s people.
- ♦ **The millennium development goals.** In 2008 around 24 percent of the world’s population lived on less than US\$1.25 per day (down from 47 percent in 1990). In 2010 around 7.6 million children did not live past the age of five



years (down from 12 million in 1990). In the year 2012 around 33 percent of people in developing countries resided in urban slums without access to clean water or sanitation (down from 39 percent in 2000). Over the period from 2006 to 2008 around 850 million persons, or 15.5 percent of the world’s population, were undernourished and hungry. This included a staggering one-third of children living in Sub-Saharan Africa (United Nations, 2012).

- ♦ **Heading in the right direction but still so far to go.** The datasets reveal the severity and extent of global poverty is reducing over time. But there is consensus amongst the international community, expressed through bodies such as the United Nations (2012), that the current situation is unacceptable and poverty alleviation is a top priority. “A world without poverty”, or similar words, are written into the mission statements of The World Bank, Oxfam, AusAID and countless other international organisations. Poverty reduction is arguably the objective for the twenty-first century.

Our methods

– foresight and strategy

People need to think about the future because they need to make decisions. Decisions are, by definition, about future events. There are many ways of thinking about the future. This report is guided by the concept of the “futures cone” – a conceptual framework defining different types of future.

The diameters of the circles in the futures cone can be considered inversely proportional to the level of certainty about the future. At the current point in time the circle is a pinpoint because, if we can access accurate data, we have perfect certainty. As we project into the future we have three circles of increasing diameter and decreasing certainty.

The smallest circle is referred to as the “probable”. This relates to future events that can be forecast using historical data series and statistical inference. Predictions of rainfall patterns, population growth and economic growth may fall into this category. Given the limited availability of historic time series data on many important trends, and the limited ability for statistical forecasting of those data, the probable cone is unlikely to permit sufficiently novel or insightful descriptions. There’s not sufficient datasets to support statistical inference about the future.

The largest circle is referred to as the “possible”. This captures every event that could conceivably occur in the future. The problem with working in the possible space relates to credibility. If decision makers cannot see a solid evidence base they are unlikely to use the narratives when making important choices.

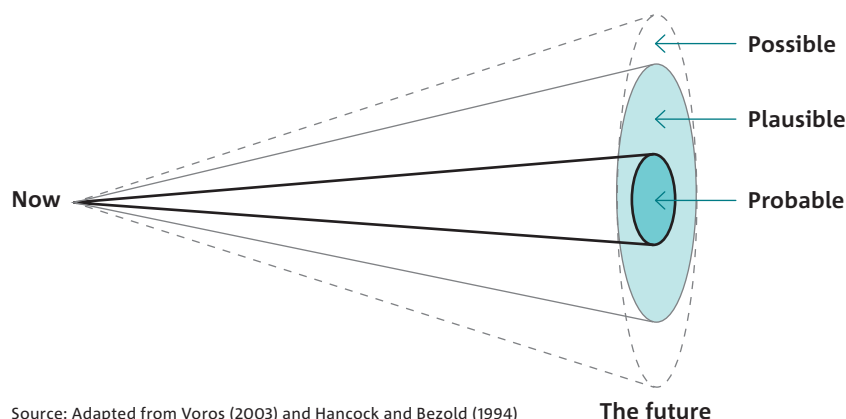
In the centre of the futures cone is the “plausible” space. This moves beyond the narrow, and empirically derived, outcomes in the probable space. However, it avoids the speculative and hard-to-substantiate nature of the “possible” space. The plausible cone is a balance of evidence and imagination.

While probable, plausible and possible futures all have a valid role this study aims to reside within the plausible space. This means that evidence already exists for each megatrend currently occurring. The megatrends are projected to play-out to a greater extent in future decades.

Decision making, foresight and strategy

Societies, organisations and individuals define themselves by the choices they make. There are critical moments in people’s careers, and critical moments in the history of society, when crucial decisions are taken. By making the right choice people can pay-off every dollar invested in their education, training and development in a single moment. However, wrong choices can lead to devastating consequences. In tough decisions there is seldom a genuine safe bet. Doing nothing could be more rewarding, or more damaging, than taking action. Decisions points are the times that matter.

Because decisions matter so much it is worthwhile investing in foresight and strategy research. Both aim to improve the quality of decision making. Foresight aims to explore, analyse and describe future events using verifiable and creative methods. Foresight studies typically involve a blend of evidence and imagination. Strategy is the process of using information about the future, gleaned from foresight, to make wiser choices and achieve desired outcomes.



Source: Adapted from Voros (2003) and Hancock and Bezold (1994)



That's the best place in the world to be. In the tube.

Big Z in the movie *Surfs Up*, Columbia Pictures and Sony Animation (2007)

This report fits into the foresight category and is designed to inform other foresight studies and strategy processes in government, industry and community organisations.

Foresight involves crafting evidence based narratives about the future that are designed to help individuals, groups and organisations make wiser choices. A narrative is typically comprised of:

1. Megatrends. A megatrend is a particularly important pattern of social, economic or environmental activity that occurs at the intersection of many trends.
2. Megashocks. A megashock is a major and sudden hard-to-predict event that causes far reaching change to an industry sector, social group or geographic region.
3. Scenarios. A scenario is a hypothetical, but plausible, story about future events constructed from observed trends and historic data.
4. Disruptive technologies. This is a new technology that has the capability to significantly change the way markets operate and people behave.
5. Weak signals. These are fragments of information which are, as yet, not widely known but have the potential to create major social, economic or environmental changes.

6. Signposts. These convey information about critical decision points on the path ahead that prompt individuals and organisations to make choices.

7. Horizon scan. A wide net is cast over all potentially relevant information resources. These may include organisational datasets, academic journals, industry reports and government reports. Where information is not published the team may interview relevant experts.

8. Predictive modelling. Through its connection to CSIRO Mathematics and Information Sciences (CMIS) CSIRO Futures can build predictive statistical models to quantitatively, or qualitatively, forecast social, economic or environmental trends.

A futures report or presentation may draw upon one, or all, of these concepts to construct a narrative of the future. The aim is to inform, engage and stimulate thinking about possible futures.

Strategy builds upon foresight. In strategy projects the team identifies strategic options that help the organisation or society achieve desired outcomes into the future. A range of decision support tools and processes are applied to evaluate and help decision makers choose the best performing strategic option. The team may also help identify mechanisms to help achieve successful implementation and monitoring of the chosen strategy.

The megatrends venn diagram

The megatrends are presented using a Venn diagram of overlapping circles. This is a well established conceptual framework developed in the field of set-theory in mathematics. In the way it has been used here the areas of overlap represent what the CSIRO Futures team has nicknamed “the tube” of strategic planning. The analogy is to surfing. When a surfer is inside the tube he or she has succeeded in finding the ideal spot. This requires successfully positioning, and riding, the surfboard amidst powerful forces such as the wind, waves and tides. Organisational planning is similar. There is an area of overlap that exists for many possible futures. If an organisation can position itself so that its business models and governance models function in the overlap space between all possible futures then the organisation may be considered to be “surfing the tube”.

Information sources

The information used to identify the six megatrends comes from the CSIRO trends database, several sector-specific foresight studies and feedback on conference presentations over the past two years. In 2009 CSIRO opened up a collaborative online intranet tool that allowed staff to add, and edit, other people's trends about the future. This led to the development of a trends database.

The trends database draws upon information held by the Australian Bureau of Statistics, the World Bank, the International Monetary Fund, the United Nations, the Organisation for Economic Cooperation and Development, the Asian Development Bank, Local, State/Territory and Federal Government reports and datasets, industry reports, academic journals, internal CSIRO datasets and other miscellaneous sources.

The trends database has also been developed through successive foresight studies involving trend identification and analysis. Each project enriches the information environment and builds a more comprehensive cross-sectoral picture. A few of these foresight studies include:

1. An analysis of what the original five megatrends mean for the State of Queensland.

2. Identification of sports trends that will reshape the Australian sporting sector.
3. Identification trends reshaping the Australian office, retail and industrial property sectors.
4. An assessment of global food price volatility and hunger alleviation.

In addition to these studies the CSIRO Futures team has presented foresight material, relating to the megatrends, at over 50 conferences and seminars to academic, government, community and industry audiences. At each event the team has received valuable feedback from people with highly diverse disciplinary and professional backgrounds.

Collectively the information built through the projects, presentations and trends database has built a unique information resource with a vast depth and breadth of information about future trends.

Process for identifying and updating the megatrends

The CSIRO Futures team went through a process of identifying and describing trends based on the information sources listed above. Interviews were held with the organisation's flagship directors and scientists from a range of disciplines. A workshop was held over two days in Brisbane to classify and collate the trends into groupings. The groups of trends were then used to identify megatrends. The titles and underlying concepts were then debated over the following weeks through an email dialogue. The writing team then turned the ideas into this report. We still see this as an open document that will continue to be re-written in coming years as new information arrives and the future unfolds.

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