Scenarios for Australia in 2050: A Synthesis and Proposed Survey

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Abstract

We reviewed a broad range of scenarios of the future developed for Australia and globally and developed a synthesis for Australia. Our four synthesis scenarios were structured around two axes: (1) individual vs. community orientation and (2) whether biophysical limits are binding on continued GDP growth or could be overcome with technology. While global scenarios have explored transformational or collapse futures,

very few scenarios at the national scale for Australia have done so. Australian scenarios have also not articulated positive futures that are very different from the status quo. We have addressed this gap. We describe each scenario in tabular and summary form. We also developed a public opinion survey to be used to involve Australians in ranking the scenarios and thinking about the future they want. This extension of scenario planning is novel and we hope to employ it to improve thinking, discussion, and policy about Australia's future.

Keywords: scenario planning, archetypes, public opinion survey

Background

> *"To deal with the future we have to deal with possibilities. Analysis will only tell us 'What is'."* ~ Edward de Bono, Parallel Thinking

Predicting the future is impossible, but laying out a series of plausible future scenarios is possible. These scenarios can enable the understanding of future possibilities or storylines and also clarify the complex uncertainties surrounding them (Nicholls et al., 2011). They have become an important way to inform decision-making with a whole-system perspective under uncertainty.

'Scenario' is a term with multiple meanings. Scenario exercises vary in their objectives and hence their characteristics (Biggs et al., 2007; Nicholls et al., 2011). We define scenario analysis or scenario planning as a structured process of exploring and evaluating alternative futures. Scenarios are essentially stories that consider how alternative futures may unfold from combinations of highly influential and uncertain drivers, and their interactions with more certain driving forces (O'Brien, 2000).

Scenario planning differs from forecasting, projections, and predictions in that it explores plausible rather than probable futures (Peterson et al., 2003). Although aspects of the future worlds depicted by scenarios may come to eventuate, these worlds are often best viewed as caricatures of reality from which we can learn.

Scenario planning is based on four assumptions (DTI, 2003):

1. The future is unlike the past, and is significantly shaped by human choice and action.
2. The future cannot be foreseen, but exploring possible futures can inform present decisions.
3. There are many possible futures; scenarios therefore map within a 'possibility space'.
4. Scenario development involves both rational analysis and creative thinking.

Scenarios are best suited to exploring situations of high uncertainty and low controllability (Peterson et al., 2003); for example, climate change and global governance are largely beyond the control of a particular region. In these situations, scenarios can help to illuminate the consequences of these uncontrollable forces and to formulate robust responses locally. Importantly, scenarios can help to reveal policy and value changes that may be required, and key branching points at which such changes can most affect outcomes (Gallopín, 2002).

Several scenario-planning exercises have been conducted in recent years at a range of spatial scales and for a range of purposes, including: global futures (Gallopin et al., 1997; Nakićenović and Swart, 2000; Raskin et al., 2002; Millennium Ecosystem Assessment 2005), regional futures (European Environmental Agency 2009; Bohensky et al., 2011), corporate strategy (Wack, 1985; Shell International, 2003), political transition (Kahane, 1992, 2004) and community-based natural resource management (Wollenberg et al., 2000; Evans et al., 2006). For example, one of the best-known scenario planning exercises on the global level is the Special Report on Emissions Scenarios (SRES) (Nakićenović and Swart, 2000). These scenarios have been widely used to study the potential impacts of future climates, especially within the Intergovernmental Panel on Climate Change (IPCC) process. The SRES scenarios are based on four global "storylines" (termed the A1, A2, B1, and B2 worlds, respectively) representing different world futures based on two distinct axes or dimensions: (1) economic versus environmental concerns, and (2) globalised versus regional/national-based development patterns. These two axes define four distinct quadrants for future development. This two axis approach to scenario design is a popular one, as our review discussed below points out, and an approach we eventually adopted for our scenarios.

To develop scenarios useful for policy development in Australia, we needed:

1. A review of existing scenarios, at both the global and national levels, to learn how others have sought to characterise the space of possible futures relevant to Australia and ensure that new scenarios built on that past work.
2. An initial set of scenarios - not intended to be 'complete', but rather a starting point for ongoing development.
3. The involvement of a wider audience in reviewing the scenarios and eliciting insightful rankings, responses, and changes to them.

In this paper we outline our approach to each of these three areas – review of scenarios, initial scenarios, and survey development – and first steps in each. We do so in reference to a call for a national conversation among Australians about their collective futures, encouraged by the Australian Academy of Science 'Towards living Scenarios for Australia' project (Raupach et al, 2012; Cork et al, 2014; Alford et al, 2014).

Review of existing scenarios

We reviewed existing scenarios that have been developed for Australia and the world (Table 1), with the aim of informing an initial set of scenarios about Australia's possible futures. The intention was that such scenarios could be used to encourage dialogue among Australians regarding what futures they would prefer, how those preferences might differ between individuals and groups, and what the basis of those differences might be. We wanted our scenarios to encompass previous thinking about Australia's futures, by drawing common threads that embody the range and depth of existing scenarios. The hypothesis was that we would find a fairly high degree of convergence around a set of themes (Raskin et al., 2002; Hunt et al., 2012).

The most commonly-used processes for developing scenarios of plausible futures include: a focus on some specific aspects of the future (e.g. energy production and consumption); consideration of the factors that might affect those aspects; assessment of what is relatively certain and what is uncertain; exploration of

the most critical uncertainties; and, consideration of what insights emerge and what actions might be relevant in the short, medium, and longer term to shape the future or prepare for threats and opportunities that might not be controllable (Schwartz, 1996; van der Heijden, 1996; Peterson et al., 2003; Scearce et al., 2004). There are a range of methods to identify and explore critical uncertainties, and these can lead to different themes and foci for scenarios (Curry and Schultz, 2009).

Since the 1970s, a complementary approach has emerged that seeks to synthesise and build on the sorts of approaches described above. It has been observed that the vast majority of scenarios developed around the world fall into a small number of types, or "archetypes" (Bezold, 2009; Curry and Schultz, 2009; Dator, 2012; Hunt et al., 2012). These archetypes range around the topics of growth, discipline/restraint, transformation, and collapse narratives. By focussing on these archetypes, different groups such as communities, businesses, government agencies, and others can quickly generate dialogue about how such futures might emerge, what they might look and feel like, and what the implications might be (Candy et al., 2006; Australian Academy of Science, 2013; Cork et al., 2013; Raupach et al., 2013). A range of critical uncertainties might be considered simultaneously in such exercises, with an emphasis of acknowledging and considering diverse understandings and viewpoints.

Our initial approach in reviewing previous Australian scenarios was to seek existing scenarios that consider the future of Australia at a national scale and to identify aspects in common with the set of scenario archetypes identified by Hunt and colleagues (Hunt et al., 2012): Market Forces (an economic and population growth archetype based on neoliberal free market assumptions); Policy Reform (a continuing growth but with discipline/restraint archetype based on assumptions about the need for government intervention and effective policy); New Sustainability Paradigm (a transformation archetype based on assumptions about limits to conventional GDP growth and more focus on environmental and social well-being and sustainability); and Fortress World (an archetype in which nations and the world become fragmented, inequitable, and head towards temporary or permanent social collapse).

We drew on several of the most substantial previous scenario analyses for Australia and the world (Table 1) with the aim of using these as a starting point for our own scenarios. In order to identify which Hunt et al (2012) archetypes are relevant to each scenario, our analysis included detailed consideration of what the published scenario processes had to say about a range of social, technological, environmental, demographic, economic, and political/legal aspects of Australian and global futures, as well as what could be inferred about a range of components of human well-being. For example, income and wealth distribution and its effects on social cohesion and well-being has been the subject of several recent studies (Wilkinson and Pickett, 2009; Piketty, 2014). In addition, the influence of the natural environment and the positive benefits it provides to humans (ecosystem services) has also been the subject of much recent research (Costanza et al., 1997, 2014). We wished to include these and other effects on overall social well-being and sustainability in the scenarios.

Table 1. *Key Australian and global scenarios and scenario-development processes drawn on in this project* (*MF = Market Forces; PR = Policy Reform; NSP = New Sustainability Paradigm; FW = Fortress World)

Scenario set	Critical uncertainties or themes explored	Relevant archetypes*
AUSTRALIAN SCENARIOS		
Will She Be Right? (Kahn and Pepper, 1980)	– World economic development – The future of the Asia–Pacific region	MF, FW
Future of energy (Dunlop, 2012)	– Business as usual vs. emergence action	MF, NSP
Australia at the Crossroads: Our Choices to the Year 2000 (Kasper et al., 1980)	– Business-as-usual policy of government intervention in the economy vs. a more market-oriented economy (the latter seen then – 1980 - as unlikely)	MF, NSP
Aspire Australia (BCA (Business Council of Australia), 2004)	– International competitiveness – Australia's place in the regional and global order – Regional stability – Sustainable development – Values and norms – Governance and politics	MF, NSP, FW
Australia's Strategic Edge (Babbage, 2011)	– What should be Australia's strategic edge in 2030? What capabilities will give the level of strategic and campaign superiority that will be needed to ensure Australia's security in 20 years time?	MF/PR, FW
Scenarios for Business to the Year 2015 (GBN Australia, 2000)	– International power and trade relationships – Access to commercial advantages of new technologies – Future of globalisation	MF, PR, FW
Energy scenarios (Energy Futures Forum, 2006)	– 10 scenarios considering possible implications of: • greenhouse gas emissions and climate change • different combinations of energy technology and different trajectories for the future • public attitudes (especially relating to risks associated with large-scale technologies, desire for energy security, and concern about the resulting shape of society)	MF, PR, FW
Exploring Solutions to Australia's Long-Term Land and Water Problems Using Scenario Analysis (Dunlop et al., 2001)	– Extent, location and demand of water-using industries (beef, horticulture, plantation forestry) – Climate change influences on rainfall and water demand – Urban water use per capita and interactions between irrigation and urban – Societal demand for environmental flows	PR, NSP
The High Road or the Low Road: Alternatives for Australia's Future (Marceau et al., 1997)	– High investment in R&D and exporting technologies vs. a low wage economy, price-taking in the global economy, importing technologies and continued heavy economic dependence on natural resources	PR, MF
Decision Points for Land and Water Futures (Dunlop et al., 2002)	– Different emphases on dryland versus irrigation in agriculture – More diverse and appropriate land uses	PR, NSP
Scenario Planning for Land Use in the Namoi Catchment (Cork and Delaney, 2009)	– Energy transition: Orderly vs. Disorderly – Climate warming: High vs. Moderate – Governance: Effective vs. ineffective influence by the region over its own future	MF, PR, NSP

Future Makers, Future Takers (Cocks, 1999)	– Economic and regulatory policies – Attitudes to: markets, international trade and environmental costs – Benefits versus disbenefits of science and technology. – Forms of governance – Cultural and demographic policies and attitudes	MF, PR, NSP
Scenarios for Australia to 2025 (Australian Workforce and Productivity Agency, 2012)	– Stability and rate of recovery of financial markets – Trajectory of global mineral and energy resource markets – Geopolitical stability and implications for trade and international relations	MF, FW
Irrigation futures for the Goulburn Broken Catchment (Robertson et al., 2007)	– Demand for agricultural products – Government policy – Climate change – Water markets – Attitudes, lifestyles, and their influence on land use	MF, PR
Austrade scenarios (Harcourt, 2001)	– The fate of individual countries – Geo-political stability – Changing trade relationships – Quantum change in technology and its applications – Social cohesion – Safety nets and distribution systems	MF, FW, NSP[a]
Clever work (Saul, 1998)	– Nature of the economy and how people are valued – Value systems – Social contract under which organisations are created and allowed to operate in society – Role of knowledge and intellectual property – Nature of employment – Welfare policy – Leadership and governance	NSP
Climate change adaptation (Low Choy et al., 2012)	– Governance: Exclusive vs. Inclusive – Community responsibility and involvement: Low vs. high	MF, PR, FW, NSP
GLOBAL SCENARIOS		
Visions of Alternative (Unpredictable) Futures and Their Use in Policy Analysis (Costanza, 2000)	– Technological Optimism vs. Scepticism – Real state of the world	MF, PR, NSP, FW
Future Vision (Watson and Freeman, 2012)	– Collectivism vs. Individualism – Pessimism vs. Optimism	MF, PR, NSP, FW
World Business Council for Sustainable Development scenarios (World Business Council for Sustainable Development, 2000)	– Market-driven growth, economic globalisation – Top-down vs. bottom-up approach to sustainability – Alliances, innovation	MF, NSP
Great Transitions scenarios (Raskin et al., 2002)	– Essential continuity – Fundamental but undesirable social change – Fundamental and favourable social transformations	MF, PR, NSP, FW
Millennium Ecosystem Assessment Scenarios (MA (Millennium Ecosystem Assessment), 2005; Cork et al., 2006)	– World development: Globalisation vs. Regionalisation – Environmental management: Proactive vs. reactive	MF, PR, NSP, FW

UK Foresight Futures (Office for Science and Technology, 2002)	– Social values: Individualistic vs. community-oriented – Governance: Interdependent vs. autonomous	MF, PR, NSP
IPCC (Intergovernmental Panel on Climate Change, 2000)	– Relative orientation toward: • economic or environmental concerns • global and regional focus	MF, PR, NSP, FW
Climate Futures (Forum for the Future and Hewlett Packard Labs, 2008)	– The direct impacts of climate change – Attitudes to climate change – The business response – The global economy – Resources – The political response – Technology	MF, PR, NSP, FW

This assessment showed that relatively few scenarios have been created that focus on the Australian national scale and that these have been mainly focused on Market Forces and Policy Reform types, with little consideration of transformational or collapse futures (Table 1).

Four scenarios for Australia

Living scenario processes require a starting point – initial scenarios that a wide audience can respond to and hence inform ongoing scenario discussion and evolution. Our review of existing scenarios informed the content of the scenarios, but there was no easy, straightforward path to synthesis. Ultimately, we used our judgement, experience, and knowledge of existing scenario exercises to develop our four synthesis scenarios for Australia. We also needed to have scenarios that could be presented in multiple ways that are accessible to diverse audiences. For example, some prefer to read creative narratives while others prefer concise lists of points. Both were developed for the purpose of communicating with the Australian public. For brevity, only a comparison table and brief summary descriptions are included here. Longer narrative descriptions and other creative ways of describing the scenarios are being developed for the project website and the ultimate public opinion survey.

In developing initial scenarios, we chose two dimensions that underpin typical scenario archetypes and also are prominent topics in public discourse about Australia's future: (a) whether individual or community interests are prioritised; and (b) assumptions about the ability of technological progress to overcome biophysical limits (e.g. climate, water, energy availability) to conventional economic growth (GDP). This last is an uncertainty and a key limiting factor that might prevent two of the archetypes from coming to pass (Costanza, 2000). We assumed that population growth rates in Australia would be similar and moderate in all four scenarios. While population growth is a huge and controversial issue at the global scale, Australia is still rather lightly populated and we don't expect major differences in population growth among the scenarios to 2050.

The four scenario names we settled on to describe the four options these axes create are: Strong Individualism; Community Wellbeing; Free Enterprise; and Coordinated Action (Figure 1)

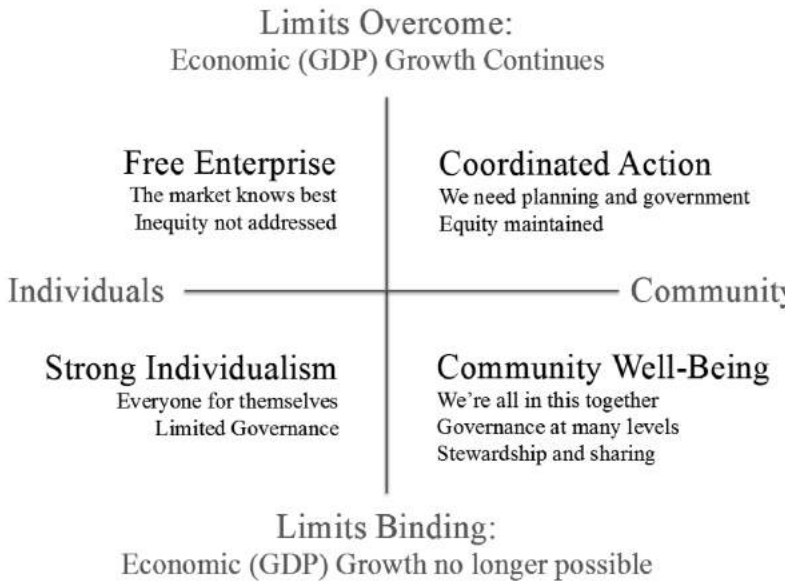

Figure 1. Axes and their resulting scenarios.

Horizontal axis: Individual vs community orientation

A common theme across scenarios is the question of whether individual or collective (community) interests are given priority. Hence, we chose this as one of the key attributes for partitioning the space of possible futures in our choice of four scenarios. Sividas et al (2008) report:

> "The construct of individualism–collectivism expresses the distinction between prevalent cultural orientations that value the importance of an individual versus those that value group harmony. People with individualist values tend to see themselves as independent of others and generally behave according to personal attitudes and preferences, whereas people with collectivistic values see themselves as interdependent with others and usually behave according to social norms (Triandis, 1995). In individualistic societies, personal goals take precedence over in- group goals, whereas in collectivist societies, in-group goals take precedence over those of the individual, with personal goals secondary. That is, individualistic societies are "me"-oriented and collectivist societies are "we"-oriented."

Sividas et al (2008) go on to provide a more nuanced analysis to provide a measure for characterising individualistic/collectivist and horizontal/vertical dimensions, where the horizontal/vertical dimension captures preferences for hierarchical versus egalitarian horizontal relationships.

The four scenarios relate to the individualism/collectivism constructs as follows. Individual autonomy is prioritised in the "Free Enterprise" and "Strong Individualism" scenarios. In the "Free Enterprise" scenario, strong market

growth and technological advances are to serve individual interests. In "Strong Individualism", one of the limited roles of the small national government is to protect individual property rights, and otherwise "get out of the way" of what individuals want. Both "Community Wellbeing" and "Coordinated Actions" prioritise collective interests, but do so in different ways, drawing on the horizontal/vertical differences mentioned above. "Coordinated Action" has hierarchical, top-down planning, and regulation to protect collective interests, while "Community Wellbeing" prioritises collective interests via egalitarian, horizontal structures.

Vertical Axis: Technological Limits to Growth

The concept of "limits" was a helpful one in interpreting existing scenarios and developing our own. Several aspects are involved in any consideration of limits. Where a biophysical limit exists, are there technical or social mechanisms for anticipating, acknowledging, and taking steps to overcome that limit? Or is the limit binding in the sense that technical solutions are ultimately impossible or counterproductive? In particular, we are concerned with whether there are technical, social, or environmental limits to continued growth of GDP. Many of our current policies are based on a vision of continued GDP growth, but this may not be possible. It also may not be desirable given the external environmental and social costs of GDP growth. This uncertainty forms the basis for our second axis.

For example, many cities in Australia were placed under water restrictions during years of drought. In Canberra, for example, dam levels were declining, there were strong regulatory and communication mechanisms in place, and Canberra residents and businesses responded by adjusting and cooperating with water restrictions. Alternatively, are there options for expanding limits? The response to water supply issues in cities such as Perth included building desalination facilities, and in the years after the drought Canberra has constructed a larger dam. Choices to impose water restrictions are interpreted as choosing to live within a limit, whereas choices to build a new dam or install desalination plants are about (temporarily) expanding limits. The question is: can this continue indefinitely? Technological optimists assume that any biophysical or social limits we encounter to continued growth of GDP will be overcome. Technological sceptics believe that there are limits to technical change that will ultimately slow down or stop growth in GDP (Costanza, 2000). The point is that we will not know the answer to this question until after the fact, and it thus creates one of the key uncertainties about the future that our scenarios are structured around.

There are other limits that do not deal with "running out" of material resources like water or energy, but with the absorption of human impacts on the Earth system. In the case of a safe climate, the issue is not the exhaustion of a material stock but the concentration of greenhouse gases in our atmosphere. This limit can still be framed in a similar way. The IPCC 5th assessment report uses the transient climate response to cumulative carbon emission (TCRE) as a useful way to define a budget of cumulative emissions to keep global average air surface temperature change below 2 degrees C (IPCC, 2013). This is a useful framework for designing and implementing mechanisms that limit total emissions to stay within an agreed budget, acknowledging that the global population would readily use far more without such mechanisms in place. The concept of "planetary boundaries" or a "safe operating space for humanity" map out some other biophysical limits that define requirements

for a sustainable human presence in the biosphere (Rockstrom et al., 2009).

In each scenario we considered whether assumptions about social and technological innovation recognised limits or assumed that any limits could be overcome. Examples of living within limits include developing the social and technical infrastructure for regulating, allocating or sharing water, emissions quotas, population control, coastal development, land-use change, and biodiversity loss. Examples of overcoming limits include developing infrastructure for desalination, bigger dams, increased intensity of land use through chemical fertilizer use, and ecosystem change. It is clear that on a finite planet, continued economic growth will require absolute de-coupling of growth from resource and sink constraints. The uncertainty about whether this is possible or desirable is the essence of this axis (Costanza, 2000).

There is an element of social construction to all limits. What is experienced as "water-limited" existence in a city like Canberra would be considered a "water-abundant" lifestyle in many desert communities. Notions of "enough" space in urban dwellings differ vastly between residents of Canberra and Tokyo. In various scenarios for the future, what flexibility do we exercise in our perception of what it is to be experiencing limits? There is also growing attention being paid to social limits, such as levels of inequality that trigger civil disobedience or the lack of access to education or health care. These social human rights provide an essential foundation to the well-being of individuals and populations (Wilkinson and Pickett, 2009). Thus, the "limits binding" end of the vertical axis in Figure 1 includes futures in which humans anticipate limits and act accordingly before limits are encountered as well as futures in which limits are encountered and require humans to respond.

The four scenarios do not explore all these aspects of limits, and instead the primary focus is on whether economic growth is prevented or not by limits. In the "Free Enterprise" scenario there is an emphasis on technological or market-driven responses to expand the limits and for economic growth to be an ongoing priority. It doesn't mean biophysical limits do not exist, only that technology is assumed to be able to overcome them and minimise the degree the population feels limited by them within a 2050 timeframe. In many countries today this is the dominant underlying vision of the future.

The "Community Wellbeing" scenario places an emphasis on anticipating and accepting biophysical limits and better regulating and/or sharing access to resources and opportunities. The "Coordinated Actio"' scenario uses centralised top-down planning, regulation, and investment in technology (with citizen input) to overcome limits in a way that allows continued economic growth, but growth that is more equitably shared. "Community Wellbeing" explores an alternative approach to governance that emphasises polycentrism and subsidiarity, and does not make economic growth an overriding goal or requirement, but rather focuses on equity and quality of life. In the "Strong Individualism" scenario some crucial limits have been reached that cannot be overcome, but the emphasis on individuals in this scenario triggers an "everyone for themselves" response with limited government interference.

Scenario comparisons

All four scenarios have different driving forces and sequences of events that

shape the path to that future. For survey participants to consider future scenarios, review the choices, and express preferences we provide a common set of basic attributes for comparison between the scenarios. The summary presents the underlying drivers and sectoral trends for each scenario so that survey participants can compare the trade-offs between the scenarios and their respective attributes and limitations (Table 2). The first two attributes in Table 2 – individualism/collectivism and limits – are the primary attributes used to partition the space of possible futures.

Table 2. *Attributes of the four scenarios.*

Scenario Name:	Strong Individualism	Community Wellbeing	Free Enterprise	Coordinated Action
Orientation	Individualism	Community	Individualism	Community
Limits	Limits binding: Economic growth no longer possible	Limits binding: Economic growth no longer possible	Limits overcome: Economic growth continues	Limits overcome: Economic growth continues
Governance				
Structure	Strong, small government focussed on national protection and individual property rights	Strong government at global to local scales, polycentric (not hierarchical)	Minimal national government, regional corporations	Strong global and national government
Democracy	Limited regulations, everyone for themselves	Strong citizen participation, pluralism	The market is the main vehicle for democracy	Compulsory participation in democratic processes
Policy	Minimal policy, enabling markets	Strong globally and locally coordinated policies	Minimal policy, enabling markets	Comprehensive global and national policy
Economy				
Economic growth	Highly variable across individuals and sectors, low growth on average	Stable, no growth economy	Strong growth on average, but not for all - growing inequity	Stable economic growth
Key Sectors	Military and construction	Health, education and service sectors	Energy and specialist manufacturing	Biotechnology, energy, communications and health
Community				
Identity	Nation and individual	Global and community	Nation and individual	Global and community
Equity and security	Inequity, security controlled by military	Equity and security prevails, high levels of trust	Growing inequity, some conflict over access to benefits of economic growth	Equity and security enabled by government
Individual Well-being				

Health and education	Inequality in access to health and education	High priority, provided through public system	Inequality in access to privatized health and education	Healthcare and education regulated by government
Natural Environment				
Environment	Biodiversity and ecosystems decline	Biodiversity and ecosystems improve	Biodiversity and ecosystems decline	Biodiversity and ecosystems improve
Greenhouse gas emissions	Emissions decline due to less consumption	Emissions decline due to less consumption	Strong emissions growth, and growing market for climate adaptation measures	Emissions decline due to strong regulations mandating emission reduction targets
Built Infrastructure				
Growth	Medium-Low	Low	High -Medium	Medium-High
Tradeoffs	**Reduced constraints and large opportunities for individuals at the expense of community and environmental quality**	**Collective goals and equity at the expense of personal wealth and consumption**	**Economic growth and wealth at the expense of equity and environmental quality**	**Strong international and domestic cooperation at the expense of individual and national autonomy**

The following summary scenario descriptions expand on the attributes listed in Table 2. Ultimately, we intend to produce a website with these and other ways of describing the scenarios as the basis for the public opinion survey.

Summary Scenario Descriptions

Strong Individualism

Scenario Drivers

The combination of environmental shocks, resource-related limits and conflict and general political unrest and terrorism effectively remove the continuing viability of a global economy. Australia removes itself from the global economy early while retaining bilateral bargaining power with key exports markets.

Australia remains relatively resilient to the global shocks by turning to increasing protectionism and individualism.

Australians have a strong emphasis on individual and family life and need to rely on themselves in terms of health, education and other services. Outside of family, society is highly competitive and has low levels of trust and cooperation.

Tradeoffs

Reduced constraints and increased opportunities for some Individuals ***at the expense of*** community and environmental quality

Governance

- Strong military presence controlling national legal issues and boder security
- Small 'Executive Council' at the national level to protect and promote national soverengty sovereighty
- Limited governance at lower levels
- Minimal taxes and regulations

Economy

- Uneven unstable economy
- High import tariffs are key source of revenue
- Military is an important part of the domestic economy
- Unregulated informal economy in media, service, artisan and trade sectors

Community

- Highly individualistic and competitive society with low level of trust
- Limited physical connectivity; virtual connectivity given priority
- Low population growth and limited immigration
- Military binds disparate regions together for national symbolism and security

Individual Well-being

- Inequality in access to health and education
- Long work hours for the employed combined with high unemployment

Natural Environment

- Biodiversity declines; Emission reduction due to reduced consumption and adaption in agricultural sector
- Unregulated land use to allow mitigation and adaptation to climate change impacts
- Water scarcity and limited natural resources

Built Infrastructure

- Technology plays a critical role in the agricultural sector
- Transport sector declines due to resource scarcity and absence of new technology
- Abandoned urban sprawl areas reclaimed for diversified economic activities

Community Wellbeing

Scenario Drivers

Successive global financial crisis, significant extreme weather events and Australia not meeting its emission targets in late 2020 cemented the need for global cooperative action to address the crisis.

Australia's response is polycentric: a locally decentralised governance structure but connected at the global level. Global public policy networks link Australians with multiple countries and stakeholders.

New values motivate Australia in 2050. Global solidarity and people connecting strongly with each other matters more. We have a commitment to sharing our resources. Ultimately we recognise that we are all in this together.

Tradeoffs

Collective goals and equity ***at the expense of*** personal wealth and consumption

Governance

- Polycentric governance- decentralized at local level, but connected at global level; global public plicy networks link Australians with multiple countries and stake holders
- Three core principles of governance are: democracy, participation and constrained pluralism
- Decision making closest to where action is required

Economy

- stable low or no growth economy
- economic success is measured in terms of more comprehensive progress indicators, not GDP
- businesses have to seek social license to operate
- the market regulated to insure positive social and environmental outcomes

Community

- Collective goals take precedence over personal goals; improved equity
- Population stabilizes
- Health and wellbeing addressed through community based solutions

Individual Well-being

- Improved work-life balance and meaningful employment for all
- Improved education levels

Natural Environment

- Targeted to meet lower emissions by 2100
- Biodiversity and ecosystems improve
- Energy requirements met through renewable energy sources
- Locally well integrated land use management

Built Infrastructure

- Innovative technologies in the building sector; most buildings are net exporters of energy
- Closed loop recycling of materials
- Lower consumption of manufactured goods
- walking, cycling and well-designed and efficient mass transport are the most common modes of transport

Free Enterprise

Scenario Drivers

To stimulate economic growth Australians reject increased government interference and adopt a more free-market approach.

The result is a highly individualistic society with opportunities for rapid expansion of material wealth for some based on technologies that can overcome energy and resource constraints. The increased privatisation of healthcare, education and social services result in a more individualistic and consumerist society with a growing divide between rich and poor. The environment degrades as environmental conservation and biodiversity protection are given low priority relative to economic growth.

Tradeoffs

Economic growth and wealth ***at the expense of*** equity and environmental quality

Governance

- Minimal national government; Local goverments are reestablished as regional corporations
- Income and corporate tax reuced to flat 10%
- Privatisation of healthcare, education and other servcies

Economy

- Strong economic growth enabled by new energy and resource extraction technologies
- Increased GDP growth rate and high individual incomes for some
- Growth in research and development in fossil and renewable energies, specialist manufacturing and bio-prospecting
- Overall agricultural sector changes from net exporter to net importer

Community

- Highly individualistic, consumerist society
- Increased labour migration and inequality in employment opportunities and pay
- Sense of security declines as inequity and unemployment increase

Individual Well-being

- Work-life balance, leisure and family oriented activities decline
- Healthcare, education and other services are less available to the lower and middle class

Natural Environment

- Environment degrades as conservation and biodiversity given low priority
- Rezoning of lands and land ownership liberalized for foreign investments
- Stable water security in the absence of agriculture driven economy

Built Infrastructure

- Technology plays a critical role to maintain growth
- Urbanisation increases
- Boom in transport and construction industry
- Labour intensive manufacturing moves off-shore

Coordinated Action

Scenario Drivers

Australia's response to the ongoing climate crisis is to restructure national government to take coordinated action at the national and global level. The UN is strengthened and presides over a substantial body of binding international laws including a global carbon tax system.

The world and Australia achieve relative climate stability and more equally distributed opportunities through effective global and regional cooperation and "green growth."

Tradeoffs

Strong international and domestic cooperation ***at the expense of*** individual and national autonomy

Governance

- Strong emerging global governance
- Australian local and state goverments cede more power to the national government
- Democratisation of decision making through digitisation; participation in online consultation process for key policies is compulsory
- Global carbon and environmental tax system. Within Australia more progressive taxation;

Economy

- stable "green" economic growth
- Knowledge intensive and service based economy
- Biotechnology, communications, health and tourism are the largest sectors
- Export growth of renewable technologies

Community

- Sense of security and stability due to government control and monitoring
- Emigration open for highly skilled migrants and refugees
- Government prioritises and monitors economic utility of human capital

Individual Well-being

- Improve access to education through tertiary.
- Improved government-funded health care system

Natural Environment

- Central planning and market based incentives improve the environment
- Biodiversity and ecosystems improve
- Energy requirements met through renewable energy sources

Built Infrastructure

- Innovative technologies in the agriculture sector
- Integrated transport network linking high-speed rails, busses and trams
- Growth in foreign investments

Public surveys and engagement

We intend to carry out public surveys and deliberative dialogues in focus groups around the scenarios we developed. This will allow a quantitative assessment of public preferences for the various aspects of each scenario. It will also help us understand how the public evaluates trade-offs between the scenarios and their respective attributes and limitations.

A purpose of the surveys will be to explore patterns of preferences among the general public for different scenarios, and to test what relationships between preferences, wellbeing and different kinds of personal goals and values can be inferred. In particular, we are interested in characterising any relationship between scenario preferences and participants' tendency towards intrinsic or extrinsic goals and values. Extrinsic values and goals have been shown to be more strongly associated with materialistic preferences for the future and this may be a major driver of scenario preferences (Hurst et al., 2013).

Values will also be abstracted from verbal statements of general preferences and goals during the deliberative dialogues in focus groups. One definition of values is "desirable, trans-situational goals, varying in importance, that serve as guiding principles in people's lives" (Schwartz, 2003). While values can be abstracted from any given context, they are inextricably linked to emotions and desires that influence behaviour. If a person highly values independence, then they are likely to be angry or despairing if their independence is threatened and happy when it is supported (Schwartz, 2003). In responding to a values questionnaire, we are essentially reporting on our affective (i.e. emotional) responses across a wide range of contexts. While affective responding is highly contextual (e.g. we might prefer affiliation in one context but not in another) one's subjective responding to a values questionnaire is the most accurate predictor of preferences in a general way.

Goals are more concrete than values. Our research will rely upon the well-validated "Aspiration Index" (Grouzet and Kasser, et al., 2005). There are a number of reasons why it is important to study the relationship between a well-validated measure of goals and preferences for different scenarios for the future. First, the goals measure provides a validation that people's preferences for different scenarios reflect general patterns of valuing rather than idiosyncratic features of the scenarios themselves. For example, our scenarios vary on the individualism-collectivism dimension. We would therefore expect those who favour the more individualistic scenarios to be more inclined to endorse self-enhancement rather than communitarian goals.

Second, including a goals measure allows us to generalise our findings. Goals appear to influence responses on a vast array of major issues such as environmental degradation, social inequity, racism, gender relations and human rights. It would be helpful to be able to relate the specific narratives of scenarios to more general patterns of intrinsic versus extrinsic goals.

Finally, and very importantly for the ongoing evolution of living scenarios, understanding the relationships between goals and scenarios will enable us to better understand how to tailor scenarios and communications so they are readily accessible to a population whose goals may vary widely. It is possible, for example, that similar visions for the future could be expressed in slightly different ways in order to better relate to people with different aspirations. In essence, we need to "meet

people where they are", rather than expecting them to adopt different goals.

The survey will elicit several kinds of information:

1. A simple ranking of scenarios from most to least preferred;
2. Estimates of how 'satisfied' participants expect they would be in each scenario (intended to supplement the preference ranking by giving an estimate of strength of preference for each scenario);
3. Demographic questions (postcode, gender, voting intention, age, highest level of education, household income, country of origin, religious affiliation);
4. A shortened and adapted form of the well-validated measure of goals known as the Aspirations Index (Grouzet et al., 2005). This measure is relatively short and can be answered by people with relatively little education.
5. A short measure of wellbeing known as the flourishing scale (Diener et al., 2010).

A sample survey form is included in Appendix A. We intend to construct a website that explains the scenarios (and a paper version for those without internet access). After individuals have spent time understanding the scenarios, they will take the survey shown in Appendix A, either online or on paper.

Discussion

A key motivation for our work is the recognition that if we are to contribute to informed national conversations about Australia's future, scenarios developed in a one-shot exercise are of less value than those that are reviewed and revised iteratively with a broad audience drawn from diverse sectors and life experience. The work described in this paper represents an initial iteration.

The review of existing scenarios pointed to a lack of scenarios exploring "collapse" or "transformation" archetypes in Australian scenario work. We included aspects of these archetypes in two of our scenarios: "Strong Individualism", where limits have been reached and triggered an "everyone for themselves" response, and "Collective Action", where alternative egalitarian governance structures emerge to foster the common good (as opposed to more conventional government regulatory instruments). It is usual for "collapse" scenarios to be undesirable, but in this work we deliberately sought to build scenarios that could be attractive to different people. This is challenging for the collapse archetype.

The audience for these scenarios is not an academic audience. Rather, these scenarios have been developed in order to provide opportunities for a wider audience to react to the scenarios via an online survey. In this way, our work serves as a vehicle for bridging academic scenario development and non-academic conversations about our future. Importantly, it is not a one-way bridge and, in the spirit of 'living scenarios' the intention is to learn from survey responses to better inform future scenario development.

An implicit assumption in these scenarios is that human behaviour is a key determinant of future trajectories; we have not assumed that the fate of humanity lies in external events outside our influence. For this reason we'd like to ensure our work can be relevant to and informed by behavioural science. The survey has been designed so that we can learn about participants' intrinsic and extrinsic values and ascertain any relationship to scenario preferences. These personal attributes are important determinants of behaviour, and are also shaped by societal context.

By making these aspects more visible via the survey results we are providing new insights into significant influences on possible futures and providing input to a broader and more informed conversation about the future.

Conclusions

As a result of this project we have assembled and reviewed a comprehensive set of existing scenarios and identified attributes useful for future scenario development. The decision to partition the space of future possibilities according to an individualism/collectivism construct is common, however our choice of second dimension – societal response to limits – is more novel. In doing so we were able to accommodate both different views about limits (e.g. whether we must be contained by them or have options for expanding them) and responses to them (e.g. whether living within limits impeded economic growth or not). Developing scenarios for the purpose of contributing to an ongoing 'living scenarios' process means that the scenario content itself is less important than the process by which a wider audience will be invited to respond to them and contribute to ongoing scenario evolution. To this end, we have developed a framework for eliciting not only responses to scenarios, but a wider spectrum of demographic and values preferences from survey participants.

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Appendix A: Draft Public Opinion Survey Questions

Scenarios for Australia's Future

Scenarios for Australia's Future

Welcome to this survey of your thoughts regarding Australia's future. By now you should have taken some time to read and explore the scenarios so that you have a clear sense of which are your most and least preferred. If you have not done that please click here to return to the scenarios. Thank you for being involved.

***1. Please rank the following from most to least preferred with 1 = most preferred and 4 = least preferred future**

- Free Enterprise
- Strong Individualism
- Community Wellbeing
- Coordinated Action

***2. If you imagine yourself living in each of these futures, how happy would you be:**

	Very dissatisfied	dissatisfied	neither	satisfied	Very satisfied	Unsure
Free Enterprise	○	○	○	○	○	○
Community Wellbeing	○	○	○	○	○	○
Strong Individualism	○	○	○	○	○	○
Coordinated Action	○	○	○	○	○	○

Comment

3. Please complete the following demographic questions. It will not be possible to identify you from this information.

What is your postcode?

4. What is your gender?

- ○ Female
- ○ Male

5. Which major party would you typically vote for?

- ○ Liberal
- ○ National Party
- ○ Other
- ○ Labor
- ○ Greens
- ○ No preference

6. What is your age?

- ○ 18 or younger
- ○ 18 to 24
- ○ 25 to 34
- ○ 35 to 44
- ○ 45 to 54
- ○ 55 to 64
- ○ 65 to 74
- ○ 75 or older

Page 1

Scenarios for Australia's Future

7. What is the highest level of education you have completed?

8. Are you of Aboriginal or Torres Strait Islander descent?

- Yes
- No

9. What is your approximate average household income?

- $0-$24,999
- $25,000-$49,999
- $50,000-$74,999
- $75,000-$99,999
- $100,000-$124,999
- $125,000-$149,999
- $150,000-$174,999
- $175,000-$199,999
- $200,000 and up

10. In which country were you born?

- Australia
- England
- New Zealand
- Italy
- Viet Nam
- Scotland
- Greece

Other (please specify)

11. The questions below ask you about aspirations you may have for the future. For each question, select a response that indicates how important it is to you that the goal be attained in the future.

	Not at all		Somewhat		A great deal
Being known and admired by many people					
Having close personal relationships					
Achieving affluence and financial success					
Helping those who need help					
Projecting an appealing and attractive image					
Attaining self-understanding and personal growth					

Page 2

Scenarios for Australia's Future

12. The questions below again ask you about various goals or aspirations. For each question, select a response that indicates how much you actually work on that goal in your life. Regardless of how important you said the goals were, to what extent do you find yourself trying to make each goal occur?

	Not at all		Somewhat		A great deal
Projecting an appealing and attractive image	○	○	○	○	○
Helping those who need help	○	○	○	○	○
Achieving affluence and financial success	○	○	○	○	○
Having close personal relationships	○	○	○	○	○
Attaining self-understanding and personal growth	○	○	○	○	○
Being known and admired by many people	○	○	○	○	○

13. Below are 8 statements with which you may agree or disagree. Using the rating scale below, indicate your agreement with each item by indicating that response for each statement:

	Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
I lead a purposeful and meaningful life	○	○	○	○	○	○	○
My social relationships are supportive and rewarding	○	○	○	○	○	○	○
I am engaged and interested in my daily activities	○	○	○	○	○	○	○
I actively contribute to the happiness and well-being of others	○	○	○	○	○	○	○
I am competent and capable in the activities that are important to me	○	○	○	○	○	○	○
I am a good person and live a good life	○	○	○	○	○	○	○
I am optimistic about my future	○	○	○	○	○	○	○
People respect me	○	○	○	○	○	○	○

Page 3