CSIRO

Future Darwin

How might Darwin build and maintain resilience in a range of plausible futures?

Report on workshop held in Darwin 9th and 10th of June 2016

July 2016

Prepared for the Northern Australia Development Office

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Executive summary

The city of Darwin is uniquely placed in the centre of northern Australia, closely related socially, culturally and economically to large near-Asian countries and a focus for northern regional development initiatives. Darwin residents point to the quality of the lifestyle in Darwin when speaking of its unique qualities. In the context of other cities within Australia, Darwin is also relatively early in its development, and therefore well placed to chart a path to being a resilient and attractive place to live and work well into the future. Darwin's history since European settlement has demonstrated the adaptive capacity of the community to recover and rebuild following events such as Tropical Cyclone Tracy and bombing during the Second World War.

The *Future Darwin* workshop was initiated in partnership with the Northern Australia Development Office (NADO) under the Northern Territory Department of the Chief Minister. NADO's role is to lead a progressive and innovative approach to shaping the future development of the Northern Territory. The Northern Territory government envisions Darwin as the gateway between Australia and Asia, and the Australian Government's *White Paper on Developing Northern Australia* identifies strategies to stimulate increased economic opportunity in Northern Australia. What will this mean for Darwin? How will it realise the vision for economic growth while remaining a desirable city for residents? How might Darwin build and maintain resilience in a range of plausible futures?

The *Future Darwin* workshop sought to anticipate and help decision-makers prepare for future challenges and opportunities, by constructing a set of future scenarios and using those to focus dialogue on the role that science, research and policy may play. The process did not seek to identify a most likely or a preferred future development pathway for Darwin, but rather stretch the thinking of decision makers beyond current-day realities to future possibilities.

The workshop guided 30 participants to develop four divergent scenarios for Darwin, and identify a range of plausible shocks and opportunities in the city's future. The likely social, technological, environmental and economic drivers of change under each scenario were explored. The scenarios were constructed around two axes of uncertainty that were considered to be driving forces for change in Darwin, which were: governance type, which ranged from interdependent to a more autonomous governance; the second axis juxtaposed a communitarian society with a more individualistic one.

The workshop developed the following four scenarios:

1. The Voice of the Territory – This scenario was based around an interdependent governance where stronger relationships were developed and formalised between the Northern Territory and near Asian countries, which lead to improved cultural and trading links. There was also a strong sense of local community identity, which enabled Darwin people to identify the local values they wanted to protect, and how growth should be managed.

2. Terra Tropicanus – This scenario saw Darwin become more autonomous from the rest of Australia, and emerge as a capital of northern Australia that was more aligned

economically and culturally with Asia. This scenario saw the prosperity of Darwin developed while still improving social equality and protecting the environment.

3. Territory Techno-optimism – This scenario was based on a highly individualistic and autonomous Darwin, where there was a smaller role for government and a growing gap between rich and poor. Economic prosperity was determined by competition between wealthy individuals, with technology providing a solution to social and environment issues.

4. Innovation Capital of the North – This scenario envisaged a much larger population for Darwin, where Darwin is the gateway between near Asian neighbours and the rest of Australia. There is a market driven approach to economic growth, which encourages technological innovation. Economic unions are formed between Darwin and Asian countries to enable free movement of people, and goods and services.

The scenarios developed for Darwin showed common themes emerged, despite the contrasting governance and social futures. In particular, participants saw the need for a more independent Darwin with less reliance on southern Australian cities. Instead many participants saw that economic and cultural ties with near Asian countries are likely to become more important over coming decades. There was also a strong sense of local identity, including the unique Darwin lifestyle and tropical character, which provided a basis for identifying the values that need to be maintained while going for population and economic growth.

The workshop is part of a larger national project, Future Cities, in which the Commonwealth Scientific and Industrial Research Organisation (CSIRO) can catalyse national dialogue on how Australian cities can adapt to future challenges. Workshops have so far been held in Melbourne, Brisbane, Perth and now Darwin. The methodology has been used in collaboration with key local decision-makers in each city to support innovation, transformation strategies to improve resilience, and to explore the policy implications of future development pathways. Compared to other cities, Darwin is earlier in the development cycle so scenarios often explored how economic and population growth could be realised while protecting local values and lifestyle. In other Australian cities the focus was often on managing the impacts of growth on the liveability and sustainability their city.

The workshop, scenarios and engagement of decision-makers will provide a foundation for NADO to lead dialogue in the Darwin community on the opportunities and limitations to the sustainable long-term development of Darwin, and how the community can develop resilience to emergent trends and future shocks.

Part I   Workshop Report

Workshop held at the Northern Australia Development Office, Darwin, 9th and 10th of June 2016

1. Introduction

1.1 Workshop Prelude

The following activities were undertaken prior to the workshop:

- *Webinar* – The webinar was intended to provide an opportunity for workshop participants to be introduced to the workshop process. The attendees were taken through the planned workshop process, and had the opportunity to ask questions.

- *Horizon scan* – a desktop review was undertaken of the possible threats and opportunities for the future development of Darwin. This review was shared with participants prior to the workshop, and was intended to stimulate thinking around the possible trends and shocks that would challenge the ability of Darwin to build and maintain resilience.

- *Survey* – Workshop participants were also invited to participate in a pre-workshop survey that explored their perceptions of the most influential drivers for change in Darwin and what they would like for Darwin the Future. The results of this survey were presented back to participants at the start of the workshop (See: Appendix B

Invitations to the workshop were targeted at a range of key stakeholders for Darwin that represented the following organisation types: local government, Territory government agencies, utilities, developers, peak business/professional organisations, and private sector businesses. Thirty people attended the workshop, with a representation from across the targeted organisations; however, participation was weighted towards the public sector.

1.2 Workshop process

The scenario planning workshop followed a common approach used in futures thinking called a *strategic conversation* (Figure 1). Developing scenarios through strategic conversation allows participants to explore different views while also bringing people together to develop a shared understanding of future challenges and opportunities (Rohrbeck & Schwarz, 2013). The workshop process also challenged dominant mental models of how a city such as Darwin works, which can help to eliminate blind spots when making decisions about the future.

The process used with the workshop to develop the scenarios can be viewed as a starting point, as the real value of the scenario process happens when participants and other stakeholders are engaged in developing and refining the scenarios. Therefore this report serves two purposes: a summary of the workshop and the scenario narratives, and; as such the basis of further discussion and thinking on cross-sectoral issues and concerns that emerged from the workshop , and identifying potential policy levels that will enable Darwin to build resilience to future shocks and changes.

Defining (being clear about) the issues

Strategic decisions

What factors might influence the future of these issues?

STRATEGIC CONVERSATION

Implications

Which factors are both highly important and highly uncertain?

Scenarios *structured* around critical uncertainties

Figure 1: The process followed in the scenario planning workshop

1.3 The focal question

The focal question was: *How might Darwin build and maintain resilience in a range of plausible futures?*

1.4 Defining resilience

There was some discussion at the workshop about how resilience might be defined (Figure 2 and Figure 3). This has been an issue of debate in the international literature for some time.
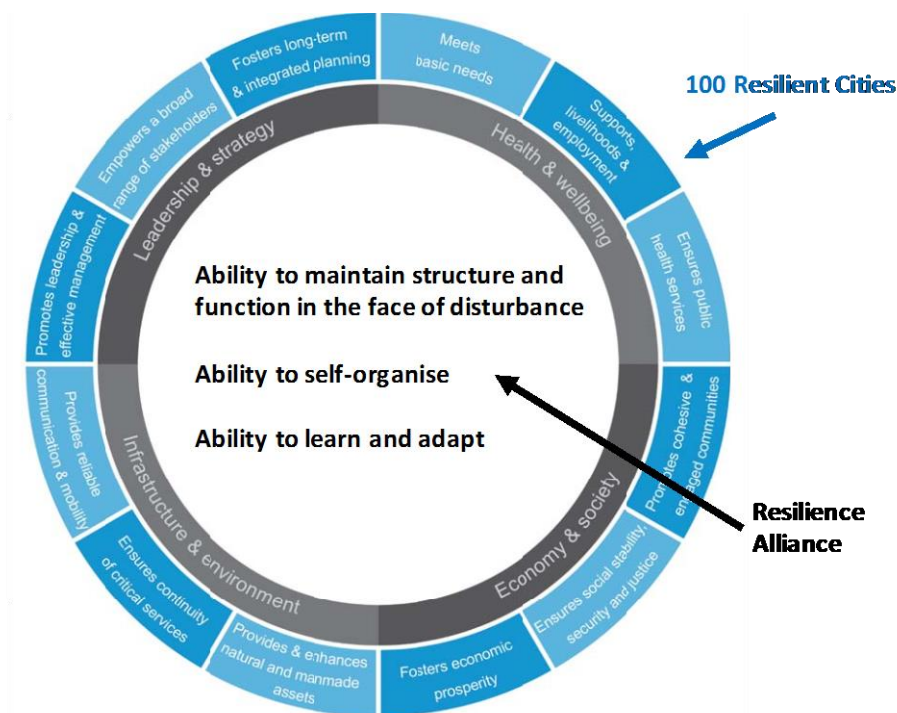
Figure 2: The framework developed by the 100 Resilient Cities Program[1] (the two circles) with a brief summary of the key components of resilience from the Resilience Alliance (in the centre)

Examples of challenges			
Population change	Feeding a hungry world	New technology impact on society	Living within planetary boundaries
Ageing population	Coping with global resource depletion	Artificial Intelligence	Transforming to improve health and happiness
Storms and natural disasters	Contributing to the world, i.e. innovation	Robotics	Water sensitive cities
Crime and unrest	Citizenship and leadership	Electric self-driving vehicles	
Water, energy, health, education and transport	Shifts in the global economy	Smart cities	
Adapting to climate change	Increasing wealth	Man-computer symbiosis	

Figure 3: Preliminary framework for thinking about urban resilience, developed to focus dialogue at this workshop

Figure 3 was presented at the workshop as a working framework for considering the different types of challenges that cities face. The point was made that cities tend to be good

at dealing with internal challenges, less good at external ones and quite poor at dealing with major upheavals that might require transformation to something that might be regarded as a different system. This way of thinking raises many questions such as whether a city can be considered as one system, how we might define the essential characteristics of that system, and how we might tell if a transformation is required. Put simply, however, we are interested in considering what it is about a city that people want to keep and what they might like to achieve in the future, what factors might threaten those *values*, and what might be required to give a city the resilience to withstand the known threats as well as some unknown ones. This is captured by the question often posed by resilience researchers: *Resilience of what, to what?*

1.5 What factors might influence the future?

Factors that might influence the future (drivers of change) were explored in two *horizon scans* circulated to participants prior to the workshop, through a survey of participants prior to the workshop (Appendix B), in a series of presentations by experts on the morning of the first day of the workshop, and on a series of cards provided at the workshop depicting 60 potential drivers under the headings of *Social*, *Technological*, *Environmental*, *Economic* and *Political/ Legal*.

As explained in Appendix D , participants were asked on the first morning of the workshop to explore drivers of change by grouping and categorizing the 60 driver cards and constructing an influence diagram showing relationships among groups of drivers. This was primarily an exercise in getting participants to listen to one another's views about Darwin as a system of interacting social, technological, environmental, economic, political, legal and other factors, but it also served to start thinking about which drivers might be most influential and about uncertainties that exist about the directions in which some drivers might develop. This was preparing participants for the next part of the process – the identification of *critical uncertainties*.

1.6 Critical uncertainties

The next phase of the process was to decide how to structure and focus the scenarios. The main objective of scenario planning is to identify and explore uncertainties that often are overlooked when thinking about the future in favour of what people think they can predict. It is usual to choose a small number of uncertainties as an organizing framework for the scenarios. The reason for choosing more than one uncertainty is to prompt people to consider interactions between uncertainties. Although any number of uncertainties can be combined, it is common to choose two that encompass as many of the others as possible, because it is difficult for people to focus if there are more than two, especially in a short workshop. Scenarios developed with two uncertainties can be expanded to consider others

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[1] Further details can be found in Appendix A

later, but it is also usual to consider other uncertainties within the scenarios defined by the two prime uncertainties.

The process of reaching consensus about critical uncertainties in a large group can be lengthy and risk the loss of momentum and interest among participants. In this workshop, the facilitator recommended adopting the two uncertainties depicted in Figure 4. This was for several reasons:

- These two uncertainties are likely to influence the other important drivers of change identified and therefore provide a way to explore a large range of plausible futures

- These, or similar, uncertainties have been used frequently in a number of other scenarios around the world, including by the Intergovernmental Panel on Climate Change (IPCC), the United Kingdom government and some recent scenarios about Australia's possible futures

- These uncertainties have been found to be useful in previous workshops as part of CSIRO's *Future Cities* project (i.e., Brisbane, Melbourne, and Perth) and so using them in Darwin provides consistency with these other sets of scenarios.

Participants were given the option to explore alternative scenario structures but no-one took up that offer.
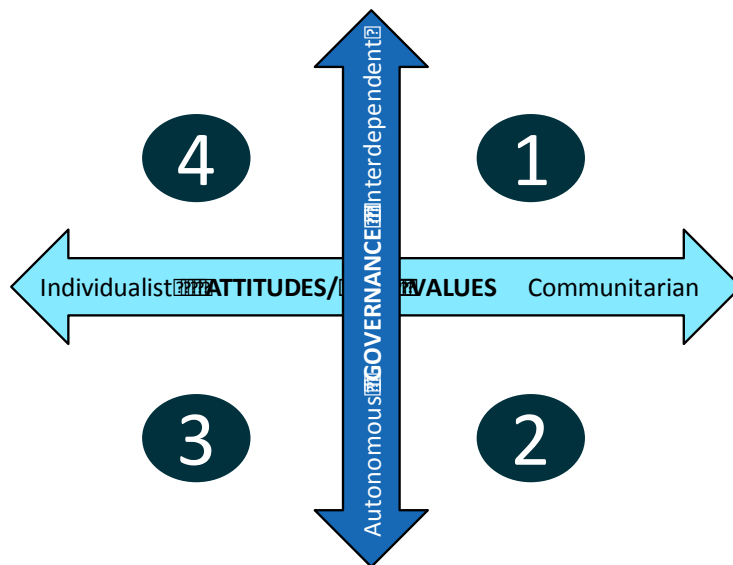
Figure 4: The two critical uncertainties selected as a guiding framework for exploring a range of plausible futures for Darwin

1.7 The scenarios and their implications

In the following sections, the workshop outputs have been reworked to be more like a narrative and comments have been made to guide thinking about refinements that could be considered in the next draft.

Preceding these reworked scenarios is a brief suggestion about a pre-scenario narrative about Darwin's past resilience to set the scene for how resilience might be further developed and/or maintained in the future.

2. Darwin's Past Resilience

2.1 Introduction

In looking forward to how Darwin might build resilience to future challenges it is also useful to consider the historical resilience of Darwin to past shocks, and what this may indicate around future capacity to adapt to change.

2.2 Phases of Change

The following is a summary of the historical events and changes in Darwin that have challenged the resilience of the Darwin community. The phases of change are not presented chronologically as in many cases these phases are overlapping in time and the drivers of change.

Larrakia Land [2]- The Larrakia people are the traditional owners of the Darwin region. The Larrakia people are often referred to as saltwater people for their close connection with the sea. Prior to European settlement, Larrakia had established thriving trade routes with the people of the Tiwi Island and Southeast Asia, and there is evidence that as well as trade the Larrakia shared cultural connections and intermarried with the neighbouring Island groups. When Europeans first arrived in the Darwin area the Larrakia provided them with food, and despite European settlement leading to conflict and marginalisation, the Larrakia have maintained their connection with the country, and continue to care for the land and water.
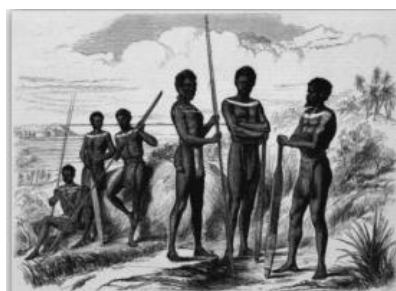
Larrakia People

Photo Source:
http://larrakia.com/about/the-larrakia-people/

Colonial Outposts - There were a number of unsuccessful attempts to establish European settlements in Australia's north during the 1800s. Port Essington, on the Cobourg Peninsula to Darwin's north, was the site of two failed attempts to establish an outpost of the Colony. The reasons given for the failure of these settlements included: isolation, disease, cyclones and the tropical climate making it difficult to attract settlers (Dale et al., 2014).
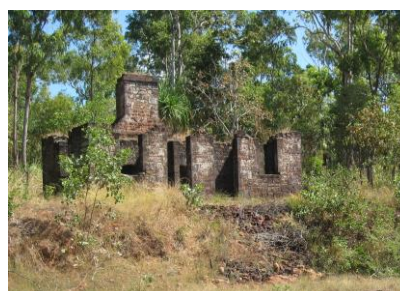
Remains of Victoria Settlement, Port Essington

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[2] Source: http://larrakia.com/about/the-larrakia-people/

Populate or perish – There were a number of federal government schemes to encourage development in Australia's north. This was partly due to fears that the sparsely populated north was a national security risk for Australia. Many of these agricultural development initiatives failed to deliver intended benefits due to lack of transport infrastructure and distance to market, lack of workers and difficulty in managing pests (Dale et al., 2014). These security fears were exacerbated by the bombing of Darwin during the Second World War, which killed more than 240 people and destroyed buildings and infrastructure

Darwin under attack in 1942

Peaks and troughs-. Since the discovery of gold at Pine Creek in the 1880s, which led to an influx of Chinese settlers as labourers, population growth in Darwin due to migration has been associated with short-term resource industries (Dale et al., 2014). Descendants of these Chinese settlers still live in Darwin today.[3] Mining and energy have driven much of the growth in Northern Australia due to the competitive advantage in access to these resources. Dale et al. (2014) highlight that while these extractive industries are important they are often subject to boom-bust cycles, which can influence migration patterns to and from Darwin.

Construction of INPEX gas plant, Bladin Point near Darwin

Indigenous Rights – During the 1960s and 1970s there was a growing recognition of the need to redress Indigenous Australians who had been marginalised in Australian society, and subject to paternalistic government policies. There has been a shift away from conservation programs initiated from the southern Australia cities to Indigenous-led land

Larrakia people fight for land rights

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[3] Source: http://www.australia.gov.au/about-australia/australian-story/chinatowns-across-australia

management which incorporates traditional knowledge and cultural heritage (Dale et al., 2014).

Cyclone Tracy – Tropical Cyclone Tracy devastated Darwin on Christmas morning 1974. Cyclone Tracy resulted in the death of 71 people and 650 injuries. The damage caused by the cyclone left more than 90% of homes uninhabitable, which meant that 40,000 people were left homeless and around 80% of Darwin's population was evacuated (Mason & Haynes, 2010). Cyclone Tracy was the third major cyclone to hit Darwin since European settlement, with other major cyclones in 1897 and 1937. The damage caused by Cyclone Tracy led to revision of building codes and standards to ensure that in the future there would be greater resilience to a similar extreme wind event. At the time the Northern Territory governance was the responsibility of Federal Government Minister in Canberra. While this Federal oversight led to a rapid and decisive response to the disaster, locally there was criticisms of the top-down manner of the reconstruction and recovery was undertaken (Heatley, 1990). Self-governance was granted to the Northern Territory in 1978.

Aftermath of Tropical Cyclone Tracy

Rebuilding a modern Darwin – Darwin has been rebuilt to the cyclone proof building code. A distinctive building style has emerged that not only encompasses cyclone resilience but also reflects the tropical climate and Darwin lifestyle. The economy of Darwin has diversified with the growth of tourism, and growing education sector. This with an increasing multiculturalism, with more than 6% of Darwin's population born in South East Asia, means Darwin has developed into a modern, cosmopolitan city. Darwin's population is now more than 140,000 people, and grew by 1.9% in the period 2014/15, which was the second highest growth rate for Australian capital cities

Darwin city skyline

(behind Melbourne)[4]. 11% of Darwin's population is of Aboriginal or Torres Strait Islands origin, which is the highest proportion of population in Australian capital cities[5].

2.3 Implications for Future Resilience of Darwin

Darwin has faced a turbulent recent history compared to other Australian cities, which includes nearly being destroyed four times (3 by cyclone and 1 bombing). These events have shaped Darwin and its community. The ability to rebuild from these catastrophic events highlights the adaptive capacity of the Darwin community. It is interesting to note that the themes that have emerged from this quick historical review also emerged in the workshop, which included: connections with Asia, self-governance, managing peaks and troughs associated with mining and energy projects, the importance of ensuring Indigenous heritage and culture is protected, protecting environmental values, and the challenges faced in realising the objectives of large-scale Northern development initiatives.

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[4] http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/3218.0Main%20Features502014-15?opendocument&tabname=Summary&prodno=3218.0&issue=2014-15&num=&view=

[5] http://www.abs.gov.au/ausstats/abs@.nsf/lookup/2075.0main+features32011

3. Scenario Narratives

3.1 Overview

The following four sections are draft narratives derived from the ideas developed by participants in the June 2016 workshop in Darwin. Questions and challenges to the scenarios have been included throughout the narratives to guide further thinking about how to refine the logic and plausibility of the scenarios. As highlighted in the introduction, scenario thinking is best done as an iterative and ongoing process that identifies, questions and clarifies our assumptions. This process makes us more aware of questions we should be asking and signs we should be looking for to: anticipate possible future challenges and opportunities; be watching for their emergence; and, be making timely preparations to shape and/or react appropriately to future trends and events.

The following narratives, based on notes from the workshop, should be viewed as drafts, as there is the potential for workshop participants to further develop and refine these scenarios based on their local knowledge and values. The boxed text highlight questions and issues that could be explored in more detail to strengthen the scenario narrative, which can deepen the thinking of how Darwin can develop and build resilience to future challenges and shocks:

3.2 Scenario 1 narrative – *The Voice of the Territory*

In 2050, the population of Darwin has reached 250,000, which was achieved through concerted cooperative efforts among locals and effective coordination with both Australia's national government and neighbouring governments in the Asia-Pacific region. Darwin's society is based on strong networks built from the ground up driven by a desire to be in charge of their own destiny and a typically northern sense of supporting your neighbours. What was the Northern Territory has achieved statehood (North Australia?) and is a major regional exporter of energy in all its forms the east, west, north and south.
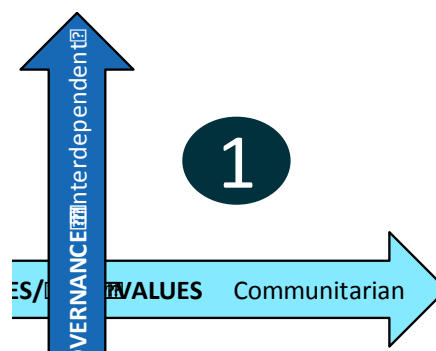
Looking back from 2050, it is hard to recognize the Darwin of 2016. Our city has been defined by surviving and adapting over several decades, but especially the 2030s. We are now even more community-focussed than we were back then, with many trading and cultural links with our northern neighbours. Early on, we identified what we valued about Darwin's unique lifestyle environment, which guided what needed to be protected and the

type of growth that should be avoided. However, as we approach the middle of this century it is again time to reflect on whether we have succeeded. Here's how the past three and a bit decades played out.

2016-2020

In 2016 the north, Darwin like the rest of Australia, was on the cusp of something, but we weren't sure what. Unrest was growing around the world and there was the ever-present concern about another global economic crash like that in 2008. There were plans to develop northern Australia but the ability of governments to understand the complexities and uniqueness of northern environments and societies, together with their inability to make major changes in the gridlocked political environments of the day, left top-enders with little confidence that a desirable future would emerge from top-down processes, be they national or territory driven.

It was recognized that Darwin's future depended on growth of the right kind and maintenance of the values that defined the top-end in 2016 – cooperation, tolerance and a pride in the vast reservoirs of formal and informal knowledge held by academics and both Indigenous and non-Indigenous locals. Darwin was already a cosmopolitan community in the process of developing a strong Asian focus while celebrating its multicultural heritage (one in eight Darwinians was of Greek descent in 2016, for example).

Building on another key characteristic of top-enders – the dislike of being told what to do – grassroots groups began to organize around the considerable existing networks to create a vision for a new and diversified economy based on tropical knowledge in all its forms and strengthened relations with Asian neighbours. This gave Darwin the flavour of a 'last frontier' and a place that wanted to be a little bit different. It was recognized that future investment, especially from Asia, would depend on both the perception and the reality of a stable society that would welcome all nationalities and beliefs and negotiate social licences to operate that were fair and in the interests of all parties.

An early initiative was to change the attitude of sitting back and waiting for the rest of Australia to do something to the north and, instead, to become proactive in making sure the rest of Australia, the Asia-Pacific, and the world understood how Darwin related to, and was differentiated from, the rest of Australia and to change the way that the rest of Australia thought of – and valued –Darwin.

The years between 2016 and 2020 saw the national Australian governments struggling to obtain large majorities and so they welcomed a strong representation from the NT that negotiated support from the Commonwealth for Darwin to develop interdependent links with Indonesia, Timor Leste, Papua New Guinea (PNG) and several other Asian and Pacific

nations. The strength of community support, including businesses of all sizes, gave the Commonwealth government the confidence to take the gamble on this experiment.

> *Question: How would Darwin increasingly decouple its governance from the Federal Government? This would include directly negotiating bilateral and multilateral agreements with other countries. Is this plausible and what steps would need to be taken to realise this?*

By 2020 we were seeing substantial progress in: developing centres of tropical knowledge and exporting expertise to near neighbours; attracting people from those neighbouring countries to learn and research in Darwin; growth in research and experience in medical trauma response in the region; agribusiness and energy, including Liquid Natural Gas (LNG) and renewable energy production; and a focus on indigenous knowledge, cultural tourism and a suite of associated opportunities. Renewed confidence in the stability and far-sightedness of communities in the north encouraged a build-up of defence capability and employment.

Darwin was marketed as a home for those who fly in and fly out of Asia – a safe base with a clean and safe environment for families – leading to increased investment in housing as the population became larger and more stable. As these processes unfolded there was considerable thinking about the values that should not be lost, including the focus on community; water sensitive design and management; lifestyle; healthy environment; and diverse and easily accessible recreation opportunities.

The target was population growth of at least twice the Australian average, drawing mainly on people from Asian countries based on developing a special relationship between Asia and northern Australia.

> *Challenge: The development of stronger relationships with Asian neighbours might give one 'voice' to the region, which might increase influence. However, the cultural and historic differences between countries might make it difficult to realise this.*

A key dilemma that was recognized very early was that growing the population in the wrong ways could threaten the environment which, in turn, could undermine the economy and amenity of Darwin. Under different circumstances this could have been a difficult dilemma to resolve. But communities were driving Darwin's surge into the future and this had two important outcomes:

- The importance of the environment for defining life in Darwin and attracting both tourists and residents was recognized

- Decision-makers at all levels of government and across communities and businesses were encouraged and empowered to develop integrated approaches that considered how social, environmental and economic processes interact

This allowed Darwin and its region to consider their overall wellbeing and resilience and their positions in Australia to the south and the Asia-Pacific to the North, East and West.

2020 to 2030

This was the decade in which governance and government were redefined. This process was driven from the bottom-up. The focus was on Darwin as part of tropical and arid northern Australia. The bottom-up process built on the networks already emerging in 2016 around developing the North but built on those with extended collaboration and cooperation internationally. There was a period of disruption as the debate about statehood for the NT was had and won – the Northern Territory became part of a Northern Australian State in 2028. A key driver of this development was the success of the initial experiment (in the early 2020s) with giving the NT support to pursue its own destiny. As relationships with Asia improved and the NT became a source of economic benefits for Australia the confidence to confer statehood grew.

A key feature was engagement of Indigenous people more inclusively and constructive dialogue between communities and local and territory (then state) governments. This was part of a broader debate about regional democracy across Australia and a move to fewer levels of government, which the NT led.

The continued rise in power and reach of electronic communication was a key driver of this bottom-up engagement process. It was a process that took time to build momentum but moved ever more quickly as the decade proceeded. A major associated benefit was an enhanced ability of NT society to think and plan constructively in the long-term about such things as infrastructure, lifestyle service corridors, future ports, and building the resilience of society.

The ever-present threat of a major cyclone was a focus for broader thinking and planning for being prepared for major expected and unexpected climatic, social and other events. It was a decade-long journey that transformed Darwin as a community.

> **Darwin's unique approach to transport technology and community**
>
> While the rest of Australia became obsessed with driverless cars to cope with overcrowding in its cities, Darwin took a different approach (typical!). Infrastructure was designed to be modular and flexible. Pools of electric vehicles were shared by residents – and not just cars but boats and four-wheel drives!

The drive towards a larger population continued as the exponential growth in power of computing technology generated previously unthought-of possibilities for high-value virtual communication and remote working. This allowed people to live in Darwin but work around the world. Of course, the opposite was true – that people could live elsewhere and work in

Darwin, but Darwin's trump card was its stability and peacefulness. As economic stress and the threat of crime and political unrest grew in many Asian centres and even in southern Australian cities, many recognized that Darwin had avoided much of this through its strong community-driven approach to all aspects of development. Darwin was a place where people could raise a family as well as succeed in business.

> *Question: What changes in Asia over the next few decades could influence how this scenario plays out?*

As the price of renewable technologies fell there was more demand but it became more difficult for many parts of the world to make profits while negotiating establishment costs and the transaction costs associated with community opposition to large-scale developments. The north was able to take a lead due its availability of space and the fact that communities were already deeply engaged in thinking ahead about energy issues. The 2020s saw Darwin increasingly exporting energy to Indonesia and other northern neighbours and to southern Australia.

> *Question: What are the key economic advantages of Darwin driving this growth? The scenario suggests growth is from energy development, and developing tropical knowledge. Is there the need to consider how the economy could be diversified? Or possible shocks that would prevent growth of sectors such as energy?*

A huge step forward for Darwin socially and economically was realising the opportunity to better capture Indigenous knowledge by true engagement. Indigenous stewardship around environmental values has been a particular feature of environmental management, leading to a reduction in risks from fires, pests and erosion (even as the climate changed) and a much more stable situation for businesses to invest in.

There was a strong focus on building the knowledge economy in this decade. Darwin built on its strong knowledge about tropical environments and dealing with extreme climatic and weather challenges and has shared this knowledge both through cooperation with countries to the north and through attracting and educating students from other countries in Darwin.

The 2020s saw Darwin's relationship with Asia mature. As Darwin recognized the benefits of a community focus it also more fully understood the importance of relationships when doing business with Asia. In 2016, connections with countries to the north were mostly about livestock and minerals but these have been expanded considerably since then around cultural connections.

2030 to 2040

Darwin's population reached 200,000 in this decade, driven by investment in major infrastructure and, in turn, encouraging further development in strategic, integrated, community-driven ways. The aim was to achieve a sustainable economy that would give

Darwin the ability to interact as an equal with cities in other parts of Australia and play a major role in national strategic thinking and planning. But Darwin's economy was also strongly engaged with Asia, particularly through bilateral and trilateral collaborations and trade agreements with other cities and regions. Climate change had resulted in a 1-2 degree increase in average temperature by mid-decade resulting in heat stress, sea-level rise, changing of many key environmental landscape processes, including water recharge, saltwater intrusion and a range of other issues that had to be responded to and adapted to at a community level. The previous decade had built a very informed community, engaged in environmental stewardship and many different levels from access to information to monitoring and a range of environmental products.

Questions:

- *How would the rates of population growth in this scenario be achieved? Is there the need for negotiating special visas between Northern Australia and near Asian countries?*
- *What are the implications of rapid population growth for the Indigenous community and their cultural values and heritage?*
- *How would population growth be achieved while protecting the Darwin 'lifestyle' and*

2040 2050

Adapting and surviving in the previous decade set up Darwin and the northern Australian region to be a major supplier of food, especially protein, to the region and exporter of energy to northern neighbours in various forms including LNG, renewables and energy generated from green waste. As 2050 approaches, it is again time to reflect on whether we have maintained the values that we sought to protect when we started this journey in 2016.

Question: How would this scenario cope with expected change in technology between now and 2050? What would attract Asian countries to engage with Northern Australian in developing economic opportunities?

3.3 Scenario 2 narrative - Terra Tropicanus

In 2050, Darwin's population is 400,000. Climatic and economic changes have resulted in northern Australia becoming a separate state within Australia, aligned culturally and economically with Asia. Darwin is its capital. Darwin's prosperity has been built on surviving major social, economic and environmental challenges since 2016 and achieving: institutional change; large infrastructure investment; social equality and order; effective containment of disease outbreaks; a new political dynamic between northern Australia and Asia; and technology-driven solutions to environmental and economic challenges.

VALUES Communitarian

Autonomous **GOVERNANCE**

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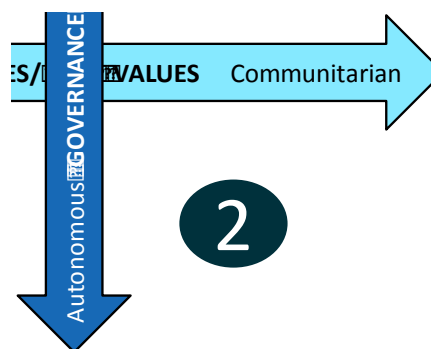
It is 2050 and 34 years since those meetings in Darwin where we tentatively imagined our journey to the middle of this century. Many who attended those meetings are pretty old now but most remember the developments from 2016 to November 2040 that culminated in the President of the Republic of Australia, create the State of Northern Australia with Darwin as its capital. This was a defining event in these past 34 years as it realised the vision for Darwin and northern Australia to become largely independent of the rest of Australia and more closely aligned economically and culturally with parts of Asia. This autonomy was possible because of the strong focus on community within the north, which gave us the strength and integrated thinking to construct our new future. Now, it is time to look back on how we have reached the Darwin of 2050.

2016-2020

A key step that allowed this future to emerge was development of a shared vision and identity for future Darwin. Two key associated enablers were: (1) a commitment to collect the data needed to drive policy forward to make necessary changes; and (2) understanding of the impacts of change and the likely downsides and upsides of the vision that is put forward for the new Darwin. Strong community spirit gave us the determination to break away from the dominant politics of the time, which only paid lip service to community wide dialogue about value, visions and alternative futures and to work towards informing and engaging all those who cared about where they wanted the north to go. By the early 2020s Darwin and the north were well on their way down this new track, while the rest of Australia was still stuck in the old ways. It was inevitable even then that we would continue to drift apart.

2020-2030

This was a critical decade for overcoming challenges that could have prevented this future from emerging, including climate change and regional and local social disorder. Shocks to regional stability from unrest in neighbouring countries were particularly challenging for realising the vision of Darwin as a hub of a tropical regional economy. The changes occurring in northern Australia itself saw some people disenfranchised and dropping out of the mainstream social system, leading to bursts of crime and other anti-social activities at times. Extreme weather events and sea level changes associated with climate change were already happening in 2016 and these escalated. Rising sea temperatures led to bigger and more

frequent cyclonic events. Knowing that Darwin was wiped out in 1974 by Cyclone Tracey, which was 50 km across, led to concerns about the potential impact of future extreme weather events such as an even more intense tropical cyclone. In the end the big one did not happen, but it really focused us on building community cohesion and making sure we could cope without calling on the rest of Australia, which was struggling with its own challenges

The future that never came

In 2029 Darwin was hit by an unprecedented cyclone 10 times the magnitude of Cyclone Tracey. While the city suffered major damage and considerable loss of life, the city was prepared and its people ready to respond. Recovery took less than 5 years and Darwin emerged with renewed confidence in its ability to stand on its own in the face of major shocks.

2030-2040

As this decade dawned, we knew that certain key objectives had to be achieved by 2040 for our vision of Darwin to be achieved: institutional change; large infrastructure investment; solving the problem of social inequality and unrest; effective mechanisms to deal with diseases outbreaks; emergence of a new political dynamic between northern Australia and Asia; and technology-driven solutions to environmental and economic challenges.

We had become convinced that autonomy from the rest of Australia made sense in terms of climate, economic focus and, to a degree, stronger cultural ties with near-Asian countries. We started working on the institutional changes that would be required if we were to achieve closer links with Asia while still remaining a part – albeit a relatively autonomous part – of Australia. Working as part of a whole-of-northern-Australia lobby, for example, we opened dialogue with the Commonwealth on new arrangements to give the north major participation in foreign policy or foreign economic relations.

As the freeing up of these arrangements started, we were able to attract large investments in infrastructure, partly from southern Australia but largely from Asia.

While we transitioned to stronger authority and autonomy for law and order, we experienced a rise in crime and social unrest in the north, which was influenced by similar unrest in the broader Asia-Pacific region. As our authority, capacity and confidence grew, we were able to influence the processes of law and order in our region and things improved.

We flexed our muscles in relation to global businesses as well, with an eye to what was best for our communities. We welcomed large corporations but we insisted that they contribute to the wellbeing of the north by becoming part of the community, bringing with them people and expertise that would add to our capability and autonomy. We encouraged more joint business-community social ventures. We encouraged people to base themselves in Darwin while servicing cities around Asia. We established knowledge centres (more than the

traditional universities of the past) as hubs to stimulate and integrate research and also to reward businesses and academics for living in Darwin.

We promoted our wide open spaces as a resource for achieving global food security (with a lot of help from timely technologies – see box below). Despite our drive for autonomy, we became part of a major tropical trading union – dubbed *Terra Tropicanus* by some – that saw a diversity such as social and community industries emerge, not just in northern Australia but throughout Asia. Most of these were of a type not even imagined in 2016 but they were another major component of what we now have in 2050 because they laid the foundations for financial and environmental sustainability by emerging at just the right time. Like what might have happened if technologies had emerged when needed (see box below), if these new industries had not emerged then northern Australia might have retreated from its tropical links and thrown itself once again on the mercy of southern Australia.

Our increasing links with neighbouring countries had other risks too, like exposure to new pests and diseases, which we had been alert to since the 2010s when concerns were raised about transfer of respiratory diseases from PNG to Queensland. Luckily (or was it just good management?) our growing autonomy and authority allowed us to manage cross-border movements of people and goods efficiently and effectively, giving the Commonwealth increasing confidence that the north was worth considering for statehood.

Increasing autonomy and confidence allowed us to both harvest the latest and best technologies from around the world and attract investment in developing new technologies uniquely suited to our needs. These were especially technologies to address environmental and health issues.

The importance of technology in the rise of northern Australia

We tend to crow a bit about how well we harnessed technology to deal with the challenges of emerging pests and diseases affecting biodiversity, agriculture and human wellbeing in the 2030s. This was a time when there were exponential increases in what computer, bio- and nano-technologies could do and how fast they could do it. Most of what emerged in that decade was unimaginable in 2016. Darwin made a major contribution, being not only located in a part of the world that was heavily impacted by climate change and associated social upheaval but also in a position to bring stable civil society and advanced science and technology to bear. But, let's face it, there was a lot of luck involved in just the right technology being available at just the right time. Trying to be autonomous at this time was a big risk. It paid off, but the opposite was also a distinct possibility.

2040-2050

After statehood in 2040, Northern Australia was able to innovate socially, environmentally and economically. Northern Australians overcome their fortress mentality and accepted refugees and other cultures into the region so that we achieved a tropical region economy

featuring regional mobility of workforce and multicultural and intercultural exchanges. These influences created the regional social and institutional diversity that would support economic diversity and allow Darwin to support a population of 400,000.

Northern Australia developed its own virtual currency. A local government model was adopted in which councillors represent regions and everyone has equal standing around the table. The process is highly participatory. One of the challenges to this model is that sometimes it goes very slowly. However, people tolerate this because it is based on strong relationships between people that mean that people matter before economic considerations. There is a strong social net and a strong community sense of values. Everything that happens in the new tropical union depends on relationships, which suits the Asian way of doing business very well. It underpins economic growth.

3.4 Scenario 3 narrative - Territory Techno-optimism

In 2050, Darwin is a highly individualistic and autonomous city within a fragmented and internally uncooperative Australia. National and Territory governments have much smaller roles than in 2016, markets drive most decisions, communities mostly get the infrastructure that wealthy individuals demand and fund, and the ways things are done in the private and public sectors (e.g., health, education, laws) are designed to meet local needs and therefore often vary considerably across Australia and especially between the north and south. Darwin's economic prosperity is determined by competition between wealthy and influential individuals and corporations and individual wellbeing depends on where one sits in social and economic hierarchies. Life is very good for some.
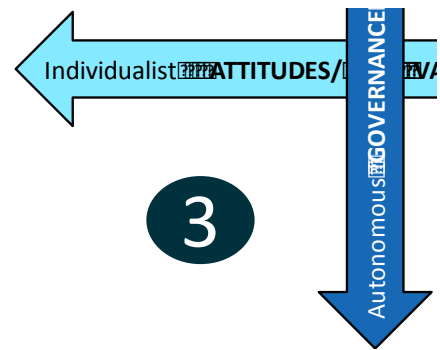
Here in 2050 Darwin has changed a lot since 2016 but it certainly has its attractions for those who have been drawn here over the past 34 years. The city looks bright and clean – the residents demand it, although they do their demanding as individuals rather than communities. We've found that individuals expressing their desires through what they are prepared to pay for is a much more effective way to organise our society than cumbersome government interventions. This means we have the working and schooling hours that suit us locally rather than adhering to national or state-wide standards and our school curriculums are relevant to our local values and future training needs. Effective leadership has transferred from politicians to business leaders. Of course, government still has a role when the market fails, or to support what the market demands. For example, we've protected those aspects of the environment that we value (e.g., scenic places, water supply catchments, charismatic species) by charging higher prices for access and by influencing government to pass laws that control extensive urban development in or near these areas. It turned out that allowing wealthy individuals to "own their own piece of nature" has attracted people who genuinely love the place for its beauty and also enjoy the freedom to practice business with few strings attached. Another key to our success has been innovation in communication and transport technologies. This has meant that people can live in Darwin and protect it from extensive industrial development while doing business remotely in other parts of Australia and the world or travelling to other destinations quickly and efficiently (especially since travel is not so crowded with budget travellers as it used to be). Sure, some are suffering but that is just the price of progress, isn't it? Let's look at how we came to be such a successful city.

> **Comment: The above paragraph is an attempt to weave an explanation around the descriptions of this future from the workshop, but it required some gaps to be filled. An attempt has been made to present this future in a balanced way, recognizing that a highly individualistic society will be attractive to some people but also has some obvious potential downsides. Workshop participants should decide if this balance has been achieved and whether the refined narrative is consistent with their thinking.**

2016-2020

The 2016 presidential election in the USA was coming up. The tenor of the debate in US politics caused Territorians to reflect on the tension between individuality and altruism in modern society,

and that in the coming decades there might be a greater need for self-reliance. This could worsen the overlooking of Australia's north in national thinking. There was also considerable discussion about tensions between China and the USA being played out in our region. Darwin and northern Australia made the decision that their economic and security interests were better oriented to the north and our Asian neighbours than to the rest of Australia.

We were being told at the time that our resilience depended on community spirit, knowing what we valued and having the resources and other capacity to protect it. Those who emerged as change agents focused on the things that they and their peers valued about our city and lifestyles. As an increasingly individualistic society Darwin's residents wanted to protect these values but also develop local products and interesting small businesses from small coffee shops to local technology start-ups. We expanded the local economy by building on available and emerging technology to boost export opportunities. Part of this was recognising the value of Indigenous knowledge, skills and art in developing fair-trade opportunities. There were a lot of positives coming out of this period, in terms of growing the local economy and increasing social capital while encouraging individualism as a basis for innovation and resilience.

2020-2030

This decade was critical in determining the future we have in 2050. It was underpinned by significant events in technology and education. The renewables industry established itself as a significant sector in the north based on both technological innovation and local strengths, such as access to solar and tidal energy. Stronger business relationships were developed with Asia and we saw substantial private investment in the financial sector. Darwin built on its strengths. There was a lot of research and innovation, especially around expertise in disaster management and recovery that could be transferred to other countries in the region. The education and research sectors also became increasingly important to the regional economy, as Darwin developed it attracted greater research investment and more students. Indigenous communities continued to become stronger and more autonomous.

2030-2040

A completely debilitating cyclone hit Darwin in 2031. This was the most recent of a string of disruptive events in northern Australia and the Asia-Pacific over the past 15 years that led to honing and sophistication of Darwin's recovery and rebuilding capacity. Over the past decade Darwin had attracted many wealthy individuals who had developed business roots and settled families in the city, so they had a strong interest in funding state of the art early warning systems and well trained emergency services personnel to protect their interests. In addition, Darwin's governance structures had matured to include well-resourced public-private partnerships that allowed Darwinians to approach the rebuilding process with a pragmatic and very specific design in mind. Darwin was rebuilt with local understanding of what is required in a modern tropical city in a cyclone zone, with minimal influence from other parts of Australia.

Advantage was taken of significant technological advancements, including freight logistics that use drones and driverless vehicle technologies. This also resulted in less need for large-scale infrastructure such as ports, which our individualist society had little need for.

> **Question: Why does this society not have need for large scale ports? How do you envisage a large modern city functioning without such infrastructure?**

The later 2020s and early 2030s saw a series of environmental disasters and biosecurity challenges, including outbreaks of tropical pests and diseases that threatened agricultural production and public health, contamination of the Darwin harbour and water scarcity due to a number of poor wet seasons and high levels of urban water demand. Looking back it is clear that these were brought on by our relatively narrow approach to environmental management based on the values and priorities of those who were prepared to fund protection of land and the management involved. This resulted in an often short-term planning horizon and a focus on only parts of the coupled social-ecological systems that influenced and relied on the natural environment. Environmental pressures like these drove innovation and growth in the agricultural sector, resulting in a turning away from land-based production to more intensive and high technology protein production, such as the large-scale adoption of vitro processes and high-tech feed lots that optimised nutrition, and controlled disease and pest outbreaks. It turned out that as the world moved rapidly into an age of unprecedented and unimagined technological capacity, the wide open spaces of the north were no longer a competitive advantage for agriculture. But, conversely, the lifestyle and amenity offered by those open spaces were part of what attracted so many cashed-up entrepreneurs to Darwin and this was the basis for our new high-tech protein production industries.

Governance structures had been becoming leaner and more efficient over the past decade but this process really ramped up in this decade. Most people living in Darwin by now were attracted by the freedom of movement and action, so they had no desire to be involved in cumbersome public consultation processes. The market seems to be solving most problems and so the focus of governance arrangements was on making pragmatic decisions, mostly to support trade and innovation. Decision makers were able to make locally relevant decisions quickly without being too bogged down in other pushing and pulling with interest groups and other jurisdictions.

Some challenges that could have derailed this future – for comment

By the 2030s, Darwin was attracting people who were motivated to build wealth and take risks. As those that succeeded started to invest in making Darwin the sort of place they wanted to live in, other residents benefited through services and infrastructure if they could afford to access them.

The local economy depended on having access to the latest communication and other technologies and it was recognized that too much reliance on centralised government bureaucracies, especially Federal bureaucracies in Canberra, could be risk and impede innovation. This was one stimulus for Darwin and the north building greater autonomy in many areas, but especially technology, through links with Asia at a business to business scale.

However, improving communication and travel technologies means that the well-off could travel elsewhere to access services if Darwin could not meet their needs. This created the possibility of another fly-in, fly-out culture. The answer was major investment in having the best of everything available in Darwin.

The 2030s saw several environmental disasters. This was in part the result of local government and local industries supporting a reduction in green tape to better compete with other jurisdictions in Australia to provide access to, and exploitation of, natural resources. The disasters of the 2030s were a wake-up call. There was renewed support for protection of the environment by local government and opportunities were taken to invest in new technologies like renewables and solar.

As a result of the environmental disasters Darwin by now had developed a serious approach to climate change adaptation and the city had been built to reflect this. This resulted in Darwin's tropical knowledge sector growing in size, sophistication and reputation, generating a major industry around knowledge-driven solutions to environmental and other risks and disasters.

Many were surprised that people continued to live in Darwin after the disasters early in this decade. The tropical knowledge sector was a very significant attraction because of its international contributions to disaster resilience, health and disease control and development/ application of emerging technologies to these issues. The agility created by small government enabled decision making, driven by private sector needs, which took action to reduce social and health problems. Perhaps surprisingly, there was less sleeping rough than there had been in previous decades for more opportunities for Indigenous people to live on country and utilise available technologies to meet both traditional and modern objectives.

Challenge: The above may be too optimistic. There might be the need to consider potential downsides to an individualistic, market-driven future.

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opportunities. Because we had less need for large infrastructure because of less bulk supply and more direct community to community trade, we had more areas that could be utilised as natural or social environments. People are attracted to research opportunities in tropical agriculture and horticulture opportunities.

On reflection, the technological revolutions of the past three decades have had a profound impact on what used to be Darwin's biggest demographic problem: the fluctuations in population as workers came and went. Back in 2016, these fluctuations were driven by bubbles of employment opportunities and the changing priorities of couples as they started to have children and felt the need to be closer to extended families who often lived in the southern cities they had come from. As communication and travel technologies freed people from having to live where they worked there was a chance that Darwin's population fluctuations could have become even greater. But the opposite happened. There were still some workers flying in and out but the private sector invested more and more in meeting the individual needs of workers and attracting the sort of people to Darwin who would stay. Schools, transportation and social support services were invested in heavily as a pragmatic way to maintain a stable workforce both to meet local demand and service the growing opportunities in Asia.

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Note: There does not appear to have been an estimate of the size of Darwin's population under this scenario. Conventional wisdom would suggest it would be lower than in other scenarios due to the affluence of the population.

3.5 Scenario 4 narrative – Innovation Capital of the North

In 2050, Darwin's population has hit 1 million. Market-driven development has seen artificial intelligence integrated into public infrastructure management, environmental monitoring, transport, logistics, water and sewer, energy. Litchfield and Kakadu have been returned to pre-European biodiversity levels because of their value for tourism and because the wealthy Darwin society can afford to protect those aspects of the environment that they value. Part of Darwin's economic success has been due to the establishment of a special economic zone uniting northern Australian and tropical Asia and serving as Australia's business gateway to the north. There has been successful eradication of Dengue and Malaria with gene termination technology backed by entrepreneurs. There is open travel between near Asia and greater Darwin, and land use has been optimized to efficiently produce food using minimum resources.
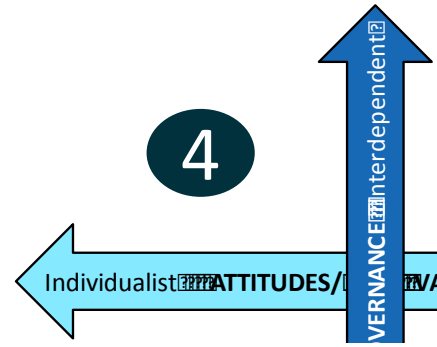
In 2050, Darwin is a big, bustling, successful city of 1 million people. This all seemed fanciful back in 2016 but getting the balance right between a market-driven approach to economic development while still maintaining strong interconnections with the rest of Australia and nearby Asia opened up doors that once were firmly shut. It all sounds simple now, but it was a sometimes shaky ride towards getting that balance right.

2016-2020

> *Note: The narrative for this initial period has been added to considerably to try to develop a convincing explanation for such a big change in a short time. Workshop participants should check to see if this is consistent with their thinking.*

The upheavals of 2016 worked in Darwin's favour, although it was not apparent to everyone at the time. The north of Australia, in particular, grew concerned about the future direction of the USA as it struggled with the decision-inertia created by opposing interests confusing and clogging the democratic process. What would this mean for US activities in the north and our relationships with Asia? As the UK struggled with whether it would leave the European Union and on what terms it became clear that the global financial systems would be in turmoil for some time. Australia's government also struggled as the close balance between the major parties made strong and decisive future planning difficult.

Leaders in Darwin's public and private sectors had reached a level of confidence in the prospects of the north and an impatience with lack of recognition and inclusion in national strategic dialogue that spurred them to mount a campaign to both alert Australia to the risks and opportunities faced by the north and demand a greater role in driving the nation's future. Both sides of national politics saw merit in this well thought-out argument at a time when they were desperate for signs of an inspiring and hopeful future. Within a few years the *Darwin Special Economic Zone Agreement* was established, based on zero income tax and company tax and 30% GST for the first 20 years. This was designed to attract investment from Asia and beyond and to provide a gateway to the north for Australian businesses. Some joked that this was essentially an *on-shore* tax haven rather than the *off-shore* ones that had been gaining so much attention.

This was an agreement different from anything Australia had seen previously. It was driven by the private sector and market forces seeking to encourage entrepreneurship but government still played a major role in maintaining interconnections between private and public institutions across

Australia and working in partnership with the north in developing and implementing foreign affairs and trade policies.

2020-2030

The 2020s saw major changes as there was a steady decline in the defence force presence in the North, as Australia explored alternative defence and security agreements with near-Asian neighbours.

> **Question and comment: Is the reduced military presence likely to raise unnecessary concerns in some quarters? Is this essential to this scenario or could this future emerge even if the US remained? If the withdrawal of the US within the next 3-8 years, as implied here, becomes pivotal to this scenario then the scenario could quickly become irrelevant if that withdrawal does not happen. On the other hand, other aspects of this future seem quite plausible, with or without a US withdrawal.**

More private companies set up in the *Darwin Special Economic Zone* and there was an influx of foreign workers. There were increasing numbers of entrepreneurs. In particular, growth in the technology and knowledge sectors attracting large numbers of knowledge-sector workers. There was a large amount of cooperative private-public investment in infrastructure to meet the needs of young and ambitious individuals and encourage them to stay in Darwin to support a strong and stable workforce. As a result of the rise in entrepreneurialism, Darwin's first Indigenous billionaire emerged in this decade.

This led not only to a booming sector exporting knowledge and technology but also to applying smarter technologies to manage the health and wellbeing of Darwinians. The entire population of Darwin was micro-chipped, which allowed government and private employers to collect real-time data from individuals about the state of their health and appropriate levels of intervention by government services.

However, there was growing stratification of wealth and opportunity across society with many people still living in poverty (the proportion of Indigenous people living in poverty reached 50% in this decade). While many of the needs of the wealthy parts of society were met, there was low support for, and participation in, community-based institutions like social and sporting clubs and other community organisations. As this inequality started to threaten the attractiveness of Darwin as a place to invest, there was a massive investment in public and government housing and establishment of a social safety-net. The government continued to play the major role in delivering basic education, which was totally online by the middle of this decade, but business played an increasing role in funding and directing further education. The closure of schools meant that campuses were abandoned. So that these would not become foci for social problems, businesses supported social entrepreneurs to develop these campuses as green spaces and sites for micro-enterprises.

2030-2040

The 2030s saw both the benefits and dis-benefits of Darwin's growth highlighted. For example, in the 2000s and 2010s Northern Territorians complained about lack of appreciation of their value to the nation but were happy to receive tax benefits that were disproportionately high in relation to their population. By the late 2020s and early 2030s this had reversed and the NT was highly

connected to national strategic thinking but this and its economic success meant that it was now expected to contribute more to the national tax pool.

> *Comments: Perhaps we need to think through the issues raised in this paragraph? Do we expect poverty to be strongly reduced in this scenario or might inequality be an even bigger problem than in the past. Those interested in social issues will look closely at what all scenarios suggest about unemployment, inequality and poverty. The plausibility and logic of this scenario and its assumptions could be improved by interviewing experts in these areas.*

Along with the benefits of being valued nationally there were still concerns of well-intentioned interventions from the Commonwealth government that were not developed in consultation with local stakeholders. Many welcomed enforcement and regulatory interventions in relation to protection of the environment, but the real challenges related to managing private rather than public lands. The private sector invested heavily in restoration of Kakadu and Litchfield as these were seen as important for tourism and recreation, but there was less recognition of the importance of managing ecological processes outside these reserves for benefits like water quality, fire control, flood mitigation, biosecurity and cultural values. An ongoing concern was the propensity of the Commonwealth to offer support for new dams, roads and other physical infrastructure without sufficient consultation with locals (although this concern was much less than it was in the 'bad old days').

Darwin was by now recognized as the highway/gateway for all physical commerce going north out of Australia, leveraging off the infrastructure developed in the previous decade. Many workers continued to be attracted to the special economic zone but there was increasing dissatisfaction and industrial action over working conditions in the higher temperatures that Darwin was experiencing due to climate change. A headline in the NT Times reports that some factory workers have died due to heat exhaustion.

One measure of the success of private sector investment in Darwin and the NT was that the ratio of industry to government funding had risen to 100:1 by the end of the decade. Charles Darwin University has risen to one of the world's highest ranked higher-education institutions, playing a big part in both basic research and entrepreneurship. One of the greatest benefits of entrepreneurship was increased diversity in the economy. In 2016 there was concern about the narrow resource-focused base for the NT's economy but by the 2030s this was only one components of the diversified economy.

By the end of the decade, the high level of education among Darwin's population, together with the booming and diverse economy, has reduced unemployment to very low levels and technology has halted and started to reverse the previously growing incidence of lifestyle diseases. In the interests of maintaining a safe and enjoyable lifestyle, there has been considerable investment in a social safety net that has reduced visible signs of poverty and disadvantage to very low levels. But some people are still excluded from these benefits due to poverty and other disadvantage and the gap between them and the more advantaged in society is greater than ever.

2040-2050

This decade saw the wholesale application of artificial intelligence to manage complex logistics, including governance and safety. One outcome was that people can now go swimming at beaches

in Darwin because all the dangerous animals are tracked and their locations and movements are known and managed.

Darwin exports solar-charged batteries to Asia. An ASEAN military base is set up in the North strengthening ASEAN ties. English has become the second language at home as the proportion of people of Asian background has increased to 70%. Central government dissolved the separation between the army and the police to manage increased crime –an outcome of poverty and economic stratification.

To paint a picture of Darwin now: infrastructure is focused on major port development; Asia is seen to be on our doorstep; clean technologies like solar energy abound and most businesses have a strong technology-driven component; almost all imaginable services are available online but that also means that behaviours and preferences are monitored closely; there is a constantly adjusting mix of free-market business development with centralized government that regulated strongly where markets fail to deliver the diverse expectations of a strongly individualistic population; on the outskirts of the city, largely out of sight and out of mind, we see government housing for the small but still significant number of people who were left out of the economic boom.

Challenge*: Perhaps the timeline for this decade needs a bit more thought to develop thinking around the implications of this scenario.*

Part II Scenario Analysis and Potential Next Steps

4. **Comparison of Resilience across Scenarios**

The Darwin scenarios were compared against the critical dimensions of resilience. These first three dimensions in Table 1 were based on the main properties of resilience as described by O'Connell et al., (2015), which include: the ability to maintain a high level objective, such as sustainability, economic prosperity, etc.; the ability to self-organise in order to respond to a change in the system; and, the ability to learn and adapt. The scenarios were also compared against the four essential elements of urban resilience as defined by the 100 Resilient Cities initiative (See: Appendix A), which are: leadership and strategy, health and well-being, economy and society, and infrastructure and environment. Table 1 highlights (in blue text) where the scenarios described actions that Darwin can take to improve their resilience.

Table 1: Components of resilience compared across scenarios

Dimension	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Maintaining structure and function	The strong community focus allows Darwin to be clear about what it values.	The strong community focus allows Darwin to be clear about what it values.	Those with economic and other influence identify and protect what they value. Key structures and functions are dependent on generating wealth, making this future potentially fragile.	Although this scenario envisages weak community networks and organisations, it also includes close connections into Australia's national strategic thinking, which would help to define Darwin's and the NT's roles and functions in the nation and region.
Ability to self-organise	Strong interdependence with the rest of Australia and Asia is a potential strength in terms of access to resources and having capacity to deal with shocks, but it could also become a risk if bureaucracies become grid-locked and the interdependence might stifle self-organisation.	The development of strong autonomy carries risks of not having the options or resources to self-organise but it also gives greater freedom to innovate in terms of institutions and governance arrangements. The greatest vulnerability in this scenario would be in the 2030s during the development of capacity for autonomy. Luck plays a big role in this period.	There is a lot of agility in this scenario, due to small government and strong influence by a small number of wealthy individuals. If they make good choices many social and other problems can be addressed but there is little capacity for whole communities to find new solutions. A risk in this future is that people don't really want to self-organise and are happy to leave it to the elites.	Like Scenario 3, there is agility due to a free-market economy but in this scenario there is more intervention from government to address failures of markets to meet society's needs. This combination could provide a route for some self-organization but the absence of strong community organisations is a major potential inhibitor.

Dimension	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Ability to learn and adapt	The strong community networks are likely to enhance learning and adaptation through exchange of information, joint assessments of successes and failures, and support for those facing hardship.	The strong community networks are likely to enhance learning and adaptation through exchange of information, joint assessments of successes and failures, and support for those facing hardship.	Prosperity in this scenario is based largely on knowledge and learning but there is a strong risk that economic success could blind society to the lessons they should be learning about human-environmental relationships and the social costs of an individualistic society. The environmental disasters of the 2030's explore some of these risks. It is assumed (optimistically) that lessons were learned	Many similar risks apply in this scenario and Scenario 3, although the involvement of government and the interconnections with other jurisdictions mean that there are more routes for exchanging information. It seems likely that learning and adaptation might occur mostly at high levels in business and government with little input from communities, which creates risks and vulnerabilities.

Dimension	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Health and wellbeing	Basic needs, support for livelihoods and ensuring employment, and public health services are likely to be achieved through the strong focus on community and the links with both Asian and southern Australian economies. The community focus and interdependence with Asia and the rest of Australia should support integration of services, although a risk is that close interactions within and between communities in northern Australia and Asia could increase exposure to health and security risks, requiring increased investment in monitoring.	Basic needs, support for livelihoods and ensuring employment, and public health services are likely to be achieved through the strong focus on community and the links with both Asian economies, so long as they work. Autonomy would have to be managed carefully to avoid stifling integration of services that require inputs beyond northern Australia, but the community focus would enhance integration within the north. Increased exposure to health and security risks is noted in this scenario, although autonomy encourages increased investment in monitoring.	Basic needs, support for livelihoods and ensuring employment, and public health services are met in this scenario through self-interested investment by the private sector to maintain a workforce. This is potentially a powerful way to meet society's needs but is also vulnerable to changes in priorities of businesses. Autonomy from the rest of Australia is seen as a way to be agile (adaptive) but it relies on there being sufficient resources and will to access all inputs required to manage health and wellbeing.	Basic needs, support for livelihoods and ensuring employment, and public health services are met in this scenario through a combination of self-interested investment by the private sector and government intervention. There is a powerful incentive for businesses to contribute to a social safety net. This is vulnerable to economic fluctuations. Interdependence with the rest of Australia potentially provides both a means and incentive for other jurisdictions to assist in times of challenge.

| Economy and society | By definition, this scenario focusses on promoting cohesive and engaged communities through social networks and integration that enhance collective ability to improve the community and encourage civic engagement in planning and decision-making. Community attitudes and interdependent links with other cities and nations should support law enforcement, crime prevention, fairness, equality, and emergency management to ensure social stability, security and justice. These will require the fostering of economic prosperity that leads to human wellbeing and the assumption is that this will flow from relationships with Asia. A risk is that Darwin might be vulnerable to economic downturns in Asia and might have to address differences of viewpoints regarding some aspects of justice and security if engaged in close cultural and trading ties and open borders with Asia. | By definition, this scenario focusses on promoting cohesive and engaged communities through social networks and integration that enhance collective ability to improve the community and encourage civic engagement in planning and decision-making.

Community attitudes should support law enforcement, crime prevention, fairness, equality, and emergency management to ensure social stability, security and justice but autonomy would need to be handled carefully to make sure there was adequate capacity where cooperation and support from outside the north were needed.

It is assumed that fostering of economic prosperity that leads to human wellbeing will flow from relationships with Asia. A risk is that Darwin might be vulnerable to economic downturns in Asia and might have to address differences of viewpoints regarding some aspects of justice and security if engaged in close cultural and trading ties with Asia. | This scenario puts very little emphasis on promoting cohesive and engaged communities. Social networks and integration that enhance collective ability to improve the community and encourage civic engagement in planning and decision-making are almost non-existent.

This future relies heavily on the benign self-interest of the wealthy to ensure social stability, security and justice. This situation might be expected to support law enforcement, crime prevention, and emergency management but fairness and equality might suffer as seen in many parts of the USA.

In this future fostering of economic prosperity is clearly a priority, although whether it is the sort of prosperity that leads to wellbeing, even for the financially well-off, is questionable. Darwin would be especially vulnerable to economic downturns in Asia and the rest of the world in this scenario. | Although this scenario puts very little emphasis on promoting cohesive and engaged communities, it does provide a social safety net that is likely to provide a degree of social stability, security and justice. The inequality and potential instability likely in Scenario 3 is less likely here due to the safety net, although if this safety net merely applies short-term fixes to social problems then there is little social capital and ultimately little real resilience or adaptive capacity.

In this future fostering of economic prosperity is clearly a priority, and despite the application of a safety net there is little incentive to ensure that economic prosperity leads to wellbeing across society. Visible signs of poverty and disadvantage are low in this scenario but the underlying processes might still be more widespread that is apparent. |

Dimension	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Infrastructure and environment	The strong community focus should facilitate understanding of the value of the environment and so enhance and provide protective natural & man-made assets. This scenario should also encourage appreciation of the importance of diversity and spare capacity to ensure continuity of critical services (rather than a focus on economic efficiency as an end in itself). The narrative in this scenario especially envisioned provision of reliable communication and mobility that suits the lifestyles and values of Darwin's communities (although questions have been raised about what factors might work against these idealized objectives, like rapid population growth, availability and affordability of appropriate technologies, and changing demands of those migrating to northern Australia).	The strong community focus should facilitate understanding of the value of the environment and so enhance and provide protective natural & man-made assets. This scenario should also encourage appreciation of the importance of diversity and spare capacity to ensure continuity of critical services (rather than a focus on economic efficiency as an end in itself). The narrative in this scenario especially envisioned provision of reliable communication and mobility that suits the lifestyles and values of Darwin's communities (although this scenarios relies heavily on emergence of technologies and social and community industries that allow autonomy to be achieved without undue social disruption).	There are major risks that this future would not adequately enhance and provide protective natural & man-made assets. It is likely that many common good values of the environment would be overlooked in favour of private values. This is likely to reduce both biological diversity and diversity of relationships with the environment and put at risk the continuity of critical services. The narrative in this scenario especially envisioned provision of reliable communication and mobility as a way to attract and keep people in Darwin. For this reason, there would be ongoing reinforcement of the need to continue provision of communication and mobility. This would be a strength of this future but it would also be extremely reliant on wise investment by the private sector and so would be vulnerable.	Like Scenario 3, there are major risks that this future would not adequately enhance and provide protective natural & man-made assets. It is likely that many common good values of the environment would be overlooked in favour of private values. The greater involvement of government than in Scenario 3 is likely to be mostly focused on public lands and not deal with risks associated with management of private land. This could put at risk the continuity of critical services. Like Scenario 3, this scenario envisioned provision of reliable communication and mobility as a way to attract and keep people in Darwin. Also like Scenarios 3, there would be ongoing reinforcement of the need to continue provision of communication and mobility but this future could also be vulnerable to inappropriate prioritization by the private sector

Dimension	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Leadership and strategy	The bottom-up influence of communities is likely to build the trust and multi-stakeholder consultation and evidence-based decision making required to promote leadership and effective management. The community focus is likely to promote education for all, access to up-to-date information, and knowledge to enable people and organizations to take appropriate action. It is also likely to encourage the communication needed to ensure that knowledge is transferred between stakeholders and between Darwin and other cities in Asia and Australia. Together, these should empower a broad range of stakeholders. This scenario envisages development of a holistic vision, integrated across sectors and land-uses that will foster long-term and integrated planning.	The bottom-up influence of communities is likely to build the trust and multi-stakeholder consultation and evidence-based decision making required to promote leadership and effective management. The community focus is likely to promote education for all, access to up-to-date information, and knowledge to enable people and organizations to take appropriate action. It is also likely to encourage the communication needed to ensure that knowledge is transferred between stakeholders although transfer between Darwin and other cities in Asia and Australia would need to be managed carefully in this autonomous future. Together, these should empower a broad range of stakeholders. This scenario envisages development of a holistic vision, integrated across sectors and land-uses that will foster long-term and integrated planning.	Leadership and effective management are driven in this scenario by the private sector and the self interest in individuals in society. Individuals gladly give up many of their rights and responsibilities in return for highly quality of life. Therefore, this future does not empower a broad range of stakeholders, but few care, making this future vulnerable if problems emerge that the elites cannot manage or are unwilling to address. This could create a situation like that experienced by New Orleans in 2005 in the face of Hurricane Katrina, in which social capital and the ability of the general public to cope were poor. Planning for the future in this scenario is also driven by a relatively small part of society. It might include a degree of long-term thinking but is unlikely to generate holistic vision across society or foster and integrated planning that takes account of all factors required for Darwin to be sustainable.	Leadership and effective management are driven by interdependence between the private sector and government and between Darwin, the rest of Australia and Asia. This future does not empower a broad range of stakeholders – it merely seeks to keep them happy, which creates vulnerabilities in crises when people are not able to be self-sufficient. Like Scenario 3, Darwin in this future could be vulnerable to a Hurricane Katrina/ New Orleans situation. Interdependence with the rest of Australia could either help management of disasters, through provision of assistance and resources or hinder it through inappropriate interventions. Links with the rest of Australia and Asia should encourage long-term thinking and, to a degree, foster and integrated planning. It is unlikely to generate a holistic vision of Darwin's role nationally and regionally, but is unlikely to encourage development of a holistic vision among Darwin's communities.

5. Darwin in the context of other cities who have explored their futures

The process that CSIRO has adopted in Darwin, and on which this report is based, has also been adopted in three other cities; Brisbane, Melbourne and Perth. On the basis of this small sample, we can make some tentative observations and conjectures:

- **Cyclones**: In none of the previous cities, natural hazards loomed as large as they did in Darwin with the threat of cyclones being both a significant challenge as well as a trigger for change. *The way that Darwin prepares for and responds to significant cyclones appears to be a fundamentally important challenge for Darwin*.

- **Separatism and local identity**: There was a strong sense of identity and Darwin being a unique place and community throughout the process. The possibility of independence from Australia emerged as a possibility; even if an unlikely one (in fact, this topic emerged even more strongly in Perth). The exact nature of the "Darwin identity" was widely discussed but there was some level of dispute about what it actually means. *Understanding the unique "Darwin identity and values" is an important issue because it goes to the heart of what values that ought to be maintained as Darwin undergoes transformation and likely growth*.

- **Competitive edge**: As in all the other cities there was much conversation about being competitive in the world and in Australia; in the sense of competing for economic opportunities. A number of key areas were mentioned: 1) *providing solutions for the dry tropics* with Charles Darwin University being a catalyst for new ventures in things like tropical health and engineering for the dry tropics, 2) further *growing the number of international students at Charles Darwin University* as a way to create an influx of talent that is likely to stay in Darwin post-studies, 3) further *building on the agricultural sector*.

- **Growing Darwin**: In Darwin more than in the previous cities, it was generally agreed that there is a need for Darwin to grow if it is to be able to create economy of scale and thus improve services in areas such as health and education. It was also generally agreed that this growth will primarily have to come from new entrants since birth-rates won't be high enough to generate the growth that is sought. However, it was also observed that on balance Australians from the southern states don't generally stay beyond a few years. It was therefore argued with fairly wide agreement, *that population growth will primarily have to occur through immigration, such as from nearby neighbours, and perhaps even by the influx of refugees*. The vicinity of Eastern Indonesia (including Bali) was mentioned as an important factor here.

- **Challenges of growth**: In Darwin just as in the previous cities, the topic of maintaining an attractive, environmentally sustainable, healthy and culturally unique city, despite significant population growth was a key theme. *There is a need to explore key trade-offs and decision points in order to understand the threats posed by population growth to existing and/or sought after values and functions*. A couple of such trade-offs were discussed, such as for example the dilemma relating to height restrictions on buildings that some believe are

necessary to maintain an attractive city, being in contradiction to developer business models that require tall buildings in order to make developments profitable. Another dilemma related to the viability of culturally unique events in Darwin (i.e. beach markets) that were thought to be potentially threatened by growing population and traffic densities. It was also thought that the much valued local environment around Darwin could be threatened by further growth.

- **The benefit of being smaller**: A perhaps more esoteric point, albeit perhaps also crucial, is that (we believe) that *Darwin has the capacity to create coordinated action to address problems at a city-system scale*. Through inter-agency and inter-stakeholder goodwill and cooperation. This capacity is by no means universal and we call this "city agency" and it is perhaps the most important aspect of urban resilience because it is so vital for the capacity to adapt and respond to change. With increasing scale this becomes more difficult as the complexity of governance and the sheer number of stakeholders grow.

6. Potential Next Steps

It was envisaged that the workshop and the scenarios would not be a stand-alone process but provide a foundation for CSIRO and NADO to explore opportunities and limitations to the sustainable development of Darwin, and how the community can develop resilience to emergent trends and future shocks. The workshop outputs can provide a basis for deeper analysis that can then be used to inform infrastructure investment, strategic planning and policy formulation.

These potential next steps are for discussion with NADO, and can be adapted to meet their needs.

Resilience Strategy - The workshop process provides a foundation that could be used to develop a *Resilience Strategy* for Darwin. The Strategy would bring together key organisations and individuals to identify actions that will build and develop the resilience of Darwin to possible future stresses and shocks. This strategy would help Darwin prepare for the future by planning for the likely consequences of "unexpected" events. This approach is being undertaken in many cities around the world as part of the 100 Resilient Cities initiatives.

Systems modelling – The workshop identified complex issues that need to be understood in greater detail to inform potential policies and actions. These issues included: maintaining the local community values and environmental quality while rapidly growing the population and the economy; developing greater cultural and economic ties with near Asian neighbours; and understanding Darwin's place as a hub for northern Australia. In collaboration with small group of local experts systems dynamics models could be developed to better understand feedbacks, and potential policy levers to guide the sustainable growth of Darwin.

Demographic analysis – Population growth is seen as vital for Darwin to develop, and to achieve the economies of scale needed for a providing efficient services and a vibrant, diversified economy. This population growth will mostly come from migration, rather than natural increases. There is the need to further explore the types of people likely to be attracted to Darwin, their motivations for coming, factors that might impede them from coming or staying, and implications for Darwin's workforce skills.

Climate adaptation strategy – Darwin is particularly exposed to the likely impacts of climate change impacts, which may include increased frequency and severity of extreme weather events, higher temperatures and changes in rainfall patterns. A climate adaptation strategy would be developed with Darwin stakeholders, and based on scientific evidence, to develop practical and effective adaptation options.

Appendix A   Framework for urban resilience developed by the 100 Resilient Cities program

The framework shown in the table below was developed by the 100 resilient cities program[6], of which Melbourne and Sydney in Australia are members. This framework has not been adopted by the CSIRO Future Cities project but serves as an illustration of the sorts of issues that should be considered when thinking about the resilience of Darwin in alternative futures.

DIMENSION	DRIVER
Health and wellbeing	1. **Meets Basic Needs**: Provision of essential resources required to meet a person's basic physiological needs.
	2. **Supports Livelihoods and Employment**: Livelihood opportunities & support that enable people to secure their basic needs. Opportunities might include jobs, skills training, or responsible grants & loans.
	3. **Ensures Public Health Services**: Integrated health facilities & services, & responsive emergency services. Includes physical & mental health, health monitoring & awareness of healthy living & sanitation.
Economy and society	4. **Promotes Cohesive and Engaged Communities**: Community engagement, social networks & integration. These reinforce collective ability to improve the community & require processes that encourage civic engagement in planning & decision-making.
	5. **Ensures Social Stability, Security and Justice**: Law enforcement, crime prevention, justice, & emergency management.
	6. **Fosters Economic Prosperity**: While Driver 2 is about individual livelihoods, Driver 6 is about the economy on a wider scale. Important economic factors include contingency planning, sound management of city finances, and the ability to attract business investment, a diverse economic profile & wider linkages.
Infrastructure and environment	7. **Enhances and Provides Protective Natural & Man-Made Assets**: Environmental stewardship, appropriate infrastructure, effective land use planning & enforcing regulations. Conservation of environmental assets preserves the natural protection afforded to cities by ecosystems.
	8. **Ensures Continuity of Critical Services**: Diversity of provision, redundancy, active management & maintenance of ecosystems & infrastructure, & contingency planning
	9. **Provides Reliable Communication and Mobility**: Diverse & affordable multi- modal transport networks & systems, ICT & contingency planning. Transport includes the network (roads, rail, signs, signals etc.), public transport options & logistics (ports, airports, freight lines etc.)
Leadership and strategy	10. **Promotes Leadership and Effective Management**: Relating to government, business & civil society. This is recognisable in trusted individuals, multi- stakeholder consultation, & evidence-based decision-making.
	11. **Empowers a Broad Range of Stakeholders**: Education for all, access to up-to- date information, & knowledge to enable people & organizations to take appropriate action. Along with education & awareness communication is needed to ensure that knowledge is transferred between stakeholders & between cities.
	12. **Fosters Long-Term and Integrated Planning**: Holistic vision, informed by data. Strategies/plans should be integrated across sectors & land-use plans should consider & include different departments, users & uses. Building codes should create safety & remove negative impacts.

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[6] http://www.100resilientcities.org/#/-_/

Appendix B   Pre-workshop survey

B.1   Introduction

A pre-workshop survey was undertaken

1) What are the three biggest drivers of change that might affect the future of Darwin? (please list in order; from most to least important)
2) What issues or events in Darwin have surprised you in the past?
3) Can you describe what you would like Darwin to be like in the future?
4) How might your organisation's work have an impact on the future of Darwin?
5) For the workshop: Can you please email an item relevant to the workshop topic that you would like to display on the wall (a news article, report, picture, etc.)?

Table B.1 Biggest drivers of change in Darwin (n = 11)

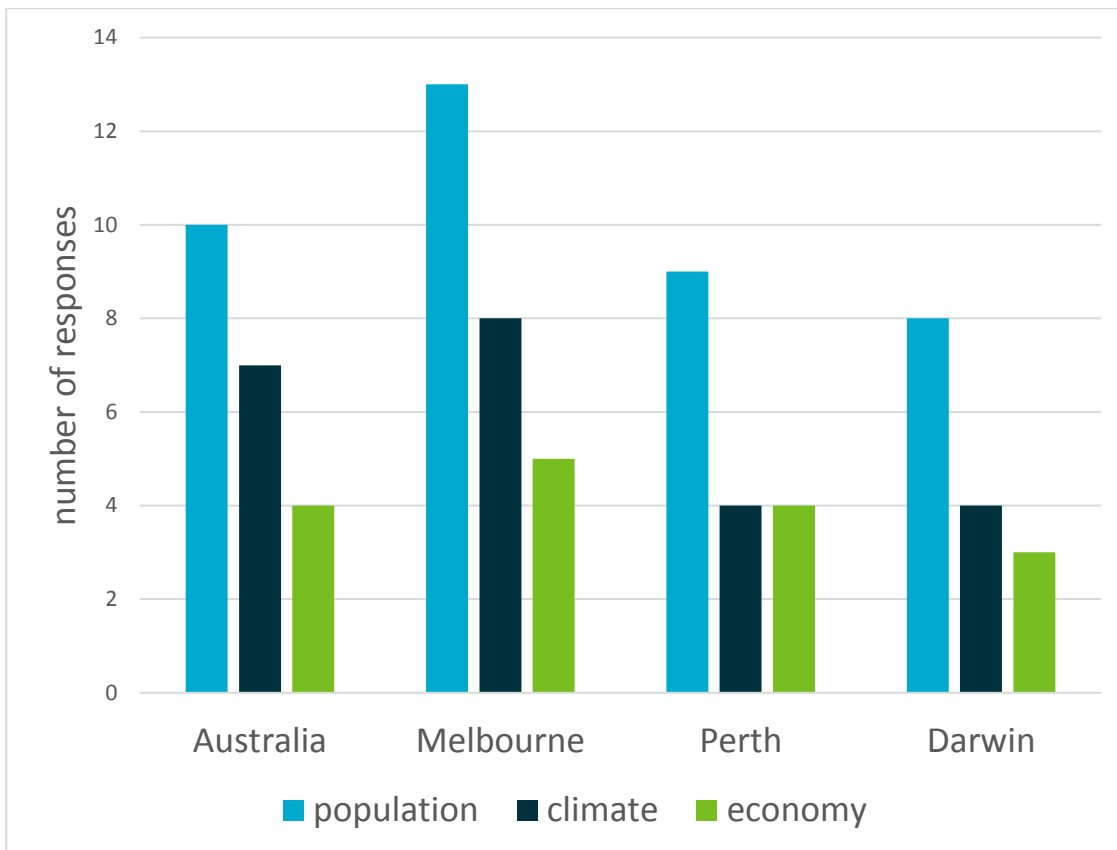| CATEGORY	N
Population change (growth, decline, immigration)	8
Infrastructure	6
Governance	6
Climate / climate change	4
Economy	3
Opportunities / relationships with Asia	3
Public attitudes & values	3
Energy	1
Health services	1
Housing	1
Local land restriction	1
Natural resource management	1
Remote mobility	1

Figure B.1 Most import drivers of change: responses by workshops

Biggest drivers of change in Darwin?

 "Population growth or decline and the willingness of old Territorians to accept change – the NIMBY syndrome."

"Whether or not the Developing Northern Australia initiative is taken seriously by the rest of the country or not."

"Potential transformation into the Asian capital of Australia."

What has surprised you in the past?

"The impact of single events on the economy (Inpex/Conoco-Phillips, Commonwealth Intervention, Military Build-up, Live Cattle Exports)"

"Spikes in population growth generated by changes in Defence policy"

"How much airtime things like electricity prices get, when in my opinion there are so many much 'bigger' issues for society, economy and environment within our midst. For example; Darwin contribution to refugee intakes (wanting more), Darwin Harbour environmental quality, the nation's largest resource project (Inpex) for many years, etc."

Figure B.2 Word cloud: Responses to - What do you want Darwin to be in the future?

What do you want Darwin to be in the future?

"A city reflective of its tropical climate."

"A modern vibrant city that is truly Australia's gateway to Asia, while retaining the charm and community of the place"

"A vibrant multicultural city which is more user friendly for people recreating and exercising e.g. Green belts; more walking and bike paths; decreasing heat sinks; outdoor events; better building design; better traffic management."

"I would like the rest of Australia to recognise that decisions made in large population centres in the temperate regions of Australia are often (usually) incompatible with Darwin's economic growth."

Appendix C   Presentation – Darwin's Demographic Future

C.1   Introduction

Dr Tom Wilson from the Northern Institute at Charles Darwin University presented on *Darwin's Demographic Future*. This presentation provided an overview of Greater Darwin's demographic trends, and explored possible demographic scenarios for the future.

C.2   Presentation Summary

The presentation highlighted that population projections are useful when planning for the future as demography affects the demand for services and infrastructure. For example, projections for a growing aged population will drive the demand for services such as health care, aged care and dwellings suitable for elderly residents. However, Tom also highlighted that in many cases projections don't reveal anything about population composition, such as: level of education, health and wellbeing, Indigenous status, income, etc. Also, the point was made that care needs to be taken when interpreting population projections, which often have the appearance of great precision and smooth trajectories. However, there is considerable uncertainty. Tom also illustrated that error in population projections is likely to be greater the smaller the population, the further into the future you look, and the greater variability of historical population growth. Therefore, population projections for Darwin have considerable uncertainty.

Darwin's populations has more than tripled over the last 45 years. The most significant blip in the growth trajectory of Darwin's population occurred in the aftermath of Cyclone Tracey in 1974. This variability is indicative that net migration in Darwin is dependent on economic conditions, such as large energy and mining projects. Darwin's population structure is considerably younger than other Australian cities. While the proportion of people aged over 65 years In Darwin is expected to grow it is likely to remain young relative to other Australian cities.

C.3   Key points

Tom's presentation highlighted the following key points for Darwin:

- Natural population change in Darwin is likely to be relatively stable
- Migration likely to continue cyclical pattern & be hard to predict
- Darwin's demographic future is primarily dependent on economic conditions influencing net migration
- By 2044 population within range 150,000 – 300,000
- Long-run population decline is unlikely (but occasional year to year decline is probable)
- Population will be older
- Planning for demographic future in Darwin requires flexibility

Appendix D Clustering and influence analyses from the workshop

After hearing views from several experts about factors that might influence the future of Darwin, participants were asked to consider a set of 60 cards, each of which represented a potential driver of future change. They were asked to group these, add to them or discard ones that did not seem important, and then consider the influence relationships between them and/or the likely relative importance of drivers in determining Darwin's future. Minimal time was allocated to this exercise – it was primarily aimed at generating conversations to help participants understand one another's different understanding of Darwin as a system of interacting social, technological, environmental economic, political, legal and other factors – so the following figures and tables are preliminary.
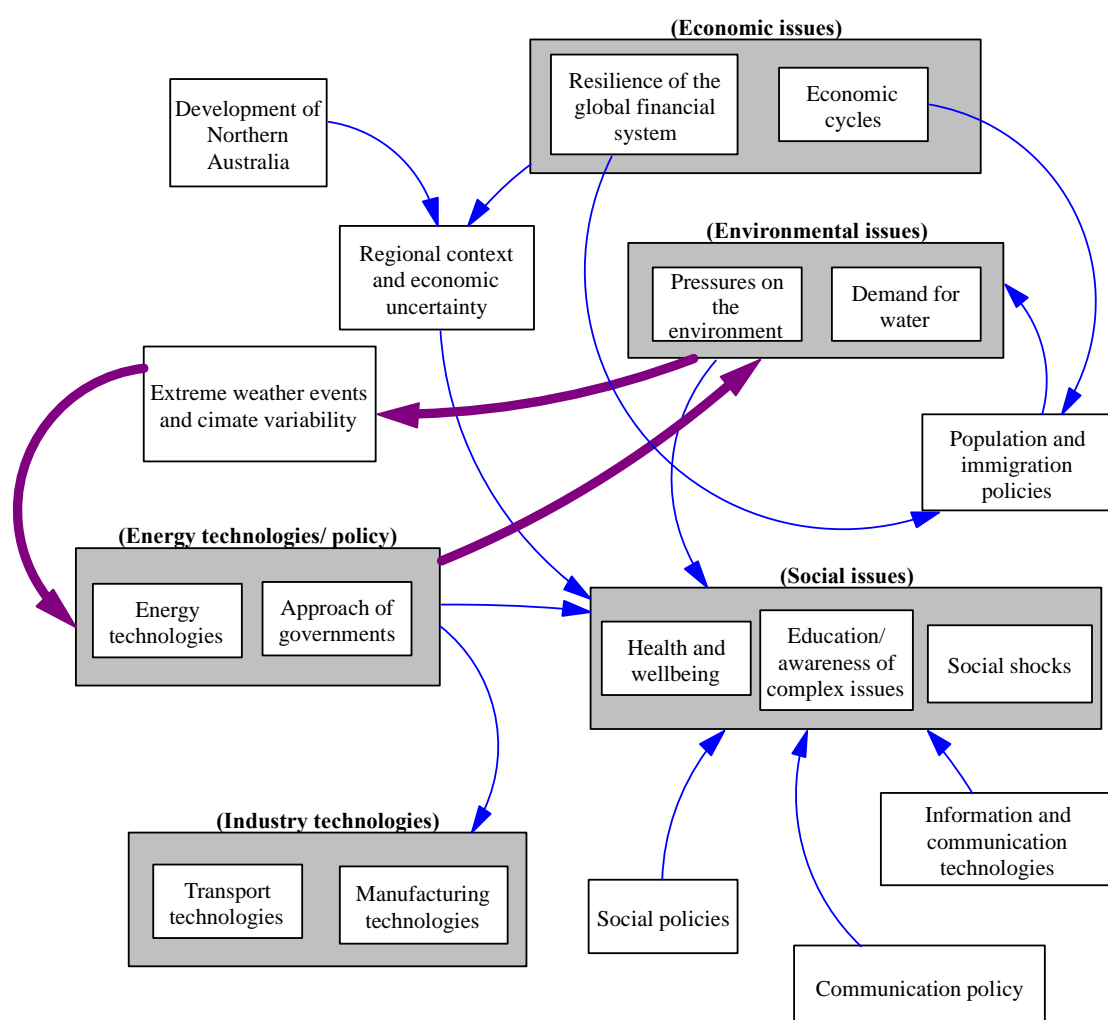

Figure D.1 Influence diagrams generated by workshop participants (a)

Note that social issues are seen as being influenced by economic, technological and policy drivers. Although not shown in this diagram, it is likely that these social issues would in turn influence other parts of the system, such as demand for water and other environmental resources. Note also the

loop shown with bold arrows, in which the response to climate change and climate variability, through technology and the approaches of governments, determines whether there is an escalation of problems through deterioration of the environment that increases susceptibility to climate change, or the risks from climate change are at least partially offset by appropriate management of the state of the environment and demand on environmental resources.
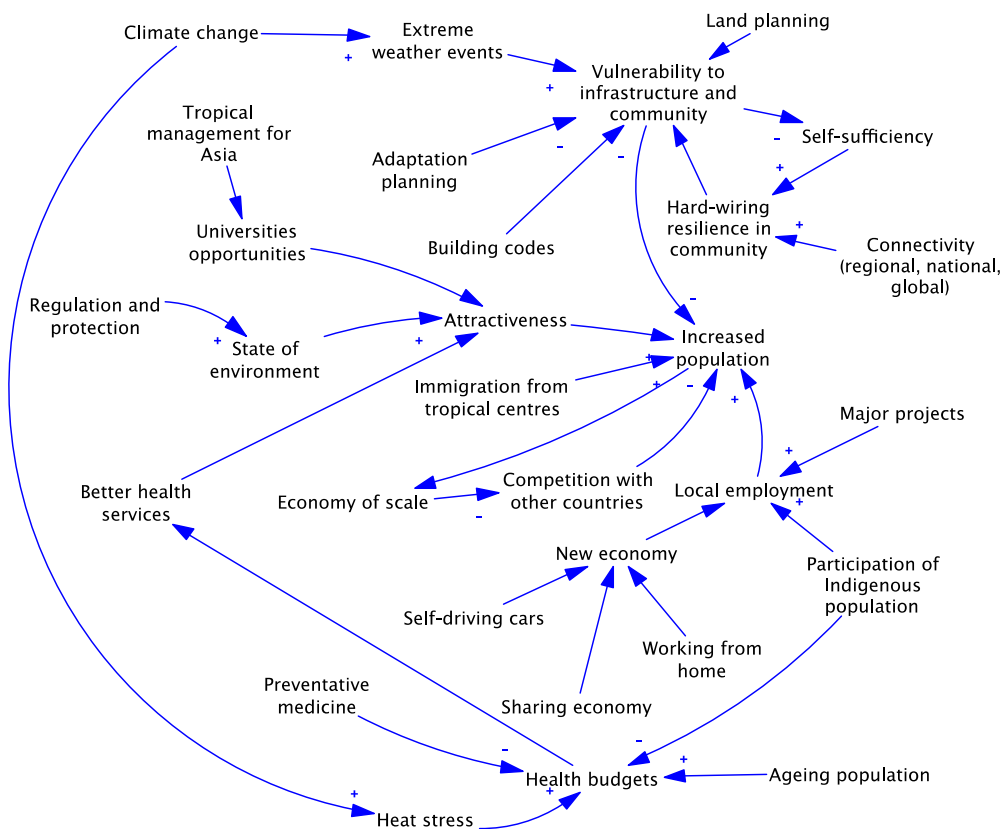

Figure D.2 Influence diagrams generated by workshop participants (b)

The importance of social processes interacting with approaches of governments in Figure D.1 supports the recommendation to make attitudes and governance key foci of the scenarios. Similarly, a large proportion of the variables in Figure D.2 are likely to be themselves driven by the degree of interdependence (cooperation) versus autonomy (competition) within governance systems and by the attitudes of the public to self-interest versus the common good and intergenerational equity. The same can be said of the medium and high-importance drivers identified in Table D.1. Although this does not mean that the two uncertainties selected to guide the scenarios are the optimal choice, it does mean that a wide range of possible futures for Darwin can be explored using these uncertainties.

Table D.1 Grouping and categorization of key drivers of change in terms of their expected importance (influence) for the future of Darwin (an alternative approach taken by one table)

IMPORTANCE		
Low	**Medium**	**High**
• Alternative measures of progress • Prosperity	• Resilience of global financial system • Communication policy • Environmental law	• Global thresholds • Population and immigration policies • Environment in settlements

paradox • Manufacturing technologies • Economic cycles • Regional competitiveness	• National defence policy • Challenges for food security policy • Climate change and variability • Changes in demand for agricultural products • Biosecurity policy • Income inequality	• Extreme weather events and climate variability • How people might live and work • Employment • Where people might live • Asian connection • Immigration/immigration (internal and external) • Demographic change • Transport technologies • Social policies

References

Dale, A., Campbell, A., Douglas, M., Robertson, A., Wallace, R., & Davies, P. (2014). *From myth to reality: new pathways for Northern Development*. Paper presented at the Northern Development Summit- Creating the Future Australia, Townsville.

Heatley, A. (1990). *Almost Australians: the politics of Northern Territory self-government*. Retrieved from: https://openresearch-repository.anu.edu.au/handle/1885/9549

Mason, M., & Haynes, K. (2010). *Adaptation lessons from Cyclone Tracey* National Climate Change Adaptation Research Facility, Gold Coast, 82 pp.

O'Connell, D., Walker, B., Abel, N., Grigg, N. (2015) The Resilience, Adaptation and Transformation Assessment Framework: from theory to application. CSIRO, Australia.

Rohrbeck, R., & Schwarz, J. O. (2013). The value contribution of strategic foresight: Insights from an empirical study of large European companies. *Technological Forecasting and Social Change, 80*(8), 1593-1606. doi:http://dx.doi.org/10.1016/j.techfore.2013.01.004