1

Caveat emptor!

What shapes my perspectives and observations on this subject ?

¶ Career has straddled corporate and public sector roles

- have sat on both sides of the fence!

¶ Work extensively internationally, especially in Asia

*- so interested in differences **across** national innovation systems - no "one size fits all model"*

¶ Background in technology, but also worked extensively in creative industries and their role in innovation

- so believe that a national innovation strategy is more than just a science and technology policy

¶ Currently chairing Australian Government review of innovation policy for Australia

- so obviously don't believe we can ever stand still

2

The pitfalls around country case studies

For one's own country:

Tendency to ***overstate*** one's own country's weaknesses and challenges, and to ***understate*** strengths and embedded advantages

and

to over-emphasise the ***short-run*** at the expense of the ***long-run***

There is as much to be learned from policy failures (or mixed results) as from obviously success outcomes

3

"How innovation can change a country?"

What is innovation?

Innovation within the Australian context

The journey : a brief history of innovation in Australia

What we do well, and not so well

Current issues now facing Australia

Government responses - current Review

Applying some of the principles and learnings from working with ECLAC

4

What is Innovation?

Innovation **= creating value through doing something in a novel way**

= *ex post*, so we *ex ante* understandings of the dynamics of economic change

Innovating **= creative problem solving**

Being innovative **= creative problem-solving in order to create value**

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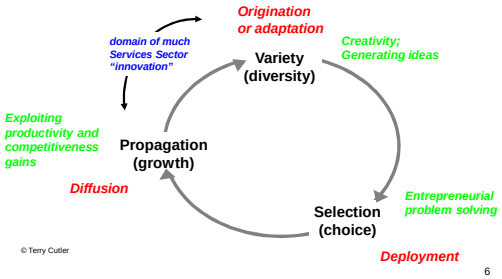
Innovation is an evolutionary system for socio-economic change and development.

There has been a lack of coherent theories of innovation to underpin development policies



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There are thus three facets to innovation - *each needs balanced attention within a national innovation system*

Creativity
-the generation of ideas and inventions
Requires fresh thinking and inventiveness

Support for higher education and research environments.

Entrepreneurship/ Commercialisation
-linking good ideas to the right market opportunities

(Good ideas or patents without customers or users are worth nothing)

Requires entrepreneurs and risk taking

Public - private linkages for sourcing relevant IP - needs two way awareness of opportunities and needs

Industry should lead, but governments should help reduce barriers to success

Firm-to-firm and firm-to-research provider linkages become increasingly important in an era of open innovation and "markets for innovation"

Diffusion and adaptation
-rolling out high potential innovations across industry or the community
Capturing national benefit

Government can assist with awareness and extension programmes - especially for SMEs;

Export facilitation

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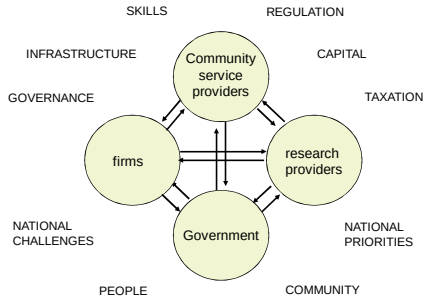
Innovation occurs within a complex ecosystem ....



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Innovation system = the stocks and flows around innovation

- We need to invest in the capabilities required around each element of the innovation system, as well as investing in the linkages and flows between them.
- The elements of innovation involve both 'stock' and 'flows': stocks of knowledge and capability, and the flows of the innovation capital around these.
- Resources applied to innovation should be regarded as *investment* in the future, not as expenditure.

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Key functions within an innovation *system*

- identification of opportunities
- creating capabilities
- managing risk and uncertainty
- building and maintaining infrastructures
- mobilising resources

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***Systemic* challenges within an innovation system**
(areas for potential* system *failure, over and above market failure)

1. **Inadequate infrastructure provision**
2. **Inadequate institutional development and evolution.**
3. **Capability and learning problems (eg absorptive capacity).**
4. **Structural adjustment issues and transitional problems in economic change (eg technology lock-in).**
5. **Networking and collaboration problems (loose *versus* tight).**
6. **Heterogeneity versus specialisation.**
7. **Imbalances within and across the innovation system (eg. foregoing leverage)**

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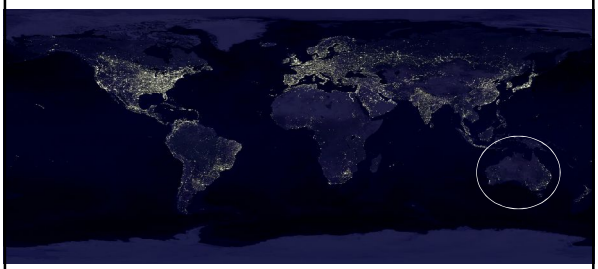
Putting Australia into context - the innovation challenge of a small economy



- **The tyranny of distance**
- **The tyranny of low density (sparcity)**
- **The impact of trade gravity**
- **The opportunities from natural endowments (seas, space, land, resources, biodiversity, isolation)**
- **The challenges of federated, distributed systems**

AUSTRALIA'S ECONOMIC PERFORMANCE - SCORECARD

Strong GDP growth (currently running at 4.3%)

Low unemployment, with skill shortages

But … all fuelled by commodities boom.

National savings through pension fund scheme

Strong productivity growth since mid-1980s (impact of micro-economic reform agenda)*

Challenged agricultural sector - 10 year drought, fuelling longer term climate change fears

High household debt, and housing affordability challenge

highly skewed exporting base

Inflationary pressures

Low trade intensity across economy as whole (despite having doubled over past three decades- a function of the scale of the services sector?)

**The sustained productivity gains in the agricultural sector have been more long-run*

AUSTRALIA: STRUCTURAL PARAMETERS

PRODUCTIVE SECTOR

- Few local MNCs
- A beleaguered manufacturing sector
- Key role of mineral resources sector
- Strong, but declining, agricultural sector (and threatened by climate change)
- Dominant services sector (80%)
- A small business economy
- Low business R&D
- Low trade intensity

KNOWLEDGE-GENERATION AND TRAINING SYSTEMS

- Small scale institutions (by world standards)
- Limited international linkages
- Limited innovation/R&D career structures
- Underinvestment in infrastructure
- Limited investment in continuing training
- Incentives for internal competition, not collaboration

PUBLIC POLICY SYSTEM

- Federal polity and contests
- Undeveloped policies for knowledge diffusion
- Cargo cults around commercialisation (linear STI model)
- Challenges around alignment of complementary assets (STI, education, transport, communications)

Adapted from Jane Marceau, 2007

Analysts often forget that technological innovation is especially important for resource based economies

"Most of Australia's massive deposits of minerals were of no use until new technology liberated them. In the last two centuries Australia has depended as much on the rise of new technology as on its own soil, grasslands, minerals and other resources"

Geoffrey Blainey, *A Shorter History of Australia*, p.24

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EVOLUTION OF AUSTRALIA'S ECONOMIC DEVELOPMENT

19th century	Superior economic performance to US - off back of mining (gold) and wool
1900-1920	1901 - Institution building around new Commonwealth of Australia; key role for government enterprises; 1914-1918 war - Disruption to civil imports; lack of local defence materiels
1920-1940	Push for greater local industrial self sufficiency, defence industry and public health capabilities
1940-1960	Sunset of Imperial influence: shift from UK to US alliance. Post war reconstruction, industrialisation: "nation building" projects - including discussion of nuclear futures (off uranium resources).
1960-1980	Manufacturing stagnates behind protectionist barriers; beginning of second mining boom (iron; coal; uranium)
1980-2000	Internationalisation of economy (with reduction of tariffs and floating of currency); programmes for structural adjustment and micro-economic reform; privatisation of government enterprises. Focus on new ICT and biotech technologies. Strong productivity growth.
2000 -	New challenges from global warming, energy futures, terrorism and preventable diseases focus new national priorities; emergence of competition from BRIC economies; China now key trading partner

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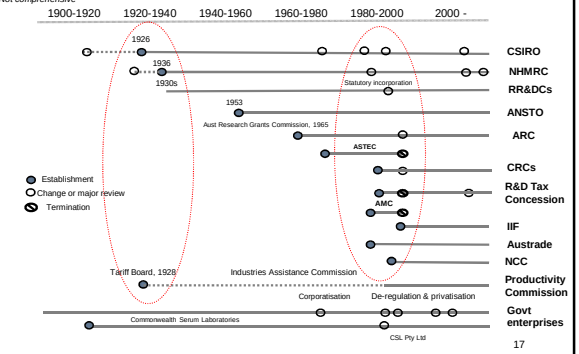
THE INSTITUTIONAL EVOLUTION OF AUSTRALIAN DEVELOPMENT AGENCIES

Not comprehensive



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Australia: currently a federated, decentralised model of innovation *(cycles of centralisation and fragmentation)*

¶ Both Federal and State governments play key roles in Australia's innovation system;

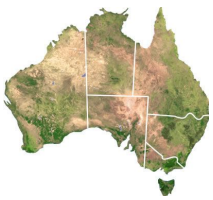
¶ At each level, activities are spread widely across different Ministries

¶ This means that a lot of co-ordination occurs at the inter-agency level, rather than from a top-down policy framework

¶ The mapping of innovation-related activities and functions on the following page can be variously interpreted as:

- un-cordinated, de-centralised and fragmented, or
- as representing a microcosm of the global challenge of managing complex systems.

¶ Australia's structural characteristics - small and sparse - put a premium on collaboration and partnerships (which equips Australia well for learning about "open innovation" within a global economy).



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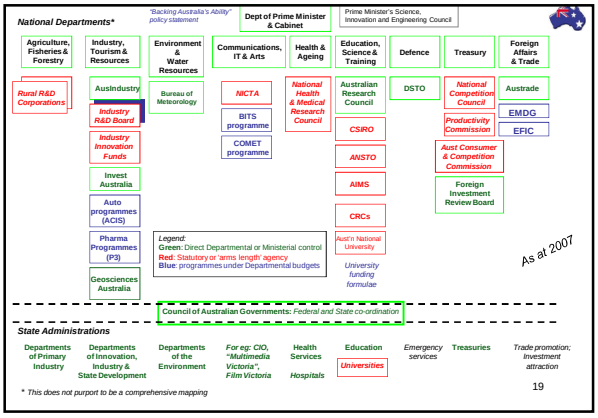
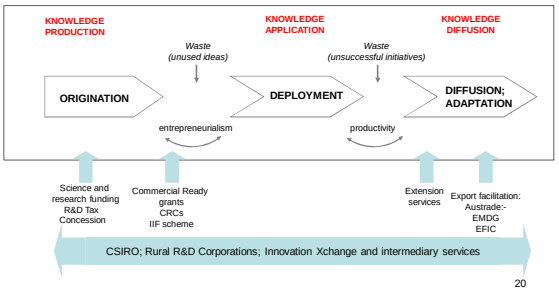


Mapping country policies and programmes against the theoretical model

Some Australian agencies have mandates that span the whole innovation system; other focus on specific aspects. The general challenge is to pursue balanced attention to the whole system and its interdependencies. Standalone, 'silo-like' interventions risk upstream or downstream distortions.



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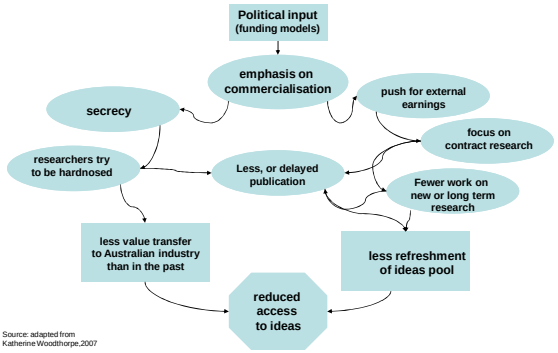
The recent policy focus on commercialisation of Australian university and public sector research illustrates the need to think about unintended consequences



Source: adapted from Katherine Woodthorpe,2007

A global assessment of Australia's innovation system ....

The parts of the system which appear to work ***best*** are where:

1 **There has been a long history of industry 'self organisation'**
(such as mining, primary production and, more recently, computer games)

- industries where Australia is fully integrated within global supply chains
- industry overwhelmingly focused on export markets
- industry arrangements span the whole value chain (from R&D to marketing)
- these industries drive diversification in support industries and attract technology innovation (eg mining and agriculture).

2. **There is reciprocity and mutuality in partnerships around outcomes ('skin in the game')**
   - co-investment and risk-sharing
3. **There are strong, semi-autonomous institutions with scale**, within which the competing pressures for sustained capability building and of responsiveness to new challenges can be assessed and balanced.
   - CSIRO, Rural R&D Corporations, Bureau of Meteorology
4. **A distributed, federated model of innovation focuses attention on diverse and complementary roles rather than contests for hegemony.**
5. **National structural challenges fuel innovative solutions.** (Logistics, environment, systems integration and project management; distributed collaboration)

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A global assessment of Australia's innovation system ....(2)

The parts of the system which appear to work ***least well*** and which represent major challenges are:

1. **Where "Innovation" is unhappily or inappropriately coupled with structural adjustment and palliative interventions.**
   - can create conflicting messages, lack of transparency
   - eg. aspects of automotive,pharmaceuticals and textiles
2. **Where industry sectors are not self-organising, or where there is no natural market organiser**
   - manufacturing, emerging markets: *issue around the role of government in such areas*
3. **Where sectors are dominated by strong local oligopolies, which are not greatly trade exposed**
   - many parts of Australia's *services sector* (retail, banking, telecommunications) whilst other areas have been highly successful (asset management, financial services, logistics, education etc)
4. **When market interventions are disconnected from upstream or downstream activities (and accompanying feedback mechanisms).** This is the challenge with schemes like the R&D tax concession, EMDG, S&T commercialisation
5. **The lack of authoritative and continuing agencies with a responsibility for strategic direction setting and consensus building around national priorities and interests.**

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Some challenges and issues arising from the Australian experience:

- Strategic adaptation to a changing innovation environment
- Specific innovation challenges for smaller country economies
- Internationalising the national innovation system
- The difficulties of collaboration and the limits to 'partnerships'
- The role of formal versus informal networks
- The role of SMEs within innovation systems
- Maintaining complementary support strategies, especially around skills
- 'market driven' versus 'technology driven' company formation
- The utilisation and dissemination of public sector research
- The challenge of evidence-based policy and evaluation
- Linking capabilities to desired national outcomes
- Maintaining robust frameworks for governance

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Australia's innovation challenge into the future

Global drivers for review and reassessment include:

- the shift from in-house R&D to open innovation markets
  - and what does this imply for access to skills, and what might represent incentives for firms
- the rise of globally networked operations and 'cyber-infrastructure', and the implications for internationalisation and collaborative effort
- user-generated & demand-driven innovation
- the growing role of service industries in the economy, and in productivity
- the shifting and unsettling dynamics of global competition (e.g. Russia, India & China)
- the increasing urgency around emerging challenges (e.g. climate change, energy, ageing)

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An innovation future for Australian industry

Australia's new government has laid out a **ten point** framework for its innovation policy which addresses many of the identified challenges going ahead:

1. Build a culture of innovation and new ideas by strengthening investment in creativity and knowledge generation.

2. Focus incentives for business R&D to promote global competitiveness, delivering the best outcomes for exports and economic growth.

3. Accelerate the take up of new technology, so Australian firms can access the best ideas from around Australia and the rest of the world.

4. Make Australia's innovation system truly international, by supporting partnerships, collaboration and foreign investment in Australian R&D.

5. Use government procurement to support innovative Australian firms.

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The ten point framework for Australian innovation policy:

6. … develop multiple pathways for industry to access the knowledge and expertise in universities and research agencies.

7. Strengthen the skill base for innovation, including in maths, science and engineering, and professional training for firms to manage innovation.

8. Develop and implement a set of national innovation priorities

9. Strengthen the governance of the national innovation system to support higher expectations of government agencies and industry.

10. Review the bewildering array of government innovation and industry assistance programs to reduce duplication and improve effectiveness.

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MEDIA RELEASE

SENATOR KIM CARR

Minister for Innovation, Industry, Science and Research

Tuesday, 22 January 2008 08/000

GOVERNMENT ANNOUNCES REVIEW OF NATIONAL INNOVATION SYSTEM

The Minister for Innovation, Industry, Science and Research, Senator Kim Carr, today announced a wide ranging review of Australia's national innovation system to

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Beginning with seven deceptively simply questions …

1. Can we imagine a better and different world?
   Are we generating fresh ideas and pushing the boundaries of knowledge?
2. How do we solve the big challenges Australia faces?
3. Can we do everyday things better?
   Creative problem solving everywhere, and incremental innovation.
4. How do we make better use of available tools and technologies?
4. How do we make it easy for people to adapt tools or ideas in novel ways?
6. How do we better build and nurture human capital?
7. How might Australia, as a small country, prioritise its innovation efforts?

REVIEW OF THE NATIONAL INNOVATION SYSTEM
innovation.gov.au/innovationreview

Review is addressing the triple bottom line of innovation policy:

(i) industry challenges, and market-oriented changes to increase productivity and improve competitiveness;

(ii) innovations and changes in public policies and service delivery around the production of public goods;

and

(iii) innovations and changes to address societal and environmental aspirations and challenges, and the mobilisation of private and public sector capabilities around these challenges.

REVIEW OF THE NATIONAL INNOVATION SYSTEM
innovation.gov.au/innovationreview

Proposing national priorities for innovation:

we can't be good at everything

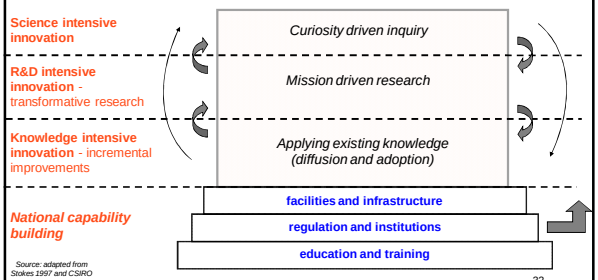
Some starting points ….

1. *Start* from leveraging Australia's natural endowments or built strengths
2. Look to areas where there might be a distinctively Australian advantage in developing solutions to globally relevant challenges or markets
3. Identify opportunities through innovation to transform and reinvent existing industries and service delivery
4. Address the small country challenge in internationalising innovation
5. Maximising RoI and national benefit from the supporting investments in national capabilities, facilities and innovation infrastructure

REVIEW OF THE NATIONAL INNOVATION SYSTEM
innovation.gov.au/innovationreview

Developing the different roles within a national innovation system

Managing an innovation portfolio *needs to encompass the spectrum of activity from breakthrough science through to incremental innovation, all underpinned by crucial national facilities and capability building*



Source: adapted from Stokes 1997 and CSIRO

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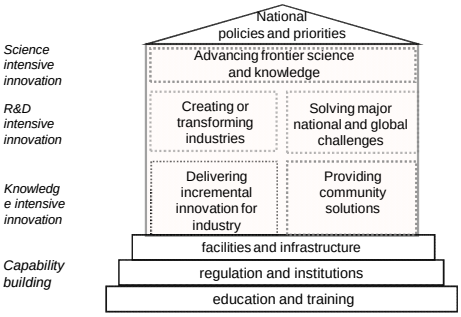
Promoting a clear framework for national investment and decision making (and for aligning the objectives and incentives of partners)



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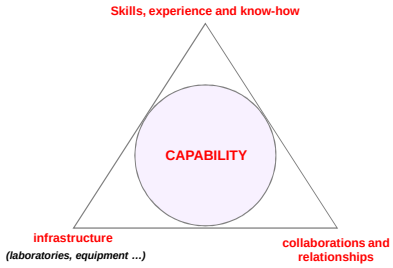
Investing in missions and capabilities to address national priorities … Capability is ….



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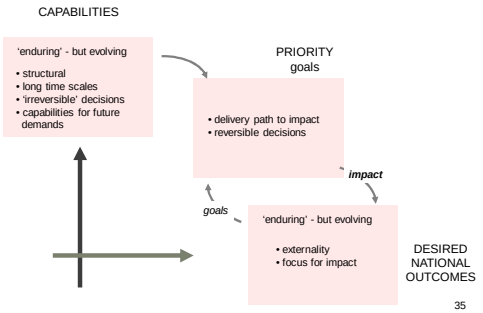
Investing in missions and capabilities to address national priorities …

Matrix management



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Governance of the innovation system:

Strengthening strategic leadership for a never-ending journey

Structuring how government exercises its roles and promoting sound governance for its innovation policy framework is promoted by distinguishing three distinct functions

Needs to be open to 'feedback' from environment that may destabilise existing understandings and arrangements

Design principles that avoid programme lock-in or capture. Implementation held accountable against policy objectives

Audit and review should be independent functions.

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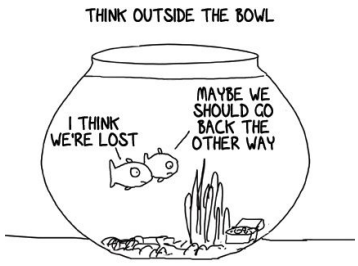
The innovation challenge:



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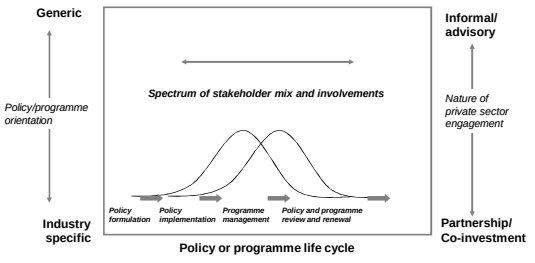
First Principles - Generic

Do	Don't	Recognise
Align with (changing) global environment and realities	Entrench policy obsolescence	Maintain capability to respond to uncertainty and the unexpected
Develop clear reference models for innovation and development	Apply 'one size fits all' models; entrench institutional "silos"; or lose policy focus over time	Risk that parts will be stronger than the whole; risk of programme bureaucratisation over time
Adopt portfolio model to Innovation System components - role house	Skew interventions	Align programmes with role characteristics, including time horizons for outcomes
Pursue evidence based policy, and embed ex ante evaluation criteria	Ignore data limitations	Challenge of developing meaningful data sets, and need for longitudinal analysis
Actively manage a capability/output matrix	Under-invest in supporting infrastructure	Articulate and embed paths to impact, but allow for synergies and serendipity
Develop open innovation market mechanisms	Over-externalise	Importance of feedback mechanisms and need to capture learning
Strike balance in levels of interdependence (loose versus tight)	Confuse roles and accountabilties	Navigate between rigidity and flexibility

First Principles - Country or Context Specific

Do	Don't	Recognise
Align with (changing) local environment and realities	Maintain policies or programmes beyond their half-life	Monitor for gaps in attention; review for continued policy and programme relevance
Recognise structural realities: -impact of economic geography and demography; -natural endowments vs built competitiveness	Indiscriminately mimic other country models	Scope for policy dissonance
Recognise and work with path dependence	Ignore history	There is no 'greenfield' environment
Promote bi-partisan consensus	Allow policy capture	The constraints of rigid political paradigms; the influence of the locus and focus of policy sponsorship.
Explore "small country" strategies and principles	Ignore imbalances of market power	The global economy is not a level playing field
Adjust for local industry structure and capabilties	Confuse structural adjustment and industry development	Scale affects the impact of global factors

Generalising from the Australian experience:
THE SPECTRUM OF STRATEGIC POLICY FORMULATION



Generalising from the Australian experience:
The variety of possible instruments and incentives deployed (often in combination)

Instrument	Example
Block funding *Tied* *Untied*	CSIRO Research Institutes
"Bully pulpit"	Industry Action Agendas
Co-investment	IIF;RR&DCs
Co-location (clustering, hubs)	CSIRO; Universities
Government procurement -Offsets - etc	Auto Pharma
Grants *- Competitive* *- Entitlement*	Commercial Ready EMDG
Industry Levies	RR&DCs
Licensing	Telecoms; Govt information
-competitive *- negotiated*	IIF Public agencies

Instrument	Example
Loans	Qld 'Smart State" loans
Offsets	
PPPs	Infrastructure projects
Subsidies	AKA as co-investment; 'Partnerships for Development'
Tax concessions or credits	R&D Tax Concession
Underwriting	EFIC

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