



# **venturous**AUSTRALIA

**BUILDING A  
STRONG NATIONAL  
INNOVATION SYSTEM**

**Dr Terry Cutler**

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## TAKING STOCK – the start of an innovation scorecard

### INDICATOR

<b>Relative GDP per capita</b>	7 <sup>th</sup> out of OECD 30, but drifting below the best for decades
<b>Productivity growth</b>	Highly concentrated (1992-2004) in agriculture, wholesale trade, communications and finance. Multifactor productivity growth has stalled since 2003.
<b>Trade Intensity</b>	c. 20% (one of lowest in world)
<b>Services exports</b>	The share of services in total exports has been declining
<b>Terms of trade</b>	Currently booming (due to resources, but historically very volatile)
<b>Innovating firms</b>	Only 7.7% of innovating firms pursuing 'new to world' innovation. Australia ranks poorly for 'capacity for innovation' in WEF surveys, and worse in World Bank's assessment of 'value chain breadth' of Australia's firm base.

**Global and exporting firms**

Of 8 firms in Fortune 500, only 1 is a global enterprise (BHP Billiton)  
Only 90 of top exporters have trade intensity > 10%, and only 49 have trade intensity greater than 50%.  
Service industries 3% of exporters, but 22% of value

**Global innovators**

No Australian firm in Business Week survey of top 50; but two Indian firms scored this year ((Tata, and Reliance)

**Patents**

Less than 1% global share.

**Scholarly publications**

3% global market share

**Terms of trade in knowledge**

2007 IP deficit of \$2.5b, and rising.

**Firm's absorptive capacity**

High ICT investment, but Australian firms 24<sup>th</sup> out of OECD 28 for having own website.

Declining number of researchers as proportion of workforce

Australia ranks OECD last for employer investment in vocational education and training

## **Human capital**

Educational outcomes have deteriorated since 1990s

## **R&D investment**

Business expenditure as % of GDP is half OECD average

Government support for science and innovation has fallen from 0.76% of GDP to 0.58% in 2007

## **Low inward innovation investment**

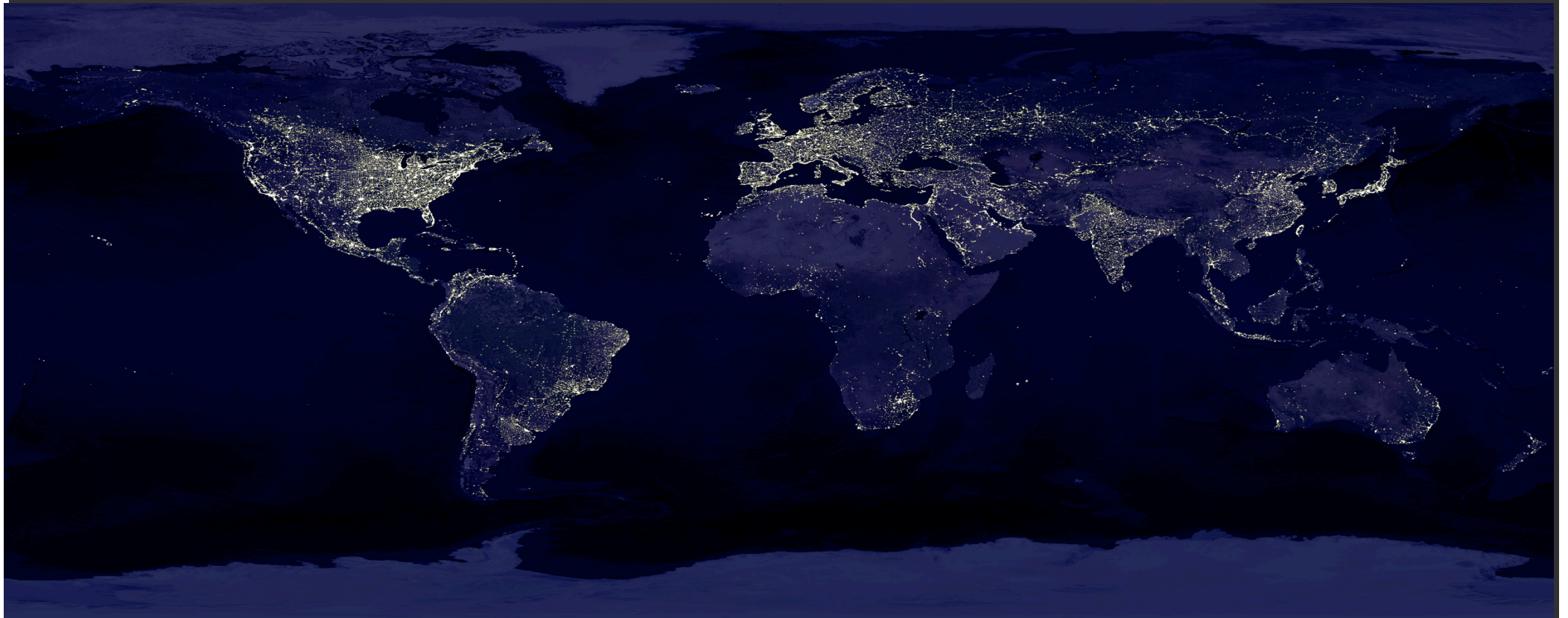
Australia is slipping, being 16<sup>th</sup> out of 20 OECD countries in 2007

Most attractive foreign R&D locations are non-OECD countries

Australia ranks last in OECD for firms with foreign co-operation in innovation

**Underperformance compounds  
underlying structural handicaps**

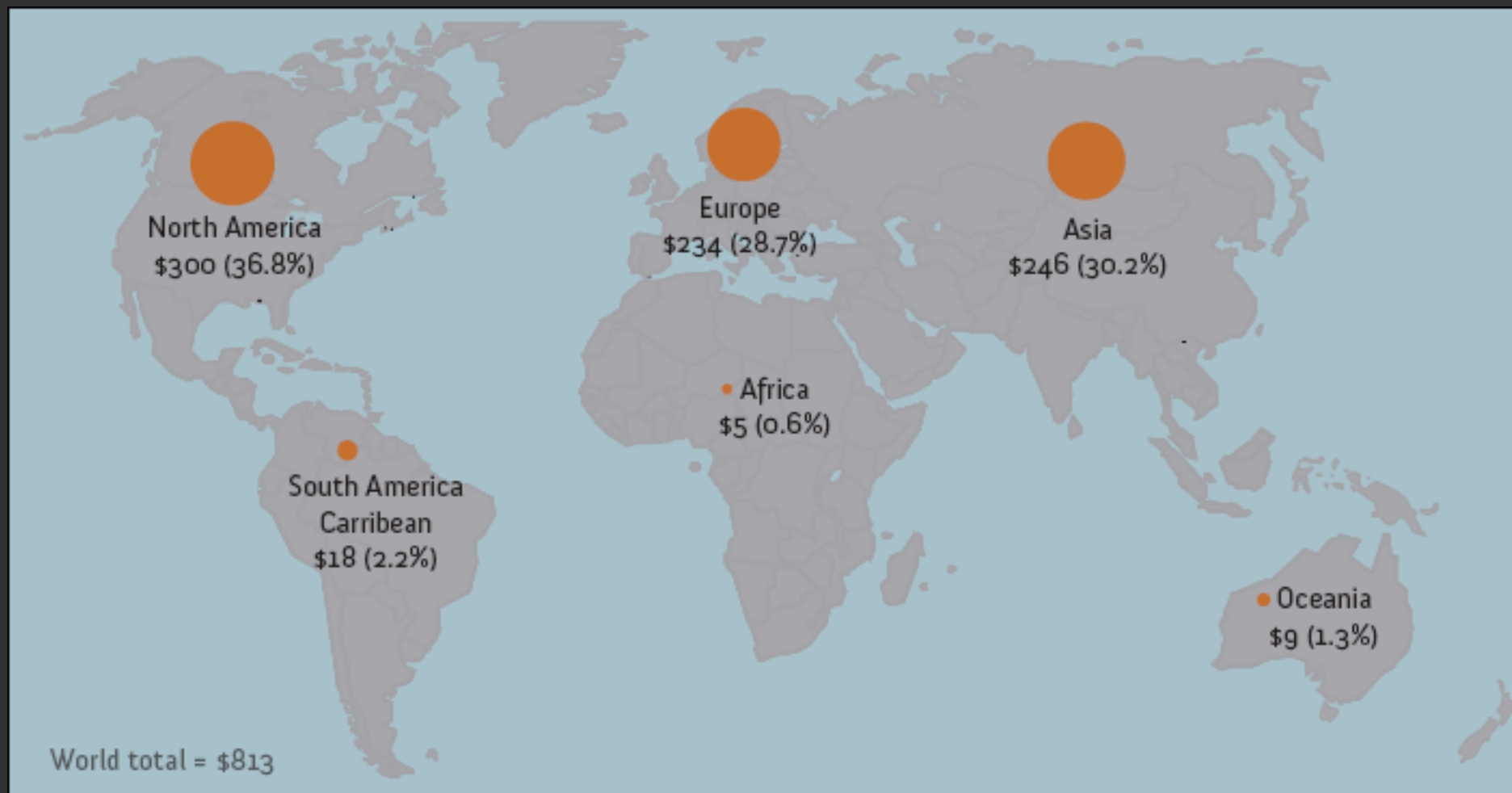
**Putting Australia into context**  
**- the innovation challenge of a small, remote economy**  
**within a big world**



## the innovation challenge of a small economy

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- ¶ The tyranny of distance
  - ¶ The tyranny of low density (sparsity)
  - ¶ The impact of trade gravity
  - ¶ The opportunities from natural endowments,  
and the need to prioritise  
(seas, space, land, resources, biodiversity, isolation)
  - ¶ The challenges of federated, distributed systems

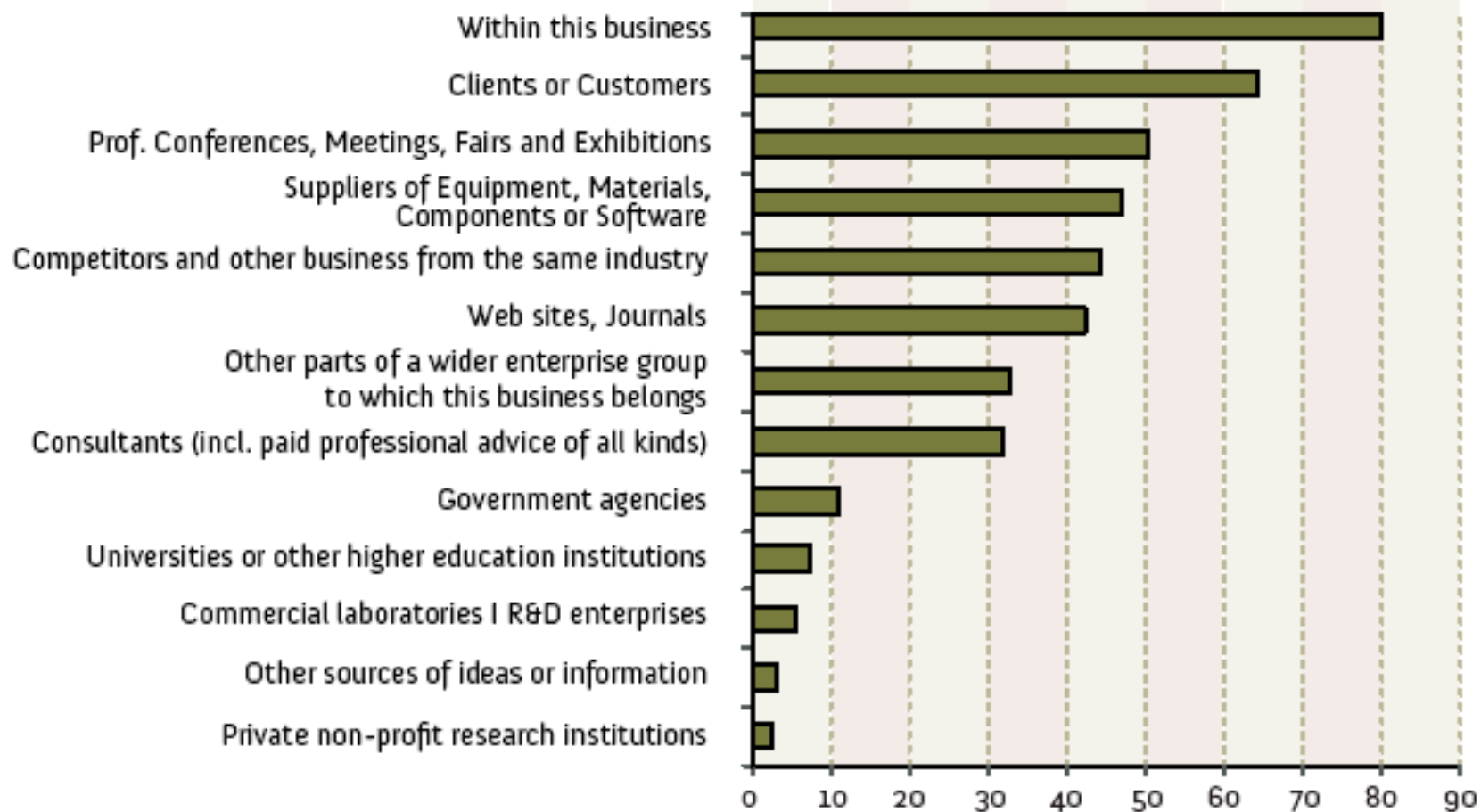
## Estimated R&D expenditures and share of world total, by region (2002)



US National Science Board, Science and Engineering Indicators, 2008

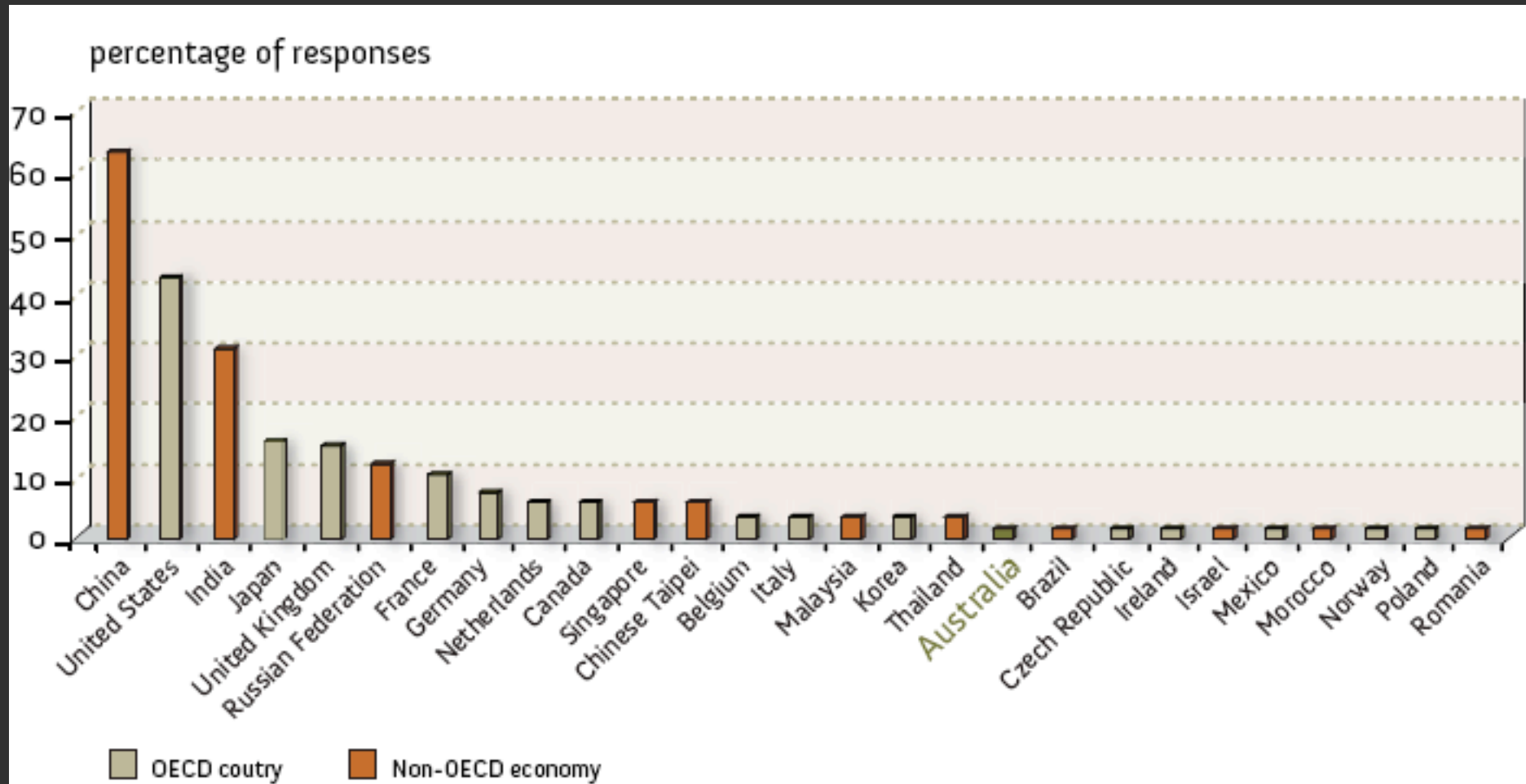
# Key Sources of ideas or information for innovation in Australian innovating businesses – *the problem of being a long way from the action*

(per cent of all companies)



Derived from *Innovation in Australian Business 2003*, (Reissue) ABS 2006

## Most attractive foreign R&D locations – *we are scarcely on the radar*



Source: OECD, *Main science and technology indicators*, 2007

# What would a well-functioning innovation system look like?

Core functions of an innovation system	Potential points of failure within an innovation system
1. Addressing opportunities and choices ( including options around emerging markets)	1. Structural 'lock in' and inability to change track ( <i>yesterday's success formula no guarantee against tomorrow's challenge</i> )
2. Building national capabilities	2. Skill and capability gaps and learning problems (not picking up market signals)
3. Managing risk and capacity to deal with uncertainty	3. Inadequate institutional evolution and responsiveness ( <i>players pulling in different directions</i> )  4. Trade-offs between diversification and specialisation ( <i>how many eggs; how many baskets?</i> )
4. Ensuring the supply of infrastructure	5. Inadequate infrastructure provision
5. Mobilising resources around challenges or opportunities	6. Inadequate linkages and networks – <i>blocked information flows and missed connections</i>  7. Imbalanced innovation investment portfolio ( <i>skewed, or some bases not covered well</i> )

## Potential points of failure

## Issues raised during Review

Inadequate infrastructure

Lack of world competitive broadband  
Inadequate funding of national facilities  
Neglect of national collections, and their digitisation  
Underfunding of research infrastructure  
No legal deposit for digital publications  
Underfunding of metrology and standards  
eScience and eResearch platforms

Structural 'lock in' and inability to change track

Australian manufacturing (eg auto and textile reviews)  
Coal fired energy  
Incompatible information systems  
Proprietary standards and IP lock-up  
Weakening firm technical skill base  
Global "innovation gravity" – Australia's 2% handicap  
Slow exploitation of Web.2.0 platforms

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**Inadequate institutional  
development and evolution**

**Digital media regulation**

**Poor skills and awareness of emerging IP policy  
issues and emerging cyberlaw**

**Lag world in policies for open access to public sector  
information**

**Non-transparent approach to market design of  
emerging markets (GM crops, nanotechnology, and  
carbon reduction)**

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Network problems

Over concentration on formal, contractual  
collaboration at expense of informal, trust-based  
relationships.

Neglect of social networking in innovation policy.

Barriers from disciplinary, sectoral and bureaucratic  
silos

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## Capacity and learning problems

Weakness in extension services, particularly to small businesses

Relatively low levels of technical skills within firms

Undeveloped intermediary problems, particularly internationally

The need for 'public spaces for technology transfer and information exchange

Lack of connection with the 98% of innovation developed elsewhere

Need enhanced awareness of and access to platform technologies, including new innovation technologies

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Trade-offs between diversification and specialisation

Lack of attention to specialisation in 'horizontal' capabilities (such as platform technologies) and in the ability to mobilise multidisciplinary skills.

Insufficient attention to role of design and creative industries.

Imbalances in the innovation portfolio

Need greater attention to demand-side drivers of innovation, and diffusion to existing firms.

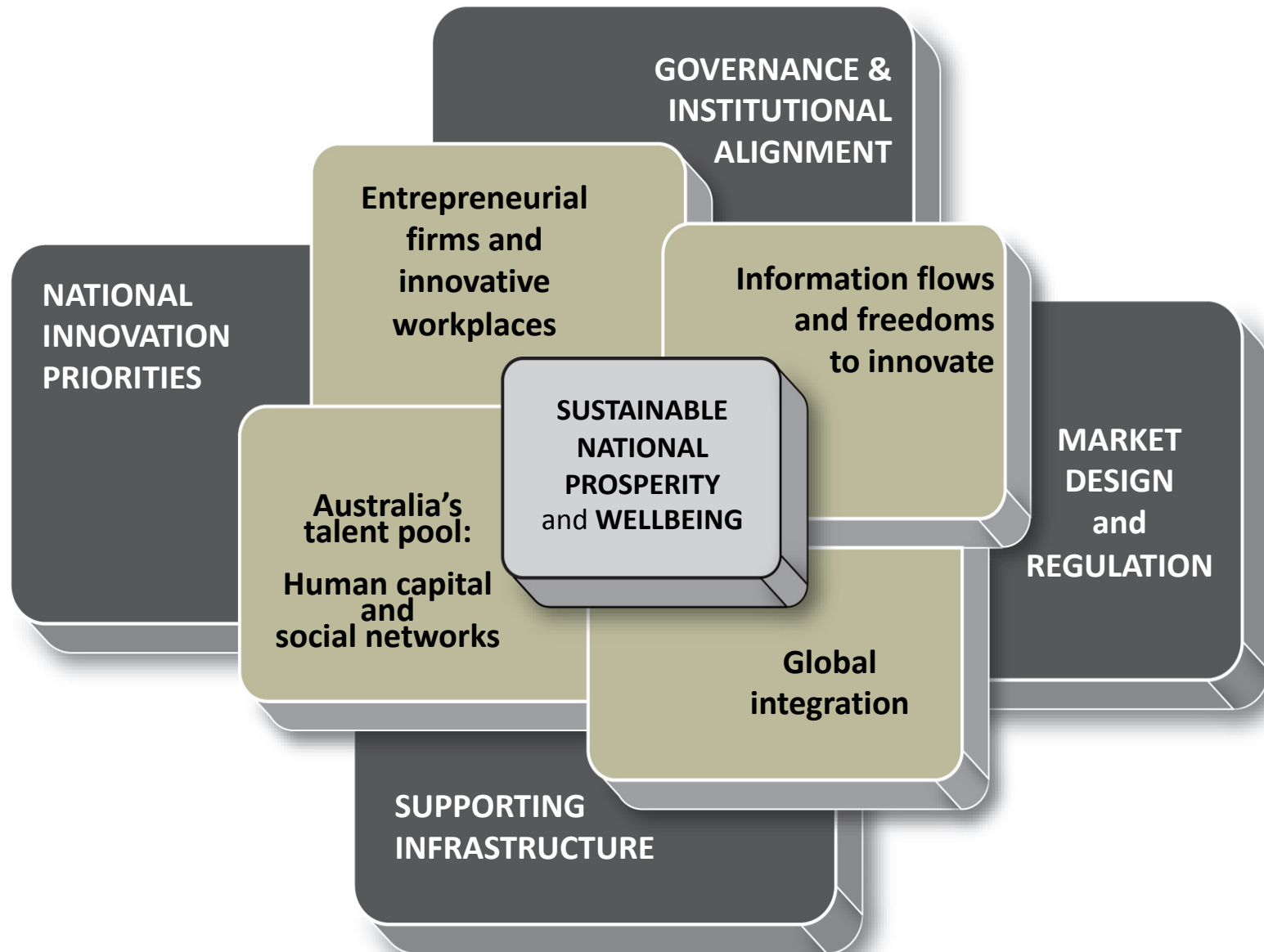
Neglect of role of creative and liberal arts.

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# 10 framework principles

1. The market place is the crucible for innovation. The firm and the entrepreneur must be at the heart of innovation
2. People and talent are what make it happen.
3. Access to knowledge and information flows is what connects and energises the players within the innovation system.
4. Innovation policy needs to address systemic points of failure - a broader notion than market failure
5. A small country economy faces the challenge of accessing and leveraging the 98% of knowledge not invented locally – global integration is a necessity.
6. Innovation policy calls for a whole of government perspective and coordination
7. National priorities for innovation should focus on distinctive strengths and challenges
8. We need to invest in gathering information about innovation to support evidence based policy
9. There needs to be clarity about the role of players
10. Within a global economy, innovation systems must internationalise.

# Four key thrusts for innovation policy, and four supporting roles for government



KEY DRIVERS OF DESIRED OUTCOMES

CORE ROLES FOR GOVERNMENT

**PRIORITY  
CHANGED  
AHEAD**

**STOP**



# **NATIONAL INNOVATION PRIORITIES**

**Leverage natural endowments  
and built strengths**

**Exploit distinctive national advantages**

**Transform and reinvent existing industries**

**Internationalise innovative activity**

**Invest in strategic capabilities and  
platforms**

# The role of the different players and the rules of the game



# Roles within the innovation system

**The firm and the entrepreneur  
(or impresario)**

**Universities**

**Public research agencies**

**The Academies**










**Industry Associations**

**Government**

Greater clarity about roles will facilitate better innovation performance and collaboration around shared priorities and directions

# A small economy must specialise and prioritise

WILL YOUR RESEARCH PROGRAM GET THE CHOP AT THE 2020 SUMMIT? PANIC NOW!!!

<p>AUSTRALIA IS A SMALL COUNTRY (ONLY 1.6% OF THE WORLD'S GDP), WE CAN'T DO EVERYTHING! WE'VE GOT TO MAKE SOME TOUGH DECISIONS ABOUT INTELLECTUAL CAPITAL. WHAT WILL WE INVEST IN AND WHAT WILL WE LEAVE BEHIND? SHOULD WE BE MEDIOCRE AT EVERYTHING OR TOTALLY BRILLIANT AT A FEW THINGS?</p>		
<p>We're pretty good at the Hokey Pokey</p> 	<p>We should keep investing in that then</p> 	
<p>AUSTRALIA'S SPACE PROGRAM</p>		
<p>Should we establish a base on the sun?</p>	<p>It would be hugely expensive and it's difficult to see the benefits.</p>	
<p>We could put Kyle Sandilands up there!</p> 	<p>We should start right away</p> 	
<p>Nano technology vs Nanna technology</p>	<p>Become an international sporting powerhouse! <b>YES</b> ✓</p>	
<p>I can't see it</p> 	<p>Become a powerhouse in gracious defeat and humility! <b>NO</b> ✗</p>	
<p>I can't see it</p> 		
<p>OTHER THINGS WE MIGHT LET GO OF</p>		
<p>Water soluble fish detector</p> <p>you put it in the water and then umm...ooh hang on</p> 	<p>Remote controlled tin foil</p> <p>I shall wrap that sandwich from over here!</p> 	<p>Hippopotamus proof pants</p> <p>I have this feeling I've forgotten something...</p> 

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