



Government of **Western Australia**
Department of **the Premier and Cabinet**

Presentation to SEGRA

Chief Scientist of Western Australia
Professor Peter Klinken
26th October, 2016

Science and innovation

Lord Alec Broers

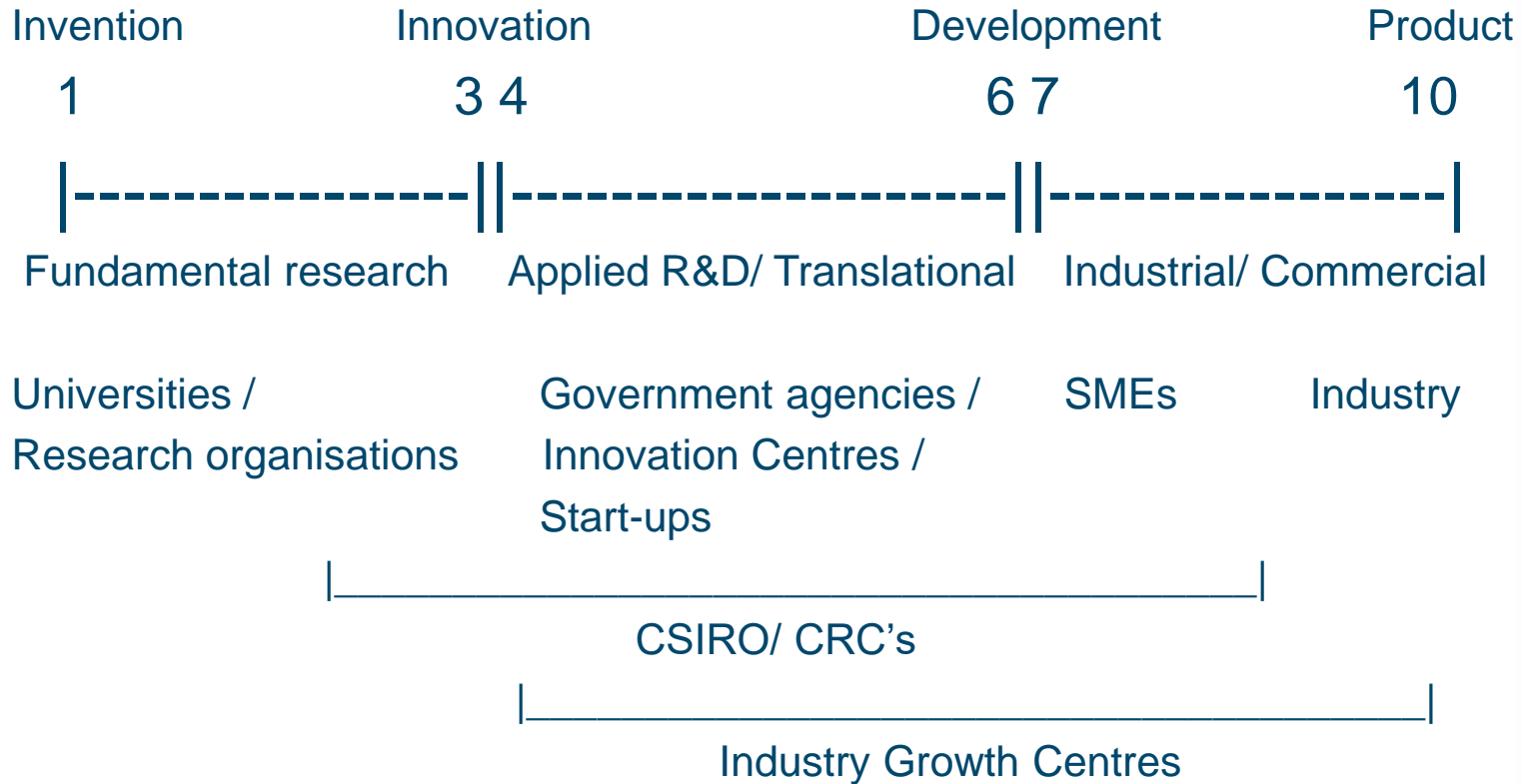
“The technological revolution has been swift and the pace relentless. Nations that fail to keep up are doomed to become part of a second world”

(UWA Alumni presentation, London 2014)

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Science / Industry Continuum



Australia as a knowledge nation

“Australia’s science base is strong, as shown by its high public-sector expenditure on R&D, the high international ranking of its Universities and publication rates in top scientific journals”

(OECD Science, Technology Industry Outlook 2012)

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Australia as a knowledge nation

- Produces ~3-4% world's new knowledge annually
- ~0.3% world's population
- Rankings
 - OECD #9
 - Nature #11
 - Scientific American #12
- 6 Universities in top 100 globally (ARWU)
- 16 Universities in top 100 (under 50 years old)

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Australian Nobel Prize Winners

Medicine

- Baron Howard Florey
- Sir Macfarlane Burnet
- Sir John Eccles
- Sir Joseph Katz
- Peter Doherty
- Barry Marshall / Robin Warren
- Elizabeth Blackburn

Physics

- Sirs Lawrence and Henry Bragg
- Brian Schmidt

Chemistry

- Sir John Cornforth

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Rankings for Innovation

- Bloomberg **#15**
- OECD **#19**
- Global Innovation Index **#19**
 - Institutions **#11**
 - Human capital and research **#7**
 - Infrastructure **#7**

Translation / Commercialisation

- Global Innovation Index
 - Innovation efficiency **#81**
 - Knowledge diffusion **#78**
 - Science and Engineering graduates **#73**
 - High/ medium tech manufacturing **#54**
- OECD
 - Firms collaborating with academia **34/34**
 - Firms collaborating globally **26/34**

Conclusions

- Very good a research and innovation
- Poor transfer to economic benefit
- Poor collaboration - industry and academia
- Insufficient STEM graduates
- PhD graduates -> academia not industry

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STEM education

- Underpins a capable and adaptable economy
- Core Competencies : critical thinking, creative thinking, problem solving, innovative approaches
- Curriculum content can crush creativity and curiosity
- Science, mathematics - compulsory in Yrs 11-12
- Crucial for jobs of the future
- Important for an informed community that values science, innovation and creativity
- STEAM / eSTEAM – arts, entrepreneursh

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Future job predictions

CEDA

- 40% of current jobs will not exist in 10-15 years

Australian Chief Scientist

- 75% of fastest growing occupations require STEM

CSIRO

- Job creation will outpace job destruction, despite automation
- New jobs will involve creativity, complexity, judgment
- Need agile, flexible, nimble workforce

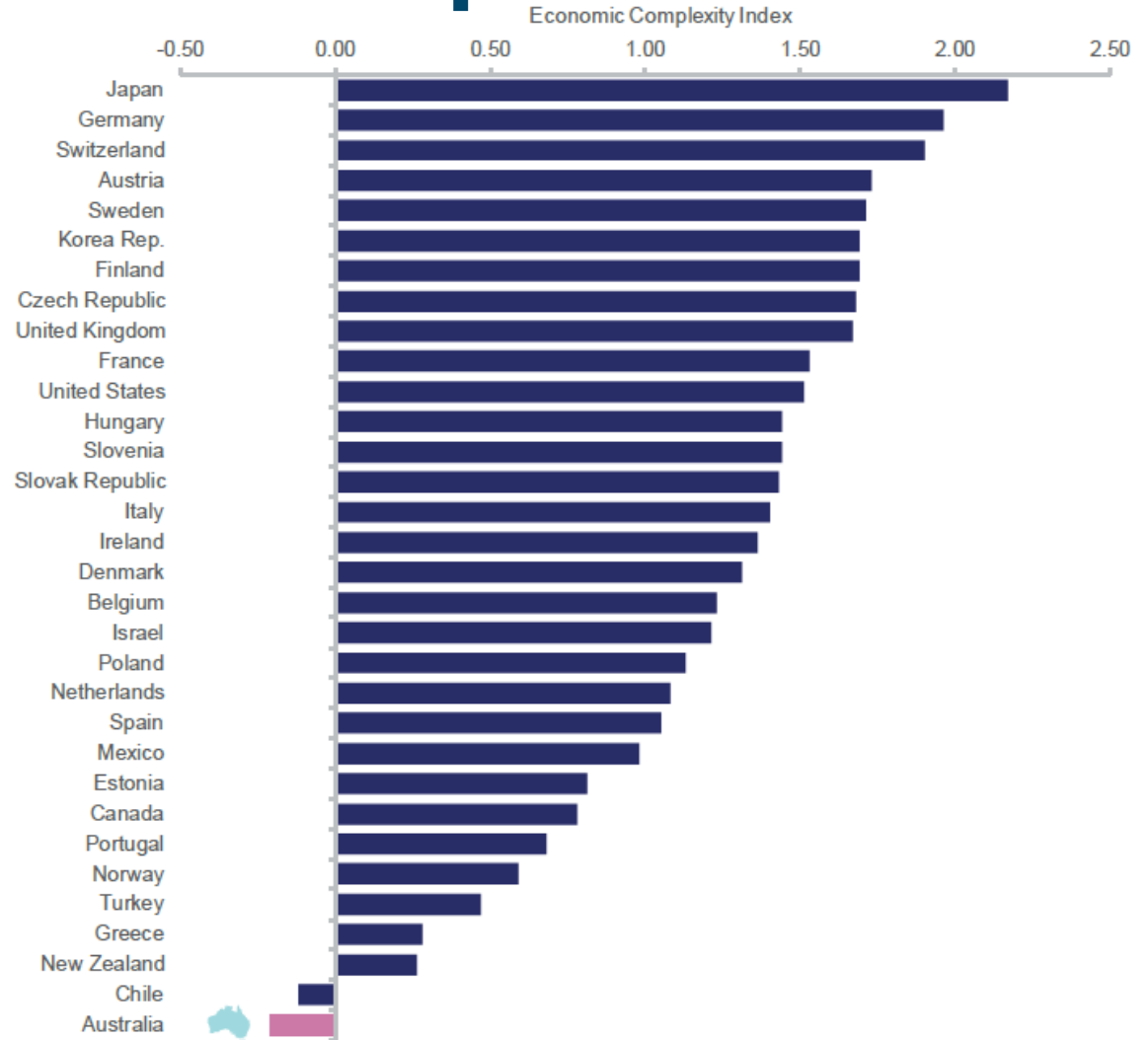
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Australian Exports

- Diversified domestic industrial base
- Lowest export complexity in the OECD

Figure: Economic Complexity index (2010) in OECD Countries
(Source: Harvard University)



Curse of the Natural Resources ("Dutch disease")

Countries "blessed" with natural resources:

- Cost of living escalates
- Other industries become uncompetitive
- Exports more expensive
- Complacency
- Decreased innovation
- Decreased entrepreneurial activity

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Some Australian challenges

- Over-governed (red / green tape)
- Global Competitiveness Report (ranked #21) – problems with labour regulations, tax rates, government bureaucracy, complex tax laws, work ethic, infrastructure
- Risk averse eg (KPMG - Aust CEOs most risk averse)
- Cost of doing business
- Investment capital shortage
- Sense of entitlement / decreased personal responsibility
- Reduced entrepreneurial spirit (“Have a go, mate”)
- Workforce capability (STEMable?)

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Creativity / Quality of life

- Global Creativity Index (Talent, Technology, Tolerance)
 - Australia #1
- UN Human Development Index (Quality of life)
 - Australia #2
- Sustainable Development Network (Happiness)
 - Australia #9
- Economist Intelligence Unit (Most Liveable Cities)
 - Melbourne #1, Adelaide #5, Perth #7

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Innovation and Creativity

- **Bright** ideas come from **bright** people
- Environment to attract / retain bright people
- **Creative class** (Richard Florida, Martin Prosperity Institute)
 - Passionate
 - Aspirational
 - Open-minded
 - Risk takers
 - Value creativity
 - Mobile

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Approaches to innovation

Innovation – embedded in ALL organisations (?)

Examples:

- Established companies – can we improve?
- SMEs - what's the problem ? Can we fix it?
- Start-ups - new idea -> innovation
 - high “failure” rate
 - potential disruptive new technology

New job creation in USA

Kauffman Foundation

- Over past 25 yrs new private sector jobs created by companies <5 yrs old
- Companies >5 yrs old destroyed more jobs than they created
- Conclusion – new and young companies are the primary source of job creation in the US economy

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Environment for success

- **Physical**
 - Natural environment
 - Built environment
 - Universities, research organisations
 - Science / technology parks, incubators, accelerators
- **Emotional**
 - Culture that values science, innovation, creativity
 - Risk taking, entrepreneurship
 - Innovation ecosystem - mentoring, feeling valued, supported
 - Narrative – examples of success
- **Financial**
 - Capital - angel, seed, venture, corporate
 - Risk appetite (beyond resources...)
 - Superannuation funds to support innovative industries
 - Reduce regulatory burden

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Cambridge phenomenon

- 1970's – “market town” with big University
- Current population – 130,000 (wider 350,000)
- 60,000 high-tech employees
- 1500 high-tech companies
- Key elements for success:
 - Personnel
 - Facilities
 - Culture
 - Finance
 - Communication
 - Collaboration
 - Incentives

Regional WA

- How to attract / retain **BRIGHT** people?
- Create the environment for innovation
- Clear plan / bold vision
- Comparative advantages
- Incentives

Examples:

- Geraldton – “Pollinators” incubator
- Bunbury – Vue Group

Thank you

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Government's role

- Clear direction, co-ordination
- Buildings, facilities, equipment
- Catalytic
- Support
- Reduce impediments
- “De-risk” projects for industry

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Perth – Innovation and Creativity

- Maturing city
- Ingredients for a dynamic city
- Energy, passion
- Entrepreneurship, risk-taking
- Music / Food / Wine / Arts / Culture
- Science, innovation



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