



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

# Presentation to SEGRA

Chief Scientist of Western Australia  
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# Science and innovation

## Lord Alec Broers

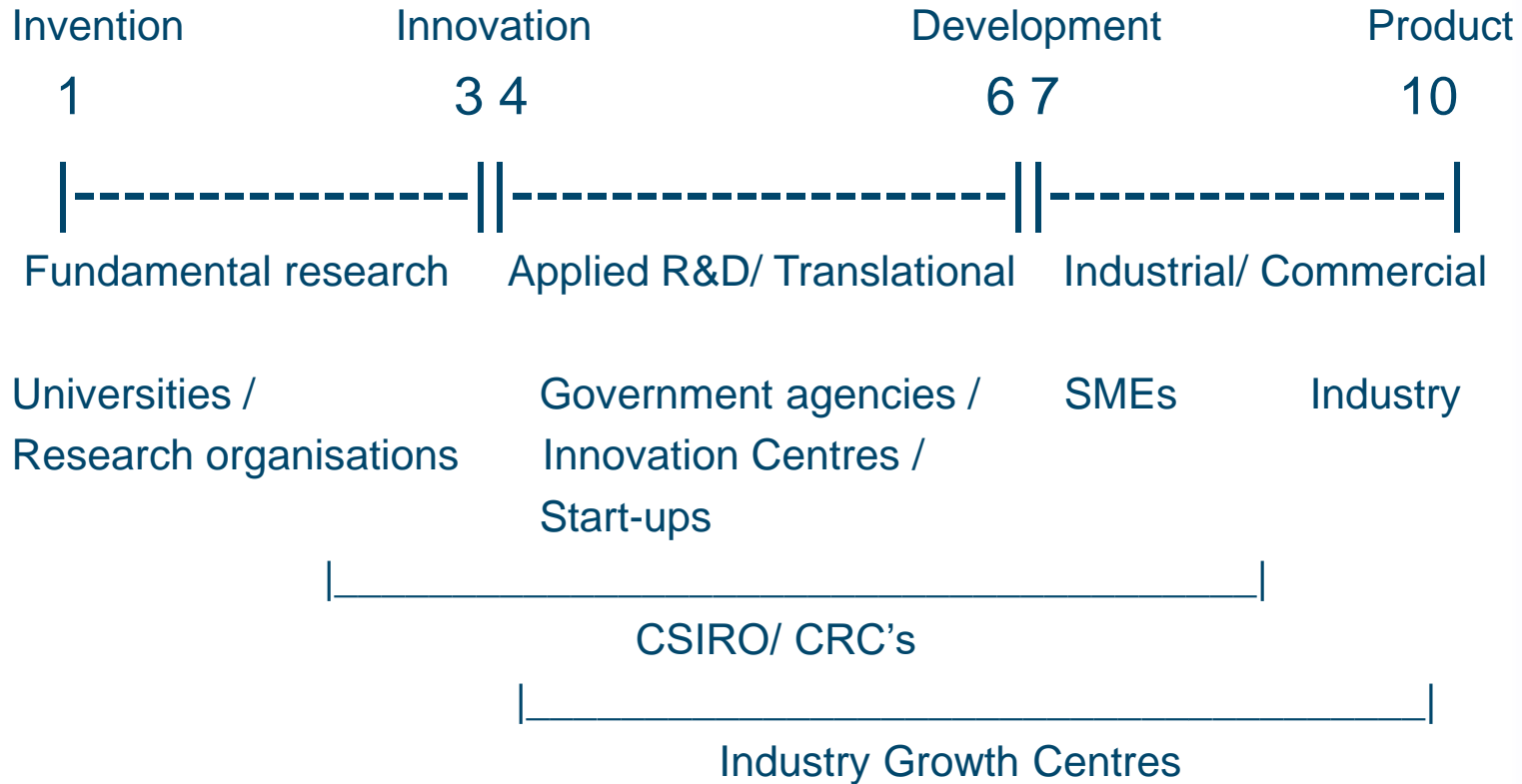
*“The technological revolution has been swift and the pace relentless. Nations that fail to keep up are doomed to become part of a second world”*

(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

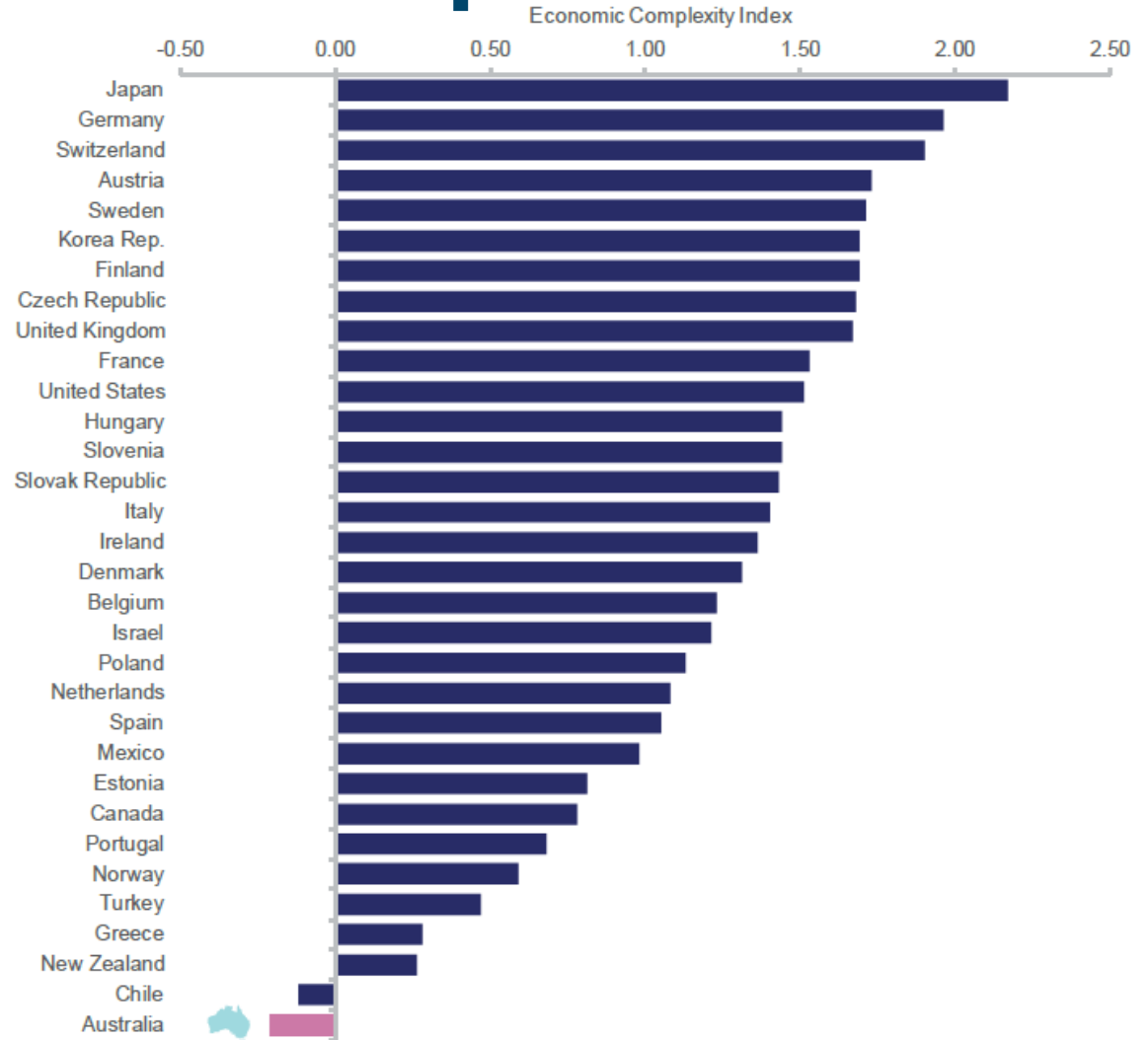
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# Australian Exports

- 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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