# Looking at Innovation from a Uniquely Canadian Perspective

**Richard Hawkins PhD**
**Professor,**
**University of Calgary**
**rhawkins@ucalgary.ca**

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# A “Canadian Paradox”?

- Canada has had top five status on the UN-HDI for over 30 years
- Canada is one of the most prosperous countries on earth
- Canada has weathered successive economic storms far better than the US and most OECD countries
- Canada produces first rate human capital
- Canada punches way above its weight in world science
- Relative to its size, Canada has a large number of globally competitive MNCs in a variety of sectors

# A “Canadian Paradox”?

**However:**

- Canada appears to have chronically **lower productivity** than the US
- Canadian companies do not appear to invest as much in **R&D** as US companies

**Obvious, but contradictory conclusion:**

- ***if*** growth and prosperity depend on productivity
- ***and*** productivity is correlated strongly with R&D
- ***then*** Canada cannot possibly be prosperous!

**Is this really a paradox, or simply the product of misplaced emphasis; on inputs like R&D rather than on outcomes like innovation?**

# Seven Questions

1. What is innovation and why should it concern policy-makers?
2. How has innovation been conceptualized in policy?
3. What is the problem with this conceptualization?
4. **Is Canada good or bad at innovation?**
5. Do existing innovation policies work?
6. Why is it important for Canada to think about innovation policy in a different way?
7. What needs to be done?

# Q1:

# What is innovation and why should it concern policy-makers?

# Q1a: What is innovation?

- Any new combination of factors that produces new sources of value
  - New products and services
  - New processes and methods
  - New resources and/or resource supplies
  - New organizational forms
  - New markets

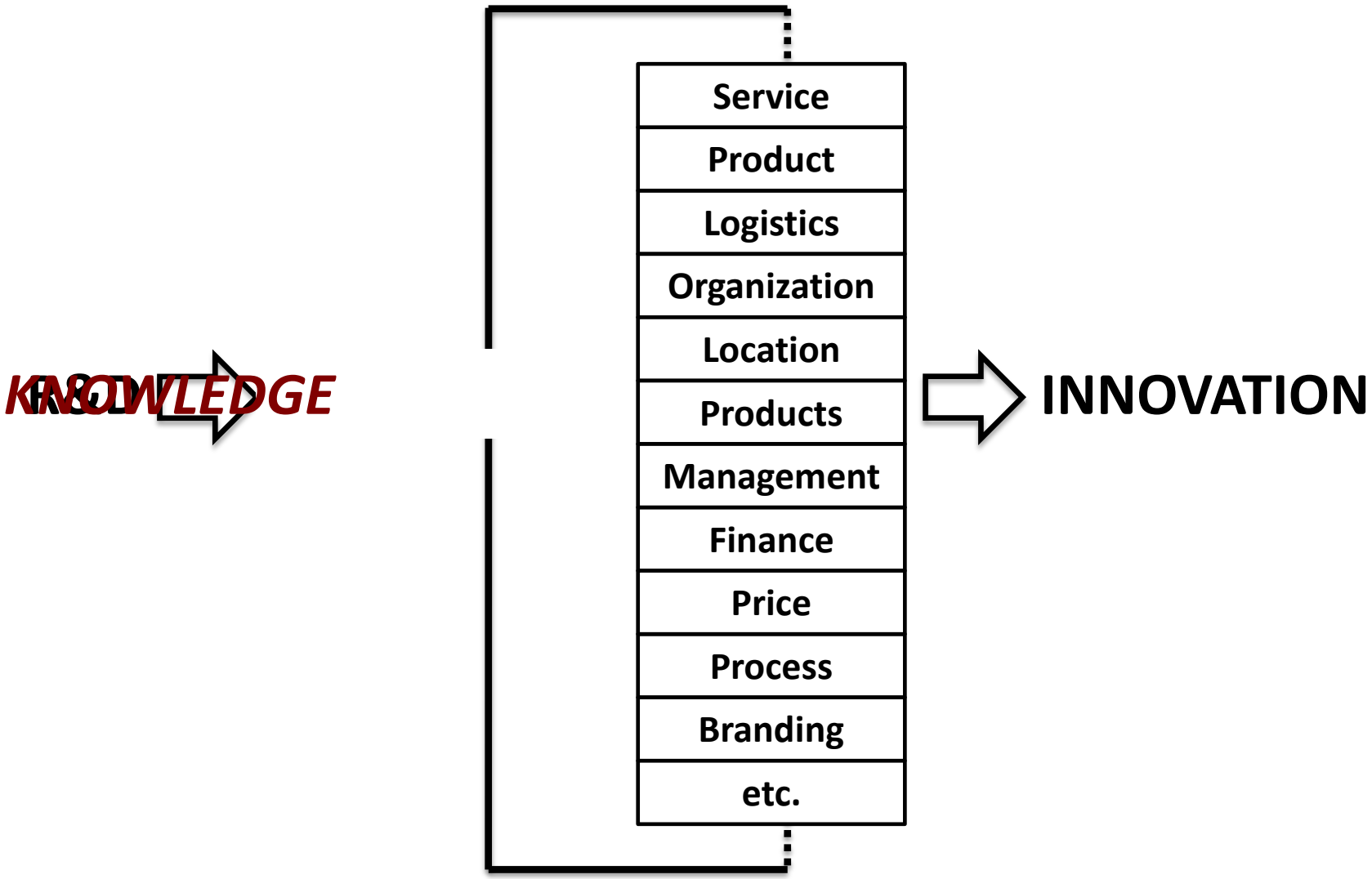
[Schumpeter, Theory of Economic Development (1912), and Oslo Manual (OECD/Eurostat 2005)]

# Q1b: What is R&D?

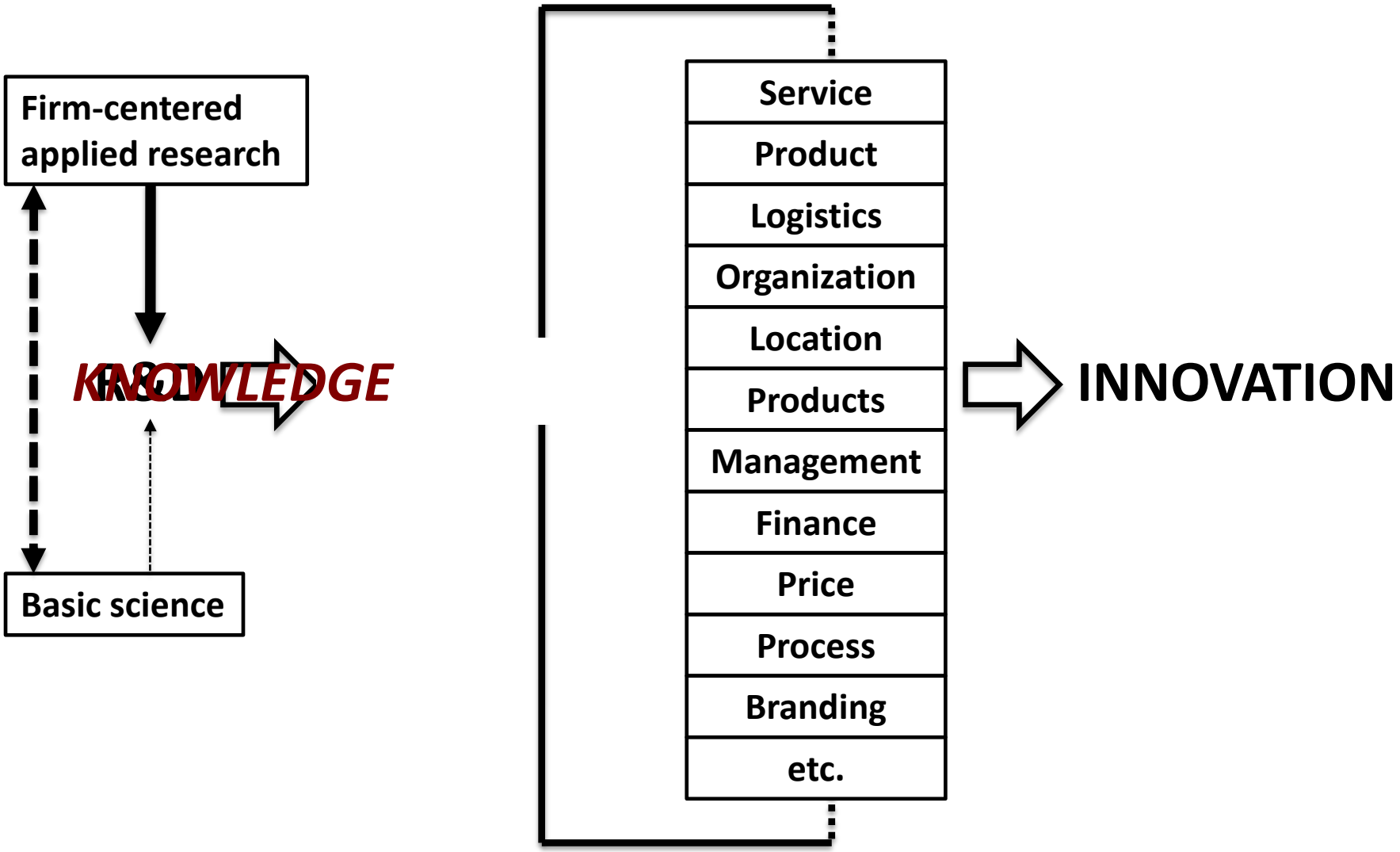
*"…creative work undertaken on a systematic basis in order to increase the stock of knowledge,* ***including knowledge of man*** *(sic)****, culture and society****, and the use of this stock of knowledge to devise new applications."*

[OECD Frascatti Manual for R&D Statistics (2006)]

# Q1c: What is the role of R&D in innovation?



# Q1d: Where does knowledge for R&D come from?



# Q1e: Why should any of this concern policy-makers?

- Innovation induces competitiveness, employment, productivity and growth
- Policies can promote or impede innovation
  - Structural interventions
    - e.g. legislation, regulation, procurement, education, basic research
  - Non-structural
    - e.g. finance, brokerage, networking
- Positive innovation policies should generate sustainable competitive advantages in their own jurisdictions
- **So why is it so difficult to demonstrate that they do this, in Canada or in any other OECD country?**

# Q2:

# How has innovation been conceptualized in policy?

# ***Innovation*** **policy??**

**Historically in the OECD region, *Innovation Policy* is basically *Technology Policy:***

- Innovation defined narrowly in terms of ***technical change***
- Policies aimed only at R&D: producing and applying ***more technology***
- ***Dominated by the linear model***:

  science => technology => growth

# Policy *imprinting*

**ca 1970 – ca 1985**

- Transition of policy interest from defense, public welfare and public works to innovation in commercial sectors
- Imprinting on IT – the perfect "political" technology
  - Rapid growth from minimal investment
  - High positive externalities
  - Low political risk
- Transferring expectations from the IT model to other industries

## Q3:

## What is the problem with this conceptualization?

# Why is *technology* policy a *conceptual* problem?

- Innovation scholarship has moved on
  - Innovation is ***much more than technology***
  - Technology (and R&D) is related to growth, but ***differently*** than previously thought
  - There is ***no linear relationship*** between science and R&D, or between R&D and growth
  - Proxy ***input*** indicators (R&D, patents, start-ups etc.) ***cannot be generalized*** as innovation measurements
  - ***Broader definitions*** and more precise exploration of more diverse innovation phenomena

# Why is *technology* policy a *practical* problem?

- There is ***no shortage*** of technology
- Focuses public resources on ***"technology producer goods"***
  - Policies, actions and statistics heavily biased towards R&D-intensive industries with patent-intensive business models
- **Most companies that "innovate" do not produce technology, and never do "R&D"** (Statscan Survey of Innovation, EU-CIS etc.)

# What does *R&D-oriented* policy ignore?

- Innovation in ***90%+*** of the economy
  - Fewer than a dozen sectors are R&D intensive (re-investing > 3% of revenues in R&D)
  - About 800 ***large*** firms worldwide perform roughly 80% of global R&D
  - Only 75 companies perform 50% of R&D in Canada and no Canadian company is one of "the 800"
- ***Capital-intensive*** industries (primary industries and services)
  - most capital-intensive innovation activities fall outside the "innovation" policy net, and outside the measurement framework

# Q4:

# Is Canada good or bad at innovation?

# Q4: Is Canada good or bad at innovation?

- National comparisons mean very little
- Need for an assessment of how and where we innovate, free of abstract performance norms and idealized outcomes
- National systems of innovation are unique products of distinct economic and industrial histories
- We have a suggestive outline of the Canadian system, but limited empirical capabilities

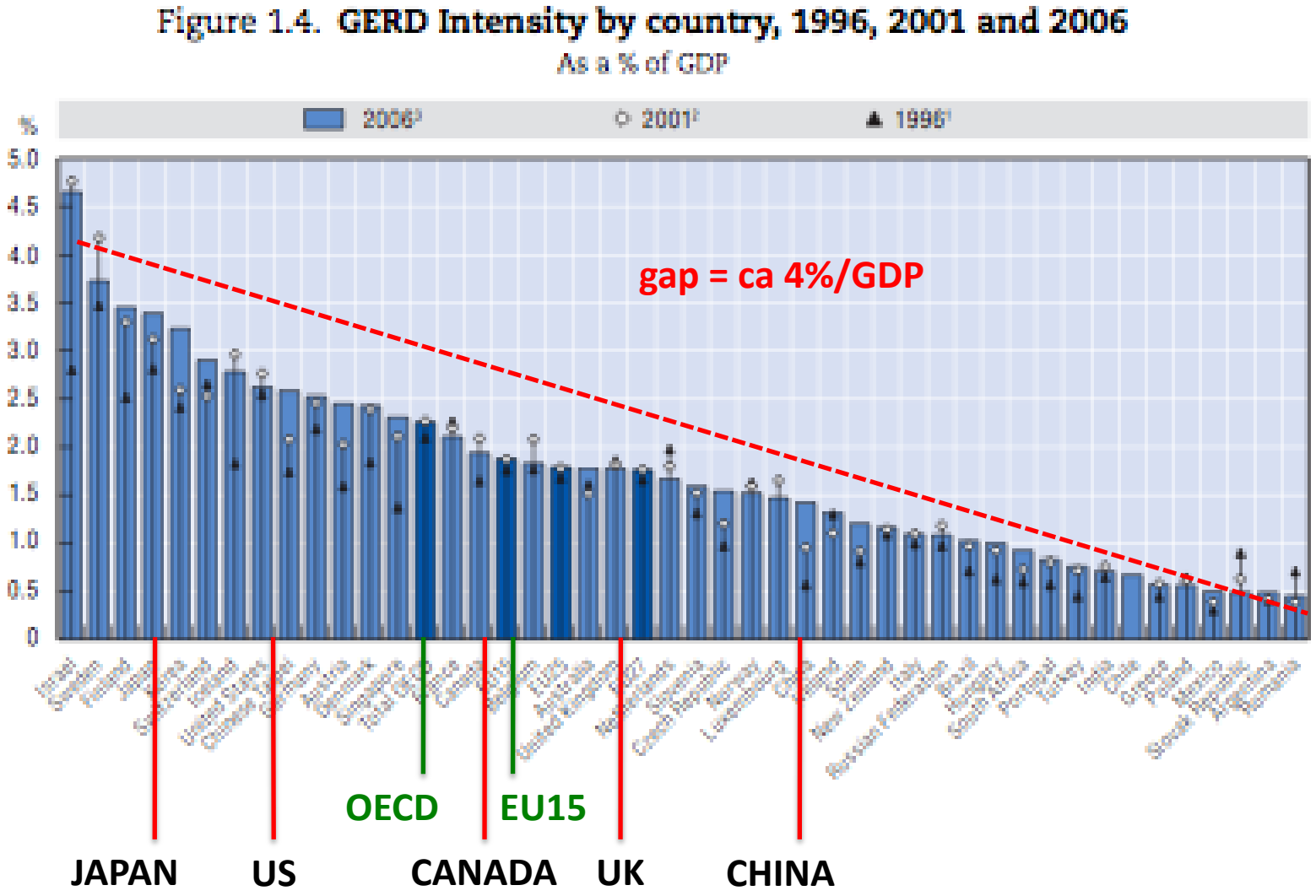
# Q5:

# Do existing innovation policies work?

# Main proxies for policy success

1. Increase investment in R&D
   - Industry
   - Higher education
   - Government
2. Gain ground on competitor jurisdictions in R&D investment

# Interpreting GERD



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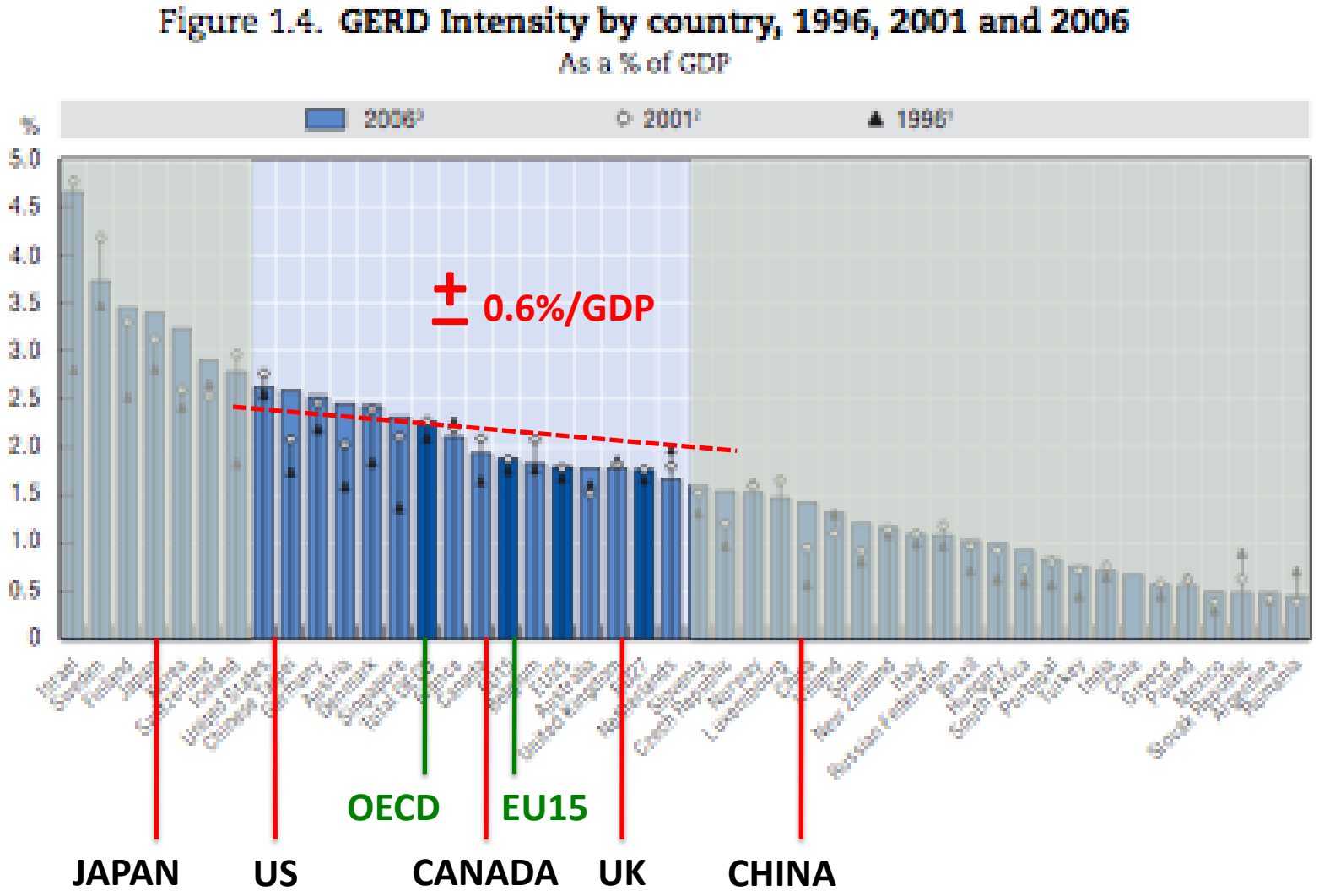


# Do technology policies actually work?

- OECD R&D average has not budged in 25 years (just under 2% of GDP)
- Minimal change in relative positions of countries over 25 years
- Only ever two genuine “gazelles” – Israel and Korea
- No consistent statistical correlation between table positions and economic performance over 20 year span:
  - Japan – high R&D : low growth
  - US – high R&D : slowing growth
  - NL – low R&D : accelerating growth
  - Israel, Korea, Austria – high R&D : high growth

*CONCLUSION:*

**If the aims of technology-oriented innovation policy are to boost R&D, then they all seem to have failed!**

# So are the statistics worthless?

- **NO!**
  - They give us invaluable knowledge about the role of technology producers in the Canadian economy
  - They signal important challenges for the R&D-intensive sectors
  - They indicate that along with most OECD countries, Canada's innovators are widely diverse
  - They show us what we don't know about the innovation system in Canada
- **But they do not in themselves provide a comprehensive image of Canada's innovation landscape**

## Q6:

## Why is it important for Canada to think about innovation policy in a different way?

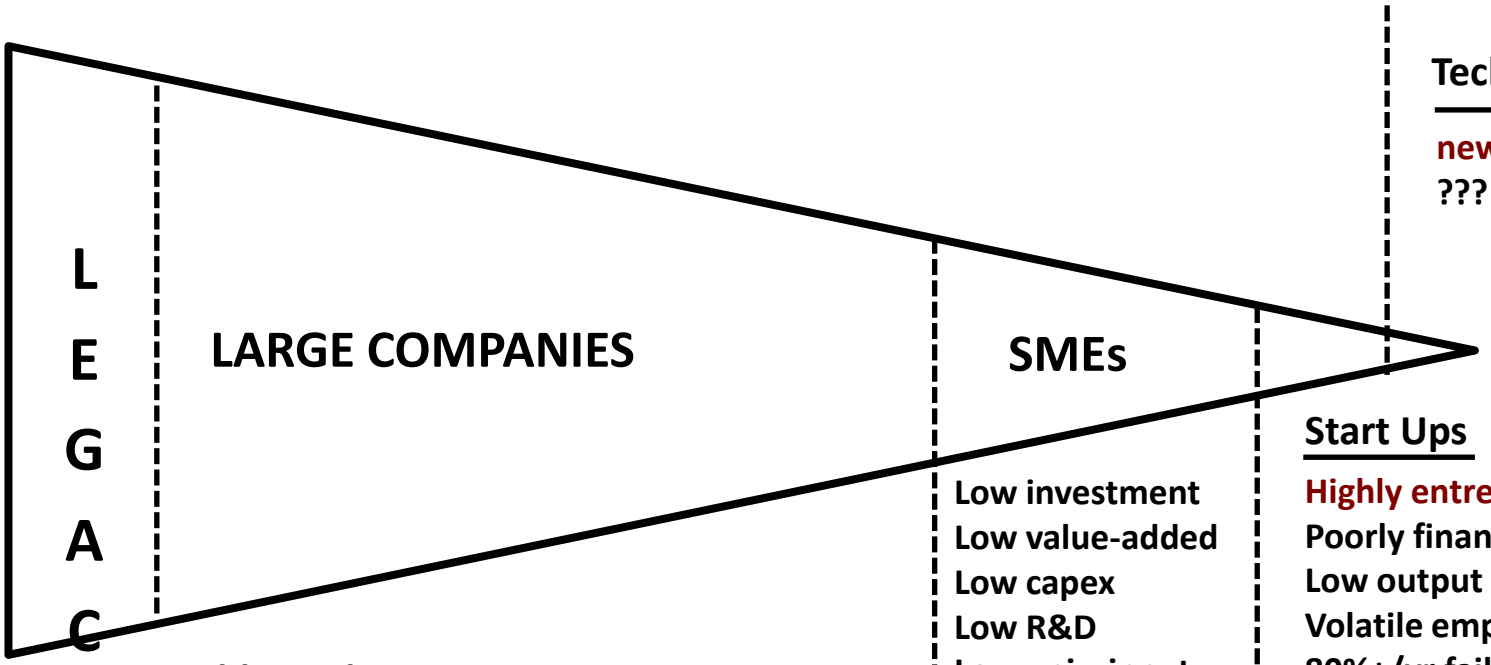
# Canada has a unique asset base

- one of only four OECD countries that **is <u>both a knowledge economy and a resource economy</u>** (with the US, Australia and NZ)
- most of our large structural industries are **<u>capital intensive</u>** – technology users rather than technology producers
- most of our large structural industries are also **<u>human capital intensive</u>** and technologically sophisticated

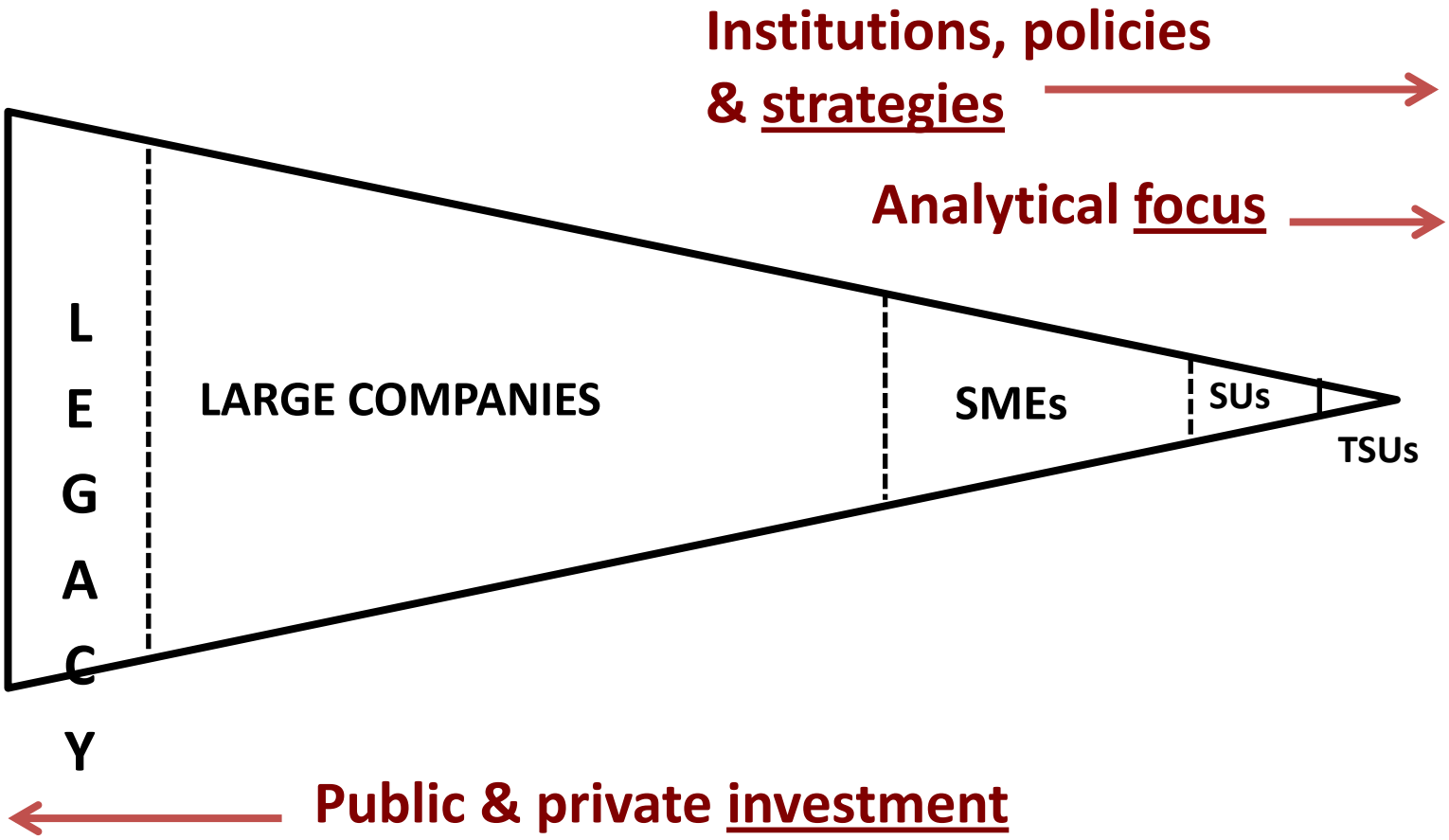
# What does this mean for innovation in Alberta ?

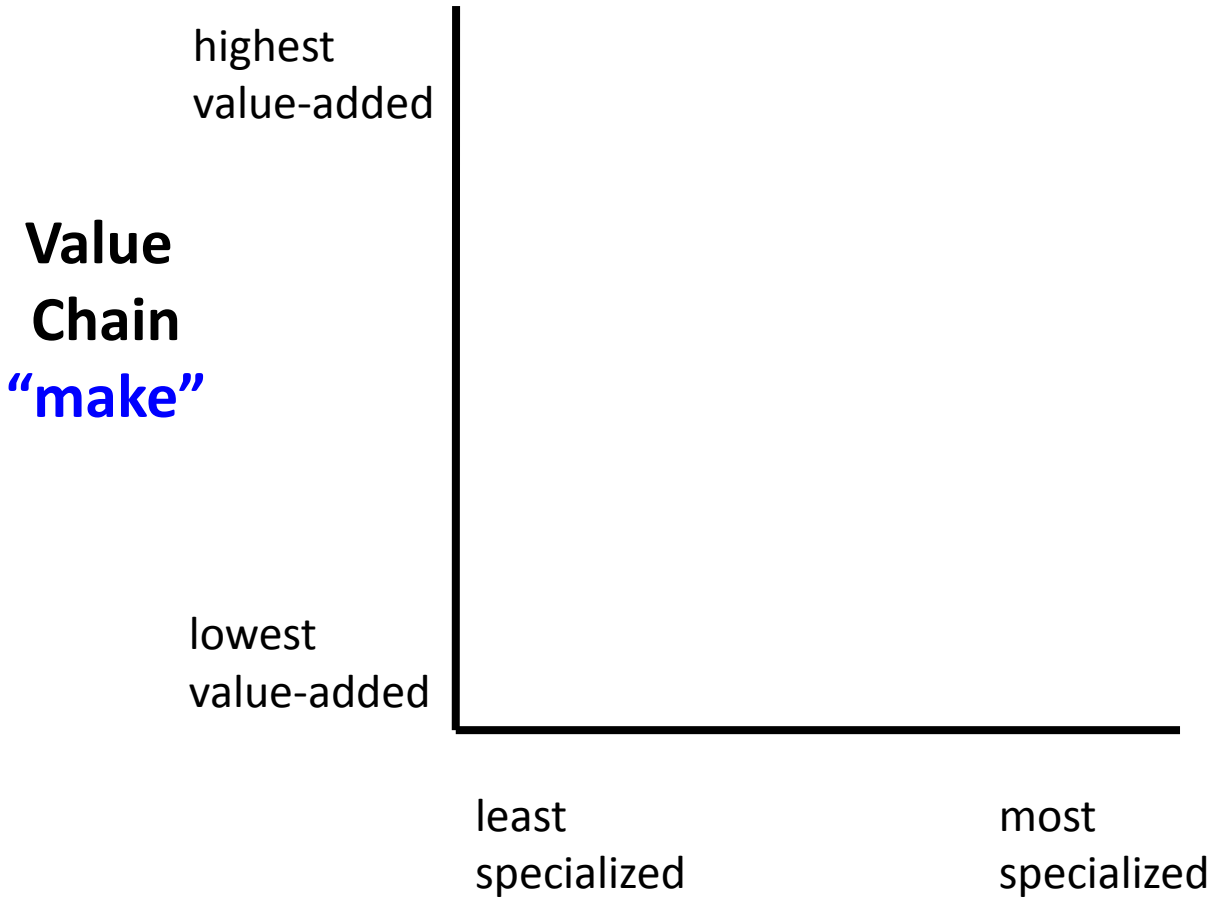
- Our most ***HUGELY*** significant innovations have emerged ***from within our capital-intensive sectors***
  - oil & gas
  - agriculture
  - bio-mass
  - financial & business services
- Manufacturing oil from sand is the ***most significant innovation*** in Canadian history!
- ***Sustainable diversification is a product of asset transformation NOT investment transfer***

# The wedge problem



# The innovation policy wedge

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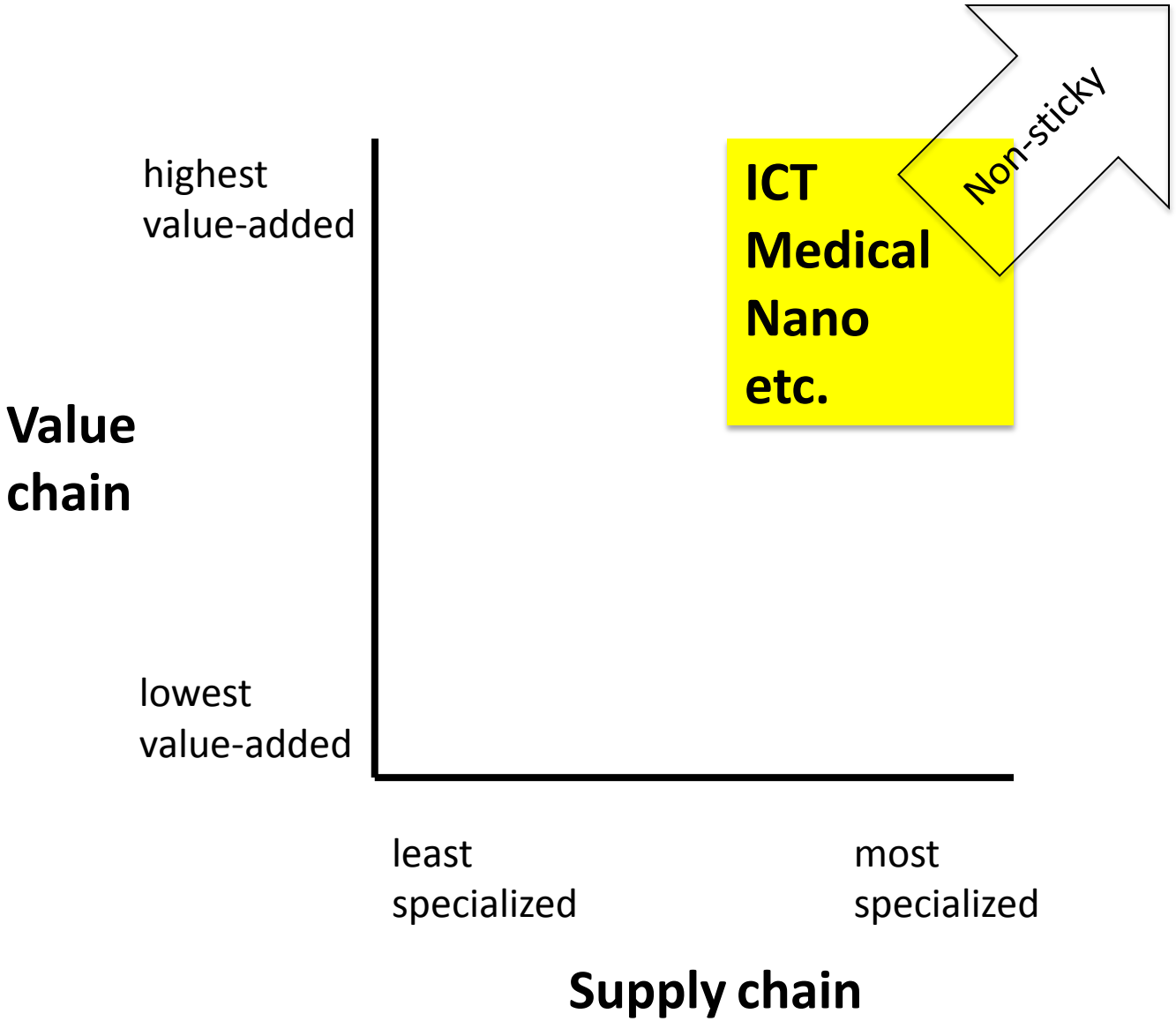
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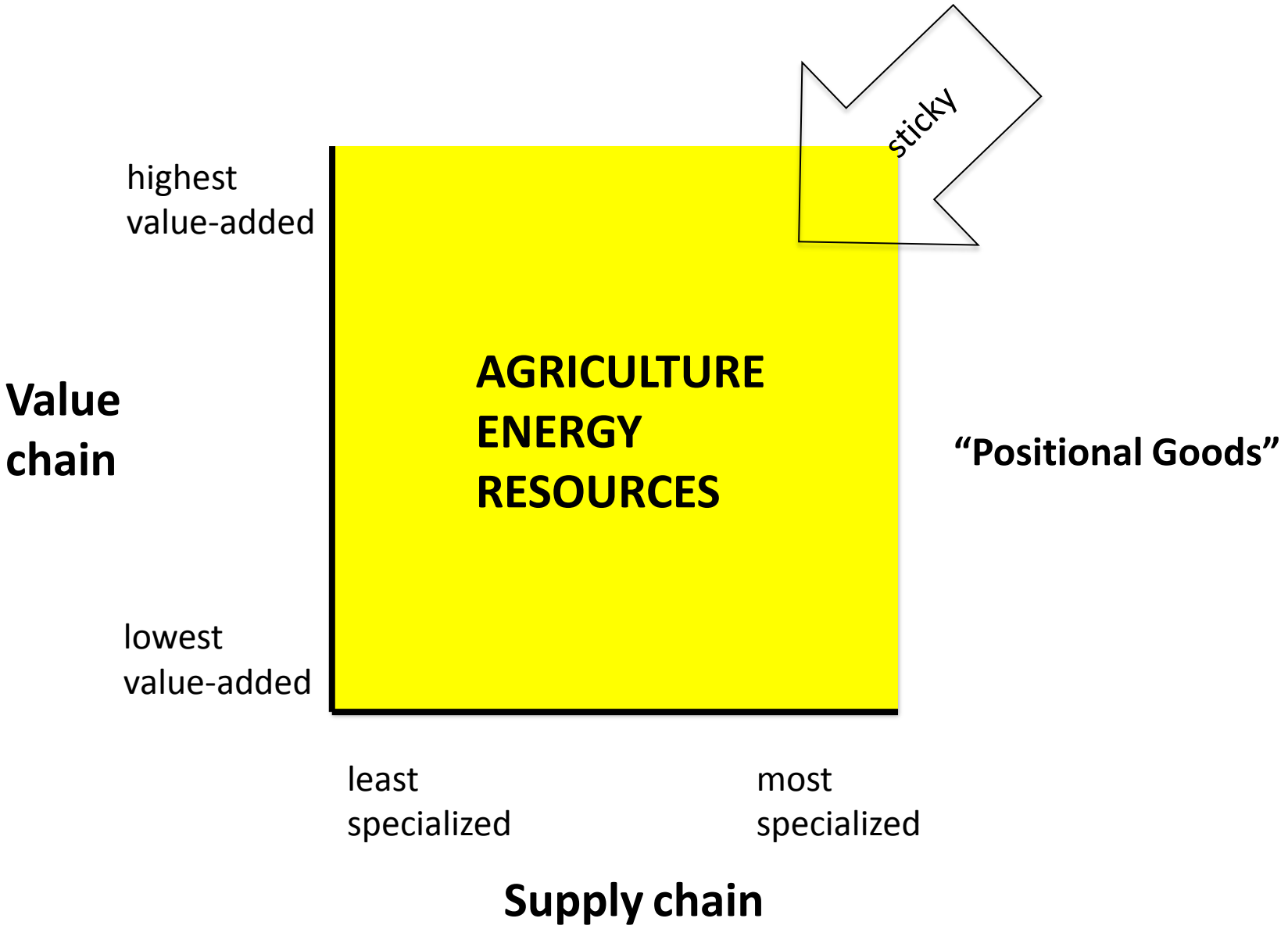
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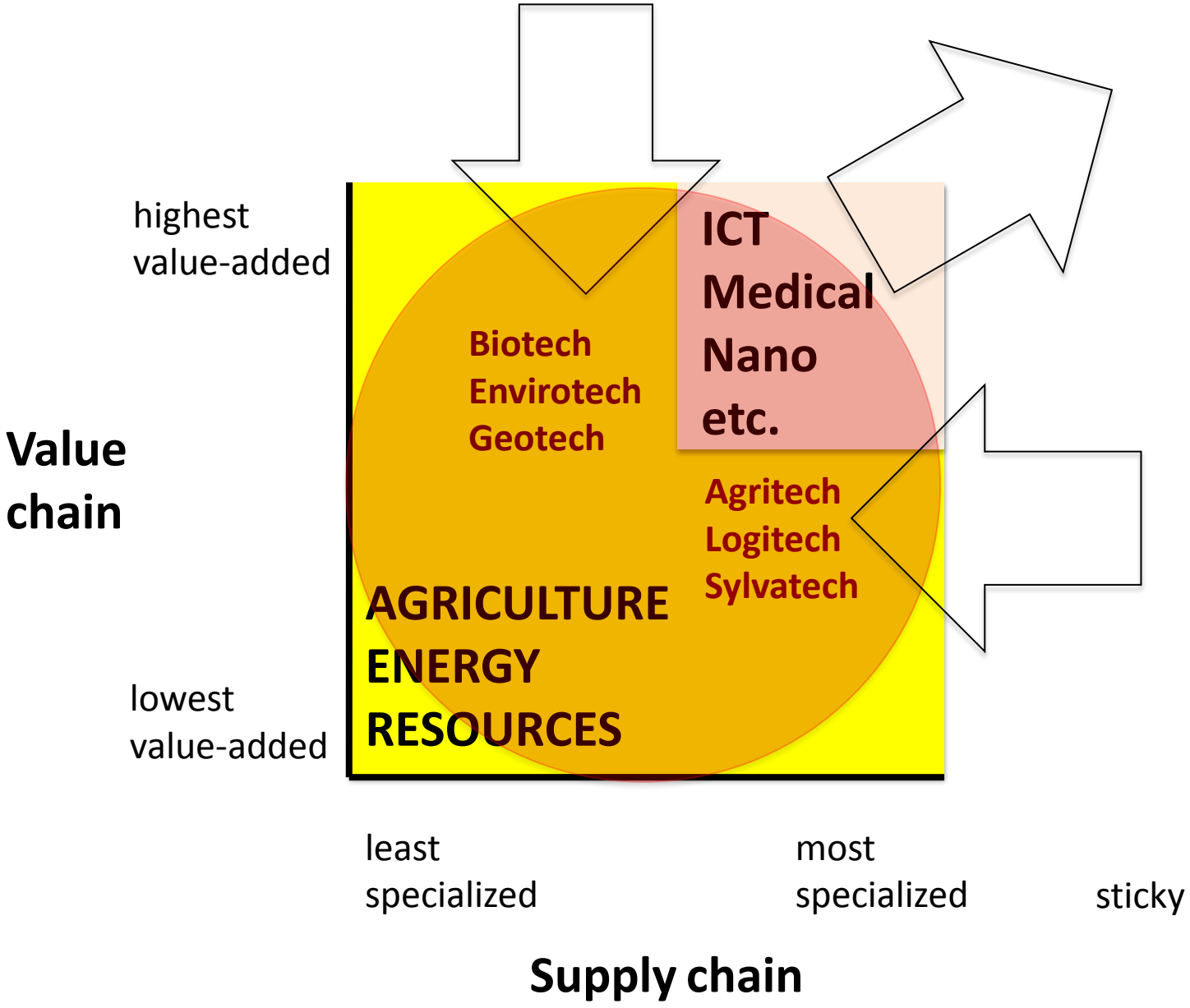
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RESOURCES
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specialized
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Supply chain

# Q7:

# What needs to be done?

# Three proposed initiatives

- **Reconnect** policy with state-of-the-art knowledge about innovation – ***"An Innovation Manifesto for Canada"***
- **Reconstruct** the ***"lost knowledge"*** of Canadian innovation – establishing an historically grounded reference model
- **Re-examine** the role of Canada's structural industries in the innovation system – ***targeted prospective studies***

# What happens if we do nothing?

- Risk inefficient allocation of diminishing public resources for basic and applied research
- Risk research investment becoming alienated from our strongest structural industries
- Risk becoming a net exporter of human capital and associated revenues
- Risk of becoming genuinely a hewer of wood and a drawer of water for the first time in our history