Future trends in Science, Technology and Innovation Systems

based on the OECD STI Outlook

Sandrine Kergroach and Michael Keenan
OECD Directorate for Science, Technology and Innovation

CSTP-TIP Workshop on the Future Trends in STI Policy
Paris, December 17, 2015
STI systems

- Actors performing STI activities
- Infrastructures
- Policy design and implementation agencies
- Norms, values, ideas and ‘soft’ institutions
- Local, regional, national, transnational, global
The future of innovation policies

- **Knowledge triangle** at the top of policy agenda
- **Broaden the scope of policy intervention**:
  - Multiple goals (industrial transformation, inclusive innovation, grands challenges etc.)
  - Going beyond the scope of national innovation policies
- **Growing complexity**:
  - Growing number of STI actors (ministries, agencies, non-state actors) involved in the design and implementation of STI policy
  - Multi-level governance
  - In search for synergies with the private sector, strategic P/PPs and joint investments.
  - Larger portfolio / mix of policy instruments
- **Evaluation is key** but would require a ‘whole of government’ approach and persisting gaps in metrics.
A broad approach of innovation policy

The actors: the “knowledge triangle”
Firms engage in mixed modes of innovation

Innovative firms by mode of innovation, as a percentage of all firms (%), 2008-10

The rise of universities

R&D expenditure by the public sector, OECD, % of GDP

New ways of doing (data-driven) research

Figure 1.1 TDM-related scientific articles
1995-2014, per thousand article

Digital science
Open science
Citizen science
Entrepreneurial science

Fields of research
Methods
Skills & culture
Quality assessment

Knowledge transfer is a central objective of research policy

Substantial changes in various STI policy areas, country self-assessment, 2012-14

*Source*: Country responses to the STI Outlook policy questionnaire 2014.
The future of innovation policies

• **Knowledge triangle** at the top of policy agenda

• **Broaden the scope of policy intervention**:
  – Multiple goals (industrial transformation, inclusive innovation, grands challenges etc.)
  – Going beyond the scope of national innovation policies

• **Growing complexity**:
  – **Growing number of STI actors** (ministries, agencies, non-state actors) involved in the design and implementation of STI policy
  – Multi-level governance
  – In search for synergies with the private sector, strategic P/PPs and joint investments.
  – Larger portfolio / mix of policy instruments

• **Evaluation is key** but would require a ‘whole of government’ approach and persisting gaps in metrics.
A more utilitarian view of STI

• The transition to a low-carbon economy and the preservation of natural resources would require technological breakthroughs, deployment of existing technologies and new infrastructures, systemic changes (behaviours, governance).

• Ageing would require new technologies/services to assist the elderly remain active and autonomous longer, assist care providers, funding and better coordination between social care and health services.

• Income inequality has increased during the crisis. ICTs offer opportunities to support inclusive innovation. Education and training policies will be essential to avoid exclusion.

⇒ Raising the status of innovation in the policy portfolio
⇒ Broaden the scope of policy intervention
⇒ More ‘responsible’ STI policies
⇒ Enlarge the number of actors involved in the policy
The future of innovation policies

- **Knowledge triangle** at the top of policy agenda
- **Broaden the scope of policy intervention**:  
  - Multiple goals (industrial transformation, inclusive innovation, grands challenges etc.)  
  - Going beyond the scope of national innovation policies
- **Growing complexity**:  
  - **Growing number of STI actors** (ministries, agencies, non-state actors) involved in the design and implementation of STI policy  
  - Multi-level governance  
  - In search for synergies with the private sector, strategic P/PPs and joint investments.  
  - Larger portfolio / mix of policy instruments
- **Evaluation is key** but would require a ‘whole of government’ approach and persisting gaps in metrics.
Growing research capacity worldwide

Emergence of globally interconnected innovation hubs

Internationally co-authored documents, 2011 and 1998 (whole counts)

The future of innovation policies

• **Knowledge triangle** at the top of policy agenda

• **Broaden the scope of policy intervention:**
  – Multiple goals (industrial transformation, inclusive innovation, grands challenges etc.)
  – Going beyond the scope of national innovation policies

• **Growing complexity:**
  – **Growing number of STI actors** (ministries, agencies, non-state actors) involved in the design and implementation of STI policy
  – **Multi-level governance**
  – In search for synergies with the private sector, strategic P/PPs and joint investments.
  – **Larger portfolio / mix of policy instruments**

• **Evaluation is key** but would require a ‘whole of government’ approach and persisting gaps in metrics.
Figure 1.13. **Cities make a major contribution to green public investment**

Gross capital formation in environmental protection by level of government, percentage of total, 2012

Note: State government data only for Austria, Belgium, Germany and Spain.

The future of innovation policies

• **Knowledge triangle** at the top of policy agenda

• **Broaden the scope of policy intervention**:
  – Multiple goals (industrial transformation, inclusive innovation, grands challenges etc.)
  – Going beyond the scope of national innovation policies

• **Growing complexity**:
  – **Growing number of STI actors** (ministries, agencies, non-state actors) involved in the design and implementation of STI policy
  – **Multi-level governance**
  – **In search for synergies with the private sector**, strategic P/PPs and joint investments.
  – **Larger portfolio / mix of policy instruments**

• **Evaluation is key** but would require a ‘whole of government’ approach and persisting gaps in metrics.
Cross-sectoral funding

Industry funding to public research: Universities take the lion’s share

Public funding to business research: Tax incentives on the top of increasing subsidies

(Exploratory charts to be updated)

New strategic public-private partnerships

Signs of slowdown in technology transfer activities
- Prompted governments to rethink their TT policy and practices

Figure 6.6. Licensing income from public research, 2004-11
As a percentage of research expenditures

The future of innovation policies

- **Knowledge triangle** at the top of policy agenda
- **Broaden the scope of policy intervention:**
  - Multiple goals (industrial transformation, inclusive innovation, grands challenges etc.)
  - Going beyond the scope of national innovation policies
- **Growing complexity:**
  - **Growing number of STI actors** (ministries, agencies, non-state actors) involved in the design and implementation of STI policy
  - Multi-level governance
  - In search for synergies with the private sector, strategic P/PPs and joint investments.
  - Larger portfolio / mix of policy instruments
- **Evaluation is key** but would require a ‘whole of government’ approach and persisting gaps in metrics.
Some major opportunities and risks….

• **Opening science** to address societal challenges

• **Digitalisation of science** is a major disruptive force

• System thinking and **system innovation**

• **Fiscal consolidation** / budgetary constraints

• More attention to managing **socio-technical risk and uncertainty**

• Greater use of **evaluation**, but persisting gaps in **metrics**
... By 2030

• Opening science to address societal challenges
  ➢ Open science is there

• Digitalisation of science is a major disruptive force
  ➢ Science 2.0 is the dominant form of doing research

• System thinking and system innovation
  ➢ The circular economy is a major system innovation

• Fiscal consolidation / budgetary constraints
  ➢ There’s no more money!

• More attention to managing socio-technical risk and uncertainty
  ➢ Data-driven innovation is ubiquitous

• Greater use of evaluation, but persisting gaps in metrics
  ➢ Metrics miss the mark
Questions?

- **Future needs for skills and infrastructures** should be tackle now. Which ones and how?

- How to raise organisational capabilities? In ministries, agencies, universities, firms etc.

- **How to address inevitable fragmentation?** Improve coordination mechanisms?
For further question...

www.oecd.org/sti/outlook
www.innovationpolicyplatform.org/sti/e-outlook
www.innovationpolicyplatform.org/oecd-stio-forward-look

Thanks!

michael.keenan@oecd.org
sandrine.kergroach@oecd.org