資料3－1

STRATEGIC PUBLIC/PRIVATE PARTNERSHIPS FOR INNOVATION

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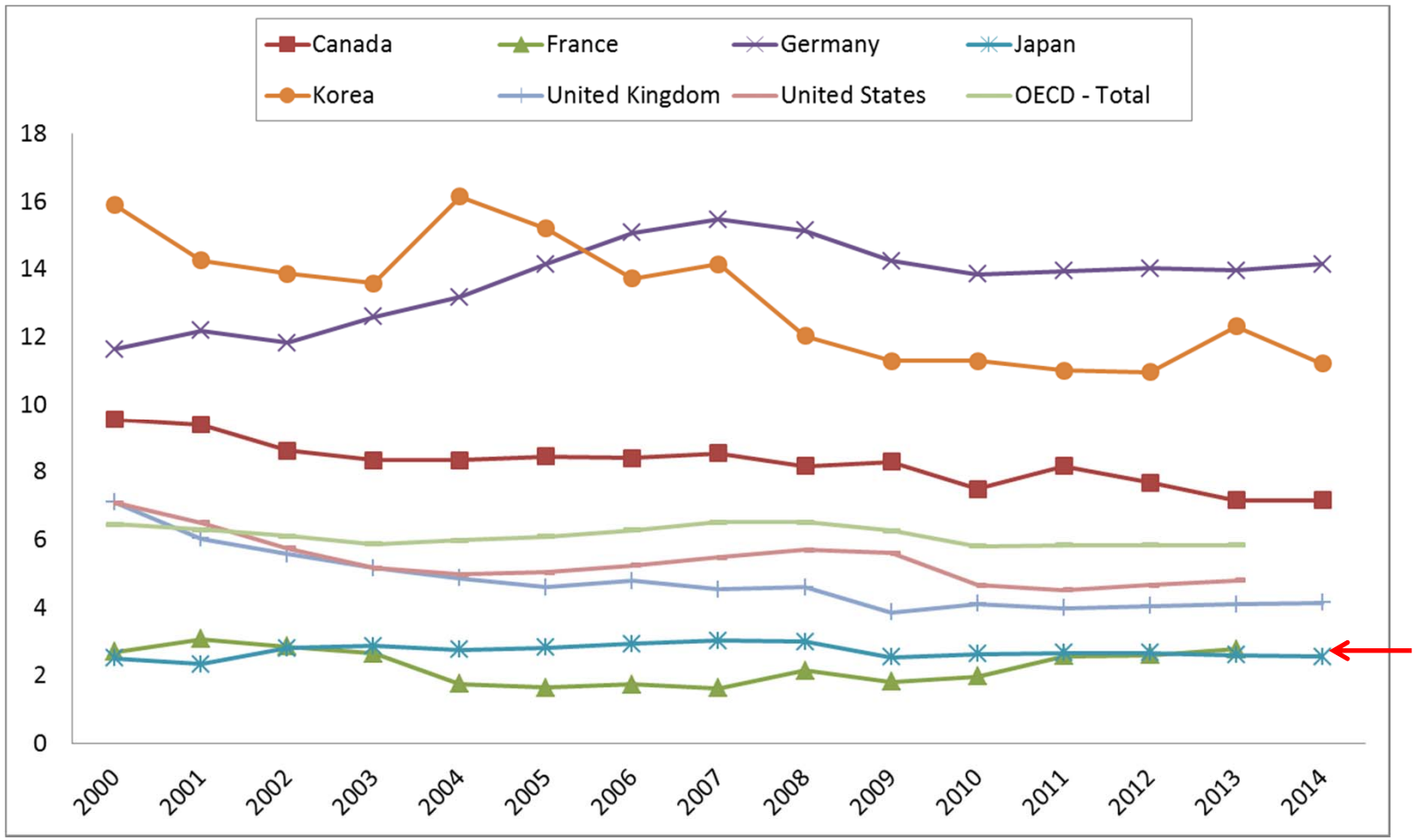
BETTER POLICIES FOR BETTER LIVES

Outline

- Trends in industry-science collaboration
- Why focus on PPP now?
- Defining Strategic PPPs for STI
- Country participation and case studies
- Implications for actors in P/PPs
- Concluding remarks
- Contacts

Business-funded R&D in the higher education sectors, 2000-2012



Source: OECD, Main Science and Technology Indicators (MSTI) Database, October 2016.

Why focus on P/PPs in STI now?

- Competiveness concerns in OECD
- Complex social /global challenges
- Fiscal consolidation and pressure to focus public investments in R&D + I
  - Smart specialisation in the EU
  - Lead markets (e.g. Germany's High-Tech Strategy, Netherlands TOP Sector strategy – incl. agri-food)
- Changing nature of innovation; greater complexity/interdisciplinary, open innovation, global networks

Why focus on PPP for STI now?

- *But* mainstream R&D and innovation policy instruments tend to focus on increasing the 'rate' of innovation (e.g R&D tax credits, improving linkages between industry and science, etc.)
- Little attention to the 'direction' of innovation or a systemic approach

Strategic P/PPs in STI

Defining characteristics:

- ***Co-operative and contractual agreement to accelerate innovation more effectively than a government lab or a firm could achieve on its own.***
- ***multiple private and public stakeholders,***
- ***high-risk projects around emerging technologies***
- ***intellectual assets-based ; IPRs and talent.***
- ***primarily initiated by the government and aligned with industrial and innovation strategies***

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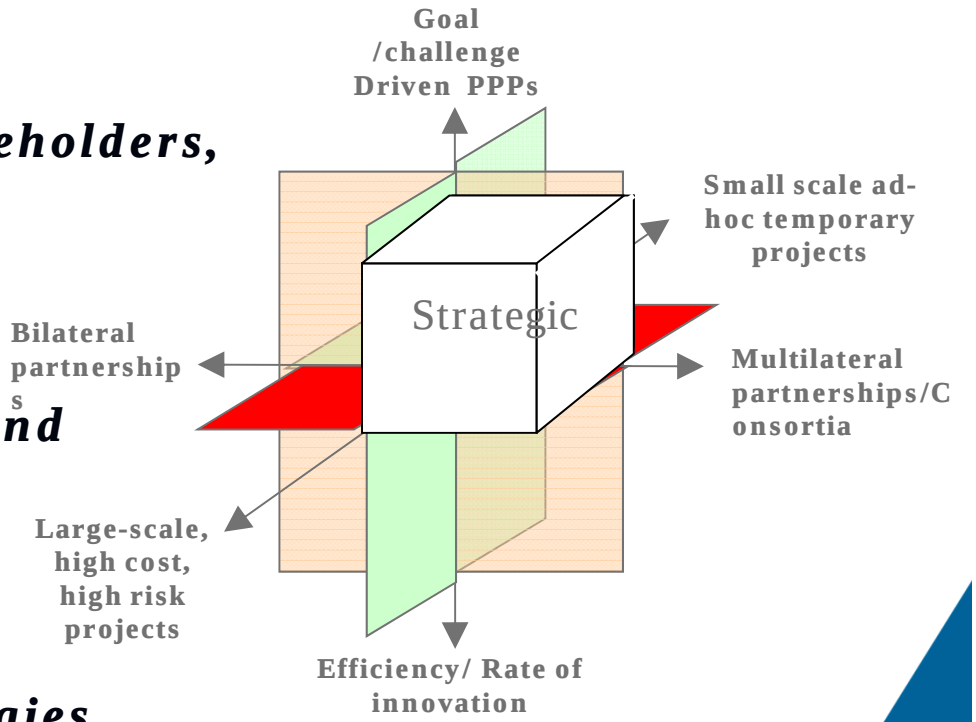


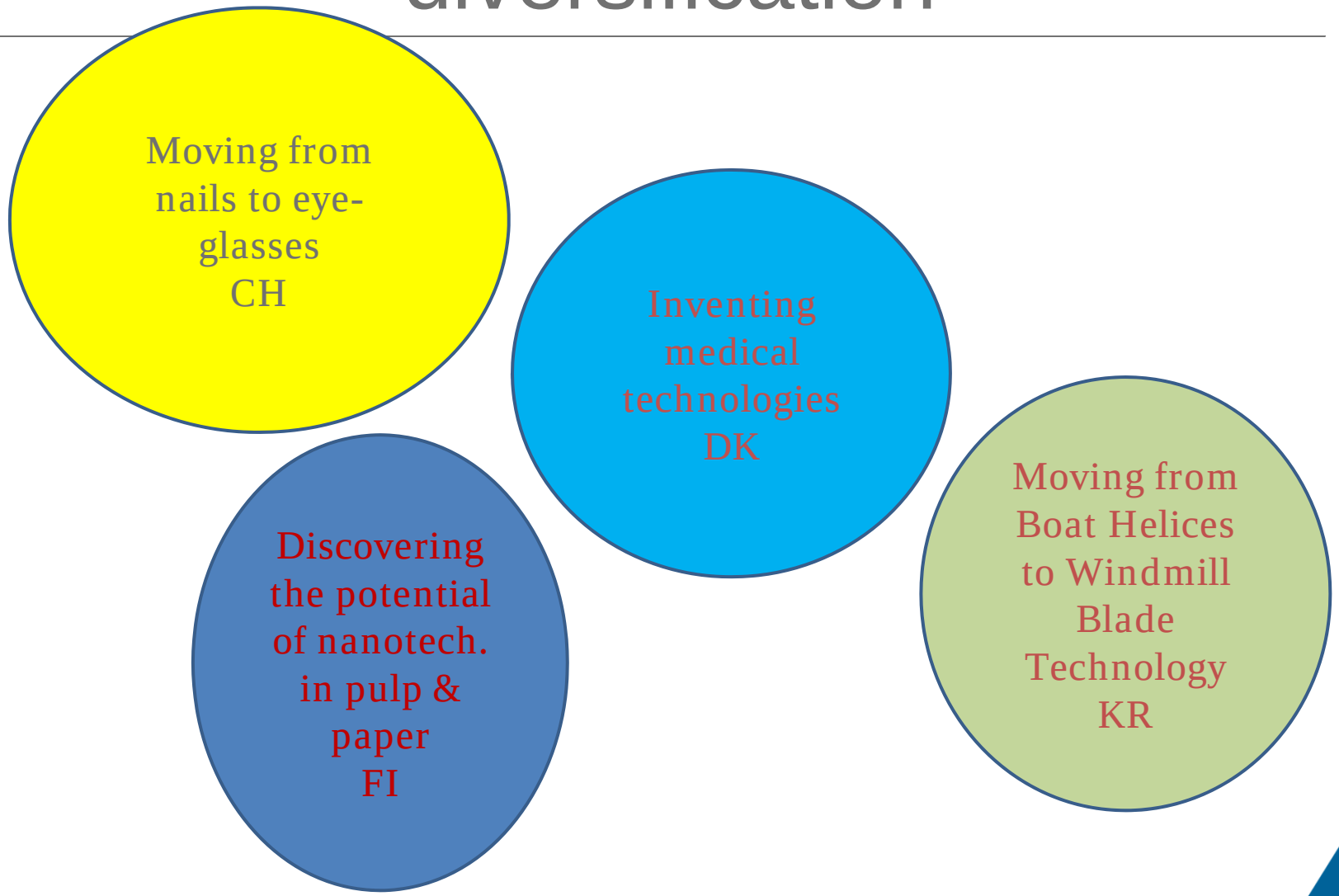
Characteristics of Strategic PPP's in STI

- Not only efficiency or value for money but a focus on strategic goals
- More on the direction of innovation, than the rate
- Multi-actor, multi-disciplinary and systemic
- Considers the value chain (producers – public research – consumers) ; demand-oriented
- A vehicle for transition and systemic innovation
- Policy rationales go beyond market and systems failure, also
  - Failures in demand
  - Technology lock-in
- A focus on opportunities!

What sets Strategic P/PPs in STI apart from other forms of industry-science collaboration?

- ***Challenge-driven (top-down, linked to new industrial policies)***
- ***Adaptive IP arrangements (e.g. restricted, open or shared)***
- ***Flexible entry and exit managed through contracts***
- ***Incentivised financing with controls (e.g. judicious timing of public support, use of equity financing, use of milestone payments)***
- ***Implementing monitoring plans, performance indicators***
- ***Implementing independent organisational structures (e.g. monitoring boards)***

Examples of specialisation and diversification



Example of P/PPs – Lead Market

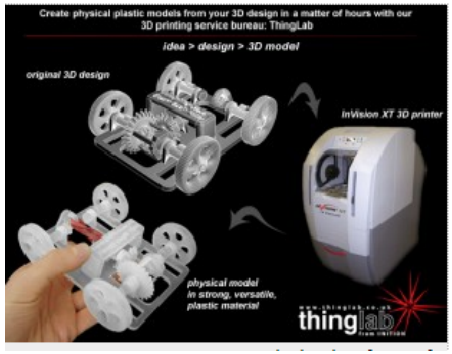
Top consortium Knowledge & Innovation (TKI) Maritime in the Netherland

Scope of research	• the whole 'knowledge chain', i.e. a mix of fundamental research, applied research and innovation.
Duration	• No fixed duration of the programme. The underlying 'innovation contract' is renewed every two years.
Governance	• Having a light governance structure which gives a large degree of freedom in organising the way in which their participants collaborate and how they arrange their funding and spending, leaving much room for bottom-up project ideas. • Using different collaboration modalities for each stage of the knowledge and innovation chain.
Finance	• The government gives a TKI allowance (a 25% top-up) on the cash contribution of the companies to the collaboration, which provides an incentive for industrial commitment.
Management of IPR	• The TKI Maritime follows the general 'rules of play' for IPR including background knowledge and foreground knowledge, which helps to streamline IPR arrangements within and between top sectors.
Monitoring and evaluation	• Delivering an annual report to show how the resources have been used and what the results are, which is also used in learning activity on how to set-up and manage P/PPs.

Source: case study report provided by Dutch delegate for OECD Working Party on Innovation and Technology Policy (TIP)

Other Examples

- Belgium's CINBIOS
- China's Strategic Alliances for Industrial Technology Innovation
- The Danish Innovation Consortia
- EU's Joint Technology Initiatives (JTIs)
- Finnish-Russian Innovation Alliance on Nanotechnology
- Germany's National Electric Mobility Platform
- Japan's global nanotechnology complex Tsukuba Innovation Arena (TIA)
- The Netherlands Ecogenomics Consortium
- Spain's National Strategic Consortia for Technical Research
- ***US's National Additive Manufacturing Innovation Institute (NAMII)***



Example of P/PPs - institutional level

The Christian Doppler Research Association (CDG) in Austria

Scope of research	• Application oriented basic research (performed by CD Laboratories) • Application oriented research (performed by JR Centres) ➢ Have to be based on the demand of a company.
Duration	• Maximum 7 years (CD Laboratories), Maximum 5 years (JR Centres)
Governance	• The composition of steering elements consists of companies and academia as well as representatives from the responsible ministry. • Integration of all stakeholders allows for a highly flexible response to environmental changes and individual circumstances.
Finance	• Public-Private Partnership with usually 50% financed by each, the public as well as by the commercial partners. • SME involvement increases public share to 60%.
Management of IPR	• Based on specified fields of interests, results from research activities (e.g. patents, software) have to be handed over to the commercial partners or may be utilised by the academic partner.
Monitoring and evaluation	• Mid-term evaluations are based on scientific results and the development of basic research. • The final evaluation report has to be structured along clear defined guidelines, including indicators on scientific output and economic activity.

Source: case study report provided by Austrian delegate for OECD Working Party on Innovation and Technology Policy (TIP)

Focus: *US's National Additive Manufacturing Innovation Institute (NAMII)*

Actors:

- Consortium of manufacturing firms, universities, community colleges, and non-profit organizations primarily from the Ohio-Pennsylvania-West Virginia 'Tech Belt'.

Budget:

- An initial $30 million Federal award
- The members of NAMII will co-invest $40 million

Key technology:

- Additive manufacturing, often referred to as 3D printing

Government initiated:

- The Department of Defense, The Department of Energy

Major issues of P/PPs

Implications for actors in P/PPs

(1) Project selection and design

- Establishing well-designed partnership:
  - Well-designed partnerships (including clear goals and timelines) can have clear and positive impacts, which provide efficiency gains in research and closer ties to application, and help partners manage technological and financial risks effectively.
  - The longer-term perspective and commitment from all partners are required for the strategic goals.
  - Clarifying issues such as ownership, access, decision and control in the partnerships is important.
- Taking into account eco-system and value-chain perspective:
  - Integrating technological roadmaps and regional/cluster foresight in partnerships can help identify opportunities for broader application of research and technological outputs from the partnerships.

Implications for actors in P/PPs

(2) Finance

- Ensuring financial transparency:
  - It is important to establish a mechanism for ensuring financial transparency and preventing moral hazard which might occur under a collaborative programme,.
- Ensuring financial sustainability:
  - It is important to design a strategic P/PP in a way that incentivises the participants to collaborate closely.
  - Excessive shifting of risk to the private sector will reduce their incentives to participate in the P/PP. In general, a well-established financial and business infrastructure (re-insurance, contract resolution and renegotiation) plays a catalytic role in increasing the success of the partnerships.
  - Ensuring multiple sources of funds is important.
  - It is also important to develop clearer measures of outcomes to justify investment.

Implications for actors in P/PPs

(3) Governance

- Ensuring strong governance arrangements:
  - Successful P/PPs require strong governance arrangements, especially when they involve a wide number of actors.
  - Regarding government-supported partnerships, governments can act as leader and orchestrate processes in support of the overall goal of the partnerships. Complex and strategic P/PPs may also require the commitment and active involvement of more than one ministry to achieve desired outcomes.
  - Establishing strong and horizontal governance within the HEIs and PRIs is important to manage the partnership.

Implications for actors in P/PPs

(4) Managing Intellectual Property

- Establishing contractual mechanisms:
  - The establishment of contractual mechanisms that define knowledge and IP sharing and transfering, including access to research data and infrastructure, during and after the partnership, is crucial for the success and longevity of such collaborative arrangements.
- Incentivising participation:
  - Sharing of knowledge and IP is a common tool but more in upstream research processes rather than in downstream commercialisation.
  - For example, the assignment of exclusive rights to the private sector provides incentives for firms to continue to control costs in the development of new technologies.
- Case-by-case application:
  - Taking into account technical areas, technology readiness level, the attribution of the participants etc. and optimising IP management is crucial so as to maximise the social and economic value created.

Implications for actors in P/PPs

(5) Human resources

- Creating incentives for researchers to collaborate with private firms
  - Both financial rewards and institutional changes promoting careers of those scientists who choose to work on knowledge transfer tasks are important (although a proper balance must be sustained between basic science and applied research).

(6) Openness to participation

- Enabling a wide range of actors to participate:
  - Small and medium-sized enterprises (SMEs) face particular difficulties in connecting with other actors in innovation eco-systems given the shortage of finance, coordinating costs, legal costs of IPR arrangements etc. Because of their diversity - some SMEs are closer to research, while others are closer to commercial activities - they can play an important brokerage role in translating high level government objectives and the commercial objectives of larger enterprises.

Implications for actors in P/PPs

(7) Internationalisation

- International partnerships:
  - International P/PPs have increased in the context of cross-border EU programmes (FP7, Horizon 2020) whereas national P/PP programmes tend to be focused on national actors. At the same time, private foundations (e.g. Gates Foundation) are establishing international P/PPs around global challenges like health.
- Considering the differencies in legislation, rules and procedures:
  - Differences in legislation, rules and procedures for P/PPs in OECD and non-member countries may make the establishment of cross-border P/PPs difficult at best given the lack of standards. These differences make the management of P/PPs in the STI area more complex than in other areas and deserve particular attention from policy makers.

Implications for actors in P/PPs

(8) Evaluation and impacts

- Extending a scope of evaluation and impacts:
  - In the context in which P/PPs are used as a policy instrument to cope with grand challenges such as climate change, biodiversity and food security, traditional impact assessments which focus on economic impacts is not sufficient to meet policy needs.
  - In the STI area, value for money may not always be the main criteria for evaluating the impact of P/PPs; improving health or the environment, creating new knowledge, human capital building or building new networks may be equally important impacts.

Summary of P/PPs Good Practice

(1) Project selection and design	• Establishing well-designed partnership (including clear goals and timelines) • Taking into account eco-system and value-chain perspective
(2) Finance	• Ensuring financial transparency • Ensuring financial sustainability
(3) Governance	• Ensuring strong governance arrangements
(4) Managing Intellectual Property	• Establishing contractual mechanisms • Incentivising participation • Case-by-case application
(5) Human resources	• Creating incentives for researchers to collaborate with private firms (Including promoting careers of those scientists who choose to work on collaboration)
(6) Openness to participation	• Enabling a wide range of actors to participate
(7) Internationalisation	• International partnerships • Considering the differencies in legislation, rules and procedures
(8) Evaluation and impacts	• Extending a scope of evaluation and impacts

Concluding remarks

- Strategic PPPs represent a major shift in STI policy from an approach that promotes collaboration in innovation towards one that links public research with companies in order to achieve strategic goals such as revitalizing industrial production or tackling social and global challenges; P/PPs can be more flexible than tax credits or direct subsidies.

- The success of strategic PPPs is conditioned by three major factors:
  1) project design and ex-ante selection of proposals and;
  2) contractual design, which specifies internal management activities as well as the allocation and distribution of financial resources; sharing of IPRs etc;
  3) public funds should be used to incentivise firms to bear market risks while upstream research risks should be borne by public partners.

- Evaluation of PPPs, like that of many policies to encourage industry-university collaboration, is difficult but possible:
  1) Ensure evaluation techniques match policy objectives;
  2) Use multiple methods to increase the reliability of evaluation results.

Thank you!

Contact

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ADDITIONAL REFERENCES

Standard definition of Smart Specialisation

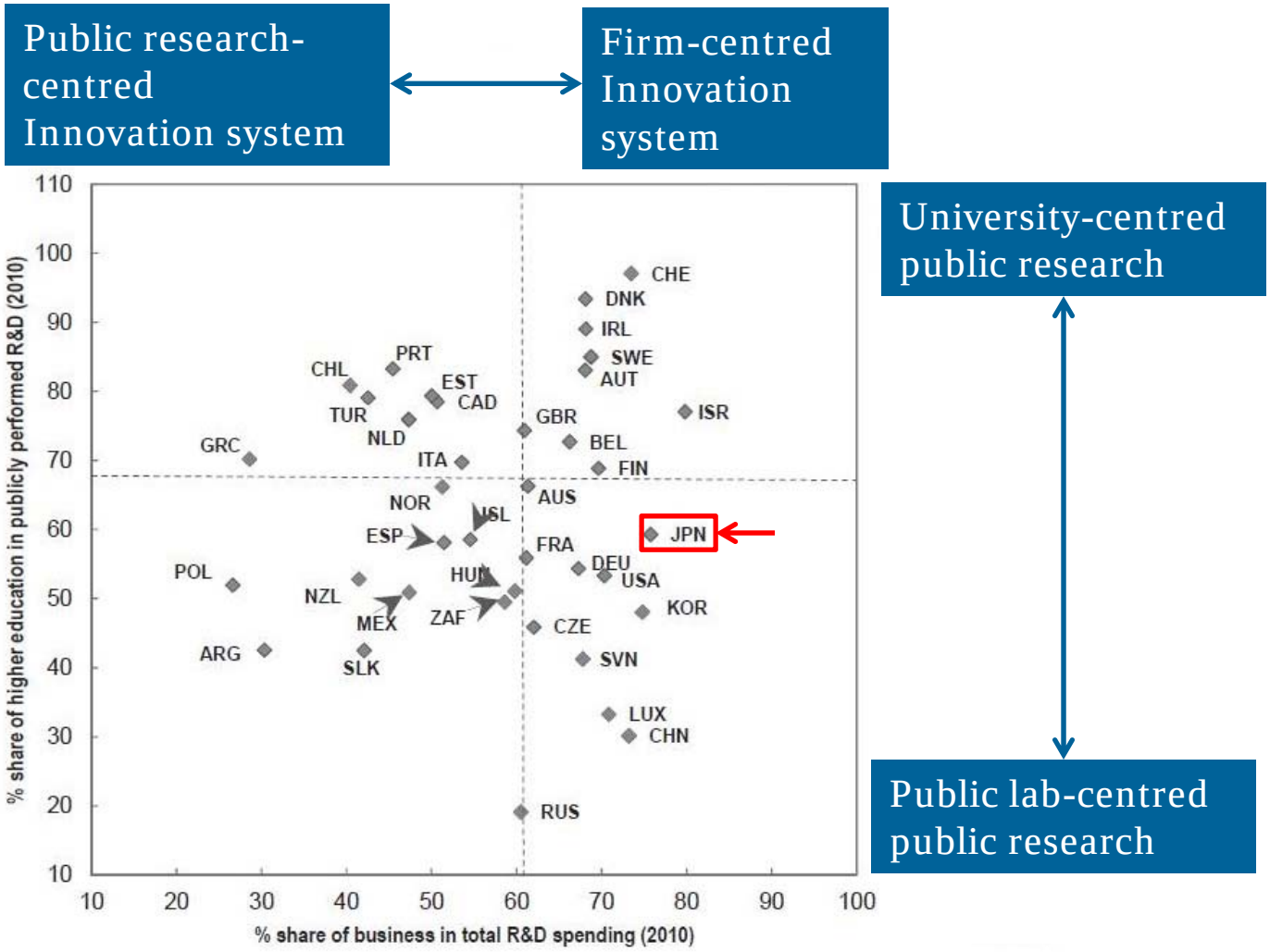
- *« It is not a planning doctrine that would require a region to specialize in a particular set of industries »*
- *« It is an approach to policy that considers whether those activities already strong or showing promise for a region can benefit from (more) R&D and innovation »*

- D. Foray

Key elements of smart specialisation and their theorectical underpinnings

- Key elements of smart specialisation
  - Entry and growth
  - Innovation
  - Specialisation and diversification
  - General purpose technologies
  - Prioritization
  - Entrepreneurial discovery
  - Regions
  - Openness
  - Universities and Centres of Excellence
  - New Industrial Policy
  - Evaluation

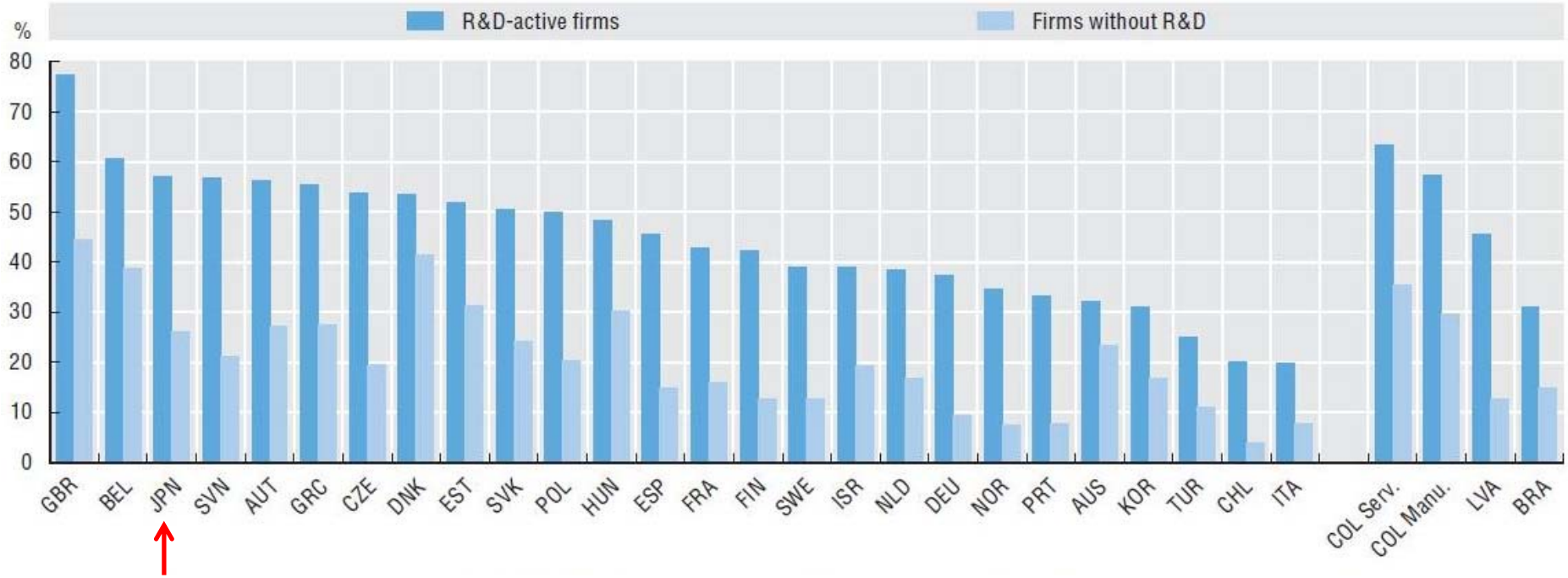
Archetypes of innovation system, 2010



Source: Commercialising Public Research (OECD, 2013)

Firms engaging in collaboration on innovation, by R&D status, 2010-12

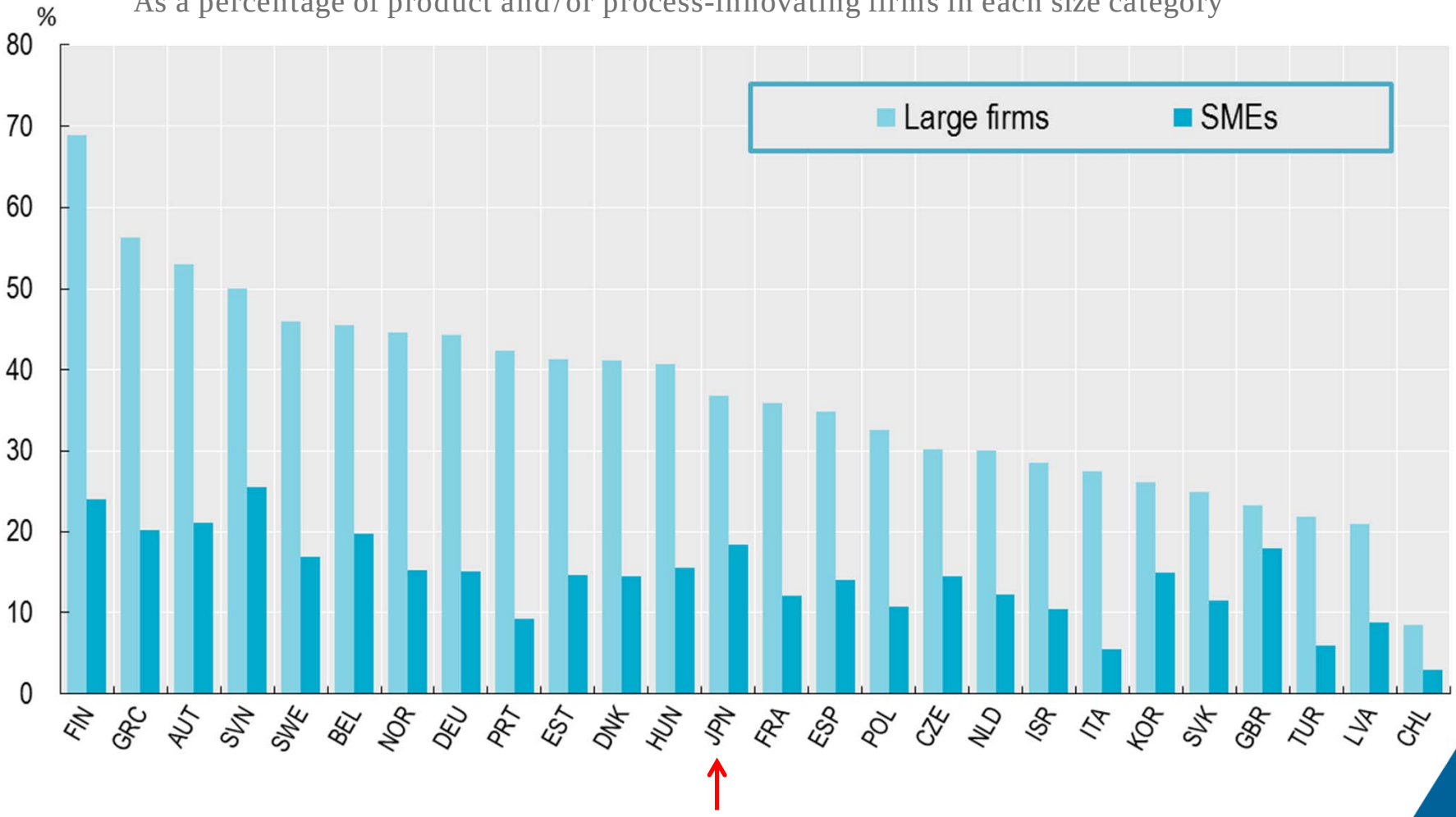
As a percentage of R&D-active and non R&D-active firms



Source: Science, Technology and Innovation Scoreboard 2015 (OECD, 2015)

Firms collaborating on innovation with higher education or research institutions, by firm size, 2010-2012

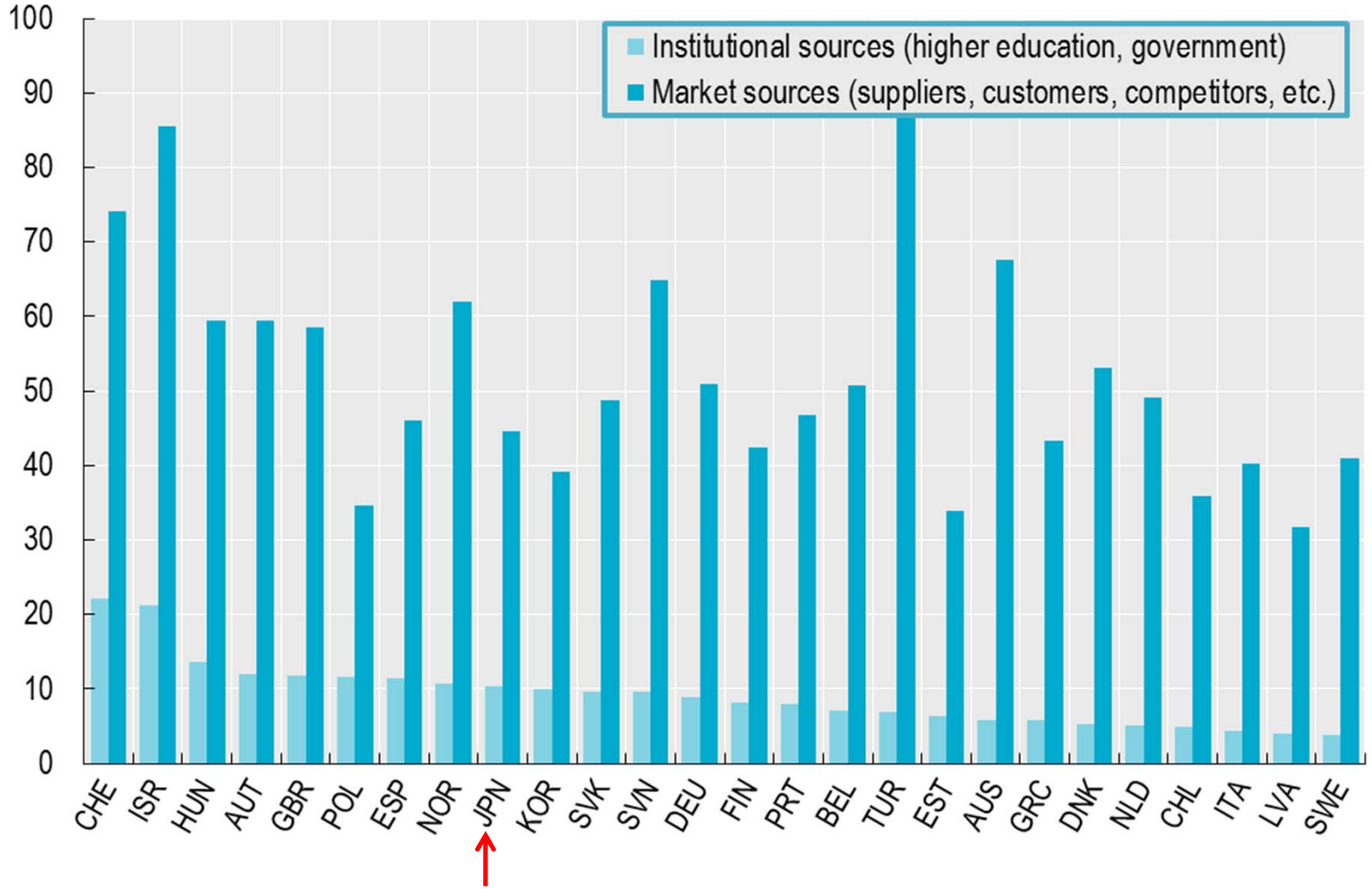
As a percentage of product and/or process-innovating firms in each size category



Source: Science, Technology and Innovation Scoreboard 2015 (OECD, 2015)

External knowledge sources firms use for their innovation activities, by type of sources, 2010-12

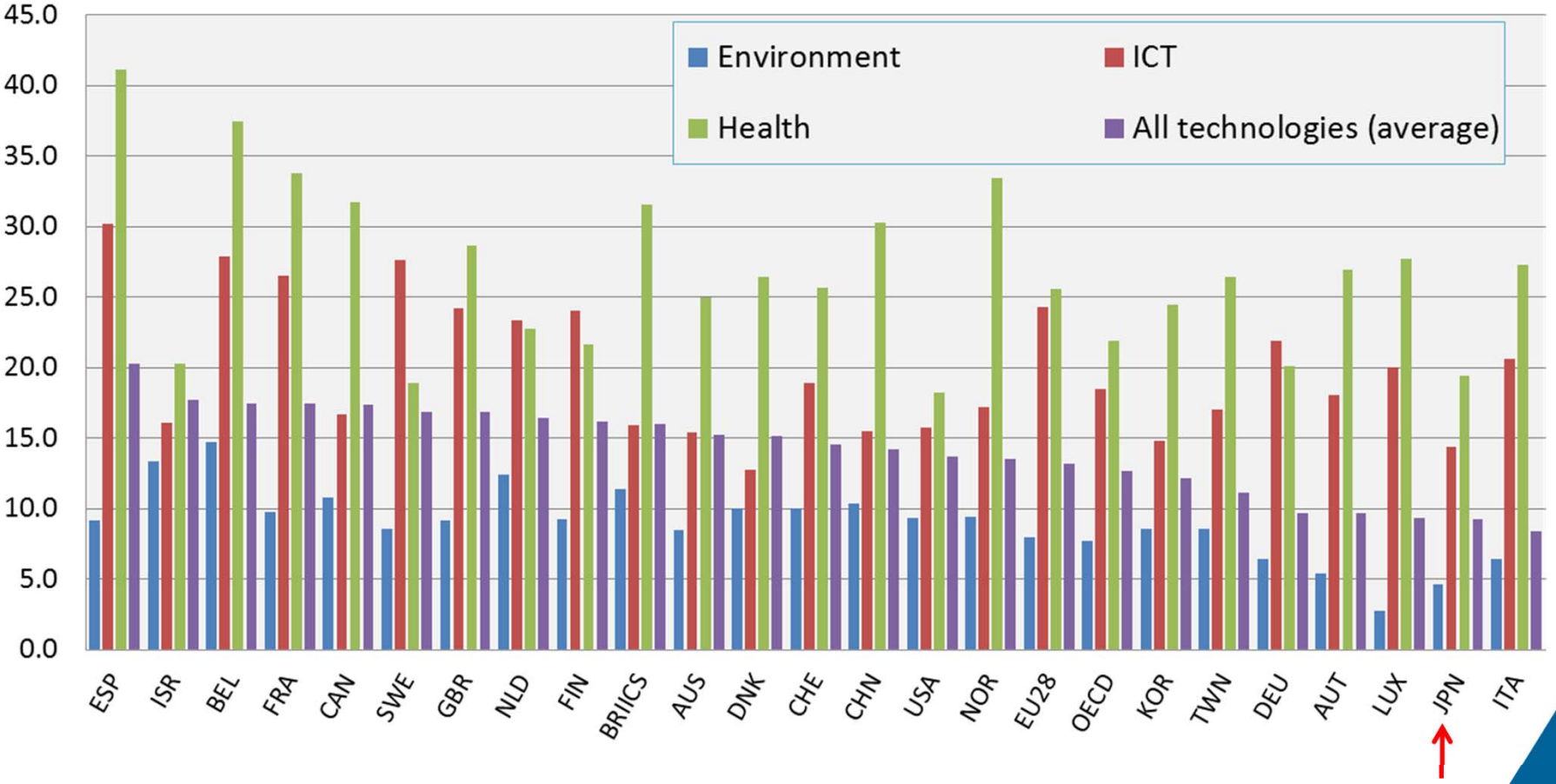
As a percentage of product and/or process-innovating firms citing source as "highly important"



Source: Science, Technology and Innovation Scoreboard 2015 (OECD, 2015)

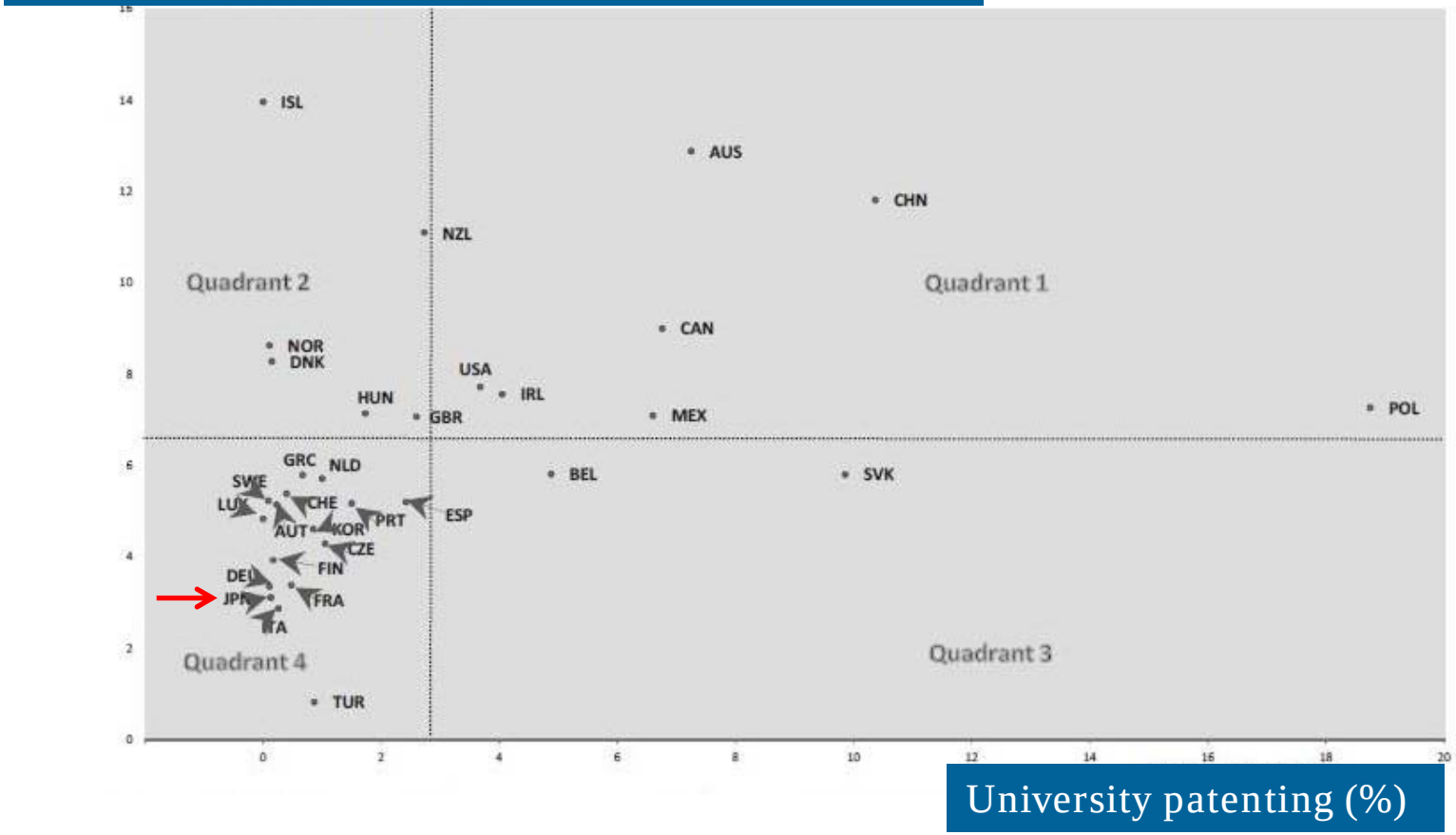
Patents citing non-patent literature (NPL), selected technologies, 2007-13

Share of citations to NPL in backward citations, average, EPO patents



Source: Science, Technology and Innovation Scoreboard 2015 (OECD, 2015)

Share of university patent applications and share of business patents citing university patents (%)



Source: OECD (2013) based on R. Veugelers et al. (2012), "The participation of universities in technology development: Do creation and use coincide? An empirical investigation on the level of national innovation systems", Economics of Innovation and New Technology, Vol. 21, pp. 445-472.