Australian Government

OFFICE OF THE CHIEF SCIENTIST

International Science Policy Analysis

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AUSTRALIA

Key Ministry	Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education Key advisory bodies: Prime Minister's Science Engineering and Innovation Council, The Australian Research Committee
Name of Policy	No overarching national science policy. The key Science, Technology & Innovation (STI) strategy document is *Powering Ideas: An Innovation Agenda for the 21st Century (2009-20)*.
Key Theme(s) and Scope of Policy	It commits to strengthen public research, improve science-industry collaboration and international linkages, strengthen human capital and improve governance.
Overall Strategy or Coordinating Body	Strategy: *Powering Ideas: An Innovation Agenda for the 21st Century (2009-20)*.

- A total of 79 science programs were funded through the Australian Government 2012-13 Budget, as identified in the Science, Research and Innovation Budget Tables.[1]

- Administration of these programs was distributed among 14 portfolios.

- Some examples of programs and administering portfolios (in brackets) are as follows:
    - Rural industries R&D (Agriculture)
    - Cancer clinical trials (Health)
    - Super Science – Marine and Climate (Industry)
    - Marine and biodiversity research (Environment)

- Much of the basic research done in Australia is funded through competitive grant schemes administered by the Australian Research Council (Industry portfolio), the National Health and Medical Research Council (Health portfolio) and the Cooperative Research Centres program (Industry portfolio).

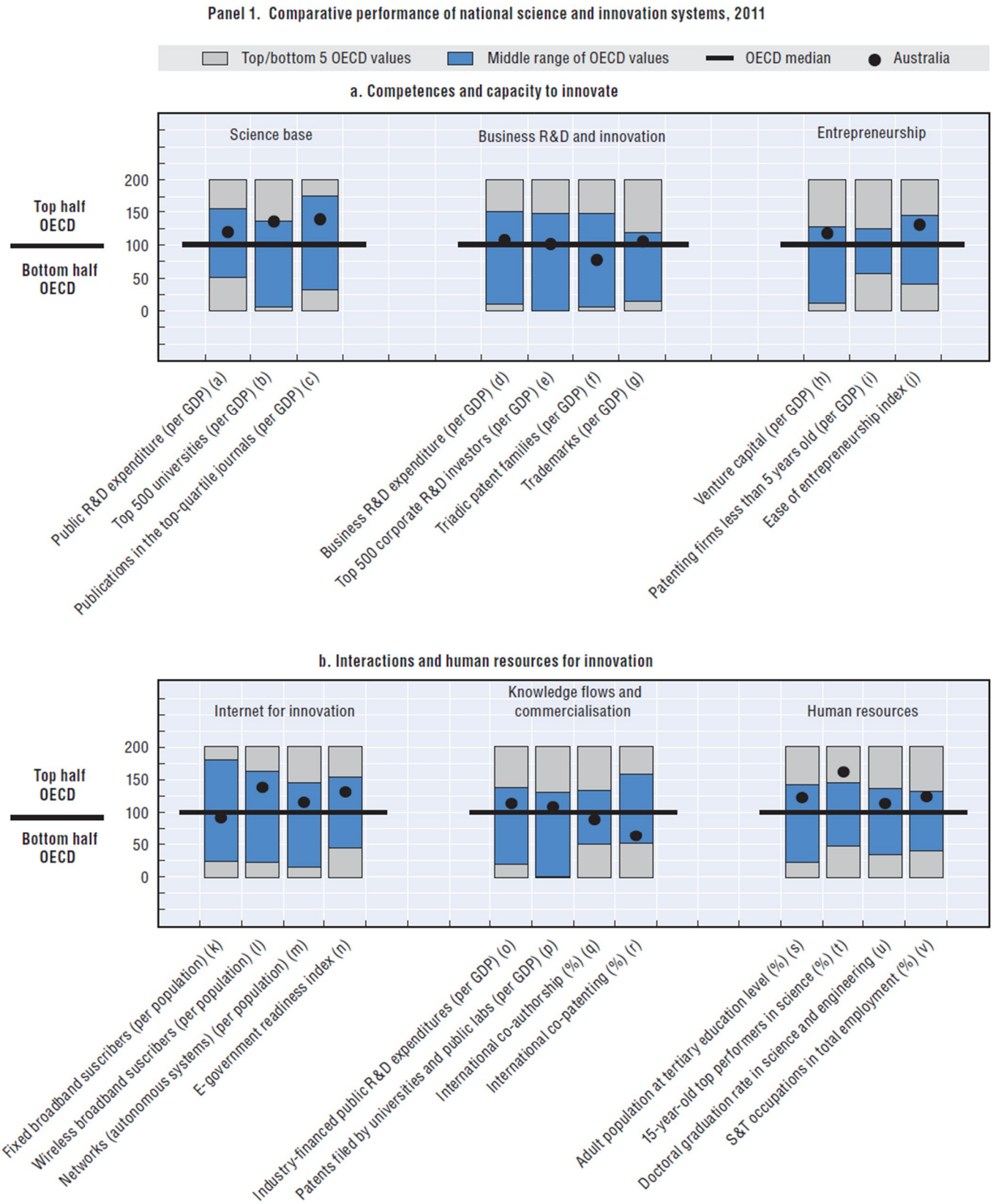
[1] Australian Government Science, Research and Innovation Budget Tables (2012-13)

Key Comparative Statistics – Australia and OECD Average[2]

- GERD as percentage of GDP, 2008:
    - OECD: 2.36%
    - Australia: 2.26%
- GERD, 2010 current PPP:
    - OECD: $974.4 billion
    - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
    - OECD: $807
    - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
    - OECD: 1.48% (62.7% of total)
    - Australia: 1.4% (61.9% of total)
- Government financed GERD as percentage GDP, 2008:
    - OECD: 0.69% (29.2% of total)
    - Australia: 0.78% (34.6% of total)

[2] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Australia: comparative performance of national science and innovation systems, 2011[3].



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[3] OECD Science, Technology and Industry Outlook, 2012.

CANADA

Key Ministry	Industry Canada Advisory body: Science Technology and Innovation Council
Name of Policy	*Mobilising Science and Technology to Canada's Advantage (2007)*
Key Theme(s) and Scope of Policy	• Four key principles of the policy are: promoting world-class excellence; focusing on priorities; fostering partnerships; and enhancing accountability. • The three areas in which the policy aims to foster competitiveness are: 1. Entrepreneurial Advantage - making Canada a world leader in innovation through S&T 2. Knowledge Advantage - positioning Canada at the leading edge of global S&T 3. People Advantage - Growing Canada's base of knowledge workers
Stand-out Initiatives	• Aiming to create an Industrial Research and Innovation Council, with a clear business innovation mandate. • International Science and Technology Partnerships program (ISTPCanada) facilitates the development of new R&D partnerships between Canadian companies, research organizations and their counterparts in other countries
Overall Strategy or Coordinating Body	Strategy: *Advantage Canada* Body: Canadian Science Technology and Innovation Council

- The Canadian Science Technology and Innovation Council (STIC) is an advisory body that provides the Government with external policy advice on science and technology issues, and produces regular national reports.
- The current science and technology (S&T) strategy *Mobilizing Science and Technology to Canada's Advantage* was released in 2007.
- A progress report was produced in 2009.
- Four key principles of the policy are: Promoting world-class excellence; focusing on priorities; fostering partnerships; and enhancing accountability.
- The four priorities for investment are: environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communications technologies.
- Canada's 2010 Budget announced a Review of Federal Support to R&D. The expert panel released its final report on 17 October 2011. It made seven recommendations that call for a simplified and more focused approach to R&D funding:
    1. Create an Industrial Research and Innovation Council (IRIC), with a clear business innovation mandate
    2. Simplify the Scientific Research and Experimental Development (SR&ED) program by basing the tax credit for small and medium-sized enterprises (SMEs) on labour-related costs.

3. Redeploy funds from the tax credit to a more complete set of direct support initiatives
4. Make business innovation one of the core objectives of procurement, with the supporting initiatives to achieve this objective.
5. Transform the institutes of the National Research Council (NRC) into a constellation of large-scale, sectoral collaborative R&D centres involving business, the university sector and the provinces, while transferring NRC public policy-related research activity to the appropriate federal agencies.
6. Help high-growth innovative firms access the risk capital they need through the establishment of new funds where gaps exist.
7. Establish a clear federal voice for innovation, and engage in a dialogue with the provinces to improve coordination and impact.

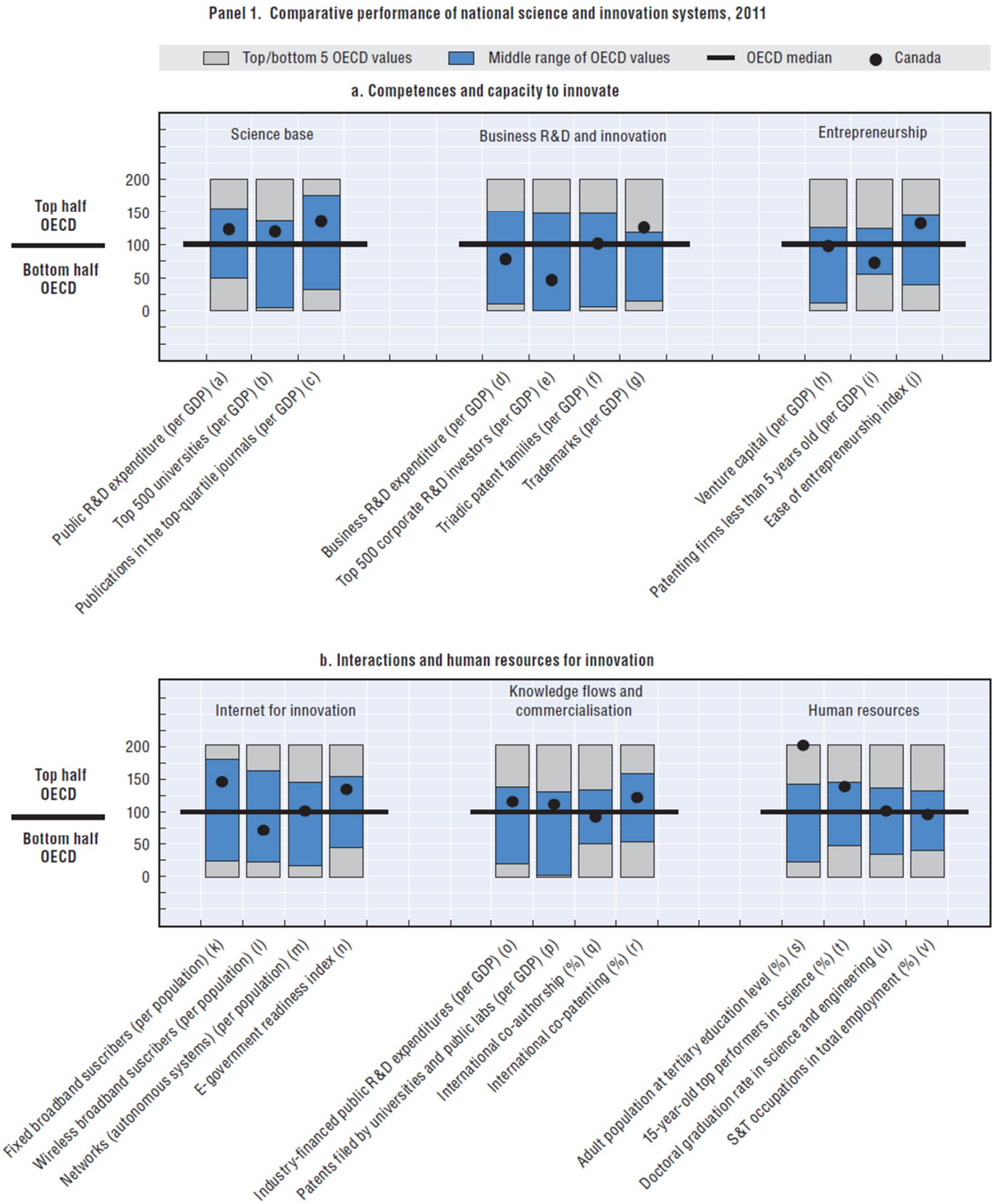
- The results of the Budget review helped shape R&D support in the Economic Action Plan 2012, which is focused on boosting economic growth and job creation – innovation, investment, education and skills.
- International Science and Technology Partnerships program (ISTPCanada) facilitates the development of new R&D partnerships between Canadian companies, research organizations and their counterparts in other countries; invests in cooperative research projects with high commercial potential; and stimulates early-stage partnership development activity.
    - Currently ISTPCanada has agreements with Israel, India, China and Brazil.

Key comparative statistics – Canada and Australia[4]

- GERD as percentage of GDP, 2010:
    - Canada: 1.85%
    - Australia: 2.20%
- GERD, 2010 current PPP:
    - Canada: $24.6 billion
    - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
    - Canada: $722
    - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
    - Canada: 0.95% (49.5% of total)
    - Australia: 1.4 % (61.9 % of total)
- Government financed GERD as percentage GDP, 2008:
    - Canada: 0.65% (34%)
    - Australia: 0.78 % (34.6%)

[4] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Canada: comparative performance of national science and innovation systems, 2011.[5]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[5] OECD Science, Technology and Industry Outlook, 2012.

DENMARK

Key Ministry	Danish Ministry of Science, Innovation and Higher Education Advisory body: The Danish Council for Research Policy
Name of Policy	*Denmark – A Nation of Solutions* *Danish Science, Innovation and Higher Education – a Global Perspective (Nov 2012)* *RESEARCH2020 (Sept 2012)*
Key Theme(s) and Scope of Policy	• Aim to increase collaborative activities across ministries • Strong focus on internationalisation • Framework for research mobility • A catalogue of important themes for future strategic research will be submitted every four years to the Government
Stand-out Initiatives	• To encourage international collaboration, the government has opened centres of innovation in Silicon Valley, Shanghai, Munich, Hong Kong and Sao Paulo. • In 2007, the university sector was reformed including the merger of 25 universities into eight universities and three research institutions.
Overall Strategy or Coordinating Body	Strategy: *Denmark – A Nation of Solutions* Body: The Danish Council for Research Policy

- The Danish Council for Research Policy advises the Danish Government and the minister for science, innovation and higher education as well as the Parliament in overall research matters, comprising future perspectives and priorities.
- A new innovation strategy was released in December 2012: *Denmark - A Nation of Solutions: The National Innovation Strategy*.
- An English version of this policy document is not currently available, however the three main areas of focus are:
  - Social challenges should drive innovation: Demand for solutions in concrete social challenges need to be prioritized more in the government innovation efforts.
  - More knowledge should be translated into value: Focus on mutual knowledge exchange between companies and knowledge institutes and more effective innovation agreements.
  - Education should increase innovation capacity of their students: More focus should be placed on innovation in the educational sector.
- Current priorities in the science, research and innovation sectors include increasing international mobility, globalisation, and strengthening the interaction between research institutions and industry.
- To spur international contacts between researchers and high technology companies, the Ministry has initiated Memorandum of Understanding agreements with the US, Brazil, China, India, Japan and Israel.
- Domestically, evaluators of grant proposals are instructed to emphasise the involvement of international partners with the aim of stimulating potential collaboration, publications and dissemination of results.

- The Ministry of Science, Innovation and Higher Education has also established partnership agreements with Stanford University's H-STAR (Human-Sciences and Technologies Advanced Research Institute) and the Japanese Science and Technology Agency.
- To encourage international collaboration, the government opened centres of innovation in Silicon Valley, Shanghai, Munich, Hong Kong and Sao Paulo.
- The international centres provide assistance to Danish industries and research institutions in gaining access to global networks of knowledge, technology, venture capital, and the possibility of exploring new and emerging markets.
- Changes to the Law on Technology and Innovation were implemented to allow the Danish Council for Independent Research and the Council for Strategic Research to allocate up to 20% of their annual funding to international research projects and overseas institutions.
- A 2006 report into the Danish innovation system identified declining participation in the EU framework programs (currently FP7).
- In response to this declining participation the subsidy scheme *EUopStart* was established in 2011 to give financial support to Danish knowledge institutions and businesses to prepare and negotiate grant agreements within FP7.
- Research funding priorities are defined by the *RESEARCH2020* policy.
- The policy is the result of political agreements to improve the basis for political distribution of funding for strategically prioritised research areas.
- A catalogue of important themes for future strategic research will be submitted every four years to the Government.
- The report *Danish Science, Innovation and Higher Education – a Global Perspective* is focused on measures to transform the Danish education sector through both domestic reforms and international engagement.
- In 2007, the Danish university sector was reformed in part through the merger of university and research institutions from 25 in total to the current eight universities and three research institutions.
- There are no tuition fees for full degree programs in Danish educational institutions, and state education grants are available for study periods abroad.

Key comparative statistics – Denmark and Australia[6]

- GERD as percentage of GDP, 2010:
  - Denmark: 3.07 %
  - Australia: 2.20%

- GERD, 2010 current PPP:
  - Denmark: $6.9 billion
  - Australia: $20.2 billion

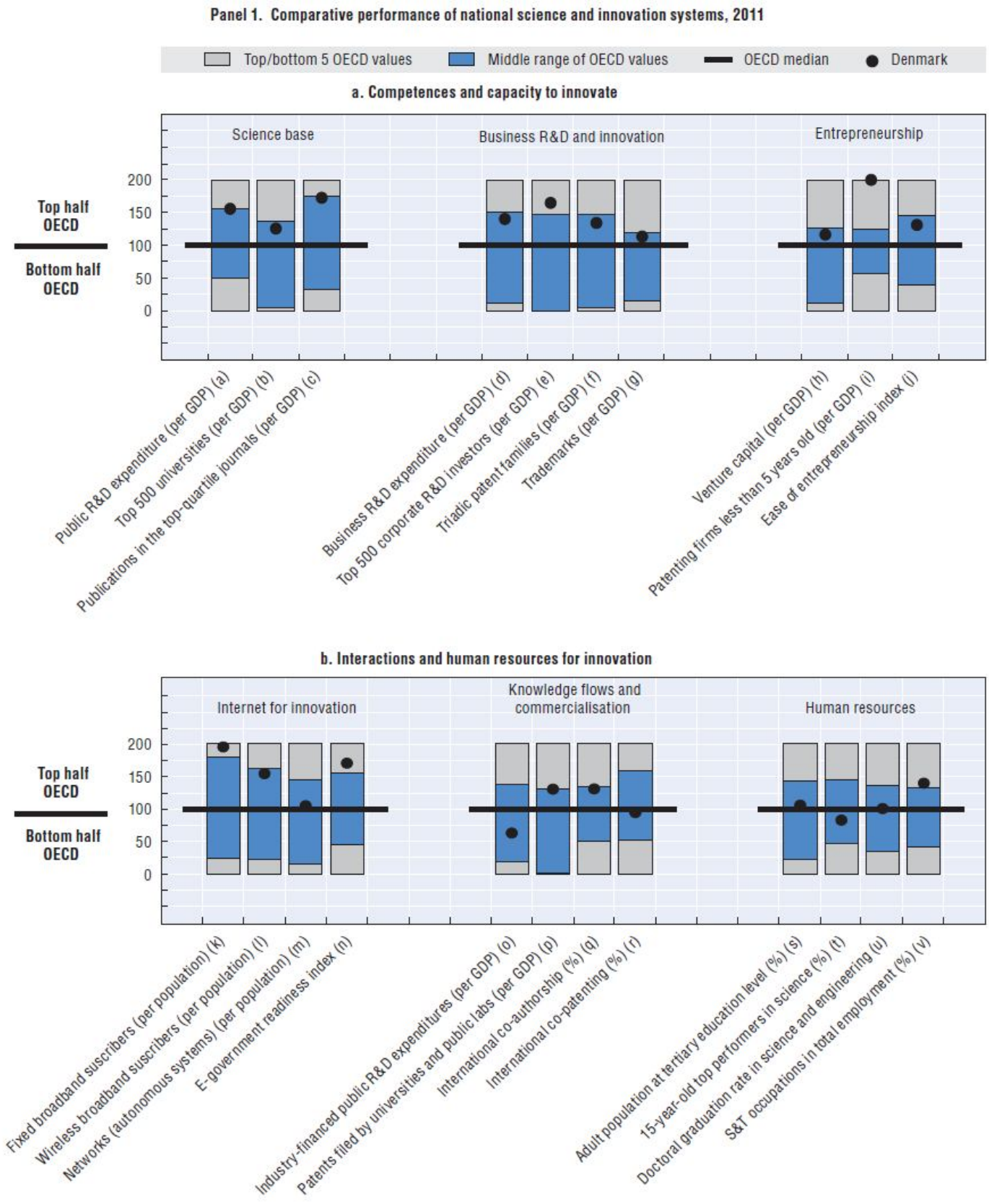
- GERD per capita, 2010, current PPP:
  - Denmark: $1246
  - Australia: $898

- Industry financed GERD as percentage of GDP:
  - Denmark, 2009: 2.0 % (62.1 % of total)
  - Australia, 2008: 1.4 % (61.9 % of total)

- Government financed GERD as percentage GDP:
  - Denmark, 2009: 0.83 % (26.1 %)
  - Australia, 2008: 0.78 % (34.6%)

[6] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Denmark: comparative performance of national science and innovation systems, 2011[7]



[7] OECD Science, Technology and Industry Outlook, 2012.

EUROPEAN UNION

Key Ministry	European Commission (EC) Directorate-General for Research and Innovation Key advisory bodies: Joint Research Centre (JRC)
Name of Policy	Three tiered strategy: 1. *Europe 2020 Strategy* 2. *Horizon 2020* (the science and innovation strategy) 3. The *Innovation Union*
Key Theme(s) and Scope of Policy	Sustainable and inclusive growth under 7 themes
Stand-out Initiatives	R&D intensity target of 3% by 2020
Overall Strategy or Coordinating Body	Strategy: *Horizon 2020* Body: Directorate-General for Research and Innovation

- Through *Europe 2020 - the EU's growth strategy*, the EU has set five ambitious objectives - on employment, innovation, education, social inclusion and climate/energy - to be reached by 2020. Each Member State has adopted its own national targets in each of these areas. Concrete actions at EU and national levels underpin the strategy.
- By 2020, the EU 2020 Strategy aims to achieve a range of targets including 3% of the EU's GDP to be invested in R&D/innovation.
- The EU's research policy and coordination of research activities is the responsibility of the Directorate-General for Research and Innovation. Its mission can be summarised as follows:
  - to develop the EU's policy in the field of research and technological development and thereby contribute to the international cooperation of European industry;
  - to coordinate European research activities with those carried out at the level of the Member States;
  - to support the EU's policies in other fields such as environment, health, energy, regional development, etc.;
  - to promote a better understanding of the role of science in modern societies and stimulate a public debate about research-related issues at European level.

- *Horizon 2020 – Science and Innovation Strategy* is a financial instrument aimed at securing Europe's global competitiveness.
- One of the primary agendas is the implementation of the Innovation Union Flagship, a major Europe 2020 initiative (see below). In addition the plan aims to:
  - Bridge gaps between research and market by facilitating enterprises to develop technological breakthroughs into commercially viable products.
  - Facilitate partnerships between the private sector and Member States.
  - International cooperation: full openness to international participation, targeted actions with key partner countries and regions with focus on EU strategic priorities.
  - Completion and development of the European Research Area by 2014; break down barriers to create single market for knowledge, research and innovation.
  - Horizon 2020 will run from 2014 to 2020 with an €80 billion (~AUD 102 billion) budget:

- dedicated science budget of ~ €25 billion (~AUD32 billion), including an increase in funding of 77% for the European Research Council,
- an innovation budget of ~€18 billion (~AUD23 billion); major investment in key technologies, greater access to capital and support for SMEs, and
- a budget for research to address European societal challenges: ~€32 billion (~AUD41 billion) to help address challenges such as climate change, sustainable transport and mobility, affordable renewable energy, food safety and security, challenge of an ageing population.

- (The current EU instrument to support research is the €55 billion Seventh Framework Program (FP7) covering the period 2007-13. Horizon 2020 is the Commission's proposed successor to FP7).

- The goals of the Innovation Union Flagship are:
  - increasing EU R&D intensity to 3%,
  - supporting major new European Innovation Partnerships to tackle societal challenges (current partnerships are in: water, agricultural sustainability and productivity; active and healthy ageing; and raw materials),
  - improving access to finance by reducing cross border impediments to venture capital flows and the matching of innovative firms and investors,
  - completing the ERA by fostering open access to research results and removing obstacles to researcher mobility,
  - strengthening public sector and social innovation,
  - using public procurement to drive demand for innovative products and services,
  - establishing a European patent,
  - the use of EU structural funds to boost innovation, and
  - establishing an Innovation Union Scoreboard, including a new high-level indicator on the share of fast-growing innovative companies, and an independent university ranking system.

- The European Research Area (ERA) is composed of all research and development activities, programmes and policies in Europe which involve a transnational perspective. Together, they enable researchers, research institutions and businesses to increasingly circulate, compete and co-operate across borders.
- There are a number of fully integrated European-level structures and programmes: including the current Seventh Framework Programme (2007-2013), and future Horizon 2020 Programme as well as a number of intergovernmental infrastructures and research organisations:
  - European Organisation for Nuclear Research (CERN) and the research activities of the European Atomic Energy Community (Euratom).
  - European Space Agency (ESA) and the first Framework Programmes.
  - new organisations which are changing the ERA 'landscape': notably, the European Research Council, the Joint Technology Initiatives and the European Institute for Innovation and Technology.

- The EU also develops and promotes voluntary guidelines and recommendations which serve as common European references in areas such as researchers' careers and mobility, knowledge transfer and co-operation between public research and industry.

- Joint Programming is a new process combining a strategic framework, a bottom-up approach and high-level commitment from Member States. It builds on the experience gained from existing schemes coordinating national programmes.
- Joint Programming is a structured and strategic process whereby member states agree, on a voluntary basis and in a partnership approach, on common visions and strategic research agendas to address major societal challenges. On a variable geometry basis, member states commit to joint programming initiatives where they implement together joint strategic research agendas. The following have been launched to date:
    - Alzheimer's and other neurodegenerative diseases
    - Agriculture, food security and climate change
    - A healthy diet for a healthy life
    - Cultural heritage and global change: a new challenge for Europe
    - Urban Europe - global urban challenges, joint European solutions
    - Connecting climate knowledge for Europe
    - More years, better lives - the potential and challenges of demographic change
    - Antimicrobial resistance- the microbial challenge - an emerging threat to human health
    - Water challenges for a changing world
    - Healthy and productive seas and oceans

Key comparative statistics –EU and Australia[8]

- GERD as percentage of GDP:
  - EU 2011: 2.03 %
  - 2020 Target: 3%
  - Australia, 2010: 2.20%
- GERD, 2010 current PPP $:
  - EU: $287.7 billion
  - Australia: $20.2 billion
- GERD per capita, 2010, current PPP $:
  - EU: $722
  - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
  - EU: 1.1% (55.2% of total)
  - Australia: 1.4% (61.9% of total)
- Government financed GERD as percentage GDP:
  - EU: 0.67% (33.6%, 2009)
  - Australia: 0.78% (34.6%, 2008)

[8] OECD Main Science and Technology Indicators 2012-2

FINLAND

Key Ministry	Ministry of Education and Culture Main advisory body: The Finnish Research and Innovation Council
Name of Policy	*Research and Innovation Policy Guidelines for 2011-2015 (2010)* *New Science and Innovation Policy Action Plan due early 2013.*
Key Theme(s) and Scope of Policy	• Maintaining GERD at 4% of GDP in the 2010s • Update funding models for universities and polytechnics by 2013 • Allocate resources to enhance the international scope of education, research and innovation activities • Improve quality and promote exploitability of science and technology • *Internationalisation of Finnish Education, Research and Innovation* in 2010–2015 released in 2009 to increase international engagement.
Stand-out Initiatives	• FinNode is Finland's global network of Finnish innovation organisations. • Currently there are FinNodes in China, the United States, Russia, Japan, and India. • FinNodes bring together Finnish organisations – Finpro, Sitra, the Academy of Finland, Tekes (funding agency for technology and innovation) and VTT (technical research centre). • Aim: helping businesses enter the markets in the target areas, increase mobility and research and innovation cooperation, and market Finland as an investment target.
Overall Strategy or Coordinating Body	Strategy: *Research and Innovation Policy Guidelines for 2011-2015* Body: The Finnish Research and Innovation Council

- The Finnish Research and Innovation Council advises the Finnish Government and its Ministries on research, technology, innovation and their utilisation and evaluation.
- The Council is responsible for the strategic development and coordination of Finnish science and technology policy as well as of the national innovation system as a whole.
- The Council draws up a policy on education, research and innovation (ERI) once during each term of office (Currently 2010-2015).
- Each report sets out the policy guidelines on the national measures and funding required during the next term of office.
- The current science related policy in Finland is *Research and Innovation Policy Guidelines for 2011-2015* which was released in 2010.
- In 2008-09, the Finnish innovation system was reviewed, and a report on the State and Quality of Scientific Research in Finland was produced by the Academy of Finland.
- These reports along with policy documents on the European Research Area (ERA), and the OECD's innovation strategy were exploited in preparation of the Council's current policy guidelines.

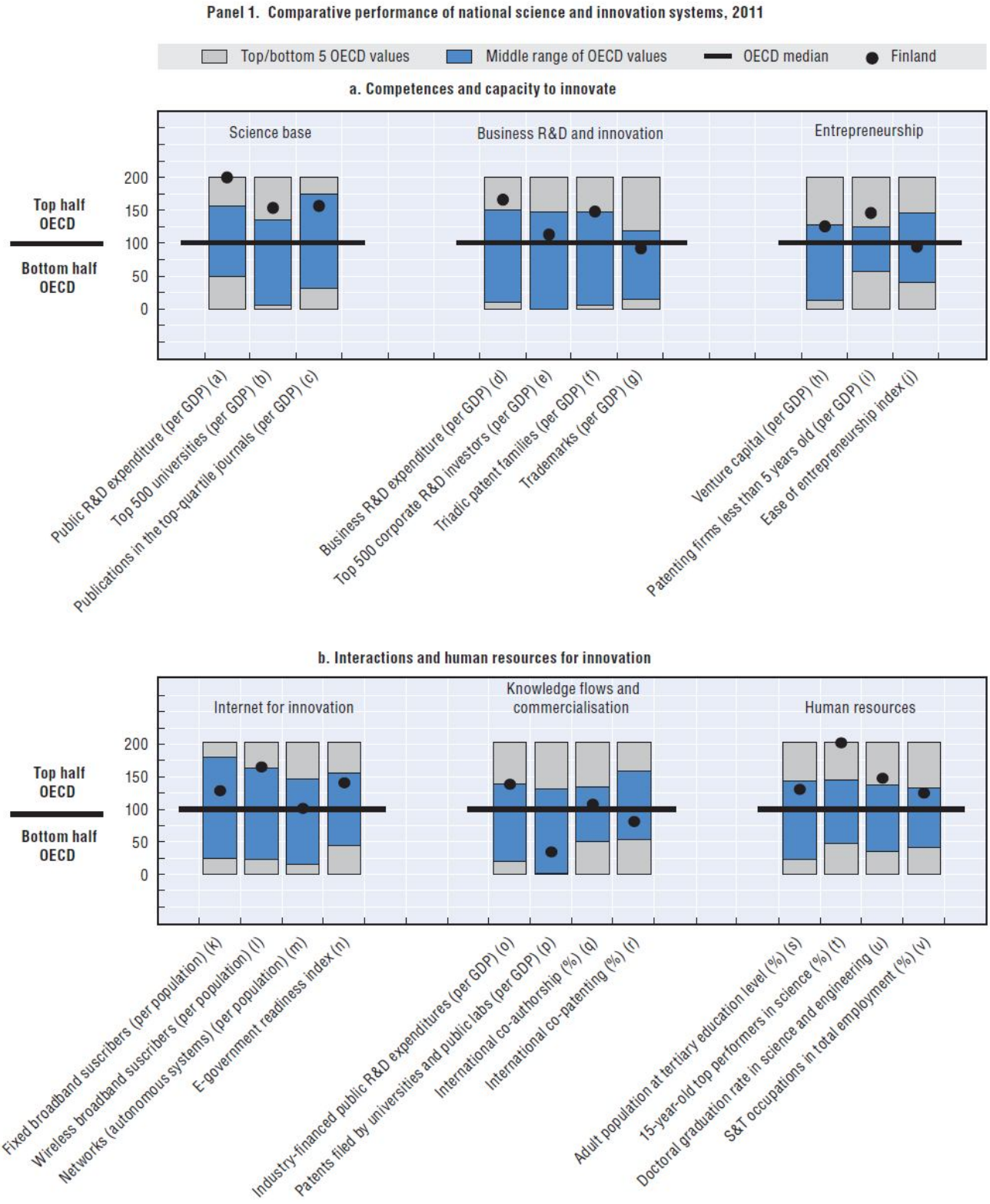
- The review identified the following areas to be addressed: the concentration of R&D and innovation in a few sectors, the low level of internationalisation of research, and fragmentation of education, research and innovation.
- Challenges for Finland that have been identified include the ageing population and the availability of skilled workers to counteract decreasing production and consumption with subsequent declining tax base.
- To rectify the low levels of internationalisation, the Research and Innovation Council of Finland published the strategy *Internationalisation of Finnish Education, Research and Innovation* in 2009 (The Strategy).
- The Strategy highlighted that alongside efforts to maintain a national competitive edge and assets, care must be taken to ensure that responsibility for common, global problems is also addressed.
- Towards increasing internationalisation, the Council noted that cooperation areas and regions must be selected proactively.
- The target countries that were identified to be prioritised for international education, research and innovation engagement included:
  - Countries where FinNodes are based – China, the US, Russia, Japan, India. (FinNodes are Finland's international innovation centres that bring together Finnish organisations – FinPro, Sitra, the Academy of Finland, Tekes and VTT – to improve coordination increase mobility and research and innovation cooperation, and highlight Finland as an investment target).
  - Countries that Finland has bilateral agreements with
  - Emerging economies such as South Korea, Brazil, Chile and South Africa.
- Importantly, the Strategy notes that to be able to seize global opportunities *"Internationalisation must be incorporated into all education, research and innovation (ERI) development(s) and decision-making. International cooperation must be an integral, natural part of Finnish ERI activities."*
- An interim assessment of the situation and development needs of the Internationalisation Strategy is due this year.
- As part of the government's mid-term review, a new science and innovation Policy Action Plan (the Plan) is expected to be released in early 2013 from the Ministry of Employment and Economy, the Ministry of Education and Culture and the Finnish Research and Innovation Council.

Key comparative statistics – Finland and Australia[9]

- GERD as percentage of GDP, 2010:
  - Finland 3.88 %,
  - Australia: 2.20%
- GERD, 2010 current PPP:
  - Finland: $7.6 billion
  - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
  - Finland: $1404
  - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
  - Finland: 2.6 % (70.3 % of total)
  - Australia: 1.4 % (61.9 % of total)
- Government financed GERD as percentage GDP, 2008:
  - Finland: 0.81 % (21.8 %)
  - Australia: 0.78 % (34.6%)

[9] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Finland: comparative performance of national science and innovation systems, 2011.[10]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[10] OECD Science, Technology and Industry Outlook, 2012.

FRANCE

Key Ministry	Ministry of Higher Education and Research Ministry of Economics, Industry and Employment Main advisory body: High Council for Science and Technology (HCST)
Name of Policy	*National Strategy for Research and Innovation (SNRI, 2009)*
Key Theme(s) and Scope of Policy	• Strengthening research capacity and scientific performance • Better conditions for development of new companies • Knowledge transfer between public research bodies and business.
Stand-out Initiatives	• Aims to place innovation and research at the heart of French society and economy • Excellence Initiative programme (IDEX) is providing €7.7 billion to eight conglomerates of universities and other institutes in an attempt to catapult them into the international academic elite.
Overall Strategy or Coordinating Body	Strategy: *Investissements d'Avenir (Investments for the Future, 2009)* Body: High Council for Science and Technology (HCST)

- The French High Council for Science and Technology (HCST) is a consultative body in charge of advising the Prime Minister and the Government on important issues and orientations as regards research and innovation policy.
- The Council is in charge of providing the Government with advice on several issues including:
    - Technological and scientific grand challenges and national priorities in the field of research
    - French scientific and technological policy at the European and international level
    - The organisation of the French research system
    - Links between research, society and scientific culture
- The current science policy, National Strategy for Research and Innovation (SNRI), was released in 2009, and is due to be updated this year.
- Extensive consultation was used to draft the SNRI through a steering committee, work groups and an Internet consultation process that was open to the general public.
- The SNRI has a strong focus on generating enthusiasm across society for science and research: *"At the core of the National Research and Innovation Strategy there is an ambition: to put back research and innovation at the heart of French society and economy."*
- The key themes of the policy focus on transforming discoveries from fundamental research into applications or technological innovations. Specifically this focus includes:
    - Strengthening research capacity and scientific performance
    - Better conditions for development of new companies
    - Knowledge transfer between public research bodies and business
- More than 600 participants from the academic research sector, business and associations were involved over a six month period to identify the three priority areas of the SNRI, which are health care, nutrition and biotechnology; environmental urgency and eco-technology; and information, communication and nanotechnology.

- The SNRI strategy aims to address weaknesses of the French research and innovation system which were found to include:
    - Fragmentation of the research system
    - Lack of investment in R&D from the private sector, with accompanying poor relationships between public research institutions, universities and companies
    - Poor management of human resources in public institutions with an impact on the attractiveness of careers, the mobility of researchers and the hosting of foreign researchers
    - Insufficient exchange and partnerships with emerging countries
- A €35 billion economic stimulus package called *Investissements d'Avenir* (*Investments for the Future)* was launched at the end of 2009.
- €21.9 billion of the *Investments for the Future* package was allocated to research and higher education, and the French National Research Agency (ANR) is responsible for the administration of these funds.
    - Evaluations of all proposals for this funding are conducted by international panels through an extensive peer-review process.
    - As part of the package, a €7.7 billion Excellence Initiative (IDEX) programme was set up to create 5 to 10 Higher Education Institutes with international visibility and boost competitiveness.
    - In February 2012, eight conglomerates of universities and other institutes were selected to share in the €7.7 billion IDEX programme. It is intended that some of the partners will eventually merge into big research universities to rival those elsewhere in Europe and the US.
    - Other initiatives include €260 million in new funding over ten years for nine national infrastructure projects in medical and life-sciences research, and two demonstration projects in biotechnology.

Key comparative statistics – France and Australia[11]

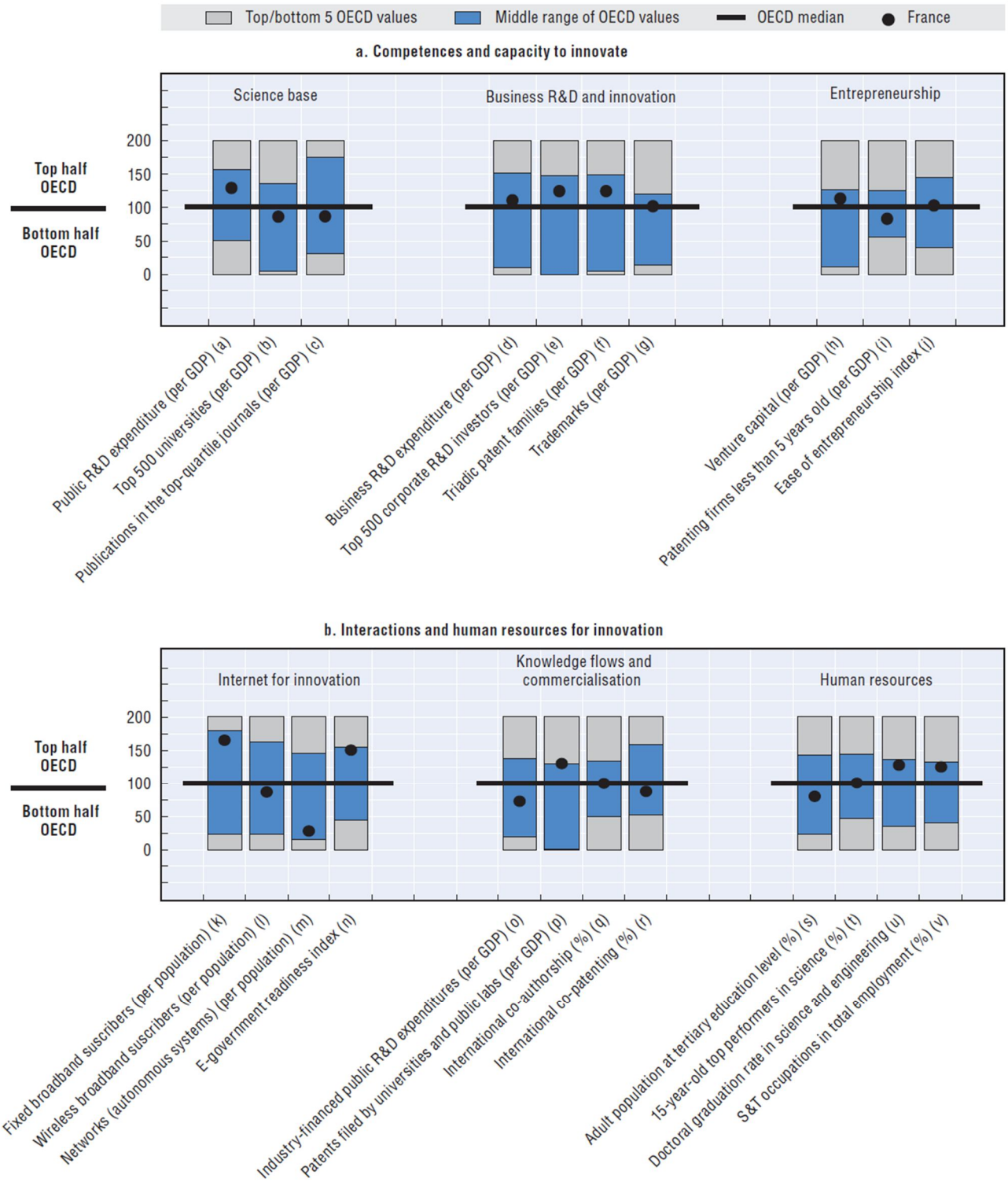
- GERD as percentage of GDP, 2010:
  - France 2.24%
  - Australia: 2.20%
- GERD, 2010 current PPP:
  - France: $49.9 billion
  - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
  - France: $770
  - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
  - France: 1.08% (50.8% of total)
  - Australia: 1.4% (61.9% of total)
- Government financed GERD as percentage GDP, 2008:
  - France: 0.83% (38.9%)
  - Australia: 0.78% (34.6%)

[11] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in France: Comparative performance of national science and innovation systems, 2011.[12]

Figure 10.15. **Science and innovation in France**

Panel 1. Comparative performance of national science and innovation systems, 2011



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[12] OECD Science, Technology and Industry Outlook, 2012.

IRELAND

Key Ministry	The Office of Science, Technology and Innovation (OSTI)
Name of Policy	*Strategy for Science, Technology and Innovation (2006-2013) (SSTI)*
Key Theme(s) and Scope of Policy	• The SSTI forms a core of the National Development Plan • Targets investment that provide critical mass in areas that link to current and likely future societal and economic needs.
Stand-out Initiatives	• Increasing GERD to 2.5% of GDP by 2013. This has now been extended to 2020. • Target of doubling the number of PhD graduates by 2013. • Proposes to increase participation rates in secondary science subjects.
Overall Strategy or Coordinating Body	OSTI is advised by Forfás – Ireland's policy advisory board for enterprise and science. In addition, the Chief Science Advisor provides independent advice to Government on any aspect of Science, Technology and Innovation.

- Ireland has adopted austerity measures to address its public debt and budgetary constraints are likely to place severe pressure on investment in research in the years ahead.
- In 2010, Ireland's GERD was 1.77% of GDP, with a target of 2.5% by 2013. Due to the economic difficulties this target date has now been changed to 2020.
- Ireland began formulating a science policy during the 1970s through the work of the National Science Council and subsequently the National Board tor Science and Technology.
- Ireland had a focus on applied research until **i**t became apparent that an attempt to build a system of applied research without a base for excellence in the underpinning sciences was not sustainable.
- Ireland's Strategy for Science, Technology and Innovation 2006–2013 is based on a vision of placing Ireland firmly on the global map in terms of the excellence of our research and its application for the benefit of society.
- Its goals include promoting innovation by improving the human capital base (especially in science and engineering), strengthening the research capability and capacity of the enterprise sector and increasing the contribution of research to development in the agriculture, health, environment and marine sectors.
- It has three over-arching goals:
    - Research oriented towards the Irish enterprise base;
    - Research for policy;
    - Research for knowledge.
- The Strategy will form a core component of the forthcoming National Development Plan, and decisions on funding for the remainder of the Strategy will be made in that context.
- The strategy will target investment providing critical mass in areas that link to current and likely future societal and economic needs.

- The strategy aims to focus investment in areas that are most likely to give demonstrable returns in the medium term, while at the same time, maintaining a sustainable STI system for long-term national prosperity and wellbeing.
- The strategy proposes to increase participation rates in secondary science subjects by:
    - reforming the science curricula for leaving certificate,
    - investment in continuous professional development and networks for teachers,
    - awareness promotion and the provision of guidance materials,
    - rebalancing the content of the science curriculum in the direction of problem solving and
    - revisiting the issue of technical assistance for schools to facilitate practical coursework.

- The STI set a target of doubling the number of PhD graduates by 2013. The numerical target was achieved by 2011.

Key comparative statistics – Ireland and Australia[13]

- GERD as percentage of GDP, 2010:
    - Ireland: 1.77%
    - Australia: 2.20%

- GERD, 2010 current PPP:
    - Ireland: $3.1 billion
    - Australia: $20.2 billion

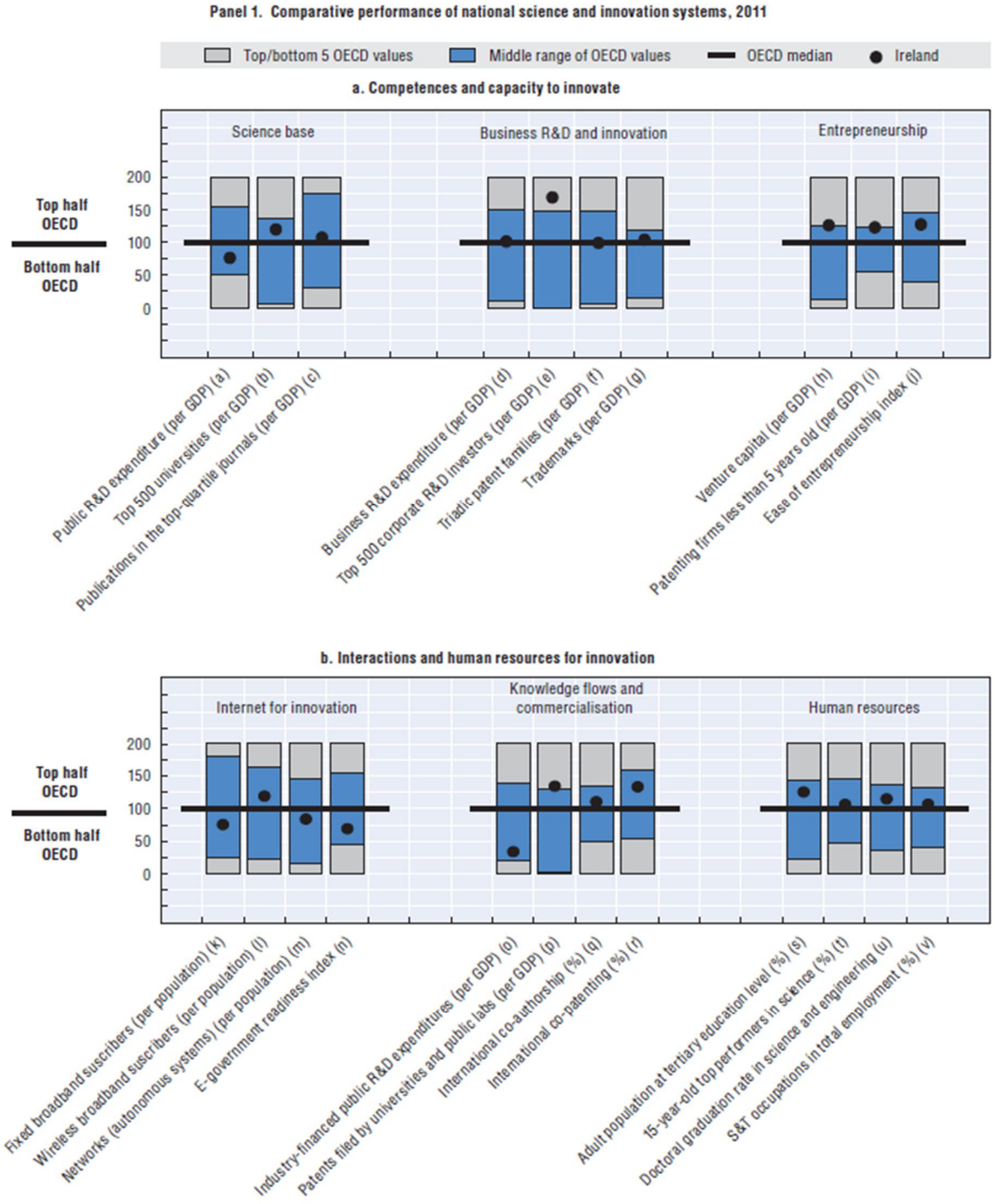
- GERD per capita, 2010, current PPP:
    - Ireland: $700
    - Australia: $898

- Industry financed GERD as percentage of GDP, 2010:
    - Ireland: 0.90 % (51% of total)
    - Australia: 1.4 % (61.9% of total)

- Government financed GERD as percentage GDP, 2010:
    - Ireland: 0.50 % (28%)
    - Australia: 0.78 % (34.6%)

[13] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Ireland: comparative performance of national science and innovation systems, 2011.[14]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[14] OECD Science, Technology and Industry Outlook, 2012.

JAPAN

Key Ministry	Ministry of Education, Culture, Sports, Science and Technology Ministry of Economy, Trade and Industry Main advisory body: Japan's Council for Science and Technology Policy
Name of Policy	*4th Science & Technology Basic Plan (2011-15)*
Key Theme(s) and Scope of Policy	• Shape competitive research budgets; seek to engage science with society; link science with industry; and provide governance for science and technology policymaking • Stresses the importance that science and technology will play in rebuilding the earthquake/tsunami affected prefectures in north-eastern Japan and for revitalising the domestic economy
Stand-out Initiatives	• New focus on integrating science with innovation and increasing the share of business R&D to 3% by 2020
Overall Strategy or Coordinating Body	Strategy: *Strategy for the Rebirth of Japan (August 2012)* Body: Japan's Council for Science and Technology Policy

- Chaired by the Prime Minister and attended by key Cabinet Ministers, Japan's Council for Science and Technology Policy (CSTP) is the central advisory body to the Cabinet Office on S&T policy.
- The CSTP is responsible for research and technology policy formulation and budget allocation.
- As a function of the Ministry of Education, Culture, Sports, Science and Technology, the Science and Technology Policy Bureau is responsible for planning and design of basic research policies.
- Japan has a series of five-year science and technology (S&T) plans commencing with the first Basic Plan in S&T in 1996.
- Formulated and directed from the Cabinet Office, the basic plans aim to support R&D activities, meet social and economic needs, create intellectual assets for Japan, and enable Japan as a key knowledge producing nation.
- The current plan is the *4th S&T Basic Plan (2011-15)* and was introduced in August 2011.
    - This policy has a budget of approximately $314 billion or 1% of GDP.
- The plan was based on a report by CSTP and includes four major challenges to be overcome for sustainable growth and prosperity:
    - recovery and revitalization
    - green innovation
    - life innovation
    - science, technology and innovation system reform
- The Basic Plan also covers other essential areas of emphasis, such as basic research, human resources, national security and the role of science, technology and innovation in Japan's international diplomatic strategy.

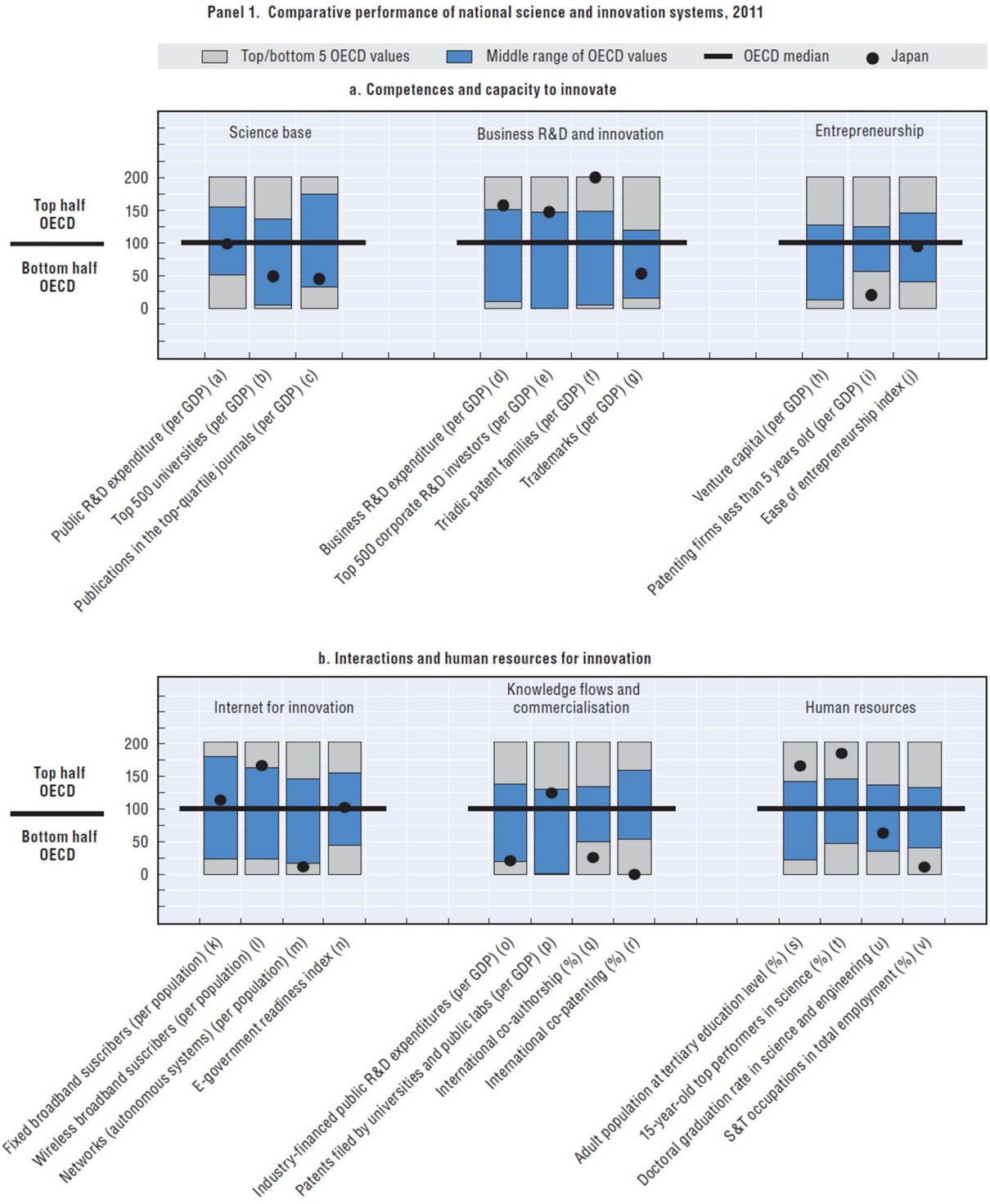
- The societal challenges facing Japan were identified as responding to an aging society; effectively managing and responding to a declining population; energy and the environment, including natural disasters; rare earth materials; combating deflation and stimulating economic growth; and also addressing growing concerns over the fiscal deficit.
- Recent policy initiatives link closely with addressing these challenges.
    - Under the *4th S&T Basic Plan (2011-15)*, the government plans to invest 1% of GDP per year (approximately $USD312 billion over five years) in several priority areas: environment, energy and health and medical research.
    - The policy also stresses the importance that science and technology will play in rebuilding the earthquake/tsunami affected prefectures in north-eastern Japan and for revitalising the domestic economy.
- In August 2012, Cabinet endorsed the *Strategy for the Rebirth of Japan*, which provides an overarching policy for Japan's economy.
    - Concerning S&T, this Strategy places an emphasis on developing pharmaceuticals and medical equipment (such as cancer drugs); updating the regulatory environment to promote regenerative medicine; and using robotics in health and nursing care.
    - The 4th Basic S&T Plan closely dovetails with the Strategy in aiming to revitalise Japan’s economy and maintain Japan’s position as a global S&T leader, particularly in light of China’s increasing S&T capacity.

Key comparative statistics – Japan and Australia[15]

- GERD as percentage of GDP, 2010:
  - Japan 3.26%
  - Australia: 2.20%
- GERD, 2010 current PPP:
  - Japan: $14.1 billion
  - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
  - Japan: $1100
  - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
  - Japan: 2.71% (78.2% of total)
  - Australia: 1.4% (61.9% of total)
- Government financed GERD as percentage GDP, 2008:
  - Japan: 0.54% (38.9%)
  - Australia: 0.78% (15.6%)

[15] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Japan: comparative performance of national science and innovation systems, 2011[16]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[16] OECD Science, Technology and Industry Outlook, 2012.

NORWAY

Key Ministry	The Ministry of Education and Research
Name of Policy	Science for the Future 2010-14 White Paper on Research 2003-13 Climate for Research 2008-09
Key Theme(s) and Scope of Policy	Defines nine research policy goals – five thematic and four generic goals: 1. meeting global challenges, with a particular emphasis on the environment, climate change, oceans, food safety and energy research 2. better health, levelling social differences in health, and developing high quality health services 3. addressing social challenges and provide research based practise in the relevant professions 4. knowledge based industry in all regions 5. industry oriented research within the areas food, marine, maritime, tourism, energy, environment, biotechnology, ICT, and new materials/nanotechnology 6. high quality research 7. a well-functioning research system 8. increased internationalisation of research 9. Efficient use of research funding and results
Stand-out Initiatives	• Coordinated efforts across all sectors against strategies • Internationalisation is an overall priority of the government's research and innovation policy for which clearly defines objectives and plans for international co-operation.
Overall Strategy or Coordinating Body	Research Council of Norway Ministry of Research and Education

- Norway produces multi-annual R&D strategies that are defined in periodical (every four years) white papers.
- The government's long term ambition is that total R&D expenditure will constitute 3% of GDP
- The Ministry of Research and Education is responsible for coordinating the overall research policy and maintains the largest source of government research funds
- The education sector and trade and industry sectors have for several years collaborated to enhance science and technology subjects in education.
- *Science for the future 2010-14* strategy aims to:
    - Increase the interest in maths, science and technology, and strengthen the recruitment and implementation at all levels
    - Strengthen the competence of Norwegian pupils in science subjects
    - Increase the recruitment of girls to mathematics, physics, chemistry and technology subjects

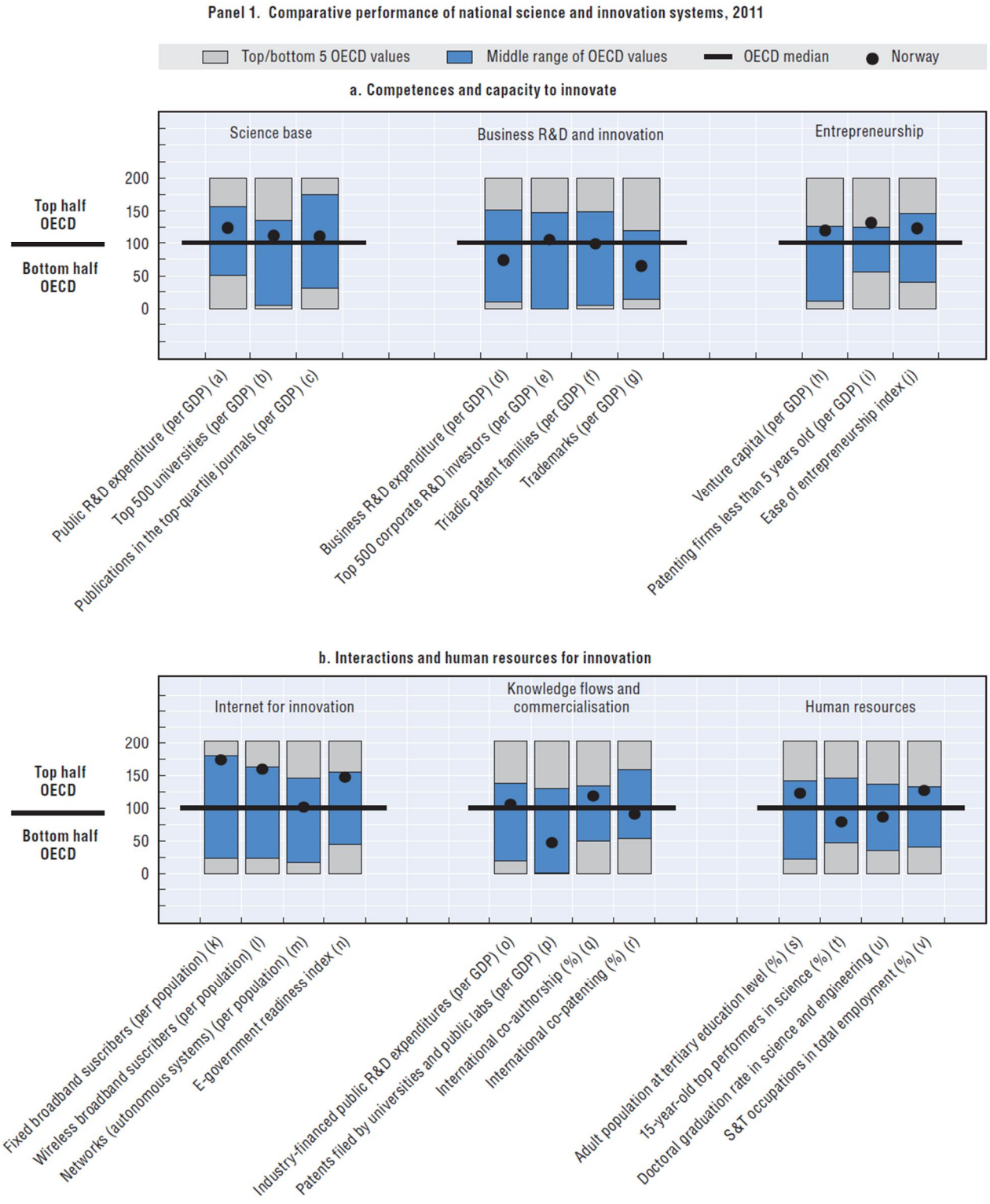
- Other focussed government strategies include:
    - Green Growth (2011)
    - Biotechnology (2011)
    - Nanotechnology and ICT (2012)
    - Ocean21 (2011 as a continuation of the prior 21-strategies)
    - The *High North* strategy is intended to protect the environment, maintain urban design and promote business development. The strategy aims to further develop cooperation between Russia and Norwegian partners in the north.
    - The Research Council of Norway also develops research strategies, both thematic and for overarching issues such as internationalisation and innovation.

Key comparative statistics – Norway and Australia[17]

- GERD as percentage of GDP, 2010:
    - Norway:1.69%
    - Australia: 2.20%
- GERD, 2010 current PPP:
    - Norway: $4.7 billion
    - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
    - Norway: $965
    - Australia: $898
- Industry financed GERD as percentage of GDP:
    - Norway: 0.77% (43.6% of total 2009)
    - Australia: 1.4% (61.9% of total 2008)
- Government financed GERD as percentage GDP:
    - Norway: 0.82% (46.8% 2009)
    - Australia: 0.78% (34.6% 2008)

[17] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Norway: comparative performance of national science and innovation systems, 2011.[18]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[18] OECD Science, Technology and Industry Outlook, 2012.

REPUBLIC OF KOREA

Key Ministry	Ministry of Education, Science and Technology Ministry of Knowledge Economy
Name of Policy	*The Second Basic Plan for Nurturing Human Resources in Science, Engineering and Technology over the period of 2011-15*
Key Theme(s) and Scope of Policy	• Creating, using and disseminating new knowledge • Increasing scientific literacy • Strengthening national innovation system by changing science and technology policy direction
Stand-out Initiatives	• Transitioning to a knowledge-based economy, away from the adaptation of imported technology from advanced economies. • Defined areas of endeavour: IT, life sciences, materials, alternative energy, the environment; mechatronics; and basic science.
Overall Strategy or Coordinating Body	National Science and Technology Commission

- Key governance and funding bodies are:
  - Governance: National S&T Commission (NSTC) – as the Republic of Korea's top science and technology (S&T) policy making body;
  - Funding agencies: Ministry of Education, Science and Technology; and Ministry of Knowledge Economy.
- The Republic of Korea (South Korea) has few natural resources and is heavily dependent upon imports for energy and raw materials. Thus, one of the main driving forces behind South Korea's transformation from an underdeveloped country into an industrialised one has been its investment in human capital.
- In the early 2011, the Ministry of Education Science and Technology announced *'The Second Basic Plan for Nurturing Human Resources in Science, Engineering and Technology over the period of 2011-2015'*[19].
- The Basic Plan over the period of 2006-2010 was focused on universities. Enhancing knowledge circulation as well as knowledge production is increasingly a crucial element for South Korea's innovation policy.
- To facilitate cooperation amongst industry, academia, and research institutes, the government announced the *'Plan for Advancing Cooperation amongst Industry, Academia, and Research Institutes'* in September 2010.
- S&T is acknowledged as the driving force behind changes and developments that shape South Korea. It sees a crucial role of scientific discovery and technological innovation in becoming an industrially advanced economy.

[19] MEST, 2011

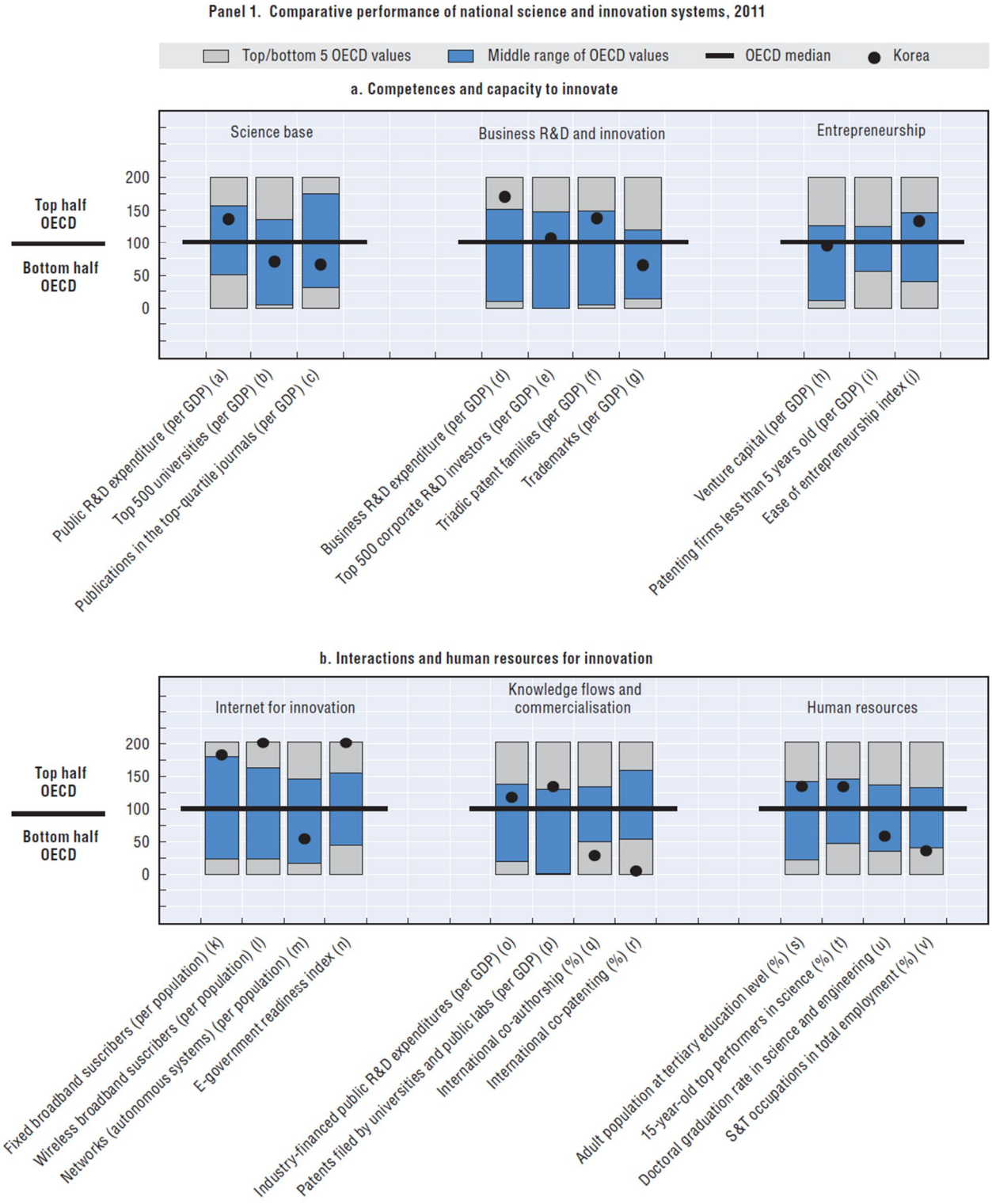
- In 2000, South Korea launched its long-term S&T strategy/blueprint: *"Vision 2025: Korea's long-term plan for scientific and technological development"*. Vision 2025 is comprehensive and focused plan which aims to strengthen competitiveness.
- In July 2010, the government announced the creation of a new position at the Office of the President, Senior Secretary to the President for Education, Science and Culture.
    - The Senior Secretary is responsible for identifying and developing new growth engines in the areas of S&T, broadcast and information technology, and green growth.
- There are advisory bodies at the top administrative level such as the President Committee on Green Growth and the Presidential Advisory Council on Education, Science and Technology (PACEST) chaired by the President.
    - PACEST is the foremost body responsible for the direction of S&T policy for government R&D investment.
- After the 2012 R&D budget review, the NSTC selected five major investment areas to respond to social challenges and industrial demand as follows:
    - big public R&D such as space and aviation industry, particle accelerator
    - construction and maritime industry
    - green resources such as new and renewable energy, essential industry such as machine equipment and materials
    - advanced fusion industry such as system semiconductor, LED system and ICT industry
    - life welfare technology
- All of the major areas have specific policy measures and will be implemented by relevant departments.

Key comparative statistics – Republic of Korea and Australia[20]

- GERD as percentage of GDP, 2010:
    - Korea: 3.74%
    - Australia: 2.20%
- GERD, 2010 current PPP:
    - Korea: $53.2 billion
    - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
    - Korea: $1077
    - Australia: $898
- Industry financed GERD as percentage of GDP:
    - Korea: 2.7% (71.8% of total 2010)
    - Australia: 1.4% (61.9 % of total 2008)
- Government financed GERD as percentage GDP, 2008:
    - Korea: 1.00% (26.7% 2010)
    - Australia: 0.78% (34.6% 2008)

[20] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Republic of Korea: comparative performance of national science and innovation systems, 2011[21]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[21] OECD Science, Technology and Industry Outlook, 2012

SWEDEN

Key Ministry	Ministry of Education and Research - research policy Ministry of Enterprise, Energy and Communication - innovation policy Main advisory bodies: Research Advisory Committee
Name of policy	Research and Innovation Bill (2012/13:30). *This is the current (2013-16) of a series of 4-year strategies.*

Key Theme(s) and Scope of Policy	• Sweden's research policy objective is to perform high quality research and innovation that underpin social development of society and competitiveness of industry.
	• The Bill aims to provide[22]:
	  • freedom, long-term approach and greater opportunities for risk-taking
	  • greater endeavours to achieve high quality
	  • good conditions for researchers
	  • initiatives for society and business
	  • increased utilisation of research-based knowledge

Stand-out Initiatives	Increased funding for: strategic innovation areas, the Swedish Research Council for funding research, and the RISE industrial research institutes[23]
Overall Strategy or Coordinating Body	Strategy: Research and Innovation Bills (series of 4-year strategies)

- The European Commission's Innovation Union Competitiveness Report (2011) includes Sweden in the group of "very high knowledge-intensity countries" together with Denmark, Finland and Switzerland.[24]
- In the Research and Innovation Bill of 2008, twenty strategic areas were identified for investment (see page 37).
- Alongside the strategic areas, four societal challenges have been identified by Swedish Governmental Agency for Innovation Systems (VINNOVA), where Sweden is considered well placed for internationally leading innovation:
  - Information society 3.0
  - Sustainable attractive cities
  - Future healthcare
  - Competitive production
- Life sciences represent an area of research strength that can contribute to meeting social challenges.
- Life Science companies contribute a significant part of Swedish exports.

[22] Research and Innovation – A summary of Government Bill 2012/13:30, Government Offices of Sweden
[23] RISE Research Institutes of Sweden is a network of research and technology organisations (RTOs), wholly or partly owned by the Swedish state. The RTOs within RISE perform industrial research and innovation.
[24] http://ec.europa.eu/research/innovation-union/pdf/competitivenessreport/2011/countries/sweden.pdf#view=fit&pagemode=none

- Life science areas receiving increased investment in 2013 were: infections and antibiotics, ageing and health, pharmaceutical development, and clinical studies.
- As research infrastructure becomes increasingly large and costly, Sweden sees regional and international level collaboration as necessary to develop such infrastructure.
- The European Spallation Source (ESS) uses neutron radiation to determine the three-dimensional structure of an object, thereby acting as a kind of giant microscope. Since 2009 there have been plans to build the ESS in Lund; this is one of the largest research infrastructure initiatives in Europe in recent decades.
- Sweden has pledged to contribute 35 per cent of the construction costs (estimated at around EUR 1.5 billion at 2008 price levels).

Sweden's 20 strategic areas for research funding

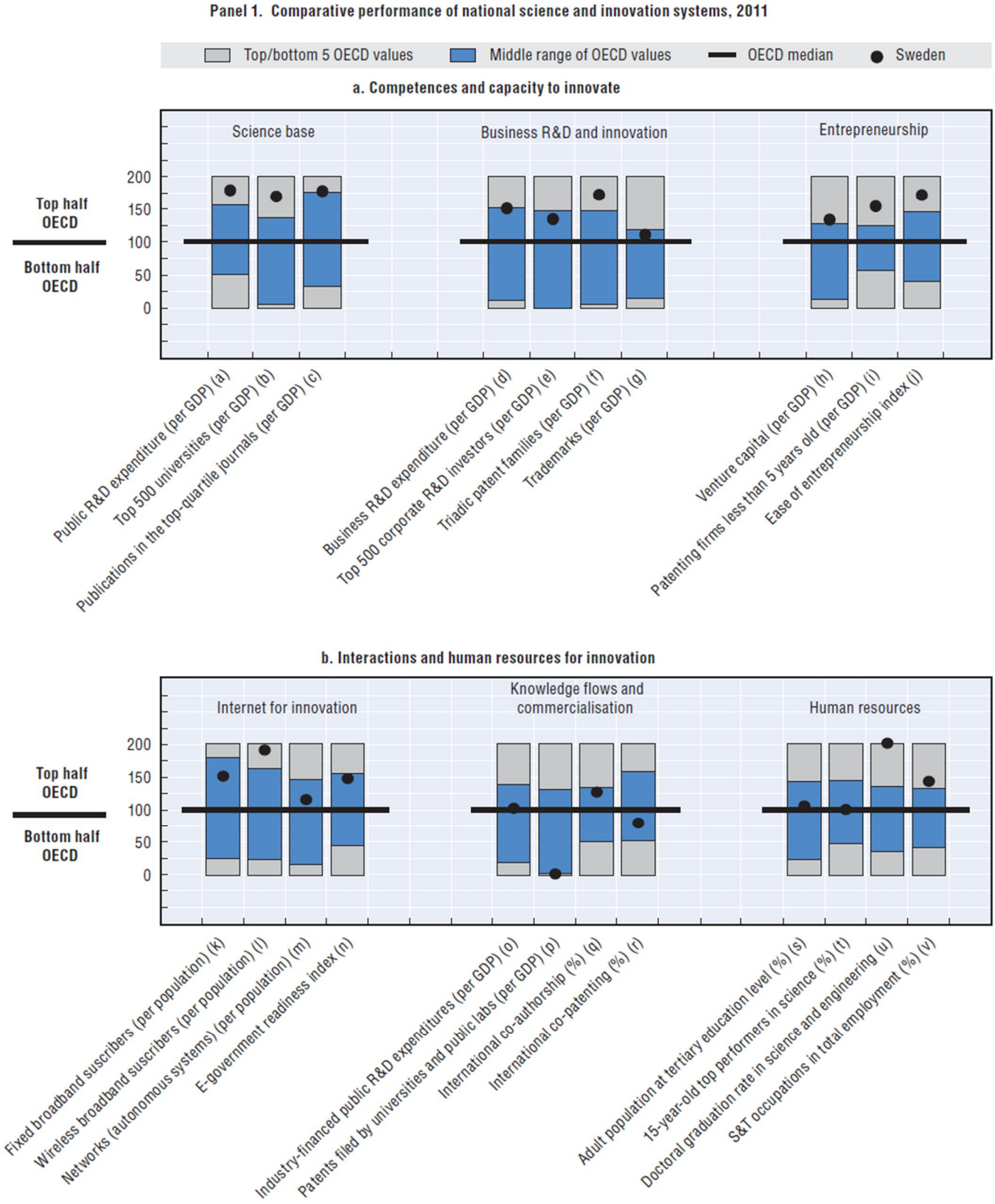
1. Energy
2. Sustainable exploitation of natural resources
3. Effects on natural resources, ecosystems and biological diversity
4. Climate models
5. Sea environmental research
6. Cancer
7. Diabetes
8. Epidemiology
9. Molecular biology
10. Neuroscience, incl. brain- and nerve system diseases
11. Stem cells and regenerative medicine
12. Health
13. Nanoscience and nanotechnology
14. E-science
15. Material science, incl. functional materials
16. IT and mobile communication
17. Production technology
18. Transport research
19. Security and crisis management
20. Politically important geographical regions

Key comparative statistics – Sweden and Australia[25]

- GERD as percentage of GDP, 2010:
    - Sweden 3.39%
    - Australia: 2.20%
- GERD, 2010 current PPP $:
    - Sweden: $12.5 billion
    - Australia: $20.2 billion
- GERD per capita, 2010, current PPP $:
    - Sweden: $1331
    - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
    - Sweden: 2.12% (58.8% of total)
    - Australia: 1.4% (61.9 % of total)
- Government financed GERD as percentage GDP:
    - Sweden: 0.99% (27.5 %, 2009)
    - Australia: 0.78% (34.6%, 2008)

[25] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Sweden: comparative performance of national science and innovation systems, 2011.[26]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[26] OECD Science, Technology and Industry Outlook, 2012.

SWITZERLAND

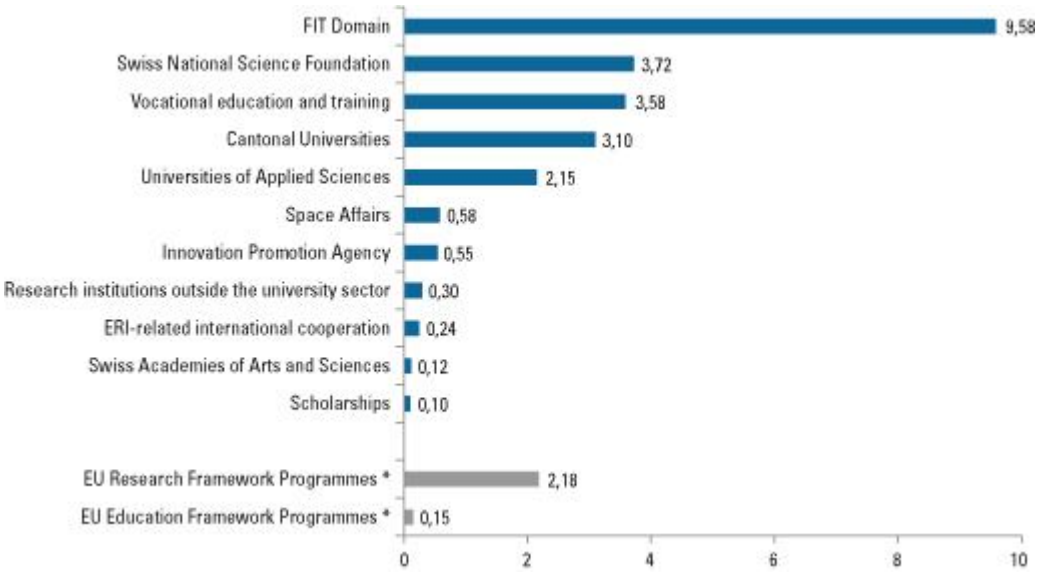
Key Ministry	The State Secretariat for Education, Research and Innovation (SERI)
Name of Policy	The Education, Research and Innovation (ERI) Message
Key Theme(s) and Scope of Policy	The ERI Message 2013-16 has three policy guidelines:[27] 1. Ensure education system provides skills that match market demand. 2. Strengthen (competitive) funding and increase R&D and innovation capabilities. 3. Build research and economic activities on the "principles of equal opportunity, sustainability and competitiveness"
Stand-out Initiatives	• Increased funding commitment for: federal institutes of technology, the Swiss National Science Foundation for funding research, and vocational education
Overall Strategy or Coordinating Body	Strategy: Education, Research and Innovation Messages (4-year strategies) Body: SERI coordinates related activities within the Swiss Federal Administration and ensures cooperation with the Cantons (state and territory governments).

- The European Commission's Innovation Union Competitiveness Report (2011) includes Switzerland in the group of "very high knowledge-intensity countries" together with Denmark, Finland and Sweden.[28]
- The federal government's strategic planning document, the ERI Message, is released every four years to provide a general framework for education, research and innovation policy.
- The recently announced ERI Message has committed a budget of approximately CHF 26 billion (~$28 billion AUD) for 2013 -16. This includes estimated funding for Swiss participation in EU framework programs for education and research.
- Funding for the ERI system will grow at an annual rate of 3.7%, which is considerably higher than the growth rates for other policy areas.[29]
- Public research funding mechanisms have changed following reforms of the Swiss National Science Foundation (SNSF), the main basic research funding agency.
- Since 2009, overhead costs are paid to institutions hosting funded research projects.
- Selection procedures have moved towards harmonisation of processes, better provision of information to applicants, the creation of expert panels, and the launch of an electronic application procedure.
- In its *Energy Strategy 2050*, Switzerland has emphasised energy efficiency and the expansion of hydropower and new renewable energy.[30]

[27] OECD Science, Technology and Industry Outlook, 2012.
[28] http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/countries/switzerland.pdf#view=fit&pagemode=none
[29] SERI - http://www.sbfi.admin.ch/org/01645/index.html?lang=en

- The reshaping of Switzerland's energy system will be supported by targeted research at the national and international level, technology transfer between universities and industry and the establishment of new, innovative businesses.

Swiss funding for education, research and innovation 2013-16 (billion CHF)[31]



* Will be requested at a later time.

[30] Fact Sheet - Energy Perspectives 2050 – (Swiss Government) Federal Council's analysis of the options for provision of electricity

[31] SERI - http://www.sbfi.admin.ch/org/01645/index.html?lang=en

Key comparative statistics – Switzerland and Australia[32]

- GERD as percentage of GDP, 2008:
  - Switzerland 2.87%
  - Australia: 2.26%

- GERD, 2008 current PPP $:
  - Switzerland: $10.5 billion
  - Australia: $19.1 ($20.2 billion, 2010)

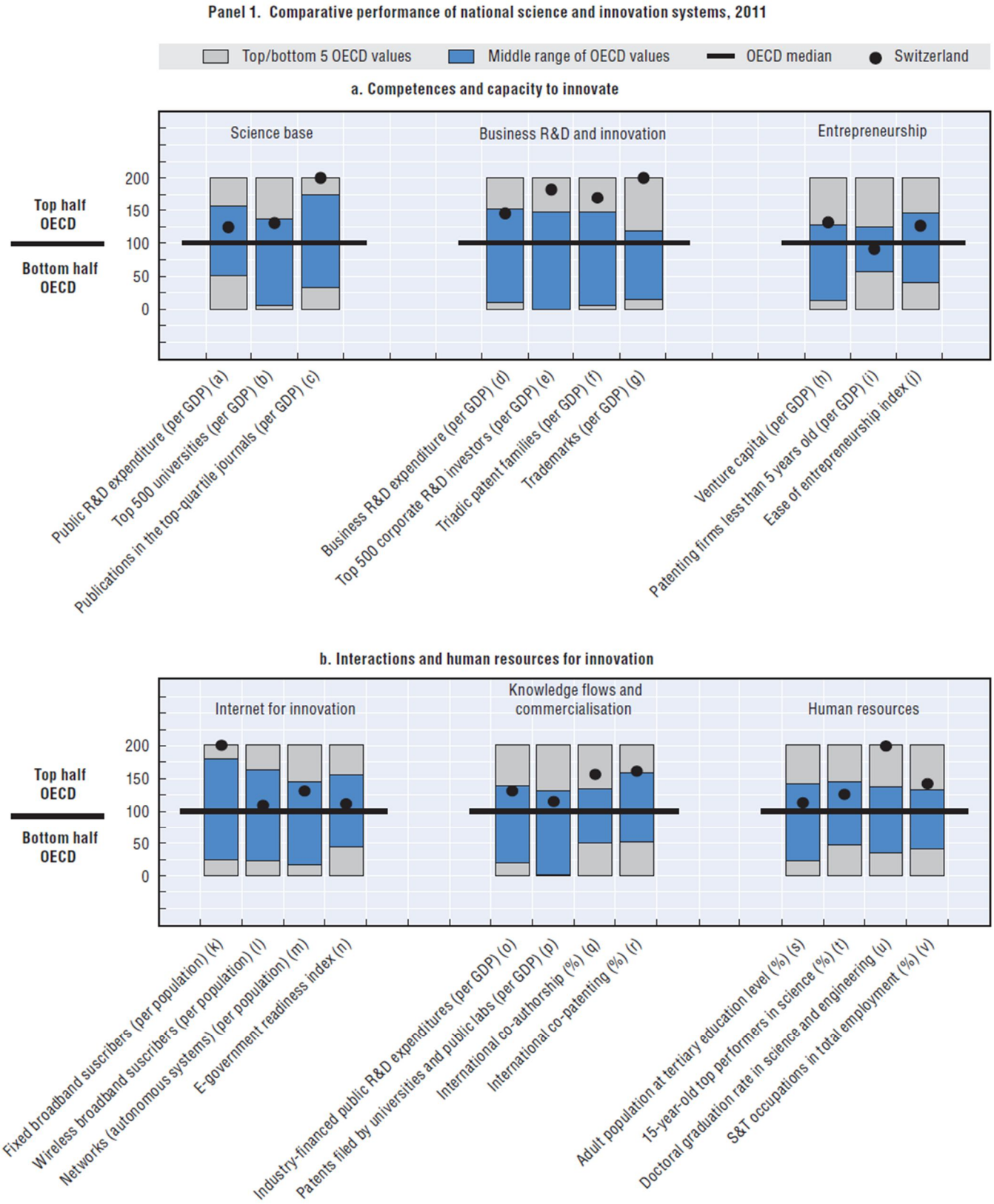
- GERD per capita, 2008, current PPP $:
  - Switzerland: $1365
  - Australia: $881 ($898, 2010)

- Industry financed GERD as percentage of GDP, 2008:
  - Switzerland: 1.96% (73.5% of total)
  - Australia: 1.4% (61.9 % of total)

- Government financed GERD as percentage GDP, 2008:
  - Switzerland: 0.66%
  - Australia: 0.78%

[32] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in Switzerland: comparative performance of national science and innovation systems, 2011.[33]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[33] OECD Science, Technology and Industry Outlook, 2012.

UNITED KINGDOM

Key Ministry	Department for Business, Innovation and Skills - supported by 45 agencies and public bodies.
Name of Policy	*Innovation and Research Strategy for Growth (2011)*
Key Theme(s) and Scope of Policy	• Maintain the annual budget of $4.6 billion for science and research. • Seeking to establish new universities with a focus on science and technology and on postgraduates, however with no additional government funding. • Increasing the level of university and business collaboration. • Delivering a better environment for commercialising research. • Supporting international collaboration. • Supporting open access to the data and findings from publicly funded research.
Stand-out Initiatives	• The UK government has a policy focus on identifying and supporting specific technologies for priority investment where there is particular potential for the UK. • Mobilising resources to exploit emerging technologies whilst driving innovation in high technology sectors and in response to societal challenges.
Overall Strategy or Coordinating Body	Strategy: *Innovation and Research Strategy for Growth (2011)* Body: Department for Business, Innovation and Skills (BIS)

- The UK is the 3rd highest contributor to the world's research output (behind the United States and China).
- In 2010, scientific publications submitted by UK-based researchers accounted for nearly 8% of the world total (compared to Australia at just over 3%).
- The UK has relatively low rates of paper co-authorship between industry and academia, they generate just 2.2% of global patents and business spend on R&D is low as a percentage of GDP.
    - This problem has been debated for a long time — "…the small band of British scientific men have made revolutionary discoveries in science, but yet the chief fruits of their work have been reaped by businesses in Germany and other countries where industry and science have been in close touch with one another" — Alfred Marshall 1919.
- The Department for Business, Innovation and Skills (BIS) is the main policy-making body in the science, technology and innovation area.
- The BIS is supported by various partner organisations such as the Technology Strategy Board, the Higher Education Funding Council for England, and the Research Councils.
- The devolved administrations in Scotland, Wales and Northern Ireland have their own science and innovation agendas and measures.
- In an attempt to address this problem, BIS has developed an Innovation and Research Strategy for Growth (IRSG).
- The IRSG brings together elements of government support for innovation, research and universities and provides a direction for UK policy into the future. The central elements are:
    - continued support for blue skies, curiosity-driven research across a broad range of disciplines, with a focus on supporting excellent research and excellent universities;

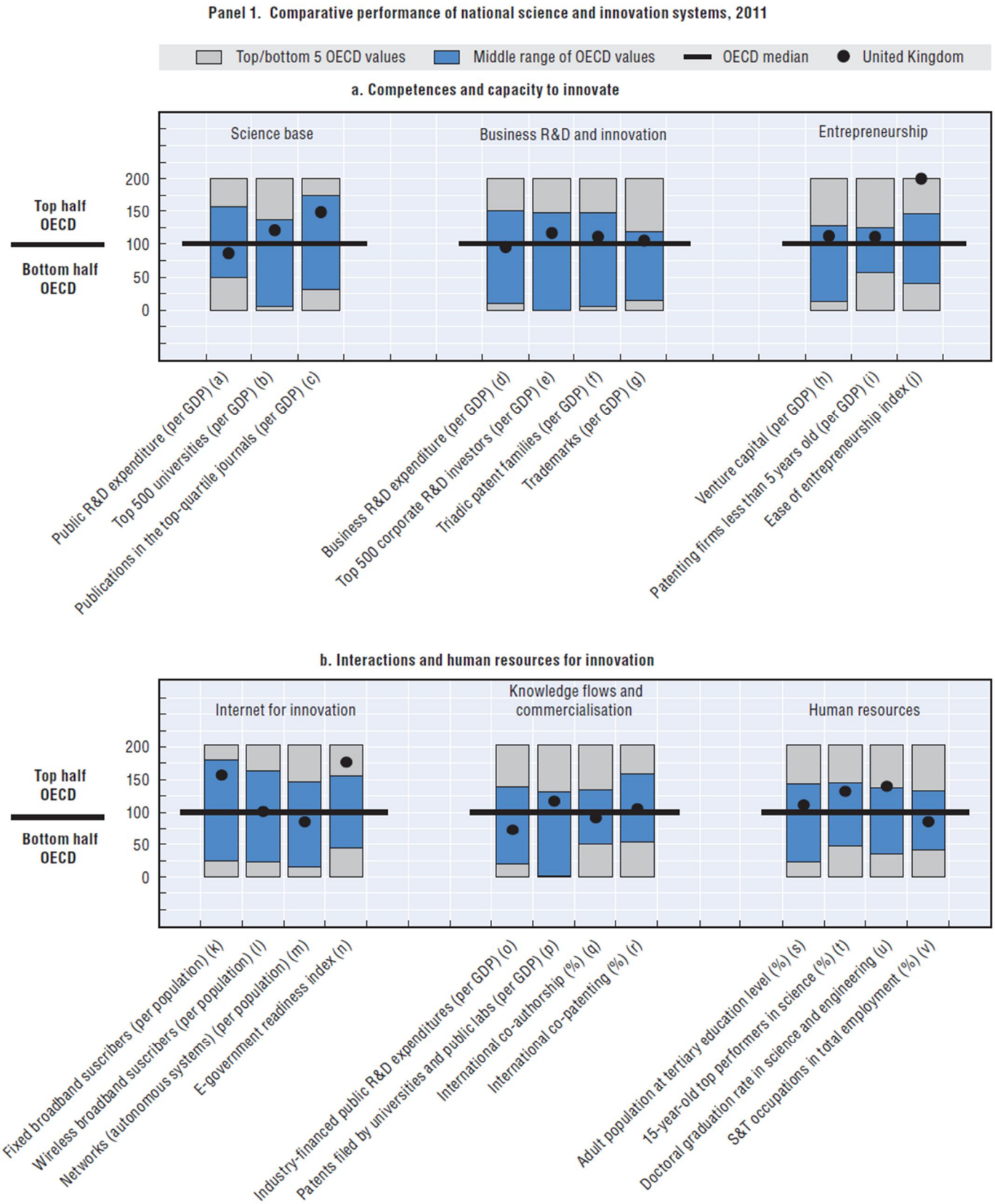
- identifying and mobilising resources to exploit emerging technologies whilst driving innovation in high technology sectors and in response to societal challenges;
- encouraging increased business investment in all forms of innovation, particularly by SMEs, including technology development, but also in intangible assets such as design, the development of new business models and skills;
- increasing knowledge exchange and facilitating networks, clusters and research campuses as hubs for interaction at local, national and international level;
- strengthening the capability of the UK to be an active participant in and beneficiary of the changing geography of innovation, supporting UK research and business communities in benefitting from international collaboration, foreign direct investment and market access; and
- a commitment by Government to maximise its contribution by making public data available to innovators, removing red tape that blocks innovation, using prizes and challenges to solve problems and acting as a lead customer for innovative products and services.

Key comparative statistics – UK and Australia[34]

- GERD as percentage of GDP, 2010:
  - UK: 1.82%
  - Australia: 2.20%
- GERD, 2010 current PPP:
  - UK: $40 billion
  - Australia: $20.2 billion
- GERD per capita, 2010, current PPP:
  - UK: $635
  - Australia: $898
- Industry financed GERD as percentage of GDP, 2008:
  - UK: 0.8% (45% of total)
  - Australia: 1.4% (61.9% of total)
- Government financed GERD as percentage GDP, 2008:
  - UK: 0.58% (33%)
  - Australia: 0.78% (34.6%)

[34] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in the UK: comparative performance of national science and innovation systems, 2011.[35]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[35] OECD Science, Technology and Industry Outlook, 2012.

THE UNITED STATES OF AMERICA

Key Ministry	[No "ministry" of science as such] White House Office of Science and Technology Policy (OSTP) Main advisory bodies: President's Council of Advisors on Science and Technology (PCAST), National Science and Technology Council, and congressional committees.
Name of Policy	*America COMPETES Act*[36] *President's Plan for Science and Innovation*[37] *Strategy for American Innovation*[38] *Innovation in FY2013 Budget*[39]
Key Theme(s) and Scope of Policy	• Raise GERD to 3% of GDP (no timeline) • Double R&D funding to the National Science Foundation, Department of Energy Office of Science and National Institute of Standards and Technolgy. • $3 billion for Federal investment in STEM education
Stand-out Initiatives	• Doubling budgets in 3 basic research agencies • Clean Energy Initiative • STEM focus • Coordinated multi-agency initiatives
Overall Strategy or Coordinating Body	Strategy: President's Plan for Science and Innovation/America's COMPETES Act Body: White House Office of Science and Technology Policy

- Key features of the COMPETES Act:
  - Pushing the Frontiers of Scientific Discovery: Federal basic and applied research portfolio totalling $64.0 billion.
  - Spurring Innovation: Increase in non-defense R&D to $64.9 billion, $75.9 billion for defense R&D.
  - Commitment to double the budgets for National Science Foundation, the Department of Energy Office (DOE) of Science, and the National Institute of Standards and Technology laboratories by providing a total of $13.1 billion.
  - Promoting Clean Energy: $350 million for transformational energy R&D in DOE's Advanced Research Projects Agency-Energy. $2.3 billion for DOE's Energy Efficiency and Renewable Energy office, with focus on improving clean-vehicle technologies, advanced materials and processes to cut manufacturing energy use.
  - Creating New American Jobs in Manufacturing: $2.2 billion for advanced manufacturing R&D: focus on innovative manufacturing processes, advanced industrial materials, and robotics.
  - Medical Research: $30.7 billion in discretionary appropriations for the National Institutes of Health (NIH).

[36] http://thomas.loc.gov/cgi-bin/bdquery/z?d110:s.00761
[37] http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy2013rd_doubling.pdf
[38] http://www.whitehouse.gov/innovation/strategy
[39] http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy2013omb_innovation.pdf

- Educating Our Children in Science, Technology, Engineering, and Math: $3.0 billion for the Federal investment in science, technology, engineering, and mathematics education.
- Expanding Private Sector Investment: expanded, simplified, and permanent Research and Experimentation Tax Credit.
- 21st Century Infrastructure: free additional spectrum for next-generation, wireless broadband Internet; in smart, energy-efficient, and reliable electricity delivery infrastructure; 21st century aviation system.
- Global Change Research: $2.6 billion for the U.S. Global Change Research Program to understand, predict, mitigate, and adapt to global change.
- Networking and Information Technology R&D: $3.8 billion for the Networking and Information Technology Research and Development Program: Plans and coordinates agency research efforts in cyber security, high-end computing systems, advanced networking, software development, high-confidence systems, health IT, wireless spectrum sharing, cloud computing, and other information technologies.
- National Nanotechnology Initiative: $1.8 billion for NNI to accelerate nanotechnology development in support of the President's priorities and innovation strategy.

Key Comparative Statistics – Australia and USA[40]

- GERD as percentage of GDP (2010)
  - USA 2.83%
  - Australia: 2.20%

- GERD, current PPP (2010; USD in this and subsequent statistics):
  - USA: $409 billion
  - Australia: $20.2 billion

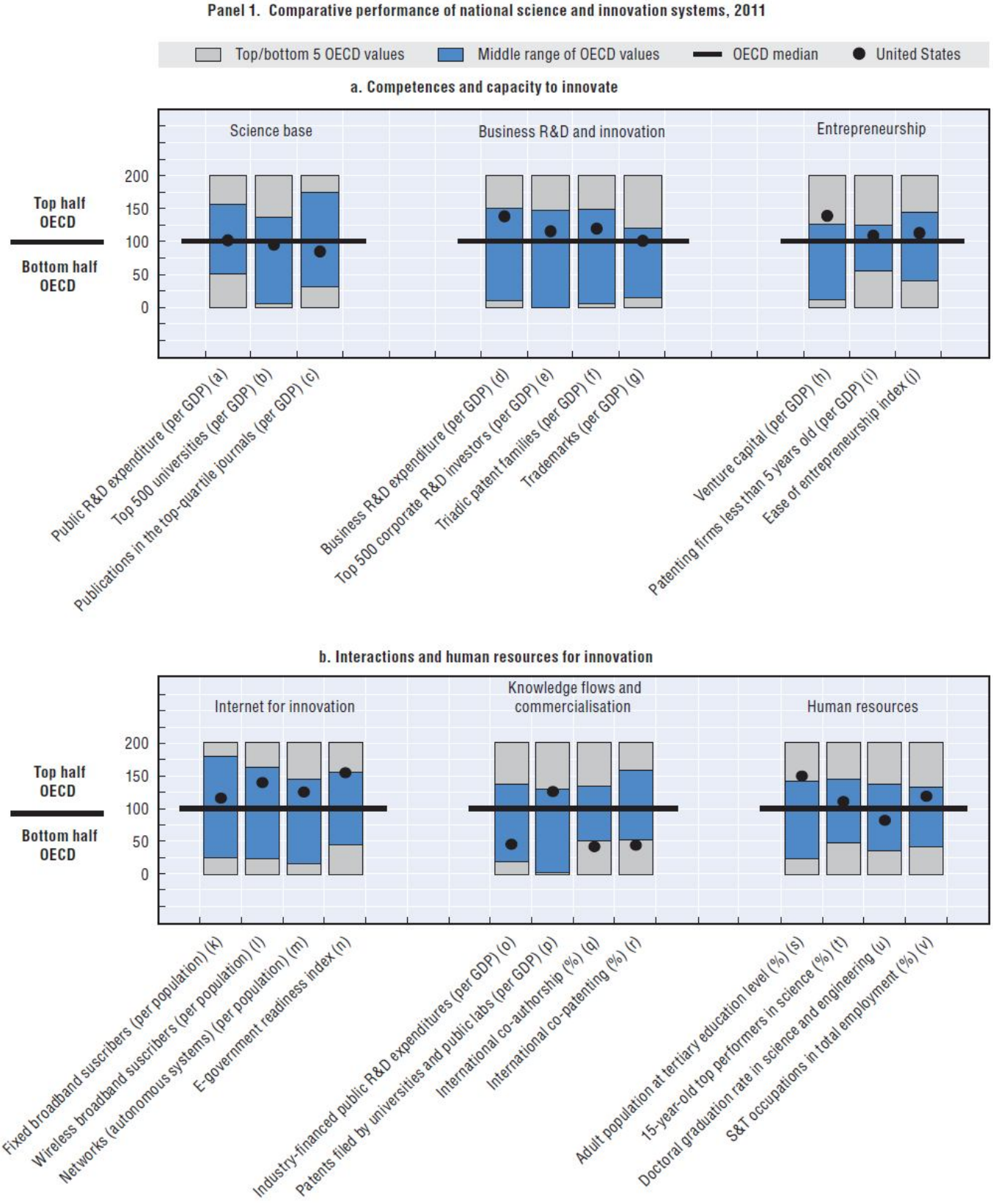
- GERD per capita, 2010, current PPP:
  - USA: $1319
  - Australia: $989

- Industry financed GERD as percentage of GDP (2008):
  - USA: 1.82% (64 % of total)
  - Australia: 1.4% (62 % of total)

- Government financed GERD as percentage GDP (2008):
  - USA: 0.86% (30%)
  - Australia: 0.78% (34.6%)

[40] OECD Main Science and Technology Indicators 2012-2

Science and Innovation in the USA: comparative performance of national science and innovation systems, 2011[41]



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

[41] OECD Science, Technology and Industry Outlook, 2012.