

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY

Global Forum on the Knowledge Economy

BETTER INNOVATION POLICIES FOR BETTER LIVES - SUMMARY OF KEY IDEAS

CSTP, 12-13 October 2011

CIIE, 7-9 November 2011

This note provides a brief summary of some key ideas, findings and outcomes from the Global Forum on the Knowledge Economy, held on 12-13 September 2011, focusing on Better Innovation Policies for Better Lives. The complete webcast of the conference, including all presentations and discussions, can be found on the OECD Internet, at www.oecd.org/knowledgeeconomy

This note is provided for information to the CSTP and CIIE during their meetings in October and November, respectively, as the discussions at the Forum may provide useful input for the Committee discussion on their future work.

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BETTER INNOVATION POLICIES FOR BETTER LIVES - SUMMARY OF KEY IDEAS

1. This note summarises salient ideas emerging in different sessions of the *Global Forum on the Knowledge Economy*. The full webcast of the Forum can be found on the OECD Internet site, at www.oecd.org/knowledgeeconomy.¹

Opening session

2. The OECD Secretary General, Mr. Angel Gurría, opened the Forum. In his remarks he noted that innovation is more important than ever in the context of current macro economic and fiscal conditions and uncertainties. He also stated that innovation is more than science and R&D but also involves other aspects, with the translation of new ideas into commercial outcomes being of paramount importance. Governments need to support innovation performance by strong framework conditions and support for human capital formation and development. Green growth needs to include innovation to help break the nexus between economic growth and energy consumption.²

Plenary Session 1: How Can Science and Innovation Help?

3. This session focused on the following key questions:

- What should we expect from science and innovation in the future? Where are the opportunities for science and innovation to improve lives?
- How can science and innovation be focused on the big challenges of the world today? What barriers need to be overcome? What good practices can be used?

4. Education is critical for innovation and for creativity. Education systems must not focus on rote learning, but foster creativity and excellence, as well as delivering generic skills. Today, people need to learn how to learn. Inspirational teachers are key in this respect and need to be given the freedom to teach. We should focus less on metrics and more on empowering inspirational teachers.

5. The development of basic science is critical for innovation and a shoestring budget simply won't do. For example, Israel is the number two power in the world in terms of computer-related innovation, which owes in part to its strength in fundamental mathematics. To convince politicians to invest in the long term, it is important to tell the story effectively. The evolution of medical ultrasound is an interesting example (a technology that went from military, to industrial to medical uses).

6. The best science systems are run on criteria of excellence. But this is not enough. Policymakers also need to frame incentives that will mobilize scientific endeavour in targeted directions. To best engage scientists, for example, interesting questions are needed. An interesting question has to be important,

¹ The list of speakers for each of the sessions is contained in the agenda ([DSTI/GFKE/A\(2011\)1](#)), whereas some background to the discussion is contained in document [DSTI/GFKE\(2011\)1](#).

² The full text of the opening statement by the OECD Secretary General is available at: http://www.oecd.org/document/26/0,3746,en_21571361_44315115_48665370_1_1_1_1.00.html

tractable, fit the skills of the potential respondents and be fundable. All four of these features are needed to make progress.

7. The innovation system also needs to be truly joined up. Investment in basic science needs to be complemented with means of translating research results into innovation. In many countries, there is a major gap between discovery and development, and discovery is not being translated into growth. An essential component for this to happen is to mix people, to create teams that lead to an innovative spark. Another challenge is financing, which is sometimes also due to policy instability, which makes markets hesitant to invest. We need fiscal incentives and direct financing for early stage invention, and need to be more effective at public private partnerships (PPPs), with bridging mechanisms and dialogue between business and policy communities. Innovative public procurement is also a major opportunity, in areas from health to transport.

8. Foundations can play an important role in the innovation system, complementing government and business, as they often have longer term time horizons and more flexible ways of working.

Plenary Session 2: Science and Innovation Policy on a Shoestring – how can governments better leverage public funding following the financial crisis?

9. This session focused on the following key questions:

- What are the new opportunities to strengthen science and innovation following the financial crisis and how can they be seized?
- How can governments best strengthen science and innovation in a context of scarce resources? What policies work in practice? Which should be avoided?

10. People innovate and nobody innovates significantly in isolation. So the essential ingredient for innovation is the workforce. There is no shortage of people with a talent for creative problem solving, but governments need to help ensure that young people are brought into the problem solving undertaking. Well crafted immigration policies focused on talent attraction are also necessary.

11. Demand-side policies are important, including public procurement, regulations and standards. For example, the Danish building code for 2020 was recently established and implies that only 20kwhours per square metre can be used annually. This standard was developed with business and other institutions. This has gone hand-in-hand with proper pricing and framework conditions. International collaboration in standards setting and the timing of regulation could also be beneficial.

12. Governments need to continue their investment in the future; in France, EUR 35 billion has been earmarked for a wide range of programmes for public labs and private firms, and the government has convened an international review process for the use of this money. Governments can also do much to get the best output from their spending on science and innovation, *e.g.* through institutional design in the university system, including a high level of autonomy for researchers and competitive allocation of funding based on peer review; a more effective use of capital, with greater co-funding by a variety of institutions and increased international collaboration; avoiding the waste and redundancy from not being able to access research already done, *e.g.* through better data mining; improving incentives, *e.g.* through the use of prizes; speeding up the innovation process, *e.g.* in disbursing grants more rapidly; and by removing regulations that are no longer relevant.

13. Tools for mapping the benefits from public R&D support are currently inadequate, although assessment of possible economic and broader societal impacts is essential. There are criteria for thinking about how to allocate funding in times of budget constraint, but this is an area where more systematic

assessment could be required. In some areas, expert opinion is key, *e.g.* are we building on an area of existing academic strength; are we expecting this to be a growing global industry; do we have candidates that might apply these technologies?

Parallel Session 3A: Strengthening science-industry interactions

14. This session focused on the following key questions:

- What are the main challenges for science-industry interactions today?
- How can mobility and knowledge exchange between science and industry be strengthened? Is Bayh-Dole still a good model?
- What new solutions are available and what works in practice?

15. The discussion demonstrated that the debate on science-industry interactions has shifted significantly over the past decade, due to some important trends. This includes a greater focus on solutions; the expanding boundaries of innovation, including a greater interest on technology converge; new infrastructure and collaboration platforms as well as new models to share these; the growing importance of data to create economic value; the changing nature of innovation; best practices that include much deeper interaction between industry, universities and PROs; new dimensions to Intellectual property; new approaches to dealing with risks; new players including entrepreneurial universities and philanthropists ; as well as some difficult political issues related to science, *e.g.* how to deal with foreign firms in public support for science and innovation. In response to these challenges, the Forum discussed the need for a shift in models of collaboration, towards longer term interactions, with institutional structures that will need to change to support this.

16. In recent years countries have been rethinking the tech transfer model, looking for policies that are more appropriate to the capabilities and structural characteristics of countries. In many cases, there is still a strong bias to licensing, and other policies for technology transfer are neglected. Policy is also too strongly focused on supporting a few world class centers of excellence, and should focus more on 2nd tier universities and what they can bring to innovation and science-industry links. In some cases, there has also been too little attention on policy to enable spin-ins – i.e. moving industry into universities. Spin-ins can improve the research questions asked by researchers, improve training for students, etc, but policy is locked into “what can universities do for commercialisation?”. Increasingly, it is important to look at how the expertise and talent and tools that universities need can be gained from industry. Finally, it may be advisable not to include patenting and/or entrepreneurial activity into the measurement of universities as it blurs their mission, Moreover, if governments evaluate universities on the quantity of patents, they will produce more patents – but this is expensive and not necessarily desirable.

17. Education is the tech transfer engine and this implies skills and talent for the whole value chain. In addition, education systems must be adaptive, quickly supplying the skills requirements of emerging areas (*e.g.* green technologies). Mobility between science and industry is important too, and helps to attract the best and brightest. Geography matters too – bringing companies or corporate research labs onto campus can foster tech transfer and mobility.

Parallel Session 3B: Changing the Game – boosting entrepreneurship

18. This session focused on the following key questions:

- What are the main barriers to entrepreneurship and the growth of young firms? How should they be overcome?

- How can entrepreneurship contribute to more inclusive growth and help address social and global challenges?
- What should be done to foster a culture of entrepreneurship? What works in practice?

19. In the short run, various policies can help catalyse entrepreneurship, including access to finance, an area in which the OECD has been doing significant work. Over the longer term, entrepreneurship needs good structural policies: this is not only about eliminating barriers for firms to grow, but also barriers for firms to shrink. Policy should not be to spur more entrepreneurs but rather to let high growth entrepreneurs grow and fostering this requires different policies. High growth firms are not necessarily high-tech firms, they can be small or large, old or young. Comparison between the EU and US indicates that the US has more high growth firms but also more shrinking firms. A higher churning means also higher productivity growth. We know much more about what does not work relative to evidence on what works. Government needs to experiment with new policies; but these policies need to be evaluated.

20. Creating an entrepreneurial culture is important and, over the long-term, entrepreneurship education has a large role to play and the education system should be changed: teachers (teaching, mentoring, coaching) as well as children (tell them/show them/involve them). The education system in Europe still reflects a predominantly industrial culture (process thinking and rote learning). A modern education system should increasingly teach lateral thinking and creativity with teachers as mentor's/coach. Youth increasingly lose interest in entrepreneurship the longer they stay in formal education. Entrepreneurship increasingly involves integrating multiple ideas and multidisciplinary teams, and implies that schools need to focus on team building as well as increasing understanding of globalization. There is also untapped entrepreneurship potential among women and immigrants.

21. Welfare systems play a role too. Work by the Kauffman foundation has shown that the loss of health care insurance in US is important barrier for becoming an entrepreneur. On the other hand, the flexisecurity model used in the Nordic countries protects people not jobs, and may help support entrepreneurship.

Plenary Session 4: Fostering Green Innovation

22. This session focused on the following key questions:

- What are the key barriers faced by innovators who want to develop green products and markets?
- How can the opportunities for green innovation and green growth be realised?
- What investments in research are needed and how should these be made?
- What good practices are emerging around the world and how could they be scaled up?

23. To win what can be considered a race against time, a strategy is needed of exploiting existing incremental innovations to decrease carbon emissions (accelerating adoption, learning and improvement, supported by information dissemination, project demonstration and the leveraging of private markets, *i.e.* demand-side policies). However, this strategy should combine with a long-term strategy to find true alternatives to the hydrocarbon economy, requiring funding research and investment in radical innovations. The environmental challenge is complex and urgent and needs diverse solutions.

24. To avoid lock in, it is important to buy in time by picking the low hanging fruit that emerges from the adoption of existing low-carbon technologies. Even if these technologies are not radical, they buy time before the carbon problem becomes irreversible. To turn the adoption of green technology into profits, firms need to adopt complimentary process and organizational innovation, which implies a sound climate for innovation in all dimensions.

25. Innovation to meet societal challenges, particularly in developing countries, needs a bottom-up, demand-oriented approach. For example, a combination of existing technologies and good business models could provide innovative, low-cost solutions for rural populations (“frugal innovation”), such as the use of rice waste products to develop water filters. ICT and social networking tools can play a key role in this bottom-up approach, as they could help expand social learning and change user behaviours.

26. Green growth will also depend on sharing knowledge internationally. It will be important to work in value chains and in consortia together and to get a critical mass of users.

Plenary Session 5: Making the Transformation Happen – applying science and innovation in emerging and developing economies

27. This session focused on the following key questions:

- How have science and innovation transformed emerging and developing economies? What roles have ICT and entrepreneurship played?
- What can be learned from successful transformation processes and which good practices are particularly important for other emerging and developing economies? What can developed economies learn from these practices?

28. Access to international sources of knowledge is essential for innovation in developing countries, with multiple channels playing important roles, such as inter-university international networks and FDI. ICT has proven to be a disruptive technology, for example, allowing East Asian countries to develop quickly, and in some instances, to leap-frog traditional technology leaders. In less developed countries, such as Kenya, ICTs have facilitated entrepreneurship among young people. Furthermore, ICTs have allowed for much greater knowledge exchange between countries, which has had transformative effects in areas such as education, research and supply chains.

29. Developing and emerging countries need to develop their own strategies, suited to their own needs. For example, emulation of 20th century pharma strategies by emerging economies would be a mistake, also the model is in crisis in OECD countries. Work on neglected diseases, for example, involves new organisational and partnering / networking models, also involving models to share IP.

30. At the same time, there are some factors common to success, including macroeconomic stability, openness, market-orientation, future-orientation (savings, investment), leadership and good governance. Innovation is important, even essential, in underpinning these factors, which depend upon the creation of new knowledge and utilisation of existing knowledge. This also highlights the importance of the innovation ecosystem, i.e. that there are many factors determining innovation performance.

31. One size does not fit all and conditions today are not the same as they were two or three decades ago. The distance from technological frontier is an important factor to take into consideration when looking to learn from others, for example. For example, Korea’s policies were quite interventionist, but did depend on the market to select. Today, the growth of the emerging economies offer new opportunities for learning. LDCs are much more interested today in peer learning or learning from emerging economies rather than from advanced countries. It is important to bear in mind, though, the remaining important role of incentives and institutions in supporting innovation – individual leaders, even if very dynamic and open to international learning, are often constrained by these local conditions.

32. Technology adoption and adaptation aren’t easy, requiring great awareness of the opportunities for adoption. A lot of technologies exist that are suitable for the poorest – the problem is often lack of awareness. Another problem is that technology transfer needs to be actively supported, e.g. through

expertise and funding. A final challenge concerns the under-development of technology markets. A lot of scientists and engineers develop useful technologies, but there are often too few opportunities for exploitation.

Parallel Session 6A: International Co-operation – scaling up good practices

33. This session focused on the following key questions:

- What new approaches to international science and technology co-operation are emerging?
- What are the good practices? How should they be scaled up and made more effective?

34. Good governance is required for international STI collaboration so that social, cultural and political issues are addressed. Collaboration is important, and it is easiest when dealing with world class institutions and people – so concentrate on excellence. Both bottom up and top down matter; for strategic reasons, a top down element is important. Collaboration requires resourcing of relatively equal levels on each side – if one-sided, then directions and reviews tend to be one-sided. So target support to be equal. Complementary skills also help. Travel costs and time matter, and despite teleconferencing and other IT, nothing beats face to face. So collaboration will be expensive. Also, success often requires persistence and networks last a long time. In addition, IP, especially in university collaboration, is over-rated.

35. Pressing needs plus limited funds imply a growing need for collaboration; collaborative work tends to have 3 times the payoff of non-collaborative work. There may be good reasons to give money to other countries to collaborate with you – rather than it spending internally. In general, it is necessary to identify a well defined common interest to underpin successful collaboration efforts.

36. In developing countries, the setting is often different; most innovation is business to business and not heavily research based. High tech innovation is not a priority. Adaptation and adoption are the priorities. Also, to make cooperation profitable with respect to advancing S&T, we need to understand the local context of scientists in developing countries. They often have parallel careers, one strongly local with teaching responsibilities, and another more international with research when they have the opportunity.

Parallel Session 6B: New Ways for Technology Transfer?

37. This session focused on the following key questions:

- What new approaches to and good practices in technology transfer are emerging?
- How should they be scaled up and made more effective?
- What role can foundations play?

38. A purely open approach is rarely the complete answer for tech transfer and innovation; championship and ownership are needed to realise full potential. Ownership creates incentives and helps retain assets that are needed for creation of innovation. Another lesson, learned in the domain of neglected diseases, is that companies do not get enough value from discovery and do not go further on development; hence a lot of drugs worth developing from a societal perspective are left on the shelf.

39. Too often in international discussions, IP accused of being a barrier, leading to a polarised debate; but IP is only one part of the technology transfer story. Knowledge is broader and dissemination of knowledge goes beyond what is formally protected. The IP system is becoming increasingly stretched and the complexity around the IP system and understanding the value of IP often acts as a deterrent to collaborative partnerships and knowledge diffusion.

40. Developing countries have not fully made use of flexibilities in IP available to them in the TRIPS agreement. There is, for example, an information gap regarding what can be done within TRIPS on issues such as Research Exemptions, which are not utilised, as well as patent pooling. Countries could also use compulsory licensing.

41. The creation of eco-systems with different stakeholders (business, academia, public policy) facilitates technology transfer. But eco-systems do not emerge automatically. Some guidance and intervention is needed.

Plenary Session 7: Science and Innovation for Inclusive Development

42. This session focused on the following key questions:

- How can science and innovation be better focused on the needs of the poorest and weakest in society?
- What barriers exist and what lessons should be learned from experience?
- What approaches and opportunities to inclusive innovation exist and what good practices are emerging?
- What role should business and other stakeholders play?

43. Many institutions are engaged in efforts to foster innovation among poorer groups, in developing but also some developed countries. Indeed, some governments are using innovation policies as part of broader efforts to foster economic and social inclusion. Valuable lessons can be learned in terms of the institutional approaches and innovations being employed. Such global experimentation underscores the importance of international exchanges of experience in these areas. Some of the approaches developed in developing countries might have relevance for poorer communities in the developed world. In some senses, there is a global market for social innovation.

44. Inclusive innovation also builds on resources in which poor people are rich: knowledge, ethics and social capital - minds on the margin are not marginal minds. Grassroots platforms, such as the Honey Bee Network (HBN), believe in the importance of IP and include developed a technology acquisition fund. Payments are made to innovators for IP, which is licensed to small firms at no or low cost. HBN has also developed a technology commons: people-to-people copying of innovation is encouraged. For the future, there is a need to have on-line multi-language multi-media incubation platforms which can mobilise mentorship and advice from around the world, including models to scale from grass-roots to global (G to G). With new enabling ICT technology, such approaches to knowledge diffusion can become more prevalent, especially for the poor. In every region, even the developed world, there is a “south”. These areas can benefit from grassroots innovation to harness the innovations of the disadvantaged, and mobilise the knowledge of technology-oriented students.

45. Important barriers to adoption of inclusive innovations are the need for new business models and contextual and political factors. Business models often require distribution models focused on the last mile, new sources of financial capital; scaling models; and human capital. Contextual factors includes tariffs (many countries impose 20+ % tariffs on imports of solar panels). It is also difficult for entrepreneurs to access carbon markets – to get a return for these investments. In general, just simplifying technology from the developed world does not work.

46. There are practical technical challenges in fostering innovation among and for the poor, including the development of: new business models for service delivery, new forms of micro-level finance, and virtual incubation schemes. In addition, you need many ideas to catch as many ideas and innovators as possible.

Closing session

47. The closing session focused on the following key questions:

- What are the main findings from the Forum?
- How can the discussions during this forum be turned into reality?
- What work could the OECD undertake to help strengthen policies for science and innovation further? What are the next steps?

48. Mr. Dirk Pilat (Head of Structural Policy Division, DSTI, OECD) summarised the Forum with the following main takeaway messages: innovation is broader than science and technology it includes new business models and non-tech innovation; with entrepreneurship, we need to strengthen the links between new ideas/science and innovation/commercialisation outcomes (translation); green innovation involves both incremental and radical innovation; we need to look at how innovation happens in developing countries (*e.g.* young people and mobile phone use); IP needs to balance ownership and open access; we need to increase international science collaboration/cooperation; and global inequalities and development issues raise a lot of unanswered/under researched questions.

49. Mr. Luis Sanz-Menendez (CSTP Chair) suggested that the Forum has been held at the right time to influence the PWB for CSTP. New science and technology trends are a constantly changing dynamic which will have important consequences for science and technology policy. Currently, there is a mismatch between these trends and the ways that governments are dealing with them, and there is not enough focus on the future. The current focus of international science collaboration is too much on OECD countries, and not enough on emerging and developing countries that are of growing importance. Broader involvement of stakeholders and audiences is also important in this context, including treasuries, university managers and citizens, including those involved in grassroots innovation.

50. Mr. Ken Warwick (CIIE Chair) summarised the Forum with the following messages for CIIE: we need to strengthen the business and industry aspects of innovation; we need to increase our focus on policy evaluation and demand side innovation (regulation and procurement); we need to look at intangibles and new sources of growth; we need to look at new opportunities to enhance international engagement (our work on globalisation and GVC's); we need to increase our understanding of the role of business angels in commercialisation and new growth; and new paradigms (like social innovation and open innovation systems) are challenging the theory of the firm.

51. Mr. Andrew Wyckoff (Director, Directorate of Science, Technology and Industry) concluded that the Forum played an important role in building a network and connecting to a broader community of stakeholders that all play a role in innovation. Important in this context is that there is a lot to learn beyond the OECD membership. One important aspect discussed at the Forum is that innovation is increasingly focused on big social challenges and becoming more demand-driven, involving more collaborative approaches. New options for innovation include making better use of ICT (including the cloud) and drawing greater benefits from data.

52. In the public discussion, a few important comments emerged:

- The Forum marked an important opening to a more inclusive OECD, which provides a good platform to take many of the key policy issues in innovation forward.
- There is a huge potential to develop and draw on affordable solutions from the South, which also requires new approaches to transfer technologies and share knowledge more actively. This may also imply some convergence of interests between OECD and non-OECD countries.

- Need to develop indicators on non-technological and informal innovation; policy will follow.
- Non-R&D performing firms are important and create value, and need more relevant policies; this is even more important in non-OECD countries. A greater focus on studying this, also in the informal sector, would be beneficial to all.
- More discussion needed of knowledge sharing and codifying knowledge of social innovation.

Some key findings from the Forum

53. Some particularly interesting areas for further work include:

- **Leveraging public funding:** Much of the discussion focused around questions on how governments can best leverage their scarce public funding. Many participants argued for more effective public-private partnerships in science and innovation, highlighting the need for stronger cooperation and a better sharing of risks.
- **Innovation and development:** The discussion highlighted the important role of ICT in enabling people to participate in economic activity and innovation. In Kenya, 50% of the population now has a mobile phone and broadband networks are being expanded to major universities, providing access to information and banking, and facilitating entrepreneurial activity.
- **The role of innovation for more inclusive growth:** Several governments, *e.g.* India and Malaysia, are using innovation policies as part of their efforts to foster economic and social inclusion (*i.e.* combining social with structural policy). These approaches typically get poorer people and communities directly involved in developing solutions for local problems, or aim at developing innovations at low cost (frugal innovation), such as the Jaihpur Foot, an artificial limb costing only USD 45. These approaches are equally relevant to OECD countries.
- **Policy evaluation:** The discussion highlighted a need for better tools to map and evaluate the benefits from public investments in science and innovation, as the assessment of possible economic and broader societal impacts is increasingly important.
- **Technology transfer and intellectual property:** While IP is only one element in technology transfer, the discussion suggested that the existing IP system is becoming increasingly stretched and in need of amendment. At the same time, ownership of IP is important to enhance economic dynamism and facilitate entrepreneurship.
- **Green innovation:** The discussion highlighted the need to accelerate the uptake of existing technologies to decrease carbon emissions (*e.g.* by carbon pricing and other measures to enhance uptake). However, this needs to be combined with a long-term strategy to find true alternatives to the hydrocarbon economy, requiring research and investment in radical innovations.
- **International cooperation:** The discussion highlighted the difficulties that policy makers have in funding research or supporting innovation that may have large benefits outside national boundaries.
- **Entrepreneurship:** Entrepreneurship is not only about eliminating barriers for firms to grow, but also about barriers for firms to shrink. Better evaluation of entrepreneurship policies is essential. Creating an entrepreneurial culture is important and, over the long-term, entrepreneurship education is key. There is untapped entrepreneurship potential among women and immigrants.