SUMMARY OF THE CONFERENCE ON GLOBALISATION AND OPEN INNOVATION

Introduction

1. On 6 December 2006 the OECD and the Dutch Ministry of Economic Affairs hosted a one day conference on "Globalisation and Open Innovation" that brought together academic experts, technology managers and business representatives, and policy makers to consider the policy implications of the acceleration in the globalisation of research and innovation and the shift towards "open innovation" strategies in companies. The discussion centred around three main topics: – *i)* the rise of open innovation and open business models in the context of globalisation *ii)* the evidence for open innovation, drawing mainly on company case studies; and *iii)* the implications for science, technology and innovation policies.

The rise of open innovation in a global business environment

2. Globalisation, competition and technological progress, in particular the diffusion of ICTs, have lowered barriers to firm entry and opened up new markets and ways of innovating. A central characteristic of the transformation of innovation in OECD economies has been the emergence of an "open innovation" model. This model is based on creating value from knowledge through networks rather than from knowledge generated within a single firm. This is in contrast to the vertically integrated R&D model that dominated mainly large firms in the 20th century. While firms have always collaborated with other firms as well as with public research institutions, open innovation strategies go beyond co-operation and involve tapping into a firm's own knowledge base (*e.g.* in sales, marketing, human resources development, intellectual property portfolios, etc.) and linking with global innovation networks that cut across firm boundaries, sectors and national borders.

3. According to ***Chris Buijink***, Secretary General of the Ministry of Economic Affaires in the Netherlands, the emergence of China as a global R&D player and the globalisation of industry and research have brought open innovation policy to the centre of the policy agenda. The question is first to understand how innovation operates in this new context and what policy makers can do to adapt. Firms respond to globalisation by outsourcing and/or offshore activities that go beyond manufacturing. For Mr. Buijink, open innovation and globalisation require that innovation policy be re-balanced as there is a trade-off between competition and the ability to collaborate. Another implication is that open innovation requires that university and research institutions become more "open" and that they transform themselves into "open innovation institutes" where collaboration takes place. Public/private partnerships can act as catalysts for developing and sustaining such collaboration. Such partnerships can be institutionally based (*e.g.* joint institutes) or technology-based platforms involving many actors and forms of collaboration.

4. For ***Henry Chesbrough***, Centre for Open Innovation at the Haas School of Business, University of California at Berkeley, open innovation is a business driven phenomenon. Open innovation strategies (and open business models) stress the supremacy of markets over technology because they determine the ability of firms to make a profit from technological advances. To support his arguments, Professor Chesbrough presented some lessons from the experience of large R&D intensive firms such as IBM which moved from a closed innovation model to an open business model. IBM created an OEM (Original Equipment Manufactures) Market within a supply chain wherein it can create added value. IBM spends

around USD 100 million each year on Linux but creates value-added services and software "up the stack". This open business model reduces costs and allows IBM to reinvest in new technologies.

5. The emergence of open innovation has several implications for the management of intellectual property rights. While traditionally IP captures value by giving owners an advantage over competitors through technological and market *exclusion*, in an open business model it can be used strategically to create value outside core business areas (*e.g.* through licensing to other firms) or through standards-setting. Furthermore, by offering access to IP via a common area or "intellectual commons" users and suppliers can create new added value. When two parties have conflicting claims to areas covered by intellectual property, there may also be an opportunity for collaboration.

6. Another implication for IPRs from the open innovation model is the development of a market for intellectual property. As IP becomes more important to value creation, it is becoming more tradable. This is illustrated by the beginnings of a secondary market for IP that can be used to collaterise corporate debt. This has led to the development of new exchange platforms such as IP auctions that match sellers and buyers and offer a market for intellectual assets as well a market for intermediaries (*e.g.* technology scouts).

7. In this context, Professor Chesbrough argued that polices to protect domestic industries or to limit foreign competition are inconsistent with open innovation and hark back to the time of closed innovation systems. In contrast, open innovation friendly policies require a focus on SMEs and universities instead of incumbent large firms. Policies in the area of intellectual property must balance protection of market positions with competition. Framework conditions are especially important in this respect. In particular, ensuring that the governance of public research institutions promotes excellence is a key condition. In the university sector, reforms that encourage meritocracy and provide incentives for researchers to engage with industry will complement efforts to attract the best students. Finally, Professor Chesbrough noted that for policy makers, the challenge in trying to get such framework conditions right is that there is no single constituency since policy domains cut across ministerial boundaries and institutions. There is also a time delay in the execution of policies.

8. Mr. ***Erkki Ormala***, Director of technology policy at Nokia, presented the view from a global technology company with operations in 130 countries and with over 356 million dollars invested in R&D. Nokia's research workforce covers a global network. Around 35% of the more than 20 000 Nokia personnel are involved directly in R&D activities. Nokia's approach to innovation is characterised by extensive collaboration with the research base world-wide. IPRs are important but the normal patenting procedure (two years) is too long for the product cycle of six months. Nokia is more in the business of market creation. To speed development, Nokia relies on networks and ecosystems of firms to develop new ways of creating knowledge and matching it with demand.

9. One example of an innovation network helping to match demand and supply is the "Nokia Developer Operations" peer production system for software development. By establishing an electronic platform *(i.e.* www.forum.nokia.com) on the web, some 2.5 million registered members can gain access to information about standards, IP and systems architecture that helps in using or developing new solutions. In short, users become partners of Nokia. Community-based networks embed Nokia into a larger open source community. This ensures that the firm can always adapt and renew itself. Firms of course know where knowledge hotspots lie and are therefore selective in creating open innovation platforms. Nokia partners with large and small corporations and asks them to join the network/ecosystem.

10. Nokia also has co-operation agreements with over 100 universities. Nokia partnerships with MIT and with Stanford are designed with the understanding that knowledge is a public utility and are used to advance the concept of Internet and mobility in an open environment. Nokia is also developing such

platforms in China (APAC HQ in Shanghai in 2003, technology platform in Beijing in 2004) and is pursuing research collaboration with universities and national research institutes in areas such as Beyond 3G, Internet technology, multimedia technologies and Asian user interfaces. Nokia also draws on a culture of collaboration in Finland: one third of professors are former Nokia-personnel; 400 Nokia researchers are giving lectures in universities; and there are more than 1 000 postgraduate trainees. But it is important to differentiate by context. Nokia does not collaborate with Chinese universities the way it does with MIT.

11. For Mr. Ormala, universities have three basic missions: research; education and knowledge sharing (as opposed to knowledge transfer). Knowledge sharing implies a two-way relationship. It requires finding areas of complementarities in competences between firms and PROs. Knowledge intensive companies know the market and have greater competence in core technologies than universities which instead must focus on excellence. Knowledge sharing also requires genuine commitment and trust. Nokia operationalises knowledge sharing by creating collaboration platforms and joint campus presence. It also encourages mobility of research personnel (public to private to public). Management and collaboration rules, including IPRs, need to be transparent. One implication of open innovation for universities is the need to reform reward and incentive systems. "If you reward publications, publications are what you will get. If you reward knowledge-sharing, you will generate collaborations". Finally, Mr. Ormala stressed that policy makers should get the framework conditions right for partnerships and collaboration, especially for PPs.

12. According to Professor ***Eric von Hippel*** of the MIT Sloan School of Management, users are increasingly able to develop what they need for themselves. Under the user-centered 'democratised' innovation model, lead users innovate to solve their own needs at private expense and then freely reveal their innovations (they are different from manufacturers, because they benefit from the use of their innovation, enhanced reputation). "If firms forget where their innovations come from, they can forget the next one."

13. Professor von Hippel stressed that user-driven innovation is creating a tension with intellectual property strategies. In terms of policy implications, he recommended that policy makers:

- Measure user driven innovation.
- Support infrastructure development for distributed innovation (open standards, collaborative tools).
- Support an open information communication infrastructure.
- Support users ability to modify what they buy.
- Rethink IP (support rights of users to build and protect and information commons).

The evidence for open innovation: insights from company case studies

14. The second part of the workshop was devoted to a discussion and update on the company case studies of open innovation being carried by the TIP Group in 2007-2008. Professor ***Wim Vanhaverbeke***, Professor at Hasselt University and the Technical University of Eindhoven, introduced the session and recalled the rationale for the case studies, namely the need to expand the information pool on open innovation beyond the US experience. Most of the literature on the evidence of open innovation is based on US firms. A larger and broader set of case studies allows one to validate or question the generality of some principles and practices. As such, increasing the evidence base should enhance policy makers' ability to draw implications for policy making.

15. ***Rob Kirschbaum***, Vice-President of the DSM innovation centre discussed his company's experience with open innovation strategies, in particular corporate venturing. Among the key messages were that firms should be selective in choosing which ideas to pursue while providing incentives for the generation of new ideas. Partnerships can help decrease the time to market. Open innovation also requires a differentiated approach to knowledge sourcing and development. Spinning-in helps boost top line growth while spinning out/licensing out strategies contribute directly to the bottom line. In sum, corporate venturing is a useful tool to help businesses recreate themselves while controlling risks.

16. ***Els Van de Velde***, co-coordinator of the TIP case studies, presented the experience of Tibotec as a model for successful partnerships in open innovation. Tibotec was a start-up that was later the recipient of the outsourcing of research activities from the multinational Janssen Pharmaceutical, part of Johnson and Johnson (J&J). Tibotec created a spin-off, Virco, to commercialise diagnostic applications but then merged with it while allowing Virco to maintain its existing collaborative relations. The merged firm was later acquired by J&J since Tibotec was a small R&D intensive company, but J&J had the experience, operational support and manufacturing capacity and financial means to bring drugs to the market. Among the key lessons from this case study are that IP protection is important as is the drive and motivation of partners and a commitment to collaboration. In addition, spinning in (outside-in) and spinning out (inside-out) strategies are central to open innovation.

17. ***Sverre Herstad***, senior researcher at NIFU-STEP in Norway, presented the results of two recent studies on the globalisation and innovation in order to provide input to the selection and design of the TIP case studies. A study by the Nordic Innovation Centre (FOTON) using Community Innovation Survey (CIS) and patent data focused on innovation behaviour and foreign take-overs in the Nordic countries, mainly looking at foreign-owned ICT, pharmaceutical and biotechnology firms. Another study, DOMUS, focused on domestic innovation behaviour and the international expansion of Nordic firms. Both studies used CIS data and the latter also used patent data. Based on CIS analysis, there was no clear effect on innovation behaviour due to foreign ownership. However, the data suggested a strong effect of ownership on domestic firms that are internationalised. The best performing domestic firms in all Nordic countries were found to be the most 'open' towards domestic innovation system.

18. Among the findings from both studies is that the nature of knowledge and customer bases are important in shaping structure and strategy. Consequently, openness towards various external actors, also depending on their location, varies. For the pharmaceutical companies in the DOMUS case studies, access to upstream knowledge sources was motivated by decisions to move R&D abroad. In other cases, innovation was driven by a broad set of in-house capabilities linked to customer and market considerations and supplier input.

19. Institutional contexts also matter. In the Norwegian petroleum cluster, foreign R&D was triggered by a context supporting dense relationships between industry actors, horizontally and vertically. The low intensity of foreign actor intramural R&D resulted in a high level of external purchases. There is also a high cost of technological failure in this market so that no operator will attempt technological leadership alone. Operator consortia (*e.g.* Hydro, Shell, Statoil) co-operate with specialised suppliers for the purpose of experimenting with new technologies.

20. At the same time, there are organisational limitations to open innovation. Transnational corporations (TNCs) face the challenge of operating at least three learning interfaces' simultaneously: *i)* domestic operations with domestic partners; *ii)* domestic operations of foreign operations; and *iii)* foreign operations of host partners. There are trade-offs between these, resulting in experimentation through trial and error. There is also a varying emphasis on external co-operation and in-house knowledge diffusion. For example in the Norwegian firms Jotun and Kverneland, the centralisation of R&D strengthened in-house synergies in technology but decoupled R&D from specific market requirements. As

a result, the firm (re)-decentralised to regain market contact. In the case of the Norwegian firm, Tandberg Data, all production/assembly was outsourced to China but then a production line was re-established in Oslo.

21. Based on the experience from the Nordic case studies, a focus on high tech companies (*e.g.* ICTs, pharmaceutical and biotechnology) provides limited insights for comparative analysis. A broad sectoral approach as used in the DOMUS study has its own limitations but also some advantages (including the coverage of both manufacturing and services). The TIP case studies should therefore aim to have a fairly broad sample of firms, sectors, knowledge bases and market characteristics and focus on factors that influence the degree of openness, location decision issues as well as factors that determine success or failure in applying an open innovation model. Norway will carry out several new case studies that will be presented to the TIP in 2007.

22. ***Yutaka Yoshimoto***, Chief Paris representative of Japan's New Energy and Industrial Technology Organisation (NEDO) presented the results of three case studies of open innovation (*kyo-so* in Japanese) in Japan. Two large companies (*i.e*. OMRON and 3M Japan) were analysed as was one initiative of the RCAST, University of Tokyo. In the case of OMRON, open innovation begins with an assessment of core and non-core technologies. OMRON designed the architecture of its physical research facilities to promote interaction among research units as well as to host collaboration partners from abroad. In the case of 3M Japan, the creation of a customer technical centre (CTC) that hosts more than 7 000 customers annually is an important vehicle to get feed-back from users. The Intellectual Café project at RCAST, University of Tokyo is similarly focused on creating open spaces for faculty, students and researchers. For Mr. Yoshimoto, the key messages from these different case studies is that identification of core and non-core technologies is critical to open innovation and it is something that many of the low-profit and large Japanese companies fail to do. Furthermore, open innovation doesn't necessarily mean global sourcing of knowledge. Deep supplier-customer communication (*suriawase* in Japanese) and co-ordination have long characterised the strength of Japan's manufacturing sector and provide a good basis for open innovation although it can reinforce the not-invented-here syndrome. The challenge for Japan according to Mr. Yoshimoto is to promote '*open suriawase*' by combining two traditions which appear at odds with one another: deep communication (*suriawase*) along vertical lines and the serendipitous combination of diverse pieces of knowledge through broad-based interactions. In addition, a better understanding of the relationship between open innovation and the geographic location of research and production is needed and should be considered in the TIP case studies.

The implications for science, technology and innovation policies

23. Professor ***Pieter Adriaans***, member of the Dutch Advisory Council on Science and Innovation Policy (AWT) presented the results of a survey of 500 SMEs and interviews with R&D managers and policy makers as part of an advisory report to the government on open innovation. The study found that there are different forms of open innovation. Some are more along the user-driven "democratic innovation" model and others are closer to the business driven model conceptualised by Professor Chesbrough and others. He proposed three forms of open innovation strategies:

Table 1. Three forms of open innovation (OI)

Mechanism of OI	**Purchasing-based**	**Collaborative innovation**	**Open access innovation**
	contract research	PPPs, TPs, Alliances	user-network innovation
Examples	*Dell, DSM,*	*Senseo*	*ATB, OSS*
	market co-ordination	reciprocity	reputation and trust
	cut and paste with IPR, spin-offs, research projects	partnerships and mutual long-term expectations	many hands, light work in an open network

Source: Pieter Adriaans, 2006.

24. What should governments do? Mr. Adriaans stressed the need for an integrated approach to innovation. Policies should support user-driven innovation and promote entrepreneurship. Policies and instruments should also support co-operation and alliances; encourage hot spots; and strengthen the co-operation capabilities of SMEs. However, state aid rules may in some cases be too restrictive with regard to government support. With regard to IPRs, it was important to focus on improving quality of the EU patent system and clarify relationships between IPR and competition policy. As other speakers, Mr. Adriaans noted the importance of framework conditions, not least education, an excellent IT infrastructure, well functioning capital markets, open government but more importantly, a "high-trust" environment.

Policy Roundtable: How to foster innovation in a changing business environment?

25. ***Dirk Pilat***, Head of the OECD's Science and Technology Policy introduced some of the policy issues underlying the discussion on open innovation and globalisation. To expand technological opportunities companies must access competencies wherever they lie (*i.e.* locally or globally). Footloose companies raise the challenge of ensuring returns from public support at home (*e.g.* through spill-overs). The key policy challenge that emerged from the discussion on globalisation and open innovation was how to foster innovation in a changing business environment, one characterised by a shorter time-to-market, shorter product life-cycles and the erosion of dominant positions.

26. The questions to panellists then centred on what are the barriers to open innovation and what governments could do, if anything, to address them? How can governments help strengthen the science base, including human resource development? Should governments adjust their support to business R&D and innovation in light of open innovation? How can governments facilitate the democratisation of innovation (and what are the implications for IPR policies)? Finally, will improving the relative attractiveness of countries for innovation (*e.g.* by improving the business environment) help countries to capture greater economic spill-overs from innovation?

27. Panellists at the Policy Roundtable, chaired by Ms. ***Ann Mettler*** of the Lisbon Council, were invited to discuss the policy issues and respond to questions from participants. A key question raised by several participants was whether "open innovation" was in fact new or, to paraphrase one speaker, whether it was "old wine in new bottles"? Panellists agreed that while co-operation has always existed, the phenomenon has grown in importance. Large businesses are now globally distributed which makes the

vertical model for R&D and innovation obsolete. There is also greater awareness that no firm or research institute has all the knowledge and that feedback from the market, including users, is necessary to respond to it. Another new aspect of open innovation is that co-operation between business and the academic community is characterised more by the sharing of knowledge than by technology transfer as it was in the recent past. The tendency for firms (and more recently for universities) to patent everything is not the optimal way to create new knowledge and to generate value.

28. Several main areas of policy action emerged from the discussion between panellists and participants.

- *Getting framework conditions right.* There was broad consensus that it was important to get the framework conditions for the business environment and public research right. At the same time, participants agreed that the role of government policy should not be over-estimated. In addition, country differences may require different areas of focus and the case studies present an opportunity to learn from the experience of OECD countries.

- *Adapting research and innovation policies.* Participants called for changes in the way universities and public research organisations are evaluated and the way research is rewarded so as to promote greater impact (quality) rather than production (quantity). As regards innovation policies, speakers and panellists noted that specific firms should not be targeted but rather that networks and eco-systems of firms should be the focus. Current policies to support innovation (*e.g.* tax incentives) focus on creating incentives for firms to build in-house R&D and innovation capacity rather than on network building. In addition, instruments in many countries do not cover service-oriented firms with little in-house R&D capacity that depend on networks to innovate. It was also felt that there was a need to create more awareness and capacity in SMEs regarding the importance of open innovation strategies.

- *Balancing IPR and knowledge sharing.* IP policies were considered by most participants to remain important but governments should ensure that rights are clearly defined so that firms can understand the risks of infringements as well as the opportunities for collaboration and knowledge sharing. Some participants viewed IP policies, especially in universities (*e.g.* Bayh-Dole types of legislation) as counter productive in an "open innovation" context. Innovation sometimes requires letting go of IP but it is up to owners to determine when and where not to hold on to IP. A possible role for government is supporting the capacity for knowledge sharing (*e.g.* through open source platforms, intellectual commons).

- *Building trust.* Related to knowledge sharing, participants stressed the role of trust in co-operation and in open innovation. Within firms and research institutions, organisational changes as well as the creation of forums and open space areas can foster communication and build relational capital. Well functioning legal and regulatory environments can also help shape the norms for trust building.

- *Develop talent and encourage mobility.* Knowledge is partly embodied in people and participants felt that training, especially for managing research collaborations, was important as was mobility of research personnel.

- *Promoting networking.* Networking is central to open innovation. However, – participants in particular from industry – were divided as to what governments could do. Information gaps in networks were also considered a challenge, especially for SMEs. Public-Private Partnerships (P/PPs) were viewed as important catalysts for co-operation and networks.

- *Growing new technology based firms*. NTBFs play a key role in open innovation strategies of large firms so support to entrepreneurship and new firm creation was considered important, especially by addressing financing issues.

29. ***Theo Roelandt***, Chairman of the TIP, on behalf of ***Karien van Gennip,*** State Secretary of the Dutch Ministry of Economic Affairs, stressed that globalisation and open innovation are two sides of the same coin. Policy he said focuses on three areas: creating talent; promoting research and technology development; and building trust, which is especially important for entrepreneurship. It is a shared responsibility between the public and private sectors. In an open society, open boundaries and open innovation go hand in hand. Achieving this will require changes to way the universities work as well as greater openness towards knowledge migrants. The hope is that open innovation strategies will allow more players and countries to take part in the knowledge economy and benefit more from globalisation.