



European
Patent Office



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für Wirtschaft und Arbeit

International conference

**Intellectual property
as an economic asset:**

**key issues in valuation
and exploitation**

Summary Report

**INTELLECTUAL PROPERTY AS AN ECONOMIC ASSET:
KEY ISSUES IN VALUATION AND EXPLOITATION**

EPO-OECD-BMWA CONFERENCE SUMMARY REPORT



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FOREWORD

This report summarises the main conclusions and discussions held at the International Conference on “Intellectual Property as an Economic Asset: Key issues in Valuation and Exploitation” organised in Berlin on 30 June and 1 July 2005 by the European Patent Office (EPO), the Organisation for Economic Co-operation and Development (OECD) and the German Federal Ministry for Economics and Labour (BMWA). The conference aimed to examine the different ways in which patents contribute to business value and economic growth and highlight implications for government policy. The conference gathered more than 250 participants and discussions were led by renowned speakers from the business, legal, government and academic communities, from Europe, Japan and the United States and included key representatives of the information and communications technology, biotechnology and automotive industries, among others.

This report provides a summary of the presentations and the discussions held at the event. It briefly presents the main findings and conclusions that can be drawn from the event and then provides short summaries of each of the individual sessions, which focused on the following themes:

- New uses of intellectual property and the need for valuation
- How can small and medium enterprises actively use patent protection and licensing as a business strategy?
- Intellectual property and technology intermediaries
- Intellectual property management and exploitation: practices across industries
- Encouraging valuation and exploitation: the experience of public institutions
- Methods of patent valuation
- Macroeconomic evaluations of licensing markets in Europe, Japan and the United States
- Encouraging valuation and exploitation: What could government do (or not)?

As the report illustrates, issues of patent valuation and exploitation are gaining in importance in the public and private sectors and will benefit from continued exchanges among stakeholders from business, government and academia.

This summary report has been prepared by the conference organising team at OECD (Jerry Sheehan, Catalina Martinez, Shigeki Kamiyama), EPO (Dominique Guellec, Tilo Bachmann, Giovanna Oddo) and BMWA (Thomas Zuleger, Thomas Multhaup) drawing from the session summaries written by Chiara Franzoni from the National Research Council of Italy, Nicolas van Zeebroeck from the Solvay Business School in Belgium and Ulrich Lichtenthaler from the Otto Beisheim Graduate School of Management in Germany. Presentations made at the conference are available on the following Web sites: European Patent Academy (<http://academy.epo.org>); OECD Directorate for Science, Technology and Industry on IPR-related work (www.oecd.org/sti/ipr); and German Federal Ministry of Economics and Labour (<http://www.bmwa.bund.de/Navigation/Technologie-und-Energie/technologiepolitik.html>).

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SUMMARY AND MAIN CONCLUSIONS

Management of intellectual assets, notably patents, has become a central issue in the knowledge-based economy. An increasing share of the market value of firms appears to derive not from tangible assets as reported in financial statements but from intangible, intellectual assets that firms are attempting to manage more actively. Technology markets, which facilitate the exchange of patented inventions (via sale or licensing), are an important part of the economic infrastructure for exploiting patents and can help improve the efficiency of innovation processes by putting inventions in the hands of those most able to commercialise them. Governments in many OECD countries are therefore seeking ways to improve the exploitation of intellectual assets, such as through support of efforts to improve valuation of patents and development of technology markets, with the aim of improving economic growth in a more competitive, global economy, but little is known about the breadth or success of these efforts.

To discuss these issues and identify their implications for businesses and public authorities, more than 250 participants gathered at the international conference on “Intellectual Property as an Economic Asset: Key Issues in Valuation and Exploitation,” organised by the Organisation for Economic Co-operation and Development (OECD), the European Patent Office (EPO) and the German Federal Ministry of Economics and Labour (BMWA) in Berlin on 30 June and 1 July 2005. The conference aimed to examine the different ways in which patents contribute to business value and economic growth and highlight implications for government policy. It contained sessions on such topics as new uses of intellectual property (IP) that demand improved valuation; patenting and licensing by small and medium-sized enterprises; technology market intermediaries; methods of patent valuation; and the role of public entities in encouraging valuation and exploitation of intellectual property. Discussions were led by renowned speakers from the business, legal, government and academic communities, from Europe, Japan and the United States and included key representatives of the information and communications technology (ICT), biotechnology and automotive industries, among others.

This report provides a summary of the presentations and the discussions held at the event. It briefly presents the main findings and conclusions that can be drawn from the event and then provides short summaries of each of the individual sessions. As the report illustrates, issues of patent valuation and exploitation are gaining in importance in the public and private sectors and will benefit from continued exchanges among stakeholders from business, government and academia.

Main conclusions

Although the conference was aimed primarily at facilitating discussion among participants and sharing of good practice for valuing and exploiting patents, a number of key findings and conclusions emerged.

The economic value of patents is increasing. Spurred by increasing competition from low-wage countries, firms in OECD countries are putting more emphasis on innovation and the creation of intellectual property as a means of generating comparative advantage and are filing a growing number of patents. Economic studies show an order-of-magnitude increase in the estimated value of patents, although considerable variation remains in the value of individual patents, with a large share of the total value of patent portfolios deriving from a small number of patents. Value is strongly influenced by the novelty of the invention and the availability of alternative routes to the same solution (*i.e.* inventing around a patent).

It is highly context-dependent and relates to the ability of a firm to extract the value from its patents through competent management, as well as on the particular market environment facing a patent holder. Differences across sectors are driven by factors such as patent strength, market structure, technology characteristics, company strategies and firm size.

Firms exploit the value of their patents through multiple channels. Firms capture the value of their patents not only by embedding protected inventions in new products, processes and services while excluding competitors from the market place, but also by using patents as a source of additional revenue (e.g., via royalties from outward licensing) and a mechanism for accessing technology (e.g., via cross-licensing and inward licensing). Increasingly, they view their patents as assets that can provide markets with information about their technological capabilities and enhance their bargaining power in various types of transactions, such as establishing joint ventures, negotiating mergers and acquisitions, and accessing financial markets. Different strategies are followed by firms in different industries, often reflecting differences in innovation processes and markets: cross-licensing to get freedom of action and access to complementary technologies, direct licensing to extract royalty revenues, asset in mergers and acquisitions, exclusive rights on leading products, etc. In some low-margin, high-volume industries, such as ICT manufacturing, firms increasingly license their patents to generate revenues that finance R&D and innovation. Start-up firms find licensing an effective means improving the commercialisation prospects of their inventions, as well as of attracting financing from venture capitalists and banks. Successful companies and research organisations exploit these various channels of patent exploitation in a holistic and consistent way.

Efforts are needed to make the contribution of patents to economic value more visible. As patents are more frequently used as vehicles for transferring information to markets, investors and customers seek reliable and valid information regarding patent value upon which to base decisions. Companies also need reliable information in order to better manage their patent portfolios. To date, accounting and tax practices have not kept pace, and few companies report on the value of their patents. A number of approaches are used in industry to value patents and patent portfolios (e.g. cost, market and income approaches), but each has limitations. Little consensus has yet been reached regarding good practice, especially as the means of exploiting patents have multiplied. Valuing patents can be difficult for large firms that have large patent portfolios and/or single patents lacking market equivalents, as well as for small firms that may lack the resources and expertise to properly value their patents. Venture capitalists have some experience in assessing patent value, but usually in the context of an overall valuation of the firm that does not take patents specifically into account. Further academic research based on statistical analysis of publicly available patent indicators could provide viable solutions for firms with large patent portfolios to estimate the value of their patents (and of their competitors'), facilitating a broader range of uses of patents. All such efforts, however, will have to face the challenges presented by the high context-specific nature of patent value.

Markets for technology offer significant social and economic benefits, but are developing unevenly across the OECD. Well-functioning markets for technology play an essential role in the exploitation of patents and can provide significant social benefits as well by increasing the efficiency of innovation processes via the re-allocation of resources at the firm levels and enhancing the diffusion of knowledge. Although reliable statistics are limited, available evidence indicates that technology markets (essentially licensing transactions) are expanding rapidly, in particular in the United States and in the ICT and biopharmaceutical sectors. This expansion reflects a shift toward more open innovation processes that make firms more eager to use licensing to gain access to needed inventions in a timely fashion and to generate additional revenues from inventions they do not plan to exploit themselves. It has been facilitated by governments, which are encouraging universities and other public research organisations to enter patent markets, licensing inventions to the private sector and engaging in more co-operative research with industry. Expansion is further fuelled by globalisation, as reflected in increased international licensing of

technology. While the majority of licensing transactions remain within affiliated groups of companies, evidence suggests that the share of open trade between unaffiliated firms is increasing.

A range of intermediaries help technology markets to function smoothly. Many large firms have developed internal capabilities for patent management and licensing, but as in other markets a diverse set of intermediaries has also emerged to foster technology markets, more so in the United States than in Europe. Intermediaries include technology licensing offices at public research organisations, Internet-based portals and private firms that offer advice and actively link buyers and sellers of technology. Each type of intermediary has a different customer focus and different level of involvement in transactions, but all play important roles in facilitating partnerships, ensuring confidentiality of partners in a transaction (e.g. protecting privacy in negotiations to avoid competitors knowing about the parties' interests), offering expertise (need to ensure that the deal corresponds to the parties' needs) and providing an external perspective on the negotiation. They can help reduce transaction costs and improve market efficiency in an environment characterized by complex licensing contracts and limitations on information available to contracting parties. While passive disclosure of information regarding technology needs and inventions available for license can help broaden technology markets, it appears that active matching of buyers and sellers is essential.

Public institutions have an important role to play. While the development and implementation of technology markets is largely a private-sector activity, there is general consensus that governments play an important role in ensuring the efficient operation of markets and competition authorities monitor their functioning and prevent anticompetitive licensing behaviour. The creation of markets takes time, and governments can help remove obstacles to the development of technology markets to accelerate the process. Government authorities in many OECD countries are engaged in a range of actions aimed at fostering the economic use of patents, although often in a piecemeal manner. The following areas for government intervention emerged from the presentations and discussions held at the conference:

- *Improving the administration of patent systems:* An efficient and effective patenting system is a pre-requisite for licensing markets. High-quality patents that are enforceable in the market place (and judicial systems) and are issued in a timely fashion provide greater assurance of the validity – and value – of a patent and help prevent too much noise in the system. Achieving this goal implies proper screening of applications; short processing times and affordable costs of patenting; and guaranteeing clarity and transparency in the patenting process.
- *Providing information to markets.* Efficient licensing markets require timely information about patented inventions. All patent offices respond to this need by publishing information on patent applications and/or grants. Some governments also have taken additional steps to make information available on licensable inventions through various electronic and print media. Japan has taken a more active approach, aiming to link buyers and sellers through various events and promotion of information disclosure via voluntary IP reports. Efforts to develop and promulgate tools for IP valuation are often seen as an important step in ensuring the validity of such information, as well as aiding market transactions.
- *Education and training.* Several governments have taken steps to make inventors more aware of the options available to them for protecting and licensing their inventions. The US government provides training for individual inventors and SMEs on patenting and licensing. There are several initiatives in Europe to increase IP awareness and foster IP use by firms, especially SMEs. Japan also provides training through a corps of patent licensing advisors. Public support is mainly targeted at SMEs that need administrative support, guidance and better access to information.
- *Supporting patent management in the public sector.* Fostering technology transfer from public research organisations demands regulatory and legal regimes that permit such activities. There may also be a role for governments in assisting public research organisations to develop or

acquire the competences needed for effective patent management and licensing, as is done in a number of OECD countries.

Improved data collection, diffusion and analysis are needed. Considerably more analysis is needed to provide improved policy guidance regarding patent valuation and exploitation. There remains limited understanding of how patents are used and how technology markets function. Many questions need further exploration, such as: Under what circumstances are patents used? When are patents licensed? When are patents used to block competitors? When are patents used to negotiate access to third party technologies? How do licensing strategies affect the perceived value of patents? How is the value of a patent related to other patents? What roles do patents play in technology markets? Which are the barriers for the development of technology markets? More and better data is needed to help answer these questions. Well-designed and broadly implemented surveys as well as careful econometric analysis are much needed to improve research-based decision making.

Greater international and domestic policy dialogue should be encouraged. There is need for increasing communication and co-operation among public bodies within and across countries with the aim to make visible and accountable the contribution of intellectual assets to value creation. International organisations play a critical role in these efforts. Participants saw this conference as an important starting point in that process.

SESSION DESCRIPTIONS

Opening session

The conference was opened by high-level officials of the three organising institutions: Rezzo Schlauch from the German Federal Ministry of Economics and Labour, Alain Pompidou from the European Patent Office and Herwig Schlögl from the OECD. All of them emphasised that creating value from intellectual assets, patents in particular, is high on the political agendas of their respective institutions.

Rezzo Schlauch, Parliamentary State Secretary at the Federal Ministry of Economics and Labour and Federal Government Commissioner for SMEs, stressed the importance and timeliness of the topic of the conference. Although IP has been on the political agenda for many decades, policy makers have only recently understood that, if actively managed and properly valued, patents are an economic asset representing a considerable value added. Rezzo Schlauch insisted on the need to protect IP through property rights that can be acquired at low cost and effectively enforced. He also highlighted the need to facilitate the capitalisation of IP and its use as collateral for business loans, especially as regards innovative SMEs that try to raise external funds. Improved valuation methods and better developed markets for technology and IP intermediaries will likely help those objectives. Finally, he recognised that improved commercialisation of university patents is also a priority issue, as illustrated by the 2002 amendment to the German Employees Invention Act, which stipulates that commercialisation is no longer the privilege of individual university teachers, but the responsibility of universities as public research institution. This legal change was accompanied by the establishment of regional patent exploitation agencies.

According to Rezzo Schlauch, governments have two main roles to play in promoting valuation and exploitation of IP. First of all, to define the legal framework for patenting via legislation, where the role of patent examiners is crucial for its application in ensuring that patent rights are clearly defined and granted for genuine inventions offering clear value added. Second, to design a patent policy that encourages SMEs to increase their use of IP protection and prompts all firms to make patents a strategic element in their corporate policy. As regards intellectual assets more broadly, the German Federal Ministry of Economics and Labour recently launched an initiative called 'the knowledge balance sheet' or 'intellectual capital statement' that aims to help firms, especially SMEs, visualise and assess their intellectual capital, such as know-how, property rights and quality of management.

Alain Pompidou, President of the European Patent Office, agreed with Rezzo Schlauch on the central role of patents in economic performance, especially in an era of increased globalisation in which their role has progressively changed. Technology based start-ups use IPRs not only to build up and protect their key competitive advantages, but also to gain entrance into markets and to raise financial capital and attract potential investors. However, the development of market for patent licenses in Europe is lagging behind its competitors namely the United States and Japan. Licenses are a strong strategic tool because companies increasingly acquire knowledge from other companies or public research organisations (PROs). Making licensing markets efficient is crucial, especially for SMEs, as they rely heavily on technology suppliers and often license inventions to larger firms that are more able to commercialise them.

The mission of the European Patent Office in this context, Alain Pompidou affirmed, is increasingly one of providing patents that add value to the economy, which means granting patents only to high quality inventions that are truly novel; shortening the processing time to obtain a patent; improving the clarity of

patents granted and providing easily accessible and up-to-date patent information in order to promote a better diffusion of innovations. Several issues deserve special attention in the near future from policy makers at the national and international level, he concluded, such as fostering technology markets in Europe and increasing the co-operation and communication between public bodies.

Valuation and exploitation of IP are essential to innovation and value creation, and as such, **Herwig Schlögl**, OECD Deputy Secretary-General, reminded participants that this event is part of a broader effort at OECD to improve policy making related to intellectual property rights and innovation. This work extends back to a conference organised in Berlin in late 2000 that examined industry-science relationships and led to an OECD study of intellectual property management in universities and other public research organisations. OECD IPR work subsequently examined the links between IPR, innovation and economic performance, with a focus on business use of patents. Work continues along two related themes that will both draw heavily on the discussions at this conference. On the one hand, the relation between IPR, innovation and diffusion of knowledge, with patent licensing being a key channel for technology diffusion. On the other hand, intellectual assets and value creation, with an increasing share of firm value being derived from intellectual assets (intellectual property, human capital, organisational capabilities, etc).

The introductory remarks from the representatives of the three organising institutions were followed by keynote speeches from two renowned representatives of academia and the business community on the study and practice of markets for technology and exploitation of IP: Ashish Arora from Carnegie Mellon University and Ruud Peters from Philips.

Ashish Arora, Professor at the Heinz School of Public Policy and Management at Carnegie Mellon University, noted that the value of IPRs has increased markedly in the past two decades, both in terms of their real economic value and perceived importance. A number of studies and surveys conducted before 1980 indicated that business executives did not view patents as an effective means of protecting comparative advantage vis-à-vis secrecy and lead time and that patents were not highly valued in financial terms. The number of patents produced per dollar of R&D spending declined through the period, with wide variation seen in the value of individual patents. Estimates based on French patent renewal data for the 1970s, for example, indicated average patent values of USD 15 000, ranging from USD 4 000 in the pharmaceuticals industry to USD 20 000 in electronics (excluding patents filed by Japanese firms which were of higher estimated value). Licensing contracts and licensing revenues were also found to be not very profitable.

Since the 1980s, the importance of patents appears to have increased steadily. The number of patents per dollar of R&D spending increased rapidly in the United States after 1984, coinciding with a rapid increase of worldwide licensing, and estimates of patent value (based on renewal data) show seven- to ten-fold increases in countries such as France, Germany and the United Kingdom. Although firms continue to report that patents are not the most important mechanism for protecting competitive advantage, econometric studies indicate that obtaining a patent raises the value of an innovation by about 47% on average (a patent premium), although with strong variations across industries. Studies show that the distribution of patent values remains highly skewed, but the mean value appears to have grown significantly, ranging from EUR 300 000 to EUR 1 million in Europe according to recent estimates (using the Patval survey).

The difference between business perceptions of the importance of patents and economic estimates of the value of patents may result from the expanding role of patents in the economy. Patents are increasingly used not just to protect a company's unique inventions but also to serve other strategic purposes, such as enabling access to complementary technology (through cross-licensing) and improving a firm's position in negotiations. The way patents are used depends on characteristics of the specific industry in which the company operates (*e.g.* based on complex versus discrete products), but further research is needed to better understand how patents are used and how their expanding uses affect social and private value. Of particular

concern is the question of whether stronger and more effective patent protection significantly increases the patent premium and thus reinforces incentives to innovate and the entry of specialised technology suppliers in some industries, or whether they simply motivate firms to patent more of their existing inventions and create patent thickets that impede innovation without generating additional societal benefits. Economists will need more and better data to address such questions.

As emphasised by **Ruud Peters**, Chief Executive Officer at Philips Intellectual Property and Standards, changes in the way firms exploit their patents reflects challenges posed by globalisation and differences in the way companies compete in global markets. In the 1970s a company's strategic effort was typically based on investing in product development and manufacturing with the objective of making better products at lower cost. Success was based on manufacturing high-volume products at low prices. In recent years, the globalisation of marketing and manufacturing has brought in stronger competition, lower profit margins and shorter product life cycles. Technology has become more complex, raising the cost of R&D and demanding specialised technology suppliers. As a result, returns to the investments in the development of new products and services are less certain, and emphasis has shifted away from manufacturing as the key to competitiveness and towards R&D as a source of new ideas and to build better relationships with customers.

As IP protection has strengthened (especially in the United States), patents and trademarks have become strategic weapons for many businesses. Companies protect their inventions via patents and build up their patent portfolios for strategic purposes. Wise management of IPRs through technology marketing and licensing strategies is increasingly seen as a strategic way to generate revenues and profits. Such changes are leading to an intellectual economy in which IP becomes the basis for value creation for firms, whether through its incorporation into innovation products and services or through its sale in the market place.

As Ruud Peters outlined, firms can employ their IPR in several ways to extract value, with different market environments calling for different strategies. First, patents generate value through *exclusion*. By preventing others from practicing an invention, patents can help firms generate extra margins through the unique features they can include in products or services. Secondly, patents may be used as a medium for *exchange*, such as through cross-licensing transactions with third parties that provide firms with freedom-of-action and provide cost savings against royalties that might otherwise be paid to gain access to complementary technologies. Third, patents can be exploited *pro-actively* to generate royalty revenues through outward licensing and to accelerate innovation processes through inward licensing. Finally, IPRs can be used as an *asset* by making more visible the knowledge endowments of a firm, which can be particularly useful in the case of joint ventures, mergers and acquisitions, initial public offerings, and external fund-raising.

Although many companies still fear that technology licensing will weaken their technological advantage by allowing others to exploit their inventions, Ruud Peters argued that the licensing of a patent may be an extremely powerful mechanism to extract value from a company's IPR. Technology licensing, however, often entails more than a legal agreement to allow another firm to use an invention and typically includes providing technical support and know-how to licensees to successfully develop and implement an invention. As for accounting for the total value contribution of IP, one must also take into account the benefits of inward licensing, which facilitates a shift to an open innovation paradigm, greater engagement in public/private partnerships and external technology acquisition. While some of these benefits are hard to quantify, Ruud Peters suggested that discounted cash flow analysis could be effective in valuing patents. He noted that value will depend on the uniqueness of the patented invention (are there alternative ways of generating a similar effect) and on the need for complementary assets. Peters also noted that increasing competition in licensing markets could put downward pressure on royalty rates, making licensing less

attractive from a financial point of view and suggested that the functioning of technology markets could be impeded by competitors with significant market power.

Session 1: New uses of IP and the need for valuation

The exploitation of intellectual assets such as patents has become increasingly important for business in recent years. Large and small corporations are making new uses of patents and undertaking sophisticated licensing policies. Shareholders are more interested in understanding the innovative potential of their companies and look at patent portfolios as a key competitive asset to generate value. At the same time, reforms along the lines of the Bayh-Dole Act in the United States have encouraged universities and public research organisations to become actively engaged in patenting and licensing in many countries. Universities and publicly funded agencies are increasingly encouraged to patent and license the results of their research activities. As part of this trend, national agencies financing research are increasingly concerned with the number and importance of patents that are generated by means of publicly-sponsored research. This enhanced focus on IPRs raises a set of new problems and critical issues, all claiming for the need to have more precise and reliable mechanisms for patent evaluation and empowered enforcement.

The increased importance of IPRs for companies has heightened the need of making visible the value of patent portfolios in financial statements. Nevertheless, accounting and tax practices have failed to keep pace. There is a strong need for comprehensive reporting of IPRs, as argued by **Isabel Verlinden**, Managing Partner of Eurofirm Transfer Pricing Services at PriceWaterhouseCoopers. A number of litigations suits have been recently related to the transfer of IP across business units and across countries, raising the problem of double and non-homogeneous taxation rules in different countries. In this context, national tax authorities need to understand who generates the profit, what it is worth and in which country it is made. Speculation may create fertile soil for tax litigation, either between the firm and its national tax authority or between multiple tax authorities when negotiations involve more than one country.

Companies demand more clear and comprehensive tax regimes to simplify transactions and reduce the risk of getting involved in litigations with tax authorities. While a clear definition of the tax and accounting practice is still pending, companies may prevent litigation suits and extract the maximum value from their portfolios by following some general practices throughout the whole IP life cycle. First, they should keep a good paper trail specifying who has developed what, and how the roles and responsibilities were divided, to help substantiate their decisions. Second, they can undertake active and advanced planning in order to reduce their taxes and increase the value for their shareholders, which may include migration to a more tax-effective jurisdiction.

According to **Malte Köllner**, Managing Partner at Triangle Venture Capital Group, venture capitalists have traditionally paid little attention to IPRs in their investment decisions and they still have limited knowledge on IPRs. In his view, the value of patents depends on who owns and uses them, which means that issues of management and marketing become critical determinants. With a few exceptions, the types of firms targeted by venture capitalists do not usually have sufficient market power to extract value from their patents. However, when technologies and patent portfolios are integrated with market power wealth can be created. Venture capitalists rely more on assessments of firms' management capabilities and market opportunities.

Nevertheless, practices appear to be changing somewhat and some venture capitalists are beginning to look at patent strategies and patent portfolios as they apply to different phases of an investment.

- First, in the *pre-investment phase*, the availability of a patent may help secure the investment by increasing the visibility of the competitive advantages on which the company is bidding. They

might also be seen as a liquidation benefit for the shareholders, given that the key patents may still be sold or redistributed if the company does not succeed.

- During the *holding period*, good patents can effectively make the difference in increasing the turnover of a growing company, and a good management of patents can be particularly useful to generate additional returns. In the holding period, patents are used in such as: *i)* preventing competitors from entering the market; *ii)* protecting the company's competitive advantage; *iii)* establishing strategic partnerships; *iv)* serving as a bargaining chip in negotiations and; *v)* licensing.
- At the *exit phase*, the visibility of patents may be useful to the venture capitalist when negotiating a merger or acquisition or preparing an initial public offering. Even in the event of failure or low turnover of the venture capital-backed company, a good patent may be redistributed or resold in the liquidation.

Venture capitalists do not usually engage in quantitative valuation of patents or patent portfolios. Rather venture capitalists prefer to value the company as a whole and consider the role of IP in that process. In this regard, qualitative evaluation of a firm's patent position and the ability of patents to support a business plan can make or break an investment decision. On the other hand, quantitative financial valuation is needed when patents alone are sold, which is often conducted with the assistance of intermediaries. In the context of performing due diligence on investment targets, venture capitalists do consider potential liabilities from patent infringement suits, but the know-how regarding patents is often solicited from outside sources.

The role of patenting in award decisions by government R&D funding agencies was addressed by **Riikka Heikinheimo**, Executive Director for Research Funding at Tekes, the National Technology Agency of Finland. Tekes is charged with promoting the competitiveness of the Finnish industry and service sectors through technology development and finances research projects that range from basic research performed by universities to applied research and business R&D. In 2004, Tekes distributed EUR 409 million in grants for a total of 2 242 projects; of this sum EUR 172 million supported 778 projects at universities. Projects that were completed in 2004 resulted in 2 500 publications, 1 000 academic theses and 730 patent applications or granted patents. In addition, 770 new products and 190 new processes were produced. Tekes periodically opens calls for proposals in all major scientific disciplines, with a special focus on particularly promising topics that are believed to be of key importance for the competitiveness of Finnish industry. Research programmes are intended to reinforce the national knowledge base, while at the same time promote the development of applications for industrial and market purposes. On average, Tekes supports 50% of the project cost.

For the most part, IPR considerations play a limited role in Tekes' funding decisions as it does not invest in companies but in research, and as such does not look for a direct financial return on its investments. When evaluating research proposals, Tekes aims at maximising the impact of financed research on society and the environment, in terms of improving the living conditions of Finnish citizens. In order to do so, evaluation of project proposals is done by teams of experts that compare the proposals according to the following set of general criteria:

- Importance of the technology, innovation or know-how to be developed or the importance of the scientific challenge and its novelty.
- Attractiveness of the targeted technology-based business in terms of volume and profitability, and the related impact of the project on a company's development.

- Potential diffusion of knowledge and the indirect effects of the project on other organisations, as foreseeable through the networks and other forms of co-operation between actors.
- Availability of resources to complete the project.

Consideration of patents is further limited by Tekes' desire to apply a consistent set of criteria to all proposals. The role of IPR differs considerably by industry sector and technological field: for innovation in complex systems (*e.g.* semiconductors and telecommunications), competitiveness is often based on a firm's IPR portfolio; whereas in biotechnology it is often based on an invention, which can be protected by a single patent.

Nevertheless, patenting may become more important in the context of Tekes-sponsored projects. The number of patent applications resulting from the academic research projects it sponsors grew by almost 40% between 2001 and 2004, which is partly attributable to increasing patenting by researchers and growing awareness due to workshops organised by Tekes on topics such as value-driven project and portfolio management. In addition, Tekes also provides support to cover the costs of applying for a patent based on the results of Tekes-sponsored research. Although Tekes does not aim to value these patents, the investors that provide the remaining 50% of a project's cost may do so.

Session 2a: How can SMEs actively use patent protection and licensing as a business strategy?

The knowledge economy requires more and more integration of IP strategies into business plans, for IP rights to be used for business development or be themselves commercialised, and for revenues from IP licensing agreements to be reinvested into R&D activities subsequently. This session addressed the specific needs of SMEs on IP matters.

The t-blade success story, presented by the Chief Executive Officer of t-blade GmbH, **Mathias Kunz**, demonstrates that a small company owning a superior technology protected with patents, trademarks, know-how and a technological competitive edge, but having no direct access to its market, can create value and be successful by sharing knowledge and licensing out its technology. The business of t-blade consists basically in the replacement of ice-blades and relies on non-exclusive partnerships with brand manufacturers. Sharing the ownership of new distribution channels via joint ventures with major players proved to be the best strategy for t-blade, whose success has also been possible because it protected its technology and know-how in different ways (not only with IPRs) and made IP fully part of the company's strategy.

But, as noted by Mathias Kunz, the key is bargaining power. When negotiating with potential investors, partners, licensors and customers, only the perceived value of IPRs matters, which gives a strong argument in favour of involving IP professionals to improve the visibility of strong IPRs. The t-blade case suggests that a small company should definitely use its IP to access markets by licensing out its technology and entering into joint ventures with distributors. Furthermore, in order to survive, grow, drive profits and cope with technological change, SMEs need to be competitive and protect their innovations. In this respect, patents do contribute to protect market position, create business value, give access to capital and establish a brand.

European SMEs patent on average 30% fewer patents per employee than large firms, as noted by **Richard Simmons** from the European Association of Craft, Small and Medium-sized Enterprises, which demonstrates that either the European patent system is poorly adapted to SMEs at present, or European SMEs do not have sufficient resources or knowledge to patent. What would an ideal patent system look like in order to allow innovative SMEs to be granted the rights they need to access a market? The difficulties faced by European SMEs in patenting could be explained by the fact that patents are costly, force disclosure (to industry majors among others), invite infringement and may lead to litigation costs.

According to Richard Simmons what SMEs really need is a patent system that is easy to use (to avoid unnecessary experts' fees – experts should be used to help draft a patent, but they are not required to process multi-country renewals), provides a level of protection that meets international standards, is affordable to register, maintain and defend. This would require the introduction of a single European patent, registered at a low cost in a single language, where access to justice would be given via contingency lawyers or a low-cost patent insurance scheme. However, a successful patent system is only an enabler. European SMEs might also be penalized by a relative lack of marketing skills, a sub-optimal EU venture capital market and risk aversion. A clear business strategy can help SMEs cut patenting costs by targeting the market and hence limiting the protection to the relevant designated states and to the relevant technologies. Finally, as far as litigation is concerned, licensing out to big players can provide support to overcome litigation, in the sense that it can create, via shared ownership or exploitation of the rights, some sort of solidarity between the licensee and the licensor. Access to an affordable enforcement process remains a key issue for SMEs.

Wolfgang Knappe, Head of the Fraunhofer Patent Center for German Research, emphasized yet another role of patents. Bringing products onto the market is a central event for the process of innovation, but it goes with lots of difficulties and very high costs in order to develop and market them. In their active form (registration and exploitation), patents can protect the necessary initial investments from an idea to the final product, protect the product from imitation once it has been launched, and generate additional incomes through licensing. Nevertheless, the success of an innovation depends on a well-timed patent application. In their passive form, patents can provide a powerful source of information to find new ideas, partners and customers. Designing, manufacturing, marketing and distributing new products contain inherent risks which can require partnering with existing actors. But to become successful innovations, ideas must be economically attractive, with exclusive features of advantage to customers and partners. This can be facilitated by tracing demand, which means finding ideas and identifying competitors by watching third parties' activities in the field, notably thanks to patent databases. Searching for partners – for the sake of development, production or distribution – can be a very difficult task. But patent databases can also help here, along with other sources of information, such as press reports, trade fairs or (costly) technology mediators. Turning an idea into a successful innovation requires extensive strategic planning which should be covered by intensive acquisition of information. By making all the information contained in patent applications and grants available to the public, the patent system delivers early hints on activities of companies, competitors, possible partners and potential customers.

Session 2b: IP and technology intermediaries

The session started with an overview of recent trends in the commercialisation of technology assets. **Alexander Wurzer**, Director of the Steinbeis Transfer Institute, underlined in his talk on IP exploitation trends in Europe that an adequate exploitation process is necessary for appropriating the value inherent to technology assets. Although a patent is usually compared to a monopoly, and a monopoly in turn is considered to generate immediate wealth, the creation of wealth from patents requires an appropriate exploitation process. The importance of IP may be demonstrated by the share of intangible assets and IPRs in corporate market value, which often amounts to more than 90% in the case of software developers or Internet-based retailers.

In addition to the application of technological knowledge in a firm's own products and services through the operational use of IP or through IP-based business strategies, firms may externally leverage technology assets, above all through licensing their IP. As the importance of intangible assets has been rising continuously, firms have begun to overcome the rather exclusive focus on protection, which may be gained with IP rights (passive patent strategy), in order to pursue a more strategic intellectual asset portfolio management with particular emphasis on licensing (active patent strategy). This trend towards the external exploitation of IP may be demonstrated by a large variety of figures, such as the increase in the

licensing revenues of some pioneering firms that obtain over USD 100 million from licensing revenues per year. IBM, for example, earns USD 1.5 billion in annual licensing revenues derived from 5 800 patent families (from 1998 until today). These figures show that the average revenue per patent family is around USD 250 000 for IBM.

In this context, firms may not only develop internal capabilities to carry out technology transactions, they may additionally rely on intermediaries in technology markets. These intermediaries may be categorised in different ways. First of all, public institutions, such as technology transfer organisations, may be distinguished from professional companies. Second, open platforms, mainly Internet databases, may be distinguished from service offerings that intend to actively support the commercialisation of intellectual assets. While platforms aim at directly linking business to business, the active intermediary service providers put themselves in the middle of this process (business-to-intermediary-to-business).

With regard to these types of intermediaries, the talk of **Walter Holzer**, European Patent Attorney and past president of the European Patent Institute, highlighted the problem of the emergence of ‘wrong intermediaries’ in technology markets, those who charge their clients but do not deliver adequate results. In particular, he stressed the challenges inherent to the commercialisation of disembodied knowledge and how intermediaries may help industrial firms to meet these challenges. However, Walter Holzer noted that the existence of intermediaries does not automatically lead to perfect markets. Patent attorneys, for example, usually have a technical-scientific background with acquired legal knowledge; however, they usually lack economic training. Thus, they need to closely work together with accountants when it comes to the valuation and exploitation of patents.

The potential benefits of using intermediaries in technology transactions were emphasised by **Phil B. Stern**, Chief Executive Officer of Yet2.com. The company was founded in 1999 with the objective to bring together buyers and sellers of technologies. It has a strong advisory board, including IP experts from numerous firms, such as Bayer, DuPont, Philips and P&G, and over 90 000 registered users. Apart from providing an online marketplace for thousands of technologies, Yet2.com advises its clients on technology acquisition and licensing, IP strategy consulting and IP portfolio analysis.

According to Phil Stern, intermediaries can provide value added along the following four dimensions:

- *Connectivity* – as they have access to key gatekeepers, and have relationships with venture capitalists and SMEs. Furthermore, they tend to have cross-industry and cross-geography experience and knowledge.
- *Confidentiality* – as they provide a good opportunity for screening and for initial discussions. At that stage, they guarantee that the client name and the application of a technology is protected.
- *Expertise* – as they have experience regarding major evaluation and communication methods as well as market and buy-side knowledge. Furthermore, they have business formation and commercialisation skills.
- *External perspective* – as they provide an external perspective by giving unbiased evaluations and offering critical thinking which may be absolutely essential to successfully leverage technology assets.

As noted by Phil Stern, large firms should organise internally the commercialisation of core technologies to their own market, for strategic purposes, whereas they may well seek the help of intermediaries for the commercialisation of core technologies to other markets and the commercialisation of non-core technologies. Different types of organisations have different needs when it comes to technology commercialisation and thus, the use of intermediaries. Intermediaries also provide services for SMEs which aim to find large companies for collaborative development and distribution purposes.

Technology licensing by SMEs can result in strategic alliances and cross-licensing to other SMEs. For the universities or research institutes, intermediaries provide spin-out formation services as well as commercialisation of patents. On the other hand, he noted, in general, when large firms want to work with universities, there is no space for intermediaries because they have already established closer relationships than that of intermediaries. Phil B. Stern also underlined that markets for technology in distinct industrial sectors tend to be quite different. For example, standards licensing is extremely important in electronics, whereas the focus in life sciences is on specific skills in market development.

As an example of an intermediary that focuses exclusively on one particular type of organisation, **David Secher**, Director for Research Services at the University of Cambridge, pointed out that there has been a strong increase in the number and size of university technology transfer offices in the United Kingdom over the past ten years. Despite the enormous success of technology transfer activities at some leading universities in the United States, the reality is often rather different because “the links between universities and firms seldom realise their potential”, David Secher noted. In this context, a good technology transfer office can provide value added by focusing on the business perspective, taking an informed and independent approach, providing a national and international view and offering the experience that it has accumulated over time. Successful university-industry linkages are particularly important due to the increasing percentage of R&D that is outsourced to universities. In the EU, this figure has risen from 0.7% in 1981 and 2.0% in 1990 to 2.5% in 1999. In particular, David Secher presented the following as major characteristics of an ideal technology transfer office:

- Director and senior staff that combine broad business experience with technological depth.
- Operations of the technology transfer office supported with ‘hard’ university budget for staff and patents.
- Transfer office that provides access to the advice of IP experts as well as legal experts.
- Free of academic bureaucracy and would help to reduce administrative challenges.
- Clear mission and sufficient understanding that technology transfer is often movement of people.

David Secher concluded that a clear mission is essential in order to appropriately assess the performance of a technology transfer office. The number of spin-out firms does not constitute an adequate performance measurement in most cases. Rather, the assessment has to be linked to the mission of the office, which may be oriented more towards income generation or more towards the transfer and diffusion of new technological knowledge. He also emphasised the need to identify best practices in this field. With regard to Cambridge University, 61 new UK patents were filed in 2003/04. The licensing income during this period was GBP 2.2 million, 5 spin-outs were formed, and additionally 28 start-ups were assisted in the start-up phase.

During the open discussion following the presentations the issue of the critical size of university technology transfer offices, and room for mergers among existing ones was also emphasised, along with the need to understand cultural differences before making simple comparisons. For example, the attitude towards risk-taking and business failure tends to be more positive in the United States than in Europe. As described by one participant, what is perceived in Europe as failure might be perceived in the United States as experience that can contribute to future business success.

Session 3: IP management and exploitation: Practices across industries

The session aimed at presenting different industry experiences in IP management and exploitation. Business strategies and practices vary between industries depending on specific market characteristics and dynamics, and so do IP strategies.

At Wilhelm Karmann, a medium-sized company in the automotive industry, IP is a key element of the business strategy. **Volker Plogmann**, Managing Director of Karmann's Patent and Trademark Department, defined IP management in his company as a business-oriented international IP portfolio management process, aimed both at blocking competitors and at generating revenues. His department makes sure that patents are applied only for those technologies that present a real inventive step, are relevant in Karmann's active market segments and that show potential for blocking and licensing. Thanks to their strength and relevance, IP assets are key elements in the negotiation of contracts and critical to the valuation and rating of the company.

Karmann's IP management strategy has many facets, Responsibilities include surveying the state of the art, licensing patents, and responding to infringements. As such, IP management acts as a catalyst to make sure the relevant information is passed on to persons throughout the company. To achieve this end, a culture of innovation is required in the company, which implies turning IP management into innovation management, stimulating new ideas and promoting innovation everywhere in the company. In terms of revenue generation, licensing opportunities need to be actively sought. The process often starts by identifying potential infringers, examining such companies to determine whether infringement already occurs and the relative strength of each company's patent rights in the field. Based on these considerations, the companies will then license or cross-license technologies. Royalty rates in the automobile industry depend on the specific invention and product area, but average about 2% of revenues. Litigation occurs seldom in this industry made of large players with large IP portfolios. Karmann's case shows that IP strategy is a pre-condition to a successful development, but requires awareness and active involvement of all departments.

Kevin Nachtrab, Director of Intellectual Property and Licensing at Innogenetics, a company specialised in biotechnology for healthcare, highlighted some common licensing strategies and practices in the biotechnology and pharmaceuticals industries and some major challenges the industries are currently facing. A first commonly used licensing strategy consists in segmenting the licensing market based on the geography, type of activity or company size to maximise market penetration for the licensed technology. In addition, specific practices force licensees to grant back to the licensor rights or options related to future related IP assets and technologies. Thirdly, the tying of royalties to market exclusivity and the demand for step down royalties by licensees (especially large pharmaceutical companies) when competition exists in a country of sales can be a real challenge to SMEs, which can often not afford to seek protection in all countries.

On top of these strategies and practices, Kevin Nachtrab outlined several additional challenges the biotechnology industry faces in relation to recently introduced national or international regulations:

- The new EU Technology Transfer Block Exemption, for example, presents challenges to all contracting parties. Some provisions may bring deals outside the block exemption's scope, as certain contractual clauses are prohibited (*e.g.* downstream price fixing) and some others are excluded (*e.g.* mandatory grant-back of rights to future improvements). Also, to benefit from the block exemption, it is important to pay close attention to the relationship among the parties (whether they compete or not) and their market shares.
- The recent US Supreme Court decision in the *Integra vs. Merck* case has expanded the scope of R&D activities that are exempt from infringement of an existing patent according to the US FDA's "Safe Harbor" provision. The change in scope from clinical testing to patented compounds (and possibly research tools) used in preliminary clinical testing could have tremendous impacts on companies and particularly SMEs (being more often licensors than licensees) by reducing the value of R&D licenses and making the timing and pricing of the licenses more critical.

- The discussion centred around the UN Convention on Biological Diversity raises issues such as the need to identify the sources of genetic resources included in patent applications and requires informed consent by local authorities prior to accessing genetic resources.
- OECD Best Practices Guidelines for licensing of genetic inventions requires balancing principles in the contracts, such as patient privacy versus patient information needed by licensees. Licensees will face the challenge of adopting the guidelines and incorporating their principles and best practices into the text used in actual licensing agreements.

Kevin Nachtrab concluded that licensing in the biotechnology and pharmaceutical industries faces specific challenges that can only be successfully addressed by paying more attention to the negotiation of contracts so as to better plan for issues relating to the identification of sources and informed consent, planning for future contingencies such as market shares and structuring third party compensation.

Botaro Hirosaki, Senior Vice President and Executive General Manager of the Intellectual Assets Operations Unit at NEC Corporation, noted that IP is also under increasing pressure to generate revenues in the ICT sector. As technological innovation accelerates, product lifecycles get shorter, competition increases, profit ratios become vital and the fight for standardization gets very intense, the resources that maximise profits are shifting to intellectual assets. To meet these challenges, NEC Corp. has adopted an IP strategy aiming at combining internal and external knowledge to leverage business profits. This strategy is based on the open innovation paradigm, best suited to cope with those industry-specific challenges. High-tech sectors require extensive and costly R&D that cannot be reduced, so the structure of R&D needs to be adapted to generate additional incomes to fund it. This requires more openness at each stage of the innovation process: patenting in the early research phase, university collaborations and complementary technology in-sourcing during the research and development phases, licensing out, spinning off, transferring non-core technologies and building alliances in the business development phase.

Based on this open innovation model, the IP strategy has three main objectives at NEC Corporation, as described by Botaro Hirosaki: *i*) integration with the business strategy by focusing intellectual asset registration on core technologies and standardisation; *ii*) maximising technological competitiveness by continuously investing in R&D and in-sourcing promising new technologies; and *iii*) enhancing profit opportunities with licensing-out and technology transfers. This scheme has been applied by NEC Corporation in recent years in different business areas, as illustrated by different business alliances with Siemens or SVA Group of China among others.

Session 4: Encouraging valuation and exploitation: The experience of public institutions

Although their main focus remains the examination of patent applications, a number of patent offices have become more active in promoting the valuation and exploitation of granted patents, as have other public institutions.

The experience of Japan in this field was presented by **Kiyoshi Yonetsu**, Director of the International Affairs Division at the Japan Patent Office (JPO). Following a 2002 policy statement by Prime Minister Koizumi, Japanese authorities have taken a number of initiatives to fostering technology transfers and licensing in order to make Japan an IP-based nation. Initiatives to foster the patent licensing market have been undertaken mainly by JPO since 1997 and by the National Centre for Industrial Property Information and Training (NCIPI), a government agency established in April 2001 independently from JPO.

Starting with the observation that a patent right provides a business with a monopolistic advantage secured by legal enforcement rather than economic value *per se*, the JPO first created a system for ranking patent rights not according to their monetary value but according to factors such as the patent right's strength and the business potential of the invention. This valuation model is aimed at facilitating the

development of a licensing market by making patent values more transparent. The approach sums up the scores of a patent along four dimensions: *i*) basic items such as the status of the application, the term of duration of the patent, the number of designated states, etc., *ii*) the essential value of the patent, which depends on factors such as its breadth, degree of disclosure and clarity of scope; *iii*) its transfer and licensing potential, and *iv*) its marketability.

The second axis of Japan's initiatives consists of efforts to promote and assist licensing. The objectives of promotion efforts, particularly but not exclusively addressed to SMEs, are to improve the exploitation of university and public research, to activate regional economies and to build a patent licensing market in Japan. In this respect, one major element of the programme is the designation of patent licensing advisors – experts in technology transfer who are dispatched throughout the country to visit companies, universities and research institutes, to collect technological needs and identify licensable patents and to serve as technology transfers matchmakers. In addition, the programme set up a patent licensing database that can be searched free of charge via the Internet. Patent owners have already listed about 60 000 licensable patents in the database. Finally, graphical tools help finding desirable technology by means of patent maps, and patent information advisors give advice on how to use patents effectively. Along with various other licensing promotion activities (seminars, publications, trainings, *etc.*), Kiyoshi Yonetsu noted that these programmes have significantly improved the volume and economic impact of licensing in Japan over the past years.

An interesting experience undertaken in the United Kingdom was presented by **Lawrence Cullen**, Senior Policy Advisor at the Intellectual Property Policy Directorate at the UK Patent Office. In 2003, an independent review of business-university collaboration in the United Kingdom concluded that technology transfers via business-university collaborations needed to be improved in order to enhance the UK's innovation performance. The review also noted that the major practical difficulties encountered in setting up contractual agreements often lead to the abandonment of collaboration projects.

In order to improve such technology transfers, the UK Patent Office launched a programme to produce a set of five model contracts for research collaboration, to be used on a voluntary basis by industry and universities to facilitate business-university negotiations. This so-called Lambert Model Toolkit addresses key issues related to IP ownership, use of research results, the financial contribution of businesses and publication criteria for universities. The outline of the toolkit helps users identify the main issues in such agreements and provides a framework for addressing them. Guidance notes further explain terminology and legal issues. Finally, the so-called decision guide consists of a series of questions to help users choose among the five standard agreements to identify the one that is best adapted to their particular case in terms of rights' ownership, financial contributions and academic use.

Jon Santamauro, Intellectual Property Attaché of the US Trade Representative's Office, presented several initiatives taken by US Government agencies in this field. In addition to assistance centres and publications of licenses' offers, the USPTO has committed itself to reducing patent pendency and improving patent quality in order to improve the availability and desirability of patent licensing and exploitation at large. Other US government agencies provide support and education to SMEs in the field of IP management. The Bayh-Dole Act, by allowing universities and inventors to take title to patents on the results of federally funded research, facilitates commercialisation of public inventions without use of tax-based incentives. Finally, the recent tax deduction for donations of patents encourages firms to put inactive but potentially valuable patents into the hands of organisations that have an interest in developing them.

By assisting member states in promoting and leveraging IP for economic development, elaborating toolkits for patentees and inventors and promoting knowledge sharing, the World Intellectual Property Organisation (WIPO) tends to leverage IP as a tool for economic, social and cultural development, especially in developing countries. **Roya Ghafele**, Associate Economic Officer in the Intellectual Property

and Economic Development Department at WIPO, illustrated this strategy with an Indonesian case example demonstrating how WIPO co-operated with local stakeholders to develop the Indonesian natural medicine market thanks to international partnerships, clinical trials in Indonesia, standardisation throughout the value chain, quality controls, patents on new ingredients, certification marks to guarantee product safety, training, etc.

Session 5a: Methods for patent valuation

Although there is a growing awareness of the importance of intangible assets in explaining current and perspective economic performance of a firm or a country, they remain difficult to fit into the framework of existing accounting systems. Even for those intangibles assets that can be included in balance sheets, numerous methodological problems remain to be solved. Methodological issues related to the valuation of patents and other IP are therefore crucial to improve the long-term economic decisions of firms and policy makers alike.

As noted by **Guido Von Scheffer**, Director of Sales and Organisation at IP Bewertungs AG and **Martin Zieger**, Partner of Corporate Finance at KPMG, firms increasingly feel the need to include information about their patent portfolios in their accounting systems. Nevertheless, difficulties remain in representing the true and fair value of patents, while complying with the prudence principle that inspires accounting standards. Traditional and international accounting methods rely on historical cost figures to determine value, but this approach is not in line with the idea that valuation has to reflect the true market value of an asset. Market values will depend on firm strategy, industry sectors and on the particular point in time. As a result, the value of a patent that can be included in a company's balance sheet fails to represent both the true costs supported by a firm and the perspective value of the asset.

To use patents as an asset (*e.g.* to secure debt financing by banks and financial investors) several basic requirements have to be met by valuation processes. These requirements include objectivity, speed (to ensure short valuation times), applicability across large patent portfolios and cost-effectiveness. Recently, the German Federal Financial Supervisory Authority (*Bundesaufsichtsamt für Finanzdienstleistungen – BaFin*) offered banks the opportunity to accept patents as the sole form of security for debt financing, as long as the patents are valued using systematic patent valuation methods.

Guido Von Scheffer and Martin Zieger described the three methods that are currently the most widely used by firms to estimate the value of their patents; each has its own strengths and weaknesses:

- *The cost approach* is based on the cash payments made to obtain and secure the patent. Despite being relatively simple and inexpensive to use, this method does not produce the true market and commercial value of a technology, rather its production or replacement cost. The replacement cost variant of this method can help adjust values downwards, when the historical costs figures overestimate the current value costs.
- *The income approach* aims at computing the commercial value of a patent based on the discounted value of the cash flows that will be generated in the future. The main disadvantage of this approach is that it requires many assumptions related to future income, payment times and the discount rates; hence, its use is only advisable in the presence of large and reliable databases that can provide historical data on which to base future projections.
- *The market approach* is based on the realised market values of comparable patents and allows the estimation of a lump-sum value for a given patent. This approach reduces the problem of subjectivity to one of properly choosing comparable patents. The main disadvantage of this method is the unique character of patents, which makes it especially difficult to find comparable patents for radically new inventions and nascent industries. A more effective approach relies on

comparisons not with other patents but with a range of indicators extracted from bibliographic patent data. The value of a given patent can then be computed by proper combination of the various indicators.

Different estimation techniques may also be adopted depending on the purpose of the evaluation. Overall, risk-averse and financial investors seeking to secure their credits may prefer the replacement cost and market approach, whereas the shareholders and venture capitalists may find it useful to combine market and income approaches.

New methodologies are currently being proposed by scholars and tested empirically. **Markus Reitzig**, Associate Professor at the Copenhagen Business School, summarised the theoretical underpinnings of approaches that value patents from a strategic (investment) perspective, viewing a patent as a real option. Applying these methods in practice via custom-tailored expert assessments is challenging. Assessing future cash flows and the volatility that results from technological, market, and legal uncertainties makes valuation of individual patents difficult. In the case of large portfolios, where the interrelationships among the option values of individual patents may produce synergetic effects, making assessments even more complicated, time-consuming and costly.

As a result, ongoing academic research increasingly pursues methods that can reduce the complexity and cost of valuation. Such methods focus on indicators that can be computed from bibliographic data, such as forward and backward patent citations and number of claims, and that have been adopted and tested to capture a set of characteristics that are suspected to be related to patent value, such as science linkage, inventive step and associated market size. Empirical testing of such approaches has produced mixed results and suggests that indicators must be calibrated to capture the specific characteristics of portfolios to be evaluated. While the number of citations received by a patent appears to be a good representation of the technological quality of an invention, this measure can only be used to assess value ex-post. Obtaining relevant bibliographic measures earlier in the lifetime of a patent remains a major challenge, with significant potential rewards. Further progress is also needed to improve the availability of variance indicators at the firm level, clarify the theoretical linkages between indicators and patent characteristics and strengthen the empirical basis for such indicators.

Werner Fröhling, Head of the Patent Department at Volvo Technology Corporation, presented his experience in patent evaluation from a practitioner's point of view. Occasions for IP evaluation occur frequently in a company, both periodically (annual reports) and occasionally (M&A, joint ventures, purchase or sale of a technology or grant of licenses). The value of a patent for a company is not only that of protecting its competitive advantages through process and product innovation; patents increasingly serve a multiple set of purposes, such as serving as a sort of currency in transactions; securing the access to promising third-parties complementary technologies via cross licenses; strengthening the company's position in strategic alliances, co-operations or mergers & acquisitions; and indicating the company's innovation potential and technological competence. All of the previous purposes require effective patent portfolio evaluations at each point in time. While a small patent portfolio allows annual in-depth evaluations, a simplified but still robust and trustworthy annual evaluation may be preferable for larger patent portfolios.

In order to make the evaluation more effective, companies may find it useful to subdivide their patent portfolios into sub-portfolios or classes on the basis of a set of parameters and to use "user-friendly score-assessments" in order to rank not only the individual patents but also the sub-portfolios and associate them to different business units. Investments and strategic decision-making may be empowered by comparing the perceived importance of the sub-portfolio with the importance of the business or division. As regards evaluation methods, Werner Fröhling commented the advantages of combining several methods, such as simple High-Medium-Low (HML) analysis and in-depth analysis, an approach that could

be particularly useful for medium sized patent portfolios. More qualitative, simple approaches should not be left aside either if they are useful and trustworthy. Also, frequent plausibility checks during the evaluation process are very important.

Session 5b: Macroeconomic evaluations of licensing markets in Europe, Japan and the United States

The session provided insight into the size and development of technology markets in the three regions concentrating most of the world patents. **Alfonso Gambardella**, Professor at Bocconi University, presented an assessment of the market for technologies in Europe, as well as some background information, which showed clear increases in both patenting and technological transfer in recent years in the world. He noted that markets for technology have several positive effects: they stimulate innovation because the actual inventors of new technologies may not always be the best users of this knowledge; and they also enhance the rate and efficiency of technology use because firms that lack complementary assets may have the opportunity to sell intermediate output.

According to Alfonso Gambardella, the development of the markets for technology in Europe has lagged behind that in other countries since the 1990s, in particular the United States. Several surveys conducted by the British Technology Group, OECD and EPO support this conclusion. Nevertheless, there has been a clear increase in technology transactions in recent years – a trend which is expected to continue in the future. The worldwide market for licenses was estimated to have been worth about USD 100 billion in 2003. Some sectors might play a leading role in the evolution of markets for disembodied knowledge such as the biopharmaceuticals industry and the ICT industries.

The situation in Japan was described by **Kazuyuki Motohashi**, Associate Professor at the Research Center for Advanced Science and Technology at the University of Tokyo, who presented a quantitative analysis of licensing activities based on two available surveys, METI's Basic Survey of Business Structure and Activities, and the JPO's Survey on IP Related Activities. Major reasons behind the increase in technology transactions include more intense competition, faster pace of innovation, growing importance of scientific knowledge for innovation (especially in the biopharmaceuticals industry), and institutional changes in the science sector, such as recent reforms to Japan's national universities. Although the evidence presented demonstrates that firms have increased their out-licensing activities more rapidly than their in-licensing operations in recent years, licensing revenues only make up a small part of the overall revenues in most firms. In the sample of firms surveyed, licensing revenues represent only 0.15% of total firm revenues, on average. In addition, international licensing agreements of Japanese firms have contributed more strongly to the rise in licensing deals than transactions among players within Japan. Furthermore, licensing activities are concentrated in the ICT and pharmaceutical industries, with smaller and younger firms making more use of licensing.

Despite the increase in technology transactions, evidence suggests that markets for technology have not yet achieved their full potential. Imperfections inherent to these markets continue to lead to high transaction costs and impede the successful negotiation of licenses. According to a survey of about 230 companies in North America conducted by the Licensing Foundation (the educational arm of the Licensing Executives Society in the United States and Canada) and analysed by **Iain Cockburn**, Professor at Boston University, potential licensees are found in only 25 cases out of each 100 licensable technologies (from the perspective of the potential licensor). Potential partners enter into negotiations in only 6% to 7% of cases, and final agreements are achieved in only 3% to 4% of the cases on average.

The results of the Licensing Foundation survey highlight some of the obstacles to licensing and the difficulties encountered when trying to measure the productivity and performance of licensing activities. These difficulties result mainly from the confidential character of the information, from the complexity and context-dependency of the contracts and the absence of a regulatory framework that imposes filing

requirements on such transactions. As the complexity of licensing deals constitutes a major challenge to both the parties to the transaction and external observers, such as researchers, Iain Cockburn noted that the simplification and standardisation of licensing contracts would be beneficial for all. Obstacles to successful licensing differ in each stage of the process. Insufficient resources for out-licensing and difficulties in getting internal approval to enter into negotiation for in-licensing are major obstacles for not starting negotiations after identification of potential partners. Failing to achieve mutually acceptable financial terms is the most serious reason for not reaching agreements for both out- and in-licensing followed by failing to arrive at acceptable non-financial terms. Having too many parties involved in a negotiation, which is often connected to the so-called “tragedy of the anticommons”, does not seem to be a serious obstacle according to the survey.

Technology markets could be expanded if transaction costs were reduced, but in any case, the development of technology markets needs time and an initial ‘learning’ period is needed, partly due to the particular characteristics of technological knowledge. However, initial difficulties have existed in the development of most markets, such as in the formation of the insurance market in the 18th century. In this regard, future research with more systematic data may help to provide additional insight to identify the obstacles and recommend remedies to accelerate the development of technology markets. In particular, the monetary evaluation of technology transactions is important for evaluating patents, which in turn may have a major impact on overall firm value. Research shows that licensed patents tend to be more valuable than unlicensed patents, so technology markets are not at all what economists call ‘markets for lemons’ (characterized by the fact that the lowest quality goods are more likely to be the subject of transactions, for example the market for second-hand cars), but the value of licensed patents is extremely hard to assess and above all, it depends on the specificities of the deal, the bargaining power of the parties and the particular point in time along the lifecycle of the patent when licensing occurs.

Participants in this session concluded that markets for technology have been growing in recent years in all regions and may be expected to further intensify in the future. However, the external exploitation of technology assets still plays a limited role in most industrial firms. Also, the volume of the markets is still difficult to measure, and additional research is needed. Nevertheless, the findings from the three regions analysed in the session lead to rather consistent results regarding the value of licensed patents and the imperfections of the markets for technology. Besides some geographical differences (the United States are in a leading position, whereas Europe is lagging behind), the studies presented also pointed out differences across industries and identified a few leading sectors, primarily biopharmaceuticals and ICT.

Session 6: Encouraging valuation and exploitation: What could government do (or not)?

Various efforts have been made by public authorities, international institutions and business groups to promote the valuation and exploitation of patents. In this last session of the conference, government officials from Japan, Germany and the European Commission described efforts in their own jurisdictions and presented their views on the appropriate role of government in facilitating the valuation and appropriation of IP.

The Secretary General of the Intellectual Property Strategy Headquarters of the Japanese Government, **Hisamitsu Arai**, presented the current Japanese IP strategic programme, launched in June 2005. IP strategy programmes have been developed on an annual basis in Japan since 2003 following Prime Minister Koizumi’s announcement in 2002 of the goal to make Japan an IP-based nation. All government ministers are members of the IP strategy headquarters, chaired by the Prime Minister, which shows that Japan pursues a more comprehensive strategic approach to IPR policy than other countries. The Japanese IP strategic programme comprises about 450 action items that aim to strengthen the full productive cycle of the IP systems, from creation of IP, to its protection and exploitation. In particular, Hisamitsu Arai

highlighted eight areas of policy development related to the valuation and exploitation of IP within Japan's overall IP strategy.

- Encouraging patent licensing from universities. In addition to their traditional roles of research and education, universities have been given a new role: technology transfer. Legislation similar to the US Bayh-Dole Act was implemented to give universities the ability to manage their IP, and new technology licensing organisations were established to facilitate commercialisation.
- Business exploitation of IP. Enterprises are pushed towards exploiting IP internally or externally (*e.g.* through licensing and trading).
- Patent pools. Guidelines for applying the Antimonopoly Act on patent pools have been clarified and were published on 30 June 2005.
- A revised Trust Business Law has been in force since December 2004, which abolishes the limitation of eligible property in trust business. Thus, IP becomes eligible property which is expected to diversify financing methods.
- Information disclosure. Guidelines for disclosure of information regarding IP have been established (*e.g.* voluntary 'IP report' for investor relations).
- Development of IP markets. The development of markets for IP is supported by the promotion of patent licensing through various channels, such as patent licensing fairs that bring together potential buyers and sellers of patents and other IP.
- Human resource development. Patent information advisors and patent licensing advisors have been established to assist SMEs and venture companies in these issues. It is hoped that this effort will increase the number of private sector brokers and intermediaries.
- Attempts are made to establish better valuation methods through sharing experiences among firms as well as to set up international standards for accounting and tax rules, which are important in the globalisation of IP activities. In this process of harmonizing the approaches of individual countries and governments, the OECD is expected to play a key role.

Heinz Zourek, Deputy Director General for Enterprise at the European Commission outlined his views on the appropriate role for government in promoting patent valuation and exploitation. He pointed out that apart from setting an appropriate regulatory framework, government had a legitimate role in three areas: *i*) supporting SMEs in their use of the IP system; *ii*) promoting IP management and exploitation in public research organizations; and *iii*) facilitating the creation of an IP culture. To make the patent system more useful for SMEs, Heinz Zourek indicated that emphasis has to be put on practical issues instead of legal matters in order to demonstrate the positive impact that patenting may have on their performance. One particularly important aspect in this regard is the cost of litigation, which is relatively high from the perspective of SMEs. Another is the importance of evaluating IP with the aim of receiving external financing. As for public research organisations, he indicated that appropriate management of the IP resulting from public funding has a major impact on the effectiveness of that funding. Due to the large sums that governments invest in research, efforts must be made to promote commercialisation of results. Finally, Heinz Zourek noted that substantial differences exist in the level of IPR activity and awareness of the IP system across EU member states. He saw room for a stronger network of patent offices to assess the strengths and weaknesses of the systems for supporting SMEs in order to identify best practices. It is essential to bring together policy makers to facilitate a transparent process and to build up common knowledge in this area.

Finally, **Wilhelm Niemeier**, Director General of the Economic Law Department at the German Federal Ministry of Justice, argued for a more limited government role. In his view, the issues related to valuation and exploitation of IP should be first tackled by market forces, and governments should only ensure a proper legal administrative and judicial framework. As the IP portfolio strategy has become increasingly important in practice and has reached the board level of companies, IP valuation and exploitation has become a top priority for practitioners and as such should be addressed by the private sector. Concerning the regulatory framework, which Wilhelm Niemeier regards as the major factor of governmental activities related to IPR, he insisted on three aspects: efficiency, coherence and quality.

- *Efficiency.* Governments have to establish an efficient regulatory framework that is transparent and avoids excessive bureaucracy so that it works without inappropriate administrative burdens for the business community. This aspect should also be considered in the discussion on the difficult issue of the Community Patent and the standardisation of procedural and substantial patent law worldwide.
- *Coherence.* There has to be coherence within and between the different regulatory levels at the international, European and national levels. Two recent examples where coherence might have been in jeopardy include the discussions on the patentability of computer-implemented inventions in Europe and the implementation of the WTO Doha declaration on compulsory licensing for pharmaceutical products for export to countries with public health problems.
- *Quality.* It is highly important to ensure patent quality and to avoid trivial patents. Patents should be granted to inventions that contribute to the state of the art with true inventive steps. For this reason, the German government has submitted together with the Danish and Dutch delegations a document to the EPO Administrative Council this year, underlining the need for the patent system to remain selective.

In the discussion following the presentations, a call was made for further international collaboration on issues of IP valuation and exploitation. As IP moves from the periphery to the heart of the economy and of economic development, appropriate international collaboration may be considered a key factor for facilitating valuation and exploitation of IP in the future.

CONFERENCE AGENDA

Intellectual Property as and Economic Asset: Key Issues in Valuation and Exploitation

30 June and 1 July 2005

Opening Session

Introductory remarks

- Rezzo SCHLAUCH, Parliamentary State Secretary, German Federal Ministry of Economics and Labour
- Herwig SCHLÖGL, Deputy Secretary-General, Organisation for Economic Co-operation and Development
- Alain POMPIDOU, President, European Patent Office

Keynote speeches

- Ashish ARORA, Professor, The H. John Heinz III School of Public Policy and Management, Carnegie Mellon University
- Ruud PETERS, Chief Executive Officer, Philips Intellectual Property and Standards

Session 1: New uses of IP and need for valuation

Chair: Joff WILD, Editor, Intellectual Asset Management Magazine

- Isabel VERLINDEN, Managing Partner, Eurofirm Transfer Pricing Services, PriceWaterhouseCoopers
- Malte KÖLLNER, Managing Partner, Triangle Venture Capital Group
- Riikka HEIKINHEIMO, Executive Director, Research Funding, Tekes, National Technology Agency Finland

Session 2A: How can SMEs actively use patent protection and licensing as a business strategy?

Chair: Wolfram FÖRSTER, Head, Controlling Office, European Patent Office

- Mathias KUNZ, Chief Executive Officer, t-blade GmbH
- Richard SIMMONS, European Association of Craft, Small and Medium-sized Enterprises
- Wolfgang KNAPPE, Head, Fraunhofer Patent Center for German Research

Session 2B: IP and technology intermediaries

Chair: Luuk BORG, Head, Patent Information Division, Netherlands Patent Office

- Alexander WURZER, Director, Steinbeis Transfer Institute
- Walter HOLZER, European Patent Attorney, former President, European Patent Institute
- Phil B. STERN, Chief Executive Officer, Yet2.com
- David SECHER, Director, Research Services, University of Cambridge

Session 3: IP management and exploitation: practices across industries

Chair: Heinz GODDAR, European Patent and Trademark Attorney, former President, Licensing Executives Society International and Germany

- Volker PLOGMANN, Managing Director, Patent and Trademark Department, Wilhelm Karmann GmbH
- Kevin NACHTRAB, Director, IP Department, Innogenetics
- Botaro HIROSAKI, Senior Vice-President, Executive General Manager, Intellectual Asset Operations Unit, NEC Corporation

Session 4: Encouraging valuation and exploitation: the experience of public institutions

Chair: Jürgen SCHADE, President, German Patent and Trademark Office

- Kiyoshi YONETSU, Director, International Affairs Division, Japan Patent Office
- Lawrence CULLEN, Senior Policy Advisor, IP Policy Directorate, United Kingdom Patent Office
- Jon SANTAMAURO, Intellectual Property Attaché, United States Trade Representative's Office
- Roya GHAFELE, Associate Economic Officer, IP and Economic Development Department, World Intellectual Property Organisation

Session 5A: Methods for patent valuation

Chair: Nobuo TANAKA, Director for Science, Technology and Industry, Organisation for Economic Co-operation and Development

- Martin ZIEGER, Partner, Corporate Finance, KPMG
- Guido VON SCHEFFER, Director, Sales and Organisation, IP Bewertungs AG
- Werner FRÖHLING, Head, Patent Department, Volvo Technology Corporation
- Markus REITZIG, Associate Professor, Copenhagen Business School

Session 5B: Macroeconomic evaluations of licensing markets in Europe, Japan and the United States

Chair: Manuel DESANTES, Vice-President, European Patent Office

- Alfonso GAMBARDELLA, Professor, Bocconi University
- Kazuyuki MOTOHASHI, Associate Professor, Research Center for Advanced Science and Technology, University of Tokyo
- Iain COCKBURN, Professor, Boston University

Session 6: Encouraging valuation and exploitation – What could government do (or not)?

Chair: Herwig SCHLÖGL, Deputy Secretary-General, Organisation for Economic Co-operation and Development

- Hisamitsu ARAI, Secretary General, Intellectual Property Strategy Headquarters, Cabinet Secretariat of Japan
- Heinz ZOUREK, Deputy Director General, Directorate General Enterprise, European Commission
- Wilhelm NIEMEIER, Director General, Economic Law Department, German Federal Ministry of Justice

PARTICIPANTS

Mika AALTO, Tekes, Finland
José Ricardo AGUILAR, Instituto Pedro Nunes, Portugal
Denis AIVAZIAN, Bugnion SA, Switzerland
Nuno Miguel ALVES DA SILVA, Instituto Pedro Nunes, Portugal
Kay ALWERT, Fraunhofer IPK - Competence Center Knowledge Management, Germany
Bjorn Magnus ANDERSSON, Committee on Patent Protection of Biotechnical Inventions, Sweden
Bernd ANKENBRAND, Witten/Herdecke University, Germany
Nicole ANTHEUNIS, Université de Liege, Belgium
Hisamitsu ARAI, Intellectual Property Strategy Headquarters, Cabinet Secretariat, Japan
Ashish ARORA, Carnegie Mellon University, United States
Katerina AUEROVA, Inventia sro, Czech Republic
Tilo BACHMANN, European Patent Office, Germany
Peter BACKES, Deutsche Telekom AG, Germany
Martin BADER, University of St Gallen, Switzerland
Teresa BAGNOLI ASTER, Italy
Wolfgang BAIER, VDI/VDE Innovation & Technik GmbH, Germany
Eva BAKOS, Hungarian Patent Office, Hungary
Hiroshi BANDO, Jetro Düsseldorf, Germany
Dirk BAUMANN, ITIO GmbH, Germany
Angela BECKENBAUER, University of St. Gallen, Switzerland
Heike BELITZ, German Institute for Economic Research, Germany
Zuzana BELOHRADSKA, Industrial Property Office of the Czech Republic, Czech Republic
Luciano BERARDI, Alenia Aeronautica, Italy
Joseph BERNIER, Centre Spatial de Liège Ulg, Belgium
Engelbert BEYER, Federal Ministry of Education and Research, Germany
Berkay BIRCAN, Koc Holding AS, Turkey
Henry Nicholas BLANCO WHITE, Drinker Biddle & Reath LLP, United States
Paolo BOCHICCHIO, European Plastics Converters, Belgium
Ruth BOEKER, European Patent Office, Germany
Luuk BORG, Netherlands Patent Office, The Netherlands
Christophe BOUTIN, CPA Software Solutions, France
Ingo BRÜCKNER, DaimlerChrysler AG, Germany
Christoph BRUHN, European Patent Office, Germany
Jean-Marc BRUNEL, AIRBUS - Patents Department, France
Lydia BUCHOLTZ, European Patent Office, Germany
Guillaume BYK, CRP-Santé, Luxembourg
Nuria CARRASCO COMES, European Patent Office, Germany
Roberto CATANI, Snamprogetti SpA, Italy
Anka CHERVENKOVA, Patent Office of the Republic of Bulgaria, Bulgaria
My CHUNG, University Salzburg, Austria
Hana CHURACKOVA, Industrial Property Office of the Czech Republic, Czech Republic
Hartmut CLAUSEN, Federal Ministry of Education and Research, Germany
Claudia COLLA, European Commission DG Internal Market and Services, Belgium
Kenneth Neil CUKIER, The Economist, London
Lawrence CULLEN, United Kingdom Patent Office, United Kingdom
Thomas CZOGALLA, European Patent Office, Germany

Todor DARAKTSCHIEW, Ofeibea Patent Agency, Bulgaria
Adrianos DE KOK, European Patent Office, Germany
Henrique Steuer I DE MELLO, Dannemann, Siemsen, Bigler & Ipanema Moreira, Brazil
Dominique DEBERDT, INPI, France
Giustino DESANCTIS, Audio Mpeg, USA
Manuel DESANTES, European Patent Office, Germany
Roberto DINI, Metroconsult srl, Italy
Antoine DINTRICH, Institute Européen Entreprise et Propriété Intellectuelle, France
Pavel DLOUHÝ, Association of Innovative Entrepreneurship of the Czech Republic, Czech Republic
Claude DREYER, IEEPI, France
Johann Ludwig DUVIGNEAU, Federal Ministry of Education and Research, Germany
Jens EHRHARDT, AIF "Otto von Guericke", Germany
Christoph ELINEAU, German Federal Ministry of Education and Research, Germany
Petra ERHARDT, German Federal Ministry of Economics and Labour, Germany
Jean-Philippe ESCHER, Unaxis-Balzers AG, Liechtenstein
Bernd O. EWALD, Ministry of Trade and Industry, Norway
Felicia FAI, University of Bath, United Kingdom
Paul G. FAIRHURST, Max Planck Institute, Germany
Andreas FIER, ZEW, Germany
Donata FOLESANI, ASTER Soc cons pA, Italy
Wolfram FORSTER, European Patent Office, Germany
Chiara FRANZONI, National Research Council of Italy, Italy
Werner FROHLING, Volvo Technology Corporation, Sweden
Alain GALLOCHAT, Ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche, France
Alfonso GAMBARDELLA, Bocconi University, Italy
Olaf GEBAUER, Bayer CropScience AG, Germany
Marcin GEDLEK, Patent Office of the Republic of Poland, Poland
Vlastimil GEJDOS, Ministry of Industry and Trade, Czech Republic
Roya GHAFELE, World Intellectual Property Organisation, Switzerland
Constantin GHITA, SC Constantin Ghita Office SRL, Romania
Rossella GIACCHI, Finmeccanica, Italy
Mariantonietta GIANFRANCESCO, European Patent Office, Germany
Leo GIANNOTTI, European Patent Office, The Netherlands
Carlo GIORGETTI, Bridgestone Technical Center Europe Spa, Italy
Jens GLIENKE, Schering AG Corporate Patents, Germany
Heinz GODDAR, Licensing Executives Society International, Germany
Hasene Hande GÖKSOY, TUSIAD, Turkey
Christer GRANBERG, Orion Diagnostica Oy, Finland
Henno GROELL, Wilmer Cutler Pickering Hale and Dorr, Germany
Dirk GROENEWEGEN, IPD-Consulting BV, Netherlands
Dominique GUELLEC, European Patent Office, Germany
María GUILERA, Universitat Ramon Llull, Spain
Egbert GÜNTHER, Deutsche Bank AG, Germany
Francis HAGEL, Compagnie generale de geophysique, France
Jørgen Lindgreen HANSEN, Danish Patent & Trademark Office, Denmark
Tony HARRIS, Intellectual Asset Management Magazine, United Kingdom
Nikolaj F. HARTZ, European Patent Attorney, Germany
Andras HASZONITS, Hungarian Patent Office, Hungary
Riikka HEIKINHEIMO, Tekes, Finland
Sabina HEIM, Ascenion GmbH, Germany

Jonas V. T. HEITTO, Alcatel Intellectual Property Group, Germany
Yvon HELARY, AIR LIQUIDE, France
Siegfried HELLING, TSB Innovationsagentur Berlin GmbH, Germany
Christoph HERFARTH, Federal Ministry of Economics and Labour, Germany
Bettina HERMANN, Kanzlei Frohwitter, Germany
Botaro HIROSAKI, NEC Corporation, Japan
Walter HOLZER, European Patent Institute, Austria
Andreas HOLZWARTH-ROCHFORD, Boehmert&Boehmert, Germany
Jan HRUŠÁK, Academy of Sciences of the Czech Republic, Czech Republic
Stefan Rolf HUEBNER, Patent Attorney, Germany
Kentaro ISHIHARA, Intellectual Property Strategy Headquarters, Cabinet Secretariat, Japan
Kjetil JAASUND, Norwegian Ministry of Education and Research, Norway
Fiona JACKSON, Intellectual Assets Centre, Scotland
Andrea JAEGER-LENZ, Latham & Watkins LLP, Germany
Wolfgang JAEK, Forschungszentrum Jülich, Germany
Rainer JÄKEL, Federal Ministry of Economics and Labour, Germany
Dominika JAMIOL, Technical University of Szczecin, Poland
Lourdes JANÉ, Fundación Universidad Rovira i Virgili, Spain
Richard A. JOHNSON, Arnold & Porter LLP, United States
Claire JOLIBOIS, Institut Pasteur de Lille, France
Dannie JOST, Tensoriana, Switzerland
Raphael JUNG, ipal GmbH, Germany
Alain KAISER, Breese Derambure Majerowicz, France
Athanasios KAISSIS, Industrial Property Organisation, Greece
Shigeki KAMIYAMA, Organisation for Economic Co-operation and Development, France
Ingo KAPP, ZAB-BRAINSHELL, Germany
Konstantinos KARACHALIOS, European Patent Office, Germany
Harry KASPERS, European Patent Office, The Netherlands
Oliver KEMPER, Austria Wirtschaftsservice, Austria
Lutz KIETZMANN, MAIWALD Patentanwalts GmbH, Germany
Elena KLEININGER, State Office for Inventions and Trademarks, Romania
Wolfgang KNAPPE, Fraunhofer Patent Center for German Research, Germany
Samuel John KNIGHT, QINETIQ Ltd, United Kingdom
Klaus KOBEK, TLB GmbH, Germany
Malte KOLLNER, Triangle Venture Capital Group, Germany
Eberhard KOPPENHOEFER, Sisvel SpA, Italy
Angelika KRAMER, State Ministry for Economic Affairs and Labour, Germany
Jan B. KRAUSS, Forrester & Boehmert, Germany
Angela KRETSCHMER, PTJ - Project management Organisation Jülich, Germany
Ewy KRISTIANSEN, Zacco Norway, Norway
Matthias KUNZ, t-blade GmbH, Germany
Klaus Herbert KUNZ, Hammonds, Germany
Matthias KÜNZEL, VDI/VDE Innovation & Technik GmbH, Germany
Juergen LACHNIT, Weickmann & Weickmann, Germany
Francis LEYDER, TOTAL Petrochemicals Research Feluy, Belgium
Ulrich LICHTENTHALER, Otto Beisheim Graduate School of Management (WHU), Germany
Dirk LOOP, IP Bewertungs AG, Germany
Sybille A. LORENZ, Forschungsverbund Berlin eV, Germany
Francesco MACCHETTA, Bracco Imaging, Italy
Nicole L. MARÉCHAL, Cefic, Belgium
Giacomo MARSAGLIA, Pirelli & C SpA, Italy

Catalina MARTINEZ, Organisation for Economic Co-operation and Development, France
Juan MARTINEZ ARMESTO, Consejo Superior Investigaciones Cientificas, Spain
Dirk MEISSNER, Innovation Advisory, Germany
Mads MELTVEDT, DLA Nordic DA, Norway
Volker Timo MENSING, Fleuchaus & Gallo, Germany
Holger MIETHING, Klosterfrau Berlin GmbH, Germany
Ivan MIJATOVIC UBS AG, Switzerland
Frank MOESCHLER, European Commission DG Research, Belgium
Henning MØLSTED, Journalist, Denmark
Eva MOSEL, IPC Global, Germany
Kazuyuki MOTOHASHI, University of Tokyo, Japan
Thomas MULTHAUP, German Federal Ministry of Economics and Labour, Germany
Kevin NACHTRAB, Innogenetics, Belgium
Christopher NEDIN, Australian Government, Australia
Benedikt NEUBURGER, Zimmermann & Partner, Germany
Eva NEWEKLOWSKY, University Vienna, Austria
Wilhelm NIEMEIER, German Federal Ministry of Justice, Germany
Astrid NITZ, Patent Attorney, Germany
Reinhold NOWAK, Omega GmbH Consulting Group, Germany
Giovanna ODDO, European Patent Office, Germany
Nils OMLAND, Otto Beisheim Graduate School of Management (WHU), Germany
Ruud PETERS, Philips Intellectual Property and Standards, The Netherlands
Armins PETERSONS, Petersona Patents, Latvia
Jan PETR, HSH Nordbank, Germany
Angus PHANG, Mintz Levin Cohn Ferris Glovsky and Popeo LLP, United Kingdom
Bettina PIEPENBRINK, Kort Rechtsanwälte, Germany
Kai PIEPENBRINK, Kort Rechtsanwälte, Germany
Harald PIER, Swiss Federal Institute of Intellectual Property, Switzerland
Volker PLOGMANN, Wilhelm Karmann GmbH, Germany
Juliane PODSCHADLY, Schering AG, Germany
Alain POMPIDOU, European Patent Office, Germany
Clelia POP-MOTOGNA, SC Constantin Ghita Office SRL, Romania
Age RAUKEMA, ASML Netherlands BV, The Netherlands
Helene RAYBAUD, Etudes et Productions Schlumberger, France
Emanuela REALE, CERIS – CNR, Italy
Bettina REICHL, European Patent Office, Germany
Beate REIHER, AIF "Otto von Guericke", Germany
Markus REITZIG, Copenhagen Business School, Denmark
Felicita RIEDL, European Investment Fund, Luxembourg
Marja-Leena RINKINEVA, Ministry of Trade and Industry, Finland
M. Isabel RIVERA VARGAS, University of Guadalajara, Mexico
André ROLAND, ANDRE ROLAND SA, Switzerland
Hubert ROTHE, Deutsches Patent- und Markenamt, Germany
Christophe ROY, European Patent Office, Germany
Ferdinand RUDOLF, European Patent Office, Austria
Heinrich RUHMANN, Framatome ANP GmbH, Germany
Müfit SABO, State Secretariate for Education and Research, Switzerland
Christina SAMPOGNA, Organisation for Economic Co-operation and Development, France
Yolanda SANCHEZ GARCIA, European Patent Office, Austria
Xavier SANCHEZ-VALLVE, Universitat Autònoma de Barcelona, Spain
Jon SANTAMAURO, US Trade Representative's Office, Switzerland

Tiziana SANTOLI , Selenia Communications, Italy
Elefthérios SAPSALIS, Solvay Business School, Belgium
Yuka SAWADA, NEC Corporation, Japan
Jurgen SCHADE, German Patent and Trademark Office, Germany
Christian SCHAMPER, Fraunhofer Gesellschaft, Germany
Ruben SCHELLINGERHOUT, European Commission DG Enterprise and Industry, Belgium
Rezzo SCHLAUCH, German Federal Ministry of Economics and Labour, Germany
Herwig SCHLÖGL, Organisation for Economic Co-operation and Development, France
Jens SCHMIDT-EHMKE, German Institute for Economic Research, Germany
Cédric SCHNEIDER, Centre for Economic and Business Research, Denmark
K. Peter SCHNEIDER, Patent Attorney, Germany
Christoph SCHOLTEN, German Delegation at the OECD, France
Uwe SCHRIEK, Siemens, Germany
Norbert SCHULTES, German Federal Ministry of Economics and Labour, Germany
Markus SCHWEMMLE, Winter, Brandl et al., Germany
David SECHER, University of Cambridge, United Kingdom
Thomas SEUSS, Schering AG, Germany
Jerry SHEEHAN, Organisation for Economic Co-operation and Development, France
Richard SIMMONS, European Association of Craft, Small and Medium-sized Enterprises, Belgium
Joanna SLOWIK, Alstom Switzerland, Switzerland
Henk SLUITER, Technoconsult, The Netherlands
Agnieszka SNIEZKO, WTS Witek Czernicki Sniezko Patent Attorneys, Poland
Roberto SOMMA, Alenia Spazio, Italy
Claudia SPANG, BASF AG, Germany
Kristin SPECK, INPI, France
Serafim STASINOS, Industrial Property Organisation, Greece
Josef STEFFENS, VDI Technology Center, Germany
Phil B. STERN, Yet2.com, United States
Elena STOICA, State Office for Inventions and Trademarks, Romania
Koichi SUMIKURA, National Graduate Institute for Policy Studies, Japan
Evgeniya TABOVA, Bulgarian Patent Office, Bulgaria
Kumiko TAKAHASHI, Kyorin Europe GmbH, Germany
Nobuo TANAKA, Organisation for Economic Co-operation and Development, France
Yijian TANG, Novald, Germany
Norbert TAUBKEN, Campaign for Creativity, Germany
Nikolaus THUMM, Swiss Federal Institute of Intellectual Property, Switzerland
Thomas TIEFEL, Fachhochschule Amberg-Weiden, Germany
Frank TIETZE, Hamburg University of Technology, Germany
Alberto TROMBETTA, Finlombarda Gestioni SGR SpA, Italy
Martin TURNOVSKÝ, Ministry of Industry and Trade, Czech Republic
Keiji USHIJIMA, NEC Corporation, Japan
Paul WHM VAESSEN, Forschungszentrum Jülich GmbH, Germany
Jan-Frens VAN GIESSEL, Technopolis, Netherlands
Nicolas VAN ZEEBROECK, Solvay Business School, Belgium
Johannes VELLING, Federal Ministry of Economics and Labour, Germany
Diego VERGANI, Du Pont de Nemours International SA, Switzerland
Isabel VERLINDEN, PriceWaterhouseCoopers, Belgium
Patrick VOCK, CEST, Switzerland
Günter VOIGT, Patent Attorneys Dr Schulze & Voigt, Germany
Heino VON MEYER, Organisation for Economic Co-operation and Development, Germany
Guido VON SCHEFFER, IP Bewertungs AG, Germany

Paul-Alexander WACKER, Kuhnen & Wacker, Germany
Henrike WEIDEN, Bundesverband der Deutschen Industrie eV, Germany
Bruno WEIL, WEIL & ASSOCIES, France
Ulrich WEINGARTEN, BASF AG, Germany
Gerd WEKING, HARTING KGaA, Germany
Alain WERNER, TOTAL FRANCE, France
Joff WILD, Intellectual Asset Management Magazine, United Kingdom
Konrad T. WINTER, Winter, Brandl & Partners, Germany
Alexander WURZER, Steinbeis Transfer Institute, Germany
Kiyoshi YONETSU, Japan Patent Office, Japan
Tuija YPYÄ, Ministry of Trade and Industry, Finland
Lars ZANZIG, ipal GmbH, Germany
Stefanie ZENK, IPR Helpdesk, Spain
Martin ZIEGER KPMG, Germany
Jean-Michel ZILLIOX, European Patent Office, Germany
Volker ZIMMERMANN, KfW Bankengruppe, Germany
Ronald ZINK, Microsoft EMEA, France
Carsten ZINKAN, Federal Ministry of Finance, Germany
Heinz ZOUREK, European Commission DG Enterprise, Belgium
Thomas ZULEGER, German Federal Ministry of Economics and Labour, Germany

For more information please contact:

*Organisation for Economic Co-operation and Development
Science and Technology Policy Division
Directorate for Science, Technology and Industry
2, rue André-Pascal
F-75775 Paris Cedex 16
France*

Tel: + 33 1 45 24 82 00

Fax: +33 1 44 30 62 64

E-mail: IPR.contact@oecd.org