

## **BUSINESS PERFORMANCE AND INTELLECTUAL ASSETS: BACKGROUND AND ISSUES<sup>1</sup>**

### **Introduction**

1. As innovation increasingly drives economic growth, investments in knowledge become the foundation of sustainable knowledge-based economies across the OECD. Intellectual assets such as patents, trade secrets, human capital, and organizational structures are widely considered important contributors to business performance and economic growth – perhaps more-so than tangible assets such as real estate and plant and equipment. This has resulted from several factors, including the expansion of the service sector, stronger competition resulting from globalisation and deregulation, and the emergence of new information technologies. These forces have forced firms to change from traditional scale-based manufacturing, which mainly relies on tangible assets, to new business models largely relying on intellectual assets and characterised by increasing vertical disintegration, in which activities that are not important for competitiveness are outsourced, and constant pressure to innovate. In this environment, intellectual assets play a central role in business management and policy making.

2. Despite their importance, intellectual assets remain outside mainstream discussion in business, economic and policy circles. They tend to be inadequately measured, are rarely reported in financial statements, and with the possible exception of patents are limited in the degree to which they are commercially exchanged, due in part to the lack of widely accepted measurement and valuation methods. While a number of efforts have been made to enhance the availability of information regarding intellectual assets there do not exist widely accepted methods for defining, measuring and reporting them. Improving the quality of information available on intellectual assets is expected to contribute to the decision making process of corporate managers, investors and policy makers. Investors need information on financial and intellectual assets and on the operating performance of firms to project their profits and cash flow. Corporate financial statements are also a major source of information for national accounts and policy deliberations, so improper information on the value of intellectual assets may impede the optimum implementation of public policies, such as R&D tax incentives.

3. This paper provides background information on intellectual assets and identifies some possible issues for discussion among the participants of the OECD Forum on “Business Performance and Intellectual Assets” to be held on 6 October 2004 in Paris. It reviews various definitions and classifications of intellectual assets and examines the relationship between different types of intellectual assets and economic performance, including R&D and patents, human capital and organizational capital. Particular attention is devoted to issues related to measuring and reporting intellectual assets, including accounting standards and disclosure rules. Some examples of firm-level efforts to improve the measurement and management of intellectual assets are also reviewed. To conclude, the paper discusses recent policy efforts to improve measurement, reporting and exploitation of intellectual assets, identifying areas for further discussion.

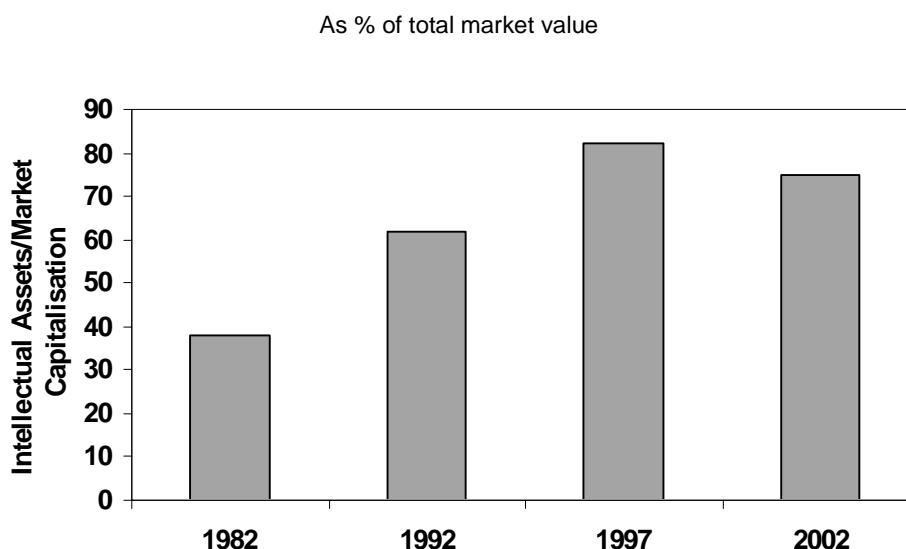
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## Intellectual assets and economic performance

4. Interest in measuring and reporting intellectual assets derives from their growing contribution to business performance and, ultimately economic performance. One widely used measure of their contribution relies on comparisons of the market value of firms to the book value of their tangible (net book value of assets less liabilities) and intangible assets. By one estimate, intellectual assets accounted for about 70 percent of firm's market value in 2002, up from about 40% in 1982 (Kaplan and Norton 2004) (Figure 1). According to another estimate, the average price-to-book ratio (the ratio of the capital market value of companies to the net assets stated on balance sheets) of S&P 500 firms increased from about 1 in the early 1980s to about 6 in 2001 (Lev, 2001). This means that in 2001 the capital market valued S&P 500 firms at six times the value reflected in their balance sheets. Such estimates are highly contingent on stock market valuations, which are themselves highly volatile. Indeed, Kaplan and Norton's estimate of the share of market value attributed to intellectual assets declined from 80% in 1997 to 70% in 2002 as the US stock markets cooled off and economic growth slowed. Nevertheless, they remained significantly higher than during the 1980s.

**Figure 1. Estimated contribution of intellectual assets to market value of firms**



Source: Kaplan and Norton, 2004.

5. A first step in measuring intellectual assets is to better define them. To date, the terms “intellectual assets”, “intangibles”, “knowledge assets”, and “intellectual capital” have been used somewhat interchangeably to refer to loosely defined or closely related sets of non-tangible factors that contribute to business performance.<sup>2</sup> Precise definitions remain elusive due to the fact that the elements regarded as intellectual assets depend on the purpose and application, be it business accounting, measurement of national income, developing and managing intangibles in business (Blair and Wallman, 2001). Nevertheless, most of the definitions available seem to agree that intellectual assets have three characteristics. They are: 1) sources of probable future economic profits; 2) lacking physical substance;

<sup>2</sup> According to Lev (2001), the following three terms have the same meaning; “intangibles” which is mostly found in the accounting literature, “knowledge assets” mainly used by economists and “intellectual capital” which can be found in the management and legal literature.

and 3) controlled by a firm as a result of previous events or transactions (self-production, purchase or any other means of acquisition) (Cañibano *et al.*, 1999). A number of examples include the following:

- “*long term outlays by firms aimed at increasing future performance by means other than the purchase of fixed assets.*” (OECD, 1992).
- “*non-physical factors that contribute to or are used in producing goods or providing services, or that are expected to generate future productive benefits for the individuals or firms that control the use of those factors.*” (Blair and Wallman, 2001).
- “*non-physical sources of probable future economic benefits to an entity or alternatively all the elements of a business enterprise that exist in addition to monetary and tangible assets*”. In addition, they must “*have been acquired in an exchange or developed internally from identifiable costs, have a finite life, have market value apart from the entity, and are owned or controlled by the entity.*” (Intangibles Research Center at New York University).
- “*non-physical sources of future economic benefits.*” (Abernethy and Wyatt, 2003a).

6. A number of different classifications of intellectual assets have been advanced. One classification scheme developed in the context of an OECD project on technology and economic performance in 1988 distinguishes between intangible investments in technology, such as R&D, patents and licenses, and enabling intangible investments, including worker training, information structure and organisational structure (OECD, 1992). Another approach developed by the European Union’s MERITUM project<sup>3</sup> differentiates among three different types of intellectual capital: 1) human capital, defined as the knowledge that employees take with them when they leave the firm (*e.g.*, knowledge, skills, experiences and abilities); 2) structural capital, defined as knowledge that stays within the firm at the end of the working day (*e.g.*, organizational routines, procedures, systems, cultures and databases); and 3) relational capital, defined as the knowledge that all resources linked to the external relationships of the firm, with customers, suppliers or R&D partners comprising part of the human and structural capital involved with the company’s relations with stakeholders, plus the perceptions that they hold about the company (MERITUM, 2002). Common elements of many of these classifications tend to be knowledge assets (such as those resulting from investments in R&D and often codified in patents), human capital, and organisational capital

7. A number of empirical studies have tried to show the relationship between investments in specific intellectual assets and improved business and economic performance. Many of them examine performance indicators such as profits, productivity and sales, in addition to stock market valuation. While less volatile than stock market valuations, profits, productivity and sales indicators suffer from time lags between the investment and its realization, which makes difficult to assess the contribution of increasing investment in intellectual assets using these indicators. The difficulty of finding data on intellectual assets differs across types of assets, and although until recently most studies on the economic impact of intellectual assets have focused on R&D expenditure due to lack of data availability on other assets, some research is also available related to other assets. The following sections present some results regarding the contribution of R&D, patents, human and organisational capital to the performance of firms.

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<sup>3</sup> The European Union project on Measuring Intangibles to Understand and Improve Innovation Management (MERITUM) was funded within the framework of the Targeted Socio-Economic Research (TSER) programme between 1998 and 2001.

### ***Technology-related assets***

8. Efforts to examine the effect of technological capital tend to focus on returns to R&D investments at the firm, industry and economy levels. As noted by Lev (2001, p.54): “*Much of the research in the field of intangibles deals with R&D, which is just one – albeit important – form of intangibles. The reason for the R&D focus of researchers is simple: R&D is the only intangible asset that is reported separately (a line item) in corporate financial statements*”. Recent work showing significant economic returns to R&D includes the following:

- Studies surveyed by Griliches (1995) show high rates of return to R&D investment at the private and the social level. At the firm level, the rate of return to R&D was estimated to be almost double that of tangible investment. Investments in basic research were found to have three times the effect of other R&D investments on firm-level productivity growth. Returns to business financed R&D were also found to be higher than those from government financed R&D that was performed in industry.
- A review of studies conducted between 1981 and 1998 on the relationship between market value and R&D in U.S. manufacturing firms showed that R&D expenditure is reflected in market value at a level of 2.5 to 8 times the investment. Measures of the stock of R&D are valued between 0.5 to 2 times the value of ordinary assets (Hall, 1999). Interestingly, the market valuations of both R&D spending and R&D stocks appeared to decline steeply in the 1980s in the United States (Hall 1993), although there was some evidence of a pick-up in the mid 1990s.
- At the industry level, an analysis undertaken by Lev for a sample of about 80 chemical firms between 1980 and 1999 revealed that an additional dollar invested in chemical R&D leads on average to a two-dollar increase in current and future operating income, controlling for other factors such as physical assets and brand. This figure corresponds to a 17% after-tax return, which is significantly above the cost of capital to chemical companies (Lev, 2001).

9. Such studies have been complemented by analyses of the returns to patents, which are used as a measure of technological output. Patents can have a direct impact on firms’ economic performance when firms develop the patented invention internally, use patents to attract venture capital, or license or sell them to third parties in exchange for royalties or to freedom of action (*e.g.*, to reduce risks of infringement via cross-licensing agreements). Because the potential value of patented inventions can vary significantly, simple patent counts are a limited proxy of the technological capacity and market value of firms<sup>4</sup>. Hall et al. (2000) employ citation-weighted patent stocks to build indicator of patent quality and show that highly cited patents are highly valued by markets. Firms with very highly cited patents (more than 20 cites per patent) showed a 50 % increase in value relative to firms with the same R&D and patent stocks, but with the median citation intensity. Some research suggests that disclosure of licensing revenue has some positive effects on investors (Gu and Lev, 2001).

### ***Human capital***

10. Investments in human capital also seem to add to firm value. Lev (2001) attributes the large increases in the market value of firms between the 1980s and the 1990s to the increasing role of human and organisational capital for value creation at firms. Attempt to measure the returns to investments in human capital have tended to examine training expenditures. Employers invest in training and education of their employees with an eye toward improving their quality (*e.g.*, skills, productivity) and subsequently firm profitability.

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<sup>4</sup> According to Lanjouw (1993), at most 16 percent of total value accrues to the bottom 50 percent patents.

- Black and Lynch (1996) found that a 10% increase in average educational level of workers in firms (approximately one additional year of schooling) lead to about a 9 percent productivity increase in manufacturing firms and a 13% increase in non-manufacturing firms. Especially in manufacturing sectors, more time spent in formal off-the-job training leads to higher productivity. In non-manufacturing the content of the training program (in particular, computer-skills development), has a significant effect on productivity.
- Research in Australia by Smith (2001) showed returns from training investments that were almost always positive, varying between 30 percent and 7000 percent. Returns were realized not only in productivity or profitability increases but also as higher levels of value added activity, greater flexibility among employees, reduced overhead costs and greater ability to innovate – concepts that are difficult to measure quantitatively. Returns were higher when training was highly focused on a specific business problem (e.g., reducing high levels of staff turnover) or related to innovation and technological change.

### ***Organisational Capital***

11. Returns to investments in organisational capital are perhaps the most challenging estimate, due in part to difficulties in defining and measuring them. Evenson and Westphal (1995) define organisational capital as “*the knowledge used to combine human skills and physical capital into systems for producing and delivering want-satisfying products.*” A review by Lev and Radhakrishnan (2003) identified two main ways of defining of organisational capital: 1) as embodied in employees and included in the human capital of the firm’s employees; and 2) embodied in the organisation itself. Examples of the latter include Wal-Mart’s supply chain, Cisco’s Internet-based product installation and maintenance system and Dell’s build-to-order distribution system. Such organisational capital contributes to the output, R&D productivity and employee productivity for non-R&D firms.

12. Sadowski and Ludewig (2003) follow the second definition outlined by Lev and Radhakrishnan (2003) and estimate the economic impact of firm-specific organisational capital in German firms, controlling for the effect of other types of capital, such as social capital and human capital. They find that the value created from specific organisational capital is quite high and emphasise the importance of organisational capital. They indicate that underestimating organisational capital may negatively affect not only the success of firms but also the welfare of society as a whole.

13. In many firms, changes in organisational structure and work processes are facilitated by (or motivated by) investments in information and communications technology (ICT). Recent research shows the economic returns to such investments. In analyzing about 1,200 firms from 1987 to 1997, Brynjolfsson et al. (2002) found that:

- Each dollar of investment in computers resulted in more than ten dollars of market value, whereas a one-dollar investment in tangible good yielded 1.5 dollars of market value and investments in other assets, such as accounts receivable and inventories, yielded only one dollar market value;
- ICT-intensive firms are likely to adopt working practices that involve a specific cluster of organisational characteristics, including greater use of teamwork, broader distribution of decision rights and increased training;
- Firms which adopt these organisational characteristics and have larger stock of computer-related capital are highly valued by markets; Firms with not only higher level of computerization but also high level of these organisational characteristics have higher output.

14. OECD work on drivers of economic growth has also shown a strong association between ICT use and implementation of new work practices (OECD, 2001). For example, 62% of firms that implement new work practices in Finland use computers. Labour productivity gains tend to be higher when new work practices are implemented together with ICT use. For example, in the United States labour productivity of industries with high ICT intensity and high incidence of new work practices are about 5 times higher than that of industries with low ICT intensity and high incidence of new work practices (Arnal *et al.*, 2001). On the other hand, some studies find little effect of work practices on organisational performance. For example, Cappelli and Neumark (1999) report that while high performance work practices raise the productivity of firms, which is consistent with earlier studies, such practices also lead to higher labour costs per employee. Therefore, they conclude that there is no apparent positive effect in the net result.

***Suggested issues for discussion:***

- Are there important distinctions between “intellectual assets” and “intangible assets” that should be taken into account in future work on value creation?
- What are the main types of intellectual assets that should be considered in future analysis – knowledge assets (*e.g.*, R&D and patents), human capital and organisational capital?
- Do available definitions and classifications of intellectual assets reflect current business practices?
- Is there sufficient evidence of the contribution of intellectual assets to business performance and economic growth? In which areas would further analysis be most productive in establishing the links?

**Measurement and management of intellectual assets**

Providing appropriate financial and non-financial information to investors is important for better decision-making. Investors need historical financial information, but also information on intellectual assets (*e.g.* patents, skilled employees and customer lists), operating performance measures (*e.g.* customer acquisition costs, number of customers, market share and time to market) and forward-looking information to project future profits and cash-flow (SECITF, 2001). This information may also help managers in internal decision-making. Although some commercial transactions of intellectual assets occur, notably for patents and patent licenses, markets are not still fully developed, which makes it difficult to include them in financial statements.

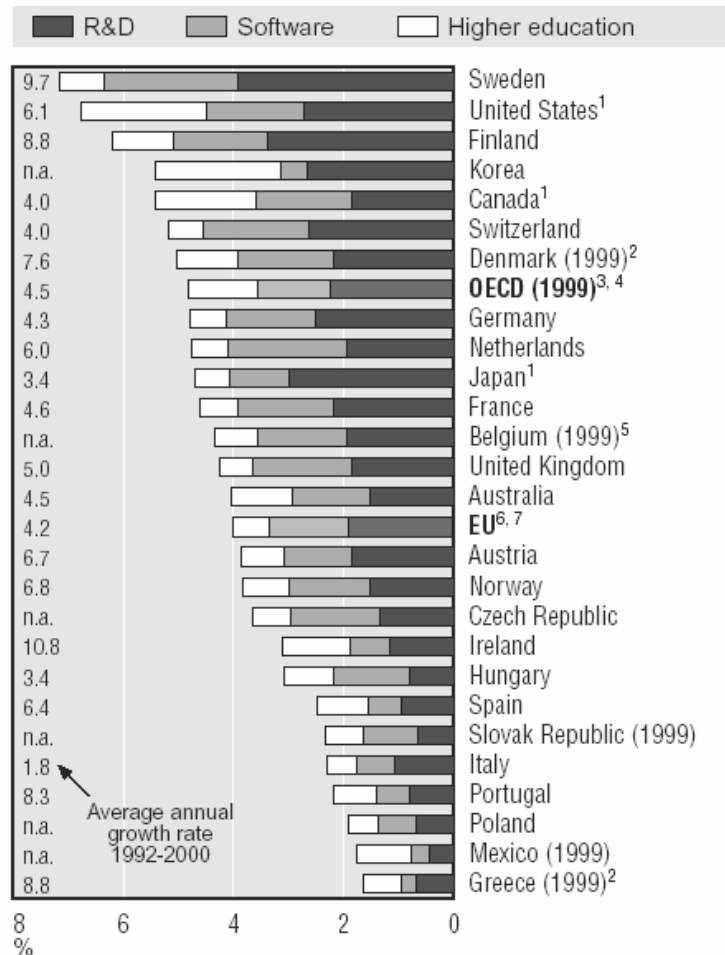
***National investments in intellectual assets***

15. At the country level, investment in R&D expenditure, software and higher education have been used by the OECD as proxies of investment in knowledge or intellectual assets.<sup>5</sup> In 2000, such investments ranged from approximately 3% to 7% of GDP in most OECD countries (Figure 2). Although investments in knowledge remain below those in machinery and equipment in OECD countries as a percentage of GDP, annual growth rates between 1992 and 2000 exceeded that of gross fixed capital formation, with the exception of United States, Australia and Canada. This resulted in 4.5% average annual growth rate for investment in knowledge in OECD countries, which is 0.5 percent points higher than that of gross fixed capital formation. Software investment seems to be the largest source for this increase in knowledge investment (OECD, 2003).

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<sup>5</sup> A more complete picture of investment in knowledge would include parts of expenditure on innovation, job-related training programs, and investment in organization. Due to lack of data availability, these data are not included.

**Figure 2. Investment in knowledge as a share of GDP (2000)**

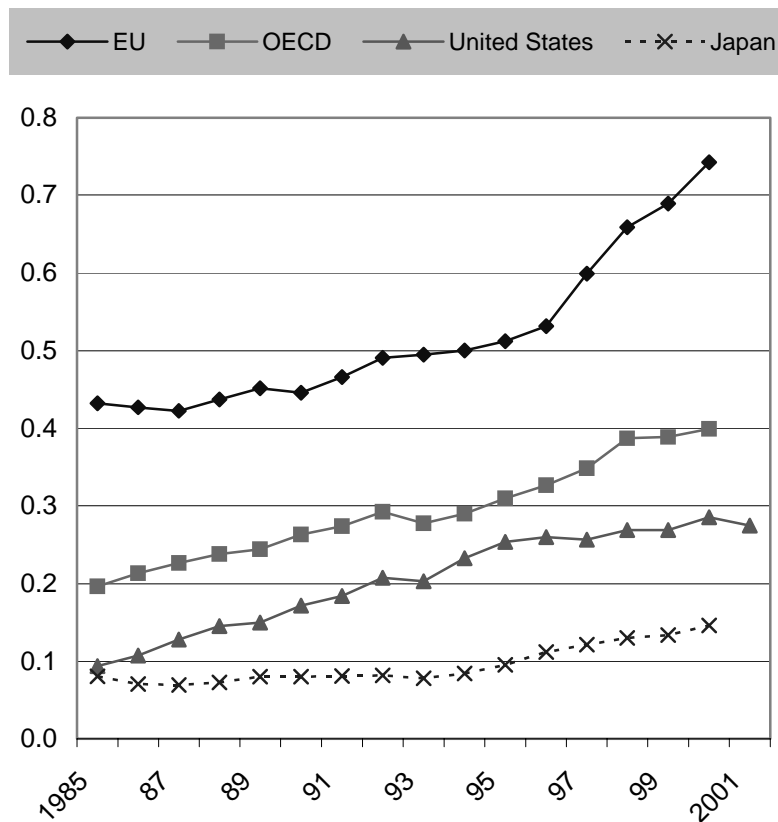


1. Post-secondary non-tertiary education is included in data for higher education
2. Average annual growth rate refers to 1992-1999
3. Excludes Hungary, Poland and the Slovak Republic
4. Average annual growth rate refers to 1992-1999 and excludes Belgium, the Czech Republic, Hungary, Korea, Mexico, Poland and the Slovak Republic.
5. Data for higher education only include direct public expenditure.
6. Excludes Belgium, Denmark and Greece.
7. Average annual growth rate refers to 1992-99 and excludes Belgium

Source: OECD 2003 Science, Technology and Industry Scoreboard.

16. Additional insight into intellectual assets can be gleaned from data on international technology balance of payments data. Such statistics measure international technology transfers related to licenses, patents, research and technical assistance, but detailed breakouts of these elements are generally not available. Nevertheless, existing data indicate that the average of technological payments and receipts has increased rapidly across the OECD, from 0.2% of GDP in 1985 to 0.4% of GDP in 2000 (Figure 3).

Figure 3. Trends in technology flows as a percentage of GDP



Source: OECD (2003).

### Accounting standards and disclosure

17. At the firm level, the ability to disclose information about intellectual assets is governed largely by accounting standards. Current accounting standards in most countries do not fully capture intangible assets, however. In the United States, for instance, according to the Financial Accounting Standards Board (FASB) “*financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions*”<sup>6</sup>. In order to be reported as an asset in financial statements, an item is required to meet several criteria according to FASB rules. First, it must meet the definition of an asset and offer “*probable future economic benefits obtained or controlled by a particular entity as a result of past transaction or events*”.<sup>7</sup> In addition, it must satisfy three criteria:

1. “*Measurability. It has a relevant attribute measurable with sufficient reliability.*”;
2. “*Relevance. The information about it is capable of making a difference in user decisions.*”;

<sup>6</sup> FASB(1978), Paragraph 34, SFAC No.1, Objectives of Financial Reporting by Business Enterprises

<sup>7</sup> FASB(1985), Paragraph 25, SFAC No.6, Elements of Financial Statements

3. “Reliability. The information is representationally faithful, verifiable, and neutral.”(FASB, 1984).

18. In other words, an item lacking reasonably reliable measurement can not be recorded as an asset in a financial statement which leaves out most of intangible assets.<sup>8</sup> Firms would be required to demonstrate the contribution of their intellectual assets to business performance and business value (*i.e.*, relevance) before they can include them in their financial statements. They would also have to determine what types of indicators can be used to provide reliable information to investors. For example, patent numbers are easily measurable, but are simple patent counts a reliable and relevant measure of technological capability? Or should patents be weighted by their citation ratios? Or should efforts be made to attribute a financial value to a firms’ patent portfolio?

19. Despite these problems, some firms already include some information in their financial statements relating to their intellectual assets. According to a recent report by FASB, “Insights into Enhancing Voluntary Disclosures”, pharmaceutical firms disclose more their R&D activities than firms in other industries because they attribute more importance to R&D as a measure of their performance and the need to provide such information to investors (FASB, 2001). FASB launched the project “Disclosures about Intangible Assets” in 2002 aiming to establish standards for improving disclosure of information about intangible assets such as brand names, customer lists, licensing agreements and patented technology. However, the project was removed from FASB’s research agenda in January 2004.

20. Lev and Zarowin (1999) point out that the utility of financial information for investors has decreased in the past 20 years, a period characterised by large business changes, and make two proposals to improve the usefulness of financial statements. First, they propose to extend capitalization to all intangible investments after uncertainty about future benefits is reduced to a certain extent, such as the establishment of technological feasibility. This is similar to the treatment of software mentioned above, but different in that capitalization is not only done after establishment of technological feasibility (software case) but also extended to pre-establishment of feasibility. Second, it is a systematic restatement of past financial reports to accommodate changes such as reorganisation of firms, when such changes materialize.

### ***New approaches to measurement and reporting***

21. To improve the availability of information about intellectual assets, various approaches including guidelines and methodologies for measurement and reporting intellectual assets have been proposed.<sup>9</sup> Some of them are already used as tools for internal decision-making and external communication tools, however these voluntary disclosures vary in quality and uniformity and their effectiveness as intellectual assets report/accounts is still unclear (Abernethy and Wyatt, 2003a ; PRISM, 2003). Two examples developed by Skandia (1998) and Lev (2001) respectively are described in what follows.

- *Skandia Value Scheme*. The Swedish company Skandia began work on intellectual capital management in the early 1990s and published its first intellectual capital report as a supplement to its 1994 annual report. Since then, Skandia published annual and interim supplement which contains intellectual capital indicators until 1998. From the view of Skandia Value Scheme, market value is created by traditional financial capital and intellectual capital. Intellectual capital consists of human capital and structural capital. The latter consists of customer capital and organisational capital. Organisational capital is broken down into three components, namely process capital Culture and Innovation Capital. The so-called “Skandia Navigator” provides

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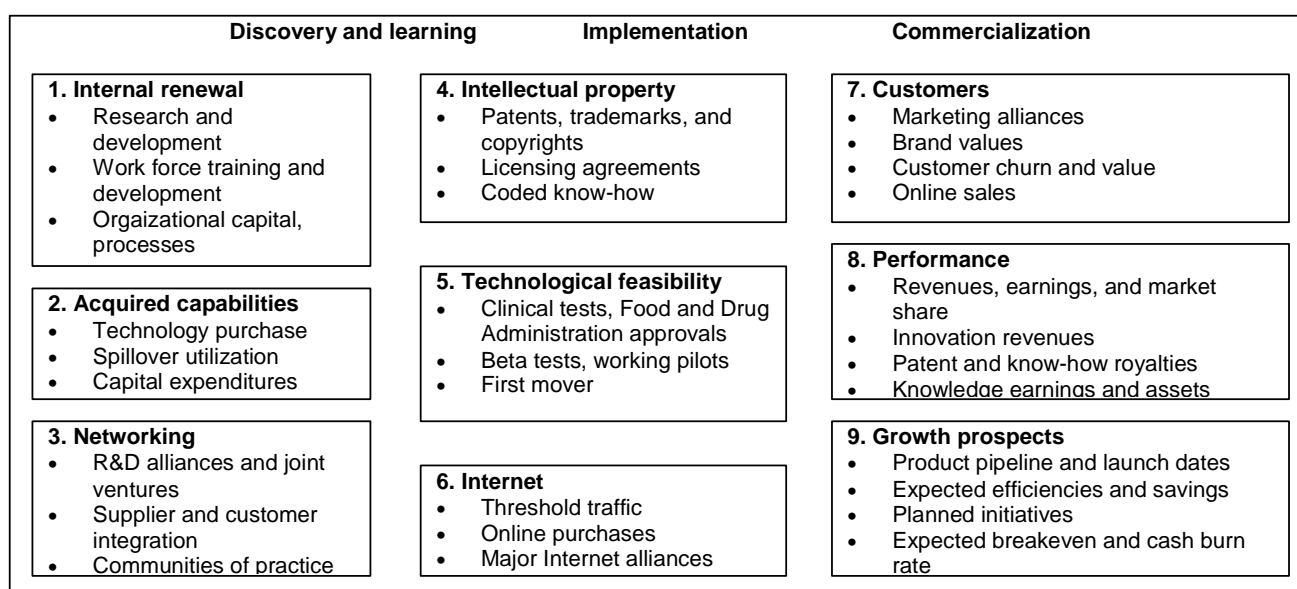
<sup>8</sup> For other accounting standards, see Abernethy and Wyatt (2003b)

<sup>9</sup> As regards guidelines, please see Danish IC guideline (MSTI, 2003), MERITUM project guideline (MERITUM, 2002), Nordika project report (<http://www.icframe.net/>), and the Japanese IP disclosure guideline (METI, 2004), etc

information about intellectual capital such as number of contracts, training expenses per employee, number of contracts per employee of its group firms (Skandia, 1998).

- *Lev's Value Chain Scoreboard.* The objective of the scoreboard proposed by Baruch Lev is to provide primarily individual investors and partners networked to the firm with the information at the level of professional investors and managers, whereby capital markets is expected to be more competitive and monitoring ability of investors on managers to be improved. The scoreboard consists of three stages, discovery and learning, implementation and commercialization. Each stage consists of three information boxes, especially focusing on innovation (Figure 4). To maximize the usefulness of the scoreboard, three criteria are required. The indicators should be; 1) quantitative such as employee work practice and patent cross-licensing; 2) standardized to make indicators comparable across firms; and 3) confirmed by empirical evidence as relevant to users such as stock returns and productivity improvement. According to Lev (2001), the scoreboard can be used for both internal decision making and communication tool with the difference of the level of details of information required for each purpose.

**Figure 4. The Value Chain Scoreboard**



Source: Lev, 2001.

### ***Recent policy initiatives of measuring and reporting***

22. At the policy level, several attempts have also been made to improve measurement, management and reporting of intellectual assets. OECD activities on intellectual assets were initiated under the aegis of the OECD Industry Committee in 1987. Work developed at that stage showed that investments in intellectual assets had grown more rapidly than Gross Fixed Capital Formation over the period 1974 to 1984, where four components of investments in intellectual assets were considered, namely, R&D, software, training and marketing. Some years later, in 1999, the OECD held an international symposium on "Intellectual Capital, Measuring and Reporting Intellectual Capital: Experience, Issues, and Prospects" in Amsterdam in co-operation with the Netherlands Ministry of Economic Affairs and Ministry of Education,

Culture and Science, and the Nordic Industrial Fund.<sup>10</sup> The chair's conclusions included the following (1) need for better information on intellectual capital, its relation to tangible capital and its role in value creation (2) need for experimentation which lead to general principals or guidelines for reporting intellectual capital and should be evaluated.

23. In the United States, Securities and Exchange Commission-inspired task force published a report in 2001 on "Strengthening Financial Markets: Do Investors Have the Information They Need?" (SECITF, 2001). On the basis of their belief that information about intellectual assets is very important for investors and more regulation would not contribute to enhance the disclosure of information about intellectual assets, the task force made two recommendations to improve supplemental disclosures.

- SEC's initiatives to pull together the efforts on improving reporting and facilitate the creation of a framework for the voluntary supplemental reporting of intellectual assets, operating performance measures and forward looking information.
- Government initiatives to create environment that encourages firms to disclose more information speculative in nature by taking measures to reduce risks of litigation associated with such disclosure.

24. Within the European Union, a number of initiatives have been taken to improve measurement and disclosure of information related to intellectual assets. The European Commission's MERITUM project, for example, was launched in 1998 with the objective to "*provide a consistent basis for the measurement and disclosure of information on intangibles, thus improving policy-making capabilities in the realm of science, technology and innovation*" (MERITUM, 2002). The project resulted in a set of guidelines that provide a model intellectual asset management system for identification of intellectual assets, measurement; and action. The guidelines also provide information on how to prepare intellectual asset reports. The proposed components of the intellectual assets report are: 1) a vision of the firm describing the key intellectual assets that enable the firm to accomplish its strategic objectives; 2) a summary of intellectual assets resources that the firm can control and of activities to enhance the value of intellectual assets; 3) a system of indicators related to human, structural and relational capital that enable readers to better estimate the firm's future performance (MERITUM,2002).

25. In 2001, the European Commission launched the PRISM project with three objectives: 1) advance the knowledge about the economics and measurement of intellectual assets; 2) propose policy recommendations to foster the growth of competitive, world class European economy; and 3) provide an infrastructure for disseminating the results of research (Holtham, 2003). In its report , policy implications which is intended to be taken up in the agenda of the Competitiveness Council include (PRISM, 2003):

- Build a better understanding of productive process of services and reform the measurement protocol for R&D investment in services.
- Examine the feasibility of a European version of EDGAR (US SEC) electronic information system.<sup>11</sup>
- Appointment of a high-level interdisciplinary taskforce by the EC to oversee and manage reform of macro indicators (System of National Accounts, SNA, and European equivalent, ESA), reform of the business accounting model extension of data collection on intellectual assets.

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<sup>10</sup> For detailed activities and related documents, see [http://www.oecd.org/document/15/0,2340,en\\_2649\\_34555\\_1943055\\_119808\\_1\\_1\\_1.00.html](http://www.oecd.org/document/15/0,2340,en_2649_34555_1943055_119808_1_1_1.00.html)

<sup>11</sup> see <http://www.sec.gov/edgar.shtml>

***Suggested issues for discussion:***

- How do firms define, measure and disclose their intellectual assets?
- How do investors, financial analysts and venture capitalist value intellectual assets within firms, and to what extent do their valuations of firms derive from valuations of intellectual assets?
- To what extent do voluntary disclosures of intellectual assets provide useful information to markets for valuing firms? Would more standardized forms of voluntary disclosure improve on the situation?
- What approaches are feasible and effective to enhance usefulness of financial information about intellectual assets?

**Business perspectives on valuation and exploitation of intellectual assets**

26. In recent years, many firms have adopted a more active approach to managing their intellectual assets as a means of enhancing business performance. Many of these efforts focus on more careful valuation and exploitation of their intellectual property, in particular patent portfolios, to enhance their value to the firm. This implies not only exploiting their patents internally (*i.e.*, commercialising inventions in the form of new or improved products or services), but also licensing patents to generate revenue or improve market conditions, and abandoning or donating patents that cannot otherwise generate value to the firm, but entail maintenance costs.

27. Interest in better patent portfolio management reflects the growing recognition that existing patents are systematically under-utilized. While the number of patent applications submitted to major patent offices (*e.g.*, European Patent Office, Japan Patent Office and US Patent and Trademark Office) increased by more than 40% between 1992 and 2002 (OECD, 2004), few of these patents are actually exploited by their owners. In a survey carried out by BTG Corp. of 150 technology-intensive firms and research universities in Europe, Japan and the United States, only 15% of respondents indicated that they had no unused patents in their portfolios. Almost one-quarter reported that they had more than 100 unutilized patents, and 12% had more than 1,000 unutilized patents. Among Japanese respondents, a full 30% reported that they had more than 2,000 unused patents in their portfolios (Arora et al., 2001). Another large-scale survey by JPO yielded similar results: 30% of patents were exploited internally, less than 10% were licensed out to other parties, and more than 60% were not used at all (JPO, 2004).<sup>12</sup>

28. Interest is further motivated by changes in business innovation processes that provide greater opportunities for – and greater need for – exploitation of patents and other IPR. The growing technological complexity of products, processes and services, the increased technological opportunities created by scientific and technological advances and growing competition have conspired to make innovation more collaborative. Firms focus a larger share of their innovative activity in areas of particular competence and rely on other firms and public research organisation for complementary technologies. Hence, demand for patent licenses has increased at the same time as a growing number of new technology-based firms are joining larger firms in seeking outlets for technologies that they themselves cannot single-handedly bring to market. In a recent survey of firms in OECD countries, approximately 60% of respondents indicated that they had experienced an increase in both inward and outward patent licensing over the past decade, and more than 70% expected inward licensing to increase further in the next 5 years (Sheehan et al., 2004).

29. This phenomenon is highly evident in the pharmaceutical sector where small biotechnology firms with successful technology have become important partners of large pharmaceutical firms, many of which maintain their own in-house R&D capability. Between 1995 to 1998, the ten largest pharmaceutical firms in the United States agreed to more than 200 inward licensing agreements (Rogers, 1999), and by one

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<sup>12</sup> Data are estimated based on responses from a sample of firms.

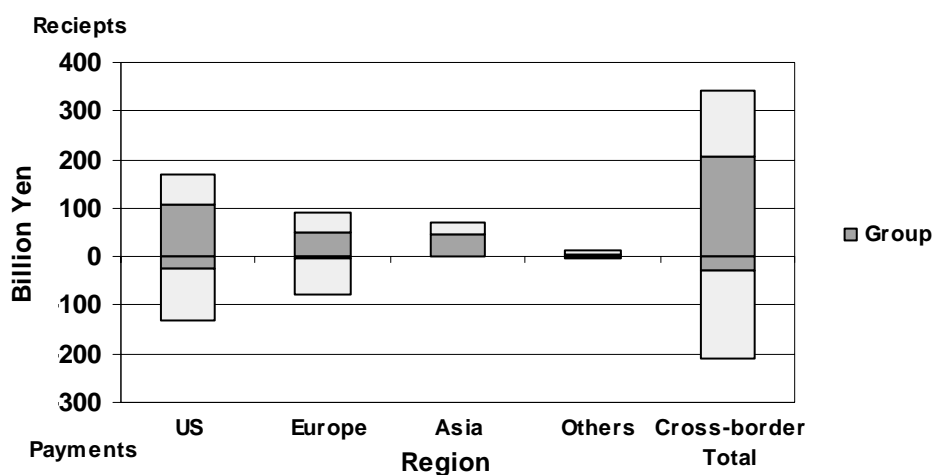
estimate, 30% of the revenues of large pharmaceutical firms in 2001 came from drugs they had licensed from other firms (Kalamas *et al.*, 2002).

### Patent licensing revenues

30. Firms that more actively manage their patent portfolios have begun to see sizeable economic returns. For example, by introducing an intellectual asset management programme, Dow Chemical increased its intellectual property licensing revenue from USD 25 million to USD 125 million and saved 50 million in intellectual property cost alone.<sup>13</sup> IBM Corp., which started more actively managing its IPR in the late 1990s averaged more than 3000 US patent grants a year between 2000 and 2003 and reported income from licensing royalties and sales of IPR of USD 1.4 billion in 2000, USD 1.2 billion in 2001, USD 0.86 billion dollars in 2002 and USD 0.9 billion dollars in 2003 (IBM, 2002:2003).

31. More comprehensive data on patent licensing and resulting royalties are not generally available. Most patent licensing is based on private contracts and confidential agreements, and accounting guidelines and corporate disclosure rule do not require firms to break out IPR-related revenues from other sources of income. Estimates are therefore based on firm-level surveys. In the United States, it has been estimated that patent licensing revenues rose from USD 15 billion in 1990 to more than USD 100 billion in 1998, and experts estimated that revenue could top half-trillion dollars annually by the middle of next decade (Rivette and Kline, 2000). In Japan, patent licensing revenue from foreign parties totalled JPY 340 billion in 2002, and Japanese firms spent approximately JPY 210 billion on foreign licenses, yielding a surplus of JPY 130 billion (Figure 5). If business transactions within affiliated firms are excluded, however, total revenue and expenditure become about 140 billion yen and 180 billion yen respectively, resulting in a deficit balance (JPO, 2004).

Figure 5. International balance of payments for patent licenses in Japan, 2002



Note: Data are estimated based on responses from a sample of firms.

Source: JPO, 2004

32. While revenue streams from outward licensing represent one benefit of stronger intellectual property management, firms seek additional benefits from patent licensing that have a more indirect effect

<sup>13</sup> see <http://www.ipambestpractices.com/Info/GordonP%20bio.pdf>

on their performance. In the ICT sector, for example, many products incorporate multiple technologies that are covered by numerous patents. The resulting thicket of densely overlapping patents means that unintentional patent infringement is sometimes unavoidable (Shapiro, 2001). Many firms therefore use mechanisms, such as cross-licensing and patent pools to avoid such conflicts and enhance diffusion:

- *Cross-licensing* can be used to secure freedom of operation without running a risk of patent infringement litigation with other firms operating in similar product markets. Although the primary purpose of cross-licensing is to secure freedom of operation, royalty payments may also flow from the owner of a weaker patent portfolio to the owner of the stronger patent portfolio (Grindley and Teece, 1997). In Japan, cross-licensing is frequently used more often in electronics industries than chemicals and pharmaceuticals (JPO, 2004).<sup>14</sup>
- *Patent pools* create a one-stop shop for a set of patents needed to implement a particular technology. Although firms that contribute to a patent pool may receive lower royalty rates than if they licensed independently, the market for their technology may expand because the pool simplifies negotiations for both licensors and licensees. The pool may also create a standard that participants can benefit from.

### ***Encouraging greater use of patent management and licensing***

33. Governments can take a number of steps to facilitate firm-level efforts to extract greater value from their intellectual property via licensing. Stronger patent regimes appear to play a critical role in the development of patent licensing markets. By extending patent protection to new types of inventions (*e.g.*, genetic inventions) and strengthening enforcement of patent rights, governments can encourage firms to patent more of their inventions, which creates more opportunities for licensing. Stronger IPR regimes may also increase international transfers of technology. Branstetter et al. (2004) found that US increased technology transfers to affiliates in countries that had reformed and strengthened their IPR systems. Affiliates, in turn, increased their R&D expenditures. These tendencies are concentrated among affiliates of parents that patented widely in the United States; such affiliates experienced more than 20 percent increase both royalty payments and R&D expenditure.

34. Insight into other steps for governments to take can be gleaned from a recent survey of Japanese patent holders.

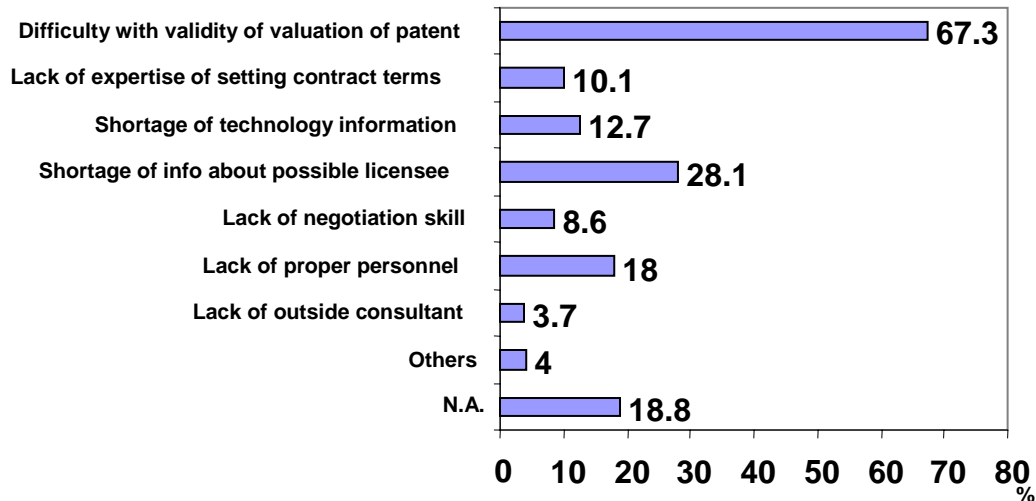
- *Matching buyers and sellers.* In a recent survey of Japanese patent holders, more than one-quarter of respondents indicated that lack of information about possible licensees was an impediment to licensing. Active markets do not exist for linking buyers and sellers. While there are numerous opportunities for private sector intermediaries to play this role, governments have also begun to play a role, especially as relates to links to public research organisations.
- *Valuation techniques.* Governments can also work with industry to develop and promulgate accepted approaches for valuing intellectual property and/or patent portfolios. More than two-thirds of the firms in the Japanese survey reported that difficulty valuing a patent impeded their licensing efforts (Figure 6). Currently, about 50% of Japanese patent holders report that they evaluate their patent portfolios. More than 70% of these respondents use internally developed tools for evaluation of their patent portfolios, but they anticipated greater use of an agreed-upon standard or outside valuation services (JIII, 2003).

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Cross-licensing accounts for about 90% of licensing in the Japanese electronics industry, versus less than 20% in chemicals, where inward and outward licensing is more common. These figures are based on a sample of firms that responded to a survey by the Japan Patent Office.

Figure 6. Issues for patent licensing



Source: (JIII, 2003)

***Suggested issues for discussion:***

- What are the main elements firms consider in their intellectual asset management programmes? How successful have such programmes been in enhancing value creation in firms?
- What approaches have proven successful for valuing patents and/or patent portfolios?
- What are the most serious issues to be resolved to improve patent license markets?
- Do the answers to the previous questions differ by sector and firm size? How?

**Policies to enhance exploitation of intellectual assets**

35. A number of governments have taken steps to promote value creation via intellectual assets. Such efforts take numerous forms. Some countries, like Denmark, Japan and the United Kingdom have developed guidelines for firms to assist them in disclosing information about their intellectual assets. Others have emphasised changes in their IPR systems or have taken steps to foster technology diffusion. Several examples are outlined below. Many of these programmes are new, and their impact has yet to be determined; nevertheless, preliminary experience to-date may provide valuable lessons that can be applied in a number of other countries.

36. In Denmark, the Ministry of Science, Technology and Innovation issued new guidelines in 2003 to assist firms in preparing Intellectual Capital Statements. The guidelines use a series of questions, checklists and examples to help firms systematically describe four types of knowledge resources: employees, customers, processes and technologies. The model statements discuss the role of intellectual assets in the firm's competitiveness (*e.g.*, what product or service the company provides, what makes a difference for the customer, etc.), management challenges (*e.g.*, which existing knowledge resources should be strengthened and what new knowledge is needed), a prioritized list of needed initiatives, and relevant indicators for each initiative (MSTI, 2003). The first guidelines were published in 2000 and tested

by about 100 companies. Lessons from this pilot study were used to formulate the revised guidelines published in 2003.

37. Japan has taken a series of steps to revitalize the Japanese economy through development and exploitation of IPR. They follow on the enactment of the Basic Law on Intellectual Property in 2002 and the release of a Strategic Program for the Creation, Protection and Exploitation of Intellectual Property in 2003 which includes more than 250 action items (IPPH, 2003). In addition to strengthening IPR protection in general (such as through creation of a High Court for IP), efforts to date focus on both disclosure and support to technology licensing, including:

- *Reference Guidelines for Intellectual Property Information Disclosure* were published by METI in 2004 to improve communication between firms and markets about intellectual property management, on a voluntary basis. The guidelines request disclosure of information related to: 1) core technology and business models; 2) acquisition and management of IPR, management and protection of trade secrets; 3) significance of licensing to the company's business, 4) significance of patent portfolios to the company's business; 5) policies governing intellectual property portfolios, etc. Each should be substantiated with underlying assumptions and quantitative data (METI, 2004). In 2004, thirteen firms that participated in the study group to develop the reference guidelines are expected to prepare and disclose their intellectual property information in accordance with them.
- *National Center for Industrial Property Information* (NCIPI), an independent administrative institution, has been in charge of several elements of a program that includes dispatching patent licensing advisors to firms, creation of a patent licensing database and training programs for technology transfer intermediaries. The program has resulted in more than 4,000 technology transfer contracts that created 1,000 new jobs, and its economic impact was estimated at more than JPY 120 billion between 1997 and 2004 (NCIPI, 2004).
- *Japan-US Tax Treaty*, which provides tax immunity for royalties from intellectual property and other intangible property in the source country.

38. As part of a process of reforming corporate law, the United Kingdom has developed a draft set of regulations for Operating and Financial Reviews (OFR) that firms would be required to include in their annual reports. The OFR is a narrative report that aims to enable shareholders to assess company strategies and their potential for success. It would include quantitative and qualitative information related to 1) the development and performance of the business, 2) the position of the company, 3) main trends underlying the development, performance and position of the business and 4) the main factors likely to affect future development, performance and position. As such, they could contain information on intellectual assets (training, R&D, new technology, etc.). The regulations were in a public comment period until August 2004 and are expected to be in effect for financial years beginning on or after 1 January 2005 (DTI, 2004). OFRs would be prepared annually by all quoted companies meeting certain criteria (about 1,300 in total).

39. The European Commission provides support to technology licensing via a network of about 70 Innovation Relay Centers (IRCs) in 1995. IRC services include 1) help identification of potential partners for technology offers and needs of which information are converted across Europe via internet based system (2) advice on innovation, intellectual property, licensing and negotiation. These services are mainly targeted at technology-based SMEs. To date, IRCs facilitated about 1,000 technology transfer agreement including signed agreements for the sale, licensing, distribution or joint development of new technologies.<sup>15</sup> EU also created Community Research and Development Information Service (CORDIS)

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see <http://irc.cordis.lu/>

which provides information about EU R&D programs and transferable technologies. With regard to legal changes, a new safe harbour for licensing patents, know-how and software copyright, part of a competition reform, which is expected to reduce bureaucracy and increase legal certainty has come into force since May 2004.<sup>16</sup>

40. The importance of intellectual assets is likely to still increase in near future. However, as noted above, related systems such as measurement, reporting and market for some intellectual assets are not fully developed to extract maximum value from intellectual assets. What can governments do? – Improvement of disclosure, data collection and related laws such as intellectual property rights and competition law are possible issues where government can take initiatives. The role of government would be especially important in areas where more international harmonization is required, such as patent law and data collection, and in raising the public awareness on the importance of intellectual assets. However, these objectives would not be accomplished by governments alone, cooperation with industries and academia is needed in this field.

***Suggested issues for discussion:***

- What can government do to improve value creation and exploitation of intellectual assets? What are the top priorities?
- How effective have been recent efforts to establish guidelines for reporting intellectual assets, and what lessons can be applied to future efforts?

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<sup>16</sup>

see press release (ref.IP/04/470)

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/470&format=HTML&aged=0&language=EN&guiLanguage=en>

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