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INFORMATION SOCIETY TECHNOLOGIES
PROGRAMME**



The PRISM Project



Report of Research Findings and Policy Recommendations

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PREFACE

This report sets out the initial findings of the PRISM research initiative on the intangible economy. In so doing, it represents the culmination of an 18-month programme of policy research and dissemination directed at gaining a better understanding of the socio-economic issues resulting from the growing influence of intangibles in the modern economy. The focus of the research was guided by an advisory council, whose views were ascertained via a series of interdisciplinary forums and business-led thematic workshops. The report concludes with recommendations for the policy community.

A list of collected PRISM research papers is contained at Appendix I. The consortium members and academic researchers are listed at Appendix II. Appendix III lists the organisations whose executives contributed to the initiative, either as members of the advisory council or as participants in the field research work.

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EXECUTIVE SUMMARY

In a mass-production economy with homogenous goods, the knowledge content of goods was low and the most important phase of the production process was manufacturing, since firms relied on economies of scale for market performance. Hence, tangible factors of production were held to be the most important, and economic productivity was held to be determined by a direct, causal relationship with the amount of physical capital and labor employed. Today, the knowledge content of goods is of an order higher, and the pre-manufacturing phase is the key phase for value-creation. The activities carried out in this phase, namely research and organisation, therefore assume a much higher significance than in the past. The post-manufacturing phase provides critical leverage for the exploitation of this value, often through wholesale diversification of the market offer.

Set against this background, our conclusions and recommendations are summarised below. The presentation is structured in line with the four key themes of the PRISM research and dissemination programme¹:

A. The emerging new theory of the firm

The first centres on the macro perspective and what is driving the economic context in which firms are operating. It is often argued in business and academic circles that the global economies have undergone a structural shift in the mode of wealth creation over the past few decades, driven by changes in the architecture, pace and connectivity of the corporate value system. If this is so, management challenges and practices will be evolving in response. What is it about this 'new' economy that requires new tools? Do we need a new theory of the firm? Our conclusions on these key questions may be summarised as follows:

- 1) On balance, the empirical evidence would suggest that the mature global economies have indeed experienced a fundamental shift in the corporate asset base. Moreover, this has led to a significant, but largely undetected, shift in the mode of wealth creation
- 2) We are in economies of surplus, in the sense that consumers' basic needs are essentially satisfied. This, combined with the dramatic expansion of computing power and connectivity in the last quarter of the 20th century, has redefined the role and economic importance of non-price factors of competition (intangibles)
- 3) The economic characteristics of intangibles are very different from those prevailing in the manufacturing era. Adding to this, their value-generation mechanisms are, as yet, poorly understood
- 4) These changes have not occurred suddenly or from a common cause, but have occurred progressively and can be attributed to different causes which, taken together, have induced important changes in the architecture of the corporate value chain. Thus, the transition to a knowledge-based economy is forcing a fundamental re-think of the old-world value delivery systems

¹ A bibliography of the research papers published by PRISM is included as appendix I. A collection of these papers, together with conference proceedings and reference to other works in the intangibles field, can be found at www.euintangibles.net

- 5) Value chains always had a limited life in competitive markets, but they are now eroding at a much faster rate than in the past. Hence the critical importance of:
 - (i) An effective ‘innovation machine’, to keep one step ahead
 - (ii) Networks, as key strategic assets
 - (iii) Understanding the new dynamics of power, which are very different from those in a traditional, hierarchical and vertically-integrated industrial firm.
- 6) An important consequence of this is that successful players in today’s hyper-competitive markets must have access to a nexus of unique, or at least difficult-to-replicate, capabilities, competences and quasi-assets in order to stay ahead of the game. As a result, they are constantly trying to create, maintain or invade monopolies, whether or not founded on intangibles
- 7) As a primary instrument for granting monopoly rights, the efficiency of the European Union’s IPR regime is one of the keys to incentivising economic growth and innovation. Deficiencies in the existing system are costing Europe dear, and addressing these is a matter of urgency if the European Commission is to deliver on its Lisbon objectives.

B. The ‘hidden’ productive economy demands new measurement tools

Our second theme leads naturally from the first. If there are fundamentally new economic drivers, this will impact directly on the established norms of measurement practice. Our existing business routines and metrics were devised when firms operated within fixed boundaries and the management focus was geared to resources that were physical, and owned. An important feature of the 21st century enterprise is the separation of its physical and legal boundaries, and the fragmentation of the old legal entity into a labyrinth of licenses, contracts and other trading agreements, often involving multiple jurisdictions. Our main conclusions in this regard may be summarised thus:

- 1) The assertion that we are in the midst of a new post-industrial economic revolution appears to have been an intuitive rather than a rational response - fuelled in no small part by a paucity of hard empirical data - to the uncertainties created by the unparalleled growth in the use and versatility of information and communications technologies (ICT) and the speed at which this has taken place. It is now clear there are many different perspectives on today’s economy, and different ways of describing it
- 2) The data collated by the PRISM project gives credence to the view that a gradual shift has been taking place for many years in the economy, especially within the drivers of growth and productivity.
- 3) Factors that have up to now been hidden, mis-classified, or lumped together as ‘residuals’, have gradually emerged as some of the most important factors in our economy. Growth is not the result of one single policy or input factor

The macro-economic context

- 3) At a technical level, the System of National Accounts (SNA) is poorly aligned to measure today’s economic realities. A major revision of the conceptual framework and data classifications is needed in order to better align the national accounts with the economic realities:
 - (i) Measurement needs to be reoriented around the value-drivers of economic production

- (ii) Innovative and creative activities, such as research and development, should in future be recognised as investment and wealth-creating activities
- (iii) The production of knowledge and intellectual capital formation should also be recognised as such. Educational expenditures - including training and skills development – are intermediate services which the student consumes for the purposes of acquiring knowledge and building human capital, and should be re-classified as such

Corporate accounting and reporting

4) The existing accounting system arguably does a satisfactory job of tracing the transaction flows in and out of the modern enterprise, together with the value-building process along the physical supply chain. However, intangibles strike at the very heart of this model because their value for an organisation is not linked to transactions, but to their imaginative exploitation in the core activities of innovation, production and distribution, leveraged by networks and other ‘macro’ factors external to the enterprise. Even if conservatively enforced via an effective governance system, the cost-based accounting model has become increasingly irrelevant in judging the health and performance of key sectors of the modern economy

5) A number of guidelines published in recent years address different aspects of non-financial performance measurement and, in so doing, serve the needs of their own user (stakeholder) communities. This is a useful starting point, but from a policy perspective we urgently need consensus on a holistic business reporting framework. Accordingly, this report and its supporting papers lay out a set of principles, together with the broad lines of a comprehensive business reporting model

6) In the area of business accounting standards, the July 2001 proposals by the U.S. Financial Accounting Standards Board were an important step forward. On current plans, the new accounting treatment will be extended to European listed companies in 2005 via an agreement with the International Accounting Standards Board - a regulatory change that will stimulate wider EU interest in the management of intangibles and their representation in company statements. Although external reporting per se is a secondary priority at this stage, a limited revision of the international standard on accounting for intangible assets (IAS 38) would open up the field for the much-needed development of new management tools in this area.

C. Issues for the business community

Our third focus concerns the perspectives of different economic actors. What do our findings mean for corporate executives? How are the banks, venture capitalists and other members of the investor community adapting their analytical models, standards and regulatory practices? Our main conclusions in this regard are that:

1) The overriding issue for corporate executives is less about coping with intangibles than rebuilding trust in the functioning of the markets. This, in turn, will require better performance information to enable more enlightened, rational judgments to be made about the performance of the corporate sector. A key feature of any new reporting framework is new tools and protocols for managing intangibles internally. External disclosure is simply not possible without first laying down a new generation of internal management systems

2) The corporate sector also needs to rebuild public confidence in the lines of defence that protect shareholders and investors against securities fraud and other unwarranted insider

manipulation of financial information. This will require a fundamental change of discipline and reward systems to curb the culture that incubated many of the corporate excesses and failures of the dotcom era, and re-draw the line between the poachers and gamekeepers. A key question for policy is how to respond to the issue of information asymmetry

3) It is often assumed that banks and other capital providers are not concerned with evaluating intangibles beyond the intangible assets - mainly goodwill, patents and leases - currently disclosed in company reports. Our respondents would suggest that intangibles such as latent and core competencies, competitiveness and calibre of management have in fact been incorporated in credit risk analysis for some time, albeit intuitively and subjectively, and with neither a common language nor an explicit measurement framework

4) The rating agencies similarly deploy non-financial information in evaluating the different levels of default risk on the debt obligations of nations and corporations, and a growing catalogue of other financial instruments

5) The development of a more holistic information framework will pose a challenge to the current business model of the analyst community (currently under legal and regulatory review in the U.S.). The European Association of Financial Analysts (EFFAS) should be encouraged to launch an awareness programme with their members aimed at fostering a culture of disclosure and making professional analysts appreciate the value of more transparent reporting

6) In the field of audit, while a synthesis of the regulatory and governance issues facing the profession is beyond the remit of this study, we are still some way off a consensus on standards for tackling innovative forms of business reporting such as intellectual capital statements. The short term priority from an intangibles perspective is to agree on a consistent set of valuation protocols for the U.S. list of disclosures, which will become mandatory across the EU from 2005.

D. Policy implications

The fourth theme concerns the implications for the established policy set. What are the principal policy and regulatory implications of the 'new economy'? What should the Commission be doing at a policy level to improve Europe's chances of delivering on the Lisbon objective of becoming the most dynamic, competitive and knowledge-intensive economy in the world by 2010?

Accordingly, the PRISM group recommends the following broad policy agenda for adoption by the Commission and national governments:

1) Given the weight and influence of services across the modern economy, the EU should take steps towards building a better understanding of their fragmented (and generally hidden) productive processes. This is an acute problem that requires a response from the policy and statistical communities. Agreement on a framework for tracing and reporting on their productivity and their different value-generating mechanisms should be given a high priority on the policy agenda

2) Our national statistics and company reporting frameworks are failing to reflect the growing impact of knowledge intangibles in a number of important areas and, in so doing, leave a substantial gap in our information about the structure and dynamics of the 21st century economy and its growth engines. The Commission should consider appointing a high-level interdisciplinary task force to oversee and manage through the following policy initiatives:

(i) The first, essential requirement is for national and international statistical offices, including Eurostat, to accept the need for a substantial revision of the SNA and its European equivalent, the

ESA, and to take the necessary collective action. This requires major extensions to the production and asset boundaries of the SNA and ESA. This will enable major new flows in the form of investments in new technology and knowledge to be identified, thereby radically changing the structure of measured GDP as well as its total size

(ii) Data collection on intangible assets has to be extended. The main problem of the pioneering attempts to measure intangible assets is the lack of robust and consistent data. In this regard, priority should be given to a framework of 'meso' business indicators, supported by surveys at a national level

(iii) The EU's business reporting infrastructure requires significant enhancement to improve the transparency of the information that is available to investors and other interest groups. This will necessitate different policy mechanisms at the EU, regional, national, industry and company levels. A common thread is needed to create and inform the linkage between these levels, in the shape of 'meso' information systems to complement the various macro and micro systems already in place. At the corporate level, we urgently need to ascertain the feasibility of a European version of the EDGAR electronic information system at the U.S. Securities and Exchange Commission

(iv) At the firm level, a holistic business reporting model is required that unifies and integrates the fragmented array of models currently promoted by the different stakeholder interest groups. The report lays out a conceptual framework that extends the financial reporting model with a broad range of performance indicators to meet the different needs of the stakeholder interest groups. As a starting point, the accounting regulatory community should consider extending the existing reporting model to include a breakout of investment spend on key business intangibles, such as research and development, ICT, organisational and competency development, and workforce training.

3) Attention is needed to tackle the long-overdue reform of the measurement protocols for R&D investment in services. Specifically, the issue of capturing reliable R&D information for the service sectors requires a priority initiative at the EU level. Its resolution will be an important plank towards achieving the Lisbon objectives and the drive to raise R&D investment from 1.9% to 3% by 2010

4) In respect of a Single European Market for services, notwithstanding the recent progress towards resolving the Community patent issue, deficiencies in the intellectual property (IPR) regime are still costing Europe dear. Renewed political pressure is required to address the high transaction costs and asymmetries involved in obtaining and protecting IPR across the member states, which in this respect is still significantly out of line with the USA.

5) Policy attention is also required in the area of equity and debt finance for small and medium enterprises (SMEs). We conclude this report with a policy recommendation to improve the allocation of innovation capital among small and medium sized European companies by encouraging the spread of a more market- oriented approach to the analysis of credit risk.

The policy reforms outlined in this report will impact directly on the academic syllabus, since the universities and business schools will need to be brought centre-stage in a wide ranging programme of research, debate and outreach. A shift of emphasis is needed, away from the old-world deterministic accounting model in favour of a mindset geared to a much better understanding of the real value-drivers in a context of active, imperfect markets that are rife with connectivity and arbitrage opportunities.

FINDINGS AND CONCLUSIONS

Introduction

The findings set out in this report are based on the following key assumptions:

The policy implications of the rise of intangible assets have to be analyzed within the context of the deep changes arising in the economy in recent decades². Not only has there been a growth in the volume of international trade and finance, but firms have been changing products more frequently, and have changed their organisations, location and cultures. The penetration of information and communications technologies has also accelerated, inducing many commentators to view these technologies as the origin of all the observed changes.

The changes have not occurred suddenly or from a common cause, but have occurred progressively and can be attributed to many different causes which, taken together, have induced important changes in the architecture of the corporate value chain, such that core activities of innovation, production, distribution and consumption, as well as their components – capital, labour, raw materials, management and digitally-enabled ICT networks – are now organised on a global scale, either directly or through a network of linkages between economic agents.

The result has been an increase in competition at all levels, and the need to define new strategies in order to adapt to such changes. In many industries, the increased competition has induced firms to adopt strategies to protect their market power by increasing product differentiation or by personalising products. The product has therefore become more complex, in the sense of having a higher knowledge content. In the first case, successive product generations require more innovation (research), while in the second case, the final product often incorporates some services. Along the supply chain, this means that the knowledge-intensive phases of production have become more important for value-creation. In the first case, the research phase is important, while in the second case, the marketing and distribution phase is key. Often both strategies are used simultaneously to increase product differentiation and the scope of the tactical weaponry to sustain competitive advantage and market leadership.

Nonetheless, while the global economies are undoubtedly experiencing as rapid an era of change as at any time in history, there is no new economy per se and our economic fundamentals remain firmly in place.

Key findings

A. The Emerging New Theory of the Firm

(i) *How does the modern knowledge economy differ from what we had before?*

There is an overwhelming weight of evidence to suggest the advanced economies have witnessed a significant but largely undetected shift in the mode of wealth creation over the past few decades. The principal source of economic value and wealth is no longer the production of material goods, but lies in the creation, acquisition and exploitation of intangibles. Economic growth is influenced less by investments in physical capital (land, machinery, stocks of goods) than by knowledge, which is now a critical factor in the productive application and exploitation of physical capital. Consequently, competitive success today requires a critical capacity to develop, manage, measure

² See the PRISM paper WP3.2 by Patrizio Bianchi & Sandrine Labory, which outlines these changes and their acceleration over the last 10 to 20 years

and control the flow of knowledge and intangibles.

The origin of intangibles lies in an organisation's capacity to accumulate knowledge on the market, production and organisation, thus allowing it to transform specific activities into value by means of superior information. The more a firm embodies intangible assets in its production function, the more investments in these assets are sunk and cumulative. Often these assets are environment-specific and inseparable from their context of origin. From this stems the difficulty of associating them with a stable and transferable property right, as well as a consistent measurement system.

Intangible factors play a dominant role in the ability of companies to innovate and compete in a knowledge-based economy. Such assets enable knowledge-intensive economies to maintain their competitive position and out-perform resource or labour-intensive economies. This dematerialisation of the economy involves a significant investment in intangibles. There is a growing awareness in OECD member countries that an increasing part of the total investment in the business enterprise sector is directed towards intangible 'investment products' such as R&D, marketing, training, and software. Nevertheless, OECD data on intangible investment is still relatively scarce (Vickery, 1999), as it is in the national statistics.

But, the much-vaunted, loose generalisation that this can be ascribed to 'globalisation', or in some way to the ubiquitous spread of digital technologies and services across the economy, is too simplistic and is masking deeper transformations that are at work in the modern economy. It is now clear to many of us that:

- The economic characteristics of knowledge intangibles are very different from those prevailing in the manufacturing era. In particular, the non-exhaustion, non-rivalry and complementarity characteristics of intangibles, as well as the predominance of the pre- and post-manufacturing elements of the value chain, will have significant and far-reaching implications for all interest groups³. Much more research and empirical study is needed to explore the economic and measurement issues arising
- The explosion of computing power and connectivity in the 20th century has redefined the role and economic importance of intangibles. Leading-edge business practices now migrate around the world at the touch of a button⁴ (although this is not necessarily true for collective intangible assets, such as social capital⁵, which require a broader base of receptive foundations if they are to take root)
- It has also served to destabilise the old-world corporate value system and create a wholesale disaggregation of the value-delivery processes. Value chains always had a limited life in competitive markets, but are now eroding at a much faster rate than in the past⁶. Hence the critical importance of an effective innovation machine to keep one step ahead⁷. Continuous

³ *The case study by KTH of new business models in the music industry provides some examples (WP9.2.1)*

⁴ *What Castells calls 'timeless time'*

⁵ *See Bianchi & Labory in their final report, WP3.8*

⁶ *As highlighted in UCC's study of Digifone, WP9.1.1*

⁷ *The exponential growth in connectivity has also led to a dramatic increase in the scope for serendipity in innovation. If Louis Pasteur's assertion that "chance favours the prepared mind" is correct (and history shows that most discoveries are by a chance association of ideas), then today's massive connectivity growth raises significantly the probability of such new associations*

evolution and renewal of this capability is one of the main preoccupations of corporate strategy today⁸

- Networks have come to be regarded as key strategic assets. They have come into prominence partly because organisational strategy needs to change faster than rigid organisational forms possibly can, but also because the scale and complexity of the innovation machine is often beyond one firm's capabilities. The loose ties of networks, the available resources, and the dynamics of power are very different from a traditional, hierarchical and vertically-integrated industrial firm.
- Thus, the principal means of obtaining market power of the past, namely ownership, is not the only means of control. Other forms of control include making one's activities complementary to the activities of the other actors⁹.

The mature market economies are in surplus, in the sense that consumers' basic needs are essentially satisfied. Faced with increasing global competition, Europe's mature industries are struggling to get to grips with the exhaustion of the old mass production model at the same time as being forced to respond to demands for mass-customisation¹⁰ by consumers whose basic demands are now commoditised¹¹. As a result:

- The modern economy is characterised by mature markets for goods and services
- As markets have become increasingly mature (commoditised), so firms are having to compete harder for monopoly profits or comparative advantage
- This forces firms to intensify their search for new strategic assets to eliminate effective competition - as well as unique factors of differentiation and market leverage - not only in the so-called 'new economy' sectors, but in mature industries struggling to keep their business models evolving at least at the pace of the market
- They are also trying to create, maintain or invade monopolies, whether or not founded on intangibles
- As a result, corporate strategy is increasingly focused on 'non-price' factors of competition. Hence the critical importance of quality reputation and branding, and 'lock-on' strategies aimed at creating or stretching the market window (monopoly rent). Typical responses

⁸ According to Don Tapscott "It used to be that competitive strategy was all about the internal challenge of either creating differentiated products or services or having lower costs. The key to strategy now is architecting capability", while according to John Browne of BP "The strategy is now the organisation".

⁹ As reported in the Cass case, WP9.4.3, which traces how a product design SME has successfully created new market space by taking ideas to clients for co-development

¹⁰ When we use the term 'mass customisation' we are exploring a phenomenon that was considered a paradox until very recently. Mass production required a stock of homogeneous goods to exploit economies of scale, whereas customisation implies the capacity to satisfy each individual's needs uniquely. Coupling the two was considered impossible with the previous models of industrial production

¹¹ This is exemplified in the KTH case of three newspapers experimenting with both printed and on-line editions (WP9.2.2)

include raising switching costs through the deployment of proprietary 'platform' technologies and the creative use of intellectual property rights¹².

- A new market model has arrived, where sustainable value-creation is geared less to economies of scale than nimbleness and speed of execution in exploiting innovation, arbitrage and scope effects
- Subtly and incrementally over several decades, this has resulted in a fundamental shift in the corporate value system, away from physical and financial assets (now commoditised) towards the creative exploitation of a nexus of intangible assets, quasi-assets and competences - mainly in the form of distinctive capabilities deriving from knowledge - that have become essential ingredients of the economic production process
- Notwithstanding the pioneering research effort on both sides of the Atlantic, their value-generating mechanisms are, as yet, poorly understood.

Technology has changed the economics of production. Today it is possible to combine both economies of scale and the multinational delivery of discrete, highly personalised products and services. Globalisation has led not to a convergence of tastes, or even homogeneous products and services per se, but to a vast increase in the number of choices available to consumers. As a consequence, global consumer companies like Coca Cola and McDonalds as well as business services firms such as IBM and PricewaterhouseCoopers, own not one brand but 150, mostly local.

In terms of policy orientation, these findings serve to move the axis of the debate away from economic theory and towards the measurement domain. They also reopen fundamental questions - at both national and EU levels - on such issues as the shifting balance between 'blue sky' and applied research, the tension between public goods and monopoly rent and, thus, the role and perception of IPR. This is especially important for the business services sector as it shifts from selling time to selling assets (institutionalised and codified know-how).

(ii) *The Emerging Corporate Asset Base*

In the course of the PRISM and HLEG¹³ Delphi sessions, we set out to develop a family of models, initially as an aid to common understanding of the different perspectives on the knowledge economy, but also to provide a common language for describing the phenomenon of intangibles. This initiative is on-going with the core advisory council members.

In the following section we present a provisional schema of the emerging corporate asset base¹⁴ that attempts to integrate the perspectives of these interest groups.

¹² See UCC's case on Reuters XML-based news delivery system, and their 'scorched earth' strategy to create a de facto standard for the media industry (WP9.1.2)

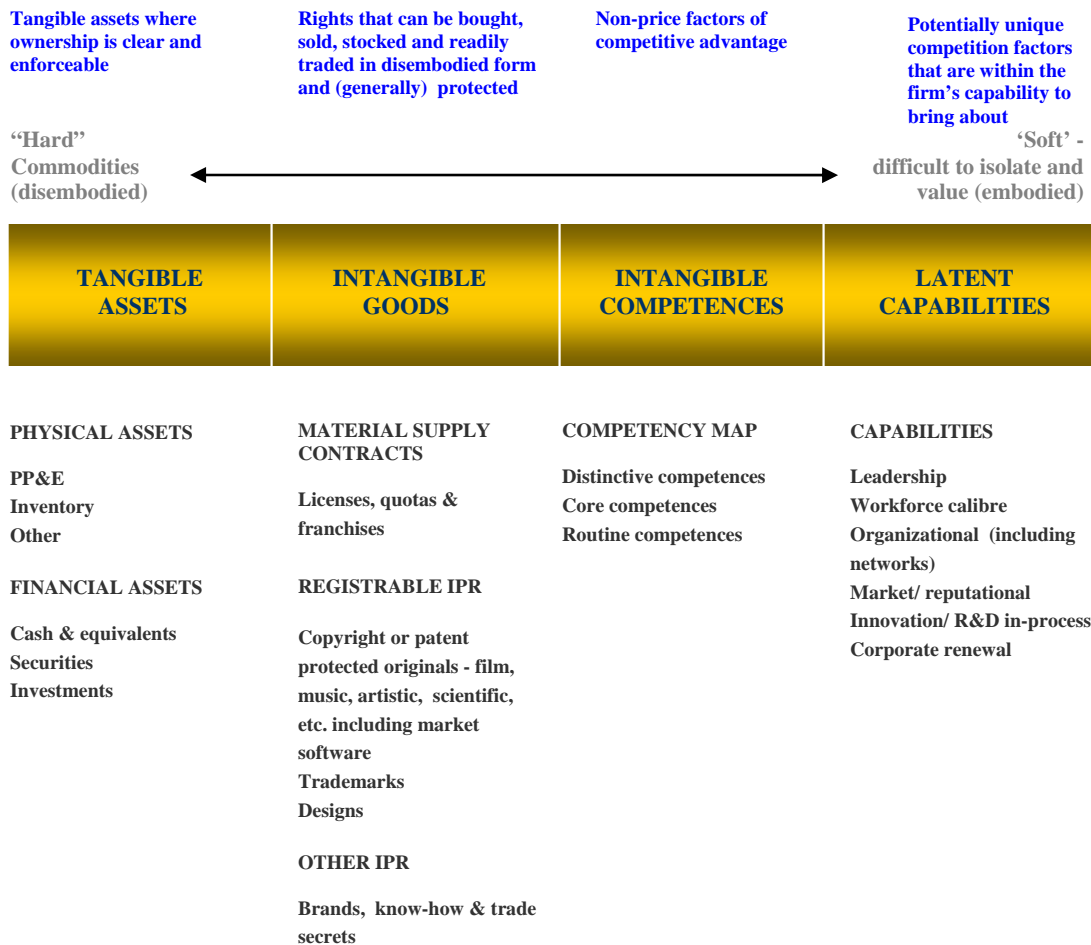
¹³ The PRISM initiative originated in a European high-level group on the intangible economy (HLEG) which, in September 2000, presented new evidence on the influence of business intangibles on economic performance and productivity. See HLEG (2000) and European Commissioner Erkki Liikanen's March 2001 address to the European Forum "Entrepreneurship for the Future" in Växjö, Sweden

¹⁴ Its origins lie in research at Cass into the capital markets response to the question of intangibles. An earlier version (Eustace, 2000) was presented as evidence to the Brookings task force on R&D and innovation, and formed the substantive basis of FASB's SFAS 141 and 142 proposals.

Michael Porter’s classic resource-based view of the firm¹⁵ addresses the physical supply chain and the value-building process from the context of a logistical materials flow. His value system traces products from the original producer to the ultimate consumer. The model described here offers a parallel perspective by tracing the essential knowledge flows of the modern business organisation. In so doing, we present a new taxonomy of the corporate asset base. In common with Porter’s system, the model is heuristic rather than causal.

Our starting point is that successful players in today’s hyper-competitive markets must have access to a nexus of unique, or at least difficult-to-replicate, capabilities, competences and quasi-assets in order to stay ahead of the game. Our research suggests that these key value-drivers can be conceptualised in terms of four asset groupings:

The resource base of 21st century enterprises



Source: Eustace & Youngman (2002)

¹⁵ Porter (1985)

The schema presents a holistic view of the various tangible assets, legal rights, competences and capabilities that constitute the extended asset base of a modern enterprise. Some lie within its physical and legal boundaries while others are to be found outside within its network of influence. They also lie along a continuum. At one end we find the ‘soft’ intangibles that are difficult to isolate and value, often termed *embodied* intangibles, whose economic influence - and hence value - depends on complementarities with other assets. At the other lie the ‘hard’ intangibles that are *disembodied*¹⁶, and generally take the form of legal instruments created by force of law, or by contractual relationships agreed between institutional or economic units.

Embodied knowledge is tacit, and embodied in people who effectively lease intellectual services as an input into the firm’s production process. Disembodied knowledge is codified, and can be stocked, bought, sold and otherwise traded just like material assets. In certain circumstances it can also be used as debt security. In the main, disembodied intangibles take the form of legal instruments created by force of law, or by contractual relationships agreed between institutional or economic units.

The right-hand segments of the schema focus on competences and capabilities. The first - latent capabilities - represents a reservoir of potential talent and innovation that provides a source of future competitive advantage. Collectively, these attributes provide a leading indicator of the organisation’s ability to respond to market threats and opportunities that are as yet unknown, and often unknowable. Latent capabilities are what investors, in particular venture capitalists, are interested in. Flushing out, exploiting and renewing these is what distinguishes good corporate leadership.

The second group, intangible competences, are more-or-less codified (but still proprietary) capabilities now widely deployed as key factors of ‘non-price’ competition. They often rely heavily on the ICT infrastructure and, as such, their substance and form migrate rapidly around the world via digital networks. Following Vollmann, we divide these into distinctive, core and routine competences:

- *Distinctive competences:* *Key factors of differentiation that are difficult or costly to replicate*
- *Core competences:* *Competitive necessities – what you must have to compete*
- *Routine competences:* *Routine activities you must do, or outsource, in order to stay in the game*

However important intangible competencies are in underpinning the business value chain, these are much more difficult to measure and value consistently across organisations. The value drivers are generally bundled together and interdependent to such an extent that they are difficult (but not impossible) to isolate and value. A key conclusion of the PRISM research is that the primary thrust of research and development of intangibles measurement should be devoted to the intangible goods segment of Fig. 1.

The left-hand segments show those assets over which ownership rights can, at least in principle, be appropriated and values assigned by reference to open-market transactions or future cashflows. For the purpose of the schema, the first of these - tangible assets - consists of physical assets (land and buildings, plant, machinery and equipment) and financial assets (cash, receivables and securities).

¹⁶ OECD (1998)

These constitute the main components of the current reporting model, and the collateral basis for allocating capital and credit and a range of debt security instruments.

The last category, intangible goods, is made up of two main sub-classes: intangible commodities and intellectual property:

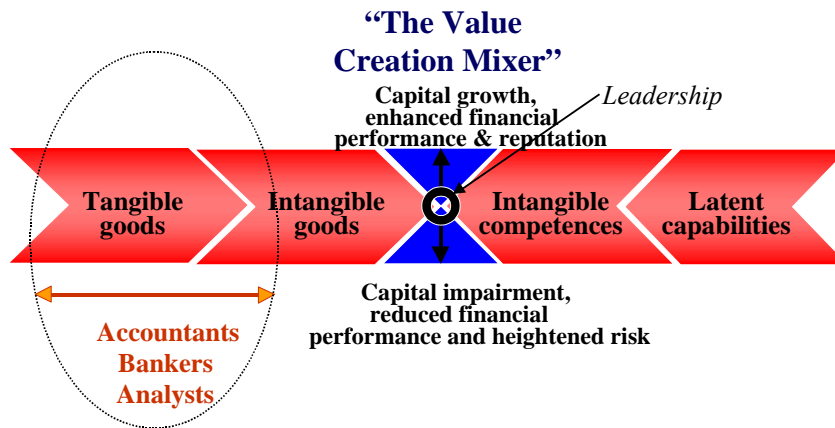
(i) Intangible commodities are essentially contractual rights, including publishing and reproduction rights, commercial databases and other marketable software with associated long-term royalty annuities. Their defining characteristic is that they can be bought, sold, stocked, leased and otherwise traded

(ii) Intellectual property includes those assets whose characteristics are derived from the legal system, e.g. patents, copyrights, registered designs, trade secrets and proprietary technology. In this case, the cost and time of legal searches can be significant and rises dramatically where multiple legal jurisdictions are involved (Rivette and Klein, 2000).

A key question for the EU's IPR system is where the line should be drawn on monopoly rights over competencies and capabilities.

Comparative advantage and value creation are an outcome of orchestrating these resources, which today is *the* defining characteristic of business leadership and management.

Competitiveness is derived from orchestrating these resources



Source: Youngman: Proceedings of 3rd Prism Forum, Copenhagen, 19- 20 September 2002

As Richard Youngman puts it¹⁷:

“... In the 20th century we focused on margin, investment and asset productivity to achieve comparative advantage. This game has run its course. The winners of the

¹⁷ In WP2.3 "Understanding and measuring intangibles: a journey of learning"

21st century game will increasingly focus on architecting capabilities – the capability to innovate and the capability to act – and managing risks such as reputational loss. We need to be less narrowly oriented in both our language and in our managerial tools around the physical and the financial”.

(iii) *New organisational forms and the importance of networks*

Organisational forms are changing in response to the new business environment. In this context, networks have become more important, but our understanding of their value mechanisms is limited:

(i) Networks are vital strategic assets, in part because organisational strategy needs to change faster than traditional organisational forms and closed competency groupings possibly can, but also because the complexity of the projects undertaken is often beyond one firm’s capabilities or resources¹⁸.

(ii) The loose ties of networks, the available resources and the dynamics of power are very different from a traditional, hierarchical industrial firm¹⁹.

Evidence suggests that hi-tech and bio-tech industries cluster in the same way we have seen in other industries throughout history, stretching from automobiles in Detroit to banking in London. The creation of new intangibles such as new competencies and technological breakthroughs requires interactivity²⁰. Un-codified knowledge does not travel well: only with the growth of social capital (in the shape of trust) does such knowledge start circulating within networks²¹.

The explanation of intangible clustering, at any rate from the U.S., seems to revolve around the role of venture capital in financing intangible capital (i.e. unsecured funding for enterprises with ‘thin’ balance sheets). The complexity of under-developed or rapidly-changing industries often means that the traditional sources of capital do not work well. Capital markets tend to be more generalist and so partially rely on the expertise venture capitalists have built up. The venture capitalist’s function is to acquire specialist knowledge (a key form of intangible capital) by focusing on a particular industry segment and learning more and more about less and less. Such knowledge does not necessarily travel well. Hence, a virtuous growth circle builds up whereby the capital is attracted to the ideas, often found in and around universities, which leads to the offspring of companies²². As these companies grow and more venture capital and associated knowledge clusters, new players on the scene are likewise attracted to the region by the pre-existence of financial and intangible capital in the form of knowledge, ideas and skills. Silicon Valley is but one of a number of examples²³.

¹⁸ *These issues are illuminated in Cass’s study of small consultancies (WP9.4.2)*

¹⁹ *See WP6.5 “Networks, Intellectual Capital and the Management of Knowledge: Performing the ‘New Economy’”, by Sof Thrane, Jan Mouritsen & Mette Johansen*

²⁰ *Collaborative business networks are enabling small biotech firms to convert patents into marketable pharmaceutical products – as reported by TSM (WP9.3.3)*

²¹ *As argued in the Ferrara paper WP3.5 “Why is Social Capital a Capital”, by Galassi & Mancinelli*

²² *TSM describes how academia/ business/ government networks have proved successful in fostering start-ups in the Twente region of The Netherlands (WP9.3.1)*

²³ *Intangibles clustering is explored in more detail in WP3.4 “The geography of intangibles”, by Tomasso, Paci and Schweitzer*

(iv) *The IPR dimension*

The efficiency of the EU's IPR regime is one of the keys to incentivising economic growth and innovation. An IPR is a distinct form of intangible asset and needs 'tender loving care' to uphold its value. The external environment, in particular the legal environment, impinges heavily on this asset class. Policy-related issues in relation to the operation of the EU IPR system are summarised below²⁴.

- (i) Fragmentation of Europe's IPR systems:
 - Despite many years of debate and countless studies, it is still disproportionately costly to obtain protection across the EU (especially in respect of patents) and to enforce those protection rights (since one cannot litigate for patent infringement across the Community)
 - The high cost of protecting European innovation acts as a disincentive to the growth of new entrepreneurial businesses.
- (ii) Proportionality and the need for rebalancing:
 - The cost of patents in the EU²⁵ is arguably out of proportion with the incentives and the rewards
 - Copyright protection (life plus 70 years for example) makes little sense in the 21st century economy, where consumer habits and expectations can change rapidly. In addition, the shrinkage of time and space in the digital economy mean that many production and distribution processes are now close to zero cost and real-time, especially in the hi-tech, software, media and telecoms sectors
 - Exclusion rules need to be redrawn with clear boundary parameters, especially regarding the patentability of business models and practices. Certain classes of fundamental discovery and many emerging areas of commercial practice should be treated as public goods and not monopolised²⁶. This is a sensitive judgmental area and more clarity is required as market forces (particularly in the U.S.) and the desire to secure new monopoly rents will continue to push the boundaries²⁷
- (iii) Deficiencies in the current system are costing Europe dear. It is a matter of great urgency for the EC to address if it is to deliver on its Lisbon objective:
 - The way the current IPR regime operates clearly favours the large company over the SME, particularly for patents. Large companies have the financial resources (and arguably the time resources) to outrun the SME in any legal battle in a fragmented legal market.

²⁴ *A legal perspective on the IPR issues is set out in the discussion papers prepared by Larry Cohen for the PRISM IPR workshop at McDermott, Will & Emery, London, on 3 December 2002*

²⁵ *This is largely a translation problem, as validation on grant requires translation into up to 11 national languages*

²⁶ *But rewards may be appropriate for the discoverer, by way of license fees. A doctrine of compulsory licensing for the use of an "essential facility" needs to be developed. The rudiments are already available*

²⁷ *Examples often cited are the 18th Century Watt patent which is held to have stifled the exploitation of steam power for over 40 years, and the genome patent*

Accordingly, they feel they can infringe and get away with it, as against an SME²⁸, and even if caught, are only stopped in one jurisdiction at a time

- The technology multinationals are amassing portfolios of patents for defensive and negotiating reasons, and are using the system in ways for which it was not intended
 - The net effect is the disincentivisation of innovation-based SMEs, since the financial and time costs of protection erode their more constructive efforts and eat away at their invested capital
- (iv) The US is additionally advantaged by the prohibitive costs of US litigation:
- The sheer cost of litigating in the U.S. (added to the fact that legal costs are not recouped in the event of a favourable judgment) will often put companies (particularly SMEs) off the idea of pursuing infringers in the U.S. courts²⁹
 - Europe is losing billions of euros of net income from such loss of royalties. Precise measurement of this loss might bring the message home – it is estimated to be in excess of €10bn for the UK alone
 - Given the importance of the U.S. as a market, this is a further disincentive to the growth of entrepreneurial SMEs in Europe
 - A more cost effective patent system in the EU would rebalance some of these disadvantages.

²⁸ *Some low-cost countries have poor enforcement procedures, which take a long time to final injunction, and inadequate damages*

²⁹ *This is ameliorated by contingent fee litigation, but discovery and depositions act as a big disincentive to SMEs from Civil Law jurisdictions*

B. The ‘Hidden’ Productive Economy Demands New Measurement Tools

Despite many years of serious debate among academia, economists, statisticians and professional accountants, our economic and statistical models (and the management systems used by firms internally), have not kept pace with these market developments. Partly this is because the processes and causal links are complex and slow to yield to analysis, but the business and academic research pioneers have also been frustrated by cognitive and data comparability problems in the established macro and micro information systems, which are unable to produce routine, systematic information on the stocks and flows of the modern economy³⁰. Instead, we have to rely on ad hoc studies for glimpses of what is happening. These are akin to having some but not all of the pieces in a jigsaw puzzle (but not the box, to illustrate what the end solution might look like) where the precise connection between the pieces and the whole picture remains unclear³¹:

- ❑ Investment in knowledge-based intangibles is now a substantial budgetary outlay for national economies, firms and individuals. Studies by Hill and Youngman³², Croes³³, and others have confirmed that intangible investment in the order of 10% of the GDP of the developed economies goes unrecorded as such, and observe that the mis-classification of sums of this magnitude distorts our picture and understanding of economic realities
- ❑ Nakamura³⁴ estimates that in 2000, US corporate investment in intangibles was US\$ 1 trillion - comparable to investment by the US business sector in property, plant and equipment. Half of this relates to R&D and software, the balance going into brands, human resources and organisational processes
- ❑ Intangible investment in the major OECD economies is running at between 50-100% of their outlays on acquiring and building physical assets. It also shows significant country variations across the EU³⁵. Not only has this transformed the economic landscape, but it acts as a social catalyst to promote changes in work and leisure patterns
- ❑ Creative occupations in the U.S. rose from 1.9% of the total in 1950 to 5.8% in 2000³⁶
- ❑ Knowledge workers are the fastest growing segment of the OECD’s labour force, with an average annual growth rate of 3% during the 1990s
- ❑ The proportion of the Australian labour force engaged in the production of intangible capital rose from 16% in 1971 to 31% in 1996³⁷
- ❑ A recent OECD study³⁸ on the linkages between R&D and productivity growth found that, on average, an increase of 1% in business R&D generates 0.13% in productivity growth. The effect is larger in countries where the share of universities (as opposed to government laboratories) is higher, in countries where the share of defence is lower, and in countries which are intensive in business R&D.

³⁰ Peter Hill & Richard Youngman, WP5.3

³¹ Plenary contribution by Alison Thomas of PwC, Copenhagen, 19 September 2002

³² Youngman, WP5.11

³³ Croes, M.M. (2000), “Data for intangibles in selected OECD countries”, *Statistics Netherlands*

³⁴ Nakamura (2001)

³⁵ Hill & Youngman, WP5.4

³⁶ *ibid*, Nakamura (2001)

³⁷ Webster E. (2000), pp 1-25

³⁸ Guellec, D. & van Pottelsberghe de la Potterie, B. (2001), “R&D and productivity growth: panel data analysis of 16 OECD countries”, *STI Working Papers 2001/3*

(i) The macro-economic context

It is clear there are different perspectives on today's economy, and different ways of describing it. The WP5 paper "Understanding today's economy and its residuals" makes it clear that many respected authorities believe that something or some things have changed, and continue to change. Notwithstanding this, an important conclusion of the PRISM research³⁹ is that no new economy per se has developed - there is no need to throw out all our economic principles and models.

With the benefit of hindsight, the assertion in some quarters that we are in the midst of a new post-industrial economic revolution now appears to have been more an intuitive than a rational response, fuelled in no small part by a paucity of hard empirical data, to the uncertainties created by the unparalleled growth in the use and versatility of ICT and the speed at which this has taken place. There have been no real discontinuities in economics or in the way we live our lives. We still drive in much the same cars as we did 30 years ago; we still burn the same fossil fuels (albeit more efficiently); and treatments available to us have improved only incrementally. The same could not necessarily have been said of the invention of the printing press or of the steam engine, or the successive improvements in transportation, from the canals and railroads through to commercial aircraft.

But, in the words of Paul Romer, some kind of soft revolution does seem to have taken place. The assets which we have inadequately and inaccurately described as soft, immaterial or intangible may in fact have become key economic goods. A fundamental difference between the 20th and 21st century economies might simply be that we can no longer rely on tangible assets and the representation of production as purely a physical process to provide us with a reliable guide to the rate and direction of economic change.

The data collated in this project gives credence to the view that a gradual shift has been taking place for many years within our economy, within the drivers of growth and productivity. No longer is it sufficient to trace the investment into physical capital and the hours worked by labourers to track change. Factors which have up to now been hidden from us, mis-classified, or lumped together as 'residuals', have gradually emerged as some of the most important factors in our economy. Growth is not the result of one single policy or input factor.

For example, many associated the development of a so-called new economy with ICT. ICT is clearly having a profound impact on today's economy and will continue to do so well into the 21st century. We will for certain have to learn how to track and measure its impact. However, it is another step to suggest that this large rise in ICT investment somehow, in of itself, represents a new economy. Although the importance of the ICT sector grew during the 1990's, the sector represents only 8.5% of the EU business sectors' value added⁴⁰.

A key perspective that may be lacking in our current thinking is the complementarity and interlinkages which exist with ICT investment. That is to say, it may not be sufficient to track the acquisition of ICT capital items alone, since, as the OECD Growth Project pointed out, it is the application of ICT that matters, the effectiveness of which is heavily influenced by the requisite investment in the skills-base and in the organisation of the workplace.

³⁹ Youngman, in WP5.9

⁴⁰ OECD (2002), "Measuring the Information Economy", OECD, Paris

In a recent U.S. study, Brynjolfsson & Yang⁴¹ have argued that conventional growth accounting does not take into account intangible investments such as the adjustment costs incurred during installation and the unmeasured investments which are complementary to computer technology. This matters if one wishes to understand productivity growth. When the ICT investment rate is slow or when the size of these intangibles is relatively small, conventional accounting does a reasonable job at estimating the rate of output and productivity growth. In the case of computer investments, however, the growth rate has been 30% in real terms for the last three decades, thereby, in their view, undermining conventional growth accounting methods. They confirm that:

- The US may have created over \$1trillion of computer-related intangible assets over the past decade – however, data systems cannot tell us for sure
- 1998 investments in computer-related assets – tangible and intangible – may have constituted as much as 10% of GDP
- A revised estimate that takes into account these intangible investments suggests that the TFP/ MFP of the US economy actually may have grown up to 1% faster during the past decade than previously estimated.

However, ICT is but one important factor in explaining growth and its cross-country disparities. Other conditions need to be satisfied in such areas as innovation, business creation and human capital⁴². The evidence the OECD has accumulated in its Growth Project suggests that if ICT is to cause a lasting improvement in productivity and growth, it must lie in its application, not merely in its production. That is to say that countries that do not produce ICT can benefit from it just as much as those, like the US, that have a substantial ICT production industry, so long as the right complementary skills and training are in place and work is appropriately re-organised.

As Shapiro⁴³ puts it, what we are witnessing is “a shift in emphasis, as networks, interconnection, compatibility, interfaces, and intellectual property rights have become increasingly important sources of competitive advantage.” What is new is the emphasis and attention knowledge is (rightly) receiving, not that knowledge has developed some kind of fundamental new economic role. This shift to what might be called a ‘new-look’ economy can be clearly seen in the growth of so-called residuals which are, in the words of Moses Abramovitz, ‘a measure of ignorance’. What actually may be new about today’s economy perversely might simply be our degree of ignorance.

In 1994, Zvi Griliches observed that the share of the economy which is measured by official statistics with a reasonable degree of accuracy is declining⁴⁴. Between 1947 and 1990, the fraction of the U.S. economy for which productivity data can be deemed reasonably accurate, he argued, fell gradually from close to 50% to about 30%. It is presumably lower again today. As a result, he commented:

⁴¹ Brynjolfsson, E. & Yang, S. (2001), “Intangible Assets and Growth Accounting: Evidence from Computer Investments”, Paper presented at the 4th Annual Conference on Intangibles at NYU, May 2001

⁴² This is demonstrated by KTH’s study (WP9.2.3) of the use of ICT in Scandinavia to deliver education and catalyse entrepreneurship in depressed rural regions

⁴³ Shapiro, C. (1999), ‘Competition Policy in the Information Economy’, in *Foundations of Competition Policy Analysis*. London: Routledge

⁴⁴ Griliches, Z. (1994), “Productivity, R&D and the Data Constraint,” Presidential Address, American Economic Association, Boston, January 4, 1994, in *American Economic Review*, vol. 84 No 1

“ Our ability to interpret changes in aggregate total factor productivity has declined, and major portions of actual technical change have eluded our measurement framework entirely.”

Factors which were deemed to be either inexplicable or statistically insignificant (and therefore treated as residuals), seem to have gradually emerged out of the negligible category and are now too important to ignore. They have been important factors in the production model for some time but we have not paid sufficient attention. We needed the dramas of the internet and dotcom bubbles (and the subsequent fall-out) to highlight things which have been clear to others for some time. What may have seemed like a sudden and dramatic intervention by computers and micro-chips was, probably, more like the result of a long, cumulative and path-dependent development of knowledge and technology, spanning many years. Such developments took place outside the scope and capabilities of the System of National Accounts (SNA) – and therefore, we missed it. The scale of the problem is both significant and urgent when one considers the size of the sums involved and the impact of the policy decisions that are taken on the basis of national accounts data.

At a technical level, the SNA is poorly aligned to measure the economic realities. A fundamental reorientation of the conceptual framework and data specifications is needed as a matter of urgency⁴⁵. In particular:

- Measurement needs to be reoriented around the value-drivers of economic production
- In so doing, it is conceptually important to recognise that there are investment activities which evidently lead to the formation of ‘assets’ (in the sense of a store of value) that are then used in production, but do not conform to the generally accepted definition of a fixed asset. When you invest in a fixed asset, you expect a flow of services. When you invest in technology or human capital, the goal is to get a step ahead, by securing some form of competitive advantage or the possibility of securing monopoly-type rents, often through property rights
- In developing this line of thought, it is essential to separate scientific and artistic originals from the tradable rights that may be derived from those originals. The originals are in effect a public asset whereas the rights are assigned to private entities for the purpose of monopoly rent. Originals are public goods that have been accumulated over thousands of years, and are non-rival in use
- Originals are very different from our conception of a fixed asset and cannot appear in the ‘balance sheet’ of the originator or user. What should appear in the balance sheet is any patent or copyright, or *de facto* equivalent that guarantees property, or monopoly rights, over the original. Such an asset is created by legal, contractual or institutional instruments and is similar to a financial asset. Such an asset should not be confused with a fixed asset. Both financial assets and property rights arise directly from legal agreements and their ongoing value is impacted by changing market conditions which give rise to potentially realizable holding gains (or indeed losses)
- Recognition of innovation expenditures, such as R&D and other forms of intellectual capital formation, as value-creating activities is recommended to better align the national accounts with economic realities. R&D expenditures are treated by national accounting as current expenses. This is illogical given software development and artistic (as opposed to

⁴⁵ A detailed treatment of the deficiencies of the SNA is beyond the remit of this report. Youngman, in WP5.10, offers a wide-ranging treatment of the statistical lacunae highlighted by the intangible economy, with references to other seminal research in this area.

scientific) originals are now treated by the SNA as capital assets. Research and development adds to the stock of knowledge and should be viewed as a capital stock which is used repeatedly over a number of years in the production process – as are fixed assets. Although long-standing problems of definition mean that official R&D data is notoriously unreliable, in many countries reported expenditures by the business sector are now approaching 3% of GDP⁴⁶

- In addition, educational expenditures - including training and skills development - are not viewed by us to be final services consumed at the point of delivery, but are actually intermediate services which the student consumes for the purposes of building human capital. This capital is owned by the household sector of the economy and is in effect then leased or rented by companies as an input into the production process
- Our first estimates, performed on the UK economy, suggest that the effect of taking this perspective on human capital formation would increase GDP by about 7% and would increase the official economically-active workforce by about 10%⁴⁷
- Accordingly, we propose that, in future, the SNA introduces two other ‘asset classes’ – technological originals and human capital assets. Treating originals as technology assets rather than fixed assets may appear to be a superficial change of terminology rather than substance. However, an entirely different picture of the economy is painted that sends very different signals to users of the accounts. The accounts would track a major new flow, which can best be described as ‘investment in technology’
- A further major gap in the SNA is its failure to measure the values of the inputs into production from fixed and natural assets. For policy analysts this is a serious limitation of the SNA in providing a basis for production and productivity analysis. An economic production account could easily be accommodated on a ‘memorandum’ basis within the general accounting framework of the SNA without changing any of the basic concepts or fundamentals of that system⁴⁸.

(ii) Corporate accounting and reporting

Similar cognitive and measurement problems exist with the corporate accounting framework.

Parallel with the system of national accounts, Pacioli’s 500-year old mercantile model has been adapted over many generations to the needs of an industrial manufacturing economy and, arguably,

⁴⁶ *A recent survey of the European Roundtable of leading industrialists found that their average R&D investment was 9% of turnover. This also highlights one of the problems of our R&D measurement system, which is insufficiently discriminatory to be of real use for policy analysis. The need for reform of the measurement protocols for R&D and productivity of service industries is now an acute issue that requires urgent attention from the policy community and statisticians. R&D has changed as a process - collecting data on investment expenditures and related processes will need to adapt.*

⁴⁷ *Hill & Youngman, WP5.3, ibid*

⁴⁸ *The so-called ‘production account’ currently found in the SNA is not a production account, but rather a ‘value added account’. Although consumption of fixed capital is measured it does not measure the inputs of capital services into production provided by fixed assets. For this purpose, rentals are needed, which might be approximated by depreciation plus the cost of capital, or interest. In the case of natural assets, not even depreciation, or depletion, is measured. It is not being suggested that the existing SNA sequence should be scrapped and replaced by a new set leading off with a proper production account, but rather that an alternative set of accounts could be set up in parallel. The precedent for parallel accounts has already been set in the 1993 SNA with the two concepts of consumption.*

now does a satisfactory job of tracing the transaction flows in and out of the enterprise. It records - with ever increasing accuracy - the mix of raw materials, labour and financial capital, and their cyclic flow through the production, sale and distribution of physical commodities. It also does a reasonably good job of tracing the value-building implications along the physical supply chain.

Accordingly, the reporting model is deeply rooted in the notion that sustainable growth and performance lie in the accumulation of fixed assets such as property, plant and equipment (Blair and Wallman, 2000).

These systems were designed to provide reliable cost-based information about the value of assets used in production, and about the net value (adjusted for depreciation) of the output produced by these assets. Intangibles strike at the very heart of this model, because their value for an organisation is not linked to transactions, but to their imaginative (and often serendipitous) application, leveraged by networks and 'macro' factors - tangible and intangible - external to the core enterprise. Even if conservatively enforced and supported by effective governance systems, the changes in the underlying structure of the economy have marginalised the cost-based accounting model as increasingly irrelevant in judging the health and future performance of the business economy.

Regarding the financial reporting model our conclusions are that:

- Our traditional accounting techniques have failed to keep pace with the value-delivery mechanisms of a knowledge-intensive economy. In conventional accounting practice, tangible acquisitions such as computers, land and equipment are treated as company assets. Investment expenditure on knowledge-building activities such as training and R&D are still largely treated as costs. This is despite such activities being a primary source of organisational wealth in the modern economy
- There is also a strong relationship at the firm level between reporting and management tools. Generally speaking, management only wants to report externally on things they are confident they can predict and control, and where disclosure makes sense in the context of the business strategy and operating plan
- At the firm level, one area where conventional accounting performs particularly poorly is in tracing the accumulation of internally-generated intangibles, such as R&D, brands and human capital, which are now viewed as the engines of economic growth. Thus far, the accounting community has adopted the line that, in general, any internally-generated intangibles should not be treated as an asset in published company accounts
- As currently constituted, our accounting principles are simply silent on the most important drivers of corporate success in the knowledge-based economy. As many commentators⁴⁹ have already observed, there presently exist no adequate accounting techniques for determining and reporting the value of intangible assets such as the skills of workers, IPR, business infrastructure, brand names, databases, and relationships with customers and suppliers.

⁴⁹ A substantial body of academic literature has been accumulated on the recognition, measurement and disclosure of intangibles over the past 10 years. For a comprehensive and highly readable account of the intangibles phenomenon see Baruch Lev (2001); also FASB (2001)

Economic consequences of inadequate accounting for intangibles

If intangibles are not reflected in the financial statements, and intangible investments are fully expensed as they are undertaken, both the book value of equity and corporate earnings are understated by the conventional accounting model. This makes it practically impossible for management and investors to:

- (i) Assess the rate or return (productivity) of investment in intangibles, and changes over time in the efficiency of firm investment activity
- (ii) Evaluate shifts in the portfolio of a firm's intangible investments - from long-term research to short-term development, or from product development to "process (cost reducing) R&D"
- (iii) Determine the value of a firm's intangible capital, and the expected lives (benefit duration) of such assets (Blair and Wallman, 2000).

Despite the evidence that this presents an urgent problem for corporate managers and investors, accounting standard-setters around the world have encountered great difficulties in their attempts to improve disclosures about intangible assets.

Broadly speaking however, there are two areas where the existing model could be expanded to provide a clearer picture of internally-generated intangibles:

- By means of historically-based data points whose position and momentum may provide a basis for predicting the future. Such data might include a more comprehensive breakout of investment spend on R&D, ICT or workforce development and training⁵⁰. Alternatively, it might be liquidity ratios, load factors, innovation revenue, repeat-order profiles or customer or employee turnover rates. However, past events are a notoriously poor predictor of future performance
- Via asset-like indicators, which form a broad spectrum⁵¹ from 'hard' indicators - such as annuity contracts, patents and other income-generating licenses, to 'soft' indicators such as the profile of workforce qualifications. The problem with these measurements is that they only have context and meaning in relation to one's competitors. In absolute terms, management cannot decide saturation levels - for example, is an investment of 5% of turnover in research and product development enough, about right or too much? What are the expected returns on these investments? What are the pre-requisites for future success? IC rating tools are available that may be useful for CEOs who have an intuitive feeling about the state of their intellectual capital, but have no generally recognised way of communicating it to the board, or the organisation at large.

Recent developments in measurement and reporting

The first signs of a co-ordinated response can be traced to the development of intellectual capital (IC) statements in the early 1990s. This movement was especially prevalent in northern European countries. Fundamentally, such statements have a function of auto-analysis for the firm, forcing it to be aware of both its implicit assets and the different links between the various types of capital. The firm therefore could more easily and consciously define a proper strategic positioning. It is also

⁵⁰ As elaborated in Brookings (2000) "Unseen Wealth", by Blair and Wallman, pp 61-65

⁵¹ *ibid*, Eustace & Youngman (2002), WP1.7

better able to evaluate its internal and external growth opportunities. Conceptually, the IC movement owes a debt of origin to Kaplan and Norton's balanced scorecard, which was the genesis of the external reporting systems promoted by pioneers such as Sveiby, St Onge and Edvinsson. However, its adoption as a mainstream reporting tool has been limited and it is not yet clear whether they will deliver what they promise. It is fair to say that a much larger company experimentation in this field is needed, and that the potential of IC reports for both internal management purposes and external communication appears to be significant.

In corporate financial reporting, a landmark event took place in July 2001, when two new US accounting standards (SFAS 141 and 142) proposed a different treatment of goodwill and intangibles with an indefinite life arising from business combinations. In essence, this new treatment consists of subjecting such assets not to systematic amortisation, but to an annual impairment test of their value. Given that this new accounting treatment for such items is likely to be extended to European listed companies in 2005 via the IASB standards, this regulatory change will stimulate a wider interest in the management of intangibles and their representation in company statements. The lessons learned from first round of SFAS 141/2 reporting in the US will lead to a refinement of the techniques to address this accounting innovation⁵².

It is to be expected that the proposed increase in the disclosure on intangibles in the notes to (and management discussions and analyses of) financial statements will stimulate further experimentation. A further stimulus to both the management and disclosure protocols will come from the new search and consolidation facilities offered by Extensible Business Reporting Language (XBRL)⁵³.

In parallel with these developments public sector accounting has seen similar moves towards more transparent disclosure of infrastructure assets, including intangibles. In this respect, a decisive marker in the sand was put down in June 1999 when the US Governmental Accounting Standards Board (GASB) brought about sweeping changes in governmental financial reporting through its statement no. 34. Asset management through a modified approach for reporting infrastructure assets includes:

- (i) Capitalisation of infrastructure assets
- (ii) Condition of infrastructure (assessed every 3 years), and
- (iii) What is being spent to maintain it (assessed annually).

Reporting on infrastructure assets has thus now become mandatory, and the extension of this context to the treatment of intangible assets is firmly on the GASB agenda.

Proprietary guidelines are being actively promoted by many of the stakeholder groups⁵⁴, but different means of sub-dividing the field of intangibles proliferate. Examples include:

- Disembodied/ embodied (as used throughout this report)
- Produced/ non-produced (a sub-classification used prominently in the SNA)
- Disentangled/ entangled

⁵² *A preliminary assessment of the impact of SFAS 141 and 142 on a sample of European firms is contained in Crosara and Zambon, WP4.5. Using their index, the new standards result in differences of up to 25% in reported net income, ROE and shareholder equity. The differences show wide variations between EU countries.*

⁵³ *The Australian Prudential Regulation Authority is one of the first government agencies in the world to adopt and deploy XBRL – as reported in UCC's case WP9.1.3*

⁵⁴ *Notably, in Europe, the guidelines published by the Danish, Nordika and Meritum projects, and the U.S. Brookings and GRI initiatives*

- Human/ non-human
- Animate/ inanimate.

From an internal perspective, differences between firms will lead to each developing its own idiosyncratic means of tracking key indicators of performance, but there is a growing acceptance that common performance indicators can be synthesised at the industry sector level⁵⁵. For example, The Brookings report⁵⁶ called for macroeconomic and microeconomic performance indicators that provide "... industry-level information to individual firms for benchmarking purposes," with the longer-term goal of improving the flow of information on intangibles to investors.

Despite Brookings' and other similar proposals⁵⁷, there appears to be little appetite in the intangibles literature for industry-specific reporting per se. Indeed, it would appear that a number of reporting items could be used that would be the same for a wide variety of industries, and hence would not need to be industry specific. Certainly the taxonomy developed under the auspices of PRISM by David Young⁵⁸ is relevant for almost any industry and, as he observes, "patents obtained, growth in customers, development of software, increased retail shelf space, and the like, while not appropriate for all industries, would have a broad enough applicability that work on industry-specific intangibles could, as a minimum, be postponed for several years".

Industry-specific reporting may or may not be needed, but it is clear that a firm's chosen industry sector is important. Firm-level profitability, certainly as measured by return on assets, differs considerably across industries in all the major economies. As a result, readers of a firm's intangible reporting statements would appear to need information about the overall attractiveness of the firm's chosen industry if they are to fully understand the firm's profitability potential. This, of course, is quite different from industry-specific reporting on intangibles.

It is difficult to lay down standards at this stage, firstly because we are still learning but also because this is not a simplistic 'one size fits all' problem which can be solved by externally-imposed standards. Arguably, standards should aim to enshrine best practice rather than set out to prescribe new and untested protocols:

- The recent spate of high-profile corporate failures and the loss of investor confidence in the integrity of company and financial analysts' reports will open up new opportunities to reform corporate reporting
- In accounting standards, the U.S. FASB proposals of July 2001⁵⁹ were an important step forward and the IASB is currently keeping under review the results of reporting on intangibles in business combinations with the aim of reforming the global financial reporting standards in this area^{60 61}

⁵⁵ *As suggested by Brookings and shown by PwC's research into future reporting models (footnote 63)*

⁵⁶ *ibid, Blair and Wallman (2000)*

⁵⁷ *Notably from the multinational accounting firm PwC*

⁵⁸ *David Young, "Toward A Set of General Principles for Measuring and Reporting on Intangible Assets", PRISM WP4.13*

⁵⁹ *As developed in FASB, 2001, "The Upton Report" and prescribed in SFAS 141/ 142*

⁶⁰ *Related technical issues, such as revenue recognition and the treatment of assets and liabilities arising from long-term annuity contracts (licenses and other operating leases, multi-annual and executory contracts), are also being addressed by the accountancy regulators*

- FASB is moving ahead with a project whose goals include "improving the quality of information displayed in financial statements so that investors, creditors, and others can better evaluate an enterprise's financial performance"
- While external reporting is of secondary benefit per se, it can be an effective driver of change, since internal company systems respond to, and align with, external demands for business information and not the other way round. A (limited) revision of the international standard IAS 38 'Accounting for Intangible Assets' would assist in opening up the field to developers of the much-needed new management tools in this area. What is needed here is a breakout of the internal investments in key intangibles together with more standardised information about their value. This would be of considerable value to investors and other users of company accounts and would enable aggregation for policy analysis at a macro level under a revised chart of accounts.

Proposals for a framework for convergence

The various guidelines published by the Danish/ GRI/ OFR initiatives address different aspects of performance measurement and in so doing serve their own user (stakeholder) communities. As learning reference points these are useful, but from a policy angle we urgently need a holistic reporting framework that is recognised and acceptable to (i.e. used by) the key interest groups. We urgently need to go beyond an acknowledgement that the current reporting framework is inadequate and the temptation to suggest yet another measurement system. The time has come for the proliferation of guidelines and methodologies to converge and move toward⁶².

A recent development by the multinational accountant, PwC, may provide a useful point of convergence. PwC⁶³ propose a multi-layer model conceptually similar to the OSI model that laid the groundwork in the 1960s for today's global telecoms standards and data exchange protocols. Arguably, this laid the foundations for the ICT revolution of the last quarter of the 20th century and provided a launch pad for the digital networked economy, and the internet.

PwC's ValueReporting methodology has been developed off the back of extensive research in 13 industries. It postulates that the future of corporate reporting will contain three tiers. The first will contain an expanded set of accounting standards applicable to all. The second will consist of measures and indicators which are applicable to the particular industry. And the third will contain measures that are unique to the company, thereby recognising the uniqueness of value creation within the "black box" that is the firm. These information layers, once laid down and agreed, could provide the basis for additional layers and views - or 'lenses' - to accommodate other perspectives like CSR, environmental reporting and human resource reporting.⁶⁴

The international audit firms and credit rating agencies have competing infrastructures for determining and delivering sets of data and information in standardised formats. They should be brought into the policy process since they will act as catalysts for the automation (via XBRL) of much of the supply of sector-specific metrics.

The research by David Young⁶⁵ at the Boston School of Management has broken new ground conceptually in shaping the theoretical underpinnings of a new reporting model that is orthogonal to

⁶² As articulated by Adele Del Bello in WP4.6

⁶³ In "Building Public Trust – The Future of Corporate Reporting", by S. DiPiazza and R. Eccles (2002)

⁶⁴ The Ferrara WP4 research package contributed to monitoring these developments

⁶⁵ *ibid*, Young, WP4.13

the PwC vision. Drawing on the corporate strategy literature⁶⁶ he asserts that:

“... it is the strategic positioning - and the sustainability of that competitive position - that reporting on intangible assets is attempting to measure”

The proposal goes on to lay out a set of principles, together with the broad lines of a methodology for intangible assets, which he suggests should be given the designation General Accounting Intangibles Principles (GAIP). His classification system is set out below:

A classification of intangible assets according to ease of measurement

Intangible Assets			
Can see and/or touch		Cannot see or touch	
<i>Possible to assign a monetary value</i>	<i>Difficult to assign a monetary value</i>	<i>Easy to describe</i>	<i>Difficult to describe</i>
Contracts with monetary amounts specified, incentive compensation systems, board member compensation policies	Internally-developed patents, contracts without monetary amounts specified, customer histories, secret formulas, trade names, copyrights, delivery routes, software programmes, procedure manuals, board member affiliations, licensing agreements	Training programmes, recruiting programmes, shelf-space agreements, established distribution channels, organizational structure, technical expertise	Talent, creativity, cultural assumptions

Source: Young (2003)

The proposals also identify the key issues that need to be tackled in order to promote a new standard for intangibles reporting. In the main, these revolve around the issue of drawing a boundary between intangibles that can be disclosed and those that cannot. Trade secrets will have to be respected, even if they constitute key intangible assets, otherwise firms could be forced to divulge their ‘magic dust’ to competitors. An interdisciplinary forum, led by an international regulator such as the European Commission and involving all stakeholders, is required in this respect.

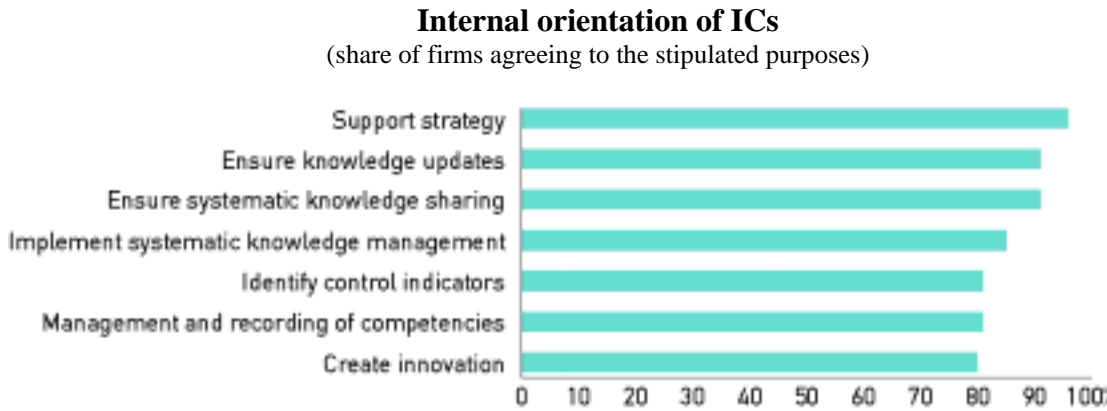
⁶⁶ David Young also offers the following perceptive insight: “Strikingly absent from the literature on intangibles is the perspective of the field of corporate strategy. Yet for over 60 years, researchers and practitioners in this field have been developing frameworks for assessing a firm’s strategic positioning and the sustainability of its competitive advantage. In effect, this field has had as its primary focus those activities that are not reported on a firm’s financial statements but that assist the firm to select and maintain a competitive position in an industry, or even, at the corporate level, to decide which industries to enter and exit. In many respects, it is these activities that intangible reporting seeks to measure”.

C. Issues for the Business Community

(i) Considerations for corporate executives

The overriding issue for corporate executives is less about coping with intangibles than rebuilding trust in the functioning of the markets. The starting point is better performance information – multi-dimensional indicators, ratios etc. that enable more enlightened, rational judgments to be made about the productivity and profitability of firms. This means bringing together a number of initiatives and perspectives which already exist – knowledge management, intellectual property management, human resource accounting, etc. – and creating a holistic picture of the business and what is going on within its strategic (as opposed to legal) boundaries.

However, motivations for corporate executives to change their management techniques and look more seriously at measuring intellectual capital and other intangibles do exist. For example, a recent survey in Denmark⁶⁷ found that intellectual capital statements (ICs) are interesting to firms if they allow them to attract and manage valued resources. In Denmark, firms orient their ICs internally and externally, as shown by the histograms below.



Source: Mouritsen (2003)

The internal orientation stresses the management of intellectual resources and shows the objects around which this is accomplished. It is clear that intellectual resources are interesting for management to get some sort of return on knowledge through knowledge management. Knowledge is related to strategy, and it is built into management control procedures so as to make certain information-cues available to support systematic knowledge management: development (up-dates) and sharing with a view to innovation.

Once intangible assets have been identified they need to be seen to be managed within the organisations’ strategic parameters: knowledge goals, which intrinsically are long-term, allow the company to develop its intellectual properties alongside its more prescriptive corporate path of development. However, since knowledge can only be built up over the medium to long term, demands for rapid strategic or corporate change are not easily achieved.

The starting point for a measurement framework is new tools and protocols for managing intangibles internally. External disclosure to legitimate interest groups is not possible without first

⁶⁷ See Jan Mouritsen’s final report, WP6.3, pp6-7

laying down a new generation of internal management systems, although responsible guidelines for external reporting will go some way to encouraging disclosure where this aligns with the firm's interests. It is clear to us that the necessary systems will take some years to evolve and regulation in this area is not appropriate, at least at this stage. Rather, policy should focus on fostering standards, since the new measurement norms will evolve through a learning and experimentation process (as shown by the Danish studies).

A historical parallel may be drawn with the development of electronic data interchange (EDI) and the evolution of the EDIFACT standard. A major factor in the rapid migration of EDI in the 1980s was the decision by the Commission to bring the software industry centre-stage and give it a lead role in promoting trials and experimentation, with financial assistance at an EU level in the developmental phase.

External orientation of ICs

(share of firms agreeing to the stipulated purpose)



Source: Mouritsen (2003)

The external dimension is an assemblage of reporting and intervention. The structure of the firm's knowledge resources are emphasised particularly in relation to individuals. The descriptive parts, however, are also related to the strategic parts, as they are seen to strengthen and develop relations to valued resources such as employees, customers and partners.

The issues go well beyond business economics and accounting to survival in the 21st century economy:

- There will be big winners and losers as these dynamics play out, and the early and successful adopters gain prominence
- It is vital for the business community to enter the debate – act now or be left behind
- It is about assisting corporate boards become more comfortable with their remit in the expectation that levels of scrutiny and accountability are on the rise, by finding a way to see what is really going on within the company
- It requires us to rebuild public confidence in the lines of defence that protect shareholders and investors against securities fraud and other unwarranted 'insider' manipulation of

financial information. This will require a fundamental change of discipline and reward systems to curb the culture that incubated many of the corporate excesses and failures of the dotcom era, and re-draw the line between the poachers and gamekeepers. One policy concern here is the erosion of governance discipline over the past decade in relation to professional gatekeepers such as CFOs, auditors and legal advisors (internal and external) and their self-regulatory bodies⁶⁸.

This is challenging as it affects the whole organisation – structurally and culturally⁶⁹:

- Innovation, which tends to be driven by individuals, is frequently and unnecessarily constrained by over-zealous or short-sighted risk management, which tends to be driven by management at an organisational level
- We are mostly trained to think and act with a financial capital perspective. Creating a new type of dialogue around knowledge creation and its circulation is tough
- We are trained and conditioned by our reward systems to develop relationships internally; now we need to develop the competences to engage with others from outside
- This is also about creating new modes and reference models of governance for the younger generation
- At a national level, Denmark has amassed valuable experience in its on-going project with intellectual capital measurement, in which over 100 companies are now involved. The Nordika FRAME project has also involved a wide cross-section of the business and user communities
- Business combinations will provide a learning experience for corporate executives, accountants, and investment bankers. Acquisitions will be more closely scrutinised for what the goodwill paid is actually composed of. Trying to account for and justify a valuation by identifying those intangibles which can be disentangled will be a useful exercise
- Cases of best practice exist, such as the IESE case on Union Fenosa⁷⁰. This case provides strong evidence that those organisations that are taking steps to manage their intangible assets better are getting positive, measurable results. It also shows how difficult it is and how much sponsorship is required
- Industry-specific technology platforms based on XBRL will enable data to be captured more cheaply and efficiently, with the benefit that the data can be cut and sliced to suit the end user⁷¹.

⁶⁸ *Exhorting the accounting profession to embrace reform and change, Paul Volker, former Chairman of the US Federal Reserve observed recently “I see the role of an auditor as guardian of the ‘truth in markets’, acting in the public interest to maintain reliable and consistent financial reporting ... what is at stake is the credibility of a profession that, in fact relies on that credibility as the bedrock of all it does” (World Congress of Accountants, 2002, Hong Kong)*

⁶⁹ *See Low and Kalafut (2002), “Invisible advantage: How intangibles are driving business performance”*

⁷⁰ *See IESE case study “Union Fenosa Corporate University: teach and learn from experience” (WP9.5.2)*

⁷¹ *As discussed in Kurt Ramin’s paper: “XBRL as a New Language for Business and Intangibles Reporting” (WP4.12) and the UCC case studies*

If Italian managers are typical of European corporate executives, it is clear from the headline results of the SUMMIT survey of Italian executives⁷² that the answer to these issues does not lie in simply expanding financial reporting:

- ❑ 80% do not trust financial reporting – as it can lead to erroneous valuations, especially in regard to prospective forecasts
- ❑ Only 18% said that financial statements have anything useful to say about the future
- ❑ 85% agree with the idea of seeing more non-financial information published
- ❑ 54% claimed they were already doing it
- ❑ 79% said that such information should be presented in a separate report – with numbers to be accompanied by narrative.

There is a growing acknowledgment that change in the corporate disclosure culture is coming, whether it be from market forces or external regulation. A key question for policy is how to respond to the issue of information asymmetry. History suggests it is best to be at the forefront of such change, innovating and influencing it, not following it.

(ii) Considerations for providers of capital

It is often assumed that providers of capital are not concerned with measuring and evaluating intangibles. The reality is that they have been doing so - albeit intuitively and subjectively - for some time; but without using the same language as intangibles, or recognising what they are doing⁷³. For example:

- In IPO prospectuses, many professionals comment on the listing entity's business plan and indeed sign it off. Some underwrite them with their own capital and reputations. They do this on the basis of judgments made on a number of loosely-collected reference points - financial information, track record, quality/ experience of management, dynamics of the industry and market, assessment of the risks and opportunities
- The rating agencies consider a similar set of non-financial information in delineating the different levels of default risk on the debt obligations of nations and corporations, and a variety of securities and other financial instruments. Financial information is the result of how many of these factors play out
- Venture capitalists tend to invest in a management team and its ability to extract economic value from a particular business model, technology, or market opportunity
- Bankers are also making intuitive judgments on intangible factors, particularly in their extension of credit to small and medium enterprises on the basis of budgets and forecasts. However they will likely remain more interested in present value so long as their risk/

⁷² Survey of 1400 senior managers (of companies with more than 250 employees) in July/August 2002 – they received 680 replies

⁷³ As outlined by Frede Mørck in “Intangibles and risk assessment by bankers and VCs” (WP7.4)

reward model stays the same. Is this a potential block on the growth of European SMEs? Is there a need for a new form of bank?⁷⁴

Some providers of capital are known to be developing their own methods:

- The California Public Employees' Retirement System (CalPERS), which provides retirement and health benefit services to more than 1.3 million members and nearly 2,500 employers, is developing a checklist of sustainable performance indicators
- The UK pension fund manager, Hermes, has published a framework of indicators of corporate governance best practice⁷⁵
- Some banks are known to use scoring methodologies to take into account intangible factors.

In the current economic environment, where business models, organisational forms and measurement systems are in a state of transition, new risk scenarios are emerging and providers of capital need to have access to information that will allow them to allocate, and price, financial capital accordingly. They may also need to invest in some re-skilling to be able to make good use of such information.

*(iii) Credit risk analysis in corporate lending*⁷⁶.

It is often assumed that banks are not concerned with measuring and evaluating intangibles beyond characteristics of a business such as goodwill and patents which currently feature in established accounting standards. Intangible and latent competencies such as competitiveness or management quality have in fact been incorporated in credit risk analysis for some time, albeit intuitively and subjectively, and with neither a common language nor explicit measurement. The following derivative of the PRISM schema in Fig 1 offers a credit perspective on the knowledge value chain:

Commercial bankers work in risk aware cultures. They often assume that the historical financial performance of a company provides a more objective view than any qualitative measures, which, when used, consist of simple checklists rather than any attempt at predictive modelling based on cause and effect. Traditional key performance indicators are only the visible effects of interdependent intangibles working beneath the surface of the value-creation process. Uncertainty due to a lack of sufficient forward-looking data augments perceived risk and often results in decisions not to lend. The lack of a common language for borrowers and lenders to discuss intangibles is a major reason for the funding gap of small and medium sized innovative European companies.

To assess the impact of intangibles on credit risk we shouldn't over-emphasise measurement but should focus instead on assumptions surrounding the intangible drivers of cashflow in calculating borrowers' probabilities of default. Although the Basle II capital accord doesn't accommodate the explicit inclusion of intangible competencies and latent capabilities within banks' credit models, understanding and incorporating intangibles is in fact implicitly compatible with the Basle II IRB foundation and advanced approaches. Banks can gain both top and bottom line benefits through

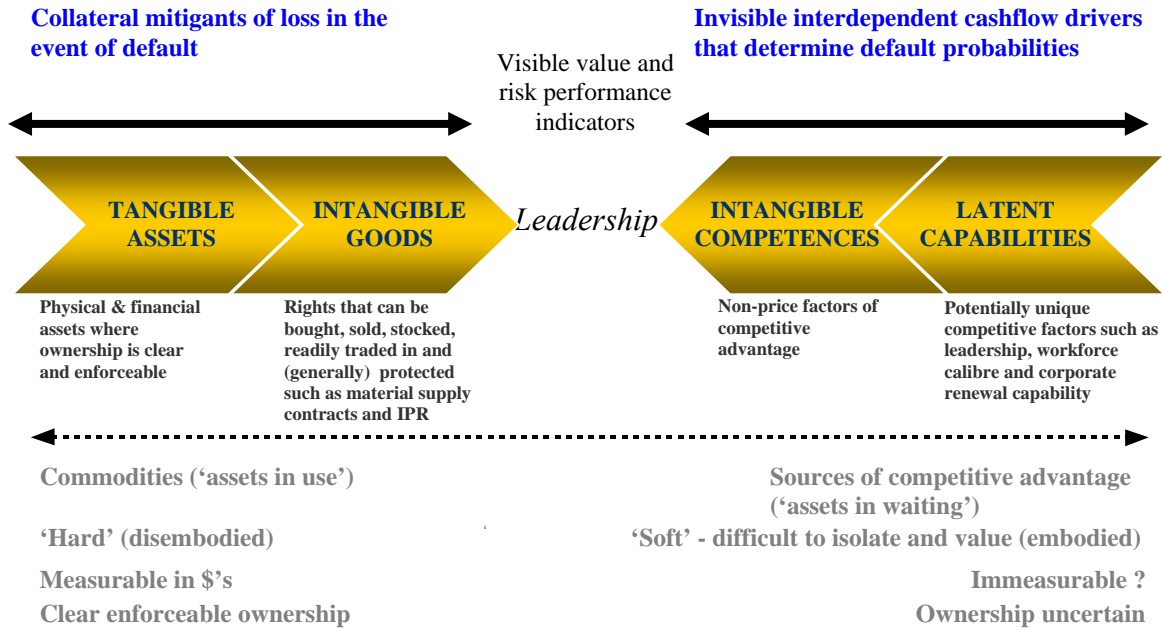
⁷⁴ TSM's case (WP9.3.2) describes how Rabobank evaluates the intangible aspects in start-up business plans

⁷⁵ A copy of the rules, known as the Hermes principles, has been sent to every UK-listed company, in a move that increases pressure on poorly-performing businesses

⁷⁶ For an excellent review of the issues for credit risk analysis in corporate lending, see Mike Hall's paper "Measures to increase the effectiveness of credit risk analysis in corporate lending through a better understanding of the role of intangibles" (WP7.1)

reduced credit losses *and* lower capital allocation. The inclusion of intangibles will however need to be incremental rather than revolutionary, principally due to legacy IT systems and need to abstract context and knowledge within broader credit metrics.

Intangibles as drivers of credit ratings



Source: Hall (2003)

Since measures for intangibles are often borrower-specific, they have to be tacitly understood both at the initial lending decision as well as during the lifetime of the loan. Such knowledge management and cultural challenges require new skills and competencies acquired via techniques borrowed from complex adaptive systems theory which challenge the orthodoxy of scientific management and mainstream consultancy, and which require an understanding and clear separation of context, narrative and content management.

The intended long-term economic benefits to the stability of financial markets will take many years to come through. The main short-term benefits will lie in a decisive change of mindset towards a more discriminatory and transparent risk-management process, and EU financial regulators will need to take care to ensure that the practical outcome goes beyond a short-term windfall for the information technology and systems supply industries.

The WP7 papers by Morck and Hall present an embryonic framework of indicators to improve credit risk management and competitiveness in the banking sector. In addition they call for the investigation of new business models for investment analysis which better incorporate intangibles in order to improve the flow to capital to those businesses most deserving it:

- (i) The conception, development and implementation via training programmes of human skills and competencies not currently used widespread in investment analysis

- (ii) Investigations into the demand for and feasibility of methods for improving the understanding and communication of intangibles within the business reporting system.

(iv) *Considerations for the investment community*

The argument has been made that the ‘true value’ of a company’s intangibles can be determined by comparing the market value of its stock to its book value, i.e., its equity.⁷⁷ It is also argued that the difference between the two can be causally attributed to such factors as human capital, R&D spending as a percent of sales, and education and training of the workforce.⁷⁸ Two questions arise that relate to measuring and reporting on intangibles⁷⁹:

- First, can it really be true that the dramatic declines in market caps of most publicly-traded companies over the past two years have come about because these companies reduced their spending on R&D, cut back on workforce training, and the like? If not, then something else is at work, and the gap between market value and book value ceases to be as good a measure of the true value of a company’s intangibles as has been suggested
- Second, and perhaps more importantly, since there is no standardised measurement or reporting of a company’s intangible assets, the market valuation is based on imperfect information, or, at best, asymmetrical information. In this regard, two goals of the effort to measure and report on intangibles are (a) to improve the quality of the available information and (b) to reduce existing information asymmetries.

(v) *Considerations for financial analysts*

The development of a more holistic information set challenges the current business model of the analyst community (currently under legal and regulatory review in the U.S.):

- This would require analysts to formulate ‘ecologies’ of measurements into an overall picture from which to take some value judgments as to how well-managed the resources of the business are
- Given the potential change in the analysts’ business model - in particular how they are rewarded - such developments provide challenges
- If they are not to be paid for research, they will want information in a ‘ready-to-go’ format
- What is the future of such traditional professional intermediaries and their roles? Are all these forces at work going to lead to the emergence of new kinds of info-mediaries who are willing and trained to package such information together?

⁷⁷ See Robert E. Hall, “E-Capital: The Link between the Stock Market and the Labor Market in the 1990s,” *Brookings Papers on Economic Activity*, 2:2000

⁷⁸ See Bronwyn H. Hall, “Innovation and Market Value,” in Ray Barrel, Geoffrey Mason, and Mary O’Mahoney (eds.) *Productivity, Innovation, and Economic Performance*, Cambridge, England, Cambridge University Press, 2000; Timothy F. Bresnahan, Erik Brynjolfsson, and Lorin M. Hitt, “Technology, Organization, and the Demand for Skilled Labor,” in Margaret M. Blair and Thomas A. Kochan (eds.), *The New Relationship: Human Capital in the American Corporation*, Washington, D.C., The Brookings Institution Press, 2000; Baruch Lev and Theodore Sougiannis, “Penetrating the Book-to-Market Black Box: The R&D Effect,” *Journal of Business Finance and Accounting*, vol. 26, April-May, 1999.

⁷⁹ *ibid*, Young, WP4.13

- And as a matter of IPR, how will those info-mediaries protect and benefit in the longer term from the information packages they put together?⁸⁰

In the field of financial analysis, the European Association of Financial Analysts (EFFAS) as well as the national associations should be encouraged to mount a serious conceptual and educational effort with their members aimed at diffusing a ‘culture of disclosure’ relating to intangibles and making professional analysts appreciate the value of more extensive intangibles-oriented reporting (e.g. lower cost of capital and price volatility due to the reduction in the informational uncertainty). Again, valuation per se is not the issue.

(vi) Considerations for rating agencies

This evolution appears crucial also for the refinement of the credit rating assignment process, which today seems to be deficient vis-à-vis its capacity to embody an evaluation of company intangibles in a more structured and objective way. This is especially important in view of the marked equity-to-debt shift over the past 20 years in the profile of capital market transactions⁸¹, and the array of sophisticated financial instruments that are now available globally.

It is not inconceivable that IC rating tools will mature as a standard to assist capital providers⁸². IC rating tools are a response to the notion that companies want to use their own indicators. A common rating standard for intellectual capital is seen as a complement to the financial rating systems of the major rating agencies, such as Moody’s and Standard & Poors. It is intended to ‘score’ companies against their idiosyncratic measures to result in a comparable standard and give more meaning to the intellectual capital indicators used today.

(vii) Considerations for auditors

In the field of audit, it appears that we are still far away from a consensus on how to audit innovative forms of reporting such as IC statements, as well as the financial values stemming from the application of the new US standards (SFAS 141 and 142).

In the post-Enron world of business ethics, it is now increasingly accepted that auditing is an inexact science, where privileged information channels and professional judgment are significant, if not overriding factors in verifying the key accounting numbers – revenue recognition, ‘fair’ values, provisions, liabilities etc. In many of these areas, auditing practice is more akin to an art than a science.

The ‘big four’ global audit firms are aware of the need to lay down internationally-acceptable principles for auditing intangibles and the information thereon, but it is difficult to foresee any conceptual or practical basis for consensus in this area. In this respect, we again believe there is a policy priority to move from awareness to action⁸³, and promote the development of internationally accepted auditing standards. However, any external intervention regarding the reform of audit (as opposed to accounting) standards at the EU level will need to be approached with prudence and a clear eye to the balance between the commercial, professional and risk factors involved.

⁸⁰ *Data base law may assist for EU-originated data based research.*

⁸¹ *Eustace (2000)*

⁸² *At least two commercial IC rating products, from ING Bank (Netherlands) and IC Rating (Sweden), now exist in Europe*

⁸³ *ibid, Del Bello, in WP4.6*

That said, one immediate issue for auditing standards at the EU level is the fallout from SFAS 141 and 142, where new conventions are required to ensure a consistent accounting treatment. We urgently need agreement internationally on a valuation system for these disclosures, which will apply across the EU from 2005.

(viii) Government sector and public institutions

In this general framework it is important that governments and public institutions at the various levels seriously consider the relevance of our knowledge assets and representation of intangibles - not only for general economic growth, but also for the management and development of their own organisations and the public sector workforce. In many respects, the measurement issues are common to both the public and private sectors. Notable differences are that the public sector organisations do not have traditional shareholders and that they produce many non-financial outputs such as services to the citizen.

E-government services are growing in parallel with similar developments in the private sector. Most governments in developed countries are placing a great deal of emphasis on developing online services to citizens and business. Considerable resources are being committed to related initiatives under the general heading of “e-government”. In addition to the traditional stock of public intangible assets (patents, licenses and other exploitation rights), many of these initiatives are themselves creating new intangible assets such as fee-earning online services. Just as in the private sector, the execution arms of all EU public administrations are thus continually creating new intangible assets that are owned by government and capable of generating new revenue streams.

Most government departments have yet to develop a clear approach to managing and protecting these assets; rather, they are at an early exploratory stage and keen to learn about developments elsewhere.

In this regard, two main policy deficiencies need to be addressed:

- While government policies stress the importance of the knowledge-based economy for the private sector, they do not carry this through to government departments and agencies; and
- Benchmarking of public sector generally omits intangible assets.

Our research would suggest that much more value could be generated from these intangible assets which would allow the government in turn to cut costs by reducing funding⁸⁴.

⁸⁴ For a discussion of the special issues in the Government sector, and a strategy for tackling them, see Edward Truch in his Henley report, “Identification and Exploitation of Intangible Assets within the Machinery of Government” (WP8.1)

D. Policy Implications

The digital knowledge economy poses a considerable challenge to our existing policy framework and regulatory conventions, and the implications for policy analysis span many academic disciplines and professional and regulatory interests.

Since the fall of 2001, the United States has witnessed market failure at its most extreme, and the over-valuations of the 1990s led to a waste of resources on a vast scale. But this cannot be dismissed merely as an American corporate governance failure. There is a deeper, longer-term and more international problem - we are running today's knowledge-based economies with tools inherited from a 19th century manufacturing era. Knowledge is now a fundamental component of our value-delivery systems, but our understanding of how to measure that knowledge and value is, at best, immature.

Our policy conclusions are based on the following assumptions:

(i) EU policy will continue to be built around the three main pillars of competition, trade and social policy (and reflect the changing tensions between them)⁸⁵

(ii) EU market policies will continue to be guided by the principles of disciplined pluralism - and the recognition that markets and their regulatory infrastructures co-evolve as a result of a continual process of small-scale and mostly unsuccessful experiment (a co-evolution that we only partially understand and whose outcome we cannot predict)

(iii) Broadly speaking, there are two approaches to regulation. One is to impose standards by intervention, top-down. The alternative is to foster self-regulation based on clearly articulated principles and norms of good practice. However, top-down regulation is of limited effectiveness unless it has a consensus of support among the regulated community⁸⁶. Also, the sheer scale of the corporate and financial governance problem in the U.S. has shown that a prescriptive rule-based approach is not necessarily the best model for today's complex and dynamic markets. Self-regulation is generally more effective

(iv) Policy intervention may be required however if one or more interest groups exhibits institutional delinquency or undue resistance to changing mindsets and practices, for example in reinforcing effective governance or adapting reporting conventions to keep pace with the changing economic landscape. How this scenario pans out will depend on the response of the market players and their regulatory institutions.

Set against this background our policy recommendations are outlined in the sections following:

(i) *Innovation and knowledge diffusion*

From a policy perspective the so-called macro (infrastructural) intangibles and collective intangible assets - essentially social capital - are preconditions for business networks to flourish. However, social capital is very difficult to define and as yet there is no consensual definition among

⁸⁵ For a description of the socio-economic changes and resulting policy assumptions underpinning this report see Bianchi & Labory (WP3.8) and Bacci (WP3.1)

⁸⁶ The concern exists in many European business circles that government is championing more information and disclosure as a basis for extending its tax base. This needs to be taken into account in any policy response on the intangibles issue

economists. We suggest that social capital be defined as the set of collective (in the sense of shared) intangible assets available in a territory (a city, a region, a country, a set of countries). Collective intangible assets allow communication and exchange to take place without rigid, formal contracts because they provide behavioural rules (formal or informal) that avoid free-rider problems or other abuses of loose contractual relationships.

Social capital is deeply rooted in a territory, mainly because it stems from idiosyncrasies of language and culture in a particular society. It can migrate across country borders only if the ground is fertile and certain preconditions exist. But from an enterprise policy perspective, initially at least, geographic concentration and proximity are essential to allow the collective intangible assets to develop - hence the often-observed clustering of firms in a territory.

Collective intangible assets are not necessarily transferable to other localities. They have to be recreated locally, as shown by the example of the Japanese transplants in the US or in Europe. As a consequence, the development of collective intangible assets implies the necessity to incur sunk costs, since there is no guarantee that the investment will have an alternative use elsewhere⁸⁷. Viewed from a policy perspective:

- (i) Encouraging and supporting the creation of networks is an important policy for innovation and knowledge diffusion
- (ii) Making these networks function effectively, in the sense of producing innovation at a European level (and reducing the technology gap with the U.S.) is also important. For this purpose therefore, we suggest that the Commission should create a horizontal policy axis, possibly in the form of a task force, that is directed toward the creation of the collective intangible assets which the PRISM research shows to be their glue⁸⁸
- (iii) Another focus regarding networks is to ensure that the bargaining power within the network is equally distributed among network members. A central element that manages the network without seeking to appropriate the benefits seems to be useful in this respect
- (iv) Another focus of policy regarding innovation networks is that they should not be too extended geographically otherwise the collective intangible assets cannot be built. In this context, further evidence is needed on how innovation networks work and have success.

(ii) *Factors concerning the Emerging New Theory of the Firm*

Intangible assets are intimately related through a common denominator - knowledge. Knowledge is created by the human mind and therefore is intimately linked to human capital. Knowledge communication arises through interactions between individuals, hence innovation arises only if human capital and social capital (the set of relationships and the trust, norms and behavioural rules guiding interactions between individuals) are present. Intangible assets based on tacit knowledge are therefore highly complementary and difficult to measure separately. In this connection:

- (i) A key source of complementarities is social capital, i.e. the interaction structure that allows relationships between economic actors to develop. Indicators for policy making should therefore be developed by taking account of these complementarities

⁸⁷ See the IESE case on Cap Gemini Ernst & Young (WP9.5.1)

⁸⁸ *ibid*, Bianchi and Labory, WP3.8

(ii) At the firm level, such changes are giving rise to new organisational architectures and new governance forms - indeed a change in the very nature of the firm. The vertically integrated firm may no longer be the best form of governance of the production process

(iii) Intangible assets can generally assume value only in so far as they are bundled together with other assets. This makes intangible assets difficult to imitate. Or, rather, while their components can be copied, the value-extraction process is contextual and depends on complementarities, thus making it difficult to imitate. In this sense, creating property rights over individual intangible assets, although often necessary to achieve optimal investment, is not sufficient - especially from a national or EU policy perspective⁸⁹.

(iii) At the management level, the governance problem is no longer to ensure that employees exert effort in line with the company's interests, but rather to ensure that the integrity of the firm is maintained.

Knowledge management has two main objectives: (i) to collect and process as much knowledge as possible on markets, competitors, technologies, etc, and (ii) knowledge-creation. In both cases the organisation as network is more effective than the individual firm:

(i) Organisational economists⁹⁰ now hold that networks feature not only within firms (decentralisation and flatter hierarchies), but also between the firm and its environment, since networks are created both as a leverage to innovation and as an extension to the supply chain (i.e. with suppliers and customers). The ability to organise and control intangibles within the network is therefore a key determinant of competitive performance

(ii) Reliance on strategic external relationships is a distinctive feature of the organisational architecture of firms today. Networks are now key strategic assets. The loose ties of networks, the available resources, and the dynamics of power are very different from a traditional, hierarchical and vertically-integrated industrial firm

(iii) The relevant unit of analysis in the study of competitiveness is therefore the network, of which the firm is a part, rather than the single firm. A major concern of corporate strategy is the creation and management of knowledge in networks in order to differentiate and keep their business models evolving at least at the pace of the market⁹¹.

(iii) *The "hidden" productive economy demands new measurement tools*

The changing competitive environment has led over time to a subtle but decisive shift of corporate strategy and this, in turn has led to investment in intangible assets. Product differentiation demands that increasing amounts of knowledge are embodied within the product, or accompany it in the form of services. As a result, the phases where intangible resources are concentrated are now indispensable to the production process (research, organisation, and marketing). The rise in the importance of these 'assets' requires not only the development of specific measurement tools, but also the adoption of a more holistic view of the drivers of enterprise performance.

⁸⁹ As illustrated in Cass' case on Thales Optics (WP9.4.1)

⁹⁰ The central themes of organisational economics are presented in a highly readable form by Paul Milgrom and John Roberts, in *Economics, Organization and Management*, Prentice Hall, New Jersey (1992)

⁹¹ See IESE's study of Siemens' support for knowledge-sharing Communities of Practice (WP9.5.3)

Considerations for macro policy analysis

Across the entire economy there is a need to capture reliable information on investment flows into the key knowledge intangibles, such as R&D and proprietary know-how, intellectual property, workforce skills, world-class supply networks and brands. This is desirable not only in the interests of information transparency and symmetry, but to provide the policy community with more effective policy levers in areas such as trade, competition, R&D and tax policy.

There is also an urgent need for much more transparency in the operation of the EU's capital, product and labour markets, and the activities of their intermediaries. We need to build a level playing field on disclosure in order to rebuild market confidence. We also need to build a long-term plan for all the diverse guidelines and stakeholder reporting models to converge, as well as a closer alignment between national and corporate accounting. If policy intervention is required, different policy mechanisms will be needed at different levels - EU, regional, national, industry, company, etc.

Regardless of whether direct policy intervention is deemed necessary, or appropriate:

(i) A common thread is required to create and inform the linkage between these levels - in the shape of 'meso' information systems to complement the various macro and micro systems already in place. At the corporate level, we urgently need to examine the feasibility of a European version of the U.S. SEC's EDGAR electronic information system⁹². The big question is how the system should be approached politically, since the hardest part is getting agreement between countries and regulators. In addition, there are only limited calls for increased disclosure, like that of the U.S. Sarbanes-Oxley Act of 2002. We believe the EU should adopt a proactive policy of support to encourage the national development of central electronic information systems and provide a lead infrastructure to ensure their proper co-evolution to common standards

(ii) Given the weight and influence of services across the modern economy, the EU should take steps to build a better understanding of their fragmented (and generally hidden) productive processes. This is an acute problem that requires a response from the policy and statistical communities. Given that two-thirds of Europe's GDP now comes from services, agreement on an EU-wide framework for tracing and reporting on their productivity and their different value-generating mechanisms should be afforded a top political priority. This has recently assumed a higher priority in the U.S. with the launch of a research initiative at MIT Sloan School under the auspices of a recently formed Information Work Productivity Council⁹³

(iii) Attention is also needed to a long-overdue reform of the measurement protocols for R&D investment in services. In particular, the problem of capturing reliable R&D information for the service sectors (especially the business and financial services sectors) requires priority attention at the EU level. Its resolution will be an important plank in achieving the Lisbon objectives and the drive to raise R&D investment from 1.9% to 3% by 2010

(iv) In respect of a Single European Market for services, renewed political pressure is needed to address the persistently high transaction costs of doing business in Europe. In particular, the costs and inconvenience of obtaining and protecting IPR across the EU, and the costs and time delays of

⁹² *A similar conclusion was reached from a legal and corporate governance perspective in the Winter report (pp 40-41). In the U.S. and Australia, central electronic filing systems are operated by securities regulators, in which all information to be filed by companies listed on stock exchanges is filed electronically, and the public has on-line access*

⁹³ *The council's founding members include Accenture, BT, Cisco, Hewlett-Packard, Intel, Microsoft, SAP and Xerox. The MIT Sloan research centre, under the direction of Professor Erik Brynjolfsson, is a private-public-private initiative with co-funding from the National Science Foundation, Washington, D.C.*

cross-border payments (notwithstanding the introduction of the euro) warrant closer attention at the EU level.

There are a number of areas where our national statistics and company reporting conventions fail to reflect the growing impact of knowledge intangibles and, in so doing, leave a substantial gap in our information about the structure and dynamics of the 21st century economy and, most importantly, its growth engines. The Commission should consider appointing a high-level interdisciplinary task force to oversee and manage through the policy initiatives described in the paragraphs following:

Reform of macro indicators

The first, essential requirement is for national and international statistical offices, including Eurostat, to accept the need for a substantial revision of the SNA and its European equivalent, the ESA, and to take the necessary collective action. This requires major extensions to the production and asset boundaries of the SNA and ESA. This will enable major new flows in the form of investments in new technology and knowledge to be identified thereby radically changing the structure of measured GDP as well as its total size.

Data collection on intangible assets has to be extended. The main problem of the pioneering attempts to measure intangible assets is the lack of data. Surveys at national level and the development of 'meso' indicators would be useful in this respect.

Reform of the business accounting model

Notwithstanding the path-breaking initiative by the U.S. Financial Accounting Standards Board (FASB), the corporate accounting model is clearly struggling to cope with intangibles. The PRISM WP4 papers set out a taxonomy and general principles that could bring the company reporting model more into line with the resource mix found in a contemporary enterprise. To take this forward, experimentation is the key and, as with EDI, the software industry needs to be brought centre-stage and given a lead role in promoting trials and experimentation. This will require financial support at an EU level in the developmental phase:

- (i) Various - often conflicting - models have been proposed by the different stakeholders. We are in an evolutionary phase where collective rules are evolving, but the main advocates have not yet formed a consensus. Only a need for consensus has emerged. In order to move the game forward, a political initiative is now required
- (ii) The starting point is a new generation of internal management accounting tools. It is clear from the research that a prerequisite to achieving any lasting success is for management to recognise (and be able to use) the information for internal decision-making. Software companies should be made more aware of the market potential of this, and given a lead role in the developmental phase
- (iii) It is important to discourage the further proliferation of guidelines and ensure that the standards-setting process is inclusive and involves all interest groups. The European Commission can play an important policy role in fostering this convergence, and should encourage open experimentation which requires the coordination and governance of a publicly-accountable agency. The European Financial Reporting Advisory Group, EFRAG, could well play a central role in this regard. In addition to corporate and professional accountants, it is essential that an appropriate representation is obtained from the intermediaries - banks and other credit providers, financial analysts, credit rating agencies and auditors. It is also important that the end users - notably institutional investors, pension funds and non-financial stakeholders - are fully

represented. National professional accountancy bodies are also important agents of change in this field and they should be made sensitive to the issues

Innovation capital and the hi-tech SME sector

Policy attention is required in the area of start-up and debt finance for technology and knowledge-based SMEs. We conclude this report with a recommendation for further research into a more effective recognition of intangibles within the investment analysis and capital allocation processes. The main objective is to develop methods to more effectively provide innovation capital to small and medium sized European companies, achievable through a more widespread understanding of intangibles as drivers of the corporate value creation process.

The academic community

The policy reforms outlined in this report will impact directly on the academic syllabus, since the universities (especially the European business schools) will need to be brought centre-stage in a wide ranging programme of interdisciplinary research and outreach. In addition, young people need to be exposed early to these new perspectives, with less emphasis on the old-world deterministic accounting model (with its backward-looking obsession with transaction-driven costs) in favour of a mindset geared to a much better understanding of the real value-drivers (and destroyers) in a context of active, imperfect markets that are rife with connectivity and arbitrage opportunities.

Acknowledgments

This report sets out the findings and conclusions of the first phase of PRISM research. They represent the synthesis of a programme of meetings and studies launched in October 2001, and present new evidence on the impact of knowledge-based, intangible factors of corporate performance and productivity in the modern economy. Finally, the report lays out some of the business and policy implications for financial market standards, companies, institutions and regulators.

We would like to thank the organisations and individuals who took part in this study. As a result of their co-operation, we have identified a range of areas that require further investigation. If there is sufficient interest, we intend to follow up on these in scoping the future PRISM agenda. In particular, thanks go to Leif Edvinsson of the University of Lund, Sweden, for his valuable contribution to the evolution of the PRISM value-chain models, and to the Advisory Council members who hosted thematic workshops: in particular, Alison Thomas at PricewaterhouseCoopers; Larry Cohen at McDermott, Will & Emery; Franco D'Egidio and Sergio Caredda of Summit, Milan; and Paul Coombes at McKinsey & Co., London.

Special thanks are also due to the European Commission, who provided the opportunity and resources to enable the PRISM group to explore the issue of intangibles in greater depth and examine some of the policy implications for the different interest groups.

The report builds on an earlier study by a European Commission high-level expert group entitled "The Intangible Economy: Impact and Policy Issues", published in March 2000.

Clark G. Eustace
Chairman, PRISM Project Management Board
May 2003

APPENDIX I: LIST OF PRISM RESEARCH PAPERS

The main research documents published under the auspices of PRISM are listed below. A comprehensive collection of PRISM papers can be found at www.euintangibles.net. The total is 67 research papers and 15 case sets.

WP1: MCL

- 1.1. Cohen L., 2002a, *Intellectual property - where Europe can improve*
- 1.2. Cohen L., 2002b, *On IPR policy recommendations*
- 1.3. Eustace C.G., 2003a, "A New Perspective on the Knowledge Value Chain", *Special issue, Journal of Intellectual Capital*, vol, 4 no, 4 due 15 June 2003
- 1.4. Eustace C.G., 2003b, *Interim Research Findings (January 2003)*
- 1.5. Eustace C.G., 2003c, *Research Findings and Policy Recommendations: final report, May 2003*
- 1.6. Eustace C.G. & R.D. Youngman, 2002a, "Rights protection in the digital economy: a perspective on the role and importance of IPR in the 21st century economy" (*IST 2002, Copenhagen, October 2002*).
- 1.7. Eustace C.G. & R.D. Youngman, 2002b, *The shifting corporate asset base*
- 1.8. Youngman R.D., 2002, *How can the EU's IPR framework be improved?*. Proceedings of IPR workshop hosted by McDermott Will & Emery, London, 3 December 2002

WP2: Cass Business School (dissemination)

- 2.1. Holtham C.W. & R.D. Youngman, 2002, "Managing and Measuring Intangibles – A European Policy Perspective", (*24th Annual McMaster World Congress, Ottawa, January 2003*).
- 2.2. Courtney N & C.W. Holtham, 2003, *The Measurement and Reporting of Intangibles: key messages from a pan-European portfolio of fifteen contemporary case studies*.
- 2.3. Youngman R.D. (2003), "Understanding and measuring intangibles: a journey of learning" (*pending, to be published in Spectra, the journal of the Management Consultancies Association, June 2003*).

WP3: University of Ferrara

- 3.1. Bacci L., 2002, *The intangible determinants of competitiveness and their measurement: the case of regional analysis*
- 3.2. Bianchi P., R. Iorio, S. Labory & N. Malagoli ,2002, *EU policies for innovation and knowledge diffusion* (proof of concept report)
- 3.3. Cottica & Ponti, 2002, *Evolution, innovation and competition in networks*
- 3.4. Di Tomasso R., D. Paci & S. Schweitzer, 2002, *The geography of intangibles*
- 3.5. Galassi F. & S. Mancinelli, 2002, *Why is social capital a capital? Public goods, co-operative efforts and the accumulation of intangible assets*
- 3.6. Iorio R., 2002, *Rationale and modalities of public intervention in research and innovation: traditional and innovative aspects in the example of space agencies*

Appendix I (continued): List of PRISM Research Papers

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3.7. Iorio R., 2003, *A synthetic view on networks, social capital, university-industry collaboration and policy instruments for research collaborations*

3.8. Bianchi P., and S. Labory, 2003, *Final Report of WP3: Policy Implications of the Intangible Economy*

WP4: University of Ferrara

4.1. AIAF – Ferrara University, 2002, *The communication of intangibles and intellectual capital: an empirical model of analysis*

4.2. Bergamini I. & S. Zambon, 2002, *A scoring methodology for ranking company disclosure on intangibles*

4.3. Bergamini I. & S. Zambon, 2003, *Scoring company disclosure on intangibles: an application of the Ferrara methodology in a European perspective*

4.4. Cordazzo M., 2003, *The value relevance of intangibles disclosure: a European and comparative study*

4.5. Crosara V. & S. Zambon, 2003, *The impact of the new US accounting standards on the valuation and disclosure of the intangible assets of European companies: an explorative study*

4.6. Del Bello A., 2002, *A regulatory competition? A critical comparison of the extant guidelines and recommendations on IC statements and intangibles reports*

4.7. Del Bello A., 2003, *The rating of intangible assets: observations on the current practices of rating agents*

4.8. Donato F., 2002, *Intangibles and the performance measurement systems of healthcare organisations: an empirical research in Tuscany (Italy)*

4.9. Donato F., 2003, *Intangible factors in theatres: the case of the Ferrara municipal theatre*

4.10. Malagoli N., 2003, *A comparison between the scoring methodology for ranking company disclosure of Intangibles of the University of Ferrara and ValueReporter of PricewaterhouseCoopers LLP*

4.11. Masino G., 2003, *Measuring and reporting intangibles and the new theory of the firm: emerging issues*

4.12. Ramin K., 2002, *XBRL as a new language for business and intangibles reporting*

4.13. Young D., 2003, *The measurement and reporting of intangible assets: toward a set of general principles (from GAAP to GAIP)*

4.14. Zambon S., 2002a, *Accounting, intangibles and intellectual capital: an overview of the issues and some considerations: Proof of concept report, WP4*

4.15. Zambon S & M. Cordazzo, 2002, *IC statements vs. environmental and social reports: an empirical analysis of their convergence in the Italian context*

4.16. Zambon S., S. Labory & A. Del Bello (assisted by P. Bianchi, D. Young and M. Anisette), 2003, *Accounting, Financial Analysis and Audit in the Intangible Economy (WP4 final report)*

WP5: Cass Business School (Macro statistics)

5.1. Hill T.P., 2002, *The measurement of intellectual capital formation in the system of national accounts*

Appendix I (continued): List of PRISM Research Papers

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- 5.2. Hill T.P., 2003, *Intangible assets in the SNA: originals, innovation and human capital formation*
- 5.3. Hill T.P. & R.D. Youngman, 2002a, *The measurement of intangibles in macroeconomic statistics: WP5 proof of concept report*
- 5.4. Hill T.P. & R.D. Youngman, 2002b, *The measurement of intangibles in macroeconomic statistics: WP5 interim report*
- 5.5. Hill T.P. & R.D. Youngman, 2002c, *Revisiting intangibles – a misnomer?*
- 5.6. Hill T.P. & R.D. Youngman, 2002d, *Intangibles: an empirical study of macroeconomic data*
- 5.7. Hill T.P. & R.D. Youngman., 2002e, *Recording and Classifying Intangibles: towards a new asset boundary and a new taxonomy in the SNA*
- 5.8. Youngman R.D., 2002, “Managing and Measuring Intangibles: A Multi-Disciplinary Challenge,” *World Corporate Finance Review Vol.2, 11, Nov 2002.*
- 5.9. Youngman R.D., 2003a, *The measurement of intangibles in macroeconomic statistics: WP5 final report*
- 5.10. Youngman R.D., 2003b, *Understanding today’s economy and its residuals*
- 5.11. Youngman R.D., 2003c, *Measuring tomorrow’s economy: why it matters and what needs to be changed*
- 5.12. Youngman R.D., 2003d, *Charting the development of the 21st century economy*
- 5.13. Youngman R.D., 2003e, *Assets and property rights - sources of confusion*
- 5.14. Youngman R.D., 2003f, *Capital formation activities in today’s economy*

WP6: Copenhagen Business School

- 6.1. Kaleva G., S. Thrane & J. Mouritsen, 2002, *Alliances, joint ventures, networks: a comparison*
- 6.2. Mouritsen J., 2003a, “Intellectual capital and the capital market”, *Accounting, Auditing and Accountability Journal (2003, vol. 16, no.1, pp. 18-30)*
- 6.3. Mouritsen J., 2003b, *The performativity of intellectual capital: measuring, managing and communicating in knowledge society enterprises (WP6 final report)*
- 6.4. Thrane S., J. Mouritsen & M. Johansen, 2002, *Networks, intellectual capital and the management of knowledge: performing the new economy (proof of concept)*

Working papers in line for submission to journals:

- 6.5. Koleva, G. & J. Mouritsen, 2003, “Unpacking packaged knowledge: patents and intellectual capital”, *R&D Management (submission 15 June)*
- 6.6. Mouritsen, J. & S. Thrane, “Network enterprises and networking: issues of management and management technologies in inter-organisational relations”, *Accounting, Organisations and Society (submission June)*

6.7. Mouritsen, J., S. Thrane & G. Koleva, “Forming Social Capital and Mobilising Networks”, *Academy of Management Journal (submission 1st of July)*

6.8. Thorbjørnsen, S. & J. Mouritsen, 2003, “Accounting for the employee in the intellectual capital statement”, *Journal of Intellectual Capital (forthcoming)*

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6.9. Mouritsen, J., P.N. Bukh et al., 2003, “Intellectual Capital Statements – The New Guideline” *Copenhagen, Ministry of Science, Innovation and Technology (www.vtu.dk/icaccounts, www.cbs.dk/staff/jan.mouritsen)*

6.10. Mouritsen, J., P.N. Buch et al., 2003, “Analysing an Intellectual Capital Statement”, *Copenhagen, Ministry of Science, Innovation and Technology, www.vtu.dk/icaccounts, www.cbs.dk/staff/jan.mouritsen)*

WP7: Copenhagen Business School

7.1. Hall M., 2003, *Measures to increase the effectiveness of credit risk analysis in corporate lending through a better understanding of the role of intangibles*

7.2. Morck F., 2002, *Banking and Venture Capital Metrics (proof of concept)*

7.3. Morck F., 2003, *Banking and Venture Capital Metrics (WP7 final report)*

7.4. Morck F., and E. Vali, 2002, *Intangibles and risk assessment by bankers and VCs*

WP8: Henley Management College

8.1. Truch E., 2002, *Technical output reports Nos. 1&2*

8.2. Truch E., 2003, *Identification and exploitation of intangible assets within the machinery of government: WP8 final report*

WP9: Case studies

University College, Cork

9.1.1. Fahy M., J. Feller, P. Finnegan & C. Murphy, 2002, “*Measuring and managing intangibles in mobile commerce: the potential of mediation standards*”.

9.1.2. Fahy M., J. Feller, P. Finnegan & C. Murphy, 2003, “*News ML: Measuring and managing the value of news reporting*”.

9.1.3. Fahy M., J. Feller, P. Finnegan & C. Murphy, 2003, “*The Australian Prudential Regulation Authority: managing regulatory complexity with XBRL*”.

KTH, Stockholm

9.2.1. Wallis R. & O. Wikstrom, 2002, *The music industry in a digital networked world. Three firms – two who didn't make it, one still hasn't quite made it.*

9.2.2. Wesslau K., N. Enlund & R. Wallis, 2002, *Newspapers on the web - giving it all away? The dynamics and relationships between digital and printed products at three Swedish newspaper companies.*

Appendix I (continued): List of PRISM Research Papers

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9.2.3. Jonsson A., C. Knudsen, J. Matic & R. Wallis, 2003, *The development of and support for the intellectual capital of individuals and regions.*

TSM, Enschede

9.3.1. Groen A., I. Wakkee & C. Millar, 2002, *Creating and justifying intellectual capital value: Entrepreneurial networking for business development on the WAP protocol.*

9.3.2. Groen A. & P. van der Sijde, 2003, *Banking and Entrepreneurship: assessing and fostering the value of intangibles.*

9.3.3. van der Sijde, P., P. Bliet & A. Groen, 2003, *The Exploitation of Biotech Innovations: a networking model for survival and success.*

Cass Business School, London

9.4.1. Brown J. & C. Hendry, 2002, *A case study on measuring skills in technological leadership: Thales Optics.*

9.4.2. Woodward S. & C. Hendry, 2002, *Skills and organisational competencies for managing intangibles in small management consultancies.*

9.4.3. Brown J. & C. Hendry, 2003, *The Changing Face of Product Design: making real returns from intangible assets.*

IESE, Barcelona

9.5.1. Lara E., R. Andreu & S. Sieber, 2002, *A case study of knowledge management at Cap Gemini Ernst & Young.*

9.5.2. Grau A., E. Lara, R. Andreu & S. Sieber, 2002, *Union Fenosa Corporate University: teach and learn from experience.*

9.5.3. Andreu R., A. Grau, E. Lara & S. Sieber, 2002, *Knowledge Management at Siemens Spain.*

APPENDIX II: CONSORTIUM MEMBERS AND ASSOCIATE RESEARCHERS

WP1	MCL	C.G. Eustace
WP2/5	Cass Business School, London	Prof. C. W. Holtham Prof. T.P. Hill R.D. Youngman
WP3	University of Ferrara	Prof. P. Bianchi Prof. S. Schweitzer (UCLA, visiting) Dr S. Labory (University of Bergamo, visiting) A. Cottica M.R. Di Tommaso F. Galassi R. Iorio N. Malagoli S. Mancinelli D. Paci G. Ponti
WP4	University of Ferrara	Prof. P. Bianchi Prof. S. Zambon Dr S. Labory (University of Bergamo, visiting) Prof. M. Abernethy (University of Melbourne, visiting) Prof. Marcia Anisette Prof. F. Donato Prof. B. Lev (NYU Stern School, visiting) Prof. G. Masino Prof. D.W. Young (Boston University School of Management) I. Bergamini M. Cordazzo V. Crosara A. Del Bello S. Droghetti N. Malagoli
WP6	Copenhagen Business School	Prof. J. Mouritsen M. Johansen G. Kaleva S. Thorbjørnsson S. Thrane
WP7	Copenhagen Business School	F. Morck M. Hall E. Vali
WP8	Henley Management College	Dr E. Truch

Appendix II: Consortium Members and Associate Researchers (continued)

WP9.1 University College, Cork	Prof. C. Murphy Dr M. Fahy Dr J. Feller Dr P. Finnegan
WP9.2 KTH Stockholm	Prof. N. Enlund Prof. R. Wallis A. Jonsson C. Knudsen J. Matic Dr K. Sabelstrom-Möller K. Wesslau O. Wikstrom
WP9.3 TSM Enschede	Prof. C. Millar P. Blik Dr A. Groen Dr P. van der Sijde I. Wakkee
WP9.4 Cass Business School	Prof. C.N. Hendry J. Brown S. Woodward
WP9.5 IESE Barcelona	Prof. R. Andreu Prof. S. Sieber A. Grau E. Lara
WP10 IntangAbility Ltd	T.C. Hoad
WP11 Courtney Consulting	Dr N. Courtney

APPENDIX III: LIST OF ADVISORY COUNCIL MEMBERS

The following organisations have contributed to the PRISM research programme, as members of the Advisory Council or through participation in the research and dissemination activities.

AIAF (Italian Association of Financial Analysts)	Italy
ARCS (Austrian Research Centers, Seibersdorf)	Austria
Barclays plc	UK
BP plc	UK
Cap Gemini Ernst & Young	USA
CONSOB	Italy
Deloitte & Touche	UK
Department of Trade and Industry	UK
Ernst & Young	Italy & Spain
ESPRiT GmBH	Austria
Financial Ombudsman Service	UK
Georgetown University Law Center	USA
GRI (Global Reporting Initiative)	Netherlands
Haberman Associates	UK
Hermes Focus Investment Management	UK
IBM EMEA	UK
IFRI	France
IMD (International Management Development)	Switzerland
Independent Audit Limited	UK
Intellectual Capital AB	Sweden
IASB (International Accounting Standards Board)	UK
ISTAT (Istituto Nazionale di Statistica)	Italy
KPMG	Netherlands
McDermott, Will & Emery	UK
McKinsey & Co.	UK
National Science Foundation	USA
Nordic Industrial Fund	Norway
NYU Stern School	USA
OECD	France
PreVenture A/S	Denmark
PricewaterhouseCoopers	UK
Skandia Insurance Co.	Sweden
Summit srl	Italy
Telecom Italia	Italy
The Economist	UK
The Financial Times	UK
Thomson Financial Corporation	USA
UAM (Universidad Autonoma de Madrid)	Spain
UNIC	Sweden
Union Fenosa	Spain

APPENDIX IV - SELECTED REFERENCES AND FURTHER READING

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