

This study was commissioned by the Financial and Management Accounting Committee (FMAC) of the International Federation of Accountants (IFAC) to discuss some of the major issues surrounding the measurement and management of intellectual capital and the accountant's role in this process. It is intended to provide an introduction to the accounting challenges and opportunities associated with intellectual capital management by discussing its underlying concepts and describing merging practices. We would like to thank the many reviewers who contributed to its development, as well as the author,

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THE MEASUREMENT AND MANAGEMENT OF INTELLECTUAL CAPITAL: AN INTRODUCTION

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BACKGROUND: THE KNOWLEDGE ECONOMY

1. Accounting for intellectual capital is more than an exercise for the fad-struck. What's at stake is nothing less than learning how to operate and evaluate a business when knowledge is its chief resource and result. *Thomas Stewart 1994.*

2. Two hundred years after Adam Smith recognized the potential role of manufacturing in economic society, the world has entered an era in which the new wealth of nations is tied directly to the creation, transformation, and capitalization of knowledge. Knowledge-based industries,¹ particularly in the science and technology sectors, are expanding faster than most other industries and are transforming the economic infrastructures of many countries. International trade in the knowledge sector is reported to be growing five times faster than in natural resource-intensive industries and is expected to reach \$C3.5 trillion in 2002 (as derived from www.stentor.com — Stentor, September 1994). As the burgeoning demand for knowledge-based products and services is changing the structure of the global economy, the role of knowledge in achieving competitive advantage is becoming an important management issue in all sectors. While there is little consensus as to what knowledge actually is, many do accept that
 - (1) knowledge is a primary competitive factor in business today;
 - (2) knowledge is a nontraditional, intangible asset;
 - (3) its accumulation, transformation, and valuation lie at the heart of intellectual capital management.²

The Accounting Challenge

3. Employee know-how, innovative capabilities, skills, or as Thomas Stewart puts it, the brain-power of the organization, play a predominant role in defining the productive power of the corporation (Quinn 1998) and account for an increasing proportion of the capital in traditional industries (Sveiby 1997). According to a recent survey by the Canadian Institute of Chartered Accountants (CICA), the top executives of both the Canadian Financial Post 300 firms and US Fortune 500 firms view knowledge resources as critical for a firm's success. In a comparison of 17 intangible assets (i.e., assets that lack physical substance) within the firm, the same study shows that by the year 2000, corporate executives expect employee know-how to be among the most important factors in attaining competitive advantage (Stivers, Covin, Hall, and Smalt 1997). Margaret Blair, a Brookings Institute economist, has demonstrated that the value of these and other intangible assets has grown significantly since 1982. Hard assets represented 62 percent of the companies' market value in 1982, whereas in 1992, this figure dropped to 38 percent.³ In 1995, health care and personal care companies had the highest

¹Knowledge-based industries include: computer companies, high-technology firms, software companies, drug-research companies. Knowledge-based service companies include: law and consulting firms, finance and insurance companies, media and multi-media companies, and educational institutions.

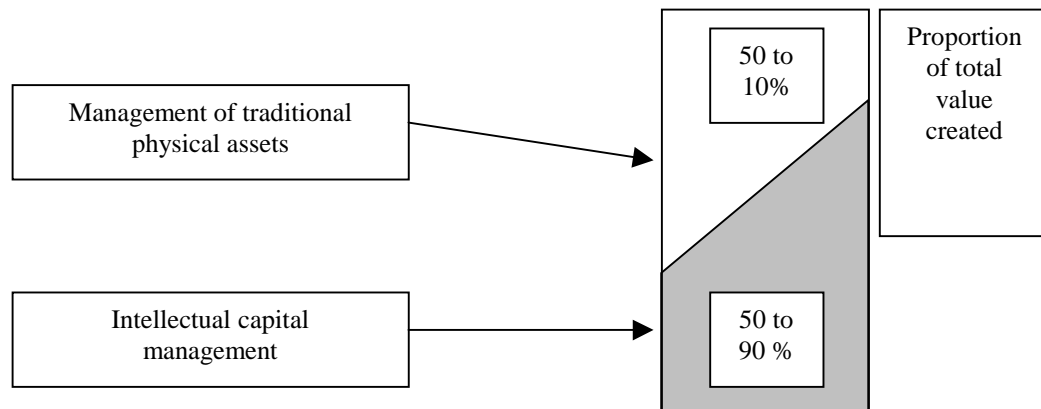
²For extensive coverage on the emerging field of knowledge management see the electronic database of Yogesh Malhotra, Knowledge Management & Organizational Learning: "BRINT web site (www.brint.com/IntellIP.htm).

³Reported in Fortune, Oct. 2, 1995.

market-to-book value in the world with almost 75 percent of market value attributable to intangible assets.⁴

4. Microsoft is used as the ultimate example of the unrecorded value of the intangible assets of the firm. In 1996, Microsoft's market value was 11.2 times its tangible asset value. This "missing value", to a large degree, represents the market's estimation of Microsoft's stock of intellectual capital that is not captured in its financial statements. This is not the exception but rather the rule in financial reporting and illustrates one of the major limitations of the current financial accounting model. Recent estimates suggest that 50–90 percent of the value created by a firm comes, not from management of traditional physical assets, but from the management of intellectual capital (Hope and Hope 1998).

Figure 1. Value Created by the Firm



5. Standard accounting models were designed for informing company management and stakeholders on stocks and flows of value — value that could be attributed to places, periods of time, products, customers, and activities. Most of these are quantifiable, and subject to generally accepted accounting principles and practices (GAAP). In contrast, intellectual capital is a relatively new and enigmatic concept, relating primarily to the intangible, highly mutable assets of the firm. As such, the current accounting model does not adequately capture their value nor represent them in a concise, meaningful format. Accounting for intellectual capital will ultimately require the invention of new financial and management accounting concepts and practices.
6. The accounting and reporting of intellectual capital pose three principal challenges:
 - the need for better tools to manage investment in people skills, information bases, and technological capabilities;

⁴The real estate, automotive, and banking sectors had the lowest market-to-book ratios of the fourteen groups, and electronic and data processing companies were somewhere in the middle.

- the need for some form of accounting measurement that can differentiate between firms in which intellectual capital is appreciating versus firms in which it is depreciating;
 - the need to be able to measure, over the long run, return on investment in people skills, information bases, and the organization's technological capabilities (McLean 1995).
7. The aim of this study is to address some of the major issues surrounding the accountant's role in intellectual capital management. It will provide an introduction to the accounting challenges and opportunities associated with intellectual capital management by discussing its underlying concepts, by describing the leading emerging practices, and ultimately, by identifying the potential contribution to the management accounting discipline in identifying, valuing, reporting, and participating in the management of the intellectual capital of the firm.

INTELLECTUAL CAPITAL DEFINED

8. In 1977, Funk and Wagnal offered a broad perspective on what the intellectual capital of the firm might mean:

Intellectual adj. Of or pertaining to the intellect;
Engaging, or requiring the use of the intellect.

Capital noun 4. Wealth in any form employed in or available for the production of more wealth.

9. As it is applied today, the term, intellectual capital, has many complex connotations and is often used synonymously with intellectual property, intellectual assets and knowledge assets. Intellectual capital can be thought of as the total stock of capital or knowledge-based equity that the company possesses. As such, intellectual capital can be both the end result of a knowledge transformation process or the knowledge itself that is transformed into intellectual property or intellectual assets of the firm.
10. Intellectual property is legally defined and assigns property rights to such things as patents, trademarks, and copyrights. These assets are the only form of intellectual capital that is regularly recognized for accounting purposes. However, accounting conventions based upon historical costs often understate their value.
- Patents are recorded at their registration cost but not their potential value in use.
 - Trademarks, copyrights and other intellectual property rights are recorded at registration cost rather than their potential market value.
 - Franchises are recorded at contract cost rather than the market value.
 - Goodwill is recorded only when a business is sold (acquired). It is defined as the market price of the business as a whole less fair market value of other assets acquired.⁵

⁵For a discussion of the limitations of the current accounting model in capturing the value of intellectual capital, see SMAC 1998.

11. Definitions of intellectual assets and knowledge-based assets are typically less concrete and apply to a potentially broader range of intangible assets than those captured under the umbrella of intellectual property.
12. The Society of Management Accountants of Canada (SMAC) in SMAC 1998, defines intellectual assets as follows:

In balance sheet terms, intellectual assets are those knowledge-based items, which the company owns which will produce a future stream of benefits for the company.

This can include technology, management, and consulting processes, as well as extending to patented intellectual property.

13. Within this knowledge view of the firm, the organization is seen as an institution for integrating knowledge, the critical input in production, and the primary source of value is knowledge; all human productivity is knowledge dependent, and machines are simply embodiments of knowledge (Grant 1996). According to Dr. Karl Sveiby, an expert on knowledge and intellectual capital management, this emerging view of the firm may require a fundamental shift in the way we think about organizations. “Managers often have an unconscious and tacit mindset that is coloured by the values and the common sense of the industrial age. To see another world, they need to try to use a conscious mindset such as the knowledge perspective”(Sveiby 1997).
14. Some of the major points of departure between an industrial management perspective and knowledge management perspective are as follows:
 - The knowledge view of the organization sees people as revenue generators whose primary task is to convert knowledge into intangible structures, whereas within the industrial paradigm, people at times are viewed more simply as costs or factors of production.
 - The purpose of learning within the knowledge organization is to create new assets or processes instead of simply applying new tools or techniques.
 - Within the knowledge organization, production flows are idea driven and sometimes chaotic, as opposed to sequential and machine driven.
 - The law of diminishing returns is replaced with increasing returns to knowledge, and economies of scale in the industrial paradigm are replaced with economies of scope in the knowledge paradigm.
 - The power base of management rests with their relative level of knowledge as opposed to their hierarchical position within the organization. Information flows via collegial networks versus via the organizational hierarchy (Sveiby 1997).
15. In his review of the emerging knowledge-based theory of the firm, Grant (1996) identifies several characteristics of knowledge that have implications for the overall management of the organization.

- First, he distinguishes between explicit knowledge — that which can be observed, and tacit knowledge — that which is subjective and revealed through its application. Explicit knowledge often has the characteristics of a public good⁶ that can be easily transferred often at zero marginal cost. (An example of explicit knowledge is the information contained on a web page. The marginal cost of one more person accessing a web page is virtually zero) Tacit knowledge, however can only be acquired through practice. It is not easily transferred within the organization, and its transferral is slow, costly and uncertain.
- Second, transferring tacit knowledge within the organizations will require certain organizational structures and cultures. Once firms are viewed as institutions for integrating knowledge, hierarchical structures and hierarchical coordination fails. The transferral or integration of tacit knowledge requires network lines of communication and team-based structures. When managers only know a fraction of what their subordinates know and tacit knowledge cannot be transferred upwards, then coordination by hierarchy is inefficient.
- Third, knowledge is a resource that is subject to unique and complex measurement problems resulting from the inability to define or identify ownership. Direct claims on the ownership of knowledge are often difficult to prove, except in the case of patents and copyrights where owners are protected by law.
- Fourth, Grant (1996) calls into question the current shareholder structure of many firms based upon the unique ownership characteristics of knowledge. He concludes, “If the primary resource of the firm is knowledge, if knowledge is owned by employees, if most of this knowledge can only be exercised by the individuals who possess it — then the theoretical foundations of the shareholder value approach are challenged.”⁷
- Finally, the knowledge-based view of the firm provides insights into the current trends in corporate management and design such as delayering, empowerment, team building, the use of cross-functional teams in new product development, total quality management, and building strategic alliances. Each of these practices has been shown to facilitate the communication, integration, and transformation of knowledge within the firm.

The Role of the Accountant

16. As stated previously, intellectual capital is more encompassing than the traditional view of intangible assets: it is the ability that the members of the firm have to perceive, analyze, and react to both the changes of opportunity and threats in the environment, as well as the ability to collectively reorganize the allocation of resources to meet the new and ever-changing challenges involved in formulating an original *modus operandi* (not a reproduction of past

⁶By definition, public goods cannot be divided, or used up in the act of consumption. One person’s consumption does not reduce that of another if the good is purely public. Therefore, the marginal cost of extending the good to all users is zero.

⁷ The question becomes: Is the current model of ownership valid when the primary assets of the firm are so fluid that they can literally walk out the door at any time, perhaps taking other assets of the firm with them? (e.g., client lists and other competitive secrets, etc.) If the shareholder model of ownership is valid under these circumstances, this must imply that (1) share prices reflect the ability of the firm to hold and capitalize on its human capital assets and (2) when the primary assets of the firm are human, investors face similar risks to purchasing shares in a highly leveraged company.

patterns) that allows the firm to continue as a successful enterprise.

17. The knowledge view of the firm suggests a role for accountants in applying their skills to creating and integrating knowledge within their organizations; to directing and controlling the knowledge transformation process; and to evaluating, reporting, and auditing the results of these processes on an ongoing basis.⁸ These functions will depend critically on the ability to first, classify knowledge-based assets; second, identify how they form intellectual capital and therefore, how they are linked to the overall strategic goals of the organization and third, evaluate how they contribute to the intellectual capital of the firm and compare to the intellectual capital of other organizations.

THE INTELLECTUAL CAPITAL MANAGEMENT FRAMEWORK

18. A phenomenon to be understood or managed must first be delineated and measured. *James Quinn 1998*
19. Much has been said about the need to link the intellectual capital of the firm to strategic objectives (Stewart 1997; Edvinsson and Malone; Brooking 1996; Sveiby 1997) and a number of companies are now experimenting with intellectual capital management frameworks that attempt to achieve this. From these efforts, several methods of managing, measuring, and reporting the intellectual capital of the firm have emerged and each has taken a somewhat different approach. A summary of some of these methods can be found in the Appendix according to the types of institution that have developed them, the primary management practices involved, and the type of measurements used.⁹ One model of intellectual capital management has been developed jointly by Leif Edvinsson of Skandia AFS, Hubert St. Onge of CIBC, Charles Armstrong, CEO of Armstrong World Industries, and Gordon Petrash of The Dow Chemical Company. The model, or “Value Platform”, as it is called, delineates intellectual capital into three main components that interrelate to form value:
 - Human capital
 - Customer (relational) capital
 - Organizational (structural) capital
20. Table 1 illustrates the types of intellectual capital falling under each category.

⁸For a comprehensive discussion of knowledge management, see Sveiby 1997, and the corresponding Web Site [http://www.sveiby.com.au/BSC and IAM.html](http://www.sveiby.com.au/BSC%20and%20IAM.html) as well as Intellectual Capital 1996 by Annie Brooking, particularly Chapter 10 — “Knowledge Management and Corporate Memory”.

⁹For a more comprehensive description of these and other approaches to intellectual capital management the reader is encouraged to refer to Stewart 1997 and Edvinsson and Malone 1997.

TABLE 1

Elements of Intellectual Capital

<p>Human Capital</p> <ul style="list-style-type: none"> • Know-how • Education • Vocational qualification • Work-related knowledge • Occupational assessments • Psychometric assessments • Work-related competencies • Entrepreneurial elan, innovativeness, proactive and reactive abilities, changeability 	<p>Customer (Relational Capital)</p> <ul style="list-style-type: none"> • Brands • Customers • Customer loyalty • Company names • Backlog orders • Distribution channels • Business collaborations • Licensing agreements • Favourable contracts • Franchising agreements
<p>Organizational (Structural) Capital</p>	
<p>Intellectual Property</p> <ul style="list-style-type: none"> • Patents • Copyrights • Design rights • Trade secrets • Trademarks • Service marks 	<p>Infrastructure Assets</p> <ul style="list-style-type: none"> • Management philosophy • Corporate culture • Management processes • Information systems • Networking systems • Financial relations

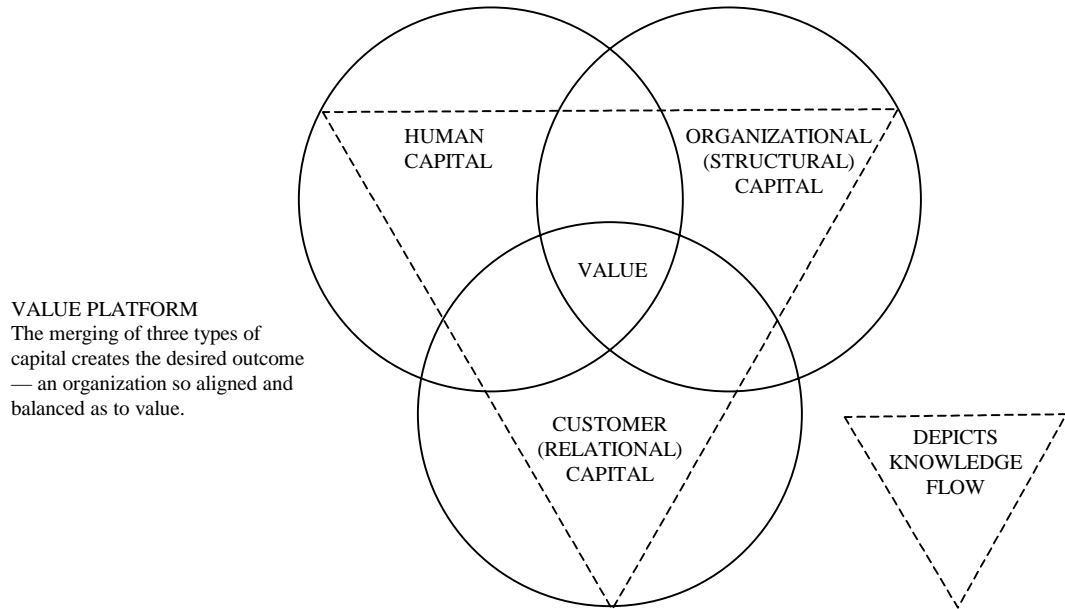
Source: Developed from SMAC 1998.

21. Within this system of classification, the intellectual capital of the firm has the following properties:
 - it can be fixed as in the case of a patent, or flexible as in the case of human capabilities;
 - it can be both the input and the output of a value creation process, that is, intellectual capital is “knowledge that can be converted into value” (Edvinsson, Leif, and Sullivan 1996) or the end product of a knowledge transformation process (SMAC 1998);
 - it is created through the interplay of human, structural, and customer capital — corporate value does not arise directly from any one of its intellectual capital factors, but only from the interaction between all of them, and just as important, that no matter how strong an organization is in one or two of these factors, if the third is weak, or worse, misdirected, that organization has no potential to turn its intellectual capital into corporate value (Edvinsson and Malone 1997, 145–6).

22. While these characteristics imply that the management of intellectual capital will be unique in each organization, it is assumed that human capital acts as the building block for the organizational (structural) capital of the firm, and both human capital and organizational (structural) capital interact to create customer capital. At the centre of the three forms of

intellectual capital lies the financial capital or value created by the interaction of these three components. See Figure 2.

Figure 2. Intellectual Capital



Source: Adapted from Hubert Saint-Onge, Charles Armstrong, Gordon Petrash, Leif Edvinsson in Edvinsson and Malone 1997, (146).

23. As can be seen in Figure 2, it is at the intersection of the classes of intellectual capital that value is created. This interaction is dynamic, continuous, and expansive. Indeed, the more the circles overlap, the greater the value produced.
24. The intellectual capital management framework described here offers new ways of seeing the organization and its core competencies. However, many of the management concepts and methodologies it proposes parallel well established management accounting practices. The following section describes the three primary components of intellectual capital as presented above, and identifies some of the techniques that can be used in their management.

Human Capital

25. Human capital refers to the know-how, capabilities, skills, and expertise of the human members of the organization. It is that knowledge that each individual has and generates (Petrash 1996). Some of the key functions tied to human capital management are drawn from the traditional practices of human resource management and include
 - building an inventory of employee competencies;

- scanning the environment and determining competencies which need to be developed or acquired to meet strategic objectives;
- developing a system to deliver the needed knowledge, skill, or intellectual upgrade as needed;
- developing an evaluation and reward system tied to the acquisition and application of competency that aligns with the organization's strategic objectives.

Organizational (Structural) Capital

26. Organizational capital includes the organizational capabilities developed to meet market requirements such as patents. It is also “that knowledge that has been captured/institutionalized within the structure, processes, and culture of an organization” (Petrash 1996, 336).
27. Clearly, every patent, trademark, management tool, improvement technique, IT system, or R&D effort that has been implemented or will be implemented to improve the effectiveness and profitability of the firm can fall within the category of organizational (structural) capital. While it is impossible to prescribe an all-encompassing framework for managing the organizational (structural) capital of the firm, Value Chain Analysis offers a systematic approach to the subject.

Value Chain Analysis

28. The objective of value chain analysis is to identify the elements of organizational processes and activities and link them to the creation of value by the firm. Processes are structured and measured sets of activities, designed to produce a specific output for a particular customer or market. Identifying the firm's value-creating process — the way in which knowledge is created, integrated, transformed, and utilized — will require a horizontal view of the organization and the cross-functional relationships that exist within it. A model is first established using process analysis and the activities within each process are subsequently analyzed. In this way management can begin to assess the flows of information, flows of knowledge, and characteristics of knowledge transformation between functional departments, within divisions, and throughout the organization. The end product of the knowledge management process can then be identified and valued as (1) a patent, consulting process, or trademark; (2) an improvement in organizational efficiency and measured by cost savings, profits, revenue growth, return of investment, or (3) improved innovative capabilities of the firm, measured by a variety of individual and team-based performance indicators.

Customer Capital

29. Customer (relational) capital includes connections outside the organization such as customer loyalty, goodwill and supplier relations. It is the perception of value obtained by a customer from doing business with a supplier of goods and/or services (Petrash 1996). Various

techniques and analysis tools have been developed to better understand the value of customers and their perceptions. Some of these are described below (SMAC 1995)¹⁰.

Market-perceived quality profiles Market-perceived quality profiles are developed through customer questionnaires for the purpose of

- identifying what quality really means to the customer;
- indicating which competitors are best on each aspect of quality;
- developing overall quality performance measures based on the definition of quality that customers actually use in making their purchase decision.

Market-perceived price profiles Market-perceived price profiles follow the same methodology as market-perceived quality profiles but instead of asking customers to list factors that affect their perception of quality, the organization asks them to list the factors that affect their perception of the product's cost. Customers are then asked to weight these factors and rate their perception of competitor's performance on each price attribute.

Customer value maps Organizations use customer value maps to illustrate how a customer decides among competing suppliers and products. They contain information on which companies might be expected to gain market share and why.

Won/lost analysis This technique allows an organization to thoroughly analyze the reasons for either winning or losing a competitive bid. If an organization has won a bid, it can determine which product and service attributes were met and what the relative price/quality conditions were. This approach also offers method for examining the factors that contribute to changes in market share, that is, what the quality-price relationships were vis-a-vis the competitors.

What/who matrix A what/who matrix allows organizations to track responsibility for the actions that will ensure success in providing customer value. The what/who matrix shows an organization which business processes influence its performance and that of its competitors for each quality attribute. It shows who owns the process that has the greatest influence on the organization's performance vis-a-vis that of a specific competitor. This business process owner (in the organization) is then responsible for coordinating the processes and functions required to improve customer value performance.

INTELLECTUAL CAPITAL MEASUREMENT

30. Intellectual capital can affect and be effected by the unique culture of the organization and the distinct processes and relationships that evolve within it. This propensity for complexity suggests that a rigorous approach to managing, measuring, and reporting on the intellectual capital within the firm would require a number of measures to evaluate the intellectual capital of the firm. Some possible measures are presented in Table 2.

¹⁰ For a more detailed discussion of these management techniques, the reader should read SMAC 1995 in its entirety.

TABLE 2

Measures for Managing Intellectual Capital**Human Capital Indicators**

- Reputation of company employees with headhunters
- Years of experience in profession
- Rookie ratio (percent of employees with less than two years experience)
- Employee satisfaction
- Proportion of employees making new idea suggestions (proportion implemented)
- Value added per employee
- Value added per salary dollar

Organizational Capital Indicators

- Number of patents
- Income per R&D expense
- Cost of patent maintenance
- Project life-cycle cost per dollar of sales
- The number of individual computer links to the data base
- The number of times the data base has been consulted
- Contributions to the data base
- Upgrades of the data base
- Volume of IS use and connections
- Cost of IS per sales dollar
- Income per dollar of IS expense
- Satisfaction with IS service
- The ratio of new ideas generated to new ideas implemented
- The number of new product introductions
- New product introductions per employee
- Number of multi-functional project teams
- Proportion of income from new product introductions
- Five year trend of product life cycle
- Average length of time for product design and development
- Value of new ideas (money saved, money earned)

Customer and Relational Capital Indicators

- Growth in business volume
- Proportion of sales by repeat customers
- Brand loyalty
- Customer satisfaction
- Customer complaints
- Product returns as a proportion of sales
- Number of supplier/customer alliances and their value
- Proportion of customer's (supplier's) business that your product (service) represents (in dollars terms)

Source: Developed from SMAC 1998.

The Universal Intellectual Capital (IC) Report

31. The above list represents only some of the measures that can be used to evaluate the intellectual capital of the firm. Skandia AFS, a pioneer company in the area of intellectual capital management and reporting have developed an IC report on the basis of no less than 164 different indicators. Edvinsson and Malone (1997) consolidate these indicators into five main categories according to the primary focus they take — financial focus, customer focus, process focus, renewal and development focus, and human focus. Using this framework, 111 IC measures have been developed, forming the basis for the Universal IC Report. (Edvinsson and Malone 1997) The following describes the five categories of the Universal IC Report and illustrates several of the measurement tools used in each area.

Financial Focus

32. Indicators that take a financial focus are represented in dollar values or percent. They include standard calculations of ROI, and other common financial ratios. However, calculated returns to employees and returns to customers are used to gain a picture of the profitability of the human resources and clientele of the firm. Examples of measures that take a financial focus include:
- Revenues/employee
 - Value-added/customer
 - Profits/employee
 - Revenue from new customers/total revenues
 - Value added/employee
 - Value added/IT employee

Customer Focus

33. The customer focus specifically assesses the value of the customer capital of the firm. It uses financial, percentage, and numerical indicators to paint a picture of such things as composition of market share, customer service, demographic characteristics of various customer groups, and the overhead and other support costs required. Examples of customer capital indicators included:
- Market share
 - Customers/employees
 - Satisfied customer index
 - Annual sales/customers
 - Annual sales per customer

- Customers lost
- Average duration of customer relationship
- Revenue generating staff
- Average time from customer contact to sales response
- IT investment/sales person
- Support expense/customer.

Process Focus

34. Measures that take a process-based focus emphasise the effective use of technology within the firm. They primarily include ratios of administrative costs; information technology use and spending per employee; efficiency measures based on time, workload, and error ratios; and effectiveness measures designed to monitor quality and quality management systems. More specifically, process measures include:

- Administrative expense/total revenues
- Cost for administrative error/management revenues
- Processing time, out-payments
- Contracts filed without error
- PCs and laptops per employee
- Network capability/employee
- IT expense/employee
- Change in IT inventory
- IT capacity/employee
- Corporate quality performance (ISO9000)

Renewal and Development Focus

35. The renewal and development focus utilizes measurements that capture the innovative capabilities of the firm. These focus on the effectiveness of investment in training, research and development outcomes, and the return to technological infrastructure spending. The following indicators are seen to capture these elements:

- Training expense/employee

- Training expense/administrative expense
- Competence development expense/employee
- Share of training hours
- Business development expense/administrative expense
- R&D expense/administrative expense
- R&D invested in basic research
- R&D invested in product design
- R&D resources/total resources
- IT expenses on training/IT expense
- Educational investment/customer
- Value of EDI system
- Upgrades to EDI system

Human Focus

36. Measurements that take a human focus are intended to reflect the human capital of the firm and the renewal and development of those resources. They include a number of calculated indexes of employee competency, measures of the elan and potential creativity of the workforce, as well as indicators of the rate at which the human resources of the firm must be replaced. The following is a sample of these measures:
- IT literacy of staff
 - Leadership index
 - Motivation index
 - Number of employees
 - Number of managers
 - Average age of managers
 - Annual turnover of full-time permanent employees
 - Percentage of company managers with advanced degrees in business, science and engineering, and liberal arts

- Time in training each year
37. What is evident from the diversity and extent of intellectual capital indicators is that each organization must decide for itself which of these measures are most suited to their needs, budget constraints and management resources available.

Comparative Indicators

38. The need to make general comparisons of the intellectual capital stock between firms has led to the development of three broad indicators that are: 1) derived from the audited financial statements of the firm and 2) independent of which definitions of intellectual capital are adopted by the firm.
- Market-to-book values
 - Tobin's "q"
 - Calculated intangible value

Market-to-Book Values

39. The most widely known indicator of the intellectual capital is the market-to-book value. The contention is that the value of a firm's intellectual capital will be represented by the difference between the book value and the market value of the firm. If a company's market value is \$10 billion, and its book value is \$5 billion, then the residual \$5 billion represents the value of the intangible assets, (or intellectual assets of the firm). The principle benefit of this method is its simplicity. However, as with most other measures, the more simple the calculation, the less likely it is to capture the complexities of the real world. In this case, simply subtracting book value from market value tends to ignore exogenous factors that can influence market value, such as deregulation, supply conditions, general market nervousness, as well as the various other types of information that determine investors' perceptions of the income-generating potential of the firm, such as industrial policies in foreign markets, media and political influences, rumour etc.
40. In addition, the current accounting model does not attempt to value a firm in its entirety. Instead it records each of its severable assets at an amount appropriate to the national or international accounting standard under which the accounts have been prepared (e.g., historical cost, modified historical cost, replacement value, etc.). The market, however, values a company in its entirety as a going concern with strategic intent. It may be argued that the differences between these two forms of valuation can be defined as the value of intellectual capital. This value will then be subject to variations the book value of the severable assets, their current market price, and various imperfections that may exist in the market valuations. However it must be recognized that if we are defining intellectual capital this way, then we are talking about an aggregate, including the difference between severable assets and the market valuation of the firm.
41. Calculations of intellectual capital that use the difference between market and book values can also suffer from inaccuracy because book values can be impacted if firms choose to or are

required to adopt tax depreciation rates for accounting purposes, and the tax rates reflect factors other than an approximation of the diminution in value of an asset. Thomas Stewart (1997, 225) explains:

To encourage companies to invest in new equipment, IRS rules deliberately permit companies to depreciate assets faster than the rate at which they really wear out; and companies can (within limits) fiddle with depreciation methods to make profits look better or worse than they are. Because the right side of a balance sheet (liabilities plus shareholders equity) must equal the assets on the left, any understatement of assets results in a corresponding undervaluation of book value.

Tobin's "q"

42. Another way of getting around the depreciation rate problem when comparing the intellectual capital between firms is to use Tobin's "q". Tobin's "q" was initially developed by Nobel winning economist, James Tobin, as a method for predicting investment behavior. It uses the value of the replacement costs of a company's assets to predict the investment decisions of the firm, independent of interest rates. The "q" is the ratio of the market value of the firm (share price x number of shares) to the replacement cost of the its assets. If the replacement cost of a company's assets is lower than its market value, then a company is getting monopoly rents, or higher-than-normal returns on their investment. A high value of "q" indicates that the company will likely purchase more of those assets. Technology and human capital assets are typically associated with high "q" values. As a measure of intellectual capital, Tobin's "q" identifies a company's ability to get unusually high profits because its got something that no one else has (Stewart 1997).
43. However, Tobin's "q" is subject to the same exogenous variables that influence market price as the market-to-book method described above. Both of these methods are best suited to making comparisons of the value of intangible assets of firms within the same industry, serving the same markets, and that have similar types of hard assets. In addition, these ratios are useful for comparing the changes in the value of intellectual capital over a number of years. When both the Tobin's "q" and the market-to-book ratio of a company are falling over time, it is a good indicator that the intangible assets of the firm are depreciating. This may provide a signal to investors that a particular company is not managing its intangible assets effectively and may cause them to adjust their investment portfolios towards companies with climbing, or stable "q"s. By making intra-industry comparisons between a firm's primary competitors, these indicators can act as performance benchmarks and can be used to improve the internal management or corporate strategy of the firm.

Calculated Intangible Value

44. A third measure called calculated intangible value (CIV) has been developed by NCI Research to calculate the fair market value of the intangible assets of the firm. (The method follows Revenue Ruling 680609 of the U.S. Internal Revenue Service.)
45. The CIV calculates the excess return on hard assets then uses this figure as a basis for determining the proportion of return attributable to intangible assets. Stewart 1997 illustrates the CIV calculation as follows by the use of a simple example taken from Merck & Co.:

- (1) Calculate average pretax earnings for three years. For Merck: \$US3.694 billion.
 - (2) Go to the balance sheet and get the average year-end tangible assets for three years: \$US12.953 billion.
 - (3) Divide earnings by assets to get the return on assets: 29 percent.
 - (4) For the same three years, find the industry's average ROA. For pharmaceuticals, the number is 10 percent. (If a company's ROA is below average, stop: NCI's method won't work)
 - (5) Calculate the "excess return". Multiply the industry-average ROA (10 percent) by the company's average tangible assets (\$US12.953 billion). That tells you what the average drug company would earn from that amount of tangible assets. Now subtract that from this company's pretax earnings, which we got in step one. (\$US3.694 billion). For Merck, the excess is \$US2.39 billion. That's how much more Merck earns from its assets than the average drugmaker would.
 - (6) Calculate the three-year-average income tax rate, and multiply this by the excess return. Subtract the result from the excess return, to get an after-tax number. This is the premium attributable to intangible assets. For Merck (average tax rate: 31 percent) that's \$US1.65 billion.
 - (7) Calculate the net present value of the premium. You do this by dividing the premium by an appropriate percentage, such as the company's cost of capital. Using an arbitrarily chosen 15 percent rate, that yields, for Merck, \$US11 billion. This is the calculated value (CIV) of Merck's intangible assets, the one that doesn't appear on the balance sheet (Stewart 1997).
46. While the CIV offers the potential to make inter- and intra-industry comparisons on the basis of audited financial results, two problems remain. First, the CIV uses average industry ROA as a basis for determining excess returns. By nature, average values suffer from outlier problems and could result in excessively high or low ROA. Second, the company's cost of capital will dictate the NPV of intangible assets. However, in order for the CIV to be comparable within and between industries, the industry average cost of capital should be used as a proxy for the discount rate in the NPV calculation. Again the problem of averages emerges and one must be careful in choosing an average that has been adjusted for outliers, such as excessively high or low values.

CONCLUSION

47. It is recognized that the intellectual capital of a firm plays a significant role in creating competitive advantage, and thus managers and other stakeholders in organizations are asking, with increasing frequency, that its value be measured and reported for planning, control, reporting, and evaluation purposes. However, at this point, there is still a great deal of room for experimentation in quantifying and reporting on the intellectual capital of the firm. Given the potential for both complexity and diversity, developing intellectual capital measures and reporting practices that are comparable between firms remains one of the key challenges for the accounting profession. The international accounting bodies represented by the International Federation of Accountants have begun to examine the role of the accounting

profession in managing and reporting the intellectual capital of the firm. In publishing this study, the Financial and Management Accounting Committee (FMAC) of IFAC supports the growing effort to understand the complexities of intellectual capital management, accounting and reporting, yet recognizes that there is a long way to go for generally accepted and endorsed practices to evolve. The three general measures of the intellectual capital of the firm that have been described within this study (i.e., market-to-book ratios, Tobin's "q", and CIV) may be the first to be considered by the accounting community.

48. Although the emerging frameworks of intellectual capital management have provided a new holistic perspective on the firm, its resources, and ways of managing them, this study introduces the view that established management accounting practices and techniques can be readily applied to this area. A wide variety of precedents and principles are currently available to assist in the management of the human, organizational and customer capital of the firm that draw upon a broad range of disciplines and management perspectives. Identifying and applying this wealth of information in a cohesive and appropriate way may be a major contribution that the accounting profession can make to managing for the success of organizations.

APPENDIX

SUMMARY OF INTELLECTUAL CAPITAL MANAGEMENT EXPERIMENTATION

Company Consultants	Managerial Practice	Measurement Technique
1. Ernst and Young	Creation of Centre for Business Innovation Support conferences, research in IC	Development of Strategic Balanced Scorecard including IC
2. Arthur Andersen	KMAT Benchmarking Study	Subjective measures of satisfaction with practices
3. Booz Allen	Development of knowledge sharing culture Reorganized around knowledge data base and intranet	Compensation on overall organization results
4. McKinsey	Revamping of internal knowledge sharing network	--
Financial Institutions	Managerial Practice	Measurement Technique
5. Skandia (AFS)	Knowledge-sharing culture Intranet Technology structure that captures IC	External reporting of IC measures
6. CIBC	Development of JIT learning Development of competence maps Cultural change to recognize strategic importance of knowledge	Some internal measures of training and knowledge sharing
7. Royal Bank	Development of expertise in servicing knowledge-based business	Measurement models to evaluate credit risk

High Technology/ Knowledge-Based Organizations	Managerial Practice	Measurement Technique
8. Hewlett Packard	Knowledge sharing culture Recognize and communicate knowledge initiatives	--
9. Dow Chemical	Patent Review process that evaluates IC content Extending to other forms of property Shift in cultural attitude	Direct measures of value of patent portfolio
10. Hughes Space	Creation of knowledge maps Attempt to eliminate knowledge silos Technological capture of corporate memory on data base to try to eliminate repeating previous mistakes	Measure speed of development Measure repeated mistakes
11. Merck	Measure of NPV of R&D investment Use of life cycle costing	Monitor value over time
12. Nova Care	Creation of knowledge nets Inverted organization where administration serves front line professionals Technology supports the administrative service	Monitor satisfaction Monitor costs

Source: SMAC 1998.

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