Measuring Intangibles

A Summary of Recent Activity

Kenan Patrick Jarboe
Athena Alliance

April 2007

This paper was commissioned by the Alliance for Science & Technology Research in America (ASTRA) as part of its Innovation Vital Signs project. The author gratefully acknowledges its support.

Athena Alliance
www.athenaalliance.org

Measuring Intangibles

Introduction

The measurement of intangibles is nothing new. Humans have been measuring intangibles for a long time. Whenever a teacher assigns a grade, they are measuring an intangible (the student's knowledge). Whenever a boss gives or does not give an employee a raise or a bonus, they are implicitly measuring the employee's skill level and value added to the company. Whenever a customer chooses one color, make, and model of a car over another, they are measuring a number of intangibles. Whenever an investor buys a company's stock based on an expectation of future gain, they are investing in intangibles.

Until recently, however, macroeconomics treated intangibles as residuals. The most famous examples are Solow's residual[1] and Tobin's Q.[2] With the rise of endogenous growth theory and the recognition of the importance of intangibles as drivers of economic value, more attempts have been made to specifically measure the value of intangibles. As part of this effort, intangibles have come to be seen as assets (stocks) as well as expenditures (flows). These efforts have advanced progress to quantify intangibles. However, as this summary paper will show, a number of important issues remain unresolved.

What are intangibles?

The first step in measuring intangibles is to define them. There are numerous frameworks with variations upon variations. The Value Measurement & Reporting Collaborative found more than 80 approaches or frameworks of value and performance measures.[3]

We must first distinguish between descriptors and measures of intangibles, and descriptors and measures of value drivers and performance measures (financial and non-financial).

Performance measures are outcomes. They can be final outcomes, such as customer satisfaction or profit per employee. They can be intermediate outcomes, such as the number of turns per table at a restaurant. In some cases, they are actually inputs used as (mostly imperfect) surrogates for outcome, e.g., research and development (R&D) spending as a measure of knowledge creation. On a macro level, economic indicators, such as gross domestic product (GDP), unemployment, and inflation, and social indictors, such as education level and life expectancy, are all performance measures.

There are numerous performance measures that touch on intangibles at the international,

national, state, and local levels. Some common examples are the number of patents, the percent of the workforce with higher degrees in science, technology, engineering, and mathematics (STEM), the level of entrepreneurial activity, and the level and availability of venture capital. (Because the broader "Innovation Vital Signs" project focuses on these measures, they will not be discussed in this report.)

Value drivers are factors that cause an increase in important performance measures. Some argue that intangibles are the same as value drivers. For example, Cummins, as notes:

> Intangible capital is not a distinct factor of production as is physical capital or labor. Rather, it is the "glue" that creates value from other factor inputs.[4]

In some cases, value drivers are simply measured directly as inputs. Many have been selected based more on a black-box approach rather than on a rigorous model. For example, R&D spending has long been accepted as a value driver in most economies and industries, and numerous studies show the return on R&D spending.[5] However, there are also reports that raise questions about the relationship between simply spending money on R&D and achieving desired performance outcomes.[6]

There are a number of frameworks that connect external factors and internal inputs with intermediate variables and performance measures and then with ultimate financial outcomes. These models allow managers to understand the key value drivers of their specific industry and how those value drivers can be enhanced. Such models include The Balanced Scorecard,[7] the Danish Intellectual Capital Statement,[8] the Skandia Intellectual Capital Navigator,[9] Intellectual Assets Monitor,[10] the PriceWaterhouseCoopers (PwC) ValueReporting,[11] the KPMG Value Explorer,[12] and, from the now defunct accounting firm of Arthur Andersen, Value Dynamics.[13]

A more direct model that links intangibles to company performance is Jonathan Low's and Pam Cohen Kalafut's Value Creation Index.[14] Their model is based on the following intangibles: [15]

- Management/Leadership
  - Strategy Execution
  - Communication
  - Transparency.
- Organization
  - Technology and Processes
  - Human Capital
  - Workplace Organization and Culture
  - Innovation
  - Intellectual Capital
  - Adaptability.
- Relationships
  - Brand Equity
  - Reputation
  - Alliances and Networks.

The model links specific value drivers to intangible assets and then to company financial performance.

While the Low and Kalafut model provides a framework for categorizing intangibles, there is one more aspect to consider: how to differentiate between assets and capabilities. The European Union (EU)-funded PRISM project has developed a framework for this differentiation. The framework is a spectrum that runs from tangible goods to intangible goods to intangible capabilities to latent capabilities. Tangible assets are both physical assets, such as plants, equipment, and inventory, and financial assets, such as cash, securities, and investments. Intangible goods include contracts, licenses, copyrights, patents, trademarks, and brands. Intangible competencies are the non-price factors of competitive advantages, often referred to as "distinctive" or "core" competencies. Latent capabilities include leadership, workforce skills, organization, and innovation capabilities.[16]

Not all intangible assets have the same characteristics. A Brookings Institution study on intangibles assets divided them into these three levels:

Level 1—assets that can be owned and sold
Level 2—assets that can be controlled but not separated out and sold
Level 3—intangibles that may not be wholly controlled by the firm.[17]

Level 1 includes not only intellectual property (IP) but also items such as contracts and business agreements, licenses and franchise rights, quotas and resource allocations (e.g., airport landing rights and water rights), and employment contracts. Level 2 describes those areas proprietary to a specific firm, but that are difficult to separate from the ongoing operation, such as business secrets, in-process R&D, and business processes. Level 3 includes items often referred to as human capital, such as core competencies, organizational capital, and relationship capital.

A slightly different version of this comes from Zambon, et al.[18] Like the other studies, this framework defines intangible assets as "non-physical sources of expected benefits." There are three subcategories—

Intellectual Property—Intangible assets with legal or contractual rights, including patents, trademarks, designs, licenses, copyrights, film rights, and mastheads.

Separately Identifiable Intangible Assets—Information systems, networks, administrative structures and processes, market and technical knowledge, human capital (if embodied in a codified form), brands, intangibles embodied in capital equipment, trade secrets, internally generated software, and drawings.

Goodwill (Non-separable Intangible Assets)—Prior intangible investments embodied in organizations, management expertise, geographical position, or monopoly market niche.

One of the most common frameworks for intangibles comes from the EU's MERITUM (Measuring Intangibles to Understand and Improve Innovation Management) project, commonly known as the three C's:

> **Human capital** is defined as the knowledge that employees take with them when they leave the firm. It includes the knowledge, skills, experiences and abilities of people. Some of this knowledge is unique to the individual, some may be generic. Examples are innovation capacity, creativity, know-how and previous experience, teamwork capacity, employee flexibility, tolerance for ambiguity, motivation, satisfaction, learning capacity, loyalty, formal training and education.
> **Structural capital** is defined as the knowledge that stays within the firm at the end of the working day. It comprises the organizational routines, procedures, systems, cultures, databases, etc. Examples are organizational flexibility, a documentation service, the existence of a knowledge centre, the general use of Information Technologies, organizational learning capacity, etc. Some of them may be legally protected and become Intellectual Property Rights, legally owned by the firm under separate title.
> **Relational capital** is defined as all resources linked to the external relationships of the firm, with customers, suppliers or R&D partners. It comprises that part of Human and Structural Capital involved with the company's relations with stakeholders (investors, creditors, customers, suppliers, etc.), plus the perceptions that they hold about the company. Examples of this category are image, customers loyalty, customer satisfaction, links with suppliers, commercial power, negotiating capacity with financial entities, environmental activities, etc.[19]

These frameworks highlight another issue in measurement: What is an asset? Accounting rules define an asset as something having a probable long-term economic benefit.

> An asset has three essential characteristics: (a) it embodies a probable future benefit that involves a capacity, singly or in combination with other assets, to contribute directly or indirectly to future net cash inflows, (b) a particular entity can obtain the benefit and control others' access to it, and (c) the transaction or other event giving rise to the entity's right to or control of the benefit has already occurred.[20]

In the case of intangibles, this definition leads to some ambiguity as to what is an asset and what is an expense. As this report will touch on, different intangibles are treated differently depending on the circumstances. The core issue is how the expenditure on an asset is treated: as an immediate expense; as an asset with a short life (that depreciates quickly); or as asset that is long-lived (that depreciates over a period of time).

There is also the unit-of-analysis issue. Intangibles can be measured on two levels: macro- and microeconomic. Macroeconomic measures look at the treatment of intangibles in the System of National Accounts. Microeconomy revolves around company-level accounting and financial reporting procedures. The remainder of this report will summarize ways to measure intangibles at both levels.

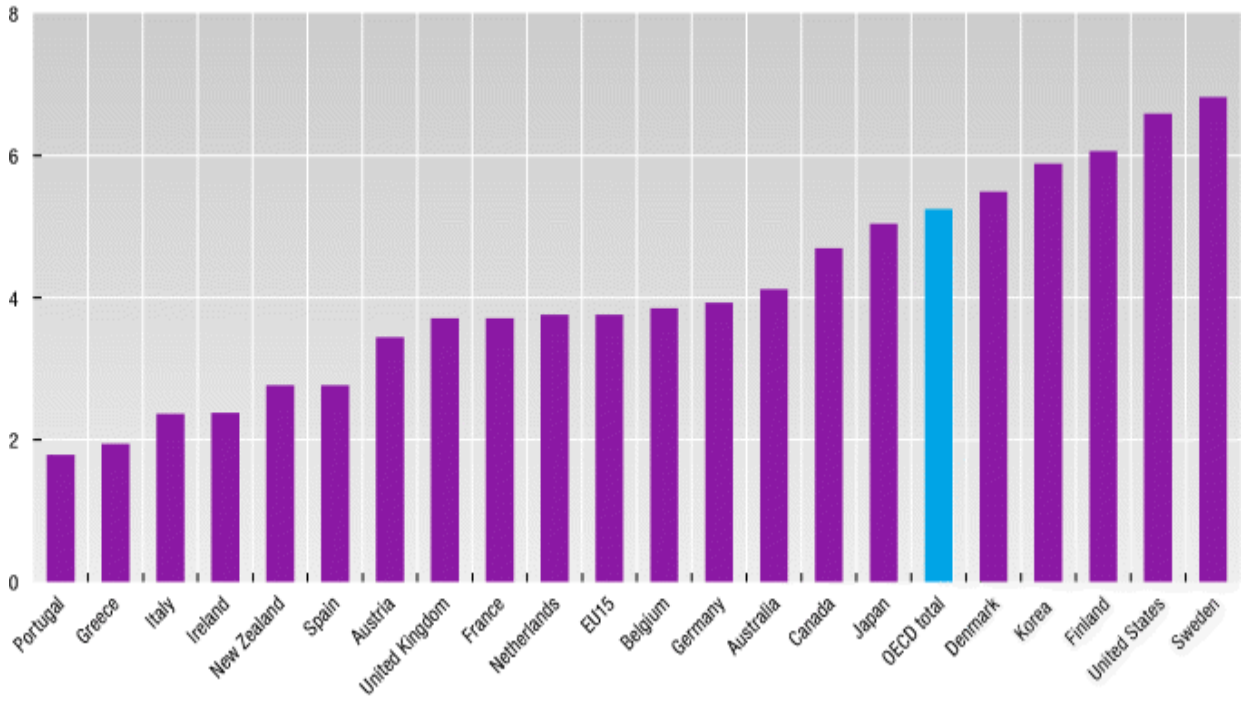
Macroeconomic-level intangibles

An important earlier look at a macroeconomic measurement of intangibles was a 1987 internal Organisation for Economic Co-operation and Development (OECD) memo that outlined the four areas of intangible investments: R&D, software, training, and marketing.[21] That study reportedly showed that intangible investments had grown more rapidly than Gross Fixed Capital Formation between 1974 and 1984.[22]

A version of this formulation is still used to publish the "Investment in Knowledge" section of the OECD Factbook.[23] The data is a summation of expenditures on R&D, higher education, and software (**Figure 1**). The United States Government uses a similar approach to report on the federal budget.[24] That report includes physical capital investments, federally funded research and development, and federally funding education and training (**Appendix A**).

Figure 1. Investment in Knowledge in OECD Countries

(As a percentage of GDP, 2002 or latest available year)



Source: OECD Factbook 2006—Economic, Environmental and Social Statistics Statlink. http://dx.doi.org/10.1787/213340280004.

In 1992 and again in 1999, OECD held a roundtable on the subject. The 1999 Amsterdam conference[25] produced a number of papers that included a theoretical outline by Young[26] and a discussion of data collection by Vosselman.[27] Another important contribution was a compilation by OECD of various national studies estimating intangible investments—both

as part of the 1992 workshop and as part of subsequent studies.[28]

For the most part, the national studies used the four categories of R&D, software, education, and training, with some variations and minor expansions. For example, France, the United Kingdom, and the Netherlands included purchase of foreign licenses. Some portion of the value of intellectual property was included by Finland and the Netherlands. Finland, the Netherlands, and Norway also included organizational development, the services of management consultants, and worker preventative health measures, respectively.

The Young paper outlined a more comprehensive framework based on those national studies (see **Appendix B** for the entire list). However, in the end, six core areas emerged from the review. The first was software, including large databases. Then next was R&D, including technology purchased from abroad (licenses). In addition, there was some discussion of whether patents should be included as part of R&D or under another category. Industrial design and artistic design were also discussed, but not seen as core components. Formal training was seen as core, but informal training, along with preventative health benefits, were viewed as hard to measure. Organization of the firm was seen as core, but there was no clear method of measurement. Marketing, mineral exploration rights, and the production of entertainment, literary, and artistic originals were also seen as core. However, it was suggested that non-producing rights, such as milk quotas, be excluded.

The Vosselman paper took the Young review and put it into a slightly different systematic framework for data collection (**Appendix C**). Core elements of this formulation are R&D; education and training; software; marketing; rights, including licenses, brands, copyrights, and patents; and mineral exploration. He also incorporated a set of supplementary categories of intangible investments, which included the development of the organization; engineering and design; construction and use of databases; remuneration for innovative ideas; and other human resource development, excluding training.

Vosselman noted that many of these areas are already subject to OECD data-collection guidelines. These include the *Frascati Manual* for science and technology statistics, the *Oslo Manual* for innovation statistics, the Technology Balance of Payments manual, and the *Manual for Better Training Statistics*.[29]

Some are also already included in the international guideline for collecting National Accounts data.[30] However, the National Accounts treat all of these as expenditures rather than investments. There is some ongoing work to include these as investments in the so-called satellite accounts, which look at specific areas of economic activity. For example, the Bureau of Economic Analysis issued a preliminary Research and Development Satellite Account late last year showing that—

> If R&D were included in the GDP as investment instead of as an expense, business investment would be 11 percent, or $178 billion, higher; and the 2002 national savings rate would be 16 percent instead of 14 percent.[31]

Obviously, incorporation of other intangibles into the National Accounts as investments rather than expenses would have similar implications.

To measure intangible investments in the United States, Nakamura used a broader definition of knowledge investments, which included R&D, advertising and marketing, software, financial activities, and the creative activities of writers, artists, and entertainers.[32] He estimated the value of U.S. gross investments in intangibles to be at least $1 trillion annually.

Nakamura used three separate methods for calculating intangibles. The first was direct expenditures of private R&D, software expenditures, and advertising/media costs. This came to $597 billion or 6 percent of U.S. GDP in 2000. He then added $50 billion for financial corporations and $50 billion for publishing, motion pictures, and sound recording. He viewed the subsequent total of nearly $700 billion as conservative because it did not include R&D by individuals and unincorporated businesses or the administrative and direct training costs of adopting new software. The figure also did not account for investments in productivity-enhancing changes in business processes, education, or employee training.

The second estimate used data on the size and median pay of workers in creative occupations—specifically engineers, scientists, writers, and artists. These workers earned almost 10 percent of all wages and salaries. Again, this figure was viewed as conservative because it did not account for managerial and other inputs or include the creative work of other professions, such as doctors and teachers.

The third estimate used the cost of goods sold. If companies have been increasing intangible expenditures in areas such as R&D and marketing, there should be a decline in the percentage of total expenditures on direct production cost (as measured by cost of goods sold). Nakamura estimated that since 1980, the proportion of total revenues made up of the cost of goods sold fell by 10 percentage points. That is in line with other estimates pegging the size of direct expenditures on intangibles and the size of payroll on intangibles at 6 percent to 10 percent.

Nakamura also used an indirect method to measure investment in intangibles. He argued that economic theory and evidence shows that the ratio of consumption to gross domestic product should be relatively stable—if all investment (tangible and intangible) is properly counted. But if intangible investments are not counted in GDP, then any rise in the consumption ratio will indicate the size of the unmeasured investments. He estimated the size of the unmeasured intangible investment to be “$910 billion in 2000, with a 5 percent confidence interval of plus or minus $200 billion. Adding in the $230 billion in software investment that was measured in that year, we arrive at a lower bound estimate of U.S. gross investment in intangibles of $1.1 trillion.”[33]

Webster undertook a calculation for the Australian economy using one different and one similar method. The first (and different) method used stock market data to derive the level of intangible assets. The second method, similar to Nakamura's, estimated the investment in intangibles based on the employment of those in occupations that produce intangibles. Webster's goal, however, was to calculate the rate of growth of intangible investments, not the absolute size of those investments. Her conclusion was that the ratio of intangible capital to overall capital in Australia grew at an average annual rate of 1.3 percent between 1948 and 1998.[34]

Another calculation of intangibles, using international accounting rules and valuation procedures (discussed later), was conducted by Brand Finance, which estimated the total value of more than 5,000 publicly quoted companies in 25 countries.[35] For 2005, the companies' total enterprise value was $36.2 trillion—$14 trillion in tangible net assets; $4.3 trillion in disclosed intangible assets; and $17.9 trillion in "undisclosed value." For the U.S., intangible assets were estimated at $9.2 trillion.[36]

A slightly different approached was employed by John Howkins, who estimated that the market size of the core industries in the U.S.'s creative economy was $960 billion.[37] These industries included R&D, publishing, software, TV and radio, design, music, film, toys and games, advertising, architecture, performing arts, crafts, video games, fashion, and art. There are also numerous variations on this formula used to determine the size of these activities (generally in terms of employment) in state and local economies.[38]

Various other intangible components have also been estimated. For example, Siwek estimated that copyright industries contributed $626.6 billion to U.S. GDP in 2002.[39] Shapiro and Hassett estimated the value of U.S. intellectual capital at more than $5 trillion, based on an imputation from current stock market values.[40] This derivative estimate seems excessively high, judging by the more extensive economic analyses discussed below. But, in sheer dollar value, it does demonstrate the importance of intangibles to the U.S. economy.

Much more rigorous work has been done on the value of brands and reputation, much of it at the company, rather than at the macroeconomic, level. As we will touch on in more detail later, valuation techniques for company brands have become relatively robust. For example, Interbrand and *Business Week* publish an annual ranking and valuation of major brands based on revenue streams.[41] Coca-Cola tops the list with an estimated brand value of $67 billion.[42] The total brand valuation of the 52 U.S. companies listed in the top 100 came to nearly $722 billion.

Using a version of the company-level methodology, Anholt estimated the brand value of the U.S. is roughly $18 trillion. This is not the sum of the economic value of all private brands, but the appeal of the nation's brand image.[43]

The most comprehensive recent analyses are two papers by Corrado, Hulten, and Sichel.[44] This work actually measured intangibles based on a broader framework, going beyond the four areas outlined almost 20 years ago. Corrado, et al. estimated that as much as $800 billion in annual investments is still excluded. As a result, the size of U.S. business capital stock is off by $3 trillion of intangibles.

Their framework has these three major areas (see **Appendix D** for the entire framework):

- Computerized information
- Scientific and creative property
- Economic competencies.

Computerized information includes both software and databases. Scientific and creative property covers not only the standard measures of R&D but also costs related to mineral exploration, copyright and license costs, and other product development, design, and research expenses (not necessarily leading to a patent or a copyright), such as new architectural and engineering designs and R&D in social sciences and humanities. Economic competencies include brand equity, firm-specific human capital (training costs), and organizational structure costs.

Some of the data for these areas comes from official government sources, such as the Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS), the National Science Foundation (NSF), and the Census Bureau's *Services Annual Survey* (SAS). But, as the authors pointed out, some investments in intangibles are not adequately captured in the National Income and Product Accounts (NIPA). For example, the value of brand equity is not included in their stock of assets, although the cost of advertising to maintain brand equity is included in the NIPA as a business expense. Likewise, what the authors call "business investments in firm-specific human and structural resources through strategic planning, adaptation, reorganization, and employee-skill building" are only imperfectly captured. Employee time and additional outside costs for training would be included as a business-consumption expenditure, but the added stock of value of those trained workers would not be captured.

Given these limitations, the authors used a mixture of public data, private data, and derivative measures to estimate each of the areas. For example, development costs in the motion picture industry were estimated using data from the Motion Picture Association of America (MPAA). In turn, that data was used to estimate development costs in the radio and television, sound recording, and book publishing industries by doubling the new product development costs for motion pictures. As the authors admitted, this last example is an especially "crude" way of estimating, which highlights the data problem.

Other estimates include the following components:

Other product development, design, and research expenses (not necessarily leading to a patent or copyright):

- New product development costs in the financial services industries, crudely estimated as 20 percent of intermediate purchases.
- New architectural and engineering designs, estimated as half of industry purchased services (revenues of the industry as reported in SAS).
- R&D in social sciences and humanities, estimated as twice industry purchased services (revenues as reported in SAS).

Brand equity (advertising expenditures and market research for the development of brands and trademarks):

- Purchases of advertising services; advertising expenditures, grand total by type of advertiser as reported by Universal-McCann (data begin in 1935) [a private data source].
- Outlays on market research, estimated as twice industry purchased services (revenues of the market and consumer research industry as reported in SAS).

Organizational structure (costs of organizational change and development; company formation expenses):

- No broad statistical information and no clear consensus on scope.
- Purchased "organizational" or "structural" capital, estimated using SAS data on the revenues of the management consulting industry.
- Own-account component, estimated as value of executive time using BLS data on employment and wages in executive occupations.[45]

The papers are a major step forward in dealing with the many technical problems associated with classifying intangible expenditures as investments, including how to break out the investment expenditures from the consumption expenditures, and how to estimate the missing investments. These innovative methods of data analysis and collection are the foundation for future work.

The papers also attack the issue of how to price and deflate those intangible investments. The purpose of depreciation is to account for an asset as it is used up. Even for tangible assets, there is controversy and disagreement over the appropriate rates (such as how many years to depreciate a machine tool). The question becomes much more difficult for intangible assets. As endogenous growth theory tells us, the expansion of knowledge is self-perpetuating with increasing, rather than diminishing, returns. Yet we know that the specific use of that knowledge for economic advantage—for example, in a patent—can diminish over time. But how rapidly does the patent diminish?

Corrado, Hulten, and Sichel analyzed this issue and had this to say:

> Relatively little is known about depreciation rates for intangibles. Based on the limited information available, we made the following assumptions about depreciation rates: [46]

Category Depreciation Rate	(percent)
Computerized information (other than software)	33
R&D, scientific	20
R&D, nonscientific	20
Brand equity	60
Firm-specific resources	40

But measurement was not their final goal; rather, they sought to understand the impact of these missing investments on the overall economic picture. Treating intangible expenditures as investments rather than consumption has the following consequences:

> Specifically, when intangibles are treated as an intermediate input, the spending on intangibles is subtracted from revenue as an expense, reducing measured profits. On the other hand, when intangibles are treated as an investment, they are not subtracted from revenue in the period of purchase, and profits are higher.[47]

Their conclusion should therefore come as no surprise: If one corrects for the current misclassification of intangible expenditures as consumption rather than investments, adds in those missing investments and properly capitalizes them, then business investment is higher than normally calculated.

The papers also tell us about the areas that contributed the most to growth.[48] Comparing the time period 1973–1995 with 1995–2003, overall intangible assets grew from 9.4 percent of total national income to 13.9 percent. Not surprisingly, computerized information went from 0.8 percent to 2.3 percent. However, scientific R&D was almost flat, increasing its share from 2.4 percent to only 2.5 percent. Brand equity rose slightly from 1.7 percent to 2 percent. The other big gainers were nonscientific R&D, which went from 1 percent to 2.2 percent and firm-specific resources, which increased from 3.5 percent to 5 percent.

In other words, the largest increase in contribution by intangibles to U.S. economic well-being was not necessarily scientific R&D, but computerization, nonscientific R&D, and company reorganization and management/worker skills.

A slightly different view comes from looking at the annual real capital growth rate of these intangibles between the two time periods. Overall, the annual rate of growth of intangible capital increased slightly from 6.2 percent in the 1973–1995 time period to 6.9 percent in the 1995–2003 time period. However, the growth rate in the intangible capital of computerized information dipped from 16 percent to 13 percent. The scientific R&D growth rate increased slightly from 3.6 percent 3.9 percent; nonscientific R&D declined from 12.4 percent to 7.2 percent; brand equity increased slightly from 4.2 percent to 4.6 percent; and firm-specific resources grew from 5.3 percent to 6.2 percent. This analysis

shows that we are likely to get our biggest increase in intangible capital in the category of firm-specific resources and nonscientific R&D (even though growth in the latter category slowed down in the latter time period).

Yet, as the papers pointed out, these are exactly some of the areas where we lack adequate measures. As mentioned before, brand valuation is much more than advertising expenditures. The value of organizational change is much more than expenditures on consultants and, at the same time, the value of product design is much greater than the expenses involved, even with more refined measures of those expenses. The path-breaking work of Corrado, Hulten, and Sichel is key to helping us understand this issue, but it also shows how much more needs to be done.

There is one other controversial attempt at macroeconomic measurement worth mentioning. Hausmann and Sturzenegger argued in a paper first published in late 2005 and revised in 2006 that a large portion of our international current account is missing,[49] a notion that set off a flurry of comments. Made up of intangibles, this "dark matter" actually showed that our current account is closer to balance than the official statistics. Methodology starts with the fact that the U.S. had a positive net income on its international financial portfolio, even though that international position was deeply negative. The authors attributed that positive income flow to the uncounted intangible assets and said:

> We know that the U.S. net income on its financial portfolio is $30 [billion]. This is a 5 percent return on an asset of $600 [billion]. So the U.S. is a $600 [billion] net creditor, not a $4,100 [billion] net debtor. Since the assets have remained stable, then, on average, the U.S. has not had a current account deficit at all over the past 25 years. That is why it is still a net creditor.
>
> We call the $4,700 [billion] difference between our measure of U.S. net assets and the standard numbers "dark matter" because it corresponds to assets that generate revenue but cannot be seen. The name is taken from a term used in physics to account for the fact that the world is more stable than you would think if it were held together only by gravity emanating from visible matter.[50]

As critics have pointed out, there are many reasons why the U.S. can have net positive income on a debt, having to do with rate-of-return differentials between our international assets and our international debt and with the seignorage on foreign holdings of U.S. currency.[51] Using a similar derivative calculation based on net income from royalties, Jarboe calculated that the value of uncaptured intangibles is closer to $640 billion to $785 billion.[52]

While the methodology used by Hausmann and Sturzenegger is suspect, the exercise does make a useful point. It is not clear that our macroeconomic statistics capture international flows of intangibles because much of their value is embodied in other products and services. Breaking out the value-added of a specific intangible (e.g., the design value of an iPod) is difficult enough domestically. When the production process is distributed globally, the measurement difficulties are that much greater.

Microeconomic-level intangibles

At the microeconomic level, some of the same categories and concepts apply. However, the firm-level situation is much more detailed than at the national level. As Bismuth points out:

> Although such classificatory schemes have been used in developing guidelines and by researchers, they may not be so value-relevant for investors and managers. Few analyst reports labelled "Intangibles" or even "Relational Capital" or "Structural Capital" or "Organisational Capital" have been released. It doesn't mean that investors do not take into account intellectual assets in their research and in their judgment about investments. Rather, they consider other more summary categories of intellectual assets such as "brand equity", "reputation", "management of skills", "franchise value" or "FDA approvals" on a company or sector basis and according to a specific situation.[53]

Company-level measurement of intangibles is governed by accounting rules, known in the U.S. as Generally Accepted Accounting Principles (GAAP), which are administered by the Financial Accounting Standards Board (FASB). Rules for intangibles that are acquired from outside the firm (via mergers or acquisitions) are covered in FASB's Statements of Financial Accounting Standards (SFAS) 141 and 142.[54] In many other countries, the governing rules are the International Accounting Standards Board's (IASB) International Financial Reporting Standards (IFRS) 3 and International Accounting Standard (IAS) 38.[55]

SFAS 141 and 142 break down intangibles into the following five main categories: marketing-related intangible assets; customer-related intangible assets; artistic-related intangible assets; contract-based intangible assets; and technology-based intangible assets. (See **Appendix E** for the entire list.) IAS 38 uses a similar categorization.

It should be noted that both SFAS 141/142 and IAS 38 only apply to intangible assets acquired through a merger or an acquisition. The purpose of these standards is to break out intangibles from the broader category of "goodwill." IASB is exploring the possibility of a new project on intangible assets.[56] The purpose of the project will be to develop similar rules to account for internally generated and separately purchased intangible assets. After commissioning a number of technical papers, the IASB will make a decision at its December 2007 meeting. If the project advances, it is anticipated that it will be conducted jointly with FASB and completed in September 2009.

In Australia, Hunter, Webster, and Wyatt developed a framework specifically for reporting intangibles, based on the OECD outline described earlier.[57] This framework consists of these five major categories: information system infrastructure; production and technology; human resources; organization and administration; and procurement, distribution, and customer linkages (**Appendix F**). Each category has a number of expenditure items that would be classified as investments in intangible assets, rather than as expenses.

In the U.S., there are a number of differences between the company accounting rules and the national system of accounts. One very large difference is the treatment of human capital. Various national-level measurement models attempt to take human capital into account, specifically expenditures on education and training. SFAS 141 states, "[The] assembled workforce shall not be recognized as an intangible asset apart from goodwill."[58] The following rationale was employed for this exclusion:

> [T]he Board concluded that techniques to measure the value of an assembled workforce and the related intellectual capital with sufficient reliability are not currently available. Consequently, it decided to make an exception to the recognition criteria and require that the fair value of an assembled workforce acquired be included in the amount initially recorded as goodwill, regardless of whether it meets the recognition criteria in paragraph 39.[59]

This illustrates a larger difference between national and company accounts. At the national level, intangible assets are measured according to the expenditures made on those assets. The level of the capital stock of intangibles is calculated based on those expenditures. Measuring expenditures is relatively straightforward: cash out the door. The trick is turning expenditures into assets via depreciation and in setting the starting point for capital accumulation.[60]

At the firm level, valuation of intangible assets can take a more direct—but no less complicated—route. As the Value Measurement & Reporting Collaborative pointed out:

> Accountants are perfectly capable of measuring intangibles, just as they are capable of measuring tangibles, so long as there is a transaction. The issue that arises with attempting to expand recognition of intangibles in financial statements is not their intangibility, but rather that most intangibles are internally generated, and do not therefore arise as a result of a discrete third party transaction.[61]

There are three traditional methods for valuation of intangible assets: the market approach, the cost approach, and the income approach.[62] Of these, the market approach, which looks for comparable market transactions, is the most straightforward. However, because this method relies on robust market transactions, it is not always the most applicable. Real estate or a piece of equipment can be reliably valued because there are a number of comparable transactions upon which to determine a price. In many cases, there are only thin markets for some intangibles (such as patents). In other cases, it is very difficult to separate out the specific asset and assign it a value distinct from all of the other assets that might be involved in a market transaction.

At the firm level, the cost approach can operate somewhat differently from the tracking of expenditures used at the national level. One way is to track past expenditures and apply an appropriate depreciation rate. However, another version of the cost approach calculates what would have to be expended to either reproduce (exactly duplicate) or to replace (create a functional equivalent of) the asset. Thus, rather than look at past

expenditures, this method looks at current costs.[63]

The income approach looks at what income would be gained from having the assets. Specifically geared toward traditional intellectual property (IP), such as patents, trademarks, brands, and copyright, this could be either one of two methods. The first is the relief from royalty methods, which looks at how much a company would have to pay in royalty and licensing fees to use the IP. The second is a "Multi Period Excess Earnings Method," which attempts to separate out the cash flows due to the intangible assets from overall cash flows.

All of these methods have their own limitations. As mentioned above, the market approach can break down if there are thin markets. The cost approach must figure in depreciation/obsolescence and does not always count all intangible inputs, such as managerial efforts and workers' skills. The income method faces imprecise assumptions about royalty rates and rates of return to various assets. Other variations and refinements of these approaches also exist.

These traditional valuation models are bottom up. They seek an overall value of the enterprise by aggregating all the separate assets: physical, financial, and intangible. Lev has developed an expanded valuation model that backs out the value of the unreported intangible assets from the whole.[64] This is done in part by estimating the contribution of intangible capital to normalized earnings; specifically by estimating a certain rate of return on physical and financial capital. In this manner, the implied value of intangibles as a whole can be measured, rather than having to identify, separate out, and value specific intangibles.

However, this approach raises concerns about the assumptions needed for the calculation, as Zambon, et al. noted in their research:

> Lev's basic assumption is that earnings can be broken down into two distinct components, one portion attributable to tangible and long-term financial assets on the one hand, and a portion to intangible assets on the other. But this assumption, for example, is not part of the Italian business accounting tradition according to which earnings are an aggregate, one and indivisible, in that they express the interaction of all the company's resources considered as a unit.
>
> A second criticism of Lev's proposed method is directed at the calculation method for the portion of earnings attributable to tangible and long-term financial assets and, as a consequence, for the portion attributable to intangible assets. In fact, there is no unanimous agreement on this calculation method since determining average earnings from tangible and long-term financial assets is highly subjective and so it is difficult to define technically.
>
> Finally, determining the discount rate to be applied to knowledge capital is based on a proxy, and, as such, … is also highly subjective.[65]

Another tactic in measuring intangibles is to take the nonfinancial route. Various models have been proposed for greater disclosure of nonfinancial metrics.[66] As discussed earlier, these generally focus on external factors, value drivers, and internal performance measures. Intangible assets are included in such disclosures to the extent that they are seen as value drivers.

In 2003, the Securities and Exchange Commission (SEC) established new guidance for Management's Discussion and Analysis (MD&A) statements to address the use of nonfinancial performance measures. Beginning in 1980, MD&A statements are required as part of annual corporate filings as a way for companies to discuss forward-looking information. The guidance clarified that generally accepted industry performance measures should be included (**Appendix G**). The guidance states that—

> [W]hen preparing the MD&A, companies should consider whether disclosure of all key variables and other factors that management uses to manage the business would be material to investors, and therefore required. These key variables and other factors may be non-financial, and companies should consider whether that non-financial information should be disclosed.[67]

While falling short of a mandatory set of disclosures, the guidance gave very specific examples (in a footnote and by reference to other documents) as to what would be acceptable disclosure.[68] Most of these are performance measures—e.g., manufacturing plant capacity and utilization; backlogs, trends in bookings, and employee turnover rates; and time to market—rather than intangible assets. However, a number have characteristics of intangible assets, such as patents, technical licensing arrangements, and customer/vendor relations. It must be noted that this guidance allows disclosure only of nonfinancial metrics of these intangible assets. Non-GAAP-compliant financial measures are not allowed. Therefore, a description of the number of patents is allowed while a valuation or a depreciation of those assets is not.[69]

A more expanded version of a reporting framework comes from the Enhanced Business Reporting Consortium (EBRC), whose Version 2.1 exposure draft was released last November.[70] That document lays out a broad framework for corporate reporting, including discussions of the business landscape, strategy, resources and processes, and performance. Reporting of intangible assets is covered as part of the resources section.

In a different take on the definition of intangibles, the EBRC resources framework outlines a five C's approach, expanding on the three C's approach described earlier, that includes the following components: monetary capital; physical capital; relationship (social) capital; organizational (structural) capital; and human capital (**Appendix H**). The new twist is that each of these areas consists of both tangible and intangible elements and characterizes many elements as tangibles that would normally be described as intangibles. For example, monetary capital includes not only the traditional financial instruments (cash or bonds), but also the intangible aspect of the company's borrowing

capacity and access to capital.[71] Intangible physical capital aspects include plant location and plant adaptability, among other factors.

In contrast to current accounting rules, the EBRC framework considers contracts and license agreements to be tangible social capital, while long-term relationships with no contractual basis and personal relationships are "intangible." Patents, trademarks, copyrights, formulas, and databases are tangible organizational capital, while employed but undocumented methodologies and processes are intangible. Employment contracts are tangible human capital while education, skills and abilities, experiences, attitudes, and accomplishments are intangibles. This is a very interesting take on existing accounting rules, where intangibles—a patent or a contract agreement—are redefined as tangibles. This practice is particularly unique in that accounting rules don't even consider the items that EBRC calls intangibles, such as employee skills or undocumented processes.

One final version comes from the Japanese Ministry of Economy, Trade and Industry (METI), which recently issued its own guidance for intellectual asset management.[72] This guidance creates 38 specific indicators in seven broad categories (**Appendix I**). The indicators include a wide range of value drivers, performance measures, and intangibles. These include the development of future leaders (average age of subsidiary presidents); operating profit margin of major businesses; degree of R&D concentration; new customer sales ratio (in B-to-B business) or growth rate of new customers or members (in B-to-C business) compared to those in the previous year; and R&D expenditures or ability-development costs vs. sales, job-leaving ratio, risk-management compliance system and corporate image survey, and ranking results.

Conclusions and observations

This brief summary of various attempts to measure intangibles highlights a number of issues. The first concerns the classification of intangibles and the proliferation of frameworks for doing so. This confusion stands in the way of any type of comparable analysis. As the European Commission RICARDIS project pointed out, the issue is not creating a new framework but is in coming up with a standardized version and producing a practical guide.[73]

The lack of a standard classification between the micro and macro levels also complicates data collection. Since most macroeconomic data is derived from individual and firm-level surveys, a mismatch in macro and micro categories introduces collection and data-translation errors.

Even with a standardized framework, a host of technical issues remain. Issues of immediate expensing versus depreciation must be addressed. Use of direct measures versus calculated estimates must be further explored. Valuation methods also need to be refined and standardized.

Finally, there is the issue of missing data. Some data is adequately captured in existing surveys. Some is part of other measures and needs to be teased out. Still other data is completely missing. More work needs to be done to effectively and efficiently capture the missing data.

The measurement of intangibles has come a long way since its earlier treatment as a residual. We now have a much better overall idea of the size and importance of intangibles to national and firm-level economic activity. However, our estimates are still approximate. Much more needs to be done to change the current economic measurement system so it can account for the way in which intangibles operate in the 21st century, an age of information and knowledge.

Appendix A. Composition of Federal Investment Outlays

(In billions of dollars)

	2006 (actual)	2007 (estimate)	2008
Major public physical capital investment			
Direct Federal:			
National defense	97.3	113.3	117.6
Nondefense	29.0	32.5	31.6
Subtotal, direct major public physical capital investment	126.3	145.8	149.2
Grants to state and local governments	64.1	69.2	71.8
Subtotal, major public physical capital investment	190.4	215.0	221.1
Conduct of research and development			
National defense	73.0	75.5	72.9
Nondefense	49.8	52.7	54.1
Subtotal, conduct of research and development	122.8	128.1	127.0
Conduct of education and training			
Grants to state and local governments	56.2	57.3	53.6
Direct Federal	61.0	34.5	28.5
Subtotal, conduct of education and training	117.2	91.8	82.1
Total, major Federal investment outlays	430.4	434.9	430.1

Source: Table 6–1, Chapter 6: Federal Investment. *Analytical Perspectives: Budget of the United States Government, Fiscal Year 2008.* Office of Management and Budget. U.S. Government Printing Office, 2007. http://www.gpoaccess.gov/usbudget/fy08/pdf/spec.pdf.

Appendix B. Young OECD: Measuring Intangible Investment

Possible components of intangible investment

1. Computer-related

Software
Large databases
Other computer services

2. Production and technology

R&D
Design and engineering
New quality-control systems
Patents and licenses
Know-how

3. Human resources

Organised training
Learning by doing
Activities to improve health and motivation of the workforce (includes labour relations, physical check-ups, and other sport and fitness programmes)
Remuneration for innovative ideas

4. Organisation of the firm

New methods of organisation of the firm as a whole
Setting up networks
New working methods in administration and finance

5. External: Marketing and sales

Market research
Advertising
Brands
Name and symbol of the firm
Customer list, subscriber list, and list of potential customers
Product certification, quality certificates
Goodwill

6. Industry specific

Mineral exploration
Entertainment, literary, and artistic originals
Milk quotas

Source: Young, Alison. *Towards an Interim Statistical Framework: Selecting the Core Components of Intangible Investment.* Organisation For Economic Co-Operation and Development conference, Paris, 1998. http://www.oecd.org/dataoecd/45/0/1943301.pdf.

Appendix C. Vosselman OECD: Measuring Intangible Investment

Core elements of intangible investments

- research and experimental development (R&D)
- education and training
- software
- marketing
- rights, such as licences, brands, copyrights, patents
- mineral exploration.

Supplementary categories of intangible investments

- development of the organisation
- engineering and design
- constructions and use of databases
- remuneration for innovative ideas
- other human resource development (training excluded).

Source: Vosselman, Wim. *Measuring Intangible Investment: Initial Guidelines for the Collection and Comparison of Data on Intangible Investment.* Organisation For Economic Co-Operation and Development conference, Paris, 1998. http://www.oecd.org/dataoecd/45/1/1943309.pdf.

Appendix D. Corrado, Hulten, and Sichel

Computerized information

1. Computer software: own use, purchased, and custom software

2. Computerized databases

Scientific and creative property

3. Science and engineering research and development (costs of new products and new production processes, usually leading to a patent or license)

4. Mineral exploration (spending for the acquisition of new reserves)

5. Copyright and license costs (spending for the development of entertainment and artistic originals, usually leading to a copyright or license); and development costs in the motion picture, radio and television, sound recording, and book publishing industries

6. Other product development, design, and research expenses (not necessarily leading to a patent or copyright), such as new product development costs, new architectural and engineering designs, and R&D in social sciences and humanities

Economic competencies

7. Brand equity (advertising expenditures and market research for the development of brands and trademarks)

8. Firm-specific human capital (costs of developing workforce skills, e.g., on-the-job training and tuition payments for job-related education)

9. Organizational structure (costs of organizational change and development or company formation expenses).

Source: Corrado, Carol A., Hulten, Charles R., and Sichel, Daniel E. *Measuring Capital and Technology: An Expanded Framework*. Federal Reserve Board, August 2004. http://www.federalreserve.gov/pubs/feds/2004/200465/200465pap.pdf.

Appendix E. FASB List of Intangibles

a. Marketing-related intangible assets
    (1) Trademarks, tradenames
    (2) Service marks, collective marks, certification marks
    (3) Trade dress (unique color, shape, or package design)
    (4) Newspaper mastheads
    (5) Internet domain names
    (6) Noncompetition agreements
b. Customer-related intangible assets
    (1) Customer lists
    (2) Order or production backlog
    (3) Customer contracts and related customer relationships
    (4) Noncontractual customer relationships
c. Artistic-related intangible assets
    (1) Plays, operas, ballets
    (2) Books, magazines, newspapers, other literary works
    (3) Musical works such as compositions, song lyrics, advertising jingles
    (4) Pictures, photographs
    (5) Video and audiovisual material, including motion pictures, music videos, television programs
d. Contract-based intangible assets
    (1) Licensing, royalty, standstill agreements
    (2) Advertising, construction, management, service, or supply contracts
    (3) Lease agreements
    (4) Construction permits
    (5) Franchise agreements
    (6) Operating and broadcast rights
    (7) Use rights, such as drilling, water, air, mineral, timber cutting, and route authorities
    (8) Servicing contracts, such as mortgage servicing contracts
    (9) Employment contracts
e. Technology-based intangible assets
    (1) Patented technology
    (2) Computer software and mask works
    (3) Unpatented technology
    (4) Databases, including title plants
    (5) Trade secrets, such as secret formulas, processes, and recipes.

Source: Financial Accounting Standards Board. *Statement of Financial Accounting Standards No. 141: Business Combinations.* June 2001, paragraph A 14, pp. 28–29.

Appendix F. A Framework for Classifying Expenditures on Intangible Investment

Classification[a]	Examples of intangible investment expenditures
Information System Infrastructure	Expenditure on: Wages of staff involved in information systems planning and development Commercial enterprise systems Software Databases Other computer services Licenses.
Production and Technology	Expenditure on: Product & process R&D Product design, engineering and development Process design, engineering and development Technology adoption Quality control systems Proprietary technology, patents, designs, licenses.
Human Resources	Expenditure on: Wages of HR managers Reengineering incentive systems Staff development and training Staff goal planning and evaluation Information and knowledge database development Programs for health and motivation of workforce (e.g., labour relations, health care, fitness).
Organization and Administration	Expenditure on: Wages of staff involved in organizational design and management techniques Corporate governance structures Networks and strategic alliances Administration structure and systems Finance systems Accounting systems.
Procurement, distribution, customer linkages	Expenditure on: Distribution and market research systems Advertising Trademarks, brands Customer lists, subscriber lists, potential customer lists Product certification, quality certificates.

[a] This classification is adapted from Young (1998). The principal criterion is whether the expenditures are long-term outlays by firms aimed at improving their future performance (other than by the acquisition of fixed assets).

Source: Hunter, L. C., Webster, Elizabeth, and Wyatt, Anne. *Measuring Intangible Investment*. Melbourne Institute Working Paper No. 15/05. Intellectual Property Research Institute of Australia, University of Melbourne, October 2005. http://melbourneinstitute.com/wp/wp2005n15.pdf.

Appendix G. SEC MD&A Nonfinancial Metrics

- manufacturing plant capacity and utilization
- backlog, trends in bookings, and employee turnover rates
- customer satisfaction
- time to market
- interest rates
- product development
- service offerings
- throughput capacity
- affiliations/joint undertakings
- market demand
- customer/vendor relations
- employee retention
- business strategy
- changes in the managerial approach or structure
- regulatory actions or regulatory environment
- any other pertinent macroeconomic measures.

Source: Securities and Exchange Commission. *Interpretation: Commission Guidance Regarding Management's Discussion and Analysis of Financial Condition and Results of Operations.* Final Rule. 17 C.F.R., Parts 211, 231, and 241 [Release Nos. 33–8350; 34–48960; FR–72]. December 19, 2003 (compiled from footnote 27). http://www.sec.gov/rules/final/33-8350.htm.

Appendix H. Enhanced Business Reporting Consortium

Monetary capital: Tangible monetary capital is reported on the balance sheet but monetary capital also has intangible aspects, identified by management, which affect the ability of a company to fund its operations and investments, such as borrowing capacity/access to capital, quality of earnings, the character and reputation of the company's major debt and equity investors, and the stability of the shareholder base.

Physical capital: Tangible physical capital is reported on the balance sheet but physical capital also has intangible aspects, identified by management, which affect its value, such as a plant location, plant adaptability, raw material accessibility, and reliance on strategic resources.

Relationship (social) capital: Management's identification of relationships with other organizations and third parties that it regards as important; these can be both tangible (e.g., contracts, license agreements, joint venture agreements, and alliances) and intangible (e.g., long-term relationships with no contractual basis and personal relationships).

Organizational (structural) capital: Management's identification of organizational resources not reported on the balance sheet and that are independent of its employees; these can be both tangible (e.g., patents, trademarks, copyrights, formulas, and databases) and intangible (e.g., employed but undocumented methodologies and processes).

Human capital: Management's identification of any attributes of its workforce (both employees and contractors) that it regards as important; these can be both tangible (e.g., employment contracts) and intangible (e.g., education, skills, abilities, experiences, attitudes, and accomplishments).

Source: Enhanced Business Reporting Consortium. *EBRC Framework Version 2.1*. http://www.ebr360.org/ContentPage.aspx?ContentPageId=107.

Appendix I. Japan METI Guidance on Intellectual Assets Based Management

(Similar to U.S. MD&A guidance)

(1) Management Stance/Leadership: Degree of sharing and penetration of management stance and target

- (Indicator 1–1) Degree of internal penetration of management principles
- (Indicator 1–2) External transmission of information by top manager (external PR activities)
- (Indicator 1–3) Development of future leaders (average age of subsidiary presidents)

(2) Selection and Concentration: Status of selection and concentration in products and services (2–1 to 2–3), technologies (2–4), customers and markets (2–5), etc. Characteristics of selection and concentration depend on the type of business. Therefore, it is desirable to make explanation on classification of business (including basic structure of business model and sales structure per B-to-B, B-to-C) as a prerequisite.

- (Indicator 2–1) Competitiveness of major business (sales, profit, profit rate)
  - (Indicator 2–1–1) Proportion of major business to the entire sales (sales)
  - (Indicator 2–1–2) Proportion of major business to the operating profit
  - (Indicator 2–1–3) Operating profit margin of major business
- (Indicator 2–2) Weighted average of the numbers of companies providing the same products/services
- (Indicator 2–3) Review performance of unprofitable department
- (Indicator 2–4) Degree of R&D concentration
- (Indicator 2–5) Differentiation of market
- (Indicator 2–6) Employee assessment

(3) External Negotiation Power/Relationships: Degree of negotiation power and connections over and with external parties/clients, customers (3–1 to 3–5), suppliers (3–6), and funding sources (3–7)—such as upstream and downstream parties

- (Indicator 3–1) Weighted average of market share of main products/services in the main business
- (Indicator 3–2) Degree of customer satisfaction
- (Indicator 3–3) Changes in customer unit price
- (Indicator 3–4) New customer sales ratio (in B-to-B business) or growth rate of new customers or members (in B-to-C business), compared to those in the previous year
- (Indicator 3–5) Price elasticity value of product sales as compared to changes in the cost of goods purchased (price pass-through capability)
- (Indicator 3–6) Price elasticity value of the goods purchased as compared to changes in material market conditions (negotiation power)
- (Indicator 3–7) Financing capacity

(4) Knowledge Creation/Innovation/Speed: Capacity and efficiency of new value creation, speed of business management

- (Indicator 4–1) R&D expenditure (or ability development costs) vs. sales
- (Indicator 4–2) Outsourced R&D cost ratio
- (Indicator 4–3) Number of intellectual property owned economically meaningful term
- (Indicator 4–4) Employees' average age and increase/decrease from the previous year
- (Indicator 4–5) New products rate

(5) Teamwork/Organizational Knowledge: Organizational power (collective strength) and solidarity as a unity of individual capacities

- (Indicator 5–1) In-house improvement proposal for quality control system, number of proposals and improvements achieved
- (Indicator 5–2) Number of lateral projects
- (Indicator 5–3) Degree of employees' satisfaction
- (Indicator 5–4) Incentive system (including yearly contract system)
- (Indicator 5–5) Job leaving ratio

(6) Risk Management/Governance: Identification, assessment and response, management, public announcement, and governance of risks

- (Indicator 6–1) Compliance system
- (Indicator 6–2) Number of public announcements regarding risk information and speed of public announcement of problems
- (Indicator 6–3) Diversification of risks
- (Indicator 6–4) Risk of being an acquisition target
- (Indicator 6–5) Compensation claims in pending lawsuits
- (Indicator 6–6) Risk of information leakage (number of trade secrets and ratio of core employees who deals with them)

(7) Coexistence in Society: Status of contribution to the community and society, etc.

- (Indicator 7–1) Amount of environment-related investment
- (Indicator 7–2) Number of SRI funds that adopted the corporation
- (Indicator 7–3) Corporate image survey and ranking results

Source: Japan Ministry of Economy, Trade and Industry. *Guidelines for Disclosure of Intellectual Assets Based Management.* October 2005. http://www.meti.go.jp/policy/intellectual_assets/GuidelineforIAM.pdf.

Endnotes:

[1] Solow's residual is the amount of economic growth that can't be attributed to labor or capital accumulation, and is therefore attributed to "technology." See http://en.wikipedia.org/wiki/Solow_residual.

[2] Tobin's Q is generally defined as the ratio of the market value of a company vs. the recorded asset value with the difference often attributed to intangibles. See http://en.wikipedia.org/wiki/Tobin%27s_q.

[3] Value Measurement & Reporting Collaborative. *New Paradigm Initiative*. See http://npi.valuemeasurement.net/approaches.shtml.

[4] Cummins, Jason G. *A New Approach to the Valuation of Intangible Capital*. Division of Research and Statistics, Board of Governors of the Federal Reserve System, 2004. http://www.federalreserve.gov/pubs/feds/2004/200417/200417pap.pdf.

Corrado, Carol, Haltiwanger, John, and Sichel, Daniel. *Measuring Capital in the New Economy*. National Bureau of Economic Research Studies in Income and Wealth, University of Chicago Press, 2005.

[5] Jarboe, Kenan Patrick. *Technology and Economic Growth: A Review for Policymakers*. Joint Economic Committee, Minority, Washington, D.C., February 1998.

Jarboe and Atkinson, Robert. *The Case for Technology in the Knowledge Economy: R&D, Economic Growth and the Role of Government*. The Progressive Policy Institute, Washington, D.C., June 1998. http://www.ndol.org/documents/CaseforTech.pdf.

[6] Jaruzelski, Barry, Dehoff, Kevin, and Bordia, Rakesh. Smart Spenders: The Global Innovation 1000. *Strategy and Business*, 2005. http://www.strategy-business.com/press/article/06405.

[7] Kaplan, Robert, and Norton, David. *The Balanced Score Card*. Harvard Business School Press, Boston, 1996. http://www.balancedscorecard.org.

[8] Danish Ministry of Science and Technology. *Intellectual Capital Statements*. February 2003. http://www.urjc.es/innotec/tools/Intellectual%20Capital%20Statements%20-%20The%20New%20Guideline.pdf.

[9] Edvinsson, Leif, and Malone, Michael. *Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower*. HarperBusiness, 1997.

[10] See http://www.sveiby.com/articles/IntangAss/CompanyMonitor.html.

[11] Eccles, Robert G., Herz, Robert H., Keegan, E. Mary, and Phillips, David M. H. *The Value Reporting Revolution: Moving Beyond the Earnings Game.* John Wiley & Sons, Inc., New York, 2001.

DiPiazza, Samuel A., Jr., and Eccles, Robert G. *Building Public Trust: The Future of Corporate Reporting.* John Wiley & Sons, Inc., New York, 2002.

[12] Andriessen, Daniel, and Tissen, René. Weightless Wealth: Finding Your Real Value In A Future Of Intangible Assets. *Financial Times*, Prentice Hall, London, 2000.

[13] Boulton, Richard E. S., Libert, Barry D., and Samek, Steve M. *Cracking the Value Code.* HarperBusiness, New York, 2000.

[14] Jonathan Low is a member of the Athena Alliance Board of Directors.

[15] Low, Jonathan, and Kalafut, Pam Cohen. *Invisible Advantage: How Intangibles are Driving Business Performance.* Perseus, Cambridge, Mass., 2002. http://www.predictiv.net.

Low. *The Invisible Advantage*. Presented to the Athena Alliance, January 23, 2003. http://www.athenaalliance.org.

[16] Eustace, Clark. *The PRISM Report 2003: Research Findings and Policy Recommendations.* PRISM Group, London, 2003. http://www.euintangibles.net/research_results/FinalReport.pdf.

[17] Blair, Margaret M. and Wallman,, Steven M.H., *Unseen Wealth: Report of the Brookings Task Force on Intangibles,* Brookings Institution Press, Washington, D.C., 2001

[18] Zambon, Stefano, et al. *Study on the Measurement of Intangible Assets and Associated Reporting Practices*. Commission of the European Communities, Enterprise Directorate General, April 2003, p. 18. http://ec.europa.eu/enterprise/services/business_related_services/policy_papers_brs/intangiblesstudy.pdf.

[19] *Guidelines for Managing and Reporting on Intangibles*, MERITUM Project, 2002, pp. 10–11. http://www.urjc.es/innotec/tools/MERITUM%20Guidelines.pdf.

[20] Financial Accounting Standards Board. *Statement of Financial Concepts No. 6: Elements of Financial Statements.* December 1985. http://www.fasb.org/pdf/con6.pdf.

[21] Kaplan, M.C. *Intangible Investment: An Essay at International Comparison*. Presented to the OECD Industry Committee, Paris, 1987.

[22] Organisation for Economic Co-operation and Development activities on intangibles. http://www.ll-a.fr/intangibles/oecd.htm. Accessed March 30, 2007.

[23] See http://lysander.sourceoecd.org/vl=1594168/cl=20/nw=1/rpsv/factbook/06-01-02.htm.

[24] Table 6–1, Chapter 6: Federal Investment. *Analytical Perspectives: Budget of the United States Government, Fiscal Year 2008*. Office of Management and Budget. U.S. Government Printing Office, 2007. http://www.gpoaccess.gov/usbudget/fy08/pdf/spec.pdf.

[25] See http://www.oecd.org/document/15/0,2340,en_2649_34555_1943055_1_1_1_1,00.html.

[26] Young, Alison. *Towards an Interim Statistical Framework: Selecting the Core Components of Intangible Investment*. Organisation For Economic Co-Operation and Development, Paris, 1998. http://www.oecd.org/dataoecd/45/0/1943301.pdf.

[27] Vosselman, Wim. *Measuring Intangible Investment: Initial Guidelines for the Collection and Comparison of Data on Intangible Investment*. Organisation For Economic Co-Operation and Development, Paris, 1998. http://www.oecd.org/dataoecd/45/1/1943309.pdf.

[28] *Measuring Intangible Investment: National Efforts to Measure Intangible Investment* Organisation For Economic Co-Operation and Development, Paris, 1998. http://www.oecd.org/dataoecd/45/41/1943317.pdf.

[29] *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development*. OECD, Paris, 2002. http://www.oecd.org/document/6/0,2340,en_2649_34409_33828550_1_1_1_1,00.html.

Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data (3rd Edition). OECD, Paris, 2005. http://www.oecd.org/document/23/0,2340,en_2649_34409_35595607_1_1_1_1,00.html.

Proposed Standard Method of Compiling and Interpreting Technology Balance of Payments Data (TBP Manual). OECD, Paris, 1990. http://www.oecd.org/dataoecd/35/13/2347115.pdf.

Manual for Better Training Statistics: Conceptual, Measurement and Survey Issues. OECD, Paris, 1997.

Harmonisation of Training Statistics. OECD, Paris, 2002. http://www.oecd.org/dataoecd/46/11/1943537.pdf.

[30] *System of National Accounts,1993*. Prepared under the auspices of the Inter-Secretariat Working Group on National Accounts, CEC-EUROSTAT, IMF, OECD, UN, and The World Bank, 1994.

[31] News Release, *Research and Development Satellite Account*, BEA–06–44, September 28, 2006. http://www.bea.gov/bea/newsrel/rdspendnewsrelease.htm.

[32] Nakamura, Leonard. Intangibles: What Put the New In the New Economy? *Business Review*, Federal Reserve Bank of Philadelphia, July/August 1999, pp. 3–19.

Nakamura. *What Is The U.S. Gross Investment In Intangibles? (At Least) One Trillion Dollars A Year!* Working Paper No. 01–15. Federal Reserve Bank of Philadelphia, October 2001. http://www.phil.frb.org/files/wps/2001/wp01-15.pdf.

Nakamura. A Trillion Dollars a Year in Intangible Investment and the New Economy. *Intangible Assets: Values, Measures and Risks* (Hand, John, and Lev, Baruch, editors). Oxford University Press, 2003.

[33] Ibid, p. 5.

[34] Webster, Elizabeth. *The Growth of Enterprise Intangible Investment.* Melbourne Institute Working Paper No. 9/99. Melbourne Institute of Applied Economic and Social Research, University of Melbourne, March 1999. http://www.melbourneinstitute.com/wp/wp1999n09.pdf.

[35] *Global Intangible Tracker 2006: An Annual Review of the World's Intangible Value*. Brand Finance and The Institute of Practitioners in Advertising, London, December 2006. http://www.brandfinance.com/Uploads/pdfs/Global%20Intangible%20Tracker%202006.pdf.

[36] *Invisible Business.* Brand Finance, London. Accessed April 18, 2007. http://www.brandfinance.com/Uploads/pdfs/Invisible%20business.pdf.

[37] Howkins, John. *The Creative Economy: How People Make Money from Ideas*. Penguin Press, New York, 2001.

[38] For illustrative examples, see Barringer, et al. *The Creative Economy in Maine*. Maine Center for Business and Economic Research and the New England Environmental Finance Center, University of Southern Maine, June 2004. http://mainearts.maine.gov/mainescreativeeconomy/conference/ce_research.shtml.

Human Capital: Greater Washington's Knowledge Workers. Greater Washington Initiative, March 2007. http://www.greaterwashington.org/services/publications/human_capital/hc_main.htm.

Creative New York. Center for an Urban Future, December 2005. http://www.nycfuture.org/images_pdfs/pdfs/CREATIVE_NEW_YORK.pdf.

[39] Siwek, Stephen. *Copyright Industries in the U.S. Economy, The 2004 Report*. Economists Inc., October 2004. www.iipa.com/pdf/2004_SIWEK_FULL.pdf.

[40] Shapiro, Robert J., and Hassett, Kevin A. *The Economic Value of Intellectual Property*. USA for Innovation, Washington D.C., October 2005. http://www.usaforinnovation.org/news/ip_master.pdf.

[41] *Best Global Brands 2006*. Interbrand & Business Week, 2006. http://www.ourfishbowl.com/images/surveys/BGB06Report_072706.pdf.

[42] It should be noted that there are large differences in brand valuations. Brand Finance put the brand value of Coca-Cola at $43 billion. See *BrandFinance250: The Annual Report on the World's Most Valuable Brands*. Brand Finance, London, January 2007. http://www.brandfinance.com/Uploads/pdfs/BF250%20FINAL.pdf.

[43] Anholt, Simon. *How the World Sees the World: Anholt Nation Brands Index Fourth Quarter 2005*. Global Market Insite (GMI), Inc. http://www.nationbrandindex.com/documents/NBI_Q4_2005.pdf.

GMI also publishes Anholt's State Brands Index (http://www.statebrandsindex.com) and City Brands Index (http://www.citybrandsindex.com).

[44] Corrado, Carol A., Hulten, Charles R., and Sichel, Daniel E. *Measuring Capital and Technology: An Expanded Framework*. Federal Reserve Board, August 2004. http://www.federalreserve.gov/pubs/feds/2004/200465/200465pap.pdf.

Intangible Capital and Economic Growth. Working Paper No. 11948. National Bureau of Economic Research, January 2006. http://www.nber.org/papers/w11948.

[45] Ibid, 2004, Table 3.

[46] Ibid, 2006, p. 23.

[47] Ibid, 2006, p. 16.

[48] Ibid, 2006, Table 3.

[49] Hausmann, Ricardo, and Sturzenegger, Federico. *Global Imbalances or Bad Accounting? The Missing Dark Matter in the Wealth of Nations*. CID Working Paper No. 124. Harvard University Center for International Development, January 2006 (revised September 2006). http://www.cid.harvard.edu/cidwp/124.htm.

[50] Hausmann and Sturzenegger. 'Dark Matter' Makes the U.S. Deficit Disappear. *Financial Times*, Dec. 7, 2005. http://www.cid.harvard.edu/cidpublications/hausmann_darkmatter_0512.htm.

[51] See Brad Setser's Weblog. http://www.rgemonitor.com/blog/setser.

[52] Jarboe, Kenan Patrick. Dark Matter II. *The Intangible Economy*, March 7, 2006. http://www.athenaalliance.org/weblog/archives/2006/03/dark_matter_ii.html.

[53] Bismuth, Annabel (with Kirkpatrick, Grant). *Intellectual Assets And Value Creation: Implications For Corporate Reporting*. OECD, Dec. 10, 2006, p. 10. http://www.oecd.org/dataoecd/2/40/37811196.pdf.

[54] Financial Accounting Standards Board (FASB). *Statement of Financial Accounting Standards No. 141: Business Combinations*. June 2001.

FASB. *Statement of Financial Accounting Standards No. 142: Goodwill and Other Intangible Assets*. June 2001. http://www.fasb.org.

[55] International Accounting Standards Board (IASB). *International Financial Reporting Standards (IFRS) 3: Business Combinations*, *International Accounting Standards (IAS) 38: Intangibles Assets*. http://www.iasb.co.uk.

[56] IASB. *Project Description: Intangible Assets*. http://www.iasb.org/Current+Projects/IASB+Projects/Intangible+Assets/Intangible+Assets.htm. Accessed April 6, 2007.

[57] Hunter, L. C., Webster, Elizabeth, and Wyatt, Anne. *Measuring Intangible Investment*. Melbourne Institute Working Paper No. 15/05. Intellectual Property Research Institute of Australia, University of Melbourne, October 2005. http://melbourneinstitute.com/wp/wp2005n15.pdf.

[58] SFAS 141, op. cit., paragraph 39, p. 17.

[59] Ibid, paragraph B169, p. 72.

[60] See the earlier discussion of Corrado, Hulten, and Sichel.

[61] Value Measurement & Reporting Collaborative. *New Paradigm Initiative: Re-discovering Measurement.* July 2005, p. 6. http://npi.valuemeasurement.net/concepts.shtml.

[62] For more detailed discussions, see Reilly, Robert F., and Schweihs, Robert P. *Valuing Intangible Assets*. McGraw-Hill, New York, 1999.

Anson, Weston, et al. *Fundamentals of Intellectual Property Valuation.* American Bar Association, Chicago, 2005.

For overviews, see also Cotton, Spencer. *IP Valuation & Intellectual Asset Management*. Nov. 9, 2005. http://www.proformance.com/portal_mojo/pcg/CUSTOM/UBC_FILES/Speaker_2005Spencer_Valuation.pdf.

Upton, Lee O., III. Innovation & Information Consultants, Inc. *Intangible Asset Valuation*. http://www.iic-inc.com/curr.intangible.shtml. Accessed April 6, 2007.

[63] The issue of current vs. historical costs is a long-running discussion within the accounting community. For example, see *Historical Cost vs. Current Cost: Accountants Wrestle with Reporting Question*, Knowledge@Wharton, April 2001. http://knowledge.wharton.upenn.edu/createpdf.cfm?articleid=348.

[64] Lev. *Intangibles: Management, Measurement, and Reporting*. Brookings Institution Press, Washington, D.C., 2001.

Gu, Feng, and Lev. *Intangible Assets: Measurement, Drivers, Usefulness*. Working paper #2003–05. Boston University School of Management, 2003. http://smgnet.bu.edu/smgnet/css/staff/pub/GetFile.CFM/Gu,_Feng_05.pdf?did=182&Filename=Gu,_Feng_05.pdf.

[65] Zambon, op. cit., p. 166.

[66] For an overview, see Jarboe, *Reporting Intangibles: A Hard Look at Improving Business Information in the U.S.* Athena Alliance, April 2005. http://www.athenaalliance.org/apapers/ReportingIntangibles.htm.

[67] Securities and Exchange Commission. *Interpretation: Commission Guidance Regarding Management's Discussion and Analysis of Financial Condition and Results of Operations.* Final Rule. 17 C.F.R., Parts 211, 231, and 241 [Release Nos. 33–8350; 34–48960; FR–72]. December 19, 2003. http://www.sec.gov/rules/final/33-8350.htm.

[68] Ibid, footnote 27.

[69] A number of other nations have similar requirements for management commentary or discussion. The International Accounting Standards Board has an initiative on management commentary that was the topic of its January 2007 meeting. See http://www.iasb.org/Current+Projects/IASB+Projects/Management+Commentary/Meeting+Summaries+and+Observer+Notes/IASB+January+2007.htm.

Discussion Paper: Management Commentary. Prepared for the IASB by staff of its partner standard-setters and others. International Accounting Standards Board, London, October 2005. http://www.iasb.org/NR/rdonlyres/0FE78C14-8AF9-4CFB-A764-40B1A08E0DF5/0/DPManagementCommentary.pdf.

[70] Enhanced Business Reporting Consortium. *EBRC Framework Version 2.1*. http://www.ebr360.org/ContentPage.aspx?ContentPageId=107.

[71] To confuse matters more, tax law in many jurisdictions define "intangibles" to be financial instruments, such as stocks and bonds. Therefore, their "intangibles tax" is really a tax on investment earnings.

[72] Japan Ministry of Economy, Trade and Industry. *Guidelines for Disclosure of Intellectual Assets Based Management*. October 2005. http://www.meti.go.jp/policy/intellectual_assets/GuidelineforIAM.pdf.

[73] *Reporting Intellectual Capital to Augment Research, Development and Innovation in SMEs (RICARDIS): Encourage Corporate Measuring and Reporting on Research and Other Forms of Intellectual Capital.* Report to the Commission of the High Level Expert Group on RICARDIS. European Commission, Directorate-General for Research, June 2006. http://ec.europa.eu/invest-in-research/pdf/download_en/2006-2977_web1.pdf.