

# COMPARATIVE REVIEW OF ALTERNATIVE INTELLECTUAL CAPITAL MEASUREMENT METHODS

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## ABSTRACT

Intellectual Capital (IC) valuation seems to be one of the main controversies amongst the IC researchers. Based on previous literature, the current study offers a comparative review of the most popular models existing in the academic and scientific community. It focuses on those that reveal the value creation path within the organization processes and can be used for the performance measurement purposes. The comparative analysis is performed on the basis of assessment criteria already used in literature. The presented methods are identified and ranked in accordance to these criteria. The review suggests that the method of Holistic Value Approach better fulfils the requirements of the presented criteria in comparison to the other methods.

**Keywords:** intellectual capital, intangibles, performance measurement.

## I. INTRODUCTION

In the early nineties, the academic community realized the importance of the intellectual capital and the connection between the investment in intangible resources and the increase of the organization's market value. Relative literature points out the association of intellectual capital resources, like estimated brand values with share prices and the year to year changes in the estimated brand value with annual returns (Barth *et al.*, 1998) or human capital indicators, such as the existence of star scientists with the growth of particular industries including the biotech-one (Zucker *et al.*, 1998).

Furthermore, academics and practitioners have established methods that attempt to value the organizations' intellectual capital and enrich the financial statements with supplementary

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information concerning the existence and exploitation of intangible resources. According to Sveiby (2010), these methods amounted to approximately 42 in the year 2010.

However, there is not much similarity between the intellectual capital methods. The majority of models differ not only in the way they try to measure the intellectual capital but also in more substantial matters, such as the definition of the intellectual capital per se or the determination of the intellectual capital sub-domains. Consequently, the current study begins with presenting the definition and the meaning attributed to the terms of intellectual capital and its sub-domains according to the typology developed by Roos *et al.* (1997).

The current study attempts to select and present the methods that help managers clarify and control the value creation process. Nine intellectual capital valuation methods are presented. The current study attempts to reveal the basic idea behind each model that penetrates its existence and characterizes its contribution to the history of intellectual capital research.

Assessment criteria derived from recent literature (Roberts, 1995; Grojer, 2001; Neely *et al.*, 2003; Pike and Roos, 2000; Chaktzel, 2002) have been used in order to compare these methods. The above mentioned criteria have been used in recent studies for the assessment of a restricted number of methods. The same criteria have been applied to the nine selected methods. The current study attempts to establish a more substantial and complete picture for the assessment of the above mentioned methods.

## II. INTELLECTUAL CAPITAL (DEFINITION AND MAIN SUB-DOMAINS)

In the academic literature, intellectual capital lacks a specific, generally accepted, definition. Authors, such as Grojer (2001), use the terms “intangibles” and “intellectual capital” interchangeably. Other authors’ definitions for intellectual capital include both intangibles as well as their interconnections (Bontis, 1999). Roos *et al.* (1997) used the term intellectual capital flows to denote the transformations of one IC category to another and also to financial capital. This term was introduced in the literature, according to Bontis (1999) by Dierickx and Cool (1989), who distinguish the intellectual capital resources (or stocks) from their transformations (or flows) from one value resource category to another. The latter have an important role in the value creation process through the intellectual capital. According to Baruch Lev an intangible asset is “a claim to future benefits that does not have a physical or financial embodiment” (Lev, 2001, p. 5). On the opposite side of this vague description, accounting practice which follows IAS 38, restricts intangibles to a limited region where non tangible assets need to fulfill particular criteria (identifiability, controllability and expectation of future economic benefits) in order to be classified as intangible assets in the balance sheet (Epstein and Jermakowicz, 2007). Within these two distant options, which review intangibles from entirely different angles, many definitions have been presented (see Table 1).

It is generally agreed that most of the authors’ intellectual capital definitions consist of the organization’s intangibles resources and their interconnections or synergies under the aim of value creation.

Intellectual capital has been broken down to various components by many authors and in some cases there seems to be similar typology. Bontis (1998) and Bontis *et al.* (2000) divide intellectual capital into human, structural and customer capital. Roos and Roos (1997) use the terms of human, organizational, customer and relationship capital for the same purpose and in

their latest publications (Roos *et al.*, 2001), the term relationship capital instead of “customer and relationship capital” has been used. In the same year, Roos *et al.* (1997) adopted Edvinsson’s distinction in their book.

**Table 1. Intellectual capital definitions according to different authors**

*“More recently Machlup (1962) was the first to coin the term “intellectual capital” and used it to emphasize the importance of general knowledge as essential to growth and development.” (Bontis 2004, p. 14)*

*“Intellectual capital embraces any valuable intangible resource gained through experience and learning that can be used in the production of further wealth.” (Marr and Moustaghfir, 2005, p. 1116)*

*“Under the name of intellectual capital, we can classify all intangible resources (Bontis, 1996; Edvinsson and Malone, 1997; Roos and Roos, 1997), as well as their interconnections (Roos et al., 1997; Bontis, 1998). Thus, for this tradition, intellectual capital is quite simply the collection of intangible resources and their flows. The problem is the definition of intangible resources: for the purposes of this paper, suffice it to say that we will call resources any factor that contributes to the value generating processes of the company and is, more or less directly, under the control of the company itself” (Bontis, 1999, p. 397)*

*“Intellectual capital (IC) is a drama, because even if it is presented very difficult to make distinct boundaries around it, IC is presented as the intangibles stuff, out of which “value” in a knowledge society and therefore knowledge organizations are created” (Mouritsen, 2003, p. 18)*

*“IC is the intermingling of words and practices and indicators, mobilized to (if stated optimistically) reflexively develop the ability of an entity to do something for others; or (if formulated less optimistically) to develop white collar productivity” (Mouritsen, 2004, p. 265)*

*“According to the Meritum guidelines, there is a general acceptance that intellectual capital embraces all forms of intangibles and that it is the combination of the human, structural and relational resources of an organization (Sanchez et al., 2001)” (Fletcher et al., 2003, p. 505)*

*“IC has increasingly been seen as an integral part of value creating process (Cumby and Corrod, 2001; Sullivan 2000)” (Bukh, 2003, p. 49)*

Edvinsson (1997), in Skandia Navigator, divides the intellectual capital into human and structural and further distinguishes the latter, into customer and organizational. As observed, many of the basic theorists agree that IC is divided into human capital, which is common in every approach, structural which for some theorists is the same with organizational and for some others it consists of organizational and customer capital. The latter has been widened by concluding other kinds of relationships besides those with customers and has taken the name relational capital in the latest publications.

Human Capital, according to Roos *et al.* (1997) refers to the advantages provided by competence (stemming from knowledge or skills), attitude (personal traits indicating social intelligence, motivation, positive behavior and concentration on ethical values) and agility (indicating ability to innovate, imitate others who have presented successful projects, keep up with changing environments and materialize new ideas in a competitive manner) attributed to

the staff of the company. The significance of the human capital in contemporary economies is described by Bontis (1998, p. 66), through the words of the recipient of the 1981 Nobel laureate in economics Th. Schultz: “The decisive factors of production in improving the welfare of poor people are not space, energy and cropland; the decisive factors are the improvement in population quality and advantages in knowledge. These advancements can be augmented by appropriate investment in human capital.”

Structural capital in contrast to human capital is a company’s property and concerns, as referred in Skandia according to Roos *et al.* (1997, p. 42), “all intellectual capital that remains in the company when employees go home for the night”. Structural capital is further classified according to Roos *et al.* (1997) as organizational, relational and renewal or development capital. According to Roos *et al.* (1997) organizational capital may contain infrastructure (as databases, process manuals, patents, brand names) as well as culture styles, internal networks and procedures. Relational capital refers to existing relationships with customers, suppliers, shareholders, or alliance partners that provide firm opportunities. Finally, renewal and development capital includes “new product development, re-engineering and restructuring efforts” and generally “all the items that have been built or created and that will have an impact on future, value but have not manifested that impact yet” (Roos *et al.*, 1997, p. 51).

### III. INTELLECTUAL CAPITAL MEASUREMENT METHODS

After the presentation of the intellectual capital definitions and sub-domains and before reviewing the intellectual capital measurement methods, it is essential to explain why there is such an extensive debate about IC valuation in literature. There are two main concerns:

First of all, many problems arise from the information asymmetry i.e. “managers know more about their intangible assets than investors and lenders” (Hand and Lev, 2003, p. 11) and the failure of the accounting systems to use the commonly accepted principles to present the internally created value of patents, the successful managerial processes, the strategic alliances, etc. This failure is responsible for effects regarding the shareholders and insufficient information and biases in the managerial procedures, seen from the perspective of both the investment decisions and internal improvement. A number of surveys (Lev and Zarowin, 1999; Lev 2001; 2002a; 2002b; Sveiby 2010; Marr *et al.*, 2003; Boone and Raman, 2001; Aboody and Lev, 2000; Mouritsen *et al.*, 2004) provide empirical evidence that supports the inability of accounting reports to inform stakeholders of the real value and the growth perspectives of a company or present the consequences of this omission. Those consequences can be summarized into two basic categories:

- ✓ Firstly, financial problems relate to the information asymmetry generated by the lack of intangible’s information, which favours insiders and causes legitimacy problems, abnormally high volatility in stock prices and excessive cost of the capital of companies intensely based in intangible resources (Lev, 2001; 2002a; 2002b; Boone and Raman, 2001; Aboody and Lev, 2000; Mouritsen *et al.*, 2004). Apart from the fallacies caused from information asymmetry, it is essential for an organization to present developments in the internal processes to the external stakeholders even if

those achievements have not yet been completed in order to reveal its possible future prospects and strengths (Sveiby, 2010; Marr *et al.*, 2003)

- ✓ Secondly, management problems reside in the idea that “you can only manage what you measure” (Sveiby, 2010). Measurement is essential in order to:
  - “Uncover costs” or “explore value creation opportunities” like those obtained when the staff acquires experience in customer service or in the use of advanced manufacturing systems (Sveiby, 2010). Sveiby, 2010 calls this perspective of measuring intangibles “learning motive”.
  - Help the organizations to design their strategy. It is essential for a firm to recognise the path of value creation and realise its own core competences. (Marr *et al.*, 2003; Mouritsen *et al.*, 2004),
  - Help strategy implementation since management can pose quantifiable goals, measure divergences, give feedback to employees and compensate those who meet the undertaken goals (Marr *et al.*, 2003; Mouritsen, 2004; Mouritsen *et al.*, 2004).

Sveiby, Andriessen and Mouritsen classify the different methods based on their major concepts and characteristics. Sveiby (2010) divides the methods as Direct Intellectual Capital Methods, Market Capitalization Methods, Return on Assets Methods and Scorecard Methods based on the different concepts used for intangibles valuation and the extent to which the valuation process is completed. Andriessen (2003) categorizes the 25 methods according to the community that uses them to deal with specific problems (Accounting, Valuation, Intellectual Capital, Human Resource and Performance Measurement Community). Further, the methods are also divided according to the type of measurement into Financial Valuation, Value Measurement, Value Assessment and Measurement Methods. Finally, although Mouritsen *et al.* (2001c) does not categorize various methods in specific groups, he groups them on the basis of their basic concept as follows:

- The financial accounting view on valuing: This is based on the financial and auditing standards. This view presupposes that the asset under valuation has to be separable, in control of the firm and marketable in a way that a fixed price can be settled for it. The accounting view provides a single number as a result of the valuation procedure that represents accumulation of the actions taken concerning the asset, which are compatible with the accounting tenets.
- The finance view of valuing: Successful valuation depends on the methods’ ability to predict, weigh and discount future cash flows. It concludes in a specific bottom line that is based on the assumption that the foreseen conditions will connect the future and the past.
- The intellectual capital approach: In this method concluding in a bottom line seems of no importance. Valuing is based on the identification of the value creation processes and the representation of value transformations and development with suitable financial and non financial indicators.

From all the above mentioned categories, the current study concentrates on the methods that belong in the intellectual capital approach methods. The importance of describing the

value creation paths using suitable indicators and contributing to the information needs as well as strategy formulation and execution has been noticed by many authors (Marr *et al.*, 2003; Mouritsen, 2004; Mouritsen *et al.*, 2001a; Roos and Roos, 1997; Pike and Roos, 2000). The current study has searched amongst the methods, for those characterized by Sveiby (2010) as Direct Intellectual Capital Methods and Scorecard Methods, and by Andriessen (2003) as Value Measurement, Value Assessment and Measurement Methods, which belong to the intellectual capital approach. Thus, the current study explores those methods that consider measurement of the intellectual capital not only necessary for informative purposes but also for managerial purposes. We focus on the most popular measurement methods consistent with the intellectual capital approach, as the identification of the value creation paths is one of the most serious procedures in every organization and is essential for measurement and management as well as internal control decisions. In a step further from the intellectual capital approach methods, the current study also presents those having a theoretical background and are not simply a proposal of a professional organization, refer to all kinds of organizations and are not restricted to a particular category e.g. public sector. Further, the study also tries to cover the organization's whole activity and not just a sub-category, e.g. human capital and provide connections between the different parts of intellectual capital in such a way that all the pieces are combined into an advanced entity. Lastly, it was also decided to present the basic methodology and then subjoin the advanced schema that arose as a development of it in cases of frameworks based on previous methodologies.

The methods presented are as follows: a) Skandia Navigator b) Balanced Scorecard c) IC-index d) Inclusive Value Methodology e) Intellectual Capital Statement f) IC d-VAL Approach g) Intangible Assets Monitor and h) Value Chain Blueprint. In each one of these methods the authors' basic insights that penetrate their theoretic framework giving solutions to problems arising from insufficiencies in the IC measurement are presented. Furthermore, the current study also presents how to define the way that this framework is implemented, thereby providing an IC measurement tool.

## 1. Skandia Navigator

The Swedish insurance company Skandia was the first company to use an intellectual capital supplement for its 1994 report (Roos *et al.*, 2005). Skandia's Director of intellectual capital L. Edvinsson and M. Malone are responsible for this particular method.

In the Skandia Navigator, the creation of value "is presented as an effect of the connections between human, structural (or organizational) and customer capital" (Mouritsen *et al.*, 2001c, p. 401). This main concept is shown schematically in Figure 1. Being distant from the accounting or financial aspects of valuation, this type of valuation, according to the previous authors, does not provide "a bottom line indicator" (Mouritsen *et al.*, 2001c, p. 402), which means that it does not conclude to an absolute measure of intellectual capital worth. Valuing for Skandia according to the same authors implies determination of the paths and mechanisms through which value is created. In Skandia supplements, procedures and linkages amongst the different members of value creation are given by "stories" which have a remarkable resemblance with stories or pictures taken from the physical world. One of the most commonly used symbols is the tree, whereby different parts represent different



categories of intellectual capital that need to co-operate in order to bear fruits (financial capital). Relationships amongst the different parts are given schematically with “sketches”.

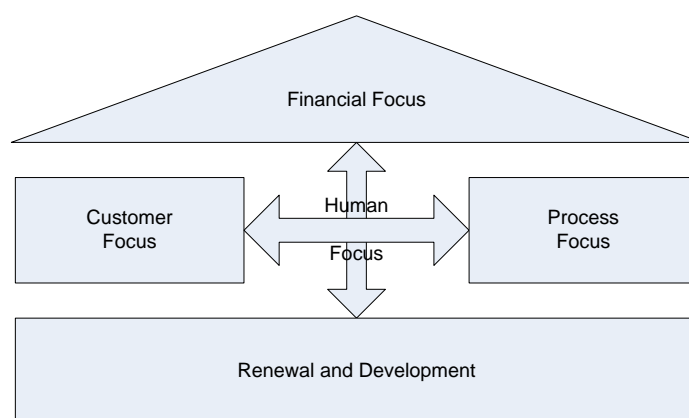


Figure 1. Skandia's Navigator (adapted from Mouritsen et al, 2001c, p. 405).

For every part of the sketch a number of indicators are used to “point the elements of strategic change out” (Mouritsen *et al.*, 2001c, p. 417). Indicators, according to Andriessen's (2003) analysis for the Skandia Navigator, may be cumulative (direct financial if permitted measures), competitive (defining company's differences with industry), comparative and combined (connecting two company variables). Every unit of a scheme has to be aware of the stories it participates in. Motivation and development are accomplished through knowledge sharing.

The best known sketch in Skandia is the navigator which is the proposal of Skandia leaders towards a balanced, successful scheme of the company's operation. This scheme can also be used as a helpful tool to “guide an organization in managing intellectual assets” (Luthy, 1998). The Skandia Navigator schema is given in Figure 1 and it demonstrates that organizations need to concentrate on five different areas. The financial focus area has to do with the organization's achievements of the past. Customers, human and process focus areas, have connections with the present efforts. Finally the renewal and development focus area indicates practices that the company uses to evolve and catch up with the future changes. Each of these areas has a number of indicators proposed by the authors. However, their number is inexhaustible (Mouritsen *et al.*, 2001c).

While Edvinsson and Malone were trying to give a total measure for IC, in 1997, they introduced the following term:

$$\text{Organizational Intellectual capital} = i * C$$

The number of indicators was restricted and 21 indicators “for easy measurement and computation” (Edvinsson and Malone, 1997, p. 184) were selected and combined to a measure of IC capability for the company ( $C$ ). The coefficient ( $i$ ) of IC efficiency is an average percentage measure that results from nine percentage indicators (see Table 2) indicative of the real organizations' ability to use their intangible resources efficiently (Edvinsson and Malone, 1997; Bontis, 2001; Andriessen, 2003).

**Table 2. Intellectual Capital Coefficient of Efficiency (*i*) Indices  
(Edvinsson and Malone, 1997, p. 186-187)**

1. Market share (%)	6. Index of training hours (%)
2. Satisfied Customer Index (%)	7. Performance/quality goal (%)
3. Leadership index (%)	8. Employee retention (%)
4. Motivation Index (%)	9. Administrative efficiency/revenues (reciprocal of administrative error/revenues)
5. Index of R&D resources/ total resources (%)	(%)

## 2. Balanced Scorecard

In 1992, Kaplan and Norton introduced a novel strategic management framework in the scientific community with the article “The Balanced Scorecard: measures that drive performance” published in Harvard Business Review 1992. Since then, a great number of articles by the same authors have been devoted to the development of the framework, the presentation of its qualifications and the way organizations could incorporate its implementation into everyday practice.

The main concept of the framework is the existence of a vision: a central cause that lies on the top of strategic procedures. This vision points out specific objectives that the management should attain, which are attributed to four strategic areas called perspectives (see Figure 2).

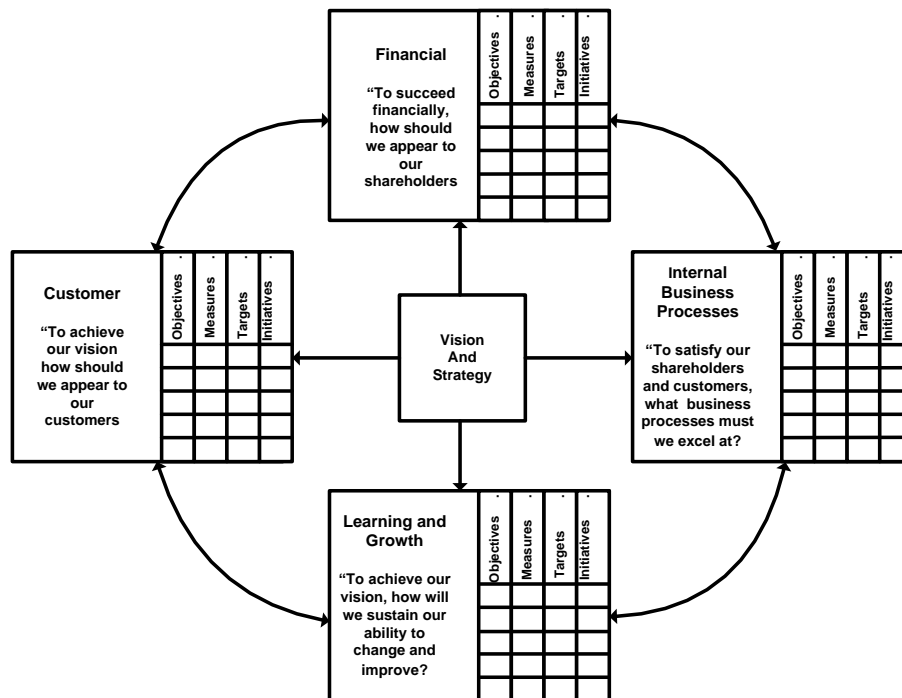


Figure 2. The balanced scorecard (Source: The Balanced Scorecard Institute).



According to Kaplan and Norton (1992; 1993; 2001a) these four perspectives are:

- ✓ “Financial- the strategy for growth, profitability and risk viewed from the perspective of the shareholder.” (Kaplan and Norton, 2001a, p.90). This perspective concentrates on the specification of targets that help the accomplishment of objectives in financial aspects and make the company more interesting to the shareholders.
- ✓ “Customer- the strategy for creating value and differentiation from the perspective of a customer” (Kaplan and Norton, 2001a, p. 90). This perspective concentrates on the strategy terms that will make the company more effective concerning the existent and potential customers needs in terms of accurate delivery, product quality, and relationships with customers and cost matters.
- ✓ “Internal Business Processes- the strategic priorities for various business processes that create customer and shareholder satisfaction” (Kaplan and Norton, 2001a, p. 90). This perspective concentrates on the growth of internal procedures that will support the accomplishment of customer and financial goals.
- ✓ “Learning and Growth-the priorities to create a climate that supports organization change, innovation and growth” (Kaplan and Norton 2001a, p. 90). This perspective is connected with the management’s responsibility to create suitable conditions in terms of human capital and infrastructures to accomplish the goals of the above mentioned processes.

The implementation of a balanced scorecard framework includes four processes that help the top management to link “long-term strategic objectives with short-term actions” (Kaplan and Norton, 1996, p. 75). According to Kaplan and Norton (1996), the processes include:

- ✓ Translating the vision: Present and clarify strategic objectives and determine actions that should be taken in each case.
- ✓ Communicating and linking: Present the strategy and link it to specific measures-goals in each company subdomain.
- ✓ Business planning: Design an appropriate plan for the allocation of business resources in a manner that eliminates problems from the crosscurrent goals.
- ✓ Feedback and learning: Investigate divergences from goals, giving feedback to managers, and reallocate priorities when needed.

The latest research work of the authors’ job concerning the Balanced Scorecard is a new framework named Strategic Maps (Kaplan and Norton, 2001a; 2001b; Neely *et al.*, 2003). In Strategic Maps, the cause and effect relationships amongst the different parts of the Scorecard are presented. Moreover, every perspective is analyzed in a strategic map into its basic components in order to present the substantial elements of a company’s strategy as well as its interconnections (Kaplan and Norton, 2001a).

### 3. IC-Index

IC-index (Roos *et al.*, 1997; Roos and Roos, 1997) is a methodology introduced in 1997 by the team of Goran Roos, Johan Roos, Nicola Dragonetti and Leif Edvinsson. The

subdivisions of intellectual capital according to this framework are presented in Figure 3. The main concept of this framework is the importance of a company's strategy. According to Roos *et al.* (1997, p. 62) "an IC system is good only if it is grounded in the company's identity and strategy".

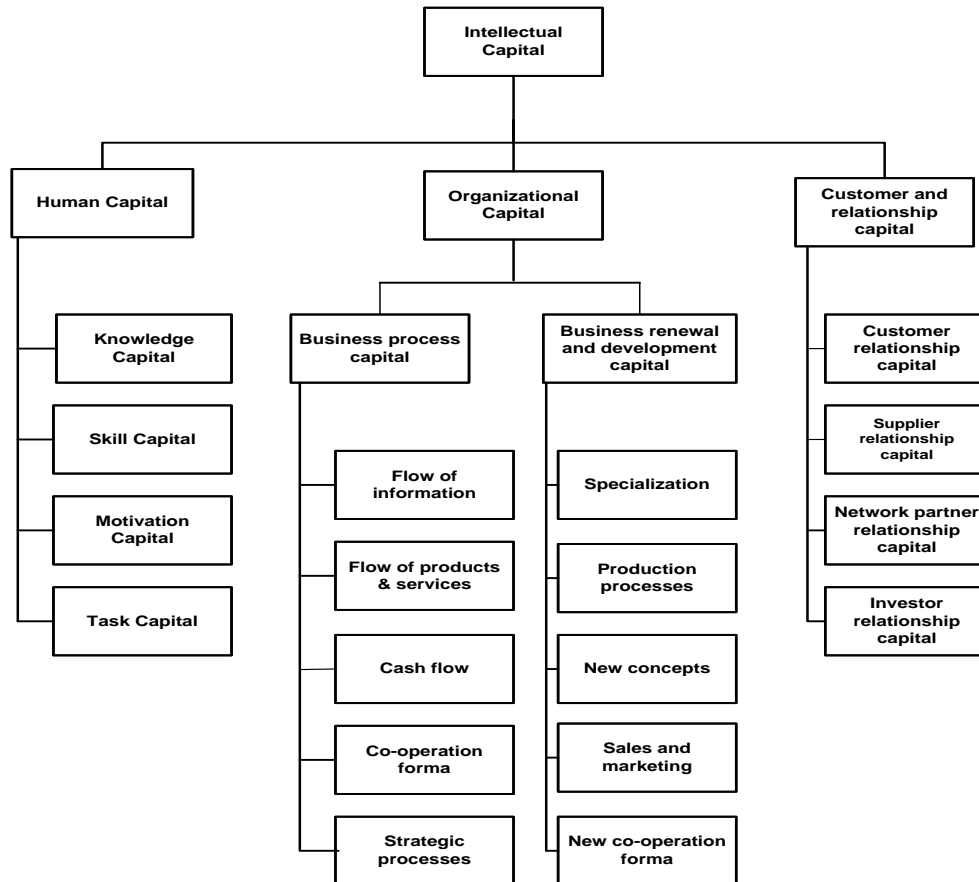


Figure 3. Limited distinctions of intellectual capital (Source: Roos and Roos, 1997, p. 416).

The first objective of an organization after identifying its long term strategic goals should be to determine the key success factors (KSFs). The identification of KSFs is a strategic process wide open to many people and the deterioration of the participants to a short number might cause group- thinking consequences (Roos *et al.*, 1997). On the other hand, the group cannot be too large as it may not be certain that every participant has a complete picture of the problem. Some of the KSFs may be considered by those who participate as more important than others.

For every KSF, according to Roos *et al.* (1997), a number of indicators are recommended. Indicators are checked for their precision, robustness and relevance. Indicators also have to be capable of incorporating relative changes of intellectual capital, being suitable for the company's strategy, being familiar to those who use them according to the company's needs and being differentiated according to the industrial area in which the company operates.

The same indicator might be used for more than one KSF. One of the main innovations of this model is that it places emphasis on the flows from one component of intellectual capital to another. These flows (specified by the authors as what has happened between two snapshots in time) have their own place in the intellectual capital picture and their own indicators. For every business activity, the IC elements, flows amongst the different elements and relative indicators should be determined.

Once the indicators are selected by the participants they are thoroughly examined and those finally selected have to be expressed as a dimensionless number. “The indicators chosen should be weighed, and then united into a single, summarizing index, taking into account the interdependence, causalities and insufficiencies” (Roos *et al.*, 1997, p. 85). The weight attributed to every indicator reveals its relative importance in the value creation procedure for the KSF that the indicator is responsible for describing.

In the final level the authors suggest the consolidation of a corporate IC-index coming up from the aggregation of the weighted indices of the same level. This last level makes the intellectual capital value comparable through the different years and different companies provided that the same indices and the same weights have been used.

#### 4. Inclusive Value Methodology

This method has been established by Philip M’ Pherson and Stephen Pike in 2001. In their article “Accounting, empirical measurement and intellectual capital” the essential steps of a measuring process, every one of which may be considered as a discrete process, are:

- 1) The mapping model: “All the measurements are mappings from the properties or manifestations of an observable process to a symbol on an independent and admissible scale on the real line” (M’ Pherson and Pike, 2001, p. 246)
- 2) The primary measurement: One to one mapping process where each instrument owns an agreed and independent scale.
- 3) The multidimensional measurement: This is a many-to-one process where a set of primary performance measures are combined into one measure that represents all the primary ones. This is, according to the authors, the case of value measurement: “a conjoint process that combines all the primary value contributions from an underlying process into a final quantifier called “value”” (M’ Pherson and Pike, 2001, p. 248).

In order to follow a multidimensional measurement procedure, according to the authors, primary components need to fulfill the requirements of completeness, distinctness and scale-independence. Additionally, the primary value scales should have different directions but a common value scale (commensurability). To solve the problem of commensurability the authors propose the solution of normalization. For every operational variable (p) a maximum and a minimum value is defined (M’ Pherson and Pike, 2001; Andriessen, 2003). In a normalized scale p has a corresponding value given as:

$$n = (p - p_{\min}) / (p_{\max} - p_{\min})$$

IVM methodology follows a bottom up procedure in order to create a specific number attributed to combined intangible value. This procedure starts with the primary measurement process where for each performance vector –input in the valuation procedure – the monetary and non-monetary subsets (performance indicators) are defined. Non-financial performance indicators follow the normalization process as described above. Finally all the measures are combined into an “objective measuring yardstick” (M’Pherson and Pike, 2001, p. 259) under specific combinatory rules which obey specific hierarchical criteria and are indicative of each measure’s significance for the value creation process.

Inclusive value methodology provides a solution for the summation of the dissimilar IC items but it does not present a new theoretical framework about IC itself or its components.

## 5. INTELLECTUAL CAPITAL STATEMENT

The methodology introduced by Jan Mouritsen and his colleagues in 2001 refers to the establishment of an IC accounting system that combines the knowledge resources and competences with the corresponding management activities. According to Mouritsen *et al.* (2001a), the existing three-way models that divide the intellectual capital into human, organizational capital and customer capital suffer from description and prescription problems. Description problems stem from the deterioration of the models to the “functional qualities” (Mouritsen *et al.*, 2001a, p. 364) of the IC’s sub-domains. Thus, these models fail to identify relationships and transactions between the different but complementary parts of intellectual capital. Prescription problems reveal the inability of the intellectual capital statements to provide information about the specific intellectual capital resources which participate in the value-creation process, the way these resources evolve and the results derived from resources exploitation and interaction.

It was observed that these shortcomings led to the development of an intellectual capital framework with two dimensions (Mouritsen *et al.*, 2001a; 2001b) shown schematically in Figure 4. The horizontal dimension presents the resources (Employees, Customers-Publics, Process and Technology) while the vertical one has three columns: Resources, Activities and Effects.

The resources columns take indicators that show availability and adequacy of the suitable means needed for the company in each resource category. An activity column presents indicators related to the manager’s activities concerning resources development and improvement. An effects column presents results from resources portfolio exploitation through the management’s “qualifying activities” (Mouritsen *et al.*, 2001a, p. 366).

An IC statement, established by the above mentioned way, should narrate the overall story (called “knowledge narrative” by the author) of value production and define the relationships between the complementary IC-sub domains.

Management efforts to develop and exploit resources are called “knowledge management challenges”. Finally, the measurement system needs indicators (called “numbers”) to visualize the results of management’s efforts. This structure is very fundamental for a functional IC system (Mouritsen *et al.*, 2001b; 2002).

Management arena		Monitoring of effects	Qualification Management	Portfolio Management
Modality		Competencies	Qualifying activities	Portfolio
Areas	Domain	Effects	Activities	Resources
	Employees	• • • •	• • • •	• • • •
	Customers Publics	• • • •	• • • •	• • • •
	Process	• • • •	• • • •	• • • •
	Technology	• • • •	• • • •	• • • •

Figure 4. An IC Accounting System (Source: Mouritsen *et al.*, 2001a, p. 365).

### 6. Holistic Value Approach

The Holistic Value Approach (HVA) is a method based on the two previous frameworks of IC-Index and Inclusive Value Methodology (Pike and Roos, 2000). Goran Roos and Steven Pike solve the problem of adding dissimilar subjects, which is the case for the IC sub domains that deteriorate implementation of the IC-Index, with the idea of normalization presented in IVM.

One of the basic concepts in the above mentioned method is the importance of the stakeholder who is interested in value measurement. According to Goran Roos “value, like beauty, is in the eye of the beholder” (Chaktzel, 2002, p. 115). When measuring the company’s value the question to be asked is for whom it is being measured for. The choice of the indicators and their relative weights would be different if the evaluation is in the eyes of the customers or the shareholders. Senior management should determine who the key-stakeholder is.

“The holistic value added (HVA) methodology of ICS combines a business navigator with the measurement theory and axiology to generate a non-dimensional view of the organizational value as seen from the viewpoint of any stakeholder” (Fletcher *et al.*, 2003, p. 510).

When the beholder has been decided, the value attributes are identified and the flows and relationships between these attributes are determined. This procedure reveals the value creation paths and leads to a navigator (see Figure 5) that schematically presents the entire

process (Pike and Roos, 2000). The navigator usually starts from a distinction tree analyzed at least in three levels (Roos *et al.*, 2005). The third level analysis means that the human, organizational, relational, monetary and physical capitals are categorized into their sub-domains. Financial value attributes and non financial value attributes are combined so as to reveal the transformation of one value category to the other and present the value creation process.

	MONETARY	PHYSICAL	RELATIONAL	ORGANIZATION AL	HUMAN
MONETARY	Investment in financial instruments	Investment in assets	Investment in building relationships	Investment in brands image and systems	Investment in competent people
PHYSICAL	Sales of products	Equipment generates products	Features build loyalty or addiction	New equipment generates new working processes	New equipment generates new competence in user
RELATIONAL	Strong relationships generate lower selling costs	Use of other company's equipment	Leveraging existing relationships to generate new relationships	Access to someone else's processes or brands	Competence building from joint projects
ORGANIZATION AL	Sales/licensing of IP, systems, processes, SW or information Brand generates higher sale price	Drawing or recipe converts to product	CRM systems increase customer loyalty	Patent application process generates IP	Computer SW that trains users in how to use other SW
MONETARY	Sales of competence frequently using the proxy of man-hours	Developing prototypes or artist creating a work of art	Building & developing relationships	Knowledge codification, creating new processes, SW, IP, etc.	Mentoring, apprenticeship

Figure 5. An Intellectual Capital Navigator in the transformation matrix form (Source: Roos *et al.*, 2005, p. 112).

Indicators are chosen for every attribute and every flow, normalized (according to IVM procedure) and combined into one measure according to the path and weights that the stakeholder has determined.

Usually organizations that belong to the same category (value chain, value shop and value network) have the same third level analysis (Roos *et al.*, 2005). As a final step in the methodology, the financial and non –financial values are presented in a value space which is a third dimensional system where the financial and intangible values can be combined. (Pike and Roos, 2000; Chatzkel, 2002).

This framework is the first one that combines a theoretically justified framework with a measurement process that leads to one number as a value for IC.

## 7. IC-dVal Approach

Bounfour established the Intellectual Capital Dynamic Value Approach in 2002. According to this model there are four important “dimensions of competitiveness” (Bounfour, 2003, p. 400). These are the resources, the processes, the building of intangibles assets and the outputs. For every dimension a number of metrics is developed. Data related to the level of investment in resources, processes, intangible assets and output values and the comparative data related to the comparison of a company’s performance in each dimension with “those best in class” (Bounfour, 2003, p. 403) are presented.

According to Andriessen (2003), Bounfour’s model proposes the combination of metrics into an overall measure by giving relative weights to each category to provide an overall index of performance. The index that comes up from this procedure when multiplied by the company’s market value gives the Intellectual Capital Dynamic Value. Unfortunately, according to the same author, this index does not clearly reflect how the “dimensions of competitiveness” link with each other.

## 8. Intangible Assets Monitor

According to Sveiby (1998), “The Intangible Assets Monitor is based on the notion of people as an organization’s only profit generators. The profits generated from people’s actions are signs of that success, but not the originator of it. Human actions are converted into both tangible and intangible knowledge “structures””.

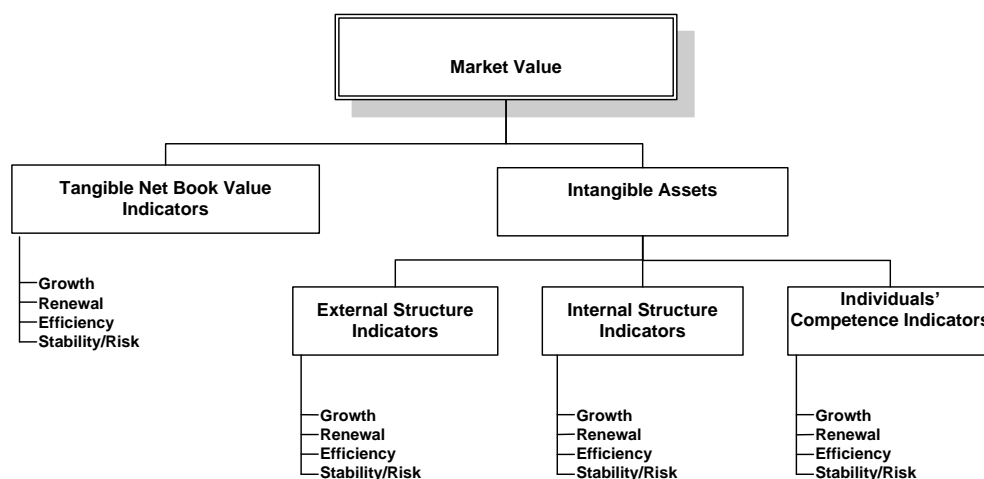


Figure 6. Intangible Assets Monitor (Source: Sveiby, 1998).

This is the main concept of the Intangible Assets Monitor framework. Intangible knowledge structures are divided into those focusing on external activities and those focusing on internal activities. So there must be indicators that estimate both the individuals’ competencies and their achievements concerning the internal or external structure. Individual competencies refer to personal characteristics of the employees including, but not limited to education and skills. Internal structure on the other hand includes non physical assets owned



by the company, such as administrative systems, procedures, and patents that constitute the entire organization's entity. The external structure includes "relationships with customers and suppliers", alliances and also subjects connected with the firm's reputation, such as brand names (Sveiby, 1998).

For these three categories a number of indicators have to be selected in order to control an organization's efforts in terms of growth, renewal, efficiency and stability in each category (see Figure 6).

The framework does not provide an aggregate magnitude for intellectual capital as one unit. According to Sveiby (1998), this is not necessary since "money is merely a proxy for human effort."

## 9. Value Chain Blueprint

Baruch Lev, one of the best known accounting professors, in his work deals with the consequences of information asymmetry and intellectual capital reporting. One of his many contributions to intellectual capital measurement and reporting is the information system of Value Chain Blueprint (Lev, 2001; Lev, 2003; Lev and Daum 2004). The basis of this framework is the value creation process within an organization.

This process starts, according to the authors, with innovations concerning projects, investment in new technologies and products or the establishment of new relationships with suppliers, customers, etc. One step further, this process includes the implementation of new ideas and achievements in the creativity process. Lastly, during the third phase, the results of the former procedures, the consequences of the implementation of new ideas and the clients' response to them, are mapped to measures of a company's performance and net worth, as well as the potential of future development (Lev, 2001; Lev, 2003; Lev and Daum, 2004). This framework is schematically presented in Figure 7.

For each one of these phases the authors recognize the relevant subdivisions. A company should have a similar system with all or some of these subdivisions and relevant indicators for each subdivision. Indicators should be quantitative, standardized (help comparisons between companies) and relevant to users (Lev, 2001; Lev, 2003).

Some interesting observations stemming from the previous analysis of IC measurement methods should be highlighted. Building an IC measurement system is not a snapshot in time. Researchers make painstaking efforts to evolve their models towards more advanced and sophisticated ones and present new frameworks. Starting from the Balanced Scorecard, Kaplan and Norton have moved on to Strategic Maps.

By using the theoretic framework of the IC-index and after solving the indicators' aggregation problem, Goran Roos and his team went on to present the Holistic Value Approach. Each one of the authors has detected a problematic issue in the existing theory and has tried to contribute a solution. Not one of these authors considered the determination of a specific value as a necessary result for a successful intellectual capital measurement procedure. All of them lay emphasis on the ways by which the value creation paths should be revealed. As Mouritsen (2001c, p. 401) observes in the intellectual capital approach models that valuing here "means to create (more) value, to generate value via the transformation or "improvement" of corporate routines or practices."

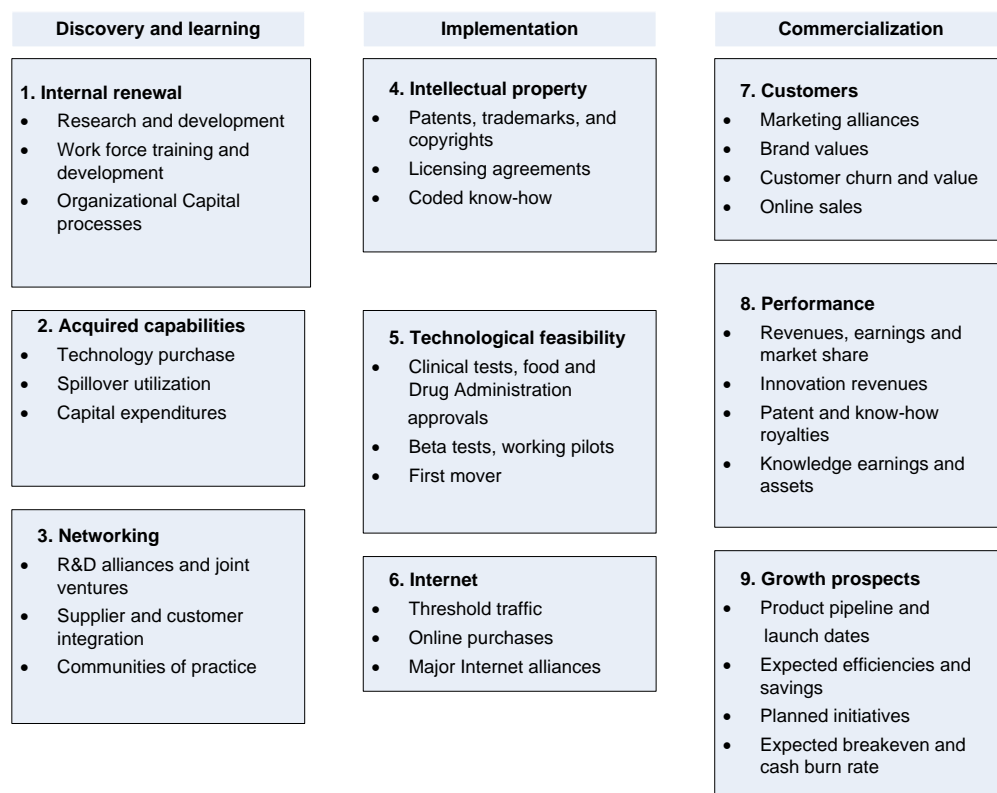


Figure 7. The Value Chain Blueprint (Source: Lev and Daum, 2004 p. 112).

## IV. ASSESSING MEASUREMENT METHODS

Many authors, such as Luthy (1998), Bontis (2001), Bontis *et al.* (1999), Andriessen (2003), and Roos *et al.* (2005), have reviewed measurement methods and present assessments of these methods. Nevertheless, comparative analysis amongst these methods is avoided. Others like Roberts (1995), Grojer (2001), Neely *et al.* (2003), Pike and Roos (2000), Chaktzel (2002) present criteria and assess the different methods based on these criteria. One of the most common practices that have been used is the clustering of the measurement methods into categories and their assessment as a whole.

Neely *et al.* (2003), Pike and Ross (2000), Chaktzel (2002) present three groups of methods referred to as the three generation models. Diversification in these three categories is dependent on the level of success of the measurement process:

- ✓ First generation methods are basically scorecard practices that try to identify resources of intellectual capital and enrich the traditional frameworks based on the financial measures with the non-financial ones. According to the authors the comprehensive measurement methods of this category are the Balanced Scorecard (Kaplan and Norton, 1996), and the Skandia Navigator (Edvinson and Malone, 1997).

- ✓ Second generation methods are not restricted to the value drivers but try to visualize transformations and flows from one resource to another. Examples given by Neely *et al.* (2003) for this category are IC-Navigator (Roos *et al.*, 1997; Chaktzel 2002), and Strategy Maps (Kaplan and Norton, 2001a; 2001b).
- ✓ Third generation methods continue to insist on the presentation of the value creation paths as the second generation models do (Neely *et al.*, 2003). However, these methods also try to combine the different attributes of the process into one entire measure (Chaktzel, 2002). In this category the authors classify the Holistic Value Approach (Pike and Roos, 2000).

Pike and Roos (2000) present a number of criteria (see Table 3) and assess the different groups of methods according to these criteria.

**Table 3. Three generation models characteristics. (Source: Chaktzel, 2002, p. 112)**

Main Criteria	Test	Financially based, EVA	1 <sup>st</sup> gen. IC, and BBS	2 <sup>nd</sup> gen. IC, e.g. IC index	3 <sup>rd</sup> gen. IC, H.V.A
Auditable and reliable	Data meet a standard	Yes	No	Partial	Yes
	Data address the future	Partial	Yes	Yes	Yes
Overhead and ease of use	Low measurement overhead	Yes	Moderate	Moderate	Moderate
	Easy to initiate and use	Yes	Yes	Moderate	Complex to initiate
Strategic Management	Allows multilevel management	Partial	Does not allow trade-offs	Yes	Yes
	Measures stock flow and influence	Stock	Stock	Stock and influence	Stock, flow and influence
Shareholder Information	Provides data at all company levels	Partial	Yes	Yes	Yes

Here, the picture accomplished indicates that the Intangible Assets Monitor and IC-dVal approach belong to the first generation like the Balanced Scorecard and Skandia Navigator. Qualitative data as customer satisfaction, technology infrastructure and personnel's commitment is visualized using quantitative indicators. Even though the IC-dVal approach leads theoretically to a specific value, it is not clear that the market value is an appropriate metric to use for IC valuation. Moreover, none of the above mentioned methods clarifies connections between all the different IC components. For example there is no indication for interaction between attributes of interal and external capital in the case of Sveiby's method. The Value Chain Blueprint may be classified in a space between the first and second

generation models. In the Value Chain Blueprint method, connections between innovations, implementation of innovative ideas and commercialization are thoroughly presented. But what about the already existing resources that have, for many years, provided an advantage to companies who own them? In Intellectual Capital Statement method, connections between the resource portfolio, management activities for the exploitation of these resources and the corresponding effects were observed. Consequently the method can be classified in second generation models. Similarly, Strategic Maps, and the IC-Index belong to the second generation since they try to reveal the overall procedure of value creation leaving no gaps between relationships and interconnections. Finally, it may be asserted that like HVA, the Inclusive Value Methodology is also in the third generation since both manage to provide a bottom line e.g. a scale of measurement.

Grojer (2001) has made another attempt to assess the different methods in terms of classification. A theoretical framework was presented for the assessment of the intangibles based fundamentally on the previous studies of Roberts (1995) and Rudner (1966). His arguments concerning IAS38, the Balanced Scorecard and the Edvinsson and Malone (1997) model are summarized in the Table 4.

It should be noted that the Edvinsson and Malone model that Grojer (2001) refers to, differs from the Skandia Navigator model also developed by Edvinsson and Malone in 1997. Conceptually Skandia Navigator is a management tool while this model refers to the financial perspective of intellectual capital as a difference between two values (market value and book value).

For attribute characteristics, Grojer (2001) was based on Robert's (1995) work, which presented five approaches to attributes selection in the study concerning the accounting system's classifications in different countries. Both presented five types of approaches:

- ✓ Essentialist approaches which maintained that the essence of an object and not the object itself can be described through the selection of attributes derived from an object's functions and activities.
- ✓ Overall similarity approaches which classify together objects that are similar or homologues in terms of specific attributes. Statistical techniques may be used in cases of overall similarity approaches to prove the resemblance amongst the different objects.
- ✓ Diachronic approaches that "*rely upon the identification of a time relationship between objects*" (Roberts, 1995, p. 650)
- ✓ Set theory approaches that define consistency (the criteria for classifying the various objects should constantly be the same), exhaustibility (the ability of the proposed system to describe the whole universe under examination), mutual exclusivity (the capability of each element to belong to only one subset of the universe) and hierarchical integrity (the existence of hierarchy classes) as properties of good classification.
- ✓ Archetypal approaches in which the principle for attribute selection should be the similarity or the difference of relationships between the attributes under classification. This is because there is a need for attributes related to each other in order to create a taxonomic scheme. The archetypal approach, apart from defining the elements, helps to "obtain an expression (attributes) of the relations between the elements and how they are related to the system as a whole" (Grojer, 2001, p. 702).

**Table 4. Confronting IAS38, BSC and IC with classification concepts**  
(Source: Grojer 2001, p. 707)

<b>Classification concepts</b>	<b>IAS 38</b>	<b>BSC</b>	<b>IC</b>
<b>Universe of discourse</b>	As a between two universes	A set of four universes	As a difference between two values
<b>Attribute</b>	Essentialist plus by listing	Archetypal plus diachronic	Overall similarity
<b>Type of classification</b>	Classification Schema	Typology	Classification Schema
<b>'Good classification'</b>			
<b>Exhaustive</b>	No (Yes)	No	No
<b>Exclusive</b>	No (Yes)	No	No
<b>Simplicity</b>			
<b>Objective notational</b>	Unclear	No	Yes
<b>Subjective notational</b>	Unclear	Yes	No
<b>Objective-logical</b>	No	No	No
<b>Subjective-logical</b>	No	Yes (No)	Yes (No)

Both Roberts (1995) and Grojer (2001) presented the advantages and shortcomings of each approach, while also using other authors' contributions. Both recognized the problems in the ability of the similarity approach to describe an empirical system because such a system could have an infinite number of attributes, whereas statistical methods would need a specific number of attributes. However, there were disagreements on the choice of a set theory approach as an approach for attribute research. Grojer (2001) considered the set theory as part of a validation process of classification schemata and not as an independent approach.

Next, the meaning of a typological system according to Grojer (2001) was examined. A typological system is a system that has a concept "determining the typology's universe of discourse", relation(s) "that determine(s) an ordering among the members of the universe of discourse", certain features that "characterise the relation(s)" and a set of concepts designating that some members of the universe are distant or at opposite sides considering the relations between them (Grojer, 2001, p. 609- 700). According to the author, a typological system is better than a classificational schema in terms of informative purposes because the first one provides a logical connection between the members of the universe. Grojer (2001) also added that the typological schemata would take precedence over the classificational

schemata as the former may include empirically testable propositions, which would not be possible in the latter situation.

Simplicity of the primitive terms according to Grojer (2001) is another point of assessment for non- theoretic formulations and can be examined according to the following dimensions:

- ✓ Objective – notational simplicity: It refers to the codifications or notations attributed to the different elements of a system and how easily these can be perceived without any kind of misunderstanding. An example given by the author would be the accounts in a chart of accounts that can be denoted either by numbers (having a greater level of notational simplicity) or by names.
- ✓ Objective - logical simplicity: It has to do with the existence of a particular structure in a model that is based on the logical connections between the different parts of the model and the attribute characteristics, such as reflexivity and symmetry.
- ✓ Subjective – notational simplicity: It has to do with psychological aspects of acceptance and recognition of the specific notation established.
- ✓ Subjective - logical simplicity: It has to do with “how people psychologically respond to logical properties of theories, (Rudner, 1966)” as quoted in Grojer (2001, p. 697).

Finally, the criteria of good classification include exhaustiveness, which means that a measurement model has the ability to cover the whole entity under consideration and exclusiveness, which declares that every piece of a systems’ structure can belong to only one category.

A matrix of the classification criteria and methods is presented in Table 5. In cases of universes of discourse, it was observed that the Skandia Navigator includes five universes (financial, customer, process, renewal and development and human focus), IC-Index includes three (human, organizational, customer and relationship capital), Inclusive Value Methodology has three universes (monetary domain, intangibles domain, and value context created by stakeholders and others), Intellectual Capital Statement has four universes of discourse (employees, customers and publics, processes, and technology, each one seen from the prospect of the resources, activities taken and effects), Holistic Value Approach has five universes (monetary, physical, relational, organizational and human), IC-dVal Approach has four universes of discourse (resources, processes, the building of intangible assets and outputs), and Intangible Assets Monitor has four universes of discourse (tangible, external structure, internal structure and individuals competence indicators). Finally, the Value Chain Blueprint has three universes of discourse (discovery and learning, implementation and commercialization) each one of which refers to three different categories of resources. The numbers of sub-domains that result from the division of the universe do not indicate the different levels of complication for these methods.

The current study presents the methods used to reveal the value creation paths. Consequently, the methods have been selected in such way so as to follow an archetypal approach. However, this is not the case for IC-dVal and Intangible Assets Monitor. In the above mentioned cases the elements are not clearly connected and the methods are more compatible with the overall similarity approach. Further, the Intellectual Capital Statement complies with both the archetypal and the diachronic approach (relationship of resources,



activities and effects have the attribute of time sequence). In the Value Chain Blueprint there is also archetypal and diachronic approach, whereby the connection between discovery and learning, implementation and commercialization implies the time sequence. The HVA fulfils the requirements of an archetypal approach and also as was denoted by Roos (2005) is compatible with the measurement theory. Thus, HVA fulfills also some of the requirements of set theory approach.

As Grojer (2001) mentions, according to the American Accounting Association there are four properties of good classification: exhaustiveness, exclusiveness, consistency and hierarchical integrity. He also contests the need for consistency and argues that hierarchical integrity is the same with notational simplicity in the IC measurement systems. In terms of exhaustiveness the IC-Index, Holistic Value Approach and Intellectual Capital Statement better fulfill this criterion since they give indicative and explanatory points for the interconnections and relationships amongst all sub-domains of intellectual capital. Additionally, the existence of flows among resources as a different entity from resources gives to the IC-Index and Holistic Value Approach the ability to describe each one of the frameworks attribute in an exclusive way. In the case of Inclusive Value Methodology the components of the theoretic framework are not presented. Thus, it is difficult to arrive at conclusions about this model in terms of exhaustiveness or exclusivity.

In terms of the classification types according to Grojer (2001), the Balanced Scorecard is a typology because it offers the time relations between the different classes and the cause-effect relations in the case of performance drivers. According to Mouritsen's point of view, the value chain in the Skandia Navigator is revealed with the use of stories that indicate the linkages between the different parts of the framework, thereby resulting in a typology. In the case of the Intellectual Capital Statement, there are relations between resources and activities and also between activities and effects. The Value Chain Blueprint may present the cause-effect relationships between the different attributes of innovations, implementations and results. Inclusive Value Methodology was asserted as a typology even though it did not define the specific theoretic framework of the whole procedure (e.g. the names of the different criteria). However, it still gave connections between the criteria and the values. The Holistic Value Approach and IC-Index respond in a better way to the typology requirements as these methods not only reveal the cause-effect relations but also manage to thoroughly identify these relations. This is because these methods use different weights proposed by the specific stakeholders for each connection. On the other hand IC-dVal and Intangibles Assets Monitor the only linkage shown is the cause-effect relation between the indicators. However, as these methods do not indicate any theoretical interpretation in the connections between the different parts of each framework their significance as typology should be considered limited.

In terms of objective notational simplicity Grojer (2001) estimates that BSC is deficient in terms of objective-notational simplicity "because of the multi-dimensional concepts that can be given several meanings" (p. 709). For the same reason as with the Balance Scorecard, it was believed that IC-Index, Intangible Assets Monitor, IC-dVal Approach, Value Chain Blueprint, Skandia Navigator and Intellectual Capital Statement also lacked objective notational simplicity. The Holistic Value Approach and Inclusive Value Methodology own higher degrees in terms of objective notational simplicity since they use a common measure for each non-monetary attribute of the model that permits comparison and combination of different attributes.



According to Grojer (2001) the objective logical simplicity in the Balanced Scorecard exists due to the model's connection between the past, present and future. This connection offers a logical continuity which is missing from IC. It was believed that IC-Index, Intellectual Capital Statement, Value Chain Blueprint, Holistic Value Approach and Skandia Navigator offer a reasonable story explaining the connection between the different parts of the model and fulfill the criterion of objective logical simplicity. Although, the indicators of growth, renewal, efficiency and stability offer a very effective description of each value category they do not display the interconnections that penetrate the system in the Intangible Assets Monitor. This is also the case for the IC-dVaL Approach.

In terms of subjective notational simplicity it was believed that methodologies that schematically and thoroughly present value creation would successfully fulfill the above mentioned criterion. Furthermore, there are cases where authors agree that it is essential to choose indicators familiar to those who use them or suitable for the organization's value category (Roos *et al.*, 2005). Of course in each one of these cases notational simplicity depends on the managers' experience concerning the use of a measurement model. However, apart from this parameter "concepts are used in the every day business life" as Grojer (2001, p. 709) claims for the Balanced Scorecard relative. This is also the case for IC-Index, Intellectual Capital Statement, Holistic Value Approach, Skandia Navigator, Intangible Assets Monitor and Value Chain Blueprint.

Finally the case of subjective logical simplicity is more complicated and should be the subject of a subsequent empirical study. For this reason we do not include this criterion in the table. It is obvious that the "oldest" methods may have higher degrees of subjective notational simplicity since they have been used by more organizations and seem more familiar to the users. Also, it is probable that methods which manage to reach a total "bottom line indicator" (Mouritsen, *et al.*, 2001c, p. 402) seem more complicated and less useful to those who carry out the project (Roos, 2005).

In many cases, managers are satisfied with clear goals and feedback for deviations from those goals about a specific project and find it more complicated when everything needs to be quantified.

In addition, the number of citations of relevant papers in Google and Scopus (see Table 6) are considered as an indication of subjective logical simplicity if we assume that such statistics reflect the acceptance of those methods by organizations used as survey sample. Balanced Scorecard, Intangible Assets Monitor and Skandia Navigator have many more citations than the other methods. Although, it is difficult to draw safe conclusions, on the basis of citations, it does seem that the above mentioned two methods are better than the others in terms of subjective logical simplicity.

In a previous analysis, the response of each method in the particular criteria was observed. It is reasonable for differences to exist amongst these methods since many of these methods have been established by authors to respond to different needs and fill in different gaps.

For example, Mouritsen's and Lev's models concentrated more on solving the problem of the accounting treatment of intangibles, whereas Roos had a more managerial perspective. This is probably the reason of differences in their models according to the specific criteria.

**Table 5. Assessment of classificational schemata offered by the measurement methods**

**Figure 9: assessment of classificational schemata offered by the measurement methods.**

Classification concepts	<u>Skandia Navigator</u>	<u>IC index</u>	<u>Inclusive value methodology</u>	<u>Intellectual capital statement</u>	<u>Holistic Value Approach</u>	<u>IC-dVal Approach</u>	<u>Intangible assets monitor</u>	<u>Value Chain Blueprint</u>
<b>General concepts</b>								
<b>Universe of discourse</b>	A set of five universes	A set of three universes	A set of three universes	A set of four universes	A set of five universes	A set of four universes	A set of four universes	A set of three universes
<b>Attribute</b>	Archetypal	Archetypal	Archetypal	Archetypal plus diachronic	Archetypal	Overall similarity	Overall similarity	Archetypal plus diachronic
<b>Type of classification</b>	Typology	Typology	Typology	Typology	Typology	Classification Schema	Classification Schema	Typology
<b>Good classification</b>								
Exhaustive	No	Yes	---	Yes	Yes	No	No	No
Exclusive	No	Yes	---	No	Yes	No	No	No
<b>Simplicity</b>								
Objective notational	No	No	Yes	No	Yes	No	No	No
Subjective notational	Yes	Yes	Unknown	Yes	Yes	Unknown	Yes	Yes
Objective-logical	Yes	Yes	---	Yes	Yes	No	No	Yes

**Table 6. Citations of basic articles referred to specific Intellectual Capital Methods (April 2010)**

Method	<u>1.Skandia Navigator</u>	<u>2.Balanced Scorecard</u>	<u>3.IC index</u>	<u>4.Inclusive value methodology</u>	<u>5. Intellectual capital statement</u>
<b>Main Article</b>	Edvinsson, L "Developing intellectual capital at Skandia" 1997 Long Range Planning 30	Kaplan, R.S., Norton, D.P. "The balanced scorecard—measures that drive performance" 1992 Harvard Business Review 70	Roos, G., Roos, J. "Measuring your company's intellectual performance" Long Range Planning 30	KMP Philip and S Pike Accounting, empirical measurement and intellectual capital- Journal of Intellectual capital, 2001	Mouritsen, J., Larsen, H.T. and Bukh, P.N.D. "Intellectual capital and the 'capable firm': Narrating, visualising and numbering for managing knowledge" 2001 Accounting, Organizations and Society 26
<b>Scopus</b>	130	1733	104	Unknown	69
<b>Scholar Google</b>	529	Unknown	449	75	192
Method	<u>6.Holistic Value Approach</u>	<u>7.IC-dVal Approach</u>	<u>8.Intangible assets monitor</u>	<u>9.Value Chain Blueprint</u>	
<b>Main Article</b>	Pike S and G.Roos (2000) Intellectual capital measurement and Holistic Value Approach (HVA)Works Institute Journal Volume 42	Bounfour Ahmed (2003) The IC-dVal approach Journal of Intellectual Capital, Vol. 4	Sveiby, K.E. (1997). The New Organizational Wealth: Managing and Measuring Knowledge-based Assets, Barrett-Kohler Publishers, San Francisco, CA	Lev B. and Daum J. 2004 The dominance of intangible assets: consequences for enterprise management and corporate reporting	
<b>Scopus</b>	Unknown	Unknown	Unknown	Unknown	
<b>Scholar Google</b>	24	42	1957	48	

## CONCLUSIONS

The current study is a literature review paper. It focuses on the IC measurement methods that may be used for performance measurement purposes since they attempt to reveal the

value creation paths in an organization. Furthermore, the current study focuses on those methods that have made a fundamental contribution to the literature by trying to provide solutions to the existing gaps in a way that takes things a step further.

Starting with a short presentation for each method, the current study goes on to gather criteria from literature review and implement them into the group of methods, while trying to figure out which one of them better responds to the theoretical and practical challenges. The current study presents the methods of Skandia Navigator, Balanced Scorecard, IC-Index, Intangible Assets Monitor, IC-dVal Approach, Inclusive Value Methodology, Intellectual Capital Statement, Value Chain Blueprint and Holistic Value Approach and tries to concentrate on the innovative characteristics of each one. The above mentioned criteria were also used to weigh up all the remaining methods for each criterion.

Third generation models, such as HVA and Inclusive Value Methodology, have characteristics consistent with the measurement theory and manage to give an overall result of the organization's value. This may be important for shareholders and future investors in order to compare the different companies or draw safe conclusions about an organization's development especially in cases of enterprises concentrated on technological innovation and services. The same attribute may be important for high level management to estimate the overall business procedure since it offers the opportunity of auditable and reliable results.

In terms of management at every level the ability of each method to be easily understandable (criteria of objective or subjective simplicity) and also offer an appropriate and integrated picture of the organization's procedures (criteria of exhaustiveness and exclusiveness) was examined.

The criteria of theoretic classification also seem to approve of the HVA model and its "ancestor", the IC-Index. The success of these models is due to the existence of the intellectual capital flows innovation within these methods. Intellectual capital flows as a separate entity gives the model advantages, such as exhaustiveness and exclusiveness.

However, the only issue that the HVA model is not performing well is the way it deals with the subjective-logical simplicity, whereas the Balanced Scorecard, Intangible Assets Monitor and Skandia Navigator look more familiar to users. The shortcomings of HVA could be because the other methods have been in use for more years than HVA, which was presented only recently.

To sum up, it is necessary for firms to use an intellectual capital supplement for management and information purposes. It is also essential that firms of similar sectors may be comparative in terms of intellectual capital and even in financial terms. Thus, it is considered essential to adopt common practices in the field of intellectual capital valuation. Accountants and financial analysts should use one of the previous methods or a new one with elements that promote transparency and communication. The current study attempts to present which of these methods would give some help. However, there is a need for empirical surveys that would investigate the importance of the above mentioned criteria or other criteria to interested parties.

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