

# Unfolding the Gordian Knot of the University Intellectual Capital

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**Abstract:** The purpose of this paper is to demonstrate that the Gordian Knot of the intellectual capital of the universities is the structural capital, and that unfolding it requires a deep understanding of the nature of structural capital. This idea comes from a new perspective on the intellectual capital structure and on the relative importance of each component of it, i.e. human capital, structural capital and relational capital. Many authors consider that the human capital is the most important and by far the dominant component of the intellectual capital of the universities. Our research based on the new concept of organizational intellectual capital integrators showed that a university may have a great potential of the intellectual capital based on the human capital component, and yet not to perform competitively due to the weak integrators and stiff structural capital. In our view, an integrator is a powerful field of forces capable of combining two or more elements into a new entity, based on interdependence and synergy. These elements may have a physical or virtual nature, and they must possess the capacity of interacting in a controlled way. For any university these integrators have an intangible nature. The interdependence property is necessary for combining all elements into a system. The synergy property makes it possible to generate an extra energy or power from the working system. It makes the difference between a linear system and a nonlinear one. The Gordian Knot of the intellectual capital of universities is the structural capital. Only understanding the nature and the complexity of the structural capital we will be able to understand the full potential of the intellectual capital metaphor. Thus, the structural capital is the key component of the university intellectual capital and it is strongly related to the concepts of university governance and university autonomy. This paper is based on a conceptual research, a search of the literature, and on a solid experience one of the authors has got in the legislation and management of the university system of Romania, as a former General Director for Higher Education in the Ministry of Education and Research.

**Keywords:** intellectual capital, human capital, structural capital, relationship capital, integrators

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## 1. Introduction

According to Lakoff and Johnson (1999, p.3), "The fact that abstract thought is mostly metaphorical means that answers to philosophical questions have always been, and always will be, mostly metaphorical. In itself, that is neither good or bad. It is simply a fact about the capacities of the human mind". The concept of the intellectual capital is a semantic extension of the economic concept of capital, as a direct result of an inspired metaphor. In classical Economics, the term capital means produced goods that are used to produce future goods. According to Fisher (1906, p. 52), "*A stock of wealth existing at an instant of time is called capital. A flow of services through a period of time is called income.*" Any constitution of stock (material or immaterial) can be qualified as capital so long as it gives rise to income. The concept of capital reflects a world of tangible objects, and a linear metric in evaluating economical processes. Thus, linearity becomes a frontier between the concept of capital and the concept of intellectual capital that reflects a world of intangible objects (Bratianu, 2009a). It is important to underline this idea since inertial thinking and metaphorical extension of many authors have already induced linearity in the semantic domain of the intellectual capital, which is a barrier in understanding the true nonlinear nature of the intellectual capital. Interpreting knowledge and intellectual capital as stocks or stocks and flows is just an example of this conceptual difficulty (Andriessen 2006; Andriessen, 2008; Davenport & Prusak, 2000; Edvinsson, 2002; Nissen, 2006).

Some inspirational ideas about intellectual capital have been developed since the second part of the last century, but the tipping point of the intellectual capital contributions can be considered 1997 when the seminal books of Edvinsson and Malone, Roos et al., Stewart, and Sveiby have been published. The Intangible Asset Monitor (Sveiby, 1997), and Skandia Navigator (Edvinsson & Malone, 1997) became the driving forces in promoting intellectual capital models. These models reflected inertial, deterministic, and linear thinking patterns (Bratianu, 2007a). Intangible Asset Monitor (IAM) contains three components: individuals competence, internal structure, and external structure. Individual competence reflects employees capacity to perform their jobs. It includes knowledge, skills, experience and values. Competence is a holistic characteristic of each employee that cannot be owned by the company, but it can be partly controlled. Individuals are the one able to create knowledge and to process it in the decision making. Internal structure reflects all functional and organizational structures of the company, patents, concepts, models and managerial routines. Internal

structure is a result of the managerial thinking. External structure reflects all relations of the company with suppliers, consumers and other external stakeholders. For evaluation of these components, Sveiby proposed a series of indicators for: growth, renewal, efficiency and stability. For instance, for the external structure, indicators of growth are: profitability per customer, organic growth, and image enhancing customers. Indicators of efficiency are: satisfied customer index, sales per customer, and win/loss index. Indicators for stability are: proportion of big customers, age structure, devoted customer ratio, and frequency of repeat order. The Skandia Navigator divides intellectual capital into human capital and structural capital. Human capital reflects all the knowledge, skills and experience of all employees. Structural capital is defined metaphorically as what remains in the company when employees go home. In Edvinsson's formulation (2002, p. 8), *"To my mind, intellectual capital is a combination of human capital – the brains, skills, insights and potential of those in an organization – and structural capital – things like the capital wrapped up in customers, processes, databases, brands and IT systems. It is the ability to transform knowledge and intangible assets into wealth creating resources, by multi[plying] human capital with structural capital."* Structural capital is composed of customer capital and organizational capital. Organizational capital is composed of innovation capital and process capital. Innovation capital is composed of intellectual property and intangible assets. Apparently Skandia Navigator is much more complex than IAM, but it reflects the same basic structure. Competence of individuals in Sveiby model corresponds to the human capital in Edvinsson model, internal structure corresponds to organizational capital, and external structure corresponds to customer capital.

This similarity between the two models presented above explains the large consensus of researchers on the canonical structure of the intellectual capital we are going to use in our research. Starting with this canonical structure we introduce a difference between the potential intellectual capital and the operational intellectual capital, and the role of integrators in transforming the potential into operational intellectual capital. Then, we shall analyze in this new perspective the relative importance of human capital and structural capital in the university context. It is a conceptual analysis based on the operational dynamics of the structural capital of a university, literature research, and on a significant experience one of the authors has got as a General Director for Higher Education in the Ministry of Education.

## 2. The canonical model of the intellectual capital

The canonical model of the intellectual capital is composed of three basic entities: human capital, organizational/structural capital, and customer/relational capital (Andriessen, 2004; Bontis, 1998; Roos, Pike & Fernström, 2005; Roos & Pike, 2007; Stewart, 1997). For simplicity we shall choose the following taxonomy: human capital, structural capital, and relational capital. According to Viedma (2007, p. 246), *"The main assumptions and principles that support the standard theory (or prevailing paradigm) can be summarised in seven points: the accounting view; the strategy implementation view; breakdown of intellectual capital; cause-and-effect relationships; relatively static approach to value-creation processes; limitation of concept of intellectual capital; use of the same models and methodologies to manage and produce reports; and attempts to treat intangible assets as if they were tangible."* We add to these assumptions the fact that canonical model is a product of the resource-based theory of the firm (Barney & Delwyn, 2007; Grant, 1991; Grant, 1996; Hamel & Prahalad, 1994; Kogut & Zander, 1992; Spender, 1996; Teece, 2009).

Although we break down the organizational intellectual capital into human capital, structural capital and relational capital for practical reasons, we must emphasize the fact that intellectual capital should be understood as a whole. One of the most important characteristic of intellectual capital is that it is unusually complementary. That means that the corporate value does not arise directly from any of its intellectual capital factors, but only from the interaction among all three. *"And no matter how strong an organization is in one or two of these factors, if the third factor is weak or misdirected, that organization has no potential to turn its intellectual capital into corporate value"* (Harris, 2000, p. 27). Senge considers this complementary characteristic as an emergent property, a property that defines living organisms and organizations. It is a property that cannot be found in any of the system components. Metaphorically, Senge says that dividing an elephant in half does not produce two small elephants (Senge, 1999).

### 2.1 Human capital

Human capital contains all the knowledge, experience, skills, intelligence and values of all employees. Human capital is important for its capacity for knowledge creation, sharing, transfer and transformation (Nonaka, 1991; Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2007). It is important to stress the fact that

knowledge as a resource is different than the physical resources. *"The attributes of knowledge are such that it does not lose value when used by a large number of people, so it is a revenue-increasing resource; it transcends time and space, whether in the form of objects, writing, or traditions passed on through generations, so it is an infinite resource; it is produced and consumed simultaneously, making knowledge production and consumption interconnected and inseparable."* (Nonaka, Toyama & Hirata, 2008, p.7). Also, we emphasize the fact that knowledge has a large spectrum of semantics from cognitive to emotional, in concordance with the oneness theory of mind and body (Nonaka & Takeuchi, 1995, p. 9), *"Highly subjective insights, intuitions, and hunches are an integral part of knowledge. Knowledge also embraces ideals, values, and emotions as well as images and symbols. These soft and qualitative elements are crucial to an understanding of the Japanese view of knowledge"*. This Japanese perspective can be easily understood if we think about the samurai education, and the stress put on their physical conditioning. Emotional knowledge is the basic product of processing our sensory system information. Thus, our mind is dealing with thoughts as well as with emotions, which means both rational and emotional knowledge. Moreover, based on a metaphorical analysis, Bratianu and Andriesen (2008) showed that rational knowledge can be transformed into emotional knowledge, and that emotional knowledge can be transformed into rational knowledge, in the same way that mechanical energy can be transformed into thermal energy, and thermal energy can be transformed into mechanical energy. That means knowledge dynamics. Thus, we may speak about a new dyad formed of cognitive knowledge and emotional knowledge, instead of just explicit knowledge and tacit knowledge (Bratianu, 2011a; Bratianu & Orzea, 2009). The main difficulty of understanding this new perspective comes from the fact that emotional knowledge is processed in the cognitive unconscious zone of our brain: *"Emotions are notoriously difficult to verbalize. They operate in some psychic and neural space that is not readily accessed from consciousness"* (LeDoux, 1998, p. 71).

Human capital contains also intelligences of all employees. In our research we used the concept of *multiple intelligences* developed by Gardner. In his perspective, *"Multiple intelligences theory pluralizes the traditional concept. An intelligence is a computational capacity – a capacity to process a certain kind of information – that originates in human biology and human psychology"* (Gardner, 2006, p. 6). Gardner defined the following intelligences: logical-mathematical, linguistic, musical, bodily-kinesthetic, spatial, interpersonal and intrapersonal. Each of these intelligences reflects a human capacity to process information and knowledge in a specific field and to make decisions. In other words, each intelligence is a capability to solve problems of different natures. Also, we may consider that this new perspective includes both cognitive and emotional intelligences. *"In other words, there is a rational/emotional split in all of us, which we're often not consciously aware of, and which makes getting to emotions crucial. Without knowing what the other party really feels, it's hard to make progress."* (Hill, 2008, p.3). We have been told that decision making is a rational process, and that managerial thinking is a result of the cognitive intelligence. However, new research coming from cognitive science demonstrates that managers use both cognitive and emotional intelligences (Gladwell, 2000; Gladwell, 2005; Kahneman, 2011; Le Doux, 1998; Maddock & Fulton, 1998; Payne & Cooper, 2001).

Human capital contains values. Individuals have professional, cultural, moral and ethical values. Although *value* is a fuzzy concept, it is fundamental in decision making and then, in the behavioural pattern. Two managers having the same levels of knowledge and intelligences will make different decisions if they have different sets of values. It is like in physics when we put in the same electricity field two small balls, one of them being charged with positive electricity and the other one charged with negative electricity. These two balls will move in opposite directions, although they have exactly the same quantity of electrical charge. The signs of electricity put them apart. Experience demonstrated so many times that due to differences in value systems organizations may experience management or antimanagement (Bratianu, 2009b). In the first case the organization has all chances to go toward business excellence, in the second case the organization will go toward its life cycle end. Thus, values may be considered as driving forces of the decision making processes. *"Values are more fundamental to a decision problem than are alternatives. Just ask yourself why you should ever make the effort to choose an alternative rather than simply let whatever happens happen. The answer must be that the consequences of the alternatives may be different enough in terms of your values to warrant attention."* (Keeney, 1992, p. 3). We are born in a certain culture and we learn the values specific to that culture through education in family, community and school. In time, they constitute our kernel of beliefs about life and work, and the reference system in decision making. Values can be changed, especially when an individual changes the cultural environment.

## 2.2 Structural capital

Structural capital contains all the intangible structures within a given organization, structures that reflect formal and informal relations established between people and groups of people, as well as operational routines and processes, software systems and platforms, intellectual property, and organizational culture. *“Structural capital is the organizational knowledge contained in databases, practices, know-how, and culture. It stands for all organizational capabilities that enable it to respond and meet market needs and challenges.”* (Al-Ali, 2003, p. 33). Intellectual property refers mainly to: patents, copyrights, trademarks, brands, registered design, trade secrets, and processes whose ownership is granted to company by law. All of these play a significant role in achieving a competitive advantage through innovation and legal protection. Operational routines incorporate both explicit and tacit knowledge. *“Shared knowledge in organizations is expressed in routines and practices. Formalized routines include process manuals providing codified procedures and rules; informal routines would be tacit rules of behaviour or work flows through the organization.”* (Marr & Roos, 2005, p. 33). Structural capital reflects the functional characteristics of the whole organization. It is a holistic dimension of the organizational intellectual capital. Metaphorically, some authors consider structural capital to be that component of the intellectual capital that remains within organization when people go home. *“But also, among the elements of structural capital are strategy and culture, structures and systems, organizational routines and procedures – assets that are often far more extensive and valuable than the codified ones.”* (Stewart, 1999, p. 109).

Swart (2006, p. 153) considers that structural capital and organizational capital should be used as two different concepts. In his taxonomy, structural capital can be defined as *“work environment, in particular work organization and physical space”*, and organizational capital can be defined as *“embedded routines, processes and technologies within the boundaries of the firm.”* However, if we adopt a systems thinking, then any organization can be conceived as a system with a certain structure. The intangible part of this structure constitutes the structural capital of that organization, and the distinction between the structural capital and organizational capital disappears. Structural capital integrates all the knowledge, intelligences and values embedded into the functional structure of the organization. It can stimulate or not the efficient use of organizational resources, especially of the intangible ones. The importance of structural capital can be seen from the fact that it is mostly discussed in the intellectual capital reports of companies. Brüggen et al. (2009) presented a detailed analysis of the determinants of intellectual capital disclosure for 125 companies from Australia, and found that structural capital is the most frequently disclosed category, by comparison with the human capital and relational capital.

Structural capital reflects the organization capacity to interconnect people such that individual knowledge fields can integrate efficiently within the organizational knowledge field. Knowledge diffusion is proportional with the gradient of the knowledge field, and in well structured organizations knowledge propagates easily and fast, without too many obstacles. According to Safieddine et al., *“It is no longer enough for companies to acquire human capital. They are nowadays faced with the necessity of adopting and incorporating structures and processes to effectively deploy, protect and retain it”* (Safieddine et al., 2009, p. 147). Structural capital contains also the organizational culture of the company, that means the shared cultural values, the company traditions, ceremonials, symbols and its shared vision. According to Schein (2004, p. 67), *“Goals, means, working procedures, measurements, and rules of interaction all must be forged out of common experience, and a sense of mission – what the group is ultimately all about – develops only as members begin genuinely to understand each other’s needs, goals, talents, and values, and as they begin to integrate these into a shared mission”*. Organizational culture plays a crucial role in achieving performance and a sustainable competitive advantage (Folch & Ion, 2009; Johnson et al., 2008; Peters & Waterman, 1982). Organizational culture influences employees behaviour and work performance through motivation and purposefulness. Thus, structural capital may enhance the human capital performance or may decrease it, based on the individual motivation.

## 2.3 Relational capital

Relational capital reflects relations between the inner business environment and the external business environment of any company. It is the intellectual capital component crossing the functional interface between organization and its environment. Although it is important to develop a powerful relational capital, many companies don’t want to invest in such a capital. As Stewart remarks (1999, p. 144), *“customer capital is probably – and startlingly when you think about it – the worst managed of all intangible assets. Many*

*businesses don't even know who their customers are – newsstands, delicatessens, most supermarkets, bus companies, many retailers."*

Knowledge is the most important ingredient of the relational capital and the databases built with this knowledge. This knowledge should reflect the specificity of the business field and, as a consequence, of the working relations with all external stakeholders. *"That customer capital is valuable may seem obvious, but it's startling just how valuable it is. Ford Motor Company figures that every percentage-point increase in customer loyalty – how many Ford owners buy Fords next time – is worth \$ 100 million a year in profits"* (Stewart, 1999, p. 144). Due to the turbulent business environment relational capital is the most dynamic component of the intellectual capital, which means continuous up dates of the information and knowledge introduced into all databases. Intelligences play also an important role in negotiations with business partners and in developing new business networks.

Relational capital may be considered an integrative field of activities for several other focused fields, like relational marketing, customer relationship management, and corporate social responsibility. Relational capital reflects the organization capacity to create communication channels with all of its external stakeholders and to use them dynamically. Also, it means to create databases concerning all aspects of collaboration with these partners, and to use them in anticipating events and building up strategies for the future. Classical management has been systematically focused on the internal business environment trying to increase workers productivity and shareholders profit. However, companies are not alone on the market and competition force them to change the way of thinking. Strategic management integrates now both views, the internal view based on resources and the external view based on competition, in order to find solutions for getting a competitive advantage.

### 3. University intellectual capital

A university is by its nature a knowledge intensive organization. *"The mission of the university, as resulted from its historical evolution, is to create, preserve and transfer knowledge to students and to society. Since all of these mission components involve knowledge creation and knowledge transformation processes, the university is a knowledge intensive organization."* (Bratianu, 2011b, p. 2). Thus, a university is characterized by a high level of intellectual capital, and its performance is directly related to it. Research on the university intellectual capital started in the last decade, mostly in Europe as a result of the Bologna process, and the need for more transparency in the university management (Bezhan, 2010; Bodnar et al., 2010; Leitner, 2004; Sanchez & Elena, 2006; Sanchez, Elena & Castrillo, 2009; Tejada, Ramirez & Baidez, 2011; Sadlak & Cai, 2007).

Corcoles et al. (2011) performed a detailed research concerning the intellectual capital in Spanish public universities and the need for its reporting. Based on a quantitative research and statistical analysis, the authors came with the following main aspects of the university intellectual capital:

- **Human capital:** academic and professional qualifications, mobility, scientific production, and teaching quality.
- **Structural capital:** effort in innovation and improvement, intellectual property, and management quality.
- **Relational capital:** graduate employability, relations with the business world, application and dissemination of research, student satisfaction, university image, and collaboration with other universities.

Reporting intellectual capital for universities is not required by legislation in European countries with the exception of Austria. Starting with 2007, Austrian universities must report annually their intellectual capital based on a series of indicators grouped on the three dimensions: human capital, structural capital, and relational capital (Leitner, 2004). However, a semantic analysis of these indicators demonstrates that not all of them are significant for the evaluation of the university intellectual capital, and some of them do not reflect actually the intangible nature of the intellectual capital. For instance, in the group of structural capital, there is an indicator for the number of squared meters of classrooms. Although we agree that infrastructure is an important component of the support system of any university, such an indicator cannot be considered a part of the intellectual capital. As Corcoles et al. (2011, p. 359) remark, structural capital contains *"The explicit knowledge relating to the internal process of dissemination, communication and management of the scientific and technical knowledge at the university."*



### 3.1 Integrators of the intellectual capital

The concept of integrator in the study of the organizational intellectual capital has been introduced by Bratianu (2008, p. 237): “*An integrator is a powerful field of forces capable of combining two or more elements into a new entity, based on interdependence and synergy. These elements may have a physical or virtual nature, and they must possess the capacity the capacity of interacting in a controlled way*”. The interdependence property is needed for combining all elements into a system. The synergy property makes it possible to generate an extra energy and power from the working system. The importance of integrators comes from their role of transforming the potential intellectual capital into operational intellectual capital. For a better understanding we may think metaphorically at the transformation of the potential energy into kinetic energy in nature and in engineering systems (Bratianu & Andriessen, 2008). All the static models of intellectual capital assume that adding up human capital, structural capital and relational capital we get the organizational intellectual capital. There are two flaws in this approach: (1) intellectual capital is not the sum of the three components, and (2) intellectual capital we get by adding up the value of the three components represents only the potential of an organization. Bratianu (2009a) demonstrated that while the classical concept of *capital* represents a linear entity, the concept of *intellectual capital* represents a nonlinear entity. Linearity is actually a frontier between the two concepts. Being nonlinear, synergy may lead to a higher value of integrating human capital with structural capital and relational capital, than just summing up their contributions. Nonlinearity of the intellectual capital comes mostly from the nonlinearity of knowledge that constitutes the essence of the intellectual capital.

In the static model of the intellectual capital it is assumed that its value is given by summing up all contributions coming from the human capital, structural capital and relational capital, and the value we get is the operational value of the intellectual capital. This flaw in the theory leads to the wrong conclusion that two companies having same values for intellectual capital will have the same performance in creating products and services for the market. In the real life, these two companies will perform differently, as a result of a different operational intellectual capital. Adopting a dynamic perspective of the intellectual capital we can make a distinction between the *potential* intellectual capital and the *operational* intellectual capital. Thus, by analogy with the potential energy and kinetic energy, we shall define a *potential intellectual capital* and an *operational intellectual capital*. The potential intellectual capital represents the highest level of intellectual capital an organization may have as a result of integrating human capital, structural capital and relational capital. This potential intellectual capital is transforming into operational intellectual capital as a result of integrators (figure 1). The more powerful are the integrators, the higher is the level of operational intellectual capital (figure 2). This mechanism explains why two different companies with the same potential intellectual capital may perform differently, as a result of their different capacity of integrators.

The canonical pattern of the intellectual capital is based on the idea that all contributions of all employees in a generic organization yield the intellectual capital, that is then evaluated and reported. However, there is a significant difference between the potential intellectual capital and the operational intellectual capital, because only the operational capital relates directly to the organization performance. Unfortunately, the Sveiby model, the Edvinsson model, and the canonical model of the intellectual capital are static models, which means that intellectual capital is conceived as a stock, or stocks and flows, without any internal transformations. Like in science, integrators are capable of transforming the potential of organizational intellectual capital into operational organizational intellectual capital, contributing this way to a dynamic and realistic modelling of intellectual processes. In this perspective, thermodynamics can be an excellent source of inspiration for knowledge dynamics. That means to consider not only the transformation of potential intellectual capital into operational intellectual capital, but also the transformation of one form of knowledge into another form of knowledge (i.e. rational knowledge into emotional knowledge, and vice versa).

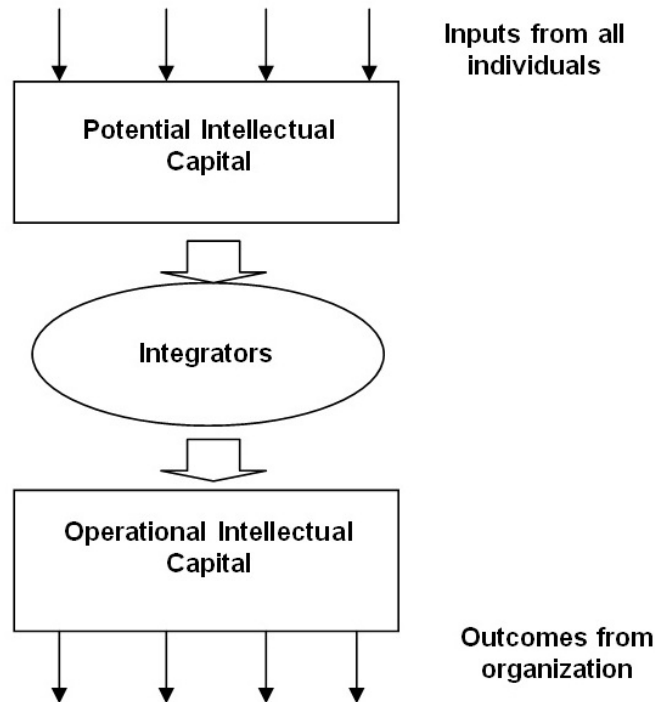
Research carried out by Bratianu and his colleagues demonstrated that the most important integrators are: leadership, management, organizational culture, technology and processes (Bratianu, 2008; Bratianu, Jianu & Vasilache, 2011; Orzea & Bratianu, 2012). Leadership is the most important integrator since it acts mostly on the emotional and spiritual knowledge fields, generating vision and high level of motivation for all employees. Thus, leadership is able to contribute very much in transforming the potential intellectual capital into operational intellectual capital due to its powerful knowledge leverage. By tradition, the European universities have been state driven organizations since their financing mechanisms have been governmental and their mission has been mostly to educate the future professionals for the country economy and public

administration. In this context, leadership was not an important issue for these continental type of universities. By contrast, American universities developed as a result of community needs and due to competition for financial and human resources, leadership has been an important issue. In a globalized economy, with a very intense competition for money and intelligence, universities all over the world face the impact of this completion and they need to enhance their operational intellectual capital. That means to increase the inputs contribution for a higher level of potential intellectual capital, and to increase the percentage of this potential that can be transformed into operational capital as a result of the work of integrators. Leadership plays an important role in this transformation of the potential intellectual capital into operational intellectual capital due to its power of creating a strong vision, and of influencing people to achieve it (Bolden et al., 2008; Coates et al., 2010; Yukl, 2012).

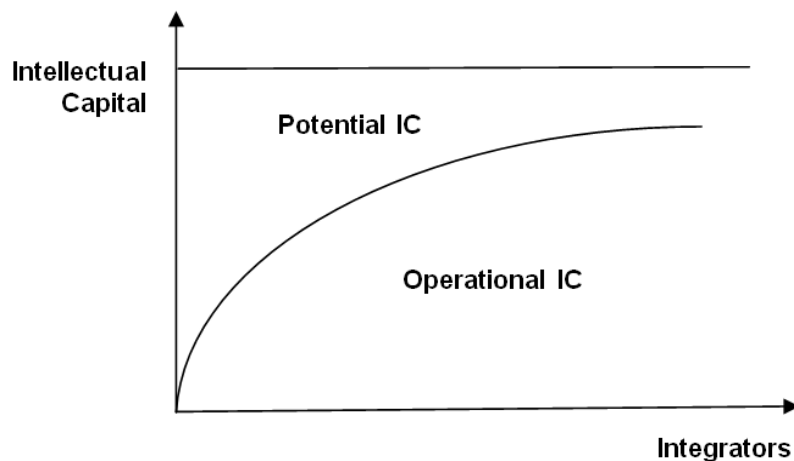
Management is the second best integrator for a university since it acts mostly on cognitive and emotional knowledge fields, and on the decision making process. Universities are a special type of organizations since they are non-profit making, and the academic staff is rather autonomous with respect to the teaching and research activities. Even the notion of efficiency has a different interpretation since there is no meaning in applying the financial metric to the knowledge transfer and learning outcomes. However, due to increasing the number of students and to reducing governmental financial support almost everywhere, universities had to consider the importance of management in allocating more efficiently their resources. Management is closely related to the governance of the university. The integrating role of management comes from the necessity of stimulating human capital to generate knowledge and to create an adequate learning environment for both students and professors. Since learning is a fundamental process within any university, people may consider universities as being learning organizations. However, many of them are not. There is a paradox that may be formulated as follows: although a university is an organization based on learning processes, it is not necessary a learning organization. It can become a learning organization if there is at least a strong integrator to assure the transition from individual learning to team organizational learning. Also, it would be important to advance from adaptive learning to generative learning (Bratianu, 2007). The role of management played as an integrator has also benefic results on the knowledge transfer and intergenerational learning. *"Knowledge transfer in the academic environment is generated primarily from the asymmetric distribution of knowledge, and the highly nonuniformity of the organizational knowledge field. Asymmetry is almost natural in such a multilayered age field, knowledge level being higher toward the oldest layer of faculty staff. Knowledge transfer follows in a way the law of entropy that is knowledge is flowing from a higher level of knowledge toward a lower level of knowledge and understanding"* (Lefter et al., p. 311).

Organizational culture contains values, beliefs, traditions, ceremonials, and symbols all of them creating a powerful force for integration. Organizational culture is a strongly nonlinear integrator. Organizational culture depends on the history and the leadership of a university. As an integrator, organizational culture acts through cultural values and traditions to motivate professors and students in pursuing higher order goals. No matter how valuable is the human capital of a university, if there is no solid motivation for professors and students to achieve strategic goals, the operational intellectual capital will be low. Unlike many other processes, learning and knowledge generation cannot be done under external pressure. They are successful only if there is a powerful field of inner forces to motivate individuals for knowledge creation and knowledge sharing.

Technology and processes reflect the intangible aspects of the engineering technology and production processes. It is not a very powerful integrator but it is an important one for the cognitive knowledge. Specifically, it reflects the intangible aspects of the IT structures and all associated databases. A generic illustration of the dynamic structure of the intellectual capital is given in figure 1. In figure 2 there is an illustration of the work done by integrators in transforming the potential intellectual capital into the operational one.



**Figure 1:** The dynamic structure of the intellectual capital



**Figure 2:** Transformation of the potential intellectual capital into operational intellectual capital

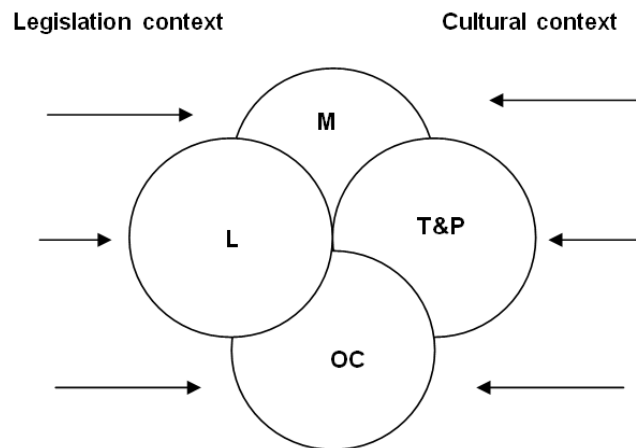
### 3.2 Structural capital as the Gordian Knot

Integrators are constituents of the university structural capital, because they represent organizational field of forces able to integrate knowledge contributions from all the professors, researchers, students and administration staff. Leadership (L), Management (M), Organizational culture (OC), Technology and processes (T&P) act in an interdependent and interactive way (figure 3).

Although they are internal field of forces, they depend on the external environment, mostly on the legislation and cultural contexts of the university. For instance, all activities within a university must respect the specific legislation of education and the general work legislation from a given country that are embedded into the governance of the university. According to Shattock (2003, p. 1), *“University governance is defined as the constitutional forms and processes through which universities govern their affairs.”* University governance depends primarily on the degree of university autonomy and on its leadership. Most of the European universities, and especially those from the former socialist countries, are state universities with a well defined centralized control from the government. In this situation, they do not have a full autonomy since the



financing mechanisms depend on the governmental policies and strategies. As a consequence, the structural capital of the university imposes a series of limitations in the financial decision making process, and especially in the motivational systems for professors, researchers and students. In such a situation the potential human capital will be transformed into a low level of operational capital. Although general wisdom says that a university with a high level of human capital will perform highly, the structural capital introduces a series of limitations to the human capital. In other words, we may say that the key element in achieving a high level of operational capital is the university structural capital.



**Figure 3:** Structural capital

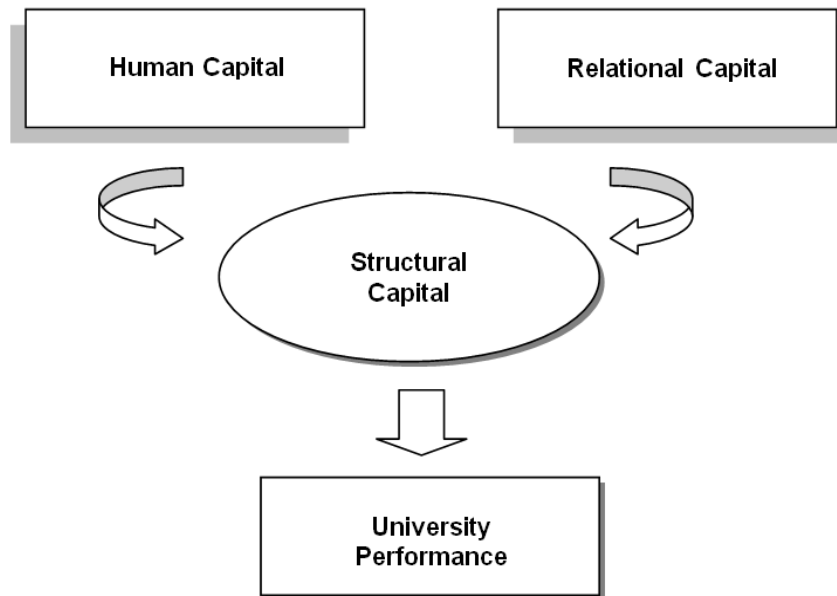
For most of European universities the governance is based on the academic management performed by university professors. In countries with traditions in selecting the rectors, deans and heads of departments or research institutes based on competition, chances are that the managerial positions to be given to professors with real managerial talent. However, in many countries these managerial positions are given to professors based on different criteria, ranging from academic image to political involvement. It is an axiom that a very good professor in his or her own field of expertise cannot be by definition a very good rector or dean of a faculty. Thus, chances are that the managerial process to suffer and to contribute very little in transforming the potential intellectual capital into operational intellectual capital (Bratianu, 2007b). Again, the university structural capital is not able to transform efficiently the potential intellectual capital into the operational intellectual capital.

Organizational culture is a nonlinear integrator acting upon the emotional knowledge field of professors, researchers and students. It could be a powerful integrator since it generates significant synergies in knowledge production and sharing. However, it can be a strong limitation when the decision making process ignore this integrator. For instance, transforming a school or a university from a predominantly teaching entity into a research entity generates many resistances. If there is a deficit of transformational leadership, the potential human capital will not be transformed significantly into operational intellectual capital, and the university performance in the research area will be very low. Structural capital acts in such a situation like an inertial force instead of being a driving force for research performance. The arguments used for human capital can be used as well for the relational capital of the university. For both of them the structural capital is the key successful factor, or the controlling mechanism. Metaphorically, we may say that the structural capital is the Gordian Knot of the university intellectual capital. A simple illustration is given in figure 4. Unfolding the Gordian Knot requires a good understanding of the role played by organizational integrators and of using them to enhance the operational capital level.

#### 4. Conclusions

Universities are knowledge intensive organizations since their mission is to generate and transfer knowledge towards students and society. For such kind of organizations, general wisdom says that the dominant role is played by the human capital that is the only component of the organizational capital able to generate knowledge. However, experience and universities classification tables demonstrate that many universities with a very high level of human capital cannot score according to general wisdom. This situation can be explained

using the following arguments: a) intellectual capital is a strong nonlinear entity and university performance cannot be direct proportional to the human capital; b) human capital, structural capital and relational capital are not independent entities; c) the potential intellectual capital is transformed into operational intellectual capital by integrators; d) all integrators form the structural capital of the university; e) structural capital may stimulate or may inhibit the transformation of the potential intellectual capital into operational intellectual capital.



**Figure 4:** The pivotal role of the structural capital

Structural capital is the Gordian Knot of the university intellectual capital. University leaders must be able to find the way of unfolding this Gordian Knot if they want to achieve university performance. This paper shows that unfolding the Gordian Knot leads to the nonlinear integrators, that are the key in enhancing the operational intellectual capital by generating synergy and entropy. The most powerful integrators for universities are: leadership, management and organizationa culture. Each of these integrators acts mostly on the emotional knowledge field, the only field able to stimulate knowledge sharing and knowledge creation.

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