SCHOOL OF ECONOMICS
AND MANAGEMENT
Lund University

Intelligence & Lund

- What lessons Lund can learn in order to
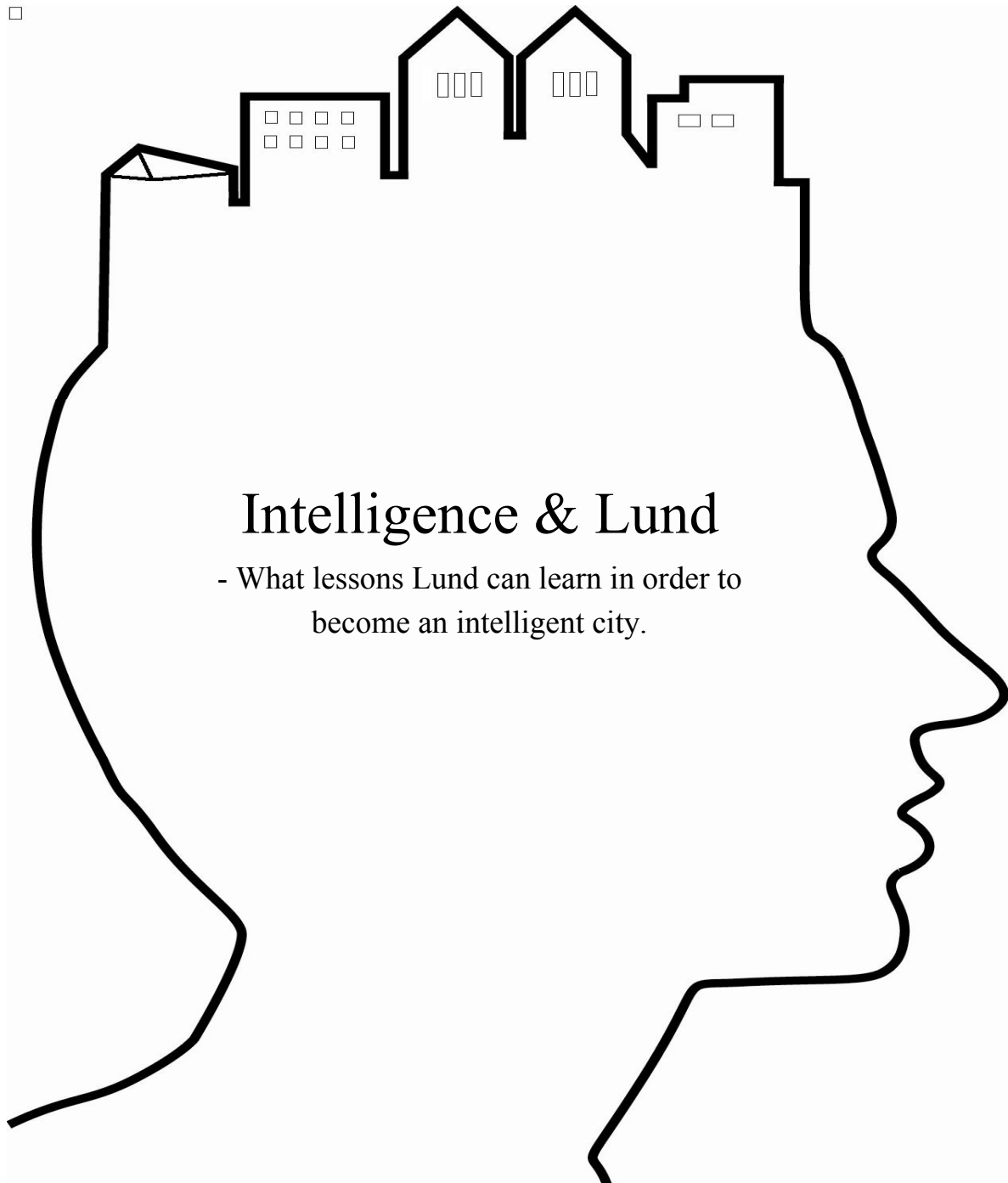become an intelligent city.

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Abstract

Title: Intelligence & Lund - What lessons Lund can learn in order to become an intelligent city

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Course: Master thesis in business administration, 10 Swedish Credits (15 ECTS)

Date: 2004-01-23

Key words: Lund, Republic of Ragusa (Dubrovnik), Intelligent City, Knowledge City, Creative City, Municipal Intelligence, Intellectual Capital

Purpose: The purpose of this thesis is to identify factors associated with the Ragusa's survival persistence and subject awareness, in order to highlight what the city of Lund may learn from this intelligent city. These factors are recognized as *sustainability factors* because they indicate the capacity for wellbeing in the long-term future. Furthermore, the purpose is to enlighten what may be components and characteristics of an 'intelligent city'.

Method: The thesis exploratory research is conducted from research of literature and from interviews with experts in the subject. Case study research strategy is used as the most appropriate method for this thesis.

Conclusions: One of the main lessons from the case study is necessity of the organised municipal intelligence for the city adaptability and development. The city of Lund needs to increase its networking potential in order to create meeting places and milieus that its citizens will experience as creative and to nourish intellectual capital of the city. Furthermore, recommends nourishment of the community spirit and integration of Lund's networks by identifying diverse *role-players*. As intelligent city, Lund should have its projection in the virtual world in order to stay connected with its citizens and to integrate the scattered arenas of the city with a universal interface. An intelligent city needs to know how big stock of its most important resource, the intellectual capital, is. Mapping of intellectual capital enables a city leadership to make better resource allocation decisions and facilitate its management.

Acknowledgements

I take this opportunity to thank Professor Leif Edvinsson for great help and guidance throughout the thesis. Without his helpful suggestions and provided material and contacts, this thesis would not be finish.
Furthermore, I would like to thank all those professionals who granted me part of their precious time to answer on my questions and shared their knowledge and insights with me.

Thank you!

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1 Introduction

The thesis introduces by presenting the background and purpose of the papers subject. This chapter's intention is to provide reader with brief insight into problems that municipalities face today. The chapter finishes by presenting the papers disposition.

1.1 Background

We live in the time when rapid change is a constant and information overload a fact. These are mainly caused by development of information and communication technology and global knowledge producing and sharing. The current economy is knowledge economy in which people work with their brains instead of their hands. Human creativity and ability to innovate are distinguished as competitive advantage in the modern global economy. The knowledge economy evolution and the focus on human capital and its intellect, result in inadequacy of traditional accounting and requirements for more 'soft' measurements of intangible intellectual assets.

How cities or more precisely the public sector handle challenges of contemporary economy? Municipalities today have the extreme competition in attracting the increasingly mobile population to live and to establish businesses in their cities. For modern Swedish cities, it is not enough to offer a good education or elderly care to attract and keep its inhabitants because these are not competitive advantage anymore when about 290 other municipalities in Sweden offer the same (Sturesson, 2003). For that reason, city leadership must constantly look for new way to sustain the city development and wealth.

I learn that various theories from the knowledge economy are reflected in theories on city development. The subjects highly topicality is demonstrated in all referenced literature that has been produced in last four years. In practice, city governments were selecting different 'source of wealth creation' from the current economy and identify them as driving forces of city development. Consequently, cities visions and strategies are developed around ideas of becoming knowledge city, creative city, innovative city, informational or informative city, etc. Following that logic and using the focus on human intellectual capital as source of wealth creation (Edvinsson, 2002); I identify the emerging necessity for an intelligent city. The object of this thesis is to highlight importance of an intelligent city by connecting history, present-day and the future of cities.

To become the city from the vision it is up to city leadership to provide all necessary attributes that will spin-off development. The leadership must have right tools to lead the city (Edvinsson, 2002). The importance of intellectual capital of companies and of entire cities leads to necessity for 'intelligent leadership'. There is no doubts that demands on cities government are high. What a city leadership can do in order to lead city's development to an intelligent city? Well, what we can always do is to look back and try to learn from the history. I use example of the Republic Ragusa from the history, the city that Professor Stevan Dedijer, known as the "father of the social intelligence" identify as "intelligent city-state".

The tiny Republic of Ragusa is rather little known, nevertheless, it had an impact far beyond its size or power. Ragusa was a city-state placed on east coast of Adriatic Sea (today known as Dubrovnik[1]) that sustains independence throughout five centuries. In his article "Ragusa intelligence and security 1301-1806: A model for the twenty-first century?" Professor Dedijer convince readers that well-organized intelligence was one of the central factors that helped Ragusa to balance between great powers of its time, as Venice, Ottoman imperia and Habsburg monarchy. Professor Dedijer asks in his article:"Is Ragusa's Intelligence and Security relevant in today's intelligence environment?" and says: "Ragusa's use of I&S to remain free is a paradigm for social systems in our world beset by complex global problems." My object is to apply this question on the city of Lund by extracting new learnings from the history of Ragusa that might contribute to Lund's evolution into an intelligent city.

Lund must take opportunity to develop and prosper in the knowledge economy and the future society. For that reason, it needs proper tools and strategies that will help the city government. In this paper, I will suggest an evolving concept of intelligent city that may be applied on city of Lund in order to secure its sustainability and wellbeing for the future.

1.2 Purpose

The purpose of this thesis is to identify factors associated with the Ragusa's survival persistence and subject awareness, in order to highlight what the city of Lund may learn from this intelligent city. These factors are recognized as *sustainability factors* because they indicate the capacity for wellbeing in the long-term future. Furthermore, the purpose is to enlighten what may be components and characteristics of an 'intelligent city'.

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[1] The name Ragusa was used up to the fall of the Republic in 1808 (Dedijer, 2002). This thesis is stressed on the era of Republic Ragusa and to put emphasis on that epoch the Roman name, 'Ragusa' will be used in rest of the thesis, instead for Dubrovnik. Ragusa (Dubrovnik, in Dalmatia) is not to be confused with Ragusa on Sicily.

1.3 Disposition

Here provides the reader with an overview over the thesis and a description of the text structure (see Figure 1). First introduction to the thesis subject is given in Chapter 1, as well as the purpose of the thesis and disposition. After reading the first chapter, the pre-understanding of what I want to achieve with the thesis should increase. The focus in Chapter 2 is on methods and procedures used during the research process.

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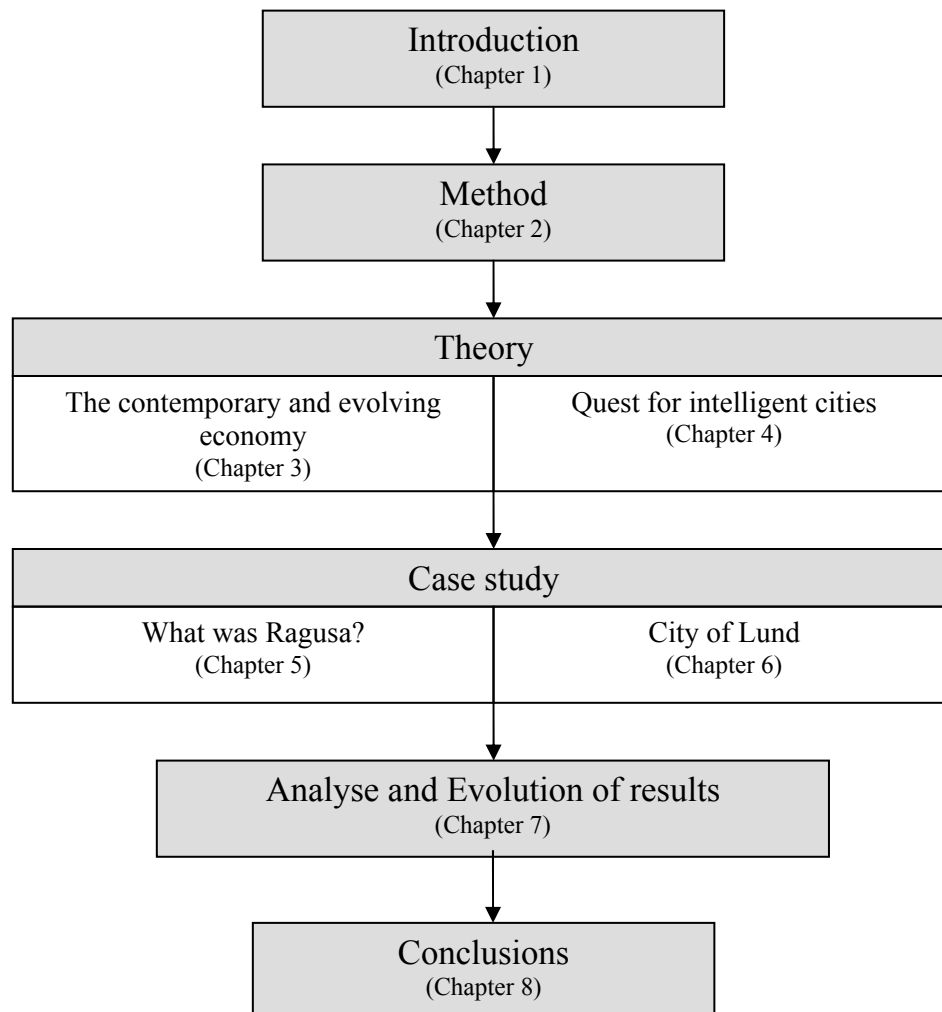
Figure 1: Thesis disposition (own resource)

The theoretical part of the thesis, Chapters 3 and 4, describes theories and conditions that are of general character for cities. Chapter 3 presents main social-economical issues that we face in the present day. Here gives a brief attention to various theories on contemporary economy and estimations on the future. This chapter stress on the importance of mapping intellectual capital and organised intelligence of the cities and regions. Demand on innovation and creativity has increased as well as competitiveness among cities, which has result in emerging of number theories about cities' leadership and strategy in order to gain sustainability.

Chapter 4 assembles currant theories related to a cities future and their development, with the intention of suggesting a refined definition an intelligent city.

In the Chapters 5 and 6, the empirical part of the thesis (the case study) describes conditions that are more uniquely related to Ragusa and Lund. These chapters are illustrated by using examples from history of Ragusa and Lund's present condition. In order to introduce the city of Ragusa to reader in Chapter 5 is briefly presented history of the city. Then follows, my attempt of identifying Ragusa's sustainability factors and lessons learned from Ragusa's experience. Lund municipality's current issues and the cities attractors are presented in Chapter 6. Analyse and evolution of the thesis results is presented in the Chapter 7. In this chapter presents leanings from Ragusa's history and suggest new components of the concept an intelligent city in order to apply them on the city of Lund. The main insights of the thesis are summarised in Chapter 8, together with some concluding remarks on possible future research.

2 Method

Method chapter describes the thesis research process, the methods used to collect the data and a brief presentation of limitations that are associated with them. At the end of the chapter is given a proposal of intended audience.

2.1 Research design

Methods and procedures of this thesis are selected within the limitations of time, money, personnel and other resources. According to Ferber and Verdoorn, knowledge of these limitations is an essential part of selection of the method (Ferber & Verdoorn, 1997).

The thesis purpose is an attempt of identifying Ragusa's sustainability factors and relating them to the City of Lund. In view of the fact that coping with rather unexplored field, the *explorative study* has shown as the most adaptive approach when it comes to clarify understanding of the problem. The approach's great advantage is that it is flexible and adaptable to changes resulted from new data and new insights that occur in the study. Explorative approach means as well that the focus is initially broad and becomes progressively narrower as the research progresses (Saunders et al., 1997). The thesis exploratory research is conducted from search of literature and from interviews with experts in the subject.

One of the methods of doing explorative research is trough a case study. *Case study* is the development of detailed, intensive knowledge about a single *case.* The approach has ability to generate answer to the questions 'Why?', 'What?' and 'How?' (Robson, 1993:40-44, cited by Saunders et al., 1997). Due to nature of case study, I find this research strategy as the most appropriate method for my thesis. The subject of the case study is Republic of Ragusa and its learnings for City of Lund. The ideal method of doing this case study would be probably a primary in-depth research of the Dubrovnik's (Ragusa's) archive in order to find essential factors. Furthermore, make additional in-depth interviews with the City Council and other citizens of Lund, in order to learn more about the subject. However, due to limitations of time and resources, the material about these cities is compiled from secondary data i.e. analysing data that have already been collected for some other purpose.

2.2 Critical literature review

Critical literature review has purpose to help further refine research questions and objectives. By sampling current opinions from a various sources and gaining insights into the aspects of the research, author provides readers of its study with the necessary background knowledge (Saunders et al., 1997).

To insure that the most relevant data is obtained following approaches of literature search are used:

- searching by using tertiary sources as indexes and abstracts as well as bibliographies and the Internet search engine (Google).
- Following up references in articles and books I already read
- Scanning and browsing secondary literature in the university library
- Asking interviewed experts for references and using the obtained material from them and my mentor Professor Leif Edvinsson.

During my research study, it has revealed that there is no agreed standard definition for an Intelligent City (Komninos, 2002). This information motivates me try to out of given litterateur identify what component would be relevant for the concept of an intelligent city. Figure 2 illustrate my literature research and choice of topics starting with rhetorical question "How intelligent is Lund?" More than one methodology book has been used in order to discover and provide an insight into research strategies and methodologies. By thorough literature research, I tried to avoid repeating of work that has been already done.

I searched the University's and the City's libraries and others Swedish libraries with help of LIBRIS database in order to reviewed available published literature in Sweden about Republic Ragusa and the subjects relevant for thesis. Theories used in the thesis are related to current and future social-economy situation and the development of cities and other aspects relevant for the concept of intelligent city. There are many other theories about the future and cities' development. However, for the purpose of the study I referred to theories that revealed as most achievable.
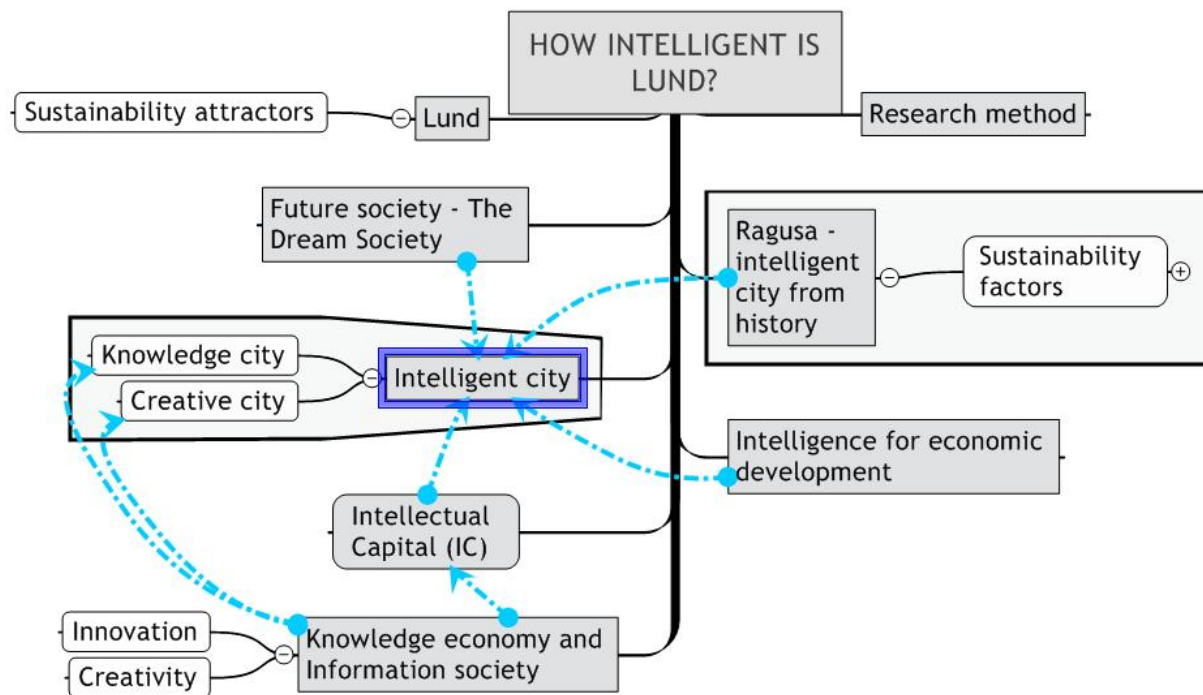
Figure 2: Literature review (own source)

The blue dotted arrows in the Figure 2 illustrate literature source of suggested components of an intelligent city. From obtained literature on Ragusa's history, I extract factors that may contribute to Ragusa's sustainability and intelligence. I learned that a well-organised intelligence that provides a city leadership with relevant information and environmental analysis was one of the essential factors. Further, an intelligent city leadership need to know how much it has of their most important resource – the human intelligent capital, in order to make right decision and manage the city. The concept of intellectual capital has emerged from the knowledge economy logic where human capital is the most important source of value along with its knowledge, creativity and ability to innovate.

From the knowledge economy, logic emerged as well the concepts of 'knowledge city' and 'creative city'. The both notions introduce very interesting issues that are significant for development of cities in the current economy. The idea of this thesis is that an intelligent city should represent a concept that offers sustainability both in the present and in the future. I suggest that some of the components of the existing concepts on knowledge city and creative city includes in the notion of an intelligent city due to their relevance for the future generations. The concept of an intelligent city should contain components that assumes be of importance in the future. For that reason, I use Jensen's theory on the Dream Society to identify what components may be significant for an intelligent city of the future. The final literature research presented here, before entering the analysis of results includes some of Lund's sustainability attractors and issues resulted in the global knowledge economy. I would like to underline that this thesis object is not to test how well City of Lund accomplishes the requiems of an intelligent city, due to limited time.

2.3 Hermeneutic spiral of the study

The two major scholarships in methodology are positivism and hermeneutic method. In the positivism, there are three ways to make conclusions: inductive, deductive and combination of these two so called hypothetic-deductive method. While the positivism describes and explains, the hermeneutic study endeavours a general comprehension, an insight into the situation (Eriksson & Wiedersheim-Paul, 2001).

The model that best describe methods and procedures of this thesis is the hermeneutic approach that gives a general impression and interpreting method. A *hermeneutic study* starts in the researcher's initial knowledge and comprehension about the subject. From this comprehension, the researcher formulates problems, questions, ideas, hypothesis etc. that are used in a 'dialogue' with research material. Word 'dialogue' is used to put emphasis on two-way process: where researcher puts a question and gets affected by the 'answers' obtained from research material. The dialogue can be initiated not only with another person but also with books, pictures, notes etc. The researcher's interpretation of the dialogue obtain a new increased comprehension that leads to new questions, new dialogue etc. (Eriksson & Wiedersheim-Paul, 2001).
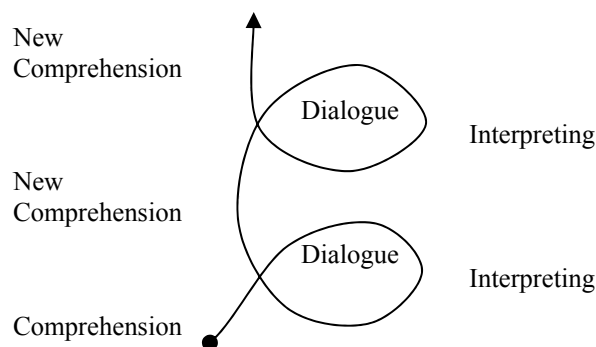
Figure 3: A hermeneutic spiral (Eriksson & Wiedersheim-Paul, 2001).

The first 'dialog' that initiates the thesis hermeneutic study was with my mentor Professor Leif Edvinsson that references Professor Stevan Dedijer's article about Ragusa's intelligence and security. The idea of making a comparison between one of the first intelligent cities in the history and the city of Lund was born. The question was what Lund can learn from Ragusa's history in order to be like an intelligent city. Furthermore, by gaining insight into the concept of an intelligent city I got a new comprehension that created a new question: What are alternatives to the concept of intelligent city? At the same time as I searched for relevant theories within subject I combined appropriate research procedure from method theories presented in: Ferber and Verdoorn, Eriksson and Wiedersheim-Paul, and Saunders et al.

The first interview with Gunnar Törnqvist, Professor of Economic Geography at Lund University, brings me an insight into importance of creative milieu with the purpose of nourishing new ideas that may contribute to development of a city as well as economy in general. While, the next interview with Peter Sörbom, the Executive Manager of Trade & Industry for City of Lund, reveals current issues of the Lund's municipality such as the cities effort to attract new citizens and companies for new research park. The first two interviewees put emphasises on creativity and the concept of a creative city as well as of an intelligent city. Therefore, to obtain comprehension about the theory about creative cities I used the book about 'creative cities' written by Richard Florida. Further, in the process, I took a part of several recent theories about cities and their development.

In his book "Intelligent cities", Professor Nicos Komninos offers an very interesting definition of an intelligent city that, however, I think that the concept need to be expanded and include other issues relevant for city development in the future. By recognising an intelligent city as the concept of the future, the estimates of the future come out as necessary to observe. Professor Edvinsson recommends the book The Dream Society written by futurist Rolf Jensen, the director of The Copenhagen Institute for Future Studies. The theory of the Dream Society gave an impression as most possible scenario of the future.

The next interview was with Jan Sturesson, Marketing Director of Komrev and partner at Öhrlings PricewaterhouseCooper, that puts emphasises on cities leadership. Sturesson contributed as a consult in crating of development program for Lund's municipality. The interview with Sturesson was very enlightening and presented a new close perspective on Lund's government. Sturesson referred me to Lennart Prytz, Chairman of the Lund's City Executive Committee and member of the City Council. The dialog with Mr. Prytz gave more 'inside' information about Lund municipality organisation and strategic planning.

Another interview with Professor Stevan Dedijer puts stress on importance of organised intelligence in a city's life and gives new insights in the subject. Furthermore, Professor Dedijer recommended interviewing the grounder of Stockholm's municipal intelligence Mr. Klas Thorén. In the interview, Thorén reveals insights from practice of municipal intelligence in Stockholm. Simultaneously, a comprehension on importance of the concept of intellectual capital for the purpose of the thesis was increasing. My mentor Professor Leif Edvinsson, known as the world's leading expert on intellectual capital, was of a great help. Before coming to the concluding research loop, I comprise Florida and Tinagli rapport on European ability to attract creative people. The concluding research loop was result of all dialogs and comprehensions obtained in the researching process.

2.4 Data collection

"Results can be no more sound than the data on which they are based" Ferber & Verdoorn's method book. This study was based on information gathered from both secondary and primary sources, in order to provide sufficient background knowledge and to help see the study in a proper perspective. The data collection was qualitative due to its more suitable approach (Eriksson and Wiedersheim-Paul, 2001). The instruments for this study include a Web-based survey, personal and telephone interviews, e-mail statements, referrals and written feedback. After obtaining literature, I evaluated date for relevance to my thesis' questions and objectives and extracted the most relevant data.

As a supplement to literature study, I interviewed different experts in the subject. These interviews were of great value for this thesis; the dialogues helped me to understand better and to increase my knowledge about the subject. I did *semi-structured interviews* because they allowed me to derive from its flexibility that I use to explore the complexity of the topic. To start an interview I used a list of themes and questions that had to be covered. The order of questions was varied depending on the flow of the conversation (Saunders et al., 1997). Each interview started by asking the interviewee to give his opinion on what an intelligent city should be like. Answer on that question lead to next that was generally concerning the interviewee's expertise.

2.5 Validity and reliability

Validity is concerned with whether the research is measuring the correct data i.e. what it supposed to measure and that a relationship between two variables is a *causal relationship*. While, in order to achieve high reliability of a study the measure made should yield the same results on different occasions, as well as different researchers should make a similar observation on different occasions (Saunders et al., 1997).

The validity and reliability of the secondary data are a function of the method by which the data are collected and their source (Saunders et al., 1997). I took a critical position when it comes to information taken from the Internet. I am aware of possibility that texts may have been written as tribute to the cities and thereby give a false impression of what exact happened. I tried to avoid any misleading information in this study and to insure reliability of the thesis all data sources are presented and can be verified. When it comes to various theories from the literature, I had to assume that they are reliable due to that experience researchers wrote them. There is possibility that due to limited access to the literature about Ragusa, I fail

to notice a relevant factor that had impact on Ragusa's sustainability or opposite, that some factor reviled as relevant even it is not.

In order to insure reliability and to facilitate quotation of statements the interviews were tape-recorded. I decided to use tape recorder because it allowed me also to concentrate on questioning and listening of interviewees. The negative effects that may have influence on the interviews validity and reliability are minimal, because all interviewed persons are experienced experts used to create opinion about an issue and to be interviewed.

2.6 Intended audience

The learning from this study could be of prime interest to community of Lund and other municipalities that compete in times of changes and globalization. This thesis is also aimed at students of business administration and teachers at any university to inspire further research with the topic. Furthermore, the paper is addressed to anyone with interest in the topic, regardless of previous knowledge.

3 The contemporary and evolving society

This chapter opens by presenting theories about contemporary conditions of social-economy situation in order to introduce reader in circumstances that have impact on municipality of Lund and its environment. It is important to make estimates on the future as well, in order to know what to expect and what the next step would be. For that purpose, final component of this chapter presents estimation on the future that I find of interests for this thesis.

3.1 The knowledge economy and the Informational society

For the first time in history, the human intellect is a direct productive force, not just a vital element of the production system.

Gunnar Törnqvist, 2002

Today we are living in knowledge-based economy or the New Economy that puts emphasise on the individual and its intellect. According to Dr. Debra Amidon, one of the architects and leaders in the global knowledge economy, all workers are knowledge workers and all industries are knowledge-intensive industry. Dr. Amidon adds: "The knowledge of all individuals is important. Knowledge is what makes companies unique – even within the same industry" (www.entovation.com). The 'raw materials' of contemporary economy consist of data, information and knowledge (Jensen, 1999) while the strategic machinery is machines that facilitate the information processing and the control and steering of production processes (Törnqvist, 2002). Knowledge is a resource that multiplies when used rather than being depleted (Amidon, 2003) and the production of new knowledge increases daily (Jensen, 1999).

The focus on knowledge as the foundation for a successful future has made knowledge management practices fundamental to capitalizing upon the knowledge-based economy (www.entovation.com). Knowledge-management had become a significant part of work in government, corporation and research sectors. European countries have acknowledged the importance of the knowledge economy. The Organisation for Economic Co-operation and Development (OECD) member countries invest in intellectual capital, such as research and development, education, patents and information communication technology (ICT). Sweden is recognised as one of the highest investors in intangibles such as R&D, education and social infrastructure (www.kmmagazine.com).

Lev Baruch, the Philip Bardes Professor of Accounting and Finance at New York University, due to the specific aspects of knowledge management such as transforming tacit to explicit knowledge, maximizing revenues from intellectual property, commercialization of innovations and networking activities, comes to conclusion that knowledge assets can be and should be managed, because the returns to effective management are high. According to Professor Lev, the survival of the most business enterprises currently depends on the success of knowledge management, while maintaining of an adequate information system for planning and control of knowledge and physical assets is the key to a successful knowledge management (Lev, 2000a).

In the knowledge economy, the major drivers of corporate value represents by knowledge (intangible or intellectual) assets, such as those related to R&D and technology, investment in human resources, brands, etc. The value of knowledge assets exceeds that of physical and financial assets. The ratio of intangible to tangible assets estimates to be 4:1 in favour of intangibles, derived independently of capital market values (Lev, 2000a). Furthermore, the knowledge economy is characterized by the rapid technological change that results in increased uncertainty while networking between the firm and its customers, suppliers and competitors causing mutual dependence and fading of the boundaries. However, the traditional accounting model was not designed to deal with the knowledge economy issues, and therefore no longer can satisfy essential needs for accounting-based information. Search for an improved or even a new accounting system leads to emergency of various alternatives such as Economic Value Added, various Balanced Scorecards or the New Accounting, proposed by Professor Lev Baruch, a system that expands traditional accounting to both the non-transaction and non-financial field (Lev, 2000b). In the Chapter 3.3, presents other reporting and accounting solutions that focus on intangible assets or intellectual capital.

The fact that information communicates knowledge always had decisive importance throughout history. However, the processing and communication of information in current society has the strategic role. The Informational Society emphasises a specific form of social organisation where the collecting, processing and distribution of information under the influence of new technological conditions becomes a basic precondition for productivity, social-economic development and power. The linkages and flows of the networks are important parts of the knowledge-based production as well as of the growth of the informational society (Törnqvist, 2002). Networking has profound impact on business enterprises and is important part of innovation process. In networking activities of innovation process, Professor Lev includes Internet and Intranet systems, "Communities of Practice" and suppliers/customers integrations (Lev, 2000b).

The economy has become global and company's location has become less relevant. Another trend that is evident and typical to knowledge-based economy is the increase in the time spent in formal education. The advanced skills and technology together with service are components that add value on goods produced in the knowledge economy resulting in fall of

prices of raw materials used in the production. The qualified and highly educated staff became an increasingly important, while research and development is rapidly growing. Fundamental structural changes in the economy and labour market emerged. Advanced business service, high technology manufacturing, design, entertainment and positions within mass media have become highly paid. Parallel, the low paid service jobs increased in number and traditional manufacturing jobs that hade intermediate level in many cities had disappeared. This has caused emergence of a concept of Dual Cities that have segregation between high- and low income earners, the highly educate and those who lack a basic education (Törnqvist, 2002).

The contemporary economy is symbolised by fast changing global economic environment. Professor Stevan Dedijer modified the old Greek saying, "Everything changes", to the modern time by adding, "Everything changes **faster**" ("Panta rei **tachiteron**") (Dedijer, 2003). Some theorists clam that today the changes are happening so fast that we do not have time to adapt to one change before it changes again (Jensen, 1999). Simultaneously, we have information overload caused by globalisation and development of information and communication technology. According to Bontis by the year 2010, all of the world's codified knowledge will double every 11 hours (www.bontis.com). For that reason, we need more systematised and organised way for collecting relevant information i.e. organised intelligence.

3.2 Innovation and creativity environments

According to Michael E. Porter, the guru in the global competitiveness, today competitive advantage of companies depending on their ability to create and commercialise new ideas i.e. on their ability to innovate. In the article "Innovation: Location matters" (2001), Michael E. Porter and Scott Stern draw attention to importance of external factors that effect innovation. The external factors are for instance favourable environment for innovation, strong university-industry linkages and a large pool of highly trained scientists and engineers. Innovation environment occur in *clusters* of geographically concentrated and interrelated companies and institutions in a particular field. The authors underline that location matters, especially regarding to where a company place their R&D ability to innovate determines the companies' (Porter and Stern, 2001).

In order to create prosperity in twenty-first century economy, according to Dr. Amidon (2004), the elementary components are Knowledge, Innovation and Collaboration (see Figure 4). Dr. Amidon writs:

- "Knowledge is the new, expandable source of economic wealth. There is an emerging recognition that the inherent intellectual assets – effectively exploited through innovation – are the most valuable resource of any country. "

- "Innovation encompasses the full spectrum from creative idea generation through full profitable commercialization. Successful innovation depends on converting knowledge flows into marketable goods and services."

- "Collaboration, replaces the competitive (win/lose) paradigm, which is prevalent in many businesses today, with win/win benefits based on pooling competencies - knowledge, know-how and skills. " (www.entovation.com/forthcoming.htm)
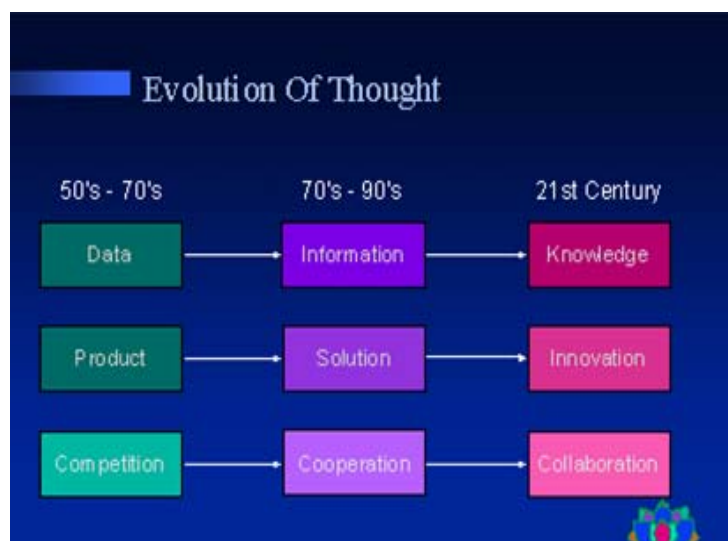

Figure 4: Evolution of Thought (Amidon, www.entovation.com/forthcoming.htm)

Dr. Amidon (2003) defines innovation as putting knowledge into action and it involves dynamic interaction with others. In the knowledge economy, the management of innovation infrastructure and the implementation of a good idea is the key factor of progress, sustainability and true economic wealth (Amidon, 2003). In order to nourish learning and the intellectual capital in 1980's various academic, industrial, government interactions have been initiated that during 1990's evolved in science, and technology parks, the Technopoleis (see Figure 5).
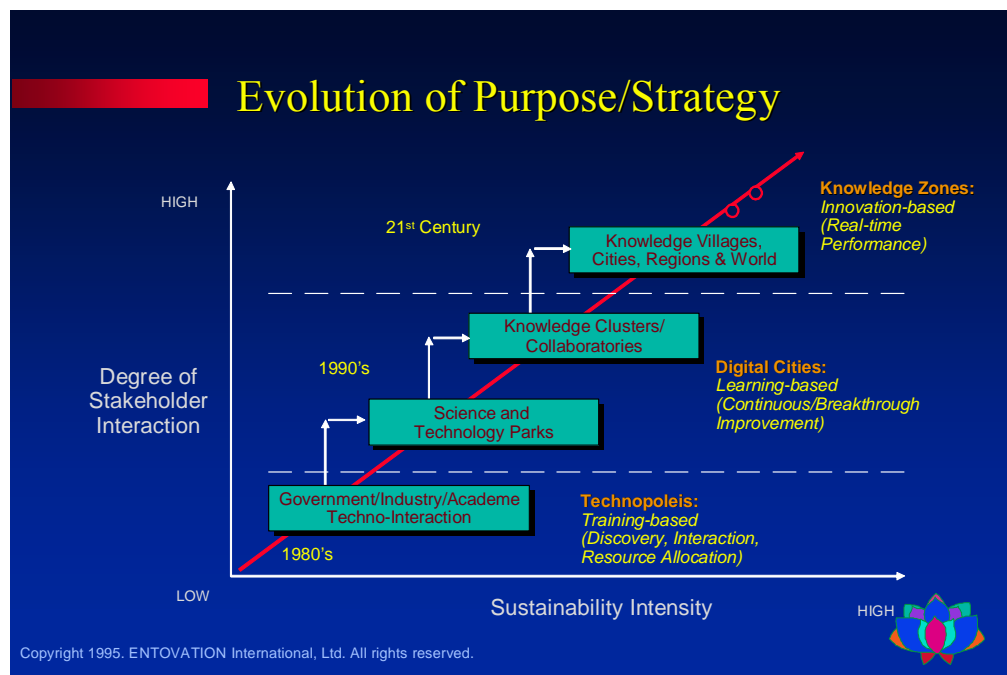
Figure 5: In to the Knowledge Zone (Amidon, 2003)

In the figure above Dr. Amidon (2003) summaries the evolution from Technopoleis to Digital Cities and further into real-time innovations systems known as Knowledge Zones. Towards the end of the twentieth century, emerged Digital Cities throughout emergence of knowledge clusters and collaboratories and development of information and communication technologies. The evolution is identified throughout constantly increasing quest for sustainability and stakeholder interaction that find this development prosperous. "Knowledge cities, for example, when developed intelligently and in harmony with the natural environment, have the potential to provide for the well being of stakeholders, bringing prosperity, safety, and a high quality of life for citizens" (Amidon, 2003).

"A Knowledge Zone is a geographic region, product/service/industry segment or community of practice (e.g., with topical areas of interest) in which knowledge flows from the point of origin to the point of need or opportunity" (Amidon, 2003). Simultaneously, Dr. Amidon highlights an evolution from 'training-based' approach typical for government, industry and academic interaction into 'learning-based' development displayed in the science parks and knowledge clusters, while the most recent 'innovation-based' movement is indicated in creating of knowledge cities, regions and world (Amidon, 2003).

A favourable environment for innovation, Professor Gunnar Törnqvist (2003) identifies as *creative milieu*. Professor Törnqvist presents three types of creative milieus: *geographic milieus, institutional milieus,* and *networks*. Even though the development of information communication technology has reduced importance of geographical milieus, the direct meetings and conversations between people remain important prerequisites for processes of renewal and innovation. The intuitional milieus as companies and universities should be flexible and open due to creative people do not like rigid systems that limits them to create and explore new possibilities. After all, the creative people with relatively unique competences that are precondition for a creative process. Creativity is no longer stimulated by the physical environment itself, but rather by a limited group of people with close mutual contacts. Trough networks that knowledge and capital are exchanged and ideas created (Törnqvist, 2003). Sociologist Castells Manuel identifies the evolving societal structure as *network society*, while economists Shapiro and Varian claim that we live in *network economy,* where utilization and understanding of network relations is essential for success (Pöyhönen and Smedlund, 2003).

The development of knowledge requires that ideas are spread and that information circulates. A new idea generates in a creative process where pieces of information are combined in new ways. These processes put demands upon their surroundings as competency build upon tradition of knowledge, communication, diversity, variation and structural instability. In creative milieu are necessary meeting places that are often placed outside the formal organisations, for instance in cafés, bars or with associations where individual have opportunity to exchange knowledge over the science border. However, it is important to underline that innovation is not predictable or possible to plan in advance. Even in well-planned science parks and technological centres, creative process may fail to come (Törnqvist 2002; 2003).

In almost every network, there is a *catalyst* i.e. an individual that plays the central role in a network. Those individuals have ability to attract other creative people to a place or an institution. An example of a catalyst is physicist Niels Bohr that drawn scientists to Copenhagen from all over the world. They came simply to speak with him or associate within the creative institutional milieu that surrounded him. Experts from different fields have difficult to communicate and to understand each other; however, Bohr had that ability to connect physicists, chemists and biologists in order to create the new ideas (Törnqvist, 2003).

Pöyhönen and Smedlund, two PhD. Candidates at Lappeeranta University of Technology, Finland, advocate that intellectual capital is created as a dynamical process within three types of inter-organisational networks in regional (knowledge) clusters. These inter-organisational networks are identified as production network, development network and innovation network that the authors relate to methods of intellectual capital creation. Accordingly, a *production network* creates intellectual capital trough efficient implementation of existing knowledge of actors within the network, while a *development network* nourish knowledge exchange

between the actors and their incremental development, and within an *innovation network* creates throughout innovation a new knowledge and intangible assets. Pöyhönen and Smedlund argue that a regional cluster should contain all three types of networks in order to capitalize on intellectual capital creation as competitive advantage and secure its sustainable self-renewal. The authors present a model of intellectual capital creation within regions that can be used to recognize weaknesses and strengths in the operation of regional clusters and its networks (Pöyhönen and Smedlund, 2003).

3.3 Intellectual Capital of cities and regions

Likewise, for private enterprise organisations Intellectual Capital (IC) is important for the productivity and competitiveness of cities and regions, and nations as whole. "The wealth of organisations, as well as the wealth of nations, lies in the space in which human capital and structural capital interact" (Edvinsson, 2002) i.e. arena where intellectual capital creates. The problem for both private and public organisation is that current accounting primarily focuses on financial assets and historical data. As the result, true value source is hidden and the agricultural and industrial plans used within regional planning are insufficient and misleading for investment institutions. The public sector investments today are determined by the financial budget, which results in disadvantaging intangibles as experts, knowledge recipes, R&D, learning as well as alliances and networks for social innovations. In order to correctly distribute its resources and reward citizens the municipality must be able to measure its value. The modern economy appeal for new regional maps of knowledge assets and intellectual capital that will be developed with help of new intelligence systems (Edvinsson and Malone, 1997, Edvinsson and Bounfour, 2003).

In 1991, Skandia appointed Leif Edvinsson as the world's first director of IC to develop a new paradigm for the renewal of the organisation. According to Andriessen (2004), Edvinsson's prototyping work gave the biggest contribution to the field of intellectual capital measurements. It resulted in a refined taxonomy and new measurement and accounting systems for IC, as well as innovation systems, such as Skandia Future Centre (www.skandiafuturecenter.com), linked to intellectual capital for IC entrepreneurship. In the Skandia model, presented by Edvinsson and Malone (1997), Intellectual Capital combines two principal components: human capital and structural capital along with their interactions. *Human capital* include all the knowledge, capabilities, competencies and creativity of the organization's staff, while *structural capital* presents by hardware, software, databases, organisations structure, patents and trademarks. Structural capital is everything that supports the employees' productivity and it includes the valuation of customer relationships or *customer capital* that can be separated out as third component (Edvinsson and Malone, 1997).

The IC Navigator (or The Skandia Navigator) is an economic model that takes into accounts both financial and non-financial values. The model has shape of a house, which is metaphor for the organisation itself, and it is composed of five areas of focus (see Figure 6). The 'roof' of the house of IC is *Financial focus* that includes the balance sheet and measures the past. The 'walls' are the company activities that focus upon the present, *Customer* and *Process focus.* The 'foundation' measures how well the company is preparing itself for the future, the *Renewal & Development Focus*. The *Human focus* is identified as the heart; the intelligence and the soul of organisation and it interact with all other areas. An enterprise focuses on these areas to create the value of the company's IC within its competitive environment is the *Operating focus* (Edvinsson and Malone, 1997).
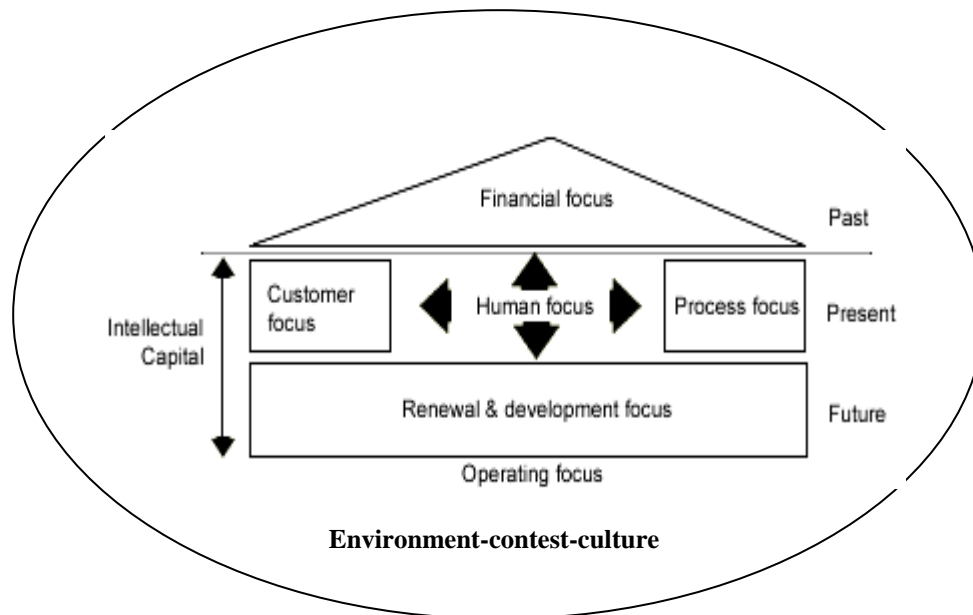
Figure 6: The Skandia Navigator (Edvinsson and Malone, 1997)

Owing to development of ICT, people are more mobile and free to choose where to live and work without risking loosing access to advantages of a big city or countryside. This has result in increased competition and new challenges for municipalities. Edvinsson and Malone (1997) name several examples from the history where the right combination of both physical and intellectual capital helped cities to become wealthy and powerful. Their strength was in their adaptability as well. Nevertheless, many cities in the same way lost their power by not adapting to changes and letting their intellectual capital, i.e. competent and creative people, to leave cities accompanied by enterprises and financial capital. The increased mobility of people will, according to city planners, lead to classification of cities as theme parks, where each municipality will focus on certain characteristics that match the lifestyles of targeted populations, for instance young parents, professionals, senior citizens etc. (Edvinsson and Malone, 1997). One example of this might be a new city Celebration, Florida, next to Disney World (www.celebrationfl.com).

This point towards possibility of applying IC Navigator on cities, where *human capital* is citizens, *customer* is the city's industry, and *processes* are presented by public sector. *Financial* capital of cities is the city's budget, tax base and the area's businesses investment. According to Edvinsson (1997) what the most cities missing are focus on *renewal and development* due to lack of competition in the past. Nevertheless, it is the most important focus in the future if cities will sustain their intellectual human capital i.e. competent citizens (Edvinsson and Malone, 1997). Essential issues for public organizations, which have impact on growth and employment, are the development of intangible resources and innovative approaches, in particular in the functional "fields" of the intangible: Research programs & development, systems of education, fiscal policies and public procurement policies (Edvinsson and Bounfour, 2003).

After applying IC Navigator, the next step for municipalities should be translation of comparable indicators and indices. In order to apply IC measurement, according Edvinsson and Malone (1997) municipality could fulfil following inquiring approach. By letting citizens answer on question: "If you could live anywhere would you live here?" municipality can reference citizens into different economic and demographic groups after age, profession, type of worker, etc. After that, the municipality can compare the results with its own goals for the economic and demographic mix of its population. Next step would be to correlate the target renewal and development investments with the earlier compared results to make decisions such as should the city build more schools or senior centres. Furthermore, the municipality should measure its investments in order to aim the city's future toward the wanted direction. By fulfilling these requirements, the municipality determines its Intellectual Capital and the efficiency (and risk) of its use of this capital as well (Edvinsson and Malone, 1997).

Measurement is important because lack of intelligence and communicable information affects trust as well as the efficient supply and distribution of future resources. A growing complexity requires a supportive system to sensitise our minds to perceive the best option, by the new potential interactive combinations, where communication is crucial to attracting the right resources for wealth creation. According to Edvinsson, a longitudinal system is required for measuring knowledge assets that will help to manage the intangible resources that increasingly determine the development of cities and regions. Analogues to 18th century ships that charted their positions with only north/south navigational tools, today companies as well as cities and regions lead their organisations mainly based on traditional financial budget (see www.corporatelongitude.com). Without a lateral navigational tool i.e. a new accounting system for IC, leadership is not able to see the opportunities with the intangibles and non-financial assets of knowledge creation, networks and relationships in its culture and contexts (Edvinsson, 2002, Edvinsson and Bounfour, 2003).

3.3.1 The pioneers in IC mapping of cities and regions

The Vaxholm Summit that took place in August 1998 was the first international meeting in visualising and measuring the IC of Nations. The pioneers that attend the meeting were Sweden, Israel, Denmark, the Netherlands, Norway, the United Kingdom and the United States (IC Nations, 1999). The following segment briefly presents evolving of the IC theory and a growing comprehension on its importance for cities and regions through increased application on cities in practise.

The first nation that applied IC paradigm on national level was Sweden. Already in 1996, a group of students from the University of Stockholm under Caroline Stenfelt's leadership together with Professor Leif Edvinsson made the first prototype in the world of IC of Nations based on the Skandia Navigator. Below are shown IC indicators that have been used to

quantify some of Sweden's key success factors for the future (Edvinsson and Stenfelt, 1999). The prototype uses the same focus as the original the Skandia IC-Navigator, but different indicators:

- *Financial Focus* includes GDP per capita, national debt, etc;
- *Market Focus*: tourism statistics, standards of honesty, balance of services, balance of trade, balance of trade in intellectual property;
- *Human Focus*: quality of life, average age expectancy, infant survival rate, health levels, education, level of education for immigrants, crime rate, age statistics;
- *Process Focus*: service-producing organisations, public consumption as a percentage of GDP, business leadership, information technology (using such measures as the number of personal computers connected by LANs), employment, etc;
- *Renewal and Development Focus*: R&D expenses as a percentage of GDP, number of genuine business start-ups, trademarks, factors important to high school students, etc. (Edvinsson, 2002; Stenfelt et al., 1996)

The study shown, that Sweden was one of the countries with the highest investments in IC however with very low efficiency in extracting wealth out of the investments (Edvinsson and Stenfelt, 1999). Later on, the Invest in Sweden Agency (ISA), a national investment organisation, adapted the Skandia Navigator model to visualise Sweden's national intellectual capital, as well. This approach enabled these previously invisible resources to be assessed and compared, which can be an important tool for selecting an international location for knowledge-based companies (ISA, 1999).

Dr. Edna Pasher with colleagues from Israel was next that developed and applied their IC prototype on national level. They had been working, since January 1997, in close collaboration with Professor Edvinsson and the students from the Stockholm University on creating the "Intellectual Capital Balance Sheet of the State of Israel", based on Edvinsson's model. In September 1999 was published a report presenting Israel's achievements in education, patents, scientists engaged in research and development, international openness, communication and computer infrastructure. The study reveals Israel's many hidden intellectual assets that contributed the rapid development of about 50 years old country (Pasher et al., 1999).

Work on IC in the Netherlands include long-term analysis of the role of knowledge in the Dutch economy, as well as other work on knowledge creation in networks and the availability of human capital. In 1997, the Dutch government has started a program that would help to shift emphases from the technology to the innovation and established a Knowledge Economy Unit at Central Planning Office. Then, in 1998, the Ministry of Economic affairs published a report "The Immeasurable Wealth of Knowledge" which found among others that in excess of 35 per cent of Dutch national investments were of an intangible nature (IC Nations, 1999; Edvinsson, 2002).

In July 1997, the Danish government initiated an IC project that compared Denmark to a number of leading countries in a broad rang of areas determining living standards and welfare in order to establish Denmark's international position and to learn from these countries. Denmark continues to work on their position in the new global knowledge competition by launching a project looking at intellectual accounting aimed to help transform Denmark from an industry to a knowledge-based economy. The National Competence Council was organised to support collaboration between the government and the business community to map the knowledge competitiveness of Denmark that later on among others led to both guidelines for knowledge reporting (www.vtu.dk/icaccounts) and establishing an InnoCouncil in 2003. At the beginning of 2002, the Ministry of Economics launched *Mind Lab* (www.mind-lab.org), a centre that nourishes knowledge management in the public sector, similar to the ideas prototyped at Skandia Future Centre (Edvinsson and Bounfour, 2003).

Norway has been working on the IC aspects of the public sector as well as the Denmark. In December 2002, guidelines for reporting on knowledge capital have been initiated by the Norwegian Association of Financial Analyst (see www.finansanalytiker.no). The local municipality of Larvik was the very first in prototyping new types of annual reports and applying the IC-rating model for its activities (www.larvik.kommune.no) among others based on IC Sweden AB idea (www.intellectualcapital.se). The Nordic Industrial Fund, an institution for innovation and commercial development based in Oslo, initiated and financed two projects, Nordika and FRAME, that would further the business community's ability to manage and report intellectual capital (www.nordicinnovation.net).

It is also relevant to mention that Professor Keith Bradley in the UK and the Bridgeport project in USA have taken initiatives on IC as the new wealth of Nation since 1997 based on Professor Edvinsson's work as well. The Bridgeport project applies the IC paradigm to work of organisations and communities in Connecticut, USA. While KNEXUS project at Stanford University, emphasise the role of knowledge in global growth and change (IC Nations, 1999). The Securities and Exchange Commission in USA has recognised the need for improved reporting. The Federation of Accounting Standard Board (FASB) supports their work by developing a white book on the subject with Professor Baruch Lev among others. While, the European IAS rules are requesting all companies to have some kind of intangible reporting by 2005 (Edvinsson and Bounfour, 2003).

During 2001 and 2002, Dr. Nick Bontis, Professor at McMaster University in Canada, worked on Intellectual Capital benchmarking of Arab countries sponsored by United Nations Development Program. That was the first intellectual capital development report published for the Arab Region and the third report at national level in the world. Bontis use modified version of Edvinsson's prototyping work with Skandia Navigator model by transforming it from a firm level to national level perspective. In the report, Bontis quantified the state of IC for each country and outlined an NICI index, which can be used by each nation to rank themselves against their peers and to learn from the experiences of other countries.

Furthermore, the NICI approach was used for testing several hypotheses related to national IC development within a structural equation model. An initiative of publishing of national and regional human development reports continues to be supported by the United Nations (see at www.bontis.com).

Professor Josep M. Viedma from Spain has developed another method for the Cities' Intellectual Capital Benchmarking System (CICBS) that was applied on the city of Mataró in 2002 (www.terra.es/personal7/jm_viedma/). The model has two approaches. The Cities' General Intellectual Capital Model that covers all economic activities of the city and is based on the IC Navigator of nations developed by Edvinsson and Malone (1997) and Bontis (2002). The second approach, the Cities Specific Intellectual Capital Model, is dealing specifically with each city's relevant economic activity and is based on Viedma's value measurement method Intellectual Capital Benchmarking System (Viedma, 2002). Andriessen classify Viedma's ICBS along with IC rating as value assessment methods. His critics to the method are that instead of yardsticks, it relies on personal judgment of the evaluator, which might have impact on the outcome of assessment (Andriessen, 2004).

The latest reports on IC of Nations are "Intellectual Capital - Efficiency in Croatian Economy" (2002) and "Efficiency on National and Company Level" (2003) presented by Dr. Ante Pulić, Professor of Economic at the University of Zagreb and the University of Graz. In his work, Dr. Pulić draws attention to importance of the creation of value and value creation efficiency intended for performance of national economy and an orientation toward the knowledge economy based on intellectual capital. Dr. Pulić develops a financial valuation method the Value-Added Intellectual Coefficient (VIAC) that measures the efficiency of value creation compared to the invested key resources (Capital Employed and IC). The benefits of this approach, according to Dr. Pulić, for both political and business management are: (1) The same approach can be used both at national level in regions and at regional level in cities and companies and identify weak points of value creation. (2) The national and regional drivers of created value and value creation efficiency are highlighted and (3) as a result, a national value oriented strategy can be developed in cooperation with the local governments and companies. The last (4) and very important benefit is that this approach enables not only control of costs but also control of value creation (www.vaic-on.net).

Furthermore, Austria has been implemented during 2003 a law requiring all Universities and Colleges to publish a knowledge capital report annually, showing knowledge goals, knowledge processes as well as knowledge indicators. The first prototype was done University of Kremz in Austria (www.donau-uni.ac.at/wissensbilanz). The Austria's example is followed by Swedish CMM-Center for Molecular Medicine at Karolinska by launching similar prototype (www.cmm.ki.se). Other countries that take initiatives around IC measuring are Australia, Canada, Finland, and Iceland (Edvinsson and Bounfour, 2003).

3.3.2 Models applied

New ways of benchmarking are necessary to be able to understand innovations and performance ability of regions and nations in the modern economy. Instead of studying standard measures of national competitiveness and focusing on the IC wealth of nations, we gain new insights into where a country's strengths and weaknesses might lie (Edvinsson, 2002). According to Bontis, the IC of nations includes the hidden values of individuals, enterprises, institutions, communities and regions that are the current and potential sources for wealth creation. This hidden intellectual capital is source of future wellbeing and it is important to have a mapping system to understand and measure intellectual capital of nations. It have been several attempt of measuring and mapping intellectual capital nevertheless, the measurement of such intangible assets has shown to be difficult (Bontis, 2003). The four basic models that have been applied on national and regional intellectual capital are IC-rating, NICI, VAIC and IC-dVAL. Here presents a brief description of the models.

IC rating is based on Professor Leif Edvinsson's theory on IC and uses as complimentary to the S&P rating of financial capital. The approach is employed for valuation and benchmarking of the perspectives of *efficiency*, *renewal* and *risk* on IC components, for the future earnings potential (see Figure 7). The following Figure illustrates accounting insufficiency due to it is based on the past and historical data while IC- rating three focuses are assessing the future potential. IC rating had been frequently applied in both Europe and Japan among others by public organisations that do not have the public stock market as a grading reference point as public organisations, schools and hospitals.
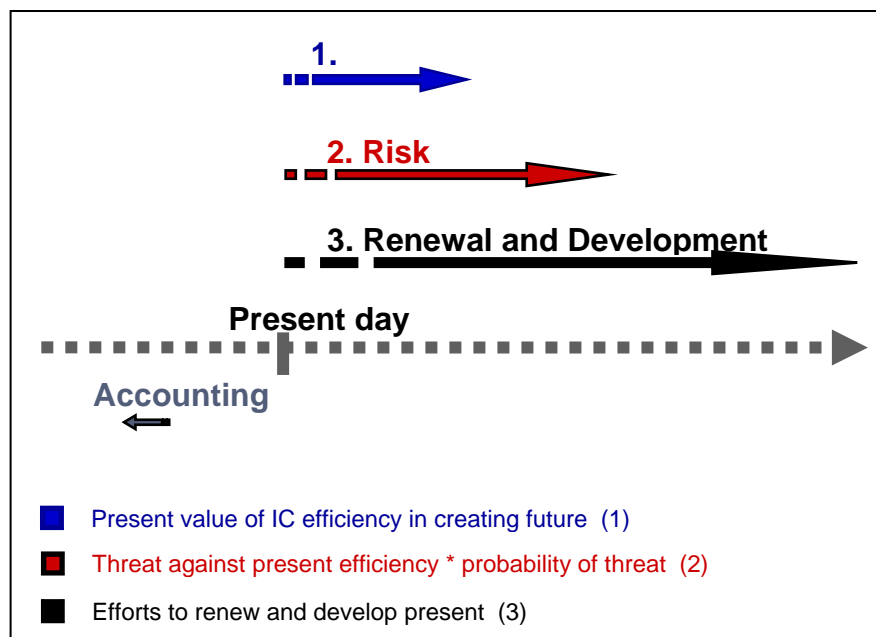

Figure 7: IC rating three focuses (www.intellectualcapital.se)

Furthermore, the approach is being used for regional rating of IC of cities and regions e.g. the Norwegian Larvik Kommune and the Norwegian oil platform. "The IC-rating gives both a map for benchmark versus best in class, but also a platform for assessing and bench-learning the future earnings capabilities, thereby creating an intelligence trust for the future"(Edvinsson, 2002). The result of an IC rating is quantified measurements of the resources that are of critical importance for long-term sustainability, which can be used as a foundation for change and as a tool in the daily management and operations (www.intellectualcapital.se).

Dr. Nick Bontis, that has a prominent research status in the fields of intellectual capital, knowledge management and organisational learning, created a national intellectual capital measurement methodology and index. The National Intellectual Capital Index (NICI) is a measure that identifies the intellectual capital development ability of a nation or region based on a variety of metrics: human capital, structural capital, literacy rates, IT infrastructure etc. (www.bontis.com). Bontis modifies the intellectual capital tree, described by Edvinsson and Malone (1997), by changing market value into national wealth, financial capital into financial wealth, customer capital into market capital, innovation capital into renewal capital while the remaining elements leaves unchanged (see Figure 8). The Intellectual Capital of Nations model has been applied on ten countries of Middle East for purpose of IC benchmarking, sponsored by the United Nations Development Programme (Edvinsson, 2002; Bontis, 2003)

Bontis' model of IC of Nations defines *human capital* as the knowledge, education and competencies of individuals in realizing national tasks and goals. The other component of *intellectual capital* is *structural capital* and it consists of *market capital* and *organisational capital. Market capital,* according to Bontis, includes intellectual capital embedded in national networking business/enterprises and foreign trade, while *organisational capital* combines from *renewal capital* and *process capital. Process capital* is the non-human storehouses of knowledge in a nation, which are embedded in its ICT: s systems, at the same time, as *renewal capital* is a nation's future intellectual wealth by investing in R&D. From these components are calculated respective sub-indexes. After combining the overall composite NICI from the sub-indices, it is possible to do benchmarking between nations and regions and to learn from others (Bontis, 2003).

Intellectual Capital of Nations
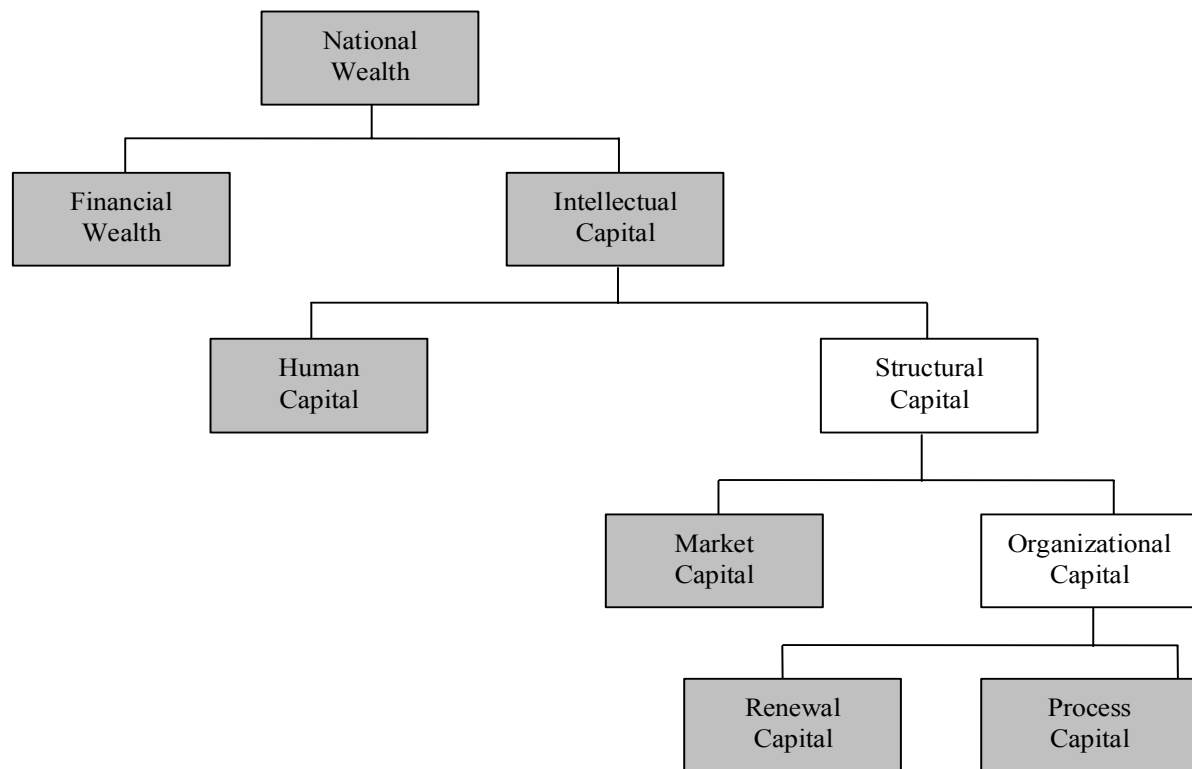
Figure 8: Modification of Edvinsson and Malone (1997) (Bontis, 2003)

As mentioned earlier, Bontis tested several hypotheses related to national IC development within a structural equation modelling technique. The report investigates the inter-relationships among the independent variables: national human capital, national process capital, national market capital, national renewal capital and the dependent variable, national financial capital (Bontis, 2003). As the result from the testing of hypothesis is following (see Figure 9):

"Human capital is the pre-eminent antecedent for the intellectual wealth of a nation. As a nation's citizens codify their knowledge into the systems and processes of a country (H1), those structural capital assets can then be renewed for the future (H2) by investing in research and development. A feedback loop further develops a nation's human capital (H3). Eventually, the codified knowledge base of nation can be marketed (H4) within the global and domestic economies. As the human capital continually develops (H5), a nation's ability to market its intellectual wealth will result in a higher financial well-being" Bontis puts emphasise on the relatively strong R-squared value of 20, 9% yielded from the overall conceptual model. This means that nearly one-fifth of the financial wealth of an Arab country is based on its national intellectual capital (Bontis, 2003).
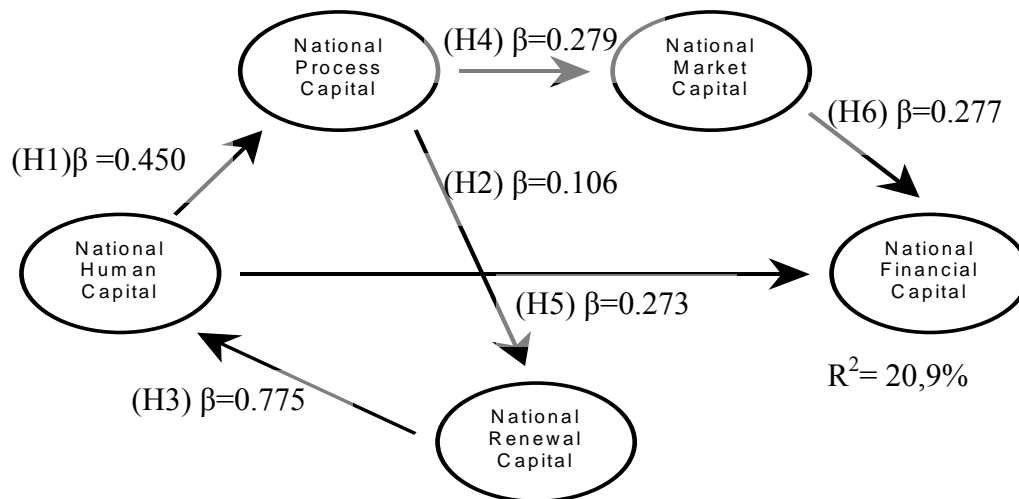
Figure 9: NICI Conceptual Map (Bontis, 2002)

In summary, the NICI conceptual map highlights the following order of the agenda for IC of Nations:

1. Research and Development
2. Education
3. Trade and Networking
4. Industrial Efficiency

The VAIC method is used for measuring of the efficiency of key resources in companies and regions. According to Dr. Pulić, two key resources crate value added in companies: *capital employed* containing physical and financial capital and *intellectual capital* containing human and structural capital. The VAIC approach use data that are publicly available and for that, reason is increasingly applied as an indicator of intellectual capital performance in statistical analysis. Dr. Pulić focuses on value creation instead of controlling of cost as in traditional accounting. The VAIC: s main assumption is that labour expenses are assets, not a cost. Consequently, in calculations of the value added Pulić leaves out all labour expenses and calculate the value added of a firm or region by subtracting input from output, whereby labour expenses are not included in the input, see Appendix 1 (Andriessen, 2004).

In 2002, the VAIC approach was applied on 21 regions of Croatia. The key principle of the report on "Intellectual Capital Efficiency in Croatian Counties" (2002) is that it is irrelevant whether a county's economy is big or small, but if it is good or bad i.e. how efficiently uses its resources. Each municipality's investments in resources and the efficiency of those resources in value creation are compared to the average efficiency of the County's economy. The analysis provides information on the value creation efficiency of the companies in for each county. The National Index indicates an average efficiency of a counter and the regions above the average are those that are driving force of the national economy, while efficiency of

a region is an average of cities that depend on the performance of local companies. Thereby connects all levels of business activity: the macro (national) level, the meso (region/city) level and the micro (company and within company) level. The National index shows as well how much value added has been crated for each invested dollar (Pulić, 2002).

In his latest rapport, the "Efficiency on National and Company Level" (2003) Pulić measure intellectual capital of EU Countries and suggest the Intellectual Capital Efficiency (ICE = HCE+SCE, see Appendix 1) as the substitute for GDP that has revealed to be insufficient measurement in the knowledge economy. ICE shows how much value-added (VA) is created on one monetary unit invested in employees and it determines the overall efficiency (VAIC). GDP do not give information how well resources are utilized, nor connects economic measurements at national and company level. The report has shown as well that GDP at macro level, as the revenue and profit at micro level, do not indicate falling efficiency in value creation. GDP of the EU countries continued to rise while Intellectual Capital Efficiency was constant during the five years period. The figure 10 shows that GDP and ICE rank EU countries differently. Main difference is that ICE includes only the working population while GDP per capita embrace the entire population of a country (Pulić, 2003).

GDP & ICE of EU Countries

2001	GDP p/c €	ICE
Luxemburg	50.039	2,21
Denmark	33.196	1,94
Ireland	29.821	2,72
Sweden	27.500	2,58
United Kingdom	27.143	1,89
Nederlands	26.845	2,23
Austria	26.374	2,28
Finland	26.141	2,79
Germany	25.155	2,06
Belgium	24.664	2,12
France	24.289	2,18
Italy	21.034	2,85
Spain	15.849	2,25
Greece	11.951	3,26
Portugal	11.882	2,18
EU TOTAL	23.289	2,21

Figure 10:GDP & ICE of EU Countries (Pulić, 2004)

As mention before the Value Creation Efficiency Analysis links companies' management with regional and national government, however, VAIC is not a tool for scanning value creation efficiency but for precise depiction of required changes in management needs other IC/ KM-management tools. According to Andriessen, even though the VAIC model has some weaknesses it gives great contribution to awareness of the importance of intellectual capital in regional economies (Andriessen, 2004).

According to Ahmed Bounfour, Professor at the University of Marne La Valleé in France, one way of looking to the longitude of tomorrow lies in considering intellectual capital from a dynamic perspective. Bounfour's the Intellectual Capital dynamic Value (IC-dVAL) approach defines ad hoc metrics for measuring intellectual capital in a dynamical way instead of analysing existing data, at the input – output level. The approach focuses on the organisational and dynamic dimension of socio-economic performance and has been implemented under different contexts, at microeconomic as well as at macroeconomic levels. According to

Bounfour, public organisation, as well as private, must develop innovative approaches in following functions: R&D, system of education, fiscal policies and public procurement policies (Bounfour, 2003; Edvinsson and Bounfour, 2003).
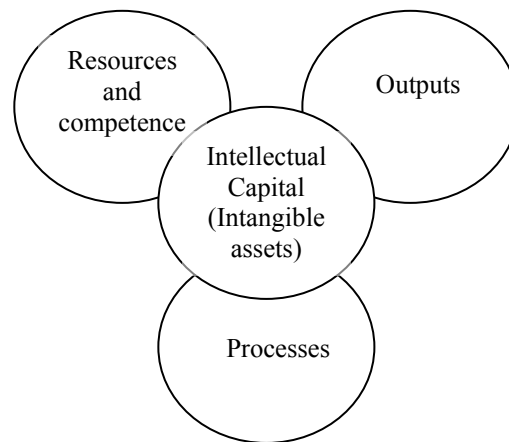
Figure 11: The IC-dVAL four dimensions framework (Bounfour, 2003)

IC-dVAL method integrates four dimensions of competitiveness (see Figure 11). *Resources as inputs* to the production process include tangible resources, investment in R&D, acquisition of technology, etc. This dimension identifies the intangible resources with specific high criticality and considers how the level and the mode of exploitation of these resources can be improved by the adoption of specific process. *Processes* implements the deployment of a dynamic strategy founded on intangible factors e.g. processes of establishing knowledge networks, and competences inside and outside organizations; processes of combining knowledge; processes for building social capital and trust, etc. *The building of intangible assets (Intellectual Capital)* can be built by the combination of intangible resources, which can lead to specific results such as collective knowledge, patents, trademarks, reputation, specific routines, and networks of cooperation. For each of these assets, indicators and methods for valuation can be developed. On *Outputs* level, performance of organizations is classically measured, through the analysis of their products and services' market positioning. Here are relevant indicators such as those relating to market shares, quality of products and services, barriers to entry building, establishment of temporary monopolistic positions. The process of integrating these four dimensions can be improved by creating a link between the financial value of assets and the internal performance of companies (Bounfour, 2003; Edvinsson and Bounfour, 2003).

The four dimensions of the IC- dVAL approach can be used at both the microeconomic and the macroeconomic level, especially in perspective of benchmarking IC performance. Bounfour has been using this framework for benchmarking the performance of EU innovation systems using the Innovation Trend Chart data as proxy values.
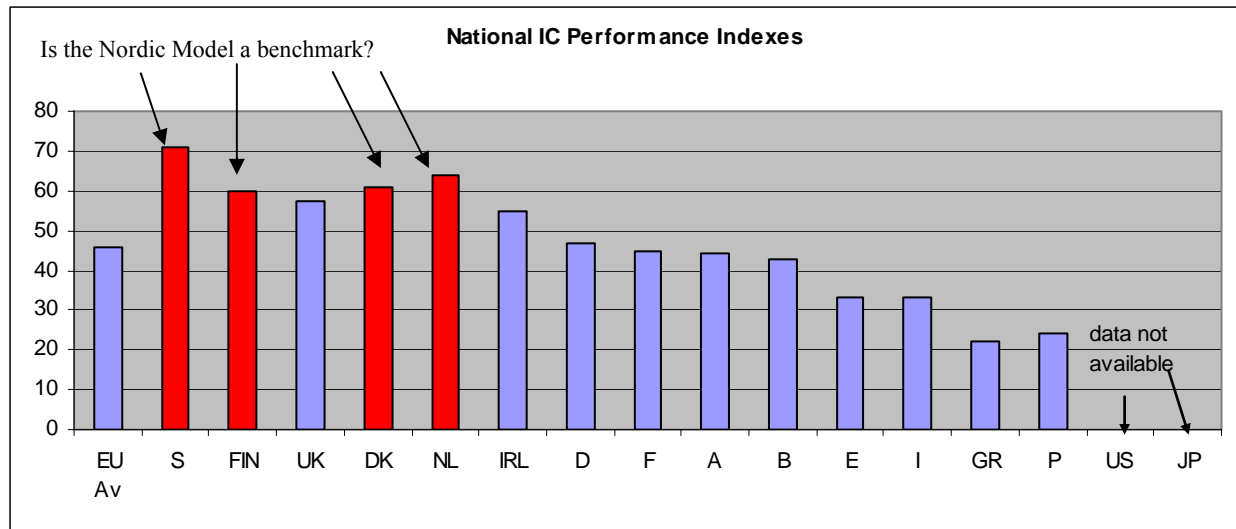
Figure 12: IC Performance Indexes for European countries, according to IC- dVAL approach (Edvinsson and Bounfour, 2003)

According to Bounfour, the issue was to document to what extent this might be meaningful for the other EU countries and if a process of 'learning-by-comparing' can be implemented. A benchlearning of IC performance at regional level can be made by using different proxies' data for measuring regional performance in terms of IC as in the case of France. The challenge for policy makers, according to Bounfour, lies at the organisational level: what kind of "learning-by-comparing" can be implemented among regions in the world (Bounfour, 2003; Edvinsson and Bounfour, 2003).

The above models are in progress for developing maps of intelligence of nations, regions and cities.

3.4 Intelligence for city development

In order to gain sustainability a city government needs to record social innovations and for that, they need intelligence. *Social intelligence* is capability of a society or an organisation to learn about its environment and itself and to foresee the future. It is ability to adapt effectively to the challenges of social changes. Social intelligence contributes to a better understanding of the present world dynamics and complexity (Dedijer, 2000). Intelligence of social system is not about to be informed it is about the analysis of the gathered information and using it in for decision-making (Dedijer, 2003).

Increasing role of 'brain power' i.e. importance of human intellect and social intelligence leads us to a new intelligence revolution. According to Professor Stevan Dedijer, William Colby, former CIA director, was the first in 1970's that observed intelligence revolution. Colby presented following components of intelligence revolution (Dedijer, 2003):

1. From the end of The Second World War all worlds countries developed national and international Intelligence and Security (I&S) communities.
2. Information and science-based technologies are being used for I&S procurement and analysis
3. 'Privatization' of intelligence in the sense that corporations and other social systems, are systematically using I&S for competition, growth and profit
4. The emergence of insight and control bodies to ensure that the I&S community hold on to the democratic principles
5. The intelligence revolution global impact " This then is the future dimension of an international resource to help humanity to identify and resolve its problems through negotiation and cooperation rather than continue to suffer or fight over them"(Colby cite by Dedijer, 2003).

To this Colby's dimensions, Dedijer added following three:

- **Individualization of intelligence**: Dedijer believes that the appearance of information technology stimulating inquisitiveness and creativity of individuals.
- **"Spying is dying,"** says Dedijer indicating that the 'espionage technique' becomes insufficient and out of date. All needed information can extracts from open sources, as media.
- **The emergence of development sciences** or the "bridge-building" methods of science, interpreting and integrating knowledge of biological, social, psychological and machine intelligence.

The intelligence revolution leads to increased demand on intelligent individuals, intelligent products, intelligent materials and machines and intelligent corporations (Dedijer, 2000), which lead as to necessity of intelligent cities.

According to Professor Dedijer, Sweden has been the best in the world in utilizing the benefits of the intelligence revolution for its social development. Due to indicators presented in Figure 13, the author identifies Sweden as an intelligent state. Sweden's high development, Dedijer explains by "Sweden's social personality" and "National Character" that is result of hers history. Sweden has developed intelligence and security in its constituting organisations that may be of example for other countries. Trough years the Sweden's Employers Association (SAF) has been benefiting to the development of Sweden's I&S community and helping companies to develop its intelligence (Dedijer, 2003).

Sweden among 180 Countries	
Education	(1) First
Competitiveness	(5) Fifth
Democracy and anticorruption	(2) Second
Standard of living	(4) Fourth
Social welfare	(2) Second
Research and Development	(1) First
"National Intelligence Quotient"*	(1) First

* Dedijer's indicator for the I&S of social systems of a country

Figure 13: Sweden: an intelligent state (Dedijer, 2003)

Intelligence is a well-established discipline at many big corporations, but what about municipalities, do they have systematic organised intelligence that provides community with necessary information? According to the studies, there is no established method of how Swedish municipal intelligence works. Each municipality that clams to have intelligence does it in a different way. Today, majority of Swedish cities do not have organized intelligence. They are relying on chefs, handling officers and specialists to keep an eye on their respective areas. However, the most of municipalities are aware of today's changing world and the fact that public sector is not protected from competition as it was before. The most evident example of changing and uncertain world is many big companies closure, which left big impact on several municipalities in recent times. Emergency of new technologies often request necessary changes as well as improved communications and increasing free trade (Jerkert, 2001). Municipalities must be prepared to act in good time.

Example of municipal intelligence from the presents is Stockholm city. In 1996, the city establishes a central municipal intelligence unit for environmental scanning and analysing. The unit's task was to analyse threats and opportunities and to suggest strategy for solving of a problem together with the municipal comities that have responsibility for intelligence

organisation within their own areas. This central intelligence unit had role of a consulting entity and not operational (Jerkert, 2001).

According to Klas Thorén, the founder of Stockholm municipal intelligence, it is difficult to prove how certain information provided by municipal intelligence has helped the city of Stockholm to make some decisions or facilitated something. Due to this common problem for organisations that have organised intelligence, many people do not believe in intelligence and its process. After active work on organisation of intelligence Stockholm municipality made an internal investigation for two years ago. The study has revealed that a one third of the staff had actively used intelligence in their daily work, while one third understand the importance of intelligence work but did not use it actively and last group thought that intelligence is waste of time. To get logic of intelligence work and process takes time and constant motivation. Like Thorén says: "It takes real enthusiast to be a driving force inside the organisation". Today Stockholm's intelligence is much decentralised and is natural part of daily tasks (Thorén, 2004).

Recently it has revealed that the city of Stockholm, after all, did not have enough information and contacts with the city's industry. For that reason, the city establishes a new intelligence unit under the management of Kristina Tidestav within municipal business company (see also www.stockholm.se). From May 2004, the intelligence entity will publish beside the regular quarter's economic situation, an annual compilation including analyses of industry development and structure changes, salaries development, etc. (Bergin, 2004).

3.5 Society of the future

People had always tried to predict the future and we may say that there are so many predictions as there are futurists. However, some theories have revealed as more innovative and more likely to happen than others. This segment presents an estimation of the future written by Rolf Jensen, the director of The Copenhagen Institute for Future Studies, in his book "The Dream Society". Jensen says:"If we limit ourselves to thinking in terms of realities, facts, and knowledge, we have got the future all wrong, because it is made, not of certainties, but of dreams. The future does not exist in the physical world but is present in our thoughts and in our dreams only" (Jensen, 1999). A dream lies behind every technological breakthrough as new product, airplane, landing on the moon, etc.

Jensen identifies revolution from the Information Society into the fifth type of society, the Dream Society. It would be the next and final phase in the human materialised societal development due to the increased attention on humankind's emotional side instead of material aspects of life. According to Jensen, status, luxury and prestige will not be favourable in the future. The Dream Society is characterised by culture, values, ethos and story telling. It is the era of storytellers and role models, which may be trusted, admired or hated, however, they can teach us something that we can use in our own lives. While, every city has a story to tell about its past or its myths and legends, which may be used to attract new inhabitants and tourists.

It has shown that consumers' purchases are made for emotional, non-materialistic reasons. The consumer buys feeling, experience and stories. People want more of a social life, and more of what gives them emotional experiences. Defined with help of the Maslow's hierarchy of needs, the needs at the bottom of hierarchy are becoming more important than at the top (see Appendix 2). According to Jensen, the future product will appeal to costumers' hearts, not heads. It is necessary for organisations to think a few steps ahead of the competition and adjust to the Dream Society logic in time. To accomplish that, they need to add emotional value to its products and services in order to attract costumers.

New types of society are developing more rapidly. We can see that from the fact that the Agricultural Society last around 10.000 years, the Industrial Society 200 years while the Information Society began for about 20. According to Jensen, we can already see some changes into the age of emotion and imagination, the Dream Society. The change into new society happens gradually and today the Information Society and the Dream Society co-exists. With a simple example of free-range hens' eggs, Jensen illustrates how the Dream Society logic is being used today. For instance, in the affluent countries as Denmark consumers are willing to pay an additional 15 to 20 percent simply for the story about animal ethics and about the good old days. Though eggs are similar in quality, consumers prefer the eggs with the better story. Jensen based his theory on development trends in the affluent countries, due

to developing countries must first evaluate through all previous societies before being able to develop into the Dream Society.

The Dream Society must be seen as the result of the entire history of humankind and not only of the last few generations. "We can understand the Dream Society only when we realize that it is rooted in the past as well as in the presents" (Jensen, 1999). The future generation will be assimilating only a few values from the Information Society, while the values characterizing the Hunter-gatherer society will become significant due to that the 90 percent of the human history belong to the hunter-gatherer societies. For instance, the hunter-gatherer respect for the laws of nature and living in compliance with nature rather than dominating it, have been already assimilated by current green movements. The contribution made by agricultural society to the future is the working at home, which will become a more common phenomenon in the future. The following Figure summarises transition from the Hunter-gatherer society into the Dream Society, based on Jensen's theory on the Dream Society evolution.

Society	Hunter & Gatherer	Agriculture	Industrial	Information	Dream Society
Unit	The tribe	Family	Hierarchy	Networks	The tribe
Playing field	The cave/tent	Farm	Factory	Office	Themed environment
The admired person	The oldest	Head of family	Capitalist	Expert	Story-teller
Value	Spirits	God	Products	Knowledge	Experience

Figure 14: The BIG overhead (Lyngsø, 2000)

Experience, the spiritual element, and the stories were important in the Hunter-gatherer society, therefore the oldest member of the tribe or the member that was the most familiar with the tribal myths and rituals was usually chosen as the leader. Hunter-gatherers were good storytellers. In the Hunter-gatherer society the fundamental needs had to be met, however, values were of a spiritual and not of materialistic nature. The same way of life Jensen predict in the Dream Society. Today, the material aspect of living becoming less important in the affluent countries however, they probably will not be reduced. The organisation of society will become value communities of limited size comparable to tribes. The communities of interest are gathering to share their knowledge and enthusiasm in sports, entertainments etc. at shindig or via the Internet. The development of information and communications technologies is the most likely the greatest contribution of the Information Society to the future and creating a 'near-global' market for the exchange of knowledge, ideas and values as well.

According to the theory, modern companies should learn from the Hunter-gatherers to value myths and stories and we already can see that some modern organizations beginning to rediscover their past and empathize with the Hunter-gatherer society. One example is team building and getting employees to know one another as human beings not only as college i.e. strengthening the tribal community sense. Furthermore, the tribal myths and stories served as guidelines for the social community, which has been reflected in modern corporations by emphasising core values of the firm instead of core business. A company of the future is comparable with a tribe with all its rituals, myths and stories. The storyteller will create corporate culture that will increase demand for social collaborative skills. The concept of work is changing resulting in all the other changes. Work will become motivating, creative and engrossing; the 'hard fun' as Jensen describes. In the future, our lives will have two social nuclei: the home and the company. Analogues to the Hunter-gatherer society the company will be more like a tribe where employees are members.

The company of the future will try to increase their "political capital" i.e. investing in confidence and reputation. The Dream Society companies will not work only for profit but also for doing well such as giving money to charities. The 'political consumer' is politically aware and chooses products from companies that demonstrate attitudes similar to their own. A growing market in twenty-first century will supporting the poor, the environment, human rights, democracy, freedom of the press and animal welfare. By this theory, the Red Cross and Greenpeace might become the most important organisation of current century.

When it comes to the politics of the future in general, Jensen recognizes a coming trend of 'recreational politics' engaged in local as well global welfare and declining number of those who have chosen politics for a livelihood. Senior civil servants will take care of continuity, cohesion, and non-political issues because of a broad consensus about long-term goals. While politicians will converse with citizens about specific issues or the emotional questions as abortion, equal rights, human rights and values – family values. Politicians of the future must be capable of "speaking to our hearts" and to have principles that they care deeply about. Consequently, politics will possibly become more turbulent, less compromising and less consensus-minded. However, they may, due to more engaged citizens, become more interactive and democratic. The theory of "civilian society" where citizens and companies laying down societal norms together and living according to them, Jensen calls the 'society of responsibility' since it offers citizens maximum responsibility for their lives and lives of fellow citizens. Educational effort and the Information Society contributed to equal distribution of knowledge and insight and made citizens equal in political questions involving moral and ethic.

The Information Society's focus on automation by replacing humans with machines causing the elimination of itself and the exact same jobs it created. Machines already replaced muscle work that is the affluent countries usually done for fun not out of need. The next to automate would be human brains and senses replacing them with computers and intelligent machines.

However, the author believes that we will avoid automating of our emotions and will keep them for ourselves. Jensen predict that jobs with emotional substance will outnumber other jobs some time in the middle of the twenty-first century (see Appendix 2) meanwhile the Information Society continue to emphasise digitalization, communication and mapping of the human intellectual capital. Jensen supports the Skandia's IC paradigm and predicts completely abandoning of traditional accounting, and the place of physical assets will be taken by intellectual capital. The company will nothing more than the sum of its participants.

We are in the midst of an information economy and a major part of the workforce is engaged in knowledge processing where numbers and words communicate the knowledge. The future communication tool will be images and pictures that rise above linguistic barriers, which are slowing down globalization. Another type of 'raw material' will be stories myths and legends that have been preserved by native people who held on to their traditions.

Through modern media we will kept apprised of how other people live and become aware in values and lifestyles which will lead to less variance in values and patterns of consumption i.e. we will become more similar. Jensen identify the rise of a global middle class, due to the expose to the same, global, stories and adjusting its patterns of consumption accordingly, as it happened with jeans that replaced local traditions of clothing. Only barriers will be culture and we will have a global encounter of cultures and a union of different value systems. In the future of global community cultural variation will remain but more alike. Global companies play a substantial and increasing role in our social existence. Companies that successfully use the Dream Society are Nike, Marlboro and Camel, Harley-Davidson, etc. The war of the Dream Society will be war of cultures and of stories. The winner will be the culture that can sell its values and ideological foundations, to the 'enemy'.

The alternative theories about the future are the green society, a world of conflict and that the Information Society will continue for the next 50 years. The green society emphasises are taking care of nature, sustainability and recyclability. New technology employs only for protection of the environment and people priorities environment over jobs. The green approach is included in the Dream Society but just as a one story among many. A conflict scenario cannot be excluded, even that we what to, due to the world's history full of wars and conflicts. The theory that everything will be same for the next 50 years without changes is less possible because there would undoubtedly be changes.

4 Quest for intelligent cities

The concepts of 'knowledge city' and 'creative city' we may identify as the result of contemporary social-economy, while the concept of 'intelligent city' as the quest of the future society.

4.1 Knowledge city

"*A city purposefully designed to encourage the nurturing of knowledge*"[2]

We may say that knowledge city is outcome of the knowledge economy and Information Society. The knowledge cities are putting emphasis on developing a knowledge society. The concept of knowledge has been used as a driving force for development. The cities place stress on information and communication technology in order to exchange knowledge and experience between individuals, as in the case of Sao Paulo. The citizens of Sao Paulo have opportunity to increase their knowledge by connecting them to networks of virtual communities organised in form of various projects (www.cidade.usp.br). Strategies and characteristics of a number other cities that have vision to became knowledge cities are presented below, while the Appendix 3 combine a list over other cities that are proclaimed as knowledge cities.

One well-known example of city transformation into a knowledge city is Barcelona. This transformation involved the city's administration, as well as the business and research community. For this purpose, the city assigned a special councillor to promote the concept of 'City of Knowledge' by creating and maintaining network between all contributors. Barcelona identifies *culture* as a motor of a knowledge city. The following indicators of a knowledge city have been extracted from Barcelona's strategic plan for any city claiming to be a "knowledge city" (www.gurteen.com or www.bcn.es/accentcultura/angl/webang.doc):

- A city that has instruments to make knowledge accessible to citizens.
- A network of public libraries that is compatible with the European standards.
- Access to the new communication technologies for all citizens.
- All cultural facilities and services with a central educational strategy.

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[2] http://www.gurteen.com/gurteen/gurteen.nsf/

- A city that has a newspaper- and book-reading level that is similar to the average European level.
- A city that has a network of schools connected with artistic instruction throughout its territory.
- A city that is respectful of the diversity of cultural practices of its citizens.
- A city that places the streets at the service of culture.
- A city that simplifies, through the provision of spaces and resources, the cultural activity of the community collectivises and associations.
- A city with civic centres that are open to diversity and that foster face-to-face relations.
- A city that makes available to citizens from other territories all the tools required for them to express themselves.

In the Berlin strategy report, the city council have been expressed the intentions of becoming the 'City of Knowledge'. As necessary prerequisites for knowledge city, the report primary identifies the quality and density of academic and educational landscape and research centres. The remaining central issues are improving and emphasising the city's competitive advantages, providing more jobs by qualifying workforce for job in new service industry, appeal to the young people and controlling migration, ecology and traffic. For the purpose of achieving the city's objectives a number of agencies are set up to promote the development of Berlin-Brandenburg region's scientific and economic development (source: see Appendix 3).

In her presentation, Melbourne Councillor Kate Redwood presents following list as, knowledge city key success factors:

- Skills-"knowledge workers"
- Research excellence
- Networks of commercial influence
- Collaborative and competitive business culture
- Infrastructure for connectivity
- Market access and awareness
- Open, tolerant and merit-based culture and inclusive society

An alternative type of knowledge cities are organised digital networks that connect researchers and other creative and intelligent individuals around specific themes to discuss and share knowledge. A good example of such digital network is En2Polis. It is a virtual city with highly intelligent and creative citizens from the whole world. The city is known as International Knowledge City of the Future. Components of the city are presented in Appendix 4.

Dubai has been, in September 2003, proclaim as leading knowledge village, with Singapore as point of reference which is as well a knowledge intensive city (Edvinsson and Bounfour, 2003). There are many examples of cities that maintain knowledge as driving forces for development for more examples of the knowledge cities follow links in Appendix 3.

4.2 Creative city

Creative city is the city that provides the stimulation, diversity and a richness of experiences for its citizens i.e. which provides source of creativity. The challenge for creative cities is to attract creative people that will contribute to cities development and development of the economy in general. Creative people demand from a city action and experience, dynamic place where one can be creative, possibility to express them self and develop as an individual (Florida, 2002). Richard Florida, Professor of regional economic development at Carnegie Mellon University in Pittsburgh, recognises the rise of *creative class* that includes scientists, engineers, architects, educators, writers, artists, and entertainers. He defines this class as those whose economic function is to create new ideas, new technology, and new creative content. The creative class is characterised by creativity, individuality, diversity, and merit. "Only by understanding the rise of this new class and its values, can we begin to understand the sweeping and seemingly disjointed changes in our society and begin to shape our future more intelligently" (Florida, 2002).

Florida R. identifies creativity as the driving force of economic growth, which consequently gives the Creative Class dominant influence in society. One of his findings is that people do not follow the jobs, it is one way around, and companies following or forming in the place where intensity of creative people is high. Florida R. brings back the emphasis on the location and real city from ever-increasing emphasis on digital cities. Creative Class people are highly mobile but it is not true that the Internet and modern telecommunication and transportation system will diminish importance of cities. Place and community are more critical factors than ever before because of the tendency of firms to cluster together. "Companies cluster in order to draw from concentrations of talented people who power innovation and economic growth. The ability to rapidly mobilize talent from such concentrations is a tremendous source of competitive advantage for companies in the time-driven Creative Economy"(Florida, 2002).

Usually Creative Class people pick a place they want to live, and then focus their job search there. The factors that creative people values in location according to Florida are:

- Thick labour markets
- Lifestyle
- Social interaction
- Diversity
- Authenticity
- Identity
- Creative friends
- Quality of place

Creative Class do not suppose to work only within one company and for that reason, they need thick labour market with many employment opportunities. The city should offer the variety of lifestyles and "scenes": music scene, art scene, technology scene, outdoor sports scene etc. The sociologists Richard Lloyd and Terry Nichols Clark of the University of Chicago note that "workers in the elite sectors of the post-industrial city make 'quality of life' demands, and ... increasingly act like tourists in their own city." which result in that a community's ability to facilitate social interaction appears to be more important in a highly mobile. This issue Professor Törnqvist identify as need for 'meeting place'.

Creative people are drawn to places known for diversity of thought and open-mindedness. They actively seek out places for diversity and look for signs of it communities. The signs of diversity include people of different ethnic groups and races, different ages, different sexual orientations and alternative appearances such as significant body piercing or tattoos. Authenticity of community projects in historic buildings, established neighbourhoods, a unique music scene or specific cultural attributes or in another words it offers unique and original experiences.

San Francisco, Austin, San Diego, and Boston are identified as creative cities that offer lifestyle options that made it much easier to attract top managerial and technical talent. The physical attractions that the most cities focus on building as sports stadiums, freeways, urban malls, etc. are irrelevant, insufficient or even unattractive to many of Creative Class people. What they look for in communities is the opportunity to validate their identities as creative people. Florida, as well Professor Törnqvist, claims that to stimulate creativity it is not enough by building high tech parks. He rank cities in their ability not only to attract the creative class, but also to transform that advantage into economic prosperity

In February 2004, Florida Richard together with Tinagli Irene made public a rapport "Europe in the creative age" that measures nations' ability to attract, retain and develop creative people in order to compete and prosper in the global economy. Florida present measurements that are based on the 3Ts of economic development i.e. Technology, Talent and Tolerance. He also develops a new indicator the Euro-Creative Index that is compound measure of overall competitiveness performance. How the 3Ts are related to each other and how they contribute to the Economic Growth illustrates in the Figure 20 in Appendix 5.

The rapport shows that the Creative Class is growing rapidly in a majority of the European nations. In Sweden, the 21.18 % of total employment is creative occupation comparing to US 30.08% that is on the top of the list. According to the Euro – Creative Index, Sweden is best country in the world in attracting creative class and has the strongest competitive advantages. The figure 15 summarise the study by ranking nations and presenting all indicators included in the Euro- Creative Index (see also Appendix 5).

Euro-Creativity Index		TALENT INDEX			TECHNOLOGY INDEX			TOLERANCE INDEX		
		Creative Class Index	Human Capital Index	Scientific Talent Index	Innov. Index	High Tech Innov. Index	R&D Index	Attitudes Index	Values Index	Self-Express Index
Rank	Score									
1. Sweden	0.81	8	7	2	2	3	1	2	1	1
2. USA	0.73	1	1	3	1	1	3	n.a.	13	4
3. Finland	0.72	4	6	1	4	2	2	3	5	10
4. Netherlands	0.67	3	2	10	6	4	8	5	4	2
5. Denmark	0.58	9	15	4	5	5	6	7	3	3

Figure 15: The Euro-Creativity Index (Florida and Tinagli, 2004)

The third Index is the Tolerance Index that Florida identifies as a critical source of competitive advantage today; however, it is not common in economic models. In his book "The Rise of the Creative Class" Florida discovers that the more open and tolerant a place is, the more talent is able to mobilize and attract. The Euro-Tolerant Index combines three measurements: The Attitude Index indicate attitudes toward minorities. The Values Index is based on attitudes towered God, religion, nationalism, authority, family, women's rights, divorce and abortion. The Self-Expression Index measure attitudes toward self-expression, quality of life, democracy, science and technology, leisure, the environment, trust, protest politics, immigrants and gays. The research shown that Sweden has highest Tolerance index in Europe and higher than USA.

4.3 Intelligent city

Following introduction on the evolution of intelligent cities around the world, presents a number of key criteria and critical success factors in developing an intelligent city. The concept Intelligent City is in working process. There are various suggestions of what should characterise an intelligent city. Most of the definitions of an intelligent city are based on the information technology perspective.

The World Teleport Association, a non-profit trade association representing the key commercial players in broadband, organised a special interest group Intelligent Community Forum (ICF) to presents annual Awards for Intelligent Community. The "Intelligent city awards" is given to cities that use broadband technology to create wealth, advance the lives of citizens and provide internet access to each of its citizens and to express a clear vision of a "broadband future" (WTA update, 2000). Intelligent Community (also the wired city, smart community, or e-city) has broader definition and includes not only towns and cities but also counties or regions that views broadband and information technology as the new essential utilities. The Intelligent Communities, according to ICF, help their citizens and businesses to turn broadband into prosperity — through education, training, innovation, e-government, technology access programs and efforts to stimulate a creative and vibrant business culture. An Intelligent Community create a culture of use for that technology and train their citizens to take advantage of new jobs, provide resources for low-income citizens to benefit from broadband, and work to deliver government services in electronic form more cost-effectively and efficiently than ever before (www.intelligentcommunity.org).

The five critical success factors for the creation of Intelligent Communities according to the ICF are:
- Broadband infrastructure
- Knowledge workforce
- Innovation digital democracy
- Marketing

These Intelligent Community Indicators should provide the first conceptual framework for understanding all of the factors that determine how competitive a community will be in the Digital Age. The ICF organisation has combined their own list of intelligent communities including among others cities Singapore, Dubai, Osaka, Calgary etc. For the complete list look at: www.intelligentcommunity.org/html/Profiles.html.

It is interesting to point out that Sweden that is among world's leaders in terms of IT, according to OECD, is not on the ICF's of intelligent communities. Sweden has a long-term public and governmental support for technology such as tax-breaks for employees buying a

computer, programmes designed to provide free internet access for students and efforts to provide all children with access to PCs (Edvinsson, 2002). However, I find ICF's definition rather narrow and believe that the concept of an intelligent city should include more aspects than mentioned.

One of the most concrete definition of an intelligent city have been made by Nicos Komninos Professor of Urban Development and Innovation Policy at Aristotle University of Thessaloniki in his book "Intelligent cities" (2002). Komninos defines intelligent cities as 'islands' (communities) where the innovation processes meet the digital world and the applications of the Information Society. The human community's intelligence increases by handling and expending its knowledge and its ability to solve problems with help of new tools provided by this digital environment. According to Komninos, the **functions** of an intelligent city are those related to the production of knowledge (R&D), technology transfer, funding innovation, new product development service and the production process, technological collaboration activities, and networking (See Figure 15). These functions are performed in parallel both in *real space* with direct human interaction and in *virtual space* via IT and telecommunications technologies interaction (Komninos, 2002).

R&D: Research and development
TT: Technology transfer
FIN: Financing of innovation
PD: Product development
NET: Networking

Figure 16: Components of an intelligent city (Komninos, 2002)
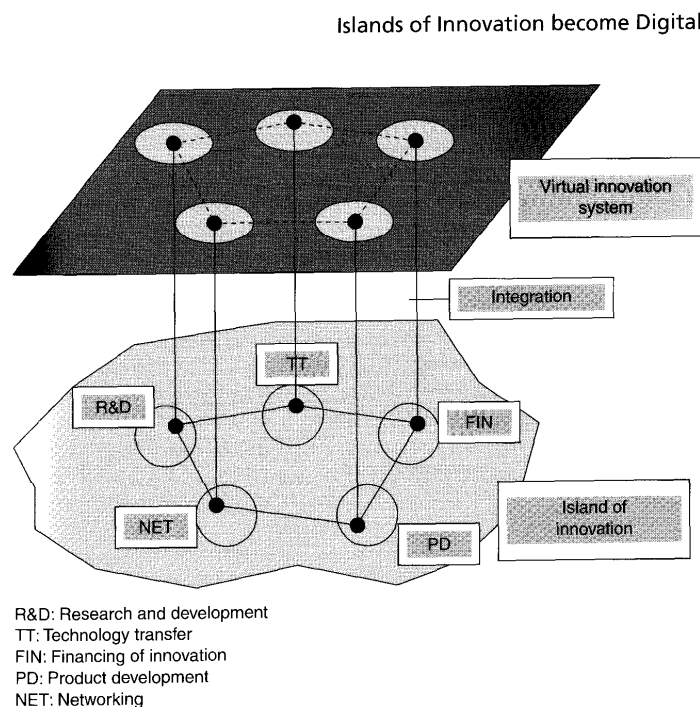
Komninos identifies three basic components of an intelligent city. *The island of innovation* formed out of a real community of scientists and producers and an environment within which social relations transform scientific knowledge into new products and where a constant renewal of production processes and exchanges take place. Examples of inlands of innovation

are clusters of industries or services, the flexible industrial district, the science park, the technology park and the innovation centre. *The virtual innovation system* includes knowledge management tools along with intelligent agents and ICT systems for online operation of knowledge and innovation function. At virtual level communication solutions provided by Internet such as web and multimedia applications, online service, remote education application etc. are of importance. *The connection between the real and virtual innovation system* – the function of the island innovation in order to work in the virtual space is the 'de-materialized' throughout its deconstruction down to its basic elements, codification of its base procedures and reconstruction with the use of methods and t it is not simple projection

In following figure Komninos illustrates the connection where different models of innovation environment may be connect with the same virtual innovation environment.
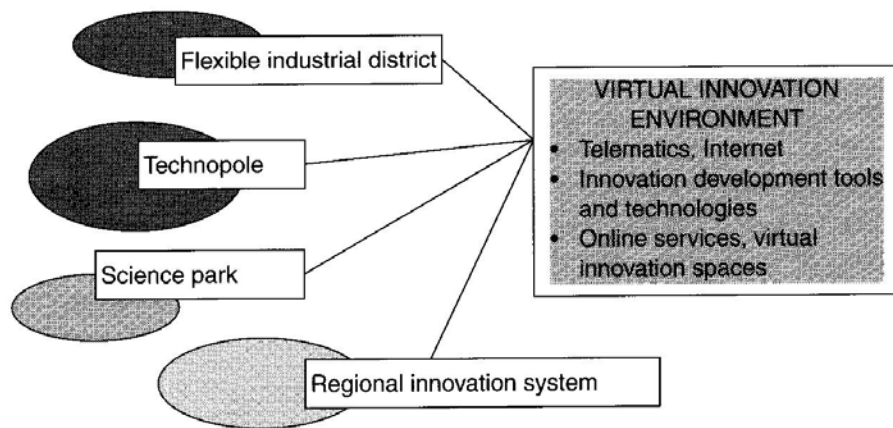
Figure 17: Interconnection between the real and virtual innovation environment (Komninos, 2002)

Innovation process occurs in the real system while a series of tools and technologies to manage the innovation process are transferred to the virtual level. The core structure of the virtual innovation environment is constitute of following tools that Komninos divide into three categories: (1) Telematics and online communication tools and technologies in form of Internet applications as web pages, databases, search engines etc., (2) Innovation development and knowledge management tools and technologies e.g. technology audits, technological evaluation, benchmarking, re-engineering, etc., (3) Online services and utilities that offer various useful applications on knowledge management and innovation.

Virtual component make processes in an island of innovation easier and faster. All these processes such as the development of knowledge, technology transfer the creation of new products and procedures, networking and collaboration are of essential for the knowledge economy and prosperity conditions in the twenty-first century. Komninos identifies beginning of intelligent cities with a radically different urban system where the basic components such

as universities, exchange malls, industry districts, science parks, recreation zones etc. operate on the real and virtual level.

George Bugliarello, chancellor of Polytechnic University in Brooklyn, N.Y., brings up a new aspect of an intelligent city not only the technological. He says that an intelligent city is one that has the ability to successfully self adapt to threats and to change. Self-adapting capability of a city can be increase with help of new instruments and capabilities as sensors, geographic information systems, telecommunications, the ability to simulate and rapidly assess trends and a responsive management structure. Then Bugliarello adds: "A city intelligent must also be efficient in its use of resources, including human ones." He is highlighting the importance of education. This is also, what can be seen from the research of Dr. Nick Bontis as drivers for wealth of regions. Education is essential to the city intelligent and efficient, not only traditional education, but also an education for living in the city as the core element of civilization." As example he refer to how to behave in crowded situations and in traffic, how to reduce pollution through modification of one's behaviour, how to learn to participate effectively in community decisions and understand the underlying issues (www.poly.edu), which connect the concept of an intelligent city to the intellectual capital paradigm.

Jan Sturesson, the marketing director of Komrev and partner at Öhrlings PricewaterhouseCooper, in his description of an intelligent city brings emphasise on creativity and leadership of an intelligent city. Sturesson says: "It is not enough only with intelligent individuals to call one city intelligent." Intelligent individuals are a good prerequisite, but even more important are creative people with many new ideas, which is part of intelligence. However, it is not word about education and the classical way of looking on intelligence - they are of course important. The most important is that a city's leadership have ability to create renewal, see things in a new way. They must dare to try new ideas and to mix various participants e.g. politic, administration, companies, associations, individuals with strong personality in the city. In the same time, they must create meeting place or arenas for those in order to exchange the ideas. The problem with the good ides is that they demand a lot, especially a lot of hard work to be realised. The most important demand on leaders is to practises leadership in such way that the visions and ideas be reality. Actions are very important. "Vision without action becomes a meaningless dream" (Sturesson et al. 1999). If we want an intelligent community then the municipality must do it, make actions. However, instead of being producer municipality should be facilitator, provider of potentials for citizen, companies and associations so that they can make the substance. It is crucial that the intelligent municipality has the ideas that facilitate all this (Sturesson, 2003).

Furthermore, says Jan Sturesson about intelligent cities: "The cities are competing for the inhabitants, which lead us to the conclusion that the intelligent city a city that manages to attract the inhabitants to live and establish their businesses in the city." As the result a cities appearance and cultural milieu gets very important as old buildings with new designs, etc. Furthermore, an intelligent community has to have a very good organised intelligence, be able

to see what happens trough time i.e. analyse, make conclusions, define their reality. The next step would be to develop the strengths and eliminate weaknesses. That is how we create visions, ideas, and a strategy; and how we will create the future, says Sturesson. It is essential that municipality have the power to implement all this. Many city governments stay in analysing phase and never pass to formulating and implementing phase. The balance between these three phases is decisive (Sturesson, 2003).

Professor Leif Edvinsson (2003) elaborated a following list of characteristic that should attribute of an intelligent city:

- Attractive
- Emphasises the values
- Mobile city with network access to various cluster and meeting places / Know-who
- Communicative city with good logistical flow and flexibility
- Wealth creation
- Safe and peaceful city
- Geographical position
- Healthy, fresh and humane city / Quality of life
- Curious city with active interface towards the unexplored
- Generous city with culture capital & coherence
- Cooperative city with high value making trough various interfaces
- Action intense city with different active interface

5 What was Ragusa?

In this chapter introduces the thesis case study by briefly describing the history of Republic of Ragusa. Further, the chapter presents my attempt to identify Ragusa's sustainability factors illustrated with examples extracted from diverse literature.

What all literature fined an amazing about Republic of Ragusa had be summarised in the following text written by Robin Harris, the author of the book "Dubrovnik: a history": "Its diplomatic expertise was legendary, its political stamina extraordinary; its merchants, trading throughout the huge Ottoman Empire, enjoyed privileges denied to other Western states. A politically skilled and commercially enterprising ruling class took every opportunity to maximise the Ragusan Republic's wealth. Dubrovnik's [Ragusa's] prosperity and stability enabled it to become a richly sophisticated cultural centre" (Harris, 2003).

Figure 18: Ragusa (Dubrovnik) today (www.dubrovnik-online.com)

City of Ragusa has preserved rich archive about links, contacts, influence and life together between Republic of Ragusa and other countries of Mediterranean and Balkans. The archive has very well documented culture-economic history of Ragusa, which is making possible for researchers to explore and learn from the past (Vinaver, 1960). The story about Ragusa begins in the first half of the 7th century when a group of refugees from Greek-Roman city Epidaurum established their settlement on a peninsula that was closing deep and sheltered bay appropriate for building harbour. As the city was developing, the bay was totally covered and settled, creating the city's current shape (Peković, 1998).

The settlement gets its name after the rock on which it was established "Laus" (Greek word for rock) or Lausion then letter "L" changes to "R" and the city finally gets the name Ragusium. The city's Slavic name Dubrovnik is derived from the word for forest "dubrava" that ones surrounded the city. The City Walls were built from the eighth until the sixteenth century and they surround the entire Old City. According to Peković, the city educated diplomats and ambassadors, which struggled and pleaded for existence of city so that they rarely need to use weapons or the city walls for defence (Peković, 1998).

From its establishment the town chose the Byzantine Emperors as a protector from enemies, above all from the Venice. However, after the Crusades in the year 1205, Ragusa fall under control of Venice and continue until 1358 when by the Peace Treaty of Zadar becomes part of the Hungarian Kingdom. At this time, Ragusa was allowed to establish the self-government and in return, they had to pay a tribute to the king and provide assistance with its fleet. The Republic of Ragusa reaches its peak in the 15th and 16th centuries (www.dubrovnik-online.com). During the sixteenth century, the total area of the republic was 1,092 km2 with a population of 80,000 inhabitants (See: Appendix 6). The Ragusa was a small commercial city-state prospering from the trading connections, especially during wartime between West and East. Ragusa had many special trade agreements with various cities that included pass trough their countries or liberated Ragusa's merchants from taxes on goods sold. Thanks to an effective and efficient trading organization, by the end of 15th century Ragusa had largest fleet of merchant in the Adriatic. Ragusa's 'world' was in the forefront the Balkan Peninsula, then Mediterranean and the Orient (Carter, 1972). Ragusa had trade colonies in many towns in nearby Bosnia, Belgrade, Istanbul, and Sofia (Dedijer, 2002). During the second half of the 18th century, Ragusa's government established 60 consular offices in almost all more important cities in the Mediterranean (Carter, 1972). (See: Appendix 7)
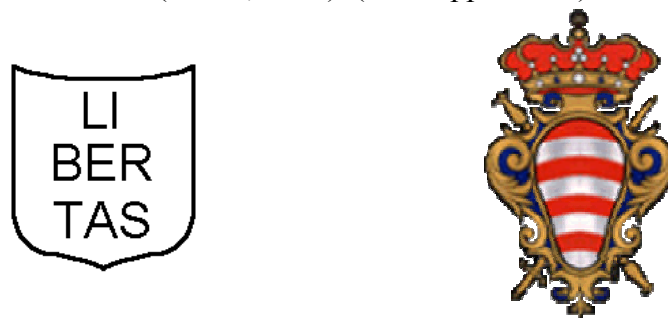
Figure 19: The flag and arms of Republic of Ragusa (**http://flagspot.net/flags**)

The Republic already used the arms in medieval times. As the only Dalmatian town free from Venice, Ragusa had between year l358 and l806 written "Libertas" on its flag. Other symbols of sovereignty were mint gold coins or silver florins and Republic's seal. The city's patron St Blais was a symbol of independents as well (Harris, 2003).

In 1526, Ragusa becomes vassal state of the Turkey Empire and starts to pay *harač*, the annual tribute to the Sultan. However, Ragusa saw this tribute as a price for peace, territorial integrity, and privileges for citizens of Ragusa inside the Turkey. Sultan did not interfere in Ragusa's government. The Republic had right to be neutral in Turkish wars and even to have contacts with their enemies due to the strategic information that Ragusa provide all part involved (Vinaver, 1960). The discovery of the New World caused a crisis of Mediterranean shipping and started the decline of the Republic Ragusa. The great earthquake of 1667, culminate a series of Ragusa's misfortune by killing ca 5,000 citizens and destroying much of the town. Gradually Ragusa rose from the ruins and started to rebuild the city, but it never came back to its old glory. Finally, in the year 1806 for the first time in her long history Ragusa was occupied. In 1808, Napoleon's General Marmont abolished the Ragusa Republic (Carter, 1972).

Ragusa's inhabitants were divided into three classes: nobility, citizens, and artisans or plebeians. Nobility had all effective power, while the citizens were allowed to hold minor offices and plebeians were powerless (Harris, 2003). Nobles of l8 years of age and older were elected as village chiefs (Dedijer, 2002). Rector's was elected for a term of office for only one month and he was qualified for re-election first after two years. In Rector's Palace could only rector work and live, his family stayed in their own house. The administrative bodies were:

- The Grand Council (supreme governing body) consisted of nobles that took their seats in the Council at the age of 18.
- The Small Council (executive power) was elected by the Knez or Rector
- The Senate worked as a consultative body. It consisted of 45 invited members (over 40 years of age). (www.dubrovnik-online.com)

5.1 Ragusa's sustainability factors

After researching available literature about Republic of Ragusa, I extracted a list of Ragusa's sustainability factors. The factors are derived from the aspects that have revealed as significant for the city's survival and development. Some of them are unique aspects of the Republic of Ragusa characterising the 'golden age' in fifteenth and sixteenth centuries. Here presents them in due order:

- Organised Intelligence and Security (I&S)
- Political stamina and government engagement
- *The Spirit* of Ragusa
- Diversity
- Rich cultural life and its diversity
- Scientific environment and knowledge tradition
- Favourable geographical position and infrastructure for transport and communication

5.1.1 Organised Intelligence and Security (I&S)

According to Professor Dedijer, historians have underestimated the role of the Intelligence and Security in Ragusa's history. The city managed to survive trough five centuries largely thanks to its intelligence. In his article "Ragusa intelligence and security 1301-1806: A model for the twenty-first century?" Professor Dedijer gives a summary of his exploration of the Ragusa's Archives that contains thousands of documents sent between the government of Ragusa and its consuls. The study shows that the city used all human and technical sources available for collecting of relevant strategic information. The government organised its consuls, merchantman situated in trade colonies, village captains and other Ragusans abroad to be the city's "eyes and ears" (Dedijer, 2002). "The Dubrovnik [Ragusa] consuls sent up to date, precise, and relevant information about political, military, and commercial situations. On the basis of such reports, the government of Dubrovnik could make the required decisions and take positions in specific conflicts to maintain its neutrality and thus advance its commercial interests" (Mitich I. cite by Dedijer, 2002).

Robin Harris identifies as well importance of intelligence in Ragusa's history. He says:"But in fact, Dubrovnik's [Ragusa's] importance to the Habsburgs went far beyond the sums foregone with the ending of the tribute. The city was a vital source of information, and agents there supplied whatever was lacking in the intelligence which the Ragusan Senate itself found it prudent to transmit" (Harris, 2003). "Also the city was a useful point of contact for the Turks with the Mediterranean world particularly during wartime, and also a good source of strategic

information" (Carter, 1972). "Ragusa used the information to solve specific political problems and to obtain the good will of the surrounding powers." (Dedijer, 2002)

Furthermore, Professor Dedijer refers to the document that verifies that the first European Intelligence and Security service emerged in Ragusa. In the document from 1301, the Senate decided to choose the men that will be responsible for the fortification and security and to explore all information available inside and outside Ragusa's Republic. The collected information was later presented to the Prince (Dedijer, 2002).

5.1.2 Political stamina and government engagement

"Ragusa defended itself by diplomacy." (Dedijer, 2002)

After reading various texts about Ragusa, it comes clear that the Government's passionate engagement in diplomacy was making the city more sustainable then other cities in history (Vinarev 1960; Carter 1972, 1977; Pekovic 1998; Dedijer 2002; Harris, 2003). However, Professor Dedijer says that diplomacy is worth nothing without proper intelligence. The government must be informed what is happening in the world in order to be able to act (Dedijer, 2003).

The city government engagement illustrates, for instance, in the given detailed orders to ambassadors on how to act when they are abroad, as well how to manage diplomatic issues with other countries. Sometimes they took even extreme measures such as begging and crying (Vinaver 1960, Dedijer 2002). The ambassadors were as the most important diplomatic agents of the Republic of Ragusa; as they were also entrusted with special judicial powers to exercise in the Ragusa is trading colonies. The ambassadors would report back to and receive instructions from Ragusa as the negotiations evolved (Vinaver 1960, Harris, 2003).

The wars in Europe, sometimes placing Ragusa on the edge of extinction, were prevented by the city government's insightful diplomacy. The government manage to stay neutral in the wars and to turn the neutrality in commercial advantages (Carter, 1972). Ragusa had rapidly growing commercial powers but their military was relatively weak. For that reason, they always had outside protection and were prepared to swallow its pride and pay tribute to the great powers (Harris, 2003). Ragusa's policy was "to have no friends or enemies, only its own interests." (Lord Palmerston cite by Dedijer, 2002). The policy of neutrality was a reflection of the two worlds in which Ragusa's citizens lived. As Slavs they were ethnical similar to the local rulers of the Ottoman hinterland, but their cultural tradition was mainly Italian (Carter, 1972)

Professor Dedijer identifies following governing rules as the typical to Ragusa's government, which indicate striving towers democratic ruling:

- It is better that a republic be governed by laws than by men
- A prince by election is better than one by succession
- Citizens of moderate means better love their Princes and country than the rich, who refuse to have anyone above them.
- To govern a republic, it is best to imitate the great god of nature, who does everything little by little, almost unobserved

Above the door of the Senate chamber in the Prince's palace stands engraved "**Obliti privatorum - publica curate**" or "Forget private interests (as you) manage public ones" (Dedijer, 2002).

5.1.3 The spirit of Ragusa

In his book, Peković point out the city's courage, intelligence, diplomacy, which insured gaining, and keeping of freedom and independence. Combining all data about Ragusa and its citizens gave me an impression of strong spirit of the city that stayed in the families for generations throughout many centuries. The Ragusans did not only supply its government with strategic information when they were abroad, they have been engaged in the city and commercial development. They did not only have same ambitions and values they had the common spirit.

A good example of citizen's strong connection to the city is scientist Ruđer Bošković. However, away almost all his lifetime, Bošković never lost his links with Ragusa. It says that he never stopped to care for the welfare of his native town. He was always ready to answer on question from the Senate and to assist in diplomatic and political issues (www.dubrovnik-online.com, Dedijer, 2002). Nevertheless, he is just a one example among many Ragusans living abroad. Carter writes about Ragusans, "they were full of a real, if somewhat narrow, patriotism."

5.1.4 Diversity

According to Carter, intensive immigration was a big issue in Ragusa. The immigrants came to Ragusa from all parts of the Balkan peninsula. Others came from the northwest and the southeast Dalmatian towns, the third group came from Italy. While, already in the thirteenth century, Albanians started to migrate into the city. Furthermore, Ragusa became the refuge of

many noble and wealthy families that fled from the Turks Due to Ragusa's position between the Italian and Slavonic elements (Carter, 1972). All these immigrants contributed to the city's diversity and cultural richness.

The search for wealth was the prime reason for all the migrations from the north and inland towards the richness of Ragusa that was certainly well known. The inland peoples also knew that all sorts of privileges were granted to the Ragusa's *peasants* (kmets), who were respected, sheltered and able to share some of the gains accrued from the republic's power (Carter, 1972). The motto of the republic's landlords was 'keep homogeneous'. This was applicable as a principle, regardless of the class a citizen belonged to, and to some extent must have prohibit any chance of particular nation developing their individuality. The main aim was to keep this homogeneity within the state so that the territory could not be broken up by political or religious differences (Carter, 1972).

5.1.5 Rich cultural life and its diversity

The cultural life of the Republic of Ragusa has been proved greater than one would have expected for such a small city-state. The city's cultural development was exposed to many diverse influences. The prosperity gained from commerce enabled the Republic to invest in the cultural development of the area. The architecture of Ragusa is peculiar and distinctive that it is ranked as a style by itself. Ragusa's literature and science was more distinguished than its art. The government of Ragusa invited foreign masters, mainly from Italy, to paint on the churches and other monuments of the city. Carter assumes that Ragusa's citizens were contented to carry on with the problems of commerce and leave any artistic work to people more able than themselves (Carter, 1977). Carter identifies Ragusa's literature as of a 'threefold nature' due to that her citizens wrote in three languages: in Latin, Italian and Slavonic. "…so mixed was the character of the people that in many instances the same author composed works in all the three languages." (Carter, 1972)

5.1.6 Scientific environment and knowledge tradition

All individuals that took an active part in the commerce life that was vital to Ragusa had a basic education. However, Ragusans were more educated than that. In the fourteenth century, the Ragusa's government starts recruit Italian tutors. Education had an important role in the life of Ragusans it meant the status and privilege (Harris, 2003).

Ragusans put great emphasise on the language skills. Just as they had created a special 'Slavic Chancery' to cope with the business of negotiation with neighbouring Slavic rulers, so in the

sixteenth century a new 'Turkish Chancery' was established to receive Turkish letters and translate them into Croatian or Italian. The most important, however, were so-called *dragoman*s, interpreters specially trained to the performance of Ragusa's negotiations with the Porte. A future dragoman was educated from youth for the task. He began his studies in Ragusa thought by a Turkish priest that was often brought to the city to act as tutor. Then the trainee was sent to one of the great Ottoman cities for two or three years to complete his training. He would later act as assistant to a serving dragoman or perhaps return to work in the Ragusa Turkish Chancery before undertaking minor missions and, finally, the supreme responsibility of accompanying the ambassador to Constantinople. An experienced dragoman would also build up a range of personal contacts with the Porte, which often allowed him to make a substantive contribution to the diplomatic mission (Vinarev, 1960; Harris 2003).

"The Archives also contain evidence of Ragusa's technological intelligence effort; for example, the appearance of artillery, shipbuilding, and information about economic changes in the Mediterranean after the discovery of America" (Dedijer, 2002) Ragusa gave to the world several men of science, two of whom deserve to be remembered are Marin Getaldić (Marino Ghetaldi) and Ruđer Bošković (Ruggerio Boscovic, or Boscovich). Living in the eighteenth century Bošković was a mathematician and natural philosopher. Marin Getaldić, less know, was one of the first astronomers and natural philosophers in Europe. "Ragusa's science men put the city on the worlds map and increased pride of the natives" (Harris, 2003)

5.1.7 Favourable geographical position and infrastructure for transport and communication

Ragusa had important geographical position, where nature and history made conditions for development of settlement with superior historical and cultural heritage (Peković, 1998). The Republic dominated the hierarchy of economic levels during the Middle Ages, since they had the strategic positions linking the inland routes with the sea that enabled the city to prosper though trade and export. The caravan trade was vital in facilitating the prosperity and rise of merchant republic of Ragusa. At the same time, the caravan routes, with their important crossroads and relay stations, contributed to development of Balkans (Carter, 1977).

In Medieval and Renaissance era, the *forum* and the *piazza* served as public meeting places or public rooms. In cramped city centres, people moved around on foot and the Mediterranean climate made it possible to meet out of doors (Törnqvist, 2003). This description of meeting place is similar to setting in the city of Ragusa.

6 City of Lund

For introducing Lund to reader, this chapter presents a number of feasibilities of the City of Lund. The results from the interviews will be presented as well to illustrate some current issues and organisation of the city's intelligence.

Lund has many qualities that are of importance and worth to mention, however, the object of this thesis is not to describe Lund in depth. For the purpose of facilitating my analyses and introducing readers outside of Lund into the city's characteristics, I briefly describe some of the Lund's attractors.

Lund municipality is placed in south of Sweden with population of ca 100.000, it is the twelfth largest municipality in Sweden. The city has young population, 21% of the city's inhabitant is between age of 20 and 29. The large number of students at the University is resulting in a high migration in the city. Every year at the end of spring term moves out about 5.000 students and the same number of new students moves in at the beginning of autumn term. The students generally stay in the city for three to six years to finish their education and then move out. Nevertheless, a large number of them stay in Lund, 58% of residence in age between 25 and 64 has a university education (24% in the whole Sweden) (www.lund.se).

Lund is recognised as a city of innovation and new thinking, very much thanks to the University, the Science Park and its innovative companies. The municipality has recently formulated a new vision for the city - "City of Ideas". The city offers many meeting places for its multicultural population in cafés, lecture halls, laboratories and restaurants. Lund has the attributes of a large international city and some of them are presented in the next segment.

6.1 Lund's sustainability attractors

The Lund's strengths are demonstrated in terms of scientific and educational milieu as well as technical, infrastructural, social and cultural conditions. The data about Lund's 'attractors' is combined from the Lund's official homepage (www.lund.se), ESS Scandinavian homepage (www.ess-scandinavia.org) and Professor Törnqvist's book from the 2002 with the title "*Science at the Cutting Edge*". Lund's features to attract citizens and companies are following:

An academic and scientific environment. "In Lund, the knowledge is concern of all" (www.lund.se). Lund is one of the major Scandinavians University cities with a long academic tradition since 1666 when the University was established. In Lund has concentrated more than 34.000 students of which 3.200 are researchers. The first Sweden's research park, the Ideon, was established in 1983 as the result of collaboration between the University, the City of Lund and industry. Today with over 400 companies within information technology, telecommunications and biotechnology the Ideon has great impact on the cities development.

Lund is a part of the context of Öresund region (the cross border region between Sweden and Denmark). Öresund region consists of Skåne (Scania), Själland (Zealand), Lolland, Falster and Bornholm. Since 1 July 2000, the Öresund bridge has linked Swedish and Danish sides. The Öresund region is in an international perspective very attractive. It is a widely held view that the Öresund area has excellent opportunities to participate in the competition between the dynamic regions of Europe (Törnqvist, 2002). The City Council is working on to give Lund a key function in the Öresund region. The Öresund University is cooperation between eleven universities and institutions of higher education involving 130.000 students and 10.000 researchers from the Öresund region, while the Stockholm-Uppsala region has only half as many. This cooperation gives opportunity of a very large range of educational alternatives to choose. Other examples of collaborations projects in the area of international research are the Medicon Valley, the IT Öresund, the Öresund Food Network and the Öresund Committee.

High-Tech industry environment. The city of Lund host rapidly growing high-tech industries, particularly in biotechnology, pharmaceutical, and telecommunications areas mostly placed in science-park Ideon. The University Hospital and the trade and industrial sector continuing a close research collaboration as well as with several other major universities and institutes of advanced study within the Öresund region. The range and number of companies make diversity in jobs opportunities.

The Lund municipality is supporting business development by making and presenting the city as an attractive location for enterprises. The city's government intention is to abolish the barriers between the University, the business community and the public sector in order to facilitate the city development. Further, the City Council is investing in a new area for companies of the innovative technologies in Brunnshög close to the science park Ideon. Many global companies that chose to place their R&D departments in Lund among them are Ericsson and AstraZeneca but also Tetra Pak, Gambro, Alfa Laval and many others.

Quality of life. Lund as a part of the Öresund region offers rich cultural and social life, an international atmosphere, recreation and the countryside and international schools. To the regions inhabitants offers variety of theatres, cinemas, museums, and art galleries. There are more than 350 cultural and recreational clubs where citizens can meet like-minded people and spend their spare time. The children have opportunity to develop their creative skills in Lund's Cultural School where they are taught music, dance, theatre, photography and film.

Among other cultural heritage is the world's next oldest open-air museum Kulturen and unique museum for sketches and models placed in the Lund's centre. A great deal of attention has been devoted to the environmental effects as well offering many opportunities to enjoy the nature.

Diversity. In Lund live 130 nationalities making the city multicultural. The meetings across cultural and national boundaries create an international atmosphere, openness and curiosity. Exchange students, guest researchers, and a large number of visitors drawn by Lund's international commerce and industry, making the city in to international place. Lund municipality is actively promoting diversity of lifestyles and the cultural diversity that has a positive impact in attracting more people that are creative to the city.

Infrastructure for transport and communication. Copenhagen International Airport, one of the major airports in Europe, can be reached for less then one hour from Lund by public transport as well as airport Sturup on Swedish side of Öresund. The well-developed public transport network enables everybody to benefit from science and culture offered in the whole region.

Global connections. Lund has well developed IT and communication infrastructure thanks to the progressive information technology policy and extension of its digital cable (broadband) network. Every library, every school and organisation has access to the Internet where anyone can use it in creative way. Throughout the University and the global industry, municipality of Lund has possibility to gain benefits from international connections. Professor Törnqvist writes:"Universities in particular act as strategic links between worldwide networks and local environments. These links communicate in two directions. The university links up a place and a region with centres of knowledge throughout the world. They act as intentional connection centres. At the same time, the university mobilises location and regional competence in different ways to create an attractive environment in those places where they are situated" (Törnqvist, 2002).

6.2 Lund's intelligence and other issues

In the present day, Lund municipality has not an organised intelligence; instead, each committee has responsibility to keep informed about respective area. During the interview, Lennart Prytz the Chairman of the Lund's City Executive Committee and member of the City Council emphasises the importance of collecting and exchanging of information with external contacts. However, even though there are many participants in this process, no one is compiling the collected information, nevertheless, analysing and making conclusions from it. It has been considered in the Development program that from the year 2004 writes an introduction to annual budget as background presentation about current environmental situation and brief analyse of changes that may have consequences on municipality's work.

The plan is to make better flow of internal information as well, which the Information Department has for responsibility to organised (Prytz, 2003).

Lund's municipality dedicated the last 2003 to strategic conditions of the city and its Development program. All administrative managers and politicians in the City Government were working together on important strategic issues of the city. This work was done with the help of a consulting company. Previous environmental analysis that Lund's municipality made was for eight years ago - for the same purpose. The municipal leadership realised that 'it was time' to look again on the city's conditions and to raise eyes from agenda. Lennart Prytz explains this lack of organised intelligence by everyday matters that must to be done and which take the most of the working time. Evidently, such project must be budgeted and financed as well, which may be a difficulty. Prytz agrees that environmental analysis should be made more often, for instance, every three-four years after every term of office (Prytz, 2003).

Dimensions as cities appearance, municipal activities, and city government's attitude build "trademark" of Lund. Outside world, recognize Lund trough the University, the University hospital, the Cathedral, and the industry (Tetra Pak, Ericsson, Gambro, etc). The problem is that the City Council does not have control over those "trademarks" of Lund (Sturesson, 2003). According to Jan Sturesson, Marketing Director of Komrev and partner at Öhrlings PricewaterhouseCooper, an intelligent city government should taking reasonability over what is happening inside the city borders without having control over those operations. The operations that municipality has control are pre-schools and day-care, elderly care, environmental work, maintenance of streets and parks, etc. The pitfall where many municipalities fall is IT and high-tech. Jan Sturesson emphasises that 'high-tech' must be followed by 'high-touch', i.e. feeling, framework, experience and city's milieu. According to Sturesson, the municipality of Lund is going in right direction; however, they are still focused on their own operations (Sturesson, 2003).

Furthermore, Lund has different arenas, one for municipal politics, one for industry, one for young people, one for associations and companies (Sturesson, 2003). The University, the industry and the public sector had they own picture and understanding of the city. Therefore, the city's municipality decide to engage a consultant to work along with the University, the science park Ideon and the public sector in order to insure that all have a common picture of Lund that will be presented to the outside world. In Development program, the municipality expressed its intention to promote Lund. It is planning to do it with help of the companies placed in the city and the University. Many citizens of Lund work within international companies and travel a lot. The municipality's plan is to distribute an 'information portfolio' about Lund, which citizens could show to their colleges in other places in the world where their company is stationed. Furthermore, the municipality had established a network with 12 Swedish ambassadors in the world that origin from Lund, which will as well get the information portfolio to be able 'spread a word' about Lund (Prytz, 2003)

According to Peter Sörbom, the Executive Manager of Trade & Industry of City of Lund, there is a lot of knowledge in the city; however, it is not obvious that the city use this knowledge in that way that would make the city intelligent. What Lund is missing is kind of administration that will collect information and give the big picture of situation. Peter Sörbom underline that Lund does not have a lack of intelligence, but the city is missing a coordination of the intelligence sources on the surrounding world. The possibilities in Lund are bigger than municipality is actually doing. The city should collect the strength that exists here instead to work in smaller areas (Sörbom, 2003).

The University, the industry and the public sector in Lund have always cooperated and had contacts. However, according to Peter Sörbom, these three sectors never worked together for city of Lund's development. These relations exist but not in productive way. All three sectors offer different attractors for citizens. University with its knowledge and international contacts, the industry with the Ideon and the public sector with primary schools, recreations centres and environment etc. There are many meeting places and associations in the city where people can get together and exchange their ideas. However, there is no such association that takes as their task to lead the city into the future with motto 'For the New Lund' or similar. Peter Sörbom suggests creating of Lund's development association combine of the public, the university and the industry sector. An association that would include people that wants to be engaged and has ideas how to develop the city and make changes. The association would be responsible to detect what is happing in surrounding world and what must be done in order to adapt to the changes (Sörbom, 2003).

One of the problems is that many of the international companies that are placed in Lund are not "Lund companies". The companies do not feel to belong to the city. There are global companies and they usually have only a fractions of its company placed here. Today companies grow globally and not in the city, a company with staff of 100 is classified as a big company. Some global companies choose to place their R&D in Lund. For instance, in order to fulfil the Brunnshög research park's purpose of being centre for research and development is necessary to attract many companies. However, Sörbom underlines that it is not about attracting companies; it is about attracting people.

I would like to finish this chapter with Jan Sturesson words: "Lund is not known as the most progressive city in Sweden. However, in the last years they have started to work with those big strategic questions and to think in a new way."

7 Analyse and evolution of results

This chapter is presenting analyse and evolution of results from the thesis research. Initially, I present lessons learned from the case study by summarising the Ragusa's sustainability factors and relating them to the city of Lund. In the next segment, I present my attempt to identify components of an intelligent city, which are in the end of this chapter related to the city of Lund with other issues of the contemporary economy.

7.1 Lessons learned from Ragusa

Before identifying the lessons learn from Ragusa's history, I would like to make some comparisons between the Ragusa's era and Lund's presents. As the major differences between the Ragusa's and Lund's days, I identify the *rapidly changing world*, the *notion of time* and the *globalisation*.

One of the consequences of the current dynamic world is that cities have shorter time to react on and adapt to upcoming changes. In Ragusa's time could go years or decades between two innovations, but nowadays, we are talking about hours. It took days and sometimes months for Ragusa's ambassadors to come home with the valuable information; today, it takes second or less for information to cross the world. Ragusa's "world" was limited (see Appendix 7) while the current globalisation has result in growing international competition between cities. The scenario where the city of Lund competes with some Chinese or American city for a company is highly possible if not regular phenomena. The quest for information at international and global level for municipalities has increased dramatically in the last decades. While, the information overload, that is result of the Information Society, making more difficult to obtain the relevant information. Nevertheless, Ragusa had organized intelligence and Lund that is a global city and has greatly higher demand for information, does not have.

I conclude that Ragusa's I&S is relevant to today's intelligence environment because it teaches us importance of networking activities and of organising citizens for the city development. If Ragusa managed to derive from its intelligence without any technology and it took months to get information from other continents we can visualize what possibilities has the modern Lund. Eight years between two environmental analyses, as Lund has it today, is a long time in this rapidly changing world. Municipality must be able to predict upcoming changes before they occur in order to organise the city for adaptation. Municipal intelligence is of vital importance for a city due to its contribution to the international competitiveness.

Furthermore, Lund needs to develop its networking potential in order to organised intelligence process. The time it takes to publish information may make the information obsolete, while it is a fact that we people trust mostly to the information that was provided by someone we know. As a result, networking becomes one of the fastest and the most reliable ways of assembling information. Lund's municipality has a plan to organise citizens of Lund to distribute an information portfolio about the city. Nevertheless, the municipality should use the same channels for information flow into the city. One of the most important lessons from Ragusa should be how to organise its citizens to be the city's 'ambassadors' and 'consuls' presenting the city's "eyes and ears".

Ragusa was intelligent city because of the city government that used its international contacts to detect signals from the surrounding world and learned what was happening in order to adapt the city's development to the situation. The Ragusa's leadership was known for its political stamina and governmental engagement or in some literature identified as outstanding diplomacy skills. Their commitment to the city and its citizens was driving force of the city's sustainability. When it comes to Lund, in interview with Lennart Prytz, I got impression of that Lund's leadership is aware of what is important and they are skilled in making a good plan. However, what I really wish to know is how good they are in implementing this Development plan. It is up to further research to observe how much of this plan will be realised. To distinguish if the Lund's current leadership has or has not the political stamina or high government engagement needs as well further and more in-depth study.

The next vital Ragusa's sustainability factor I identified as the community Spirit. This factor is related to the citizens' engagement in the community development and their integration of heterogeneity. Lund needs to work on development of homogeneity between its citizens and create 'THE WE SPIRIT' that will motivate the citizens to contribute to the cities prosperity and sustainability. For instance, the citizens of Lund should long after they leave the city feel connection with the municipality and hold on to it, as Ruđer Bošković did with Ragusa. The high migration of Lund's citizens make it more difficult for the municipality to engage and organised citizens. However, the development of ICT make possible for companies to stay in contact with and collect all possible data about their customers. Therefore, the Lund's municipality could learn from private companies how to be in touch with their consumers i.e. citizens.

Adaptability is very much connected to municipal intelligence. To have enough time to adapt to coming changes and innovations the city must have insights about what is happening in the surrounding world and what to expect. The Lund's ability to adapt to rapidly coming changes, without organised intelligence that could predict them, is questionable. I assume that a well-organised intelligence would probably detect the rapidly growing shortage of housing and helped the Lund's government to facilitate adaptation. For instance, Ragusa kept its ability to adapt to the changing times through the centuries. However, Ragusa's adaptability was challenged with discovering of the New World and the change of the commerce routs. The

Republic's commerce power started to fade with emerging of new technologies in the navy, which Ragusa could not follow.

Both cities have a favourable geographical position along with developed infrastructure for transport and communication. These factors were more vital for Ragusa's sustainability than Lund's. However, the transport and communication are of importance for Lund as well due to the significance of the direct meetings between researchers and other creative people in creating prerequisites for processes of renewal and innovation. The tradition of education was important in Ragusa's history, though due to the current knowledge economy is more emphasised in Lund. Education was central for preparing the young *dragomans* for role of Ragusa's ambassadors. Even here, Lund can learn from Ragusa how to use and prepare its students for the role of Lund's ambassador in the world by teaching them how to present the City of Lund.

However, I would like to extract from Ragusa's history the three most essential sustainability factors that distinguished the city from the others cities. These factors are the organised intelligence, the government engagement and the community spirit/homogeneity. The remaining factors can be identified as combination of those three. For instance, adaptability and presents of new technology in the city are outcome of organised intelligence and leadership's commitment. While government engagement and the Ragusans sprit had resulted in wealth that made it possible to provide a rich culture, education, etc. The remaining sustainability factors can be identified as aspects that make one city attractive and pleasant to live in. The fact is, what made one city attractive in the past is not of interest for today. For instance, the meaning of the concepts 'the quality of life' and the 'rich culture' had changed from Ragusa's time up today. However, the three sustainability factors are providing all these others and their actions are independent from time or preferences.

The three major lessons that Lund's municipality should learn from the case study are following:

1. The first lesson to city of Lund from the Ragusa is importance of well-organized and structured intelligence.
2. City leadership engagement is very important factor. It is up to cities leadership to provide preconditions for wealth creation and organised citizens to contribute to the city's development.
3. What Lund definitively need is stronger community spirit. To provide a bond between people with different institutional interests cooperating for the common good of the city.

The following figure summarise the characteristic of an intelligent city that I extracted from the literature and compared to the city of Lund.

Summering Characteristics of an intelligent city	Ragusa	Lund	Comments
Organised intelligence	X	?	Lund does not have organised intelligence
Government engagement	X	?	Needs more research
The community Spirit	X	?	Must more emphasis and develop in Lund
Cultural life / multicultural	X	X	Both cities have rich cultural life
Adaptability	X /?	X /?	Led Ragusa to its end / Lund has it (so far)
Favourable geographical position	X	X	More vital for Ragusa than for Lund
Infrastructure for transport and communication	X	X	Important factor present in both cities
Global market		X	Ragusa's world was Mediterranean /Lund's the whole globe
Diversity	X	X	Has many positive impacts on the cities
Education	X	X	More important in Lund due to knowledge econ.
Technology innovation	X /?	X	At the end Ragusa did not follow development

Figure 20: Ragusa's sustainability factors applied on Lund (own source)

7.2 Towards a new definition of an Intelligent City

What will be cities of the 21st century? The most of the literature suggests radical changes in a city development due to the current knowledge economy and increased mobility of citizens. Here I submit my suggestion for the concept of an intelligent city based on the thesis research. In the figure at the end of this segment, I illustrate how new components for the concept of an intelligent city derived from the presented theories and the case study (see Figure 20).

The contemporary and the future society should focus on a human intellect instead of artificial i.e. technology. For that reason, the existing concept of intelligent city that is defined from communication technology perspective should get more focus on humans and their intellect and creativity. My suggestion is that an intelligent city should present the concept of the future and include some components from current knowledge and creative cities due to their relevance for the next generations as well. According to this assumption, the concept needs to include the prediction on the future. I used the theory of the Dream Society to identify factors that will be of importance in the future.

The notions of a 'knowledge city' and a 'creative city' emerged from contemporary knowledge economy. As the driving force of wealth creation in these cities, are identified the knowledge, creativity and innovation of their citizens. Knowledge cities appear as completely virtual (i.e. En2Polise) or alternatively are real (physical) cities that use information and communication technology to create meeting places for its citizens in order to exchange information and knowledge (i.e. Sao Paulo). The concept of a creative city put emphasise back on the real cities and their attractiveness. Meeting places are important for an intelligent city as well. An intelligent municipality needs to create the context where knowledge workers can exchange their knowledge and be creative. These interfaces should be available in an intelligent city both at the real and the virtual level as Komninos presented in his theory. However, I suggest that the virtual aspect of the city should connect all 'islands' of a city not only industry and researchers. It is necessary to create a common arena for all citizens to meet. This should not be difficult task due to advanced communication technology.

The Dream Society theory emphasise culture, values, ethos and story telling; while, cities expect to be presented in the future as themed towns to attract its citizens. These factors must be taken in consideration by an intelligent city by looking into its past for stories that will 'touch citizens harts' and by engaging the 'Storytellers' that will create culture and strengthen the community spirit sense in the city. An intelligent city should emphasise its cultural heritage and be prepared for emergence of the global middle class that may make more difficult for cities to distinguish them selves.

The city becomes an intelligent city by being informed in order to nourish its human intellectual capital resource in the most effective and increase its sustainability. An intelligent

city should combine necessary information, use it smartly and effectively, and be acquainted with how big its stock of the most important resource, the intellectual capital, is. Mapping of intellectual capital enables a city leadership to make better resource allocation decisions and facilitate to manage it in proper way. Further, IC rating may be important tool for selecting an international location for companies due to that every city has its combination of its intellectual capital.

In definition of an intelligent city should be included the three main sustainability factors extracted from the sustainability factors of Ragusa, the first intelligent city in the history.

The concept of an intelligent city should be future oriented i.e. to sense and hedge what will be important for tomorrow. An intelligent city must be informed and know what its citizens need even before they demand it. To find out what to expect in the future an intelligent city can benefit from its organised municipal intelligence that from collected data make scenarios and estimate future trends. That is only one of the reasons why an intelligent city needs organised intelligence. Further, the city needs an engaged 'Intelligent leadership' that would motivate its citizens and created the spirit were everybody wish to contribute for its community, feel satisfied, and part of that community. The city government must to activate the residents in intelligent way to work together for the city development, create homogeneity between different parts of the city, and make everybody to feel as a part of the community. The intelligent leadership should engage individuals that will have a specified roles in the city development. These roles are Ragusa's *ambassadors*, professor Törnqvist's *catalyst*, Jensen's *storytellers*, Thorén's *enthusiast* that motivate staff, or role of a *special councillor* that connect different actors in the city as in example of city of Barcelona. These role players should actively work on networking activities due to it has shown that networks are essential for organised intelligence, the creativity and creation of intellectual capital. All cities sectors and arenas are as small "islands" of intelligence gather information for their own purposes. An intelligent city should coordinate intelligence inside not only the municipality but also organised intelligence that is spread between the university, the business community and the public sector.

Suggested components of an intelligent city might be the following:

- Organised municipal intelligence
- Intelligent Leadership: engaged with specified roles
- Good story to create the community spirit and attract citizens
- Virtual /real city
- Networking activities within specific arenas/'islands', symbolic "meeting places"
- Coordinate the 'islands' of intelligence
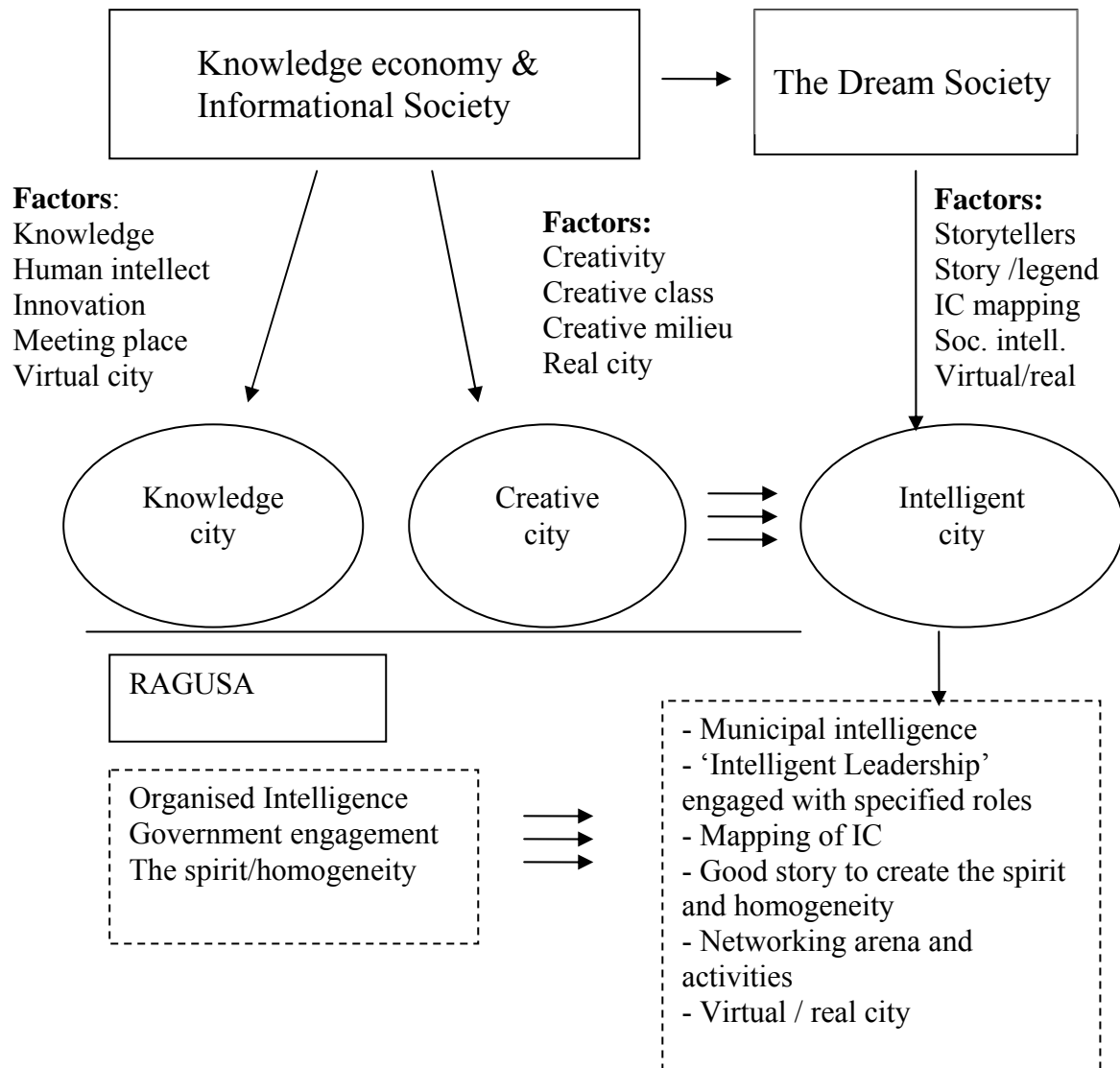- IC rating of the city

Figure 21: The summarising picture of the thesis (own source)

7.3 Lund in the current economy

Threats and opportunities that come with the knowledge economy can been identified in Lund as well such as increased demand on and competition for qualified staff, the problem of segregation (the Dual city effect) etc. Among opportunities are increased focus on knowledge and education that make the city attractive for new talents and companies. A great number of international companies placed their R&D departments in Lund thereby creating knowledge clusters within the Lund's territory. Then again, the number of higher education institutions in Sweden has increased as well as the trend of distance education, which has somewhat reduced Lund's importance as geographical place and educational centre.

Lund's new vision and development strategy is very similar to Dr. Amidon's theory on innovation were the management of innovation infrastructure and the implementation of a good idea is driving force of progress, sustainability and economic wealth. The Dr. Debra Amidon's evolution into the Knowledge Zones can be recognised in development of Lund (see Figure 5 on page 22). Trough interaction of the public sector, the industries and the University, in 1983 was established the first Lund's and Scandinavian science park, the Ideon. The Medicon Valley, the Öresund University, the IT Öresund and the University Hospital projects are exampled of collaborations that evaluated into the Knowledge Cluster where city of Lund plays one of the central roles.

Lund's citizens are highly educated (58% with university education) with intelligence and put high expectations on its municipality. Lund as the intelligent city needs city government that manages the city in intelligent way and understands what factors are necessary. With help from organised social intelligence find out where to go and to explore possibilities as Ragusa's government did.

From interviews with professor Törnqvist, Mr. Sörbom and Mr. Sturesson it become obvious that there is a need for increasing networking activities in Lund that will provide missing link between arenas/'islands' i.e. municipal politics, the industry, the University students and personnel and other associations and companies. What is necessary is to connect those different arenas in a new network connecting trough a common interface both in virtual and in real world. Lund University has en a tradition of networking and connecting researchers from different areas. As solution for the quest for new organised networks, I suggest that Lund's municipality identify the individuals that will play central role in differentiating Lund networks of Lund. This municipal intelligence unit would identify the above named role-players thereby organising municipal intelligence and connecting scattered 'islands' of intelligence and engage them in creating a strong spirit of city of Lund. With the help of such networks it would be much easer for municipal intelligence to provide intelligence environmental scanning.

Many students come and go from Lund without learning much about the municipality of Lund and its history. The migration caused by shift of generations of students is common problem for all university cities. The students are here for three or five years. During that time, they are living in their little 'world' of student dorms and books and not thinking about Lund as municipality. The Lund's government should take advantage of this available resource and incite the students how to be part of community not just the University. They may come back in the future with more knowledge and intellectual capital to offer to the community.

In addition with the high migration of students and the presence of global companies in Lund that do not feel connected with the city, there is a need for developing of the Lund's spirit. This would make companies and students more part of the city. The idea of contacting the citizens and distributing an information portfolio to the citizens of Lund could be one of the activities in the process of creating 'the spirit of Lund'. What the interviewees from Lund are agreeing upon is that the city must be promoted more intensively due to increased competition from other cities. People do not come to cities unless the city has competitive advantage that will attract the citizens. It is necessary to have competent people in the world that will tell others about the city's competitive advantages, consuls / ambassadors of Lund.

The Dream Society aspects such as dematerialisation, increased focus on emotional values and jobs as well as emergency of global middle class may have essential impacts on Lund's municipality. We may witness, according to Jensen, an emerging trend of cities turning into Themed City where every city has its story to tell. What is Lund's story? The city should use the 'power' of storytelling and create it own story that will integrate its citizens and create the community spirit. When working on retaining and attracting new citizens, Lund should consider the possible emergency of the Dream Society, where function is taken for granted and the underlying story, lifestyle, experience and adventure are of importance for citizens. Today, the people of the Dream Society in Lund are highly environmental conscious citizens.

The city's global companies and the University have many international contacts that could be used to promote the city of Lund but also to get the correct picture of the world and to adapt to the future. Due to the University and the innovative industry, it is obvious that Lund's main competitive advantage and resource is intellectual human capital. For that reason, Lund must be able to manage the knowledge and human intellectual capital concentrated in the city. The challenge is to coordinate all this to work together, as I would like to call 'In Lund, For Lund'. It is important for city of Lund to coordinate 'islands' of intelligence that is spread between the university, the business community and the public sector.

8 Conclusions

In this final chapter presents main learning from the study that may be applied on the city of Lund in order to be like an intelligent city. At the end of this chapter, I suggest some subjects for the future research.

We may speculate due to presented facts that Lund has the most of characteristics of a knowledge city and of a creative city as well. Lund, for instance, offers all requiems needed for creative process, presented by professor Törnqvist, such as the tradition of knowledge, communication infrastructure, diversity and variation. The city offers, as well, places for informal meetings as libraries, parks, and cafés, where creative people can exchange thoughts, ideas and knowledge. The city has, relatively to its size, a rich and diversified culture that both concepts emphasise. What Lund is missing in order to become an intelligent city is:

- Organised municipal intelligence
- Nourishment of the community spirit and integration of diverse networks by identifying diverse *role-players* and the city *theme* for the Dream Society
- A network that will integrate different arenas for city development
- Virtual interface where all arenas of the city can meet
- A map over the city's intellectual capital

The transformation in to intelligent city should involve all three sectors.

8.1 Future research

In last decade, it has been discussed about intellectual capital of a company and about how to nourish that capital. Nevertheless, what happens with this intellectual capital or more precisely human capital when it, at the end of day, leaves the company? Who and what nourish and stimulate the human capital outside the company? What happens with intellectual capital of a city or region? What makes people to stay in one place?

My proposition for a future research would be to explore why people decide to live and work in Lund by testing all named factors in this thesis. An additional suggestion would be to test how well municipality of Lund meets the requirements for intelligent city and what would be major indicators for an intelligent city, put together into an IC and knowledge report of Lund.

9 Bibliography

Published sources

Amidon, Debra M. *The Innovation SuperHighway: Harnessing Intellectual Capital for Collaborative Advantage* – Sample chapter, Available at:
www.entovation.com/forthcoming.htm

Amidon, Debra M. "The Praxis of Knowledge Innovation: The Case for SME's" For Cluster Conocimiento, Bilbao, Spain, 3rd October 2003, Available at:
www.entovation.com/whatsnew/praxis.htm

Andriessen, Daniel (2004), *Making Sense of Intellectual Capital – Designing a Method for the Valuation of Intangibles*, Oxford, Elsevier Butterworth-Heinemann

Bergin, Erik "Ny enhet lovar bättre statistik" *Svenska Dagbladet,* Näringsliv pp.6, 9 march 2004

Bontis, Nick (2002) *National Intellectual Capital Index: The Benchmarking of Arab Countries,* Available at:
www.business.mcmaster.ca/mktg/nbontis//ic/publications/BontisUNJIC.pdf

Bounfour, Ahmed, "The IC-dVAL approach" *Journal of Intellectual Capital,* Vol. 4 No 3, 2003, pp. 396-412

Carter, Francis W. (1972), *Dubrovnik (Ragusa): a classic city-state*, London, Seminar Press

Carter, Francis W. (1977), *An Historical Geography of the Balkans*, London, Academic Press

Dedijer, Stevan (2000), *The world jumper,* Dubrovnik

Dedijer, Stevan, "Ragusa intelligence and security 1301-1806: A model for the twenty-first century?" *International Journal of Intelligence and CountrIntelligence,* Vol XV, No 1, Spring 2002

Dedijer, Stevan, "Development & Intelligence 2003- 2053", Working Paper Series, 2003/10, Lund Institute of Economic Research (Paper presented at the Infoforum Business Intelligence Conference, Zagreb, 25-26 September 2003)

Edvinsson, Leif and Malone, Michael S (1997) *Intellectual Capital – realizing your company's true value by finding its hidden brainpower*, New York, HarperBusiness

Edvinsson, Leif and Stenfelt, Carolina "Intellectual Capital of Nations – for Future Wealth Creation" *Journal of Human Resource Costing and Accounting,* Vol. 4, No 1, Spring 1999, pp 21-33.

Edvinsson, Leif (2002) *Corporate Longitude – Navigating the Knowledge Economy,* Stockholm, BookHouse Publishing

Eriksson, Lars Torsten and Wiedersheim-Paul Finn (2001), *Att utreda, forska och rapportera* (7th edn), Malmö, Liber Ekonomi

Ferber, Robert and Verdoorn, P.J. (1962) *Research methods in Economics & Business,* New York, The Macmillan Company

Florida, Richard (2002), *The rise of the creative class – and how it's transforming work, leisure, community and everyday life,* New York, Basic Books

Florida Richard and Tinagli Irene (February 2004), "Europe in the creative age", Demos, Available at: www.demos.co.uk/catalogue/creativeeurope_page370.aspx

Hansson, Jan-Inge and Magnusson Nils Peter (2001), *Det intellektuella kapitalet i kommuner och landsting – verksamhetens dolda potential,* Stockholm, Komrev

Harris, Robin (2003), *Dubrovnik – A History*, London, SAQI

Jensen, Rolf (1999), *The Dream Society: how the coming shift from information to imagination will transform your business*, New York, McGraw-Hill

Jerkert Björn (2001), *Lokala utsikter: en skrift om åtta kommuners omvärldsbevakning*, Stockholm, Svenska kommunförbundet

Komninos, Nicos (2002), *Intelligent Cities – innovation, knowledge systems and digital space*, London, Spon Press

Landry, Charles (2000), *The creative city – a toolkit for urban innovators*, London, Comedia

Lev, Baruch, (2000a)"Knowledge management: fad or need?" *Research Technology Management* September-October 2000, Section: ONE POINT OF VIEW, Available at: http://elin.lub.lu.se/cgi-bin/ftxt/ebsco/08956308_2000_43_5_9-11/3524526

Lev, Baruch (2000b) *New accounting for the new economy*, Available at:
http://pages.stern.nyu.edu/~blev/

Lynn, Richard and Vanhanen, Tatu (2002), *IQ and the wealth of nations*", Westport, Conn.:
Praeger

Pasher, Edna Ph.D. & Associates, "The Intellectual Capital of the State of Israel- A Look to
the Future"- "The Hidden Values of the Desert", September 1998

Peković, Željko (1998) *Dubrovnik: nastanak i razvoj srednjovjekovnoga grada, (la fondation
et le développement de la ville médiévale)*, Split, Muzej hrvatskih arheoloških spomenika

Porter, Michael E. and Stern, Scott "Innovation: Location Matters" *MIT Sloan Management
Review;* Summer 2001, 42, 4; ABI/INFORM global pp. 28-36

Pulić Ante et al. (2002) *Efficiency in Croatian Economy*, Zagreb, International Business
Efficiency Consulting, Available at: www.vaic-on.net

Pulić Ante et al. (2003), *Efficiency on National and Company Level*, Zagreb, Croatian
Chamber of Economy – Intellectual Capital Association, Available at: www.vaic-on.net

Saunder M., Lewis P. and Thornhill A. (1997), *Research Methods for Business Students,*
London, Pitman Publishing

Stenfelt, Carolina et al (1996) *Welfare and security for future generations*, Stockholm, market
Academy, Stockholm University

Sturesson, Jan et al. (1999), Reflecting the Future – Development in Leadership Management
Control & Auditing, Stockholm, Komrev

Törnqvist, Gunnar (2002) *Science at the Cutting Edge. The Future of the Öresund Region,*
Gylling, Narayana Press

Viedma, Josep M. (2002), *CICBS: Cities' Intellectual Capital Benchmarking System,*
available at: www.terra.es/personal7/jm_viedma/publicaciones/CICBSi.pdf

Vinaver, Vuk (1960), *Dubrovnik i Turska u 18 veku*, Beograd, Naucno delo

WTA Uppdate (Fall 2000), A publication of the World Teleport Association, New York,
Available at: www.worldteleport.org/iCommunity/archives/UpdateFall2000.pdf

Verbal sources

Dedijer Stevan, Professor and consultant in Integrated Intelligence (by telephone and e-mail) on several occasions

Prytz Lennart, chairman of the Lund's City Executive Committee and member of the City Council, January 9th 2004

Sturesson Jan, Marketing Director of Komrev and partner at Öhrlings PricewaterhouseCooper AB, December 9th 2003

Sörbom Peter, Executive Manager of Trade & Industry- City of Lund, November 13th 2003

Thorén Klas, founder of municipal intelligence in Stockholm (by telephone), January 8th 2004

Törnqvist Gunnar, Professor of Economic Geography at Lund University, November 11th 2003

Other sources

Törnqvist, Gunnar (2003), *Creativity in time and space*, (Synopsis)

The municipality of Lund's development program (2003)

Edvinsson, Leif (2003) "Characteristics of an intelligent city"

IC Nations (1999) *An Invitation to the Future,* www.skandia.se , www.unic.net, www.icuniverse.com – cultivating and exchanging IC

IC Vision – annual report 2000, Stockholm (www.icvisions.com)

Invest in Sweden (ISA) – report 1999, Stockholm, (www.isa.se)

Edvinsson Leif and Bounfour Ahmed (2003), *Emerging Perspectives of Assessing and Navigating both, National, Regional and Business Value Creation* **,** Forthcoming article 2004, Cranfield University

"Melbourne: A Knowledge City" Presentation by Councillor Kate Redwood, Available at:
www.knowledgesystems.org/e100mty/inputs/General_KBD_inputs/participants_contributions
/dbra/EN2Polis_melburneknowledgecity.pdf

Liselotte Lyngsø, CIFS International, "The Dream Society" presentation for the Content
Summit 15-17 November 2000 , Available at:
www.interactivepublishing.net/dbfiles/downloads/IP00/liselotte.ppt

Pöyhönen, Aino and Smedlund, Anssi "Assessing intellectual capital creation in regional
clusters", Knowledge Management / Department of Business Administration, Lappeenranta
University of Technology, Finland

Electronic sources

http://flagspot.net/flags/
www.bontis.com
www.bontis.com/research.htm
www.celebrationfl.com
www.cidade.usp.br
www.cmm.ki.se
www.corporatelongitude.com
www.donau-uni.ac.at/wissensbilanz
www.dubrovnik-online.com
www.entovation.com
www.ess-scandinavia.org
www.finansanalytiker.no
www.flagspot.net
www.gurteen.com
www.gurteen.com
www.intellectualcapital.se
www.intelligentcommunity.org
www.kikm.org
www.kmmagazine.com
www.larvik.kommune.no
www.lund.se
www.mind-lab.org
www.nordicinnovation.net
www.poly.edu
www.skandiafuturecenter.com
www.stockholm.se
www.vaic-on.net
www.vtu.dk/icaccounts

Appendix 1 – The VAIC

For calculating VAIC Pulić extract four indicators. The first indicator is value added (*VA*) where *sgaExp.* is selling, general, and administrative expenses, *GM* is Gross margin and *LExp.* is labour expenses:

$$VA = GM – sgaExp. + LExp.$$

Which leads to: *OperatingIncome + LExp.*

The value added shows ability of a company or whole economy to create value and is the results of applied knowledge.

The second indicator is Human capital (*HC*) that equals the labour expense: *HC=LExp*.
Pulić defines Structural Capital (*SC*) as result of Human Capital's past performance or Intellectual Capital minus Human Capital, which leads to following equation: *SC = VA- HC*

The fourth indicator is Capital Employed *(CE)* that equals to the *Book value of the net assets.* After determining the indicators Pulić calculates efficiency through the ration between each of the three forms of capital and value added (Andriessen, 2004).

$$CEE = \frac{VA}{CE}; \qquad HCE = \frac{VA}{HC}; \qquad SCE = \frac{VA}{\frac{1}{SC}} = \frac{SC}{VA}$$

Capital Employed Efficiency (CEE) shows how much new value has been created with one monetary unit of financial and physical capital i.e. how efficiently the tangible resources have been used. Human Capital Efficiency (HCE) express how much new value has been created with one monetary unit invested in employees (www.vaic-on.net). Pulić claims that human capital and structural capital are reciprocal; in other words, the lesser human capital participates, the more of structural capital is involved (see *SCE* formula). The indicator shows as well the share of SC in value creation. As a result, Pulić adds the three efficiency measures in to an overall measure of efficiency. The VIAC is sum of Human Capital Efficiency (HCE), Structural Capital Efficiency and Capital Employed Efficiency:

$$VIAC = HCE + SCE + CEE$$

In his latest report use Intellectual capital efficiency (ICE) that is sum of human capital efficiency (HCE) and structural capital efficiency (SCE): ICE = HCE + SCE

Appendix 2[3] - The Dream Society

Maslow's Needs Hierarchy

Traditional version

Modern version

Self-realisation

Acknowledgement

Social needs

Security

Physical needs

The Work Force 1901-2021

Agriculture

Caring

Emotions and experiences

Knowledge work

Industry, craft, construction

Sources: H.C.Johansen(1985), Dansk historisk statistik 1814 - 1980, Statistisk Tiårsoversigt 1984 og 1992

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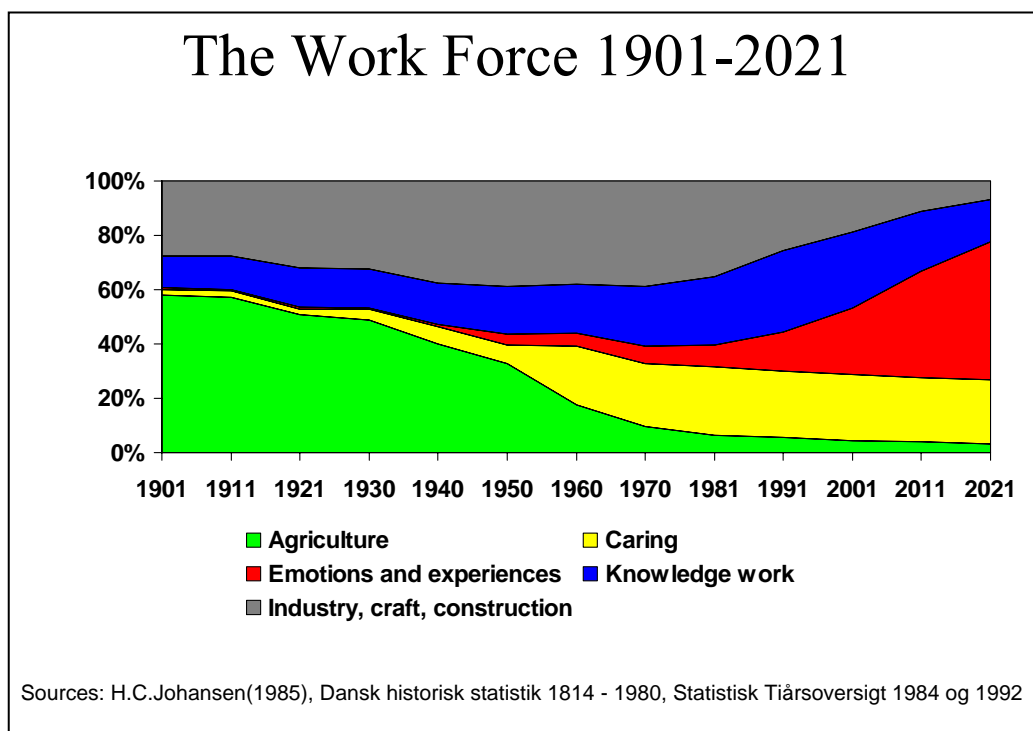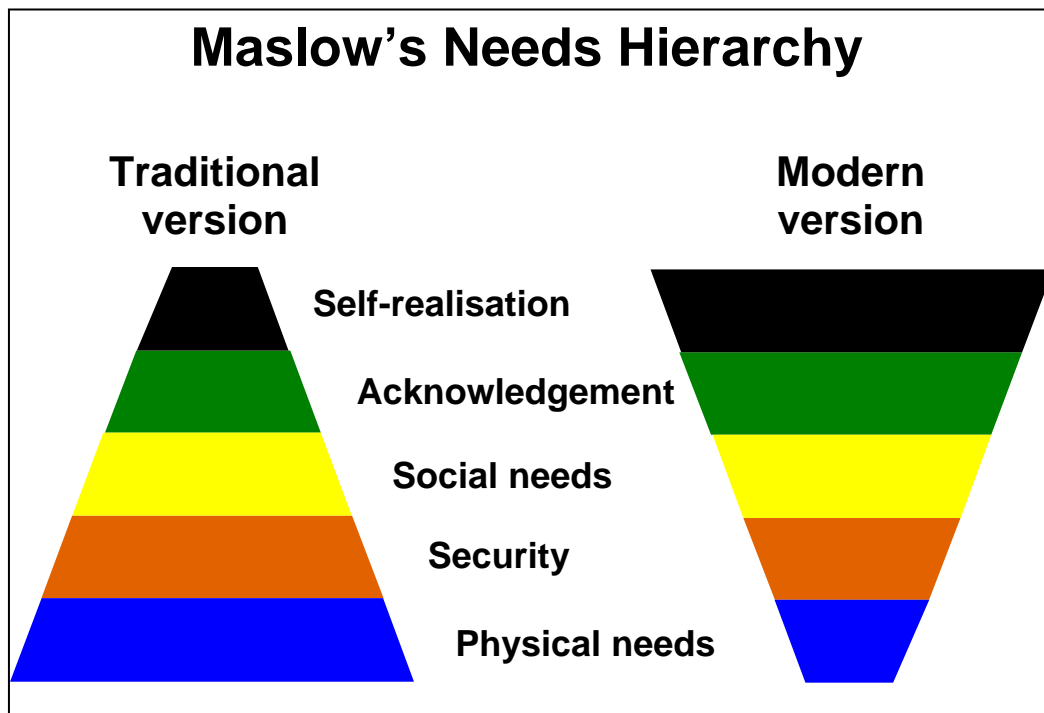
[3] www.interactivepublishing.net/dbfiles/downloads/IP00/liselotte.ppt

Appendix 3 – Knowledge cities

Some examples of cities that have knowledge as driving force for development. For more information, please follow the links:

Sao Paulo, Brazil
www.cidade.usp.br/english/

Barcelona, Spain
www.bcn2000.es/eng/06-061/III_pla.html

London, UK
www.london.gov.uk/mayor/manifesto/manifesto8.jsp
www.knowledgebridge.co.uk/readIt.asp?f=1&c_id=546

Manchester, UK
www.manchesterknowledge.com

Liverpool, UK
www.liverpoolculture.com

Cambridge, UK
www.cgkp.org.uk

Dubai, Unite Arab Emirates
www.dubaiinternetcity.com/index.html
www.kv.ae

Berlin, Germany
www.london.gov.uk/mayor/economic_unit/value_cities_presentations/berlin_re.pdf

Singapore
www.kisho.co.jp/WorksAndProjects/Works/technopolis
www.one-north.com/pages/singapore/index.asp

Melbourne, Australia
www.melbourne.vic.gov.au/cityplan/infopage.cfm?pid=18

City of Knowledge, Panama Canal Zone
www.ciudaddelsaber.org.pa/english/city/city.html

Shanghai, China
www.shanghai.gov.cn/gb/shanghai/node8059/index.html

Appendix 4 – En2Polis

International KNOWLEDGE CITY of the Future

Gateway to World Knowledge

Monterrey Knowledge Accelerator

Governance Council – *"Kinectees of Trust"*

Knowledge Hub

Knowledge Culture Exchange

En2Polis Town Hall

Future Centres

Tours To K-Clusters

Global Knowledge Alliance

World Knowledge Bank

"Club Know"

EN2Polis Cyber U

EN2Polis Knowledge Exchange

Talent, Learning, Projects, IP, Expert,

Global Trade Of Ideas

Reflective Learning Centre

Youth

EN2Polis Innovation Olympics

I⁴C Institute

Founding Citizens: Bryan Davis (Architect), Debra M. Amidon (Architect); Clinton C. Ackerman; Manfred Bornemann; Yvonne Buma; F. Javier Carrillo; Leif Edvinsson; Lilly Evans; Niki Flandorfer; Piero Formica; Karmen Jelcic; Gulgun Kayakutlu; Michael Kelleher; Esko Kilpi; Chin Hoon Lau; Jean Marc LeDuc; Eunika Mercier-Laurent; Edna Pasher; Ante Pulic; Tomasz Rudolf; Charles Savage; Lynne Schneider; Oliver Schwabe; David Skyrme; Janis Stabulnieks; Eleisa Sundrum; Karl Wiig (Helsinki – 3/24/03)

Appendix 5 – The Creativity Index
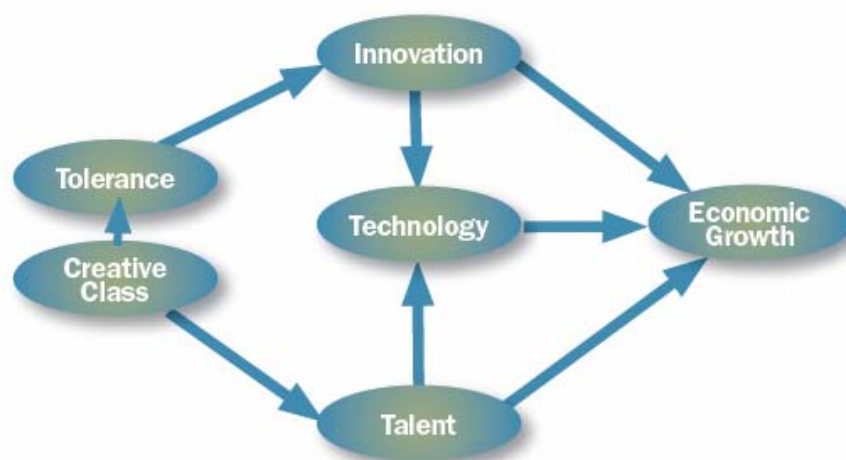
Figure 22: Tolerance, Creativity and Economic Growth (Florida and Tinagli, 2004)

Euro-Creativity Index		TALENT INDEX			TECHNOLOGY INDEX			TOLERANCE INDEX		
		Creative Class Index	Human Capital Index	Scientific Talent Index	Innov. Index	High Tech Innov. Index	R&D Index	Attitudes Index	Values Index	Self-Express Index
Rank	Score									
1. Sweden	0.81	8	7	2	2	3	1	2	1	1
2. USA	0.73	1	1	3	1	1	3	n.a.	13	4
3. Finland	0.72	4	6	1	4	2	2	3	5	10
4. Netherlands	0.67	3	2	10	6	4	8	5	4	2
5. Denmark	0.58	9	15	4	5	5	6	7	3	3
6. Germany	0.57	11	4	7	3	6	4	12	2	9
7. Belgium	0.53	2	8	6	7	9	7	13	8	8
8. UK*	0.52	5	3	8	9	6	9	8	9	6
9. France	0.46	n.a.	11	5	10	8	5	11	7	11
10. Austria	0.42	12	14	11	8	10	0	9	10	5
11. Ireland	0.37	6	10	9	11	12	1	5	15	7
11. Spain	0.37	10	4	12	13	13	3	1	12	14
13. Italy	0.34	13	12	13	12	11	2	4	11	12
14. Greece	0.31	7	9	15	14	14	5	14	6	13
15. Portugal	0.19	14	13	14	15	15	4	9	14	15

Figure 23: The Euro-Creativity Index (Florida and Tinagli, 2004)

Appendix 6[4] - Territory of the Rep. Ragusa

Territory of the Ragusan Republic

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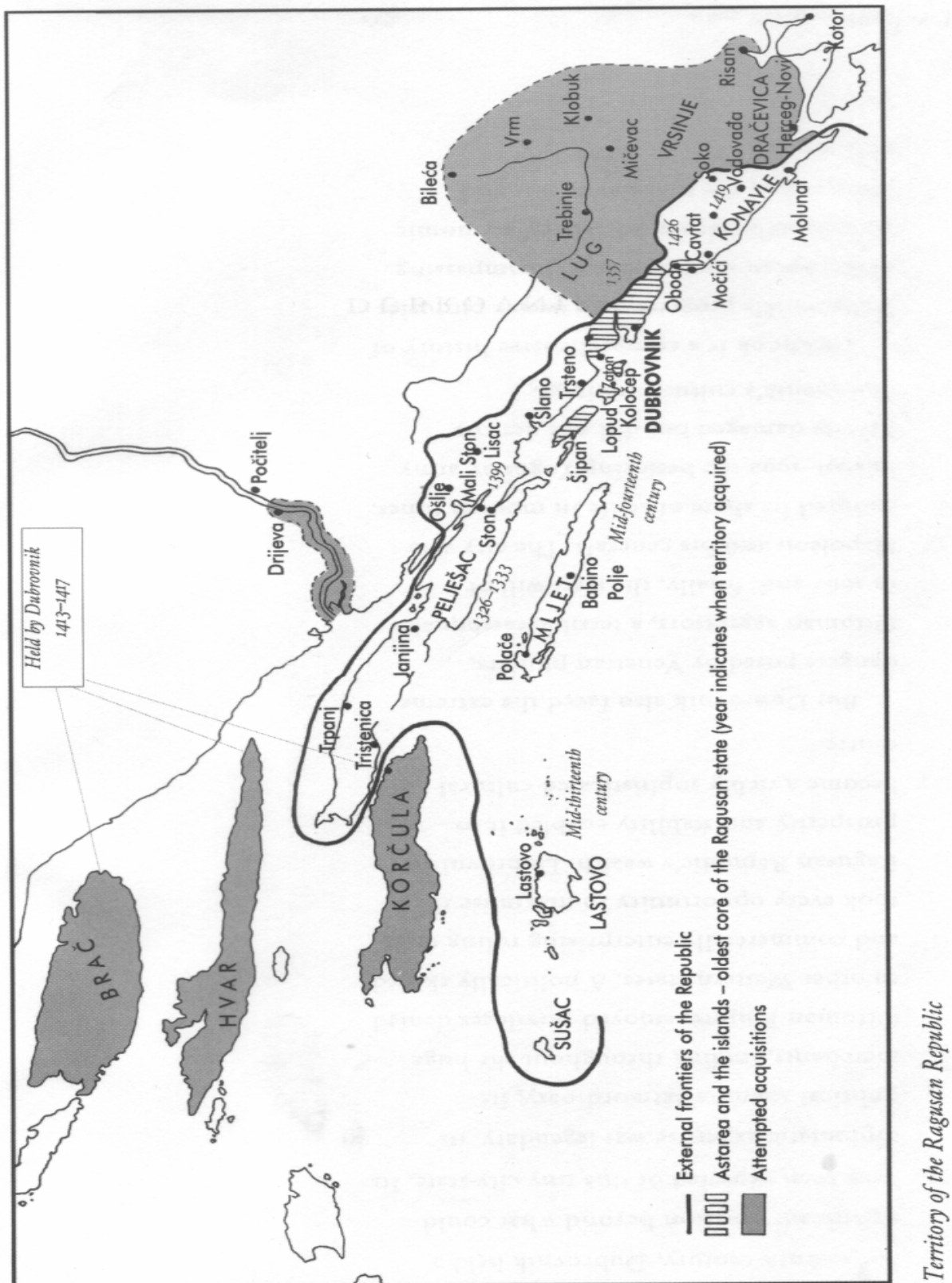
[4] Harris, Robin (2003), *Dubrovnik – A History,* the picture from the cover

Appendix 7[5] - Consulates of the Rep. Ragusa

CONSULATES OF THE DUBROVNIK REPUBLIC IN THE MEDITERRANEAN (1750–1808)

● Consulate
■ Vice-Consulate
▲ Diplomatic Representative

Source: Dubrovnik Archives

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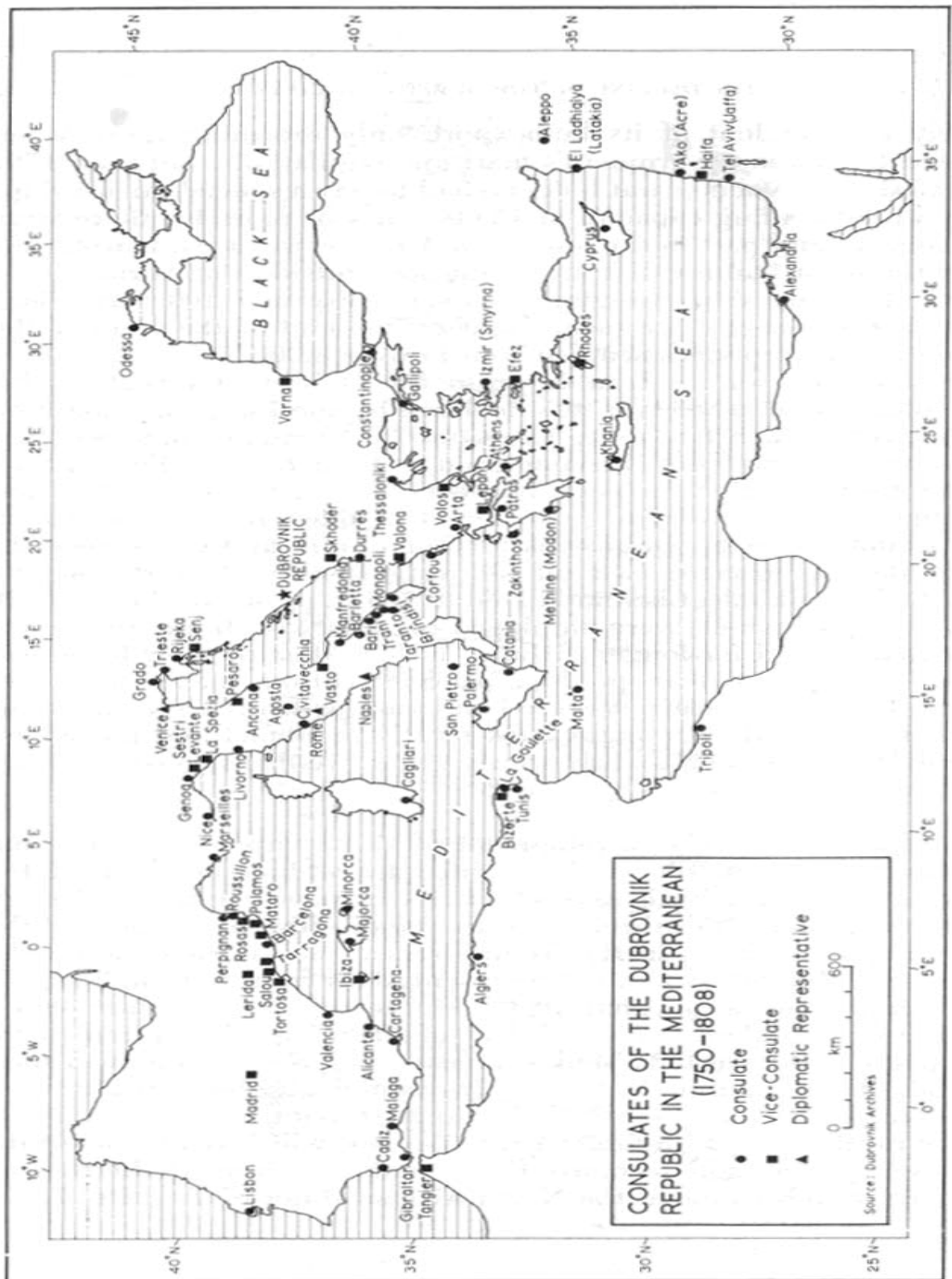
[5] Carter, Francis W. (1972), *Dubrovnik (Ragusa): a classic city-state,* pp. 436, FIG. 100