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**KEY M.I.S. ISSUES FOR MANAGEMENT:
AN EASTERN EUROPEAN PERSPECTIVE**

by

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ABSTRACT

Considerable research has been done to identify issues of importance to MIS managers in North America and other Western countries. However, little is known about the priorities of Eastern European managers with respect to the application of information technologies (IT).

IT will play an increasingly important role in Eastern Europe as organizations adapt to Western business practices. An understanding of managerial concerns is therefore useful for individuals and organizations with an interest in the economic transition and restructuring process of the region. This research aims to establish an understanding of MIS issues in an Eastern European organizational environment, and how these compare to the West. The study focuses on Estonia, which is judged to be an appropriately representative site for the research.

A three round Delphi methodology was used to elicit the issues of importance from Estonian MIS managers and the research findings suggest a significantly distinct set of priorities. The managerial issues that have dominated the North American IS scene are of comparatively little importance; instead, the top issues for Eastern European managers are primarily technological concerns.

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CHAPTER 1 - INTRODUCTION

1.1 Background

In the early 1980s, information systems (IS) researchers began conducting surveys to identify the most critical issues in the management of the IS function. Studies were conducted to elicit the thoughts, needs, priorities and issues that were of concern to IS managers. Research in this domain is useful in helping managers, consultants, vendors, professional organizations and other members of the IS community to better understand the needs and concerns of the discipline of IS management.

The early work on IS issues originated in the United States and focussed on the concerns of the American IS manager. In the late 1980's, similar studies began to emerge in other parts of the world including Canada, Australia, Europe and the Far East. Considerable work has also been done to update and verify these IS issues studies since it is recognized that the fields of information technology (IT) and management are in a constant state of evolution. The resulting body of research makes a significant contribution to our understanding of the IS issues of importance to managers in many parts of the world.

While extensive research has now been completed in identifying issues of importance to IS managers functioning in well established market economies, little is known about the priorities of Eastern European managers with respect to the application of IT. The dramatic political and economic changes sweeping Eastern Europe in recent years suggest that these economies will become increasingly important and integrated into the global economy. Information technologies will play a pivotal role in the region as organizations adapt to Western business practices and standards. An understanding of the concerns of Eastern European IS managers is useful for individuals and organizations with an interest in the economic transition and restructuring of this region. This research therefore aims to establish an understanding of IS issues in an Eastern European

environment, and how these issues compare to the priorities of managers in the West.

The study focuses on the Eastern European country of Estonia, which is judged to be an appropriate representative transitional socialist economy. Although Eastern Europe is a region of great historical and cultural diversity, the constituent nations have shared common political, economic and social systems over the past half-century, resulting in considerable convergence of experience, especially in the areas of technology and economic management. It is therefore suggested that the results of an Estonian study are relevant for other areas in Eastern Europe.

It should be noted that for the purposes of this research, the term 'Eastern Europe' refers to the European member countries of what was the Council for Mutual Economic Assistance (CMEA). In particular, this includes the various Republics of the Soviet Union, the newly independent Baltic countries and Central European states such as Hungary, Czechoslovakia, Poland and former East Germany.

1.2 Motivation

The goal of the research is to better understand the priorities and needs of IS managers functioning in an Eastern European organizational and technological environment. This information is useful for the following reasons:

- Assist researchers in directing their efforts at better satisfying IS needs in Eastern Europe.
- Help domestic and foreign firms interested in competing in Eastern European markets to understand relevant issues and concerns so that products and services can be tailored to local needs.
- Document conditions in the management information systems (MIS) field within a socialist economy in the early stages of the transformation to a market system; this sets the stage for future work which would provide an evolutionary or developmental perspective on Eastern European MIS.

- Help Eastern European training and educational institutions to better focus on the full range of important issues and, in so doing, to produce effective MIS managers.
- Help North American researchers to better understand how the role of MIS is perceived in a different setting, thereby providing a fresh perspective at delineating the discipline.

1.3 Overview

This thesis proceeds as follows. Chapter two provides background information on computing and information technology in Eastern Europe. This is followed in chapter three with historical information on Estonia, the chosen research site. Chapter four reviews previous IS issues studies in North America and elsewhere. Once these contextual reviews have been completed, the specific research questions and methodological details of the study are formulated in chapter five. Chapter six presents the study's findings and the final chapter presents the conclusions.

CHAPTER 2 - INFORMATION TECHNOLOGY: EASTERN EUROPE AND ESTONIA

2.1 Introduction

This chapter describes the state of computing and information technology in Eastern Europe. The IT industry in this region can best be described as highly centralized and integrated. Estonia is a typical CMEA setting in the realm of information technology and shares a common experience with the other countries in the area, making it an appropriate setting for conducting MIS issues research. Dissimilarities within the entire CMEA group appear to be minor compared to their collective dissimilarity with the West, especially in the areas of technology and economic management. However, it should be stressed that Eastern Europe is a large and diverse region and generalizations must be made cautiously.

2.2 Background

The information technology environment familiar to managers in the West is characterized by a highly competitive market consisting of thousands of independently acting firms offering a wide variety of products and services. Conversely, the IT sectors in Eastern European countries were dominated by central authorities that assign research and production efforts according to various political and economic goals (Judy (1987)). While the dominant theme of centralization of control in socialist economies is well documented, it is particularly true of the IT sector over the last two decades. Moscow has defined policy for much of the CMEA community, resulting in a relatively uniform IT experience in the member countries. Estonia is well integrated into the Eastern European computer sector and shares a common experience with the other regions.

2.3 Emulation of Western Technology

Before 1970, Eastern European countries largely pursued their own agendas and strategies in the computer industries. As planners and politicians began to understand the significant role that IT could play in national security and economic productivity, there was increased effort to improve the quality and coordination of CMEA computing. Independent national research and development programs were largely abandoned and replaced by the Ryad Project, a coordinated effort to build machines based largely on the IBM S/360.

The decision to copy Western machines was adopted because of persistent problems in independently developing machines of comparable quality as well as supplying appropriate software. In addition to copying IBM mainframes, minicomputers based on DEC and Hewlett Packard specifications have been widely imitated. IBM-PC and Apple II microcomputers have also been copied, primarily to satisfy educational needs. Actual production of these machines has fallen below planning targets, resulting in a continual shortage of units and parts (Davis and Goodman (1978); Goodman (1979), (1984); Judy (1987); Barker (1990)).

The policy of imitation is well entrenched, with the West providing the innovations and technological advances, followed by CMEA attempts to copy these efforts. Most of the member countries have specialized in a narrow segment or niche of this inter-compatible computer industry, and trade extensively with each other.

2.4 The Reality of CMEA Computing

Despite the efforts at coordination and integration, the CMEA has been unable to produce computer equipment of comparable power and quality with Western machines. The state of Soviet

computing was summarized by Nyren (1987) in the following manner:

- Computer hardware developments lag those in the West by an estimated 4 to 10 years, depending on the type of hardware.
- The software industry has virtually no experience in developing software for PC applications.
- The computer industry has been unable to produce reliable equipment in significant numbers.
- Computer users are consistently frustrated by poor-to-non-existent technical service and the lack of computer spare parts.
- Industrial managers have few incentives to take risks associated with incorporating new technologies at the plant level.
- There is a critical shortage of computer programmers and other technical personnel.

An additional problem in CMEA countries concerns the inadequate telecommunications infrastructures. The systems are incomplete, technologically outdated and prone to breakdown. They are often inadequate in providing verbal communications links, let alone the types of data transfers associated with modern IT (Heymann (1987)).

Judy (1987) has noted that the Soviet software industry rivals the telecommunications industry for its lack of effectiveness, and that the lag with the West in terms of software is comparatively greater than the lag in hardware. CMEA countries often resort to pirating software from the West, although Hungary is a notable exception and usually pays for these products (Barker (1990)). For large scale applications, industrial and military systems have received top priority and numerous design and implementation successes have been registered in areas such as CAD and DSS for central planning activities, although the quality of these systems still lags comparable projects in the West. Applications to process and control organizational and national data such as management information systems and automatic data processing systems have been less successful (Judy (1987); McHenry (1987); McHenry and Goodman (1986)).

2.5 Computing in Estonia

Because Estonia was well integrated into the Soviet and CMEA sphere, the IT experience in Estonia is typical for the region. Estonian factories, ministries, schools and other organizations have received the same types of equipment as has been distributed elsewhere in Eastern Europe. The small size of Estonia necessarily precluded any sort of a major role in terms of developing or manufacturing computer technologies. However, Estonia has played a relatively significant role considering its size.

The Institute of Cybernetics in Tallinn was established by the Soviet government as a major research centre for computer science and artificial intelligence. This institute is one of only three such centres in the Union, the other two being in Russia and Ukraine. Both universities in Estonia (Tartu University and Tallinn Technical University) have extensive computer science programs, and also teach courses in the use of information technology for non-specialists. The Estonian Management Institute in Tallinn offers short courses to experienced managers that cover the area of computing and information systems. These programs have resulted in considerable diffusion of knowledge about computing in the Republic.

Estonian schools and institutes have good contacts with the expatriate communities abroad, and have received considerable aid to help acquire new technologies. As an example, an Estonian-Canadian organization donated 90 IBM-ATs to Tartu University in 1991.¹ Tallinn Technical University had received similar assistance the previous year. Estonian organizations have thus been able to take advantage of contacts with the West that are simply not available to many of the other Republics. Recent estimates suggest that between 5,000 and 10,000 western PCs are in use in Estonia. A 1990 survey of computing in Estonian organizations indicated that approximately 36%

¹ Vaba Eestlane. "Akadeemiline vahetus Toronto Ülikooliga." April 30, 1991. p.7.

of existing computers were bought with the help of foreign contacts.²

2.6 The Future View

The recent political and economic changes in Eastern Europe have upset the traditional IT trade arrangements and this will undoubtedly lead to significant restructuring of the computer industry. Western manufacturers will likely supply many of the needs, and local producers will have to increase the competitiveness of their products if they are to survive. However, the lack of funds to pay for Western technology, as well as a desire to support past investments in locally produced systems, may well result in continued support of the indigenous Eastern European computer industry.

² Estonian Independent. "Computer business in Estonia." May 30, 1991. p.3.

CHAPTER 3 - THE RESEARCH SITE: ESTONIA

3.1 Introduction

The previous chapter discussed the topic of information technology in the CMEA and Estonia's integration into regional programs. Estonia is also a relatively typical Eastern European setting in terms of economic development, recent political history and standard of living. The goal of this chapter is to provide a basic knowledge of Estonia so that the reader will be familiar with the research location. The various historical, political, socio-cultural and economic conditions that have shaped modern Estonia will be investigated.

Eastern Europe is comprised of dozens of distinct nationalities with widely divergent cultural, social, educational, political and economic histories. Although no study of IT issues conducted in the region could ever claim to be completely representative, it is possible to find a setting which allows for some generalizeability about the concerns of managers in Eastern Europe. It is suggested that Estonia is an appropriate location for such research. Estonia has been chosen as the research setting for two primary reasons. First, the researcher speaks the language and has numerous academic and business contacts in the Republic. This makes it possible and practical to conduct on-site research. Second, the researcher believes that the setting is well-suited for exploring Eastern European IT issues since it provides a relatively representative perspective encompassing both Soviet and Central European views.

3.2 Background

Estonia is a small country, only slightly larger than Denmark, located in northern Europe and bounded by Russia and Latvia, as well as the Baltic Sea. As of 1989, there were 1.56 million

inhabitants, of which 62% were ethnic Estonians, 30% were Russian, and 8% belonged to other nationalities.³ The capital is the ancient trading city of Tallinn, which has approximately one-third of the population and is the most important political, administrative, and commercial centre. The university town of Tartu in southern Estonia is another important centre.

The Estonian language belongs to the Finno-Ugric linguistic group and is closely related to Finnish and more distantly to Hungarian. Estonian is not related to the Slavic, Germanic, and Romance languages common in Europe, that all belong to the Indo-European linguistic group. Culturally, Estonians are similar to the Finns, sharing a common folk tradition and history. As is the case in neighbouring Scandinavia, the Lutheran religion predominates. Education has been stressed in Estonian culture for many years; by the end of the nineteenth century, literacy approached 98%, while in neighbouring Russia it was barely 20%.⁴

Estonia has a long history of domination by other nations; since the middle ages it has been governed by Denmark, Sweden, Poland, Germany and Russia. Independence was finally proclaimed in 1918 when the country broke away from the Russian Empire, which was preoccupied with the Bolshevik revolution. The Soviet Union recognized Estonian independence in 1920 and renounced all rights to the territory in perpetuity.⁵

3.3 Independent Estonia

Once independence was secured, Estonia began establishing Western Style political institutions. A constitution based on the Weimar, Swiss, French and U.S. models was approved by

³ Rahva Hää. "Rahvastiku jaotus rahvuse ja keele järgi." September 19, 1989. p.2.

⁴ Aun, Karl. The Political Refugees. 1985. p.7.

⁵ Raun, Toivo. Estonia and the Estonians. 1987. p.110.

June of 1920. It established the superiority of parliament (Riigikogu), which was to be elected every three years by all men and women having reached 20 years of age. The state executive and cabinet were chosen by the Assembly from within its own ranks.

The political history of independent Estonia can be divided into two eras: a period of liberal democracy (1920-1934), and a period of moderate authoritarianism (1934-1939). The Republic was stable through five elections from 1920 to 1932, electing predominantly centre or centre-right governments.⁶ By 1932, the effects of the world-wide depression were undermining the health of the Estonian economy, and parliament was paralysed by a lack of consensus on how to react, resulting in four changes of government in less than one year. Movements from both the extreme right and left began to agitate for drastic political change. Parliament reacted to this threat with a new constitution that granted additional powers to the executive, and a moderate-right President named Konstantin Päts emerged from the Assembly. He invoked emergency powers, outlawed extremist groups and had 100 rightist leaders arrested. Under the mild authoritarianism of Päts, there were no political executions and amnesties were eventually granted to those arrested.⁷ Elections were held during this period, but these should not be seen as fully democratic as some political parties remained outlawed. By 1938, the Republic appeared returning to stability and open democracy.

While the Estonian experience with democracy in the interwar period cannot be seen as completely successful, it must be seen in the context of interwar Europe. The instability in the years leading up to World War II can be attributed to a deeply troubled world economy, and to the insecurity and uncertainty associated with living between the two powerful, repressive and expansionist regimes in Russia and Germany. In comparison to most other Central and Eastern

⁶ *Ibid.* p.113.

⁷ Vardys, Stanley and Romuald Misiunas. *The Baltic States in Peace and War: 1917 - 1945*. 1978. p.72.

European nations, the Estonian experience with democracy was moderate and favourable.

In terms of socio-cultural variables, the interwar period allowed Estonia to establish itself as a liberal Western nation. Upon achieving independence, there were approximately 1.1 million people in Estonia and this remained almost constant over the time of independence due to low birth rates. Ethnic Estonians comprised approximately 88% of the total, with Russians accounting for 8%, and Germans, Swedes and Jews together totalling about 3%.⁸ This made Estonia a relatively homogenous country by Eastern European standards. The 1920 Constitution separated religion from the state and churches became independent and purely voluntary organizations that did not play a dominant role in society. Education at all levels continued to be stressed. Instruction at the University of Tartu was now conducted in the Estonian language instead of in German, and a new post-secondary technical school was established in Tallinn. Female participation in universities made up 27% of the total. By the late 1920s there emerged an over-production of university graduates who subsequently had trouble seeking employment.⁹ Rights were also guaranteed for ethnic minorities; any group of at least 3,000 persons had the right to receive state funding to maintain their religious, educational and cultural institutions.¹⁰ This policy benefitted the German, Russian, Swedish and Jewish minorities which were able to establish state-funded schools.

Upon achieving independence, Estonia was a predominantly agricultural society with many large landowners. Extensive land reform created 56,000 new family farms from large, private estates and transformed Estonia into a predominantly middle class society. A modest compensation, including up to 50 ha was offered to the former owners.¹¹ By 1930, 83% of the people working

⁸ Raun, Toivo. Estonia and the Estonians. 1987. p.130.

⁹ Aun, Karl. The Political Refugees. 1985. p.8.

¹⁰ Vardys, Stanley and Romuald Misiunas. The Baltic States in Peace and War: 1917 - 1945. 1978. p.66.

¹¹ Aun, Karl. The Political Refugees. 1985. p.9.

in the agricultural industry were landowners or direct family members.¹² This established a tradition of private ownership and economic self-sufficiency that is quite distinct from the experience of most nations in the Soviet Union.

By the early 1930s, agricultural activities including forestry accounted for approximately 70% of net national production, while industry accounted for approximately 25% and transportation services for the balance. However, industry and agriculture were of approximately equal importance for international trade since much of the farm output was consumed domestically. The inter-war period saw the doubling of agricultural output in Estonia.¹³ There was a consistent agricultural trade surplus and a wide variety of items were exported including butter, eggs, milk, cereals, fruits, vegetables, meat, and cheese.

Important industrial exports included textiles, processed foods, paper, chemicals, wood products and engineering. Estonia's overall trade account was generally balanced in the interwar period, with Great Britain, Germany, and the Scandinavian countries accounting for most of the trade.¹⁴ Once the effects of the depression passed, industrial development and output began to accelerate. In particular the chemical industry, based on the extensive oil shale deposits in northeastern Estonia, received extensive investment from both the Estonian state and foreign British investors.¹⁵ With the exception of the chemical and textile industries, and a few large producers in other sectors, Estonian industry was characterized by comparatively small-sized manufacturing concerns. Estonia also developed Western financial services such as banks, insurance companies and investment houses to support continued industrial development. A relatively good road, rail and

¹² Pullerits, Albert. Estonia: Population, Cultural and Economic Life. 1935. p.63.

¹³ Parming, Tõnu and Elmar Järvesoo. A Case Study of a Soviet Republic: The Estonian SSR. 1978. p.132.

¹⁴ Pullerits, Albert. Estonia: Population, Cultural and Economic Life. 1935. p.68.

¹⁵ Raun, Toivo. Estonia and the Estonians. 1987. p.126.

communications infrastructure had also been built.

The period of independence saw Estonia begin to mature in economic terms; contemporary business practices were established and the free market system functioned relatively well. A large and secure middle class shared in the general prosperity of the period, and a spirit of self-sufficiency and entrepreneurialism became well entrenched.

3.4 Soviet Estonia

Estonia was forcibly annexed by the Soviet Union in 1940, as part of the agreement between Hitler and Stalin to partition Central Europe. By 1945, the population of Estonia had declined by at least 200,000 citizens, or 19% of its pre-war total. Approximately half of this number had fled West, while the rest were either killed during the war or deported by Stalin. An additional 50,000 to 80,000 civilians were deported in 1949 during the collectivization of Estonian agriculture. Additional banishments of 'bourgeois nationalists' totalling perhaps 3,000 occurred in 1950-51 and political arrests continued for many years. The seriousness of these losses for Estonia was further exacerbated since these numbers included disproportionately high numbers of business, political, educational, artistic and other societal elites. From 1945 to 1988, the Estonian share of the population shrank from 88% to 62% due largely to Russian immigration.¹⁶ The political and economic institutions in Estonia were also radically transformed to correspond to Soviet norms. Private ownership and enterprise was outlawed and/or discouraged, and dissent was not tolerated.

These demographic and political changes have had a number of important effects on Estonian society. There can be no doubt that the entrepreneurial and individualistic attitudes that developed in the inter-war period have been lessened, as has understanding of the market mechanism. In

¹⁶ Rahva Hää. "Rahvastiku jaotus rahvuse ja keele järgi." September 19, 1989. p.2.

addition, Estonians felt culturally threatened during this period, resulting in an enhancement of nationalist feelings. Despite five decades of Communist rule, the political and socio-cultural attitudes that prevailed in Estonia were considerably more Western than in other Soviet Republics. This was partly due to the experiences with independence, but also linked to the relatively high levels of interaction that continued with the West. The geographical location of Estonia, and the similarity of the language to Finnish, made it possible for people to follow Finnish radio and television. In addition, there are sizeable Estonian communities in Sweden, the United States and Canada that provided a connection for Western ideas and consumer goods that rarely penetrated deeper into the Soviet Union.

In addition to the negative political and cultural legacy, the economic record of the Soviet period is also unfavourable. In 1939, Estonia had a per capita income slightly higher than Finland while today, Finland is at least six times richer.¹⁷ Soviet historians have argued that the Republic is better off in the Union, but there can be little doubt that the opportunity cost of such an arrangement has been very high for Estonia.

The most important change to the Estonian economy in the post-war period was its accelerated transformation to an industrial and urban society. Soviet planners assigned the highest priority to industrial development, and particularly to oil-shale mining, electricity generation, textiles and light industry. By 1960, industrial production had tripled over pre-war levels and had surpassed agriculture as the most important economic activity. By the mid-1970s, industry employed twice as many people as agriculture and the country had become highly urbanized with 71% of the population living in cities.¹⁸ Estonia became the world's largest producer of oil-shale, allowing it to rank third, after Canada and Norway, in per capita production of electricity. This energy was used to power

¹⁷ Economist. "Survey of the Soviet Union." October 20, 1990. p.10.

¹⁸ Parming, Tõnu and Elmar Järvesoo. A Case Study of a Soviet Republic: The Estonian SSR. 1978. p.138.

Estonia and parts of Latvia and Russia, including the city of Leningrad. The development of this particular industry has caused significant environmental damage to portions of the northeastern corner of Estonia.

<u>Country/Republic</u>	<u>Per Capita GDP</u>	<u>Index of Per Capita GDP (Estonia=100)</u>
Japan	\$23 325	853
Finland	21 156	774
Sweden	21 155	774
USA	19 815	725
Canada	18 834	689
OECD AVERAGE	17 097	626
East Germany	5 256	192
Czechoslovakia	2 737	100
ESTONIA	2 733	100
Hungary	2 625	96
Latvia	2 528	92
Lithuania	2 343	86
Yugoslavia	2 279	83
Russia	2 261	83
Bulgaria	2 217	81
EASTERN EUROPEAN AVERAGE	2 162	79
USSR (15 Republics)	2 055	75
Ukraine	1 973	72
Poland	1 719	63
Romania	1 374	50
Albania	1 102	40

TABLE 1 - COMPARISON OF PER CAPITA GDP (1988)¹⁹

Agricultural production in Soviet Estonia dropped sharply after collectivization and did not

¹⁹ Adapted from: Economist Book of World Statistics. 1990, p.124. and Study of the Soviet Economy. V.1, 1991, p.231.

recover to pre-war levels until the early 1960s.²⁰ However, labour productivity in agriculture was still among the highest in the USSR and shelves were better stocked in Estonia than in other Republics. By the mid-1970s stagnation in output began setting in, and occasional shortages of certain food products began appearing.

While the Soviet system has had many negative effects on Estonia, there were some positive factors as well. Since the mid-1960s, industrial development in Estonia was directed towards light industry and the manufacturing of consumer goods. The evolution of a strong industrial base with an emphasis on small manufacturing operations allowed Estonia to develop valuable experience in sectors that are likely to provide growth in the re-transformation to a market economy. Additionally, the agricultural base is relatively intact, and the economy has not been burdened with many large, outdated, heavy industries as compared to other Republics. Estonian productivity also remained higher than the Soviet average, indicating a relatively skilled and motivated work force.

Western analysts generally agree that Estonia maintained the highest standard of living of the 15 Soviet Republics, but lagged behind areas in Eastern Europe such as eastern Germany and Czechoslovakia. In 1988, the per capita income of Estonia was 133% of the Soviet average. Table 1 provides a comparison of per capita income (in US dollars) of various OECD and Eastern European countries and Soviet republics.

3.5 The Re-establishment of Independence

In the years since the emergence of Mikhail Gorbachev as the leader of the Soviet Union, Estonia has undergone significant economic, political and social changes. Events in the Republic have demonstrated that the population was deeply dissatisfied with the status quo, and there was

²⁰ Parming, Tõnu and Elmar Järvesoo. A Case Study of a Soviet Republic: The Estonian SSR. 1978. p.144.

significant pressure for meaningful reforms. Unlike other Soviet leaders, Gorbachev demonstrated considerable desire and tolerance for change.

Events in the Republic have indicated that Western style attitudes and beliefs are still relatively intact. Democratic reforms were welcomed by the population, and a new parliament was elected to attempt the restoration of independence. This government had the support of virtually all Estonians, as well as a majority of ethnic Russians; a poll conducted in August of 1990 found that 80% of the people approve of the current leadership.²¹ However, a sizeable minority of the Russian population did not support Estonian sovereignty and this has led to strikes and some political unrest. Estonian tactics for attaining independence were somewhat less confrontational than those adopted by the Lithuanian parliament. Instead of a bold declaration of independence, Estonia adopted a statement of intent to secede. There was also a greater emphasis on economic reforms and maintaining good relations with neighbouring republics.

Estonia set up its own police force and border guard units to try to stem the drain of food and consumer goods into other Republics and this action was accepted by Moscow.²² The Estonian government also unilaterally ended food subsidies, successfully issued its own savings bonds, set up its own state bank and made plans to introduce a free market currency.²³ While regulation of the business and foreign investment environments is less advanced than in Poland, Hungary or Czechoslovakia, Estonia is considerably ahead of the rest of the Soviet Union.

Business interest and investment in Estonia has also outpaced other areas of the USSR. By 1990, 109 joint-ventures with foreign companies had been set up in the Republic, and this comprised

²¹ Estonian Independent. "Estonian leaders enjoy firm support, poll says." Sept. 6, 1990. p.3.

²² Globe and Mail. "Estonian moves challenge integrity of Soviet Union." Nov. 13, 1990. p.A7.

²³ Globe and Mail. "Escaping the Soviet economic whirlpool." Nov. 16, 1990. p.B29.

6.7% of the Soviet total.²⁴ Considering that the Republic had only about 0.5% of the total Soviet population, Estonia has been comparatively very successful at beginning the transition to a market economy. Finns, Swedes and expatriate Estonians are the groups that have shown the most interest to date in terms of establishing joint-ventures.

In August 1991, the attempted coup on Mikhail Gorbachev caused the Estonian parliament to declare immediate independence from the Soviet Union in a bid to avoid a repressive new regime. The coup attempt eventually failed but the power and legitimacy of the Soviet central government had been weakened; Western countries seized this opportunity and extended diplomatic recognition to the three Baltic Republics. In September 1991 the Soviet central government agreed to recognize the full independence of Estonia, Latvia and Lithuania, thus ending 50 years of forceful occupation. Not a single death occurred over the course of the struggle to re-establish independence in Estonia, suggesting that tolerance and social stability are still a part of the national fabric.

The likelihood of eventual economic prosperity seems quite high in Estonia.²⁵ The history of a market economy, a high level of skills and education, a demonstrated ability to adopt reforms quickly, and a culture and geography close to the West are elements in Estonia's favour. These factors make the economic prognosis for Estonia unlike much of the Soviet Union, and closer to the potential of Hungary or Czechoslovakia. In recent years, Estonia had been at the forefront of economic reforms in the Soviet Union, but it has lagged behind developments in some of the fully independent Eastern European countries; it will be interesting to see whether the newfound independence will accelerate the rate of reforms.

²⁴ Study of the Soviet Economy. Vol. 2, Table IV.4.7. 1991. p.104.

²⁵ Fortune. "Opportunity in the Baltics." October 21, 1991. p. 68.

CHAPTER 4 - REVIEW OF PREVIOUS ISSUES RESEARCH

4.1 Introduction

Various studies have been conducted over the last ten years to identify issues of importance to MIS managers. Researchers elicited and investigated the concerns and priorities of practitioners to develop a better understanding of their needs. These studies also helped shape the direction of MIS research, as consultants and academics focused their efforts on addressing the various concerns. In addition to identifying priorities and directing resources, issues research has been useful at tracking the evolution and progress of the information systems community.

While considerable research has been done to identify issues of importance to North American MIS managers, very little is known about managerial perspectives from other parts of the globe. In recent years researchers have begun to explore other settings and studies have now been conducted in Australia, Singapore and the United Kingdom. To date there have been no studies conducted in an Eastern European environment. The research conducted in these studies provides a sound theoretical base for future issues research. There has been some variability in results between the various studies due to research location, year of study and methodological differences, but there is also considerable consistency in the issues that keep reappearing in the top ten list. Most of the changes from study to study occur in the form of revised orderings in the top ten list, indicating shifting priorities and concerns in the IS managerial community as the MIS discipline evolves. The forthcoming sections present a chronological review of these studies. Note that the given dates refer to the year of publication and not data collection times, which are typically a year earlier.

4.2 Ball & Harris (1982)

The first significant attempt to identify issues of importance to IT managers was conducted by Ball & Harris in 1982. Their primary purpose was to gather information on the membership of the Society for Management Information Systems. A questionnaire was mailed to each of the Society's 1400 members and resulted in a 30% response rate. Individuals were asked to complete a detailed demographic profile of themselves, and also to rate 18 pre-defined issues on a 6 point Likert scale so that means and standard deviations could be calculated for each issue. The issues were then ranked from most important to least important based on the mean score. No additional significance testing of the results was attempted.

Table 2 summarizes the top ten issues as identified by Ball & Harris. A revised ranking scheme grouping issues that were not significantly different from each other is also provided. Note that two sample t-tests were conducted on subsequent pairs of issues; 95% confidence level was used.

<u>Revised</u> <u>Ranking</u>	<u>B & H</u> <u>Ranking</u>	<u>Issue</u>	<u>Mean</u> <u>Score</u>	<u>Standard</u> <u>Deviation</u>
1	1	MIS Long Range Planning	5.13	1.08
1	2	Gauging MIS Effectiveness	5.01	1.09
3	3	Impact of Communications on MIS	4.67	1.11
3	4	Developing Role of the IS Manager	4.59	1.28
5	5	Decision Support Systems	4.43	1.31
5	6	Office of the Future Management	4.39	1.35
5	7	Employee Training and Career Path	4.35	1.31
5	8	Education of non-MIS management	4.35	1.39
5	9	Centralization vs Decentralization	4.29	1.34
5	10	Employee Job Satisfaction	4.29	1.35

TABLE 2 - TOP ISSUES: BALL & HARRIS (1982)

This study had a number of weaknesses. It did not provide opportunities for respondents to add issues which they might have felt were important, but that were not on the original list. The wording of the issues and a lack of issue clarification by way of an issue rationale may have also biased some of the results. Finally, as noted above, no statistical testing on the significance levels was provided. The Ball & Harris study is noteworthy because it marked the first attempt to identify MIS concerns. It also alerted the research community to some of the more important issues, and laid a foundation from which subsequent work could evolve.

4.3 Martin (1982)

A study by Martin appeared in the literature soon after the work by Ball & Harris. Martin used a technique developed by Rockart (1979) to identify the Critical Success Factors of senior IS executives. He asked the fifteen participants in the study to identify the factors that 'must go right in order for the manager to be successful.'

The study began by asking each participant to write out their critical success factors and this had the advantage of not directing or biasing the responses as might have occurred in the Ball & Harris work. The responses were then tabulated, and the results returned to each manager for an opportunity to revise the factors after considering the collective group response. Eight of the fifteen managers revised their initial lists during this second iteration. Table 3 itemizes the most important factors, and indicates how many of the fifteen managers listed each in their responses.

The study concluded that the first six of these factors are important to most MIS/DP organizations. Direct comparisons with the Ball & Harris study are difficult because the CSFs are more general in nature and may each encompass a number of sub-issues. The small sample size of fifteen managers also limits confidence in any general inferences to the overall MIS community.

Nevertheless, Martin's study is important because it was the first to use more than one iteration in the process enabling movement towards a consensus on the most important factors.

<u>Critical Success Factors</u>	<u>Cited By</u>
1 Systems Development	14
2 Data Processing Operations	13
3 Human Resource Development	11
4 Management Control of the MIS/DP Organization	11
5 Relationships with the Management of Parent Organization	11
6 Support of Objectives/Priorities of Parent Organization	11
7 Management of Change	7
8 Other Factors	8

TABLE 3 - TOP ISSUES: MARTIN (1982)

4.4 Dickson, Leitheiser, Nechis & Wetherbe (1984)

This group of researchers from the University of Minnesota felt that both the Ball & Harris and Martin studies had certain methodological strengths which could be combined in a single comprehensive study. The scope of the issues identified by Ball & Harris were useful because they were quite specific, yet the allowance for feedback and revision employed by Martin was also very important. Dickson et al. decided to employ the Delphi approach to establish a definitive list of issues of concern to MIS managers. Specifically, they set out to answer the following questions:

- 1/ What are the top 10 IS issues as seen by IS professionals?
- 2/ What is the order of importance of these issues?
- 3/ How much agreement is there on this issues list?

The Delphi technique requires several rounds so that the issues can be identified and ranked. With increasing iterations, it is also likely that a consensus will begin to emerge as managers educate and

inform each other. This study went through four rounds, with the number of participants varying between 52 to 102.

The authors measured the strength of each issue based on a mean ranking out of ten for each issue; participants had been asked to allocate a 10 to the most important issue, 9 to the second most important, and so on. Consensus was measured by the standard deviations for each issue, and also by the width of the inter-quartile range. Finally, the percentage of participants who ranked the issue among the top ten was also tracked. Table 4 summarizes the results of the study after the last iteration had been completed.

<u>Rank</u>	<u>Issue</u>	<u>Mean</u>	<u>Sdev</u>	<u>TopTen</u>
1	Improved IS Planning	9.1	1.5	100%
2	Facilitation of End user computing	7.4	2.1	100
3	Integration of data processing, office automation, telecommunications	6.4	2.4	98
4	Improved Software development and quality	6.0	2.6	93
5	Measuring and Improving IS effectiveness and productivity	5.3	3.0	89
6	Facilitation of organizational learning and usage of IS technologies	4.7	2.6	89
7	Aligning the IS organization with that of the enterprise	3.7	2.8	81
8	Specification, recruitment and development of IS human resources	2.3	2.0	76
9	Effective use of the organization's data resources	2.2	2.3	70
10	Development and Implementation of decision support systems	1.5	2.1	65

TABLE 4 - TOP ISSUES: DICKSON ET AL. (1984)

In the first round, the participants were asked to identify and describe between five and ten of their most important IS issues. The researchers received 52 responses which they combined into a list of 19 key issues and rationales. In rounds two through four, the 19 item list was sent out and revised according to comments received. By the end of the second iteration, the top ten issues and their ordering had become quite stable with very few changes in subsequent rounds. However, the remaining rounds were useful because there was a clear trend towards a consensus because the standard deviations and widths of the inter-quartile range continued to decrease. In round four there

were 54 respondents, and the final results are based on these. It should be noted that regardless of whether the issues are ranked using means or medians, the ordering remains the same except that ties emerge for 3rd and 8th place.

As in the Ball & Harris study, the authors chose not to do any statistical tests to determine whether the issues were significantly different from each other. There are a series of complicating factors in this methodology that make the relevance of such tests questionable and thus not worthwhile. Firstly, the assumption of normally distributed populations is once again tenuous because the issues are rated on a ten point scale by the participants. In addition, the point allocations are not independently distributed because only the top ten issues are ranked, with each issue receiving an ordered ranking from 10 for the most important issue, down to 1 for the least important issue. Furthermore, the use of multiple iterations might have an effect on both the normality and independence of the samples. Finally there is the issue of which iteration should be tested for significant differences because the rankings remain virtually unchanged while the number of participants varies considerably.

The Dickson study established a sound methodology for conducting issues research and it identified a specific list of concerns shared by a large group of MIS managers.

4.5 Arthur Andersen & Co. (1986)

The Arthur Andersen consulting firm conducted a study of 120 senior MIS executives from Fortune 500 companies to try to elicit their concerns. The goal of the study was to develop a profile of the MIS executive, his/her position, and the organizational roles of information technology. The study essentially consisted of two parts: an unaided questionnaire where participants were free to express their concerns, and an aided survey where 22 pre-defined issues were rated on a scale. The

two parts were administered within the same questionnaire, and there was no opportunity to revise the format or content of the instrument after the study had begun.

The unaided part of the survey generated a wide variety of responses but no clear consensus or series of issues dominated the findings. Many of the issues that had been identified in the Dickson study also surfaced here, but there was little indication of the relative priorities of the issues since managers cited a wide variety of challenges.

The second part of the study presented a list of 22 issues and asked respondents to rate the importance of each on a five point scale ranging from 'not important at all' to 'very important'. This was similar in approach to the Ball & Harris study and is subject to the same weaknesses. No statistical details on the results were disclosed, other than the percentage of all respondents rating an issue as either 'somewhat or very important.' The top ten issues rated in this manner are shown in Table 5.

<u>Rank</u>	<u>Issue</u>	<u>Percentage</u>
1	Facilitating/Managing End User Computing	76%
2	Translating IT into Competitive Advantage	72
3	Having Top Management understand needs of MIS	69
4	Measuring/Improving MIS/DP Productivity/Effectiveness	66
5	Keeping Current with Technology Changes	63
6	Managing Information Resources	63
7	Integration	62
8	Data Security and Control	59
9	Impact of New Technology	56
10	Training and Education of DP Personnel	55

TABLE 5 - TOP ISSUES: ARTHUR ANDERSEN & CO. (1986)

The primary contribution of the Arthur Andersen study was to confirm that many of the issues that were identified in previous research are ongoing concerns to MIS managers.

4.6 Hartog & Herbert (1986a); Hartog & Herbert (1986b)

Hartog & Herbert were involved in two studies of MIS issues published in 1986. The first study obtained opinions from over 100 St. Louis area MIS managers (1986a) while the follow-up research had a nationwide focus and targeted IT professionals at Fortune 1000 companies (1986b).

In the first study, Hartog & Herbert referred to the previous work of Ball & Harris, Martin, and Dickson et al. to develop a list of issues. In addition, twelve 'experts' were used as consultants to refine the list and to add emerging issues such as telecommunications deregulation and expert systems to the group. Once the resulting list of 21 issues was finalized, questionnaires were sent to 107 representative companies, and 63 companies responded. Note that some organizations submitted more than one response. The questionnaire asked that each issue be rated on a four point scale ranging from 'not important' to 'extremely important'; this method is similar to Ball & Harris and allows a ranking to be calculated for each issue. After the return of the questionnaire, follow-up interviews were held with some of the participants to help the researchers to better understand the rationales and concerns of the managers.

In general, the findings of Hartog & Herbert are similar to the Dickson study with many of the same issues receiving emphasis. Table 6 summarizes the top ten issues.

<u>Rank</u>	<u>Issues</u>	<u>Importance Score</u>
1	Planning	3.4
2	Aligning MIS with Business Goals	3.3
3	Software Development	3.3
4	Data Utilization	3.3
5	End User Computing	3.1
6	Data Security	3.1
7	Integration of Technologies	3.1
8	Educating Senior Personnel	3.0
9	Quality Assurance	2.9
10	Telecommunications Technology	2.8

TABLE 6 - TOP ISSUES: HARTOG & HERBERT (1986a)

As in the Ball & Harris study, the ranking of these issues is probably not statistically significant in some cases. For instance, items two through four seem not to differ enough to justify such an explicit ordering. However, the authors do not provide us with standard deviations or the exact number of responses, and thus testing this hypotheses is not possible.

In addition to developing this list of important issues, Hartog & Herbert make an additional important contribution because they tried to understand the underlying themes in the top issues. They concluded that these issues are dominated by two main themes: MIS planning and alignment, and controlling the technical and managerial pressures created by end-user computing. They go on to use factor analysis to group issues into categories and they identified four classifications of interest. The groupings that emerged, and the number of issues that fell into each, are:

- 1/ planning/management (6)
- 2/ telecommunications (3)
- 3/ users (5)
- 4/ data (5)
- 5/ other (4)

It should be noted that two of the issues fell into more than one category.

The second study undertaken by Hartog & Herbert used the same questionnaire format as was employed in the St. Louis research, although two additional questions were included. A total of 1,500 questionnaires were sent to 'key' managers at Fortune 1000 companies, and 600 were returned resulting in an impressive response rate of 40%.

The results of this survey differed somewhat from the St. Louis study despite the methodological similarity. The ordering of important issues was considerably different although most of the important issues identified in the earlier study again appeared in the top ten. Exceptions to this are the issues of 'data security' and 'end-user computing' which dropped down to be replaced by the 'productivity' and 'office automation' issues. A number of reasons have been advanced to explain the disparity. Perhaps St. Louis area managers are different from their national counterparts, or the

different sample sizes and slightly revised questionnaire could have affected the results. Finally, the changes in ordering may have been expected since the original ordering was likely not statistically significant. These findings suggest that attempts to identify the ordering of important issues may be somewhat questionable in such research, although the various studies have been quite consistent in identifying the overall group of the ten most important issues.

4.7 Brancheau & Wetherbe (1987)

These researchers undertook to replicate the Dickson et al. (1984) study by using the Delphi technique to rank issues. They were interested in updating the findings since three years had elapsed from the time of the earlier study, and this is a relatively long period of time in the IT profession.

Their methodology was very similar to the Dickson work except that they undertook only three rounds of the study. In the first round, they asked participants to contribute any issues which they felt might of concern, but they also provided a list of past issues that had consistently been ranked as important; this differs from the Dickson study where the first round questionnaire merely solicited the issues. Again, the issues were ranked directly from one to ten, instead of using a rating scale as in the Hartog & Herbert study. The researchers also included a group of general managers in the survey so that their responses could be compared to IS managers.

As would be expected, Brancheau & Wetherbe found that the ordering of the issues had changed in the three years since the Dickson study. In addition, three new issues emerged into the top ten list. Interestingly, there was perfect consensus between the IS and general managers on what the top ten issues should be, although they disagreed on the order. The rankings are given in Table 7.

Brancheau & Wetherbe used Kendall's coefficient of concordance (W) to test the level of

agreement on the final rankings. They reported that W increased over the three iterations in the study, implying movement towards consensus. By the end of the third round, W was calculated to be 0.618 and this was statistically significant at $p < 0.001$. Note that W ranges from '0' signifying no agreement, to '1' which indicates perfect agreement. As in the Dickson study, standard deviations of subsequent rounds also decreased, providing alternative evidence of increasing consensus.

<u>IS</u> <u>Rank</u>	<u>GM</u> <u>Rank</u>	<u>Issue</u>	<u>IS Round 3</u>		
			<u>Mean</u>	<u>Sdev</u>	<u>TopTen</u>
1	1	Strategic Planning	8.6	2.6	96%
2	2	Competitive Advantage (new)	7.4	2.5	94
3	3	Organizational Learning	7.0	2.2	98
4	5	IS Role and Contribution (new)	6.6	3.0	93
5	7	Alignment in Organization	4.9	2.9	87
6	6	End User Computing	3.8	2.5	85
7	8	Data as a Corporate Resource	3.6	2.6	78
8	9	Information Architecture (new)	2.9	2.7	76
9	4	Measuring Effectiveness	2.6	2.8	60
10	10	Integrating Information Technologies	2.2	2.2	68

TABLE 7 - TOP ISSUES: BRANCHEAU & WETHERBE (1987)

As in the Hartog & Herbert study, Brancheau & Wetherbe recognize that there are some underlying themes to the issues; they broadly categorize them into management/enterprise related problems, and technology/application related problems. They noted that the trend in the years since the Dickson study is for the managerial issue types to become relatively more important.

4.8 Rao, Huff & Davis (1987)

This team of researchers appear to be the first to investigate MIS issues of importance in a non-North American setting; Singapore served as the research site for this survey of 19 senior MIS

managers. The methodology parallels the approach created for the Arthur Andersen survey. Participants were first asked open-ended questions designed to elicit the most important issues, and then each participant was asked to rate a given list of issues. Specific methodological details such as descriptions of the instruments used and rationales for study procedures were not disclosed. The researchers also did extensive comparisons of their findings to the Arthur Andersen results from the United States. Table 8 shows the top issues from both the Singapore and USA studies to facilitate comparisons.

Singapore Rank	Issue	Percentage	USA Rank
1	Measuring/Improving MIS/DP Productivity/Effectiveness	94	4
2	Facilitating/Managing End User Computing	79	1
3	Keeping Current with Technology Changes	74	5
4	Integration	68	7
5	Training and Education of DP Personnel	63	10
6	Data Security and Control	63	8
7	Disaster Recovery Planning	63	12
8	Translating IT into Competitive Advantage	63	2
9	Having Top Management understand needs of MIS	63	3
10	Impact of New Technology	58	9

TABLE 8 - TOP ISSUES: RAO, HUFF & DAVIS (1987)

Interestingly, the strategic planning issue, which has been deemed very important in most other MIS issues studies, did not arise in the open-ended sections of the questionnaire and was also not included for measurement in the structured section; no explanation is provided by the authors for this peculiarity.

4.9 Graham (1988); Dexter, Graham & Huff (1990)

As part of a Master's thesis project, Graham, along with co-researchers Dexter and Huff,

attempted to discover whether the priorities of Canadian managers were different from their American counterparts, and also to investigate how the various research methodologies affected the results. The study was carried out in Vancouver with members of the local IS community.

A five part questionnaire was used in the research with the first part asking for general demographic data and parts two through five investigating the issues. Part two asked respondents to list their top three issues (unaided), while the remaining three sections presented lists of 29 issues and asked for level of importance (rating), rank of importance, and level of agreement respectively. A total of 603 questionnaires were sent out with 257 responses received for a response rate of 43%.

The researchers used Spearman Rank correlation tests to investigate the relationships between the rankings. They found that there was a highly significant relationship ($p < 0.006$) between the aided and unaided methodologies. They also confirmed a high degree of consistency between ranking and rating methodologies and concluded that the two methodologies give consistent results ($p < 0.001$). Although the methodologies give significantly similar results, it is still possible for individual issues to vary from one method to another.

Graham Rank 88	Issue	Dickson Rank 84	Hartog Rank 86	Brancheau Rank 87
1	Planning	1	5	1
2	Data Management	8	2	5
3	Integration of Technologies	3	6	7
4	Data Security	12	9	11
5	Software Development	4	4	10
6	End User Computing	2	10	4
7	Educating Senior Personnel	13	3	2
8	Measuring Productivity	5	13	6
9	Office Automation	10	8	12
10	Telecommunications Technology	11	7	8
11	Organizational Learning	6	1	3
12	Decision Support Systems	9	12	13
13	Recruiting and Training	7	11	9

TABLE 9 - TOP ISSUES: GRAHAM (1988)

Table 9 summarizes the findings in the Dexter, Graham & Huff study; note that the final rankings are aggregations of the individual ratings using the various methodologies. To facilitate comparisons, the results from the other major studies are repeated here as well.

Graham and Dexter also conducted a factor analysis to see if the list of issues could be reduced to a shortened group of major themes. They identified a number of primary groupings, although 7 of the 29 issues did not load into any of these:

- 1/ IS Quality and Performance (6)
- 2/ Strategic Issues (5)
- 3/ End User Computing (3)
- 4/ Integration of Technologies (3)
- 5/ Software Development (2)
- 6/ Data and Architecture (4)
- 7/ Other (7)

One of the issues fell into more than one category, and this accounts for the total not summing to the 29 issues.) Many of these classifications are similar to the major themes identified in the Hartog & Herbert study, although they grouped the items into fewer categories.

4.10 Index Group (1988)

American and European readers of the Index Group publication *Indications* were sent questionnaires asking them to rate 20 pre-defined issues. This study was a single-round study and no opportunity was allowed for revising or adding new issues. Participants were typically senior IS managers, with over half being the highest-ranking IS executive in their organization. 553 Americans and 75 Europeans responded to the mail questionnaire, resulting in response rates of 11% in the US and 4% in Europe. It is unclear whether the European respondents were strictly from the United Kingdom or also from the mainland since the terms Europe and UK are used interchangeably. The low response rates are a potential shortcoming of the research as it is difficult to know whether the

respondents were representative of the underlying populations. This appears to be one of the first attempts to study a European environment.

One of the most interesting findings is that American and UK/European IS managers seem to have very similar priorities. The top ten issues in Europe and the corresponding American rankings are presented in Table 10.

<u>Issue</u>	<u>Rank UK/Europe</u>	<u>Rank USA</u>
IS Strategic Planning	1	2
Aligning IS and Corporate Goals	2	1
Educating Senior Mngmnt of IS Role	3	3
Using IS for Competitive Advantage	4	4
Developing and Information Architecture	5	5
Determining Appropriate IS Funding Level	6	10
IS Human Resources	7	8
Managing Organizational Change	8	9
Telecommunications	9	15
Integrating Systems	10	6

TABLE 10 - TOP ISSUES: INDEX GROUP (1988)

4.11 Watson (1989); Watson & Brancheau (1991)

The first attempt to utilize the Delphi methodology for issues research in a non-North American environment was undertaken by Watson in Australia. This study essentially followed the procedures established by the Dickson et al. (1984) and Brancheau & Wetherbe (1987) although two important methodological modifications were introduced. Firstly, participants were asked to rate, rather than rank, each issue as this is less taxing mentally. Secondly, participants who failed to respond to any particular iteration were still included in future iterations so that response rates could be improved. The study had three rounds, with the number of participants ranging from 48 to 55 per round.

Watson went on to compare his findings to American and European research conducted previously by Brancheau & Wetherbe (1987) and the Index Group (1988) respectively. Watson's findings are presented in Table 11.

1989 Rank <u>Australia</u>	<u>Issue</u>	1987 Rank <u>USA</u>	1988 Rank <u>UK/Europe</u>
1	Improving IS Strategic Planning	1	1
2	IS Human Resources	12	7
3	Developing an Information Architecture	8	5
4	Quality of Software Development	13	14
5	Aligning IS Organization and Enterprise	5	2
6	Understanding Role/Contribution of IS	4	3
7	IS for Competitive Advantage	2	4
8	Facilitating/Managing End-User Computing	6	14
9	Effective Use of the Data Resource	7	12
10	Organizational Learning	3	8

TABLE 11 - TOP ISSUES: WATSON (1989)

As a continuation of this work on international MIS issues, Watson co-authored an article with James Brancheau which added the Singaporean study into the comparative analysis (Watson & Brancheau (1991)). The authors concluded that the UK/European, American and Australian IS managers had shown a reasonable level of agreement on the most critical issues, but IS managers from Singapore had a considerably different view. The divergence could be due to the influence of local business culture and the relatively smaller size of Singaporean organizations.

4.12 Silk (1989); Silk (1990)

David Silk conducted two studies at the Henley Management College in the United Kingdom. Established managers from a variety of backgrounds come to this institution to update and improve

their knowledge of management techniques. Silk asked groups of managers involved in the program to indicate the issues of information management that are of concern to them. The research was first conducted with 268 managers, and then repeated a year later with with a new group of 401 managers. The results of the two studies were very similar and are presented in Table 12.

<u>Issue</u>	<u>1989 Rank</u>	<u>1990 Rank</u>
The Impact of IS on the Organization	1	1
Linking Information and Business Strategies	2	3
Maintaining the Security of Electronic Data	3	2
Managing the IS Function	4	5
Justifying IS Investment	5	4

TABLE 12 - TOP ISSUES: SILK (1990)

There are a number of potential problems with this study, making it difficult to draw conclusions and compare results with prior research. Firstly, only 5% of the participants were IT professionals, with the rest coming from other functions. Secondly, the data was gathered after the students had taken an IS course, meaning that the issues raised were quite possibly a function of exposure to the material.

4.13 Deans, Karwan, Goslar, Ricks & Toyne (1991)

Deans et al. conducted a two stage survey investigating the concerns of IS executives managing the IS function in an international context. In particular they attempted to identify the key international issues facing US-based multinational corporations. The methodology used was similar to that used by Hartog & Herbert. The first stage involved creating a questionnaire that listed a series of issues gathered from various issues studies and the international literature. This

questionnaire was then sent to the senior IS executive at 588 US-based international companies, and 31% eventually responded to the survey. The second stage of the study involved a series of extended telephone interviews with selected respondents; 26 executives participated in this stage, helping the researchers to understand the issues more fully. The most important IS issues as seen by international IS executives are presented in Table 13.

<u>Rank</u>	<u>Issue</u>
1	Educating Senior Personnel
2	Data Security
3	Integration of Technologies
4 (tie)	End-User Computing
4 (tie)	Price and Quality of Telecommunications
6	International Protocol Standards
7	Use of IT for Competitive Advantage
8	Data Utilization
9	Telecommunications Deregulation
10	Changes in Telecommunications Technology

TABLE 13 - TOP ISSUES: DEANS ET AL. (1991)

This study revealed that a multinational perspective on IS issues was quite distinct from domestic concerns. In particular, telecommunications issues were of greater concern, with three aspects of this problem ranking in the top ten issues.

4.14 Alpar & Ein-Dor (1991)

Alpar & Ein-Dor investigated IS issues specifically from the perspective of 636 small, entrepreneurial firms. Comparisons of this work to previous research is difficult since the target group of companies, methodology and issue classification scheme are each unique. They used a simple unstructured questionnaire which asked participants to describe their 'major concerns with respect to the use of computers in the firm.' Once the responses were received, the concerns were

classified by the authours into several general concerns. Small companies were found to have many concerns that differ considerably from those of larger IT organizations; the results are presented in Table 14.

<u>Rank</u>	<u>Cited By</u>	<u>Issue</u>
1	11.6%	Reliability
2	9.1	System Quality
3	8.9	Change
4	8.6	Cost
5	7.6	Development
6	6.7	Integration
7	6.5	Control
8	5.5	People
9	4.2	Data Management
10 (tie)	3.2	Hardware
10 (tie)	3.2	Software

TABLE 14 - TOP ISSUES: ALPAR & EIN-DOR (1991)

<u>Overall Rank</u>	<u>Issue</u>
1	Long Range/Strategic IS Planning
2	Aligning IS with the Organization
3	Organizational Learning/Educating Senior Management
4	Measuring IS Effectiveness and Productivity
5	Data as a Corporate Resource
6	Increase Understanding of IS Role/Contribution
7	End User Computing/Computing Centres
8	Technology Integration
9	Office Automation
10	Software Development

TABLE 15 - ALPAR & EIN-DOR'S SYNTHESIS OF PREVIOUS STUDIES

In addition to the research on small-company IS concerns, Alpar & Ein-Dor attempted an extensive synthesis of previous issues studies (Ball & Harris (1980); Dickson et al. (1984); Hartog & Herbert (1986a); Brancheau & Wetherbe (1987)). By categorizing issues into groups of similar concerns and standardizing original scores, they were able to identify the most consistently important

issues in North America. The top ten issues in North America according to this synthesis are presented below in Table 15. These ten issues provided an appropriate basis for the most important North American issues and were therefore included in the Estonia study to facilitate comparisons.

4.15 Niederman, Brancheau & Wetherbe (1991)

This North American Delphi study was an update of the work originated by Dickson et al. (1984), and previously updated by Brancheau & Wetherbe (1987). The two methodological modifications of rating, rather than ranking issues, and including non-respondents in subsequent rounds, as introduced in Watson's (1988) Australia study, were also used in this research. The study had three rounds, with the number of participants ranging from 104 to 126 per round.

The research showed that many of the priorities of MIS managers had shifted over the previous three and six year periods; the results are shown in Table 16.

1991 Rank Niederman	Issue	1987 Rank Brancheau	1984 Rank Dickson
1	Developing an Information Architecture	8	na
2	Effective Use of the Data Resource	7	9
3	Improving IS Strategic Planning	1	1
4	IS Human Resources	12	8
5	Organizational Learning	3	6
6	IT Infrastructure	na	na
7	Aligning IS Organization and Enterprise	5	7
8	IS for Competitive Advantage	2	na
9	Quality of Software Development	13	4
10	Telecommunications System	11	13

TABLE 16 - TOP ISSUES: NIEDERMAN ET AL. (1991)

It should also be noted that the Niederman et al. (1991) study provided the primary methodological basis for the Estonian study.

CHAPTER 5 - RESEARCH QUESTIONS AND METHODOLOGY

5.1 Research Questions

○ The previous chapters provide background information on previous issues studies, the research site and the state of Eastern European information technology. In order to proceed with the investigation of IS issues of importance in Estonia, it is necessary to formalize the specific research objectives. This section outlines and discusses the research questions for this project.

The primary research questions are:

- What are the top information systems issues as seen by IS professionals in an Eastern European organizational and technological environment?
- What is the order of importance of these issues?
- How much agreement is there on this issues list?
- How do these priorities compare with the various North American findings, and findings elsewhere? What are the similarities and differences?

The first three of these questions parallel the motivations of the Dickson et al. (1984) study. The fourth question attempts to reconcile the concerns of managers in an Eastern European setting with their counterparts in North America and elsewhere. Since there is considerable agreement in the North American literature on the top issues (although perhaps not their ordering), it is of particular interest to see if these issues are also relevant to managers in Estonia.

Numerous researchers (Goodman (1984),(1987); Judy (1987); Nyren (1987)) have noted that technological developments and applications in Eastern Europe tend to lag progress in the West by some five to fifteen years. This factor, coupled with the distinctive economic and organizational settings of Eastern European enterprises, suggests that many of the concerns faced by local IS

managers will differ from those of their counterparts in North America; it is expected that there will be a set of unique issues that are a function of the Eastern European environment. However, it is also likely that there will be a set of common concerns stemming from the shared experiences of managing information technology.

The findings of the Estonian study will be compared to recent North American studies (Niederman et al. (1991)), and to earlier work (Dickson et al. (1984); Brancheau & Wetherbe (1987)). Additional studies from Europe (Index Group (1988)) and Australia (Watson (1989)) will also be considered.

5.2 Selection of Methodology

Numerous investigators in the field of IS issues research have noted that the methodological approach used has some effect on the findings of the study, although this effect is thought to be minor (Hartog & Herbert (1986); Brancheau & Wetherbe (1987); Dexter et al. (1990); Alpar & Ein-Dor (1991)). This variance due to methodology can be attributed to factors such as ranking versus rating issues, multiple iterations resulting in subject change, social desirability response, and artifacts such as instructional wording or questionnaire design. Dexter et al. (1990) have called for the adoption of a single methodology so that results can be directly compared.

The strategy employed by many of the leading issues studies has been the Delphi approach (Dickson et al. (1984); Brancheau & Wetherbe (1987); Watson (1989); Niederman et al. (1991)) and there are currently additional studies of this form underway in various countries. Using the Delphi approach to investigate MIS issues in Estonia would thus have the important advantage of having a series of studies available for the comparison of findings, and possibly a number of forthcoming studies as well. The Delphi approach therefore has the distinct advantage of allowing the researcher

to control for methodology, thus strengthening claims that any differences observed between Estonia and North America are solely a function of the environment. No other approach can offer these advantages.

Using a Delphi study for this research project is appropriate for the following reasons:

- Allows for an open ended first round questionnaire, thus facilitating unbiased solicitation of views from the Estonian IS community and identification of new issues. This provides an initial database of objective information that can be used on its own to prepare an analysis similar to the Alpar & Ein-Dor (1991) study.
- Allows for the integration of new issues with previously identified concerns, thereby facilitating rating the issues and identifying the most important concerns. It also gathers information on Estonian perspectives on important North American issues.
- The methodology emphasizes feedback in subsequent rounds which encourages reflection and a movement towards consensus. A greater depth of insight is facilitated by multiple rounds.
- Maintains the anonymity and privacy of participants, thereby allowing each to have equal influence, and avoids conflict and social pressures that might surface in the relatively small Estonian IS community.

The Delphi approach provides a good general fit with the research objectives. Each previous Delphi study has been similar in approach, but minor variations are often necessary to achieve research goals, and to match a particular setting. The forthcoming section will undertake a brief overview of the Delphi methodology and describe general details related to conducting the study in Estonia. Specific details of study procedures are left to future sections.

5.3 Delphi Methodology and Estonia - An Overview

The Delphi approach requires several iterations of questionnaire completions by the study's participants. In the first round, an unaided questionnaire to solicit issues of concern is used since it

does not bias or lead the participants in any way. Once the first round questionnaires have been returned, the responses will be analyzed to isolate the primary issues of concern to Estonian managers. This analysis requires some degree of judgement to interpret and classify the responses so it is desirable that it be carried out by two or more researchers working independently. The results can then be compared and any differences reconciled through discussion. The unstructured nature of the first round will likely make this the most difficult and time consuming iteration in the study. To reduce turnaround time, this round will seek to solicit views from 8 to 10 participants who are judged highly knowledgeable about the Estonian IT environment. To enhance overall confidence in our ability to identify all of the important Estonian MIS issues, the study will also make use of supplementary techniques. These are described more completely in the 'Instrument Development' section which follows below.

The analysis of the first iteration results, and the inclusion of issues generated using supplementary techniques, will lead to the creation of a new questionnaire for the second round. In this iteration, participants will be asked to rate a list of issues in terms of their importance on a scale from 1 to 10. In this manner, the top issues will be identified and the appropriate comparisons can be made with other studies. In addition, participants will be given a final opportunity to add issues to the list to ensure that all the top Estonian concerns have been identified.

In the third round, participants will be provided with a questionnaire similar to the round 2 questionnaire, but which also provides feedback in the form of group means from the results of round 2. Participants can then reflect on their choices, and the Delphi process will move the group towards a consensus on the key issues. As was demonstrated in both the Dickson et al. (1984) and Brancheau & Wetherbe (1987) studies, two iterations are generally enough to establish the list of issues and their relative ordering. The third iteration serves primarily to confirm the ordering and promote a consensus among participants.

It was estimated that this study could be completed on-site in approximately eight to ten weeks. Proponents of the Delphi technique have suggested that approximately six weeks are required for a three iteration study, but difficulties in conducting research in Eastern Europe can be expected, and this may lengthen the process (Delbecq et al. (1975)). Arrangements were made to spend ten weeks in Estonia to conduct the research.

In order to identify, recruit and access study participants, it was necessary to establish a research base in Estonia. The capital city of Tallinn was the most appropriate location for such a base because it contains over one third of the population of the Republic, a major university, numerous research and training institutes, and a substantial industrial base. Additional travel to secondary cities such as Tartu is easily arranged from Tallinn.

An appropriate final goal for this Delphi study would be to solicit views from 20 to 30 middle and senior level IT personnel from a cross section of the local Estonian economy. This number of participants should be sufficient to achieve a proper understanding of IS issues in Estonia. Since no database of Estonian MIS managers appears to exist, it will be necessary to use a convenience sample of IS professionals. Each participant in the study will be contacted directly to stimulate interest and build commitment to the study, as well as to attempt to motivate respondents to reply quickly.

5.4 Instrument Development

This study consists of three rounds, requiring the development of three separate questionnaires. The following sections outline the procedures followed to develop these instruments.

5.4.1 Round 1 Questionnaire

The first questionnaire is of an open-ended format, asking participants to contribute issues

of importance to the Estonian MIS manager. The open-ended format minimizes the risk of biasing responses. Some recent Delphi studies (see Brancheau & Wetherbe (1987), Niederman et al. (1991)) have abandoned the strictly open-ended first round in favour of a format that asks participants to review issues from previous studies and to identify and add new issues to the list. Because the Estonian study was the first one conducted in an Eastern European setting, it was felt that an open round would be necessary in order to ensure that bias was minimized. In particular, it was desirable that Estonian managers be given an opportunity to relate important issues without the distraction of considering issues from North American studies.

The round 1 questionnaire and covering letter can be found in Appendix A. The instrument consists of three parts: 1. covering letter, 2. core of the questionnaire (space for issues to be identified), 3. participant identification section. In addition to the instructions presented in this instrument, the researcher personally met with each first round participant and verbally explained and clarified the instructions and the purpose of the study. This step was taken to promote commitment and to ensure a short turn-around time for the first round. Care was taken not to colour the views of respondents during these sessions.

5.4.2 Round 2 Questionnaire

The primary purpose of the first round was to generate a list of issues that can then be rated on subsequent rounds. In a conventional Delphi study, the round 2 issues list would be generated solely from the round 1 questionnaire (Dickson et al. (1984)). However, the requirement for completing the research within the two month study period in Estonia necessitated a smaller round 1 study group and therefore a number of supplementary techniques for generating issues for the round 2 questionnaire were also employed. The primary purpose of these supplementary issue generation

techniques was to ensure that all the relevant issues were identified, to the extent that this is possible. An additional important goal in this study was to facilitate comparison with previous issues work, particularly the North American findings, and therefore important issues from these studies were also included in the round 2 questionnaire.

The issues for the round 2 questionnaire were thus generated using the following four techniques:

- i/ **Issues of Importance from North American Studies**
- ii/ **Literature Search**
- iii/ **Informal Discussion with Estonian IT Professionals**
- iv/ **Results from Round 1 Questionnaire**

Each of these sources, and the issues which arose from using the technique, are discussed in more detail below.

i/ Issues of Importance from North American Studies - some of the issues that have been identified as highly important in North American studies will likely have international relevance. Therefore a review of past research was conducted to isolate top issues that have consistently appeared in the issues literature.

In an attempt to summarize and tabulate existing issues research, Alpar & Ein-Dor (1991) synthesized most of the major studies from the 1980s. The top 10 issues according to their classifications were:

- 1/ **Long Range/Strategic IS Planning**
- 2/ **Aligning IS with the Organization**
- 3/ **Organizational Learning/Educating Senior Personnel**

- 4/ Measuring IS Effectiveness and Productivity
- 5/ Data as a Corporate Resource
- 6/ Increase Understanding of IS Role/Contribution
- 7/ End User Computing/Computer Centres
- 8/ Technology Integration
- 9/ Office Automation
- 10/ Software Development

In their synthesis, Alpar and Ein-Dor required that an issue be reflected in at least two studies, and hence their method tends to exclude newly emerging issues. To compensate for this, two additional issues that have been rated highly in the most recent North American research will be included:

- 11/ Developing an Information Architecture
#1, from Niederman et al. (1991)
- 12/ IS for Competitive Advantage
#2, from Brancheau & Wetherbe (1987)

These twelve issues from the North American literature were thus included in the round 2 questionnaire given to Estonian IT managers.

Note that to promote comparability and consistency, the wording for these issues was taken directly from the study by Niederman et al. (1991), which in turn drew on the conventions of the earlier Dickson et al. (1984) and Brancheau & Wetherbe (1987) studies. A partial exception to this convention was issue 11. The 'information architecture' issue did not translate well into Estonian, and thus it was felt that an additional sentence clarifying the concept of an information architecture would help Estonian respondents.

ii/ Literature Search - a review of articles on Eastern European computing was useful in creating an initial list of possible issues of importance to the Eastern European and Estonian IT communities. The following list indicates issues that Western observers have speculated to be of importance in this region:

- 13/ Planning and Implementing a Telecommunications System: whether the poor state of the telephone infrastructure constrains the IS function
- 14/ Specifying, Developing and Recruiting Human Resources for IS: whether CMEA organizations are able to obtain and maintain qualified personnel for the IS function
- 15/ Regulatory Constraints on IS Activities and Ambitions: whether CMEA and Western regulations and restrictions are having a serious impact on IS management
- 16/ Availability of Appropriate Hardware and Software Resources: whether the well-documented shortages common in CMEA economies extend into the information technology sector
- 17/ Affordability of Hardware and Software: whether the high cost of imported information technology is a serious issue for Estonian organizations
- 18/ Ensuring that Applications Satisfy the Needs of Users/Organization: whether systems that are useful and usable have been developed
- 19/ Building and Maintaining Reliable Information Systems: whether breakdowns and malfunctions are a serious problem in Estonian MIS
- 20/ Establishing Alliances and Linkages with Western Organizations: whether coordination and joint ventures between Eastern European and Western firms are an IS priority

Issues 13 and 14 have also been common problems in the North American surveys, and thus the wording for these was taken directly from the Niederman et al. (1991) study. However, in the case of the 'telecommunications' issue, it was felt that a major component of this issue in an Eastern European setting was the need to improve the national telecommunications system, and thus this aspect was explicitly stated in the issue rationale.

The wordings for issues 15 through 20 were composed to reflect what was felt to be the key

aspects of these issues in Eastern Europe. To maintain consistency, an attempt was made to word these issues in the same style as found in previous Delphi studies.

iii/ Informal Discussions with Estonian IT professionals - upon arrival in Estonia, a series of visits to organizations using computers and information technologies helped to familiarize the researcher with the Estonian IT environment. During these visits, two additional issues of importance were uncovered:

- 21/ Ensuring the Physical Security of Computer Systems: a number of people related stories and anecdotes about computers being stolen from offices, and also about a general lack of care with respect to looking after existing machines. Construction crews sometimes damage hardware by not adequately protecting it while engaged in renovations.
- 22/ Legislating Copyright Protection for Software: another issue that came up repeatedly was the lack of copyright protection legislation for software. This impacts firms because their own software is in danger of being distributed, and software firms are less willing to set up and offer after sales servicing because the market consists primarily of pirated software.

iv/ Results from Round 1 Questionnaire - Each of the questionnaires was examined by the primary researcher, both alone and with the help of a co-researcher (an Estonian professor specializing in information technology and management). The results from round 1 were analyzed and a list of new issues was identified and clarified by the researcher. To check on the validity of the issue identification, the questionnaires were then given to the co-researcher for independent analysis. Next the two sets of results were compared and the researchers agreed on a final set of eight additional issues:

- 23/ Educational Weaknesses of the Workforce: whether schools and universities are producing well-trained IS personnel
- 24/ Implementing and Improving Computer Networks: acquiring and implementing technology to facilitate the linking of computers

- 25/ Promoting Standards for Hardware, Software and Data: coordinating IS products and applications to facilitate integration
- 26/ Unsettled Political and Regulatory Environment: whether massive changes in government and policy are impacting the IS function
- 27/ Obtaining Access to IS Knowledge and Advice: whether Estonian IS managers have difficulty accessing useful publications and consulting expertise as necessary for effective management
- 28/ Improving Information Security and Control: whether data is secure from theft, destruction, alteration and loss
- 29/ Changing the Attitudes of IS Employees: whether the attitudes of IS employees are compatible with requirements for high productivity and creativity
- 30/ Loss of Skilled IS Workers to Foreign Bidders: whether top IS employees are being financially enticed to work for foreign companies, or to relocate to foreign countries

Once the issues of importance were generated using the four techniques outlined above, the issues were combined into a single questionnaire (see Appendix B) after being randomly scrambled. The resulting instrument consists of four parts: 1. covering letter, 2. core of the questionnaire (30 issues to be rated), 3. open-ended section for additional issues to be added, 4. participant identification section.

The style and format of the main body of the questionnaire closely imitates the layout established in previous Delphi studies on MIS issues. The open-ended section was included as a check to ensure that the four techniques described above had been sufficient to generate all of the potentially important issues. The participant identification section was expanded considerably from the round 1 questionnaire so that data could be gathered for respondent categorization purposes. This section also asked for general descriptions about the types of systems currently in use at the respondents' workplaces so that Estonian IT environments could be better understood.

5.4.3 Round 3 Questionnaire

The round 3 questionnaire is an opportunity for participants to reflect on their answers in round 2 in light of the group response and to provide a final rating of each issue. This instrument is very similar to the round 2 instrument and conventions established in previous Delphi work were once again followed.

The issues to be ranked were now presented to the participants in decreasing order of importance, as determined by the mean response from round 2. In addition, each participant's questionnaire showed their previous responses and the mean group responses for each of the 30 issues. The open-ended section from round 2 failed to uncover any additional important issues, and thus the list remained at 30 issues. No further opportunity for adding issues was provided in this final round.

It was expected that the researcher would have to leave Estonia before all of the round 3 questionnaires could be collected. Therefore an additional page was added to the questionnaire to ensure that the data could eventually be retrieved. Each participant was asked to copy their final ratings onto this additional page, and to return this independently from the main questionnaire. This procedure was implemented to improve the likelihood of retrieving at least one copy of the final ratings.

The round 3 questionnaires and covering letter can be found in Appendix C. The instrument consisted of four parts: 1. covering letter, 2. core of the questionnaire (30 issues to be re-rated), 3. participant identification section, 4. additional page for copying final ratings. As a method for motivating respondents, each participant was also asked to check whether or not they would like to receive a copy of the research results.

5.4.4 Translations

An important methodological difference between this study and previous MIS issues studies is the requirement for bilingual instruments. While many Estonian MIS managers understand English, it was felt to be critical to the success of this research to communicate with participants in their first language. The questionnaires were presented in a bilingual format (Estonian/English) primarily for two reasons. Firstly, the Estonian IT terminology borrows heavily from English standards and thus a bilingual format will undoubtedly be useful for many respondents. Secondly, many participants will have a good command of both languages, and thus they can be used as a source to provide feedback on potentially inaccurate or misleading translations.

Brislin (1980) has identified four basic methodologies for conducting and verifying translations:

- i/ **Back Translation**, in which a researcher prepares material in one language and asks a bilingual to translate into the target language. A second bilingual is asked to translate the material back into the original language and then the researcher can compare these two versions and judge the quality of the translations.
- ii/ **The Bilingual Technique**, in which groups of bilinguals take different halves of a test in the two languages that they know. Sophisticated statistical techniques such as split-half reliability assessments can then be used to isolate items that are non-equivalent in meaning.
- iii/ **Committee Approach**, where a group of bilinguals translates from the source language to the target language.
- iv/ **Pretest Procedures**, where the translated items are field tested to insure that people will comprehend all the material

While back translations and the bilingual technique would have had substantial power in validating the quality of the translations conducted in this research project, they are simply beyond the scope of this study due to budget and time constraints.

The translational philosophy employed for this research is one of pragmatism rather than

theoretical elegance, and thus the committee approach with some simultaneous pretesting were used. It is believed that such an approach is sufficient for this project since the items to be translated reflect concrete concepts, and participant responses need no further interpretation. Such research can be distinguished from projects that attempt to measure abstract concepts such as attitudes or feelings, and where translational validation may be more critical in ensuring the validity of end results.

The principal researcher in this project is bilingual and was closely involved in all translational procedures. In addition, a number of Estonian assistants, both bilingual and unilingual, were recruited to help with the translations and to ensure their comprehensibility. The researcher has a high degree of confidence on the equivalency of the translations since the final versions for the round 2 and 3 instruments were approved by an Estonian co-researcher who has done considerable work in translations and in the field of identifying and standardizing an IT vocabulary in the Estonian language. The ensuing paragraphs document the step that were followed in translating the instruments used in this research project.

Preliminary versions of the first and second round covering letters and questionnaires were drafted before travelling to the research site. A first attempt at translations into Estonian were made by the researcher. Prior to departure for Estonia, these questionnaires were submitted for inspection to a professor of linguistics specializing in the Estonian language at UBC. The translations were edited for grammar and stylistic quality, and a special effort was made to ensure that the translations were semantically equivalent. The researcher was unable to find a Canadian expert to verify the translations of technical terms into Estonian, and thus this task was delayed until arrival in Tallinn.

These first attempt at translation went relatively smoothly with the exception of the following two problematic terms:

'issue' - there is no direct translation of this seemingly simple word so we used a combination of words in Estonian to try to leave the same impression. We replaced 'issues' with 'problems, questions and worries' (Est: probleemid, küsimused ja mured) in the explanations.

'IS manager' - initially we tried 'computer manager' (Est: arvutijuht) but this turned out to be an invalid Estonian word. In the round 1 questionnaire we eventually accepted 'computer specialist' (Est: arvutispetsialist) but subsequently decided that this may have technical rather than managerial connotations. Finally the Estonian equivalent of 'someone who oversees the IS operations of a firm' were used in rounds 2 and 3.

The first round covering letter and questionnaire was submitted for inspection to colleagues at the Institute of Cybernetics and some minor grammatical corrections were made. The concern about the translations of technical terms was lessened upon confirmation that most Estonian technical words borrow heavily from the English version, and thus literal translations are generally correct. The Estonian IT community also commonly uses the English language versions of these terms and therefore communicating these ideas is straightforward. In any event, the open, unstructured nature of the first round questionnaire required very little modification.

The validation of the translations for the second round was more complex. There was much more material to verify with some of the material appearing for the first time (newly identified issues) and thus requiring corrections to grammar, as well as semantic clarification. Once the researcher had made a first attempt at translating the entire questionnaire, it was submitted to various individuals for revision. Two individuals (an engineer (unilingual Estonian) and a computer science graduate student (bilingual Estonian/English)) helped with clarifications, revisions to grammar and the corrections of technical terms.

Finally, the translations were submitted to the Estonian co-researcher for final approval, and this resulted in some fairly significant changes to the existing translations. It was pointed out that some seemingly innocuous Estonian words are loaded with negative connotations. For example, the word 'planning' (Est: planeerimine) has connotations that associate it with the central planning system of the Soviet regime; the appropriate word to use is 'project' as a verb (Est: projekteerimine), as in "we will 'project' the installation of the system." Another example of a word that has developed a

negative connotation over the past five decades is 'improve' (Est: parendada) since the Soviet government has always stressed that things are improving. The correct word to use in contemporary Estonia is 'fix' (Est: parandada) which implicitly recognizes that broken things do exist, even in socialist societies.

The translations for the third round were relatively simple because the questionnaire was similar to the previous round. All modifications to the covering letter and questionnaire were once again revised and improved as judged necessary by translator-assistants.

5.5 Participant Recruitment

North American Delphi studies have used databases of professional associations such as the Society for Information Management (SIM) or the Canadian Information Processing Society (CIPS) to recruit participants. Unfortunately, no comparable list exists in Estonia and therefore this project used a convenience sample of individuals. Before departing for the research site, numerous potential participants had already been identified through speaking with members of the Estonian-Canadian business community and with academic contacts in Tallinn.

On arrival in Estonia, these individuals were asked to suggest additional potential participants for the study. Once appropriate individuals were identified, they were also asked to suggest further subjects. Care was taken to ensure that individuals representing each of the various types of local organizations were recruited (academic, government, state-owned company, private or limited company, joint-venture company). This sampling approach generated a group of qualified and motivated participants, and it was hoped that they could collectively reach a reasonable level of consensus in judging MIS issues of importance. While planning this research, it was expected that there might be a non-participation bias by politically conservative individuals. However, no evidence

of resistance was experienced from any of the individuals contacted for participation.

It should be noted that the concept of an 'MIS manager' per se, is not familiar to most Estonian organizations and it would be rare to find an individual with such a title. MIS functions are often performed by someone from accounting, engineering or other department that controls information technology in the firm. In addition, many of the functions that we would associate with a senior MIS executive in North America are typically lacking, at least in a formal sense, in Estonian organizations (eg. strategic planning, planning technology acquisitions and integration). It would be misleading to suggest that the individuals surveyed in this study are directly comparable to the North American MIS manager in terms of their titles, training, skills and responsibilities. Instead, this study looks at established figures in the Estonian IT community, including managers of computer centres, general managers, consultants, technical specialists, and academic and government representatives.

5.6 Data Collection Procedures

This research project was conducted on-site in Estonia between May 25 and July 26, 1991. The final data was collected by mail and was received by October 31, 1991.

5.6.1 Round 1

The first round questionnaire was delivered to a subset of the final survey sample. Only ten participants were asked to complete this questionnaire since limited time at the research site made it necessary to achieve a short turnaround time for this preliminary round. Each participant was initially contacted by telephone, and a preliminary meeting was arranged so that the purpose of the research could be clarified to the respondents, and so that participant commitment would be

enhanced. The questionnaires were hand-delivered during the initial meeting and arrangements were made to retrieve them at a future date so that no reliance on the local mail system would be needed. The participants were given one week to complete the questionnaire.

5.6.2 Round 2

The round 2 questionnaire was administered to the entire sample of 28 individuals. Once again the participants were contacted by telephone and the questionnaires were hand-delivered at a pre-specified time and location. Whenever possible, an attempt was made to meet with the participants but this was not possible in approximately one-third of the cases.

Given the difficulty in personally retrieving the questionnaires for this round, a decision was made to rely on the postal system. Each questionnaire was placed in a stamped and pre-addressed envelope which was to be returned to the researcher at his office at the Institute of Cybernetics in Tallinn. It should be noted that a number of participants expressed misgivings at the reliability of the local postal system and wished to make alternative arrangements for returning the completed questionnaires. Some participants personally delivered the envelopes, and in a few cases the researcher retrieved the questionnaires. Over half of the sample relied on the postal system.

The respondents were given two weeks to respond to the round 2 questionnaire, after which non-respondents were contacted by telephone to encourage a reply and/or to offer alternative retrieval arrangements for completed questionnaires. A cut-off time of three weeks was imposed. The postal system did not appear to be problematic, with delivery typically taking between two and three days. In one case, a participant contacted during a follow-up call claimed to have mailed the questionnaire, so it is conceivable that one envelope did go astray.

5.6.3 Round 3

Each participant had been notified by telephone during the second round that a final questionnaire was to be expected, and thus telephone contact was not deemed necessary for this round. The questionnaires were simply delivered to the offices of the participants. The round 3 questionnaire was completed approximately two weeks before the researcher was to return to Canada, so it was evident that the postal system would have to be relied upon once again for returns.

To ensure that the data did not go astray, a two-fold strategy was adopted for returning the responses. Firstly, the procedures from round 2 were repeated with the questionnaire being returned to the Institute of Cybernetics. Additional arrangements were made to have these questionnaires forwarded to Canada. Secondly, each participant was asked to copy the responses onto a separate sheet of paper and mail that directly to Canada. Stamped and pre-addressed envelopes were provided to each participant for both items which were to be returned.

The timing of the third round was somewhat unfortunate for a number of reasons. A temporary complication arose in the manner of a sudden shortage of postage stamps; it seems that postage rates in Estonia had been doubled in 1991 but the authorities had neglected to print additional stamps, resulting in a severe stamp shortage by July. The researcher was able to call upon a friendly contact employed by the post office for an adequate supply. In addition, most people in Estonia begin taking summer vacations in late July, making the timing of responses to round 3 difficult to predict and perhaps negatively affecting the response rates. Finally, temporary ill health prevented the researcher from attempting additional follow-ups to encourage responses while still in Estonia.

Since most Estonian vacations last for the full month of August, participants were given until mid-September to respond to the third round questionnaire. At this time, a co-researcher in Estonia was contacted by electronic mail and given the names of individuals from whom no final round data had yet been received. Each of these non-respondents was then contacted by telephone, reminded

of the importance of their participation and requested to return their questionnaires.

5.7 Summary of Methodological Differences

Although this research project closely followed the Delphi methodology as established by Niederman et al. (1991) and other previous studies, a number of different procedures were followed:

- i/ Translations were necessary and instruments were presented in a bilingual format.
- ii/ Round 1 questionnaires were only distributed to a subset of the study's participants. This was done to reduce the time necessary for the first round so that the study could be completed within the allocated timeframe.
- iii/ The issue list for round 2 was generated using four techniques: i/ important issues from North America, ii/ literature search, iii/ informal discussions, iv/ open-ended first round. This is in contrast to the North American Delphi studies which typically use: i/ open-ended first round, ii/ important issues from previous studies.
- iv/ The recruitment of study participants was done through personal contacts and subsequent recommendations since no appropriate list of potential participants could be located.
- v/ This study had a higher degree of personal contact with participants than is typical since face-to-face meetings were held with most recruits.
- vi/ In the questionnaire instructions for rating the issues, participants were explicitly told that they could leave an issue blank if they were "uncertain about the importance of an issue, or had no opinion."
- vii/ In round 2, participants were given an additional opportunity to contribute new issues to ensure that all of the important issues had been uncovered. This opportunity had only been provided during the first round in the North American studies.

5.8 Conducting Research in Estonia - Some Observations

5.8.1 Introduction

As McHenry et al. (1990) have noted, conducting on-site research in Eastern Europe is

fraught with numerous difficulties that are generally not encountered in the West. In conducting research in Estonia, many problems and inconveniences did arise and individuals contemplating projects in the region should be prepared for such complications. Problems can best be minimized by investigating the conditions before setting out, understanding your specific research-related needs while on-site and planning for contingencies where possible.

This section provides some practical and anecdotal descriptions about conducting research and living in one Eastern European setting. It should be remembered that conditions in Estonia continue to change quickly, especially now that the country has re-established its independence from the Soviet Union. The impressions that follow were formed in the summer of 1991 during the few last months of Soviet authority.

5.8.2 Accessing the Research Site

The only realistic way to gain access to a Soviet research site is to first obtain an invitation from a Soviet institute, agency or business. The researcher must establish contacts with an appropriate organization in the USSR, and obtain an official invitation from them. Once the invitation has been received, an application for a business visa may be made to the Soviet Consulate, and this is typically granted within a few weeks. It is also possible to enter the Soviet Union as a tourist, or by obtaining an invitation from an individual (usually a relative), but these methods are generally slower, less reliable, less flexible and more expensive than the business visa process.

Soviet officials are notorious for their inability to deal with unconventional circumstances. It is advisable to make visa applications and itinerary details as innocuous as possible. In addition, Soviet customs regulations and enforcement officials seem to vary widely in terms of their consistency and credibility; there is no need to draw attention to items of value such as laptop computers since

this may result in processing delays, payments of unspecified duties and, in rare cases, conspiracies with local organized crime units to steal these goods at a future date.

It is virtually certain that access to the Baltic countries will be liberalized significantly in the near future for holders of Western passports. It is unlikely that visas or invitations will be necessary, and the entry and exit procedures will be simplified. Travelling to a research site in Estonia is already an easy matter, with Tallinn being serviced by Finnair, SAS and Aeroflot (for the adventure traveller). Frequent ferry and hovercraft access from Stockholm and Helsinki provides another alternative.

5.8.3 Logistics and Costs

There is a serious shortage of temporary accommodation in much of Eastern Europe and Tallinn is no exception. Western quality hotels are available, but the costs are prohibitive with rates falling into the CDN\$100 - \$200 range per night. The best strategy would be to try to organize these arrangements through local contacts, thus avoiding Intourist's thirst for hard currency. It is generally possible to arrange a room, apartment or other suitable accommodation in Tallinn for CDN\$10 - \$30 per night.

As of the summer of 1991, there are two kinds of currencies in widespread use in the Soviet Union - roubles and hard currency. Since the exchange rate at this time is very favourable for Westerners converting their money, living can be very inexpensive if one is willing to live on roubles. For instance, once converted to roubles, one Canadian dollar can buy any of the items from the following list: 27 bottles of Pepsi Cola, 4 haircuts, a 4-month municipal transit pass, 4 regular lunches, 2 pizza lunches, 3 bus trips anywhere in Estonia, 3 taxi rides anywhere in Tallinn, or one dinner at a good restaurant. Of course, some of these items may require lining up for between 5 and

30 minutes. In some circumstances, bribery may also be expected of a Westerner living on roubles so that acceptable service will be rendered.

It is also possible to shop at stores and restaurants that accept only hard currency and thus avoid line-ups altogether; hard currency outlets have better quality items and service, but the prices are comparable to those in other northern European countries. As economic reforms continue, it is widely expected that the two-currency system will disappear and commerce will begin to function in a convertible local currency. As the local economy begins to improve, local wages and the prices of domestic products should also increase correspondingly.

5.8.4 Telephones and Technologies

Researchers contemplating a project in Eastern Europe should be prepared for the absence of many technological conveniences that are taken for granted in the West. One of the most severe handicaps to conducting research is the quality of the telephone system. Switching systems often function poorly, commonly resulting in connections to the wrong party. It is also difficult to adequately hear or be heard since static interferes with normal conversations. Long distance calls can be especially tedious since direct dialing is impossible from most telephones. To call long-distance, one must place an order with the operator who will then telephone back once the connection is available; if the operator remembers to do this, the wait is typically between 30 minutes and 2 hours. Many organizations are beginning to obtain telephones with access to direct lines and this simplifies the procedure enormously.

Setting up meetings with study participants or colleagues can be a very time consuming experience since many people do not have telephones at their homes. Contacting them at work may also be difficult since it is unlikely that anyone will answer their telephone if they are not at their

desks (message centres do not usually exist within Estonian organizations).

Researchers may require access to photocopy facilities and this may be a problem in some circumstances. Machines are in short supply, especially in smaller towns. Photocopy shops for hard currency are beginning to appear and contacts with local organizations might also ensure access. Access to computing facilities and printing can also usually be arranged, although be prepared to provide your own disks and paper.

Despite the poor telephone system there are many areas where the technology lag with the West is not so serious, particularly in cases where individuals or organizations have been able to coordinate their own affairs. A researcher living in Estonia should not be surprised to find satellite television, VCRs, Western-built computers, photocopiers, fax machines, printers, even international electronic mail links and other technological conveniences - the key is to ensure access to these technologies as required for the research.

5.8.5 Participant Attitudes

Estonian MIS managers contacted during the course of this research project were generally very receptive with respect to participating in this survey. Only one individual declined to participate, and cited a recent death in the family as the reason. It seems likely that individuals in Eastern Europe enjoy contact with Western researchers, and in general try to be forthcoming and helpful.

A number of Estonian academic colleagues expressed surprise at the degree of cooperation and the high response rate experienced during the course of this survey. They felt that Estonian managers were generally averse to participating in such research, and in particular were unlikely to take the time to complete a questionnaire. It would seem that Western researchers have a selective

advantage over their local counterparts with respect to gaining access to and motivating survey participants.

Estonian managers, and indeed professionals all over Eastern Europe, have increasingly been exposed to visitors and 'experts' from the West. While much of the advice and judgement rendered by these individuals is undoubtedly valuable and appreciated, in some cases there is a belief that the Western advisors have not taken the time to fully understand local conditions. Western consulting firms should be particularly vigilant about the quality of their advice because they often charge world-price fees from clients who have considerable difficulty in affording these services. In contrast to consultants and other 'experts', researchers appear to be seen in a particularly favourable light since their mandate is to ask questions and listen, rather than to explain and prescribe. This research project was undoubtedly one of the first Western studies to contact these Estonian managers, which may also help to explain the favourable response.

5.8.6 Local Allies

Arguably the most important aspect in ensuring a successful research project in a foreign environment is the necessity of developing and maintaining good local contacts. As mentioned earlier, contacts are often critical in an Eastern European setting for helping to arrange such preliminaries as visas and accommodation. Once on-site, various problems and inconveniences are certain to arise, and an individual fully familiar with the local environment can help to solve these difficulties.

A particularly useful ally would be a local co-researcher who could be fully involved in the research project itself. This can help streamline the research process, identify cultural variables that might negatively affect the research, and to generally eliminate much of the uncertainty associated

with functioning in a non-familiar environment. This project was able to recruit a co-researcher after a few weeks on-site, and the research appeared to proceed more quickly and with more confidence from this point onwards. Ideally, a co-researcher should be identified before commencing on-site research.

CHAPTER 6 - ANALYSIS AND RESULTS

6.1 Introduction

The forthcoming sections report the central findings from the survey. The results from rounds 1 and 2 are discussed only briefly since these are preliminary results. The round 3 findings are the final results and are therefore discussed in more detail and are used for comparative purposes with other studies. Specific details on the study participants are outlined at the end of this chapter.

6.2 Round 1 Results

For the first round, ten individuals were recruited for participation in the study and all ten returned their questionnaires resulting in a response rate of 100%. Table 17 shows the most critical issues identified by this group. The issues are presented in order of the number of citations given by the respondents. In addition, issues which have not appeared in previous Delphi studies but surfaced during this round are designated as 'new' issues.

Citations	New	Issue
6	New	Educational Weaknesses of the Workforce
6		Legislating Copyright Protection for Software
6	New	Promoting Standards for Hardware, Software and Data
5	New	Implementing and Improving Computer Networks
5	New	Unsettled Political and Regulatory Environment
4		Planning and Implementing a Telecommunications System
2		Affordability of Hardware and Software
2		Availability of Appropriate Hardware and Software Resources
2	New	Changing the Attitudes of IS Employees
2	New	Obtaining Access to IS Knowledge and Advice
1		Ensuring that Applications Satisfy Needs of Users/Organization
1	New	Improving Information Security and Control
1	New	Loss of Skilled IS Workers to Foreign Bidders

TABLE 17 - ROUND 1 RESULTS

6.3 Round 2 Results

In round 2, each participant was given a list of 30 issues and asked to rate each in terms of importance for Estonian MIS management. The total number of questionnaires distributed was 28, and 25 were returned resulting in a response rate of 89.3%. (An additional round 2 questionnaire was returned after the deadline and thus the data from this participant was not included in the round 3 questionnaire, nor the results as presented below.)

Rank	Mean	Sdev	Issue
1	8.96	1.27	Planning and Implementing a Telecommunications System
2	8.64	1.52	Promoting Standards for Hardware, Software and Data
3	8.28	1.61	Building and Maintaining Reliable Information Systems
4	8.24	1.84	Establishing Alliances and Linkages with Western Organizations
5	8.17	1.70	Ensuring that Applications Satisfy Needs of Users/Organization
6	8.16	1.91	Implementing and Improving Computer Networks
7	8.00	2.37	Developing an Information Architecture
8	7.84	2.15	Improving Information Security and Control
9	7.68	2.07	Legislating Copyright Protection for Software
10	7.64	2.21	Affordability of Hardware and Software
11	7.60	2.15	Ensuring the Physical Security of Computer Systems
12	7.32	2.11	Unsettled Political and Regulatory Environment
13	7.28	2.18	Educational Weaknesses of the Workforce
13	7.28	1.80	Making Effective Use of the Data Resource
15	7.25	1.83	Facilitating Organizational Learning and Use of IS Technologies
16	7.24	1.80	Specifying, Recruiting and Developing Human Resources for IS
17	7.00	2.22	Improving the Quality of Software Development
18	6.96	2.41	Changing the Attitudes of IS Employees
19	6.88	2.41	Improving IS Strategic Planning
20	6.70	2.01	Integrating DP, OA, Telecommunications and Factory Automation
21	6.64	2.62	Availability of Appropriate Hardware and Software Resources
22	6.63	2.04	Facilitating and Managing End-User Computing
23	6.52	2.40	Increasing Understanding of the Role and Contribution of IS
24	6.48	2.26	Aligning the IS Organization with that of the Enterprise
25	6.46	2.10	Measuring IS Effectiveness and Productivity
26	6.25	2.50	Using Information Systems for Competitive Advantage
27	5.87	2.15	Planning, Implementation and Management of Office Automation
28	5.84	1.93	Loss of Skilled IS Workers to Foreign Bidders
29	5.40	2.47	Obtaining Access to IS Knowledge and Advice
30	4.26	2.25	Regulatory Constraints on IS Activities and Ambitions

TABLE 18 - ROUND 2 RESULTS

Table 18 shows the results for this round, as well as the mean and standard deviations for each issue. Of the top ten issues in round 2, seven had been identified by participants in round 1, indicating a strong degree of consistency in reporting the issues of importance. Issues 3 (reliability), 4 (linkages with West) and 7 (information architecture) failed to surface in round 1 and the reasons for this are unclear. It is possible that if all the participants had been invited to complete the round 1 questionnaire, then these three issues might also have been reported in round 1. Nevertheless, it appears that round 1 was successful in uncovering most of the potentially important issues, and the supplementary issue generation techniques were useful for completing the list.

As a final check on the completeness of the issues list, the round 2 questionnaire provided a last opportunity for participants to contribute additional issues of importance. While a number of participants volunteered comments and clarifications, no additional issues were submitted at this stage suggesting that the existing list of 30 issues was comprehensive.

6.4 Round 3 Results

6.4.1 Final Ratings of the 30 Issues

The round 3 results are the final research results. Unless noted otherwise, all observations and conclusions about the research from this point onwards are based on these findings. The total number of round 3 questionnaires distributed was 28, and 24 were returned resulting in a response rate of 85.7%. The round 3 participants are essentially the same individuals as were sampled in round 2, although the response rate decreased slightly. Table 19 summarizes the results for this round. Note that ties emerged in the final rankings for the 4th, 10th and 24th place issues.

The round 3 results are closely related to the findings from the previous round and the top

ten issues remained substantially similar. However, the opportunity to reflect on round 2 results did result in a number of minor changes to the list of most important issues.

Rank	Mean	Sdev	Issue
1	8.92	1.38	Planning and Implementing a Telecommunications System
2	8.71	1.24	Promoting Standards for Hardware, Software and Data
3	8.58	1.55	Implementing and Improving Computer Networks
4	8.46	1.47	Ensuring that Applications Satisfy Needs of Users/Organization
4	8.46	1.50	Improving Information Security and Control
6	8.42	1.35	Building and Maintaining Reliable Information Systems
7	8.25	1.64	Establishing Alliances and Linkages with Western Organizations
8	8.21	1.58	Developing an Information Architecture
9	7.79	1.66	Ensuring the Physical Security of Computer Systems
10	7.75	1.36	Making Effective Use of the Data Resource
10	7.75	1.76	Legislating Copyright Protection for Software
12	7.54	1.98	Educational Weaknesses of the Workforce
13	7.48	1.50	Facilitating Organizational Learning and Use of IS Technologies
14	7.42	2.00	Affordability of Hardware and Software
15	7.39	1.55	Improving the Quality of Software Development
16	7.33	1.70	Specifying, Recruiting and Developing Human Resources for IS
17	7.30	1.84	Unsettled Political and Regulatory Environment
18	7.08	2.06	Changing the Attitudes of IS Employees
19	6.88	2.24	Improving IS Strategic Planning
20	6.58	2.02	Increasing Understanding of the Role and Contribution of IS
21	6.52	1.95	Facilitating and Managing End-User Computing
22	6.32	1.84	Integrating DP, OA, Telecommunications and Factory Automation
23	6.26	2.21	Using Information Systems for Competitive Advantage
24	6.21	2.16	Measuring IS Effectiveness and Productivity
24	6.21	2.33	Availability of Appropriate Hardware and Software Resources
26	6.17	1.91	Aligning the IS Organization with that of the Enterprise
27	5.79	2.02	Loss of Skilled IS Workers to Foreign Bidders
28	5.64	1.85	Planning, Implementation and Management of Office Automation
29	5.42	2.18	Obtaining Access to IS Knowledge and Advice
30	3.71	2.09	Regulatory Constraints on IS Activities and Ambitions

TABLE 19 - ROUND 3 RESULTS

The most noticeable change is the revised ordering of many of the issues and there are a number of factors which explain this. Part of this reordering can be explained by participants reflecting on the earlier results and subsequently refining their round 3 ratings. This process is

critically important in moving the group towards consensus and identifying the final list of important issues. However, caution is warranted in attributing all round 3 refinements to such a process because part of the movement is undoubtedly a reflection of minor changes to the sample population over these two rounds. Details on the participation patterns of individuals in these rounds are contained in Section 6.9.

The ordering of issues as presented in both rounds 2 and 3 should be interpreted with care since the differences in mean ratings are negligible in many cases, given the sizes of the corresponding standard deviations. Repeating the study or enlarging the sample size would likely result in additional revisals to the ordering and it would therefore be unwise to have complete confidence in the current issue ordering. In a conventional situation it would be easy to conduct statistical tests on the significance of the ordering; however, as discussed earlier in Section 4.4, the Delphi methodology limits the relevance of such measures since the statistical assumptions of normality and independence are violated.

Despite the lack of an appropriate statistical test, it is possible to make the general statement that 'as the distance between issues increases, the likelihood of incorrect ordering decreases.' For example, the mean scores of issues 4 through 6 are quite close making it difficult to have much confidence in any particular ordering of these concerns; however, we can be highly confident that issue 1 is correct in being ordered before the issues 4 through 6. Similarly, we can be certain that issues 1 through 8 belong in the group of top ten issues, but as we get closer to the 10th issue our confidence necessarily declines. These factors help to explain why the top ten issues underwent some revision between rounds 2 and 3. The issue of 'affordability of hardware and software' dropped from 10th to 14th, while 'physical security of systems' rose from 11th to 9th and the 'data resource' issue was boosted from 13th to a tie for 10th spot. It is acknowledged that the specific ordering of the issues may lack strong statistical support; nevertheless, this study follows the well-established

convention in MIS issues research of accepting the top ten issues as determined by their mean ratings.

6.4.2 The Top Ten Issues in Estonia

This section provides a more detailed discussion of the most important MIS issues in Estonia. There are a number of sources for the impressions and comments which follow; these include informal discussions held with study participants, discussions held with other individuals about MIS issues in Estonia, and comments left on the questionnaires by participants about specific issues.

1. Planning and Implementing a Telecommunications System

The top rated MIS issue concerned telecommunications and in particular the poor state of the Estonian and Soviet telephone systems. Organizations that require access to data from a central site have found it difficult to develop integrated on-line systems, and in some cases have found it necessary to deliver data on disks to local sites. The existing telecommunications system makes it impractical to link intra- and inter-organizational locations, since the lines are unreliable and subject to static and interference. This basic problem is distinct from the types of telecommunications concerns faced by IS managers in the West, where the issue is focused on modernizing organizational systems, and supporting the integration of voice, data, image and textual forms of information.

2. Promoting Standards for Hardware, Software and Data

IS managers are faced with trying to integrate a vast array of incompatible systems originating from both CMEA and Western sources. While economic and political changes have brought benefits in terms of increased availability and diversity of products, these changes have also complicated integration efforts. Estonian IS managers are now calling for standardization of products and systems

on at least two dimensions. Firstly, there is frustration with CMEA hardware. Although these machines are relatively close copies of Western computers, it was common practice for CMEA engineers to attempt to create 'new and improved' versions; the resulting internal differences often limit compatibility and make integration with the original Western machines impossible. Secondly, locally programmed systems are often built in isolation and there are no commonly followed procedures or standards for data formats and database definitions. This reduces opportunities for sharing and transferring information.

3. Implementing and Improving Computer Networks

Traditional computing environments in Estonia were comprised of CMEA-built mainframes with a limited number of terminals located at a single site, and thus modern networking systems were not necessary. As the proliferation of personal computers intensifies and organizations shift more of their information processing activities to new Western-standard machines, the need for improved networking capabilities is becoming evident. Estonian organizations typically run microcomputers on a stand-alone basis since the high cost of network technology has limited the practicality of linking machines. As the sophistication and scale of organizational systems increases, it is becoming necessary to install networks so that information can be effectively managed.

4. (tie) Ensuring that Applications Satisfy the Needs of Users and the Organization

A primary goal of the systems development process is to build applications that are functional and satisfy the requirements of individual users and the organization. Applications designers in the West have been criticized for overlooking the needs of end-users, and this is also a problem in Estonia. The socialist conventions of central planning and top-down decision-making may have aggravated this

problem since developers have grown accustomed to following directions from state authorities and the planning bureaucracies, thereby bypassing individuals and end-users as a significant source of development ideas. In addition, the systems that have been built under the state bureaucracy are primarily designed to support the central planning mechanism; these project have given developers little experience in constructing applications to support organizational competitiveness in a market economy.

4. (tie) Improving Information Security and Control

The issue of information security and control relates to the protection of data from unwanted destruction, alteration and disclosure. As Estonian organizations increase their dependence on computerized information systems, their potential vulnerability to security problems also increases. In addition, the dominant role of government is being weakened in Eastern European societies, and this process is rearranging traditional patterns of information control and access. Economic activities are becoming decentralized and databases are being operated by companies and private agencies, as well as the government sector. The need for secure and accountable information management is becoming increasingly evident.

6. Building and Maintaining Reliable Information Systems

The issue of reliability concerns the development of systems that are dependable and not subject to repeated breakdowns and down-time. This issue takes on special importance in the Eastern European IS environment for a number of reasons. Firstly, replacement parts for CMEA-produced technologies are often in short supply and cannibalizing other similar machines may be necessary. Secondly, replacement parts for Western machines are generally available but may be prohibitively expensive for firms with no access to hard currency. Thirdly, the expertise required to service or fix systems

may also be more difficult to procure than would be the case in typical Western environments. Fourthly, even when products are under warranty it may be difficult to obtain adequate vendor support; qualified product representatives are rarely found in Estonia and servicing in Helsinki or Stockholm may be necessary.

7. Establishing Alliances and Linkages with Western Organizations

As the transition to a market economy progresses, it is becoming increasingly necessary for Estonian organizations to become competitive within both the local and international environments. In term of the IS function, alliances with Western companies provide two primary benefits. Firstly, Estonian organizations are looking to the West for managerial expertise so that contemporary business practices can be learned and employed. Secondly, Western organizations often provide access to computers and other IT products that are too expensive for Estonian firms to procure independently. The primary method for forming these alliances is through setting up joint-ventures between foreign and domestic organizations.

8. Developing an Information Architecture

An information architecture is a high-level map that shows how major classes of information are related to the major functions of the organization. Estonian managers have shown particular concern for issues related to integrating systems as evidenced by the high ranking given to the telecommunications, networks and promoting standards issues; the information architecture issue relates directly to these integration priorities since it is concerned with the development of an overall map to guide and promote data sharing and integrated systems.

9. Ensuring the Physical Security of Computer Systems

There is a need to protect computer systems against damage caused by misuse and negligence. There is also a widespread perception that crime rates are escalating dramatically in Estonia although it is difficult to know the reality of the problem relative to Western countries. These issues are particularly important because of the expense of replacing or repairing technologies. In North America the replacement cost of a desktop computer may be around \$1,500, or less than one months salary of a typical worker. In Estonia and the Soviet Union, the same computer might cost 40,000 roubles, which translates into approximately 7 years salary. Information technologies are therefore relatively more valuable in Eastern Europe, making physical protection a higher priority.

10. (tie) Making Effective Use of the Data Resource

The data resource issue is concerned with how organizations can capitalize on information captured within corporate databases. Managers are frequently unaware of the existence of data that would help in their decision-making, or alternately they lack the ability to effectively tap this resource. Reformatting information into systems that support decision-making is central to effective use of the data resource. Estonian managers are increasingly realizing that effective information management is an essential factor of production, particularly in the evolving competitive economy.

10. (tie) Legislating Copyright Protection for Software

Estonian MIS managers have indicated that the lack of copyright protection for software is a serious matter. The absence of legislation to protect intellectual property affects firms on a number of levels. Firstly, established software vendors are reluctant to enter and service the market because their products can be easily pirated. Secondly, developers have little incentive to create programs for the

Estonian market. Thirdly, some organizations feel that they cannot protect their proprietary systems from unwanted distribution. However, it should also be noted that many managers view lack of copyright protection as an advantage since they can obtain expensive software at no charge. Despite the mixed views on this issue, the vast majority of software currently in use in Estonia is unlicensed and most IT professionals have extensive personal libraries of Western software products.

6.4.3 Issues of Least Importance

While the previous section discussed the issues that were judged to be most important, it is also interesting to look at the issues which were not rated highly. During the course of the study, a number of participants made the comment that all the issues seemed important, and it would thus be inaccurate to interpret these issues as unimportant. Instead the issues of least importance should be viewed as a set of concerns that currently have a lower priority.

Many of the issues that were rated in the bottom third of the list originated with the North American studies. Although these issues were rated highly in the United States, they do not appear to have the same impact on Estonian MIS managers and merit no further discussion. However, there are also a number of issues which surfaced as potentially important Estonian issues, but were subsequently rated as relatively unimportant. These issues are discussed below:

24. Availability of Appropriate Hardware and Software Resources

Supply shortages are a well known aspect of socialist economies and it was felt that this condition might also apply to the information technology market. However, Estonian managers indicated that they were able to get all necessary hardware and software as needed. A number of vendors sell common Western computer systems, and specialized needs can be supplied through vendors in the

neighbouring Scandinavian countries. However, a number of managers indicated that parts and accessories for existing CMEA-built computer systems might become increasingly more difficult to obtain, depending on the future prospects for these manufacturers.

27. Loss of Skilled IS Workers to Foreign Bidders

The Estonian economy is currently in transition and wages are extremely low by Western standards. This poses a potential threat to Estonian IS organizations on at least two dimensions: skilled IS employees may seek employment in foreign countries, and skilled IS employees may be lost to foreign companies operating in Estonia. Both of these factors would limit the availability of qualified personnel for existing Estonian IS organizations. While this issue may be of some relevance to large state-run information processing departments, it does not appear to have much overall importance.

29. Obtaining Access to IS Knowledge and Advice

Since Estonian is spoken by few people, there is a shortage of IS books and materials in the Estonian language. Furthermore, Western business and consulting firms are unlikely to take much interest in the market given its small size. It was believed that these factors would limit the ability of Estonian IS management to absorb and adopt contemporary knowledge on IS management and practice. However, it appears that Estonian managers have long recognized that familiarity with foreign languages is necessary for accessing the relevant information. The Estonian IS function is a multilingual environment and departments have abilities in many languages including English, Finnish, German and Russian.

30. Regulatory Constraints on IS Activities and Ambitions

Western countries still maintain certain restrictions on technology exports to members of the former

Eastern Bloc. In addition, the bureaucratic and regulatory environment which has evolved under the Soviet government is well known for its constraints on organizational activities. However, Estonian IS managers did not perceive this issue as serious. The types of technologies required from the West are no longer restricted and local governmental policies are undergoing massive liberalization. Estonian IS managers appear to have confidence that the regulatory environment is becoming fully Westernized.

6.5 Movement Towards Consensus

One of the advantages of using the Delphi technique is that it encourages participants to reach a consensus on the issues of greatest importance. Measuring the change in the standard deviations of mean ratings between subsequent rounds is an appropriate method for showing movement towards consensus. A declining mean standard deviation indicates that participants are reflecting on the issues and revising their ratings to correspond more closely with their colleagues. For the thirty issues measured for importance, the mean standard deviation during the second round was 2.08 while in the final round the mean standard deviation was 1.80. This decline indicates a movement towards consensus.

An additional indicator of improved consensus in determining the importance of the issues is an increasing differentiation between the most important and least important issues (Niederman et al. (1991)). The mean rating for the ten most important issues increased from 8.16 to 8.35 between rounds 2 and 3, while the mean rating of the ten least important issues decreased from 6.03 to 5.83 during the same period.

While it is possible that additional rounds might have improved the degree of consensus, it is highly unlikely that perfect agreement would ever be attained since the study participants would

continue to maintain certain independent views. Estonian MIS managers can be differentiated among dimensions such as position, education, language capabilities, location, industry and other organizational aspects; each of these factors influences a manager's view of the importance of a given issue.

6.6 Issue Classification

IS issues can be classified along various dimensions and categorized into groups. Such analysis helps to clarify and understand the underlying meta-issues that dominate the IS agenda. Issues can be classified into the following three categories: managerial / technical, internal / external, business relationship / technology infrastructure / internal effectiveness / technology application. These classifications were developed in previous issues studies and are defined below. The 30 issues in Table 4 are categorized according to previous conventions wherever possible, although judgement was required to classify the 15 new issues which surfaced in the Estonia study. Discretion should be exercised in interpreting the results since such analysis is by necessity subjective; alternative categorizations and explanations may be equally appropriate since many issues have components that straddle the various dimensions.

The Brancheau & Wetherbe (1987) study attempted to classify IS issues along managerial and technological dimensions, and this convention has also been followed in subsequent studies. Managerial issues are concerned with management and enterprise-wide problems such as policy, strategy, structure, accountability and human resources. Technology issues relate to questions of technologies and applications such as specification, acquisition, development, use, security and protection.

Rank	M/T	I/E	Group	Issue
1	T	E	TI	Planning and Implementing a Telecommunications System
2	T	E	TI	Promoting Standards for Hardware, Software and Data
3	T	I	TA	Implementing and Improving Computer Networks
4	T	I	IE	Ensuring that Applications Satisfy Needs of Users/Organization
4	T	I	IE	Improving Information Security and Control
6	T	I	IE	Building and Maintaining Reliable Information Systems
7	M	E	BR	Establishing Alliances and Linkages with Western Organizations
8	T	I	TI	Developing an Information Architecture
9	T	I	IE	Ensuring the Physical Security of Computer Systems
10	M	E	BR	Making Effective Use of the Data Resource
10	T	E	BR	Legislating Copyright Protection for Software
12	M	I	IE	Educational Weaknesses of the Workforce
13	M	E	BR	Facilitating Organizational Learning and Use of IS Technologies
14	T	E	BR	Affordability of Hardware and Software
15	T	I	IE	Improving the Quality of Software Development
16	M	I	IE	Specifying, Recruiting and Developing Human Resources for IS
17	M	E	BR	Unsettled Political and Regulatory Environment
18	M	I	IE	Changing the Attitudes of IS Employees
19	M	E	BR	Improving IS Strategic Planning
20	M	E	BR	Increasing Understanding of the Role and Contribution of IS
21	M	E	TA	Facilitating and Managing End-User Computing
22	T	I	TI	Integrating DP, OA, Telecommunications and Factory Automation
23	M	E	BR	Using Information Systems for Competitive Advantage
24	M	I	IE	Measuring IS Effectiveness and Productivity
24	T	E	BR	Availability of Appropriate Hardware and Software Resources
26	M	E	BR	Aligning the IS Organization with that of the Enterprise
27	M	E	BR	Loss of Skilled IS Workers to Foreign Bidders
28	T	I	TA	Planning, Implementation and Management of Office Automation
29	M	E	BR	Obtaining Access to IS Knowledge and Advice
30	M	E	BR	Regulatory Constraints on IS Activities and Ambitions

M/T - Managerial / Technology
I/E - Internal / External
BR/IE/TI/TA - Business Relationship / Internal Effectiveness /
 Technology Infrastructure / Technology Application

TABLE 20 - CLASSIFICATION OF ISSUES

Watson (1989) adopted a scheme originally developed by Hirschheim et al. (1988) to classify issues along internal and external lines. Internal matters relate to functions within the IS department and include such items as human resources, information architecture and software development.

External matters deal with the relationship between the IS department and the enterprise or the environment outside the firm. Issues such as strategic planning, the corporate data resource and competitive advantage are classified as external issues.

Niederman et al. (1991) developed a scheme to classify issues into four groups reflecting major thrusts in IS management. Business relationship (BR) concerns relate to issues that are external to the IS department and focus on the relationship between IS and the business. The internal effectiveness (IE) category concerns the internal operations and activities of the IS function. Technology infrastructure (TI) emphasizes the integration of technology to support basic business needs. Technology application (TA) focuses on the application of technologies for business applications.

The most striking element arising from this analysis is the domination of technology issues over managerial issues (see Table 20). The first six issues are all of a technological nature, as are 11 of the top 15 issues. The most important managerial issue concerns the matter of establishing alliances with Western organizations, and this is ranked seventh. Most of the other top issues are concerned with the procurement and effective application of technology. Table 21 provides a comparison of the categories of issues deemed most important in Estonian versus American settings for the top 15 issues in each study.

The emphasis placed on technological issues by Estonian MIS managers may be a reflection of an earlier stage in the development of the organizational IT function. The trend from technological to managerial issues has been well documented in the North American literature (Dickson et al. (1984); Brancheau & Wetherbe (1987); Niederman et al. (1991)) and it seems probable that Estonian managers simply lag their North American counterparts. As Estonian organizations continue to modernize and Westernize their operations and culture, managerial issues will likely move to a position of greater importance. It should also be noted that while the technological category of issues

may dominate current Estonian IT concerns, the specific technology issues of importance bear little resemblance to those issues that topped the MIS agenda in North America a decade ago.

<u>Categories</u>	<u>ESTONIA 1991</u>	<u>USA 1991</u>
Managerial	4	7
Technology	11	8
Internal	8	6
External	7	9
Business Relationship	5	6
Internal Effectiveness	6	3
Technology Infrastructure	3	5
Technology Application	1	1

TABLE 21 - CLASSIFICATION OF ISSUES: ESTONIA VS. USA

6.7 Comparisons to Other Studies

6.7.1 Introduction

There are a number of previous issues studies that are appropriate for comparative purposes. In particular, studies from the United States (Dickson et al. (1984); Brancheau & Wetherbe (1987); Niederman et al. (1991)), Australia (Watson (1989)) and Europe (Index Group (1988)) can be used. These studies are suitable for comparative purposes because they were methodologically similar to the Estonia study. The issues were presented on the questionnaires in a similar fashion and the issue wordings were generally consistent. In addition, all of these studies except the European effort were Delphi surveys.

6.7.2 Unique Estonian Issues

The findings of the Estonia survey are notably unlike those from studies conducted in other parts of the world. While Estonian MIS managers face some of the same concerns as managers elsewhere, it is clear that many of the issues of importance are significantly distinct. Of the 30 MIS issues which were measured for importance, 15 are unique to the Estonian study, having failed to surface in any other research setting. Furthermore, 7 of these unique issues are among the 10 most important concerns for Estonian managers. This demonstrates that the issues which are judged most important by Estonian MIS managers are largely dissimilar to the concerns of managers elsewhere. Table 22 lists the 15 issues which are unique to the Estonia study.

Rank	Unique Issues
2	Promoting Standards for Hardware, Software and Data
3	Implementing and Improving Computer Networks
4	Ensuring that Applications Satisfy Needs of Users/Organization
6	Building and Maintaining Reliable Information Systems
7	Establishing Alliances and Linkages with Western Organizations
9	Ensuring the Physical Security of Computer Systems
10	Legislating Copyright Protection for Software
12	Educational Weaknesses of the Workforce
14	Affordability of Hardware and Software
17	Unsettled Political and Regulatory Environment
18	Changing the Attitudes of IS Employees
24	Availability of Appropriate Hardware and Software Resources
27	Loss of Skilled IS Workers to Foreign Bidders
29	Obtaining Access to IS Knowledge and Advice
30	Regulatory Constraints on IS Activities and Ambitions

TABLE 22 - UNIQUE ISSUES IN THE ESTONIAN STUDY

6.7.3 Comparison of Common Issues

The remaining 15 issues in the Estonian study have been encountered in other research settings. Table 23 shows these issues and how they have been ranked in each of the studies.

EST 91	USA 91	USA 87	USA 84	AUS 89	EUR 88	Common Issues
1	10	11	13	13	9	Planning and Implementing a Telecommunications System
4	19	18	4	17	18	Improving Information Security and Control
8	1	8	na	3	5	Developing an Information Architecture
10	2	7	9	9	12	Making Effective Use of the Data Resource
13	5	3	6	10	8	Facilitating Organizational Learning and Use of IS Tech.
15	9	13	4	4	14	Improving the Quality of Software Development
16	4	12	8	2	7	Specifying, Recruiting, Developing Human Resources for IS
19	3	1	1	1	1	Improving IS Strategic Planning
20	11	4	15	6	3	Increasing Understanding of the Role and Contribution of IS
21	18	6	2	8	14	Facilitating and Managing End-User Computing
22	na	10	3	18	10	Integrating DP, OA, Telecommunications, Factory Automation
23	8	2	na	7	4	Using Information Systems for Competitive Advantage
24	16	9	5	19	11	Measuring IS Effectiveness and Productivity
26	7	5	7	5	2	Aligning the IS Organization with that of the Enterprise
28	na	21	12	29	na	Planning, Implementation, Management of Office Automation

TABLE 23 - COMMON ISSUES IN THE INTERNATIONAL STUDIES

Estonian IS managers clearly place more emphasis on the telecommunications issue than their counterparts elsewhere. Managers in the United States, Australia and Europe have relatively modern and functional telecommunications systems, and thus their priorities lie elsewhere. The issue of information security and control was also found to be of high importance to Estonian organizations, unlike the findings in Western studies. However, Estonian IS managers are in relatively close agreement with Western managers on the importance of developing an information architecture; this issue has been rated in the top ten in many recent international studies (Watson (1989), Niederman et al. (1991)).

As noted earlier, Estonian IS managers are primarily concerned with issues related to technology. Brancheau & Wetherbe (1987) have observed that technology issues have become progressively less important to Western IS managers as they have shifted their efforts to managerial concerns. Issues such as IS strategic planning, using IS for competitive advantage, and alignment of organizational and IS goals have consistently been ranked highly in Western studies. In the Estonian study, each of these issues merits a low ranking. It is possible that the trend towards managerial concerns will also be observed in Estonian companies as IS managers increasingly adopt Western standards and modernize their operations and organizations.

6.7.4 Correlating the Studies

The Kendall rank correlation coefficient (τ) can be used to estimate the correlation between these six international studies. Kendall's τ measures the degree of correspondence across the various rankings of the MIS issues of importance and can therefore be used to detect the existence of associations between the studies. The rankings from Table 23 were used as the inputs to calculate Kendall's τ (see Siegel (1956) for specific details). Table 24 shows the output matrix of

correlations between the various studies.

	EST91	USA91	USA87	USA84	AUS89	EUR88
EST91	1.000					
USA91	0.154	1.000				
USA87	-0.124	0.205	1.000			
USA84	-0.039	-0.147	0.116	1.000		
AUS89	0.124	0.462**	0.295*	0.116	1.000	
EUR88	-0.243	0.400**	0.464**	-0.215	0.420**	1.000

** significant at 5% level

* significant at 10% level

TABLE 24 - CORRELATING THE INTERNATIONAL STUDIES

As is evident from Table 24, the recent studies from Europe, the United States and Australia did show significant positive correlations with each other and this suggests some degree of consensus about the most important MIS issues in these countries. However, no significant relationships were found to exist between the Estonia study and any of the other international studies. This confirms that Estonian MIS managers have a unique set of priorities as compared to their Western counterparts.

6.8 Generalizeability of Results

While the results of this study provide a good indication of the priorities and concerns of Estonian IS managers, the findings may also have relevance in other parts of Eastern Europe. As discussed in chapters 2 and 3, there are a number of factors which suggest that the Estonian IT environment is typical of the area, but caution should be exercised in drawing specific conclusions about the priorities of MIS managers elsewhere in the region. Eastern Europe remains a highly

diverse region on such dimensions as language, national culture, degree of Westernization, pre-1939 history and perhaps even post-1989 history. However, the countries of the region have shared a common economic and political system for the past 50 years and this has resulted in the development of comparable centrally-planned economies, organizational cultures, educational systems and industrial activities. The CMEA countries also cooperated in the development and use of computer technologies and thus share a common tradition in information technology as well. While no country in Eastern Europe can be seen as fully representative of the entire region, Estonia does appear to be relatively typical. These factors suggest that the concerns of Estonian IS managers may parallel those of their counterparts in other areas of Eastern Europe.

In determining whether the most important MIS issues in Estonia may be relevant elsewhere in the region, it is useful to consider the issues themselves. Of the thirty issues measured for importance, none appear to be strictly linked to the Estonian IT environment. Most of the issues are universal in nature and can be seen as concerns for IS management in all parts of the world. Some of the issues do raise concerns about specific circumstances in Estonia (such as the poor state of the telecommunications system, the need to establish alliances with Western companies, the lack of copyright protection for software, or the unsettled political and economic environment) but these circumstances appear to apply equally well to other countries in Eastern Europe. This provides some measure of face validity for the claim that the results may be generalizeable. This study identifies the most important MIS concerns in a single Eastern European environment. The nature of the findings suggests that these concerns may also have relevance in countries other than Estonia, but additional research would be required to establish the actual validity of generalizing the results.

6.9 Study Participants

A total of twenty-eight individuals were recruited to take part in this study; the various characteristics of these participants are disclosed in this section. Ten people were asked participate in all three rounds, and eighteen were requested to participate in rounds 2 and 3 only. Table 25 indicates the actual participation of these twenty-eight individuals.

During round 2, an effort was made to collect a limited amount of demographic and descriptive data about the individuals and organizations reflected in this research. This information helps to provide a better understanding of some selected characteristics of the research participants. (See the end of Appendix 2 for the sections of the round 2 questionnaire that were used to gather this data.) Since the round 3 findings are the final research results, it is appropriate to provide the demographic and descriptive data only for the 24 individuals who participated in round 3.

3 RESPONSES:	Rounds 1 2 3	8
2 RESPONSES:	Rounds 1 2	1
	Rounds 1 3	1
	Rounds 2 3	15
1 RESPONSE:	Round 1	0
	Round 2	1
	Round 3	0
0 RESPONSES:	No Rounds	2
		—
TOTAL:		28

TABLE 25 - RESEARCH SUBJECTS: PARTICIPATION PATTERN

i/ Organizational Category

Government Department or Company	14	58.3%
Academic Institutions	4	16.7%
Privately Owned/Incorporated Company	3	12.5%
Joint-Venture Company	<u>3</u>	<u>12.5%</u>
	24	100.0%

TABLE 26 - RESEARCH SUBJECTS: ORGANIZATIONAL CATEGORIES

In the original questionnaire, an attempt was made to distinguish between government departments (or ministries), and companies owned by the state. Upon analyzing the data, it was decided to combine these two categories since the responses indicated that such a distinction was artificial in the Estonian context. Similarly, the distinction between a private company and an incorporated company was found to be meaningless.

ii/ Business Activity

Business Services	6	25.0%
Traditional Governmental Activities	5	20.8%
Food and Agricultural	3	12.5%
Education	3	12.5%
Transport	2	8.3%
Manufacturing	1	4.2%
Health Services	1	4.2%
Communication and Media	1	4.2%
Retail	1	4.2%
Hotel	<u>1</u>	<u>4.2%</u>
	24	100.0%

TABLE 27 - RESEARCH SUBJECTS: BUSINESS ACTIVITIES

iii/ Position of Participant

The respondents in this study occupied many distinct types of positions. Although detailed

descriptions of the various backgrounds and responsibilities were not solicited from the participants, it is still possible to compile a general overview of the respondent-types in the study.

A common profile is the senior IS manager, who tends to be from a technical background (computer science, mathematics, engineering) but may also come from a managerial area (planning, accounting, administration). This individual is charged with overseeing the acquisition, implementation and use of applications in the organization. The senior IS manager often reports to the chief accountant, although reporting to other functional areas or senior management is also common.

A familiar type of IT organization in Estonia is the 'computing centre'; these are typically large centralized data processing centres for government ministries or departments. A number of the general managers from these computing centres participated in the study. Numerous IS consultants and university educators also took part. In addition, officials from a number of independent IT associations and agencies participated in the survey.

IS Practitioners	15	62.5%
IS Observers	<u>9</u>	<u>37.5%</u>
	24	100.0%

TABLE 28 - RESEARCH SUBJECTS: POSITION

This two-category classification of individuals approximates the conventions used by Niederman et al. (1991). The category of 'Practitioners' includes individuals such as senior IS executives, IS department managers and technical managers who have responsibility for overseeing the IS operations of the organization. The category of 'Observers' would include such positions as educators, consultants and vendors; these are individuals who are extensively involved in the field of IS, but are not themselves responsible for an IS operation.

iv/ Number of Employees in the Organization

	Total Employees	IS Professionals
Mean	252	27
Median	60	10
Largest	1600	150
Smallest	1	1

TABLE 29 - RESEARCH SUBJECTS: ORGANIZATIONAL SIZE

v/ Language Capabilities of Study Participants

Estonian	100.0%
Russian	95.6%
English	87.0%
Finnish	56.5%
German	30.4%
French	15.4%

TABLE 30 - RESEARCH SUBJECTS: LANGUAGE CAPABILITIES

vi/ Hardware and Software Used by Participating Organizations

An open-ended question asked participants to briefly describe the types of IT products used by their organizations. While the unstructured nature of the responses makes a statistical synopsis impossible, it is still possible to make a number of observations:

- all organizations have DOS based machines, typically imported from Finland or other Western countries. The most common processors are 8086 and 286, although many 386 machines are also in use.
- some IBM PS/2, Apple Macintosh and UNIX-based workstations are also in use, although these are fairly rare.
- large established organizations have a variety of mainframe, mini- and microcomputers manufactured by CMEA countries; new market driven companies typically have no CMEA machines.

- all organizations had a large variety of Western software products, the most common being WordPerfect, Lotus and dBase IV. This software is typically copied and not purchased.
- networks are a rarity, although a few firms did report Ethernet setups, and one had a Novell LAN.

6.10 Limitations of the Study

While efforts were made to preserve the rigour of the research, various potential limitations of the study are summarized below:

- i/ **Fewer Participants:** the study solicited views from less than 30 participants, while North American Delphi studies have typically used between 50 and 100.
- ii/ **Non-Random Participant Recruitment:** participants could not be selected from pre-existing lists of appropriate candidates; instead, recruitment was accomplished largely through recommendations and personal contacts.
- iii/ **Concept of an 'MIS Manager' is unfamiliar to Estonia Organizations:** the individuals surveyed in this study are best described as 'established figures in the Estonian IT community' while the participants in the North American studies are 'MIS managers'.
- iv/ **Statistical Significance of Issue Ordering:** as in previous MIS issues studies, the specific ordering of consecutive issues of importance may not have statistical significance.
- v/ **Longevity of Results:** the study was conducted during a period of extensive political and economic reform in Estonia; it is possible that attitudes and opinions on MIS issues are also in a state of rapid evolution.
- vi/ **Comparisons with Non-current Studies:** the data for this study were collected in 1991 while the data for the North American and other studies used for comparative purposes were collected in 1989 and earlier.
- vii/ **External Validity:** discretion should be exercised in generalizing the results to other areas in Eastern Europe.

CHAPTER 7 - CONCLUSIONS

7.1 Main Conclusions

The primary goal of this research is to identify the most important MIS issues in Estonia.

The top ten issues are repeated in Table 30.

<u>Final Rank</u>	<u>Issue of Importance</u>
1	Planning and Implementing a Telecommunications System
2	Promoting Standards for Hardware, Software and Data
3	Implementing and Improving Computer Networks
4 (tie)	Ensuring that Applications Satisfy Needs of Users/Organization
4 (tie)	Improving Information Security and Control
6	Building and Maintaining Reliable Information Systems
7	Establishing Alliances and Linkages with Western Organizations
8	Developing an Information Architecture
9	Ensuring the Physical Security of Computer Systems
10 (tie)	Legislating Copyright Protection for Software
10 (tie)	Making Effective Use of the Data Resource

TABLE 30 - THE TOP TEN ISSUES IN ESTONIA

The most important issue in Estonia concerns telecommunications, and in particular the need for an improved national telephone system. An underlying theme in many of the top issues is the need to integrate systems; this is reflected by the high rankings given to issues such as establishing consistent standards, implementing computer networks and developing an information architecture, as well as the telecommunications issue. Two issues associated with the protection of hardware and data were also ranked in the top ten, indicating a concern about security. Most of the top issues are of a technological nature and reflect a priority for the acquisition and implementation of systems.

An additional goal of this study was to compare the findings from Estonia with existing studies conducted in Western countries. It is clear that Estonian MIS managers face a very different

set of concerns as compared to their counterparts in the West since the majority of the top issues are unique to the Estonia study. The findings from the Estonian study bear little resemblance to the earlier investigations conducted in the United States, Europe and Australia. However, it seems likely that MIS managers in other Eastern European countries might have concerns similar to those expressed in the Estonia study.

7.2 Future Directions

While this study is a first attempt at uncovering the priorities and concerns of MIS managers in an Eastern European context, there are a number of additional research projects that would be useful in improving our understanding of the topic. In particular, it would be useful to solicit views from IT managers in Eastern European settings other than Estonia; this would clarify whether managers in the region face a common set of concerns, or whether the findings of this study are relevant only to Estonia. Western investment and interest in Eastern Europe has been largely directed at Hungary, Czechoslovakia, Poland and the Russian Republic, and these areas would be of particular interest in a supplementary study.

A repetition of the Estonia study in a few years would also be useful. The continuing political, economic and technological changes undoubtedly have considerable impact on the entire organizational climate in Estonia, and it would be of interest to track the evolution of MIS priorities over time. Such efforts have been undertaken previously in North America with the series of Delphi studies and this has proven useful in maintaining a current understanding of important issues and trends. The Delphi approach to MIS issues research has now become well established with numerous North American and international studies. Future researchers should also be encouraged to utilize this methodology in order to preserve the comparability of the various studies.

In addition to conducting supplementary issues studies, it would also be useful to study Eastern European IT organizations and their operations in more depth. Estonian MIS operations appear different from those in North America on a number of dimensions, but additional research is required to uncover and clarify these distinctions. In particular, it would be interesting to investigate stages in the evolution of an IT department and to see whether the North American experience has any relevance for predicting development paths. Reporting hierarchies and the perceived role of the IS department in the Eastern European organization also merit further study.

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APPENDIX 1

Round 1 Questionnaire and Covering Letter

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Commerce
and Business Administration
2053 Main Mall
Vancouver, B.C. Canada V6T 1Y8

Telephone (604) 224-8500/224-8316
Fax (604) 224-8468

June 4, 1991

I am a graduate student at the University of British Columbia in Canada and am currently conducting a survey of information systems managers in Estonia as part of my thesis work.

As you are aware, organizations throughout Estonia and elsewhere are increasingly making use of computers, hardware, software, telecommunications systems, and various other information technologies. However, it is also recognized that there are many important issues and problems associated with effectively utilizing such technologies.

The purpose of this research is to better understand the computerization problems facing Estonian organizations. Therefore, I am asking for your help in identifying the most important issues facing information systems managers and their organizations in Estonia over the next three to five years.

On the attached page, please list what you feel to be the most important IS issues and provide a short explanation of your rationale. Please be assured that all responses will be kept strictly confidential.

If you have any questions about this research, I am currently in Tallinn at the following address:

Enn Kiudorf
Institute of Cybernetics
Akadeemia tee 21 - B434
Tallinn, Estonia
200108
Telephone: 527 314

Thank you for your help,

Enn Kiudorf

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Commerce
and Business Administration
2053 Main Mall
Vancouver, B.C. Canada V6T 1Y8

Telephone (604) 224-8500/224-8316
Fax (604) 224-8468

4. juuni 1991

Mina olen Kanadas üliõpilane British Columbia ülikoolist ja viibin praegu Eestis, et teha uurimusi eesti arvuti-spetsialistide kohta ja uurida probleeme mis neil tekivad seoses oma tööga.

See on selge, et Eesti nagu terve maailma organisatsioonid ja ettevõtted, kasutavad järjest rohkem arvuteid, nende riistvara ja tarkvara, telekommunikatsioonisüsteeme ja muid informatsioonitehnoloogiasid. Ometi saame aru, et tihti tuleb igasuguseid probleeme ja küsimusi ette, kui katsume efektiivselt kasutada neid tehnoloogiasid.

Minu uurimistöö siht on teada saada millised küsimused ja probleemid on siiani ülesse kerkinud ja võivad tulevikus veel tekkida eesti asutustes ja organisatsioonides seoses arvutite ning teiste informatsioonitehnoloogiate kasutamisega. Järelikult paluksin Teie abi kõige tähtsamate probleemide identifitseerimises, mis Eestis praegus olemas on, ja mis järgmise kolme kuni viie aasta jooksul võivad ette tulla.

Järgmisel leheküljel, palun nimetage kõige tähtsamad informatsioonitehnoloogia probleemid Eestis, ja kui võimalik siis andke igale ka lühikene seletus. Kõik vastused on täiesti anonüümsed.

Kui selle uurimistöö kohta küsimusi on, siis minu praegused koordinaadid on:

Enn Kiudorf
Küberneetika Instituut
Akadeemia tee 21 - B434
Tallinn, Eesti
200108
Telefon: 527314

Suur tänu Teie abi eest!

Enn Kiudorf

**KÕIGE TÄHTSAMAD INFORMATSIOONITEHNOLOOGIA
PROBLEEMID JA KÜSIMUSED EESTIS**

KEY INFORMATION SYSTEMS MANAGEMENT ISSUES IN ESTONIA

Palun nimetada kõige tähtsamad informatsioonitehnoloogia probleemid, mured ja küsimused mis võiksid eesti arvuti-spetsialistidele järgmise kolme kuni viie aasta jooksul ette tulla.

Please list the most critical issues facing information systems managers in Estonia over the next three to five years.

1. Probleem: _____

Seletus: _____

2. Probleem: _____

Seletus: _____

3. Probleem: _____

Seletus: _____

4. Probleem: _____

Seletus: _____

5. Probleem: _____

Seletus: _____

6. Probleem: _____

Seletus: _____

TAGAPÕHJALIK INFORMATSIOON / BACKGROUND INFORMATION

Järgnev informatsioon on tarvilik et kontakti Teiega pidada.

The following information is needed to maintain contact with you.

Nimi / Name _____

Organisatsiooni Nimi /
Name of Organization _____

Aadress / Address

Telefon / Telephone _____

Mis on Teie ametiala? /
What is your job title? _____

APPENDIX 2

Round 2 Questionnaire and Covering Letter

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Commerce
and Business Administration
2053 Main Mall
Vancouver, B.C. Canada V6T 1Y8

Telephone (604) 224-8500/224-8316
Fax (604) 224-8468

June 17, 1991

I am a graduate student at the University of British Columbia in Canada and am currently conducting a survey of information systems managers in Estonia as part of my thesis work.

As you are aware, organizations throughout Estonia and elsewhere are increasingly making use of computers, hardware, software, telecommunications systems, and various other information technologies. However, it is also recognized that there are many important issues and problems associated with effectively utilizing such technologies.

The purpose of this research is to better understand the computerization problems facing Estonian organizations. Therefore, I am asking for your help in identifying the most important issues facing information systems managers and their organizations in Estonia over the next three to five years.

The attached questionnaire lists a series of IS issues which may be of importance to Estonian IS managers. Please rate each issues in terms of how important you feel they are. Space is also provided at the end of the questionnaire for you to add any additional important issues that you feel have not been covered. Please be assured that all responses will be kept strictly confidential.

If you have any questions about this research, I am currently in Tallinn at the following address:

Enn Kiudorf
Institute of Cybernetics
Akadeemia tee 21 - B434
Tallinn, Estonia
200108
Telephone: 527 314

Thank you for your help,

Enn Kiudorf

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Commerce
and Business Administration
2053 Main Mall
Vancouver, B.C. Canada V6T 1Y8

Telephone (604) 224-8500/224-8316

17. juuni 1991

Mina olen Kanadast, British Columbia ülikooli üliõpilane. Viibin praegu Eestis, et teha uurimusi eesti juhtidest, kes kureerivad oma organisatsioonide arvuti- ja informatsiooni-süsteemide tegevusi. Mina uurin milliseid probleeme, muresid ja küsimusi neil tekib seoses oma tööga.

On selge, et Eestis, nagu kogu maailma organisatsioonid ja ettevõtted, kasutab järjest rohkem arvuteid, nende riistvara ja tarkvara, telekommunikatsioonisüsteeme ja muid informatsioonitehnoloogiaid. Ometi teame et tihti tekib igasuguseid probleeme, muresid, ja küsimusi, kui proovime neid tehnoloogiaid efektiivselt kasutada.

Minu uurimistöö siht on teada saada, millised küsimused, mured ja probleemid on siiani üles kerkinud ja võivad tulevikus veel tekkida eesti asutustes ja organisatsioonides seoses arvutite ning teiste informatsioonitehnoloogiate kasutamisega. Seega paluksin Teie abi kõige tähtsamate probleemide väljatoomises, mis on Eestis praegu, ja mis järgmise kolme kuni viie aasta jooksul võivad ette tulla.

Järgmistel lehekülgedel on küsimustik mis paneb ette mõned infomatsioonitehnoloogia probleemid, mured ja küsimused. Palun hinnata igat probleemi kuivõrd tähtis see on. Küsitluslehe lõpus on ruumi jäetud ka uute probleemide lisamiseks. Kõik vastused hoitakse täiesti anonüümsed.

Kui selle uurimistöö kohta küsimusi on, siis minu praegused koordinaadid on:

Enn Kiudorf
Küberneetika Instituut
Akadeemia tee 21 - B434
Tallinn, Eesti
200108
Telefon: 527314

Suur tänu Teie abi eest!

Enn Kiudorf

KÕIGE TÄHTSAMAD INFORMATSIOONISÜSTEEMIDE JUHTIMISE PROBLEEMID, MURED JA KÜSIMUSED EESTIS

KEY INFORMATION SYSTEMS MANAGEMENT ISSUES IN ESTONIA

Paluksin Teie abi kõige tähtsamate informatsioonitehnoloogia probleemide, murede ja küsimuste identifitseerimises, mis on Eestis praegu olemas ja mis järgmise kolme kuni viie aasta jooksul võivad ette tulla. Lisatud küsitlusleht paneb ette mõned informatsioonitehnoloogia probleemid. Palun hinnata igat probleemi skaalal ühest kümneni, kus 10 on kõige tähtsam hinne ja 1 kõige tähtsusetum. Kui Teie ei ole kindel probleemi tähtsuses, või kui Teil ei ole probleemist kindlat ülevaadet ega arvamust, siis palun jätta hinne andmata. Kui Teil on ettepanekuid või probleeme, mis ei ole küsitluslehel üles tõstetud, siis palun lisada see ja hinnang küsitluslehe lõpus, kus on selleks ruumi jäetud. Võimalik et mõnele küsimusele soovite vastata täpsemalt; olen tänulik kõigi märkuste ja kommentaaride eest.

I am asking for your help in identifying the most critical issues facing information systems managers in Estonia over the next three to five years. The following list contains a set of issues that may be of concern to Estonian IS managers. Please indicate your views by rating each of the listed issues on a scale of 1 to 10, where 10 indicates your highest priority issue(s) and 1 indicates your lowest priority issue(s). If you are uncertain about the importance of an issue, or have no opinion, please leave the rating blank. It is also possible that not all issues of importance have been identified and thus space is provided at the end of the form so that new issues can be added and rated. Any additional comments or clarifications are also most welcome.

HINDAMINE / RATING SCALE:

Üldse Mitte Tähtis				Keskpäraselt Tähtis				Väga Tähtis	
1	2	3	4	5	6	7	8	9	10
Not At All Important				Moderately Important				Critically Important	

Hinne / Rating	Informatsioonitehnoloogia Probleem ja Seletus / Key Issues and their Rationale
-------------------	---

1. Parandada Informatsiooni Kaitset ja Kontrolli / Improving Information Security and Control

Seletus: Organisatsioonide sõltuvuse kasvades infosüsteemidest suureneb risk, mis tuleneb andmete kadumisest või moonumisest, info soovimatust avaldamisest või infoteenuste katkemisest. Tugev julgeolekukontroll ja veakindel infoedastus muutub paratamatuks.

Rationale: As organizations increase their dependence on information systems, there is a greater risk from destruction and alteration of data, disclosure to outside sources, and disruption of information services. Tight security controls and fault tolerant information delivery are becoming a necessity.

2. Seadustada Autoriõigused Tarkvarale / Legislating Copyright Protection for Software

Seletus: Tarkvara kirjutajad ei ole saanud oma tööd kopeerimise eest kaitsta ja ametlikele tarkvara müüjatele on esitatud vähe nõudmisi litsenseeritud programmidele. Tarkvara kasutajad ei saanud vastavat toetust ja abi. Autoriõiguse seadusi on tarvis selleks, et neid probleeme vähendada.

Rationale: Software developers have been unable to protect themselves from pirating and retailers have had little demand for licensed programs. Organizations that use software have been unable to obtain adequate vendor support. Copyright protection legislation is needed to help rectify these problems.

3. Infosüsteemide Spetsialistide Siirdumine Välismaale või Välisfirmade Teenistusse / Loss of Skilled IS Workers to Foreign Bidders

Seletus: Kui arvestada ümber "kõvasse" valuutasse, siis on infotöötajate palgad väikesed. Praegused vahetuskursid ei võimalda kohalikel firmadel võrdväärset töötasu maksta. See põhjustab paljude tippspetsialistide siirdumist välismaisele tööturule ning viimane omakorda oskustööjõu defitsiiti kohapeal.

Rationale: Local IS salaries are low once they are calculated in hard currency equivalents. Current exchange rates make it impossible for local firms to pay competitive salaries. This causes many top IS professionals to seek work abroad, or with foreign firms, resulting in domestic shortages of highly skilled people.

4. Luua ja Korras Hoida Töökindlaid Informatsioonisüsteeme / Building and Maintaining Reliable Information Systems

Seletus: Peame parandama süsteemide usaldusväärsust. Süsteemide loojad peavad rõhku panema sellele, et tösta riistvara ja tarkvara töökindlust.

Rationale: The reliability of systems needs to be improved. Developers should place increased emphasis on maximizing the reliability of hardware and software.

5. Kergendada ja Juhtida Arvuti Kasutamist / Facilitating and Managing End-User Computing

Seletus: Laienev personaalarvutite kasutamine ennustab paremat produktiivsust, aga võib ka kaasa tuua kontrollivõimaluse puudumise. Informatsioonisüsteemide juhid peavad siis õigesti kaaluma lõppkasutajate vabadusvajadust ning kontrolli nende üle. Tähtis on ka lõppkasutajatele selgitada nende rolli.

Rationale: The proliferation of end-user computing through personal computers offers the promise of improved productivity but also the dangers of inadequate management control. Information systems management must balance control against the need for slack. Clarification of IS and end-user roles is a necessity.

6. Sobiva Riistvara ja Tarkvara Ressursside Kättesaamise Võimalused / Availability of Appropriate Hardware and Software Resources

Seletus: Praegu põle riistvara ja tarkvara pakkumine piisav. Selle tulemusel on ootamisajad pikad. Tihti peame vastu võtma neid tehnoloogiaid mis on saadaval, ja mitte neid mis täpsemalt tarvis oleks. See piirab organisatsioonide võimalusi oma sihtide saavutamisel.

Rationale: There is an insufficient supply of hardware and software products, often resulting in shortages and long waiting periods. Often it is necessary to settle for what is available, rather than what is most appropriate. Shortages of these technologies limit the ability of the organization to meet its goals.

7. Büroo Automatiseerimise Projekteerimine, Realiseerimine ja Juhtimine / Planning, Implementation and Management of Office Automation

Seletus: Paljud organisatsioonid installeerivad praegu ametikoha automatiseerimise tehnoloogiaid, selleks et tõsta teenistujate produktiivsust. Informatsioonisüsteemide osakondadel on ka selles ülesandes tähtis roll mängida.

Rationale: Office automation is being implemented by many organizations to improve 'white collar' productivity. The IS department has a role to play in this process.

8. Infoarhitektuuri Loomine / Developing an Information Architecture

Seletus: Infoarhitektuur on üks kõrgetasemeline plaan, mis näitab kuidas tähtsamad informatsiooniklassid on seotud organisatsiooni funktsioonidega. Korporatiivne/globaalne infoarhitektuur on tarvilik selleks, et identifitseerida kõige tähtsamad organisatsioonis kasutatavad informatsioonikategooriad ja nende seotus organisatsiooni tegevustega. See on vajalik, et juhtida rakenduste loomist ja võimaldada andmete integreerimist ja ühist tarvitamist.

Rationale: An information architecture is a high-level map that shows how major classes of information are related to major functions of the organization. A corporate/global information architecture is needed to identify the major information categories used within an enterprise and their relationships to business processes. It is a necessity to guide applications development and facilitate the integration and sharing of data.

9. Riistvara ja Tarkvara Finantseerimise Võimalused/ Affordability of Hardware and Software

Seletus: Et kätte saada riistvara, tarkvara ja muid informatsioonitehnoloogiaid, on järgnevalt vajalik vaba turu poole vaadata. Aga siis on tavaliselt tarvilik maksta kõrgeid hindu valuutas, mis kitsendab nende tehnoloogiate praktilist kättesaamise võimalust.

Rationale: In order to obtain hardware, software and other information technologies, it is becoming increasingly necessary to turn to free market sources. This requires paying high prices and generally necessitates the use of hard currency which limits the affordability of these technologies.

10. Soodustada Arusaamist Informatsioonisüsteemide Rollist ja Panusest / Increasing Understanding of the Role and Contribution of IS

Seletus: Informatsioonisüsteemidele vaadatakse mõnikord et nad on ainult üldkulud. Tihti on vähe arusaadav, kuidas IS toetab organisatsiooni. Seetõttu võivad organisatsiooni juhid esitada võimatuid nõudmisi ja vähendada informatsioonisüsteemi osakonna fonde. Selle tagajärjel võib aga organisatsioon kaotada mitmeid häid võimalusi.

Rationale: IS is sometimes viewed as an overhead expense with little appreciation of its contribution to the organization. This can lead executive management to make infeasible demands and to cut funding resulting in missed opportunities for the organization.

11. Saavutada Juurdepääs Infosüsteemide Alastele Teadmistele ning Asjatundlikule Konsultatsioonile / Obtaining Access to IS Knowledge and Advice

Seletus: Infosüsteemide-alane kirjandus pole arusaadavas keeles. On puudus ka konsultatsioonifirmadest, kellelt saaks küsida head nõu. Need põhjused muudavad infosüsteemide efektiivseks juhtimiseks vajaliku teabe hankimise tülikaks.

Rationale: Many useful IS books, manuals and articles are not available in familiar languages. There is also a lack of consulting firms who could provide good advice. These factors make it difficult to obtain the information necessary for effective IS management.

12. Parandada Informatsioonisüsteemide Strateegilist Planeerimist / Improving IS Strategic Planning

Seletus: Et organisatsioonides toimiks edukas majandus, on järjest tähtsam, et nad koordineeriks oma üldist strateegilist plaani ja informatsioonisüsteemide plaani. Praegusel ajal on eriti tarvilik strateegilise planeerimise oskusi parandada, sest bisnisi ümbruskond muutub kiiresti, arvuti kasutajad võtavad planeerimisest rohkem osa ja tehnoloogia areneb kiirenevalt.

Rationale: It is increasingly critical to an organization's success that it align its long-range IS plan with its strategic business plan. Rapidly changing business environments, increased involvement of end-users, and accelerated technological change underscore the need to continue improving strategic planning skills.

13. Informatsioonisüsteemide Töötajate Valik, Värbamine ja Väljaõpe / Specifying, Recruiting and Developing Human Resources for IS

Seletus: Praegune ja tuleviku puudujääk kvalifitseeritud informatsioonitöötajatest ähvardab kahandada informatsioonisüsteemi osakonna võimalusi organisatsiooni vajaduste täitmisel. Töötaja karjääri võimalusi tuleb selgitada. Üha enam rõhku peab panema bisnisi oskuste arendamisele.

Rationale: Current and future shortages of qualified information systems personnel threaten the IS department's ability to keep up with the needs of its parent organization. Career paths need to be clarified. More emphasis needs to be put on developing business skills.

14. Kindlustada Arvutisüsteemide Kaitset / Ensuring the Physical Security of Computer Systems

Seletus: Suurem osa arvutisüsteeme ja muud informatsioonitehnoloogiad on kergesti vigastatavad ja kallihinnalised. Peame hoolitsema, et need tehnoloogiad oleksid varguste, vandalismi ja õnnetusjutumite eest kaitstud.

Rationale: Most computer systems and other information technologies are fragile and valuable. Care needs to be taken to ensure that these technologies are secure from theft, vandalism and accidental damage.

15. Luua Liite ja Ühendusi Lääneriikide Organisatsioonidega / Establishing Alliances and Linkages with Western Organizations

Seletus: Luua liite, ühissettevõtteid ja muid ühendusi lääneriikide firmadega on tarvilik Eesti organisatsioonidele. Need ühendused läänega parandavad ligipääsemise võimalusi uutele tehnoloogiatele ja nende teenindamisele, vaba turumajanduse ekspertiisile ning muule kasulikule informatsioonile.

Rationale: Establishing alliances, joint-ventures and other linkages with Western firms and organizations is necessary for Estonian organizations. These links with the West provide improved access to new technologies, services, business expertise and useful information.

16. Mõõta Informatsioonisüsteemide Efektiivsust ja Produktiivsust / Measuring IS Effectiveness and Productivity

Seletus: Et efektiivselt juhtida informatsioonisüsteemi osakonda, siis peame selle osakonna jõudlust mõõtma. See on tulevikus isegi veel tähtsam, kuna organisatsioonid hakkavad investeerima rohkem ja rohkem raha informatsioonisüsteemidesse.

Rationale: The measurement of IS performance is crucial to its effective management. This is becoming more important as organizations invest more and more money in information systems.

17. Integreerida Andmetöötlus, Büroo Automatiseerimine, Telekommunikatsioonid ja Tootmise Automatiseerimine / Integrating Data Processing, Office Automation, Telecommunications and Factory Automation

Seletus: Praegusel ajal on võimalik integreerida erinevaid tehnoloogiasüsteeme. Vastavalt sellele, kuidas organisatsioonid katavad integreerida tehnoloogiaid, on tarvis lahendada ka nende organisatsioonilised probleemid.

Rationale: The capability now exists to integrate systems that are based on these diverse technologies. As organizations try to integrate their technologies, organizational and managerial problems will need to be solved.

18. Liikuda Riistvara-, Tarkvara- ja Andmestandardite Poole / Promoting Standards for Hardware, Software and Data

Seletus: Andmeformaadid pole sageli ühilduvad. Paljud rakendused on loodud ilma süsteemide integreerimise vajadusi silmas pidades. Riistvara mitteühilduvus muudab remondi ja kokkuühendamise keeruliseks. Organisatsioonid peavad püüdnud kehtestada oma süsteemidele standardid ning mõjutama üldriiklike standardite kujunemist selleks, et vähendada integreerimise raskusi.

Rationale: Data formats are often incompatible. Many applications have been developed with little regard for the necessity of integrating systems. Hardware inconsistencies make repairs and connections difficult. Organizations must strive to establish standards for their systems, and to push for basic industry standards so that integration problems will be lessened.

19. Tarkvara Arendamise Kvaliteedi Parandamine / Improving the Quality of Software Development

Seletus: Realiseerimist ootavate tarkvararakenduste järjekord on liiga pikk. Kasutajate kannatus väheneb. Seda probleemi võimendab tööjõu kallinemine. Siit tulebki tarvidus tõsta süsteemide valmistamise efektiivsust.

Rationale: The application development backlog remains at unacceptably high levels. Users are getting impatient. Add to this the increasing costs of human resources, and the need for improved effectiveness in systems development becomes clear.

20. Arvutivõrkude Rakendamine ja Parandamine / Implementing and Improving Computer Networks

Seletus: Arvutite ühendamine võrku on vajalik andmete, rakenduste ja riistvara ühiseks kasutamiseks. Asutuste võime oma informatsiooni tõhusalt juhtida hakkab üha enam olenema arvutivõrkudest. Tuleb lahendada arvutivõrkude rakendamise tehnilised küsimused.

Rationale: Networking of computers is necessary for the sharing of data, applications and hardware. The ability of the organization to effectively manage information is becoming increasingly dependent on computer networks. Technical problems associated with implementing networks must be overcome.

21. Soodustada Organisatsioonis Informatsiooni- Tehnoloogia Õppimist ja Kasutamist / Facilitating Organizational Learning and Use of IS Technologies

Seletus: Need organisatsioonid, kes õigesti ja sobivalt kasutavad uusi informatsioonitehnoloogiaid, on kindlasti samad, kellel majandus hästi edeneb. Paljudes olukordades peame muutma bisnisi harjumusi, protsessi ja ka organisatsiooni struktuure. Informatsioonisüsteemide osakond peab näitama, et nad oskavad õppida ja kasutada uusi tehnoloogiaid.

Rationale: Organizations that prosper will be those that make use of appropriate new IS technologies in their entire operation. Business practices and organizational structures will need to be modified in many cases. IS also must demonstrate its own ability to learn and use new technology.

22. Infosüsteemide Tegevuse ja Edasiarenduse Seadusandlik Piiramine / Regulatory Constraints on IS Activities and Ambitions

Seletus: Lääneriigid veel reguleerivad ja piiravad mõninga tehnoloogia eksporti. Sisereeglid piiravad organisatsioonide tehnoloogia ja majanduse püüdlusi. Need reguleerimise faktorid teevad informatsioonisüsteemide korraldamise keerulisemaks.

Rationale: Western countries still maintain some restrictions on the exportation of certain technologies. Domestic regulations limit the technological and business aspirations of firms. These regulatory factors complicate the task of IS management.

23. Telekommunikatsioonisüsteemide Projekteerimine ja Rakendamine / Planning and Implementing a Telecommunications System

Seletus: Kommunikatsioon on organisatsioonides äärmiselt tähtis. Peame parandama riiklikku telefonisüsteemi ning organisatsioonide telekommunikatsioonisüsteeme. Informatsioonisüsteemide mõju konkurentsivõime tõstmisele on tunduvalt telekommunikatsioonitehnoloogiast. Kiired ja kaugeleulatuvad muutused sellel alal teevad selle ülesande keeruliseks.

Rationale: Communication is the lifeblood of the organization. Improvements must be made to both the government telephone system and intra-organizational telecommunications systems. Using IS for competitive advantage often depends heavily on telecommunications. Rapid and major changes in the industry complicate this task.

24. Kindlustada Rakenduste Kasulikkus Kasutajatele ning Organisatsioonile / Ensuring that Applications Satisfy the Needs of Users and the Organization

Seletus: Möödunud aastatel on paljud rakendused ja süsteemid olnud tuntavalt kehvade disaini kvaliteetiga, mis vähendab nende süsteemide praktilist kasu. Lõppkasutajate vajadusi on tihti eiratud. Nüüd peame tõsiselt rõhku panema süsteemide kasutajate ning organisatsiooni vajaduste korralikule rahuldamisele.

Rationale: In past years, many applications and systems have been plagued by poor design quality, limiting the usefulness of these systems. End-user requirements have often been ignored. An increased effort needs to be made to ensure that new systems are able to satisfy the needs of users and the organization.

25. Efektiivselt Kasutada Andmeressursse / Making Effective Use of the Data Resource

Seletus: Organisatsioonide andmeressursid kasvavad suuruses ja väärtuses ning muutuvad üha komplitseeritumaks. Ometi andmeressursid jäävad suurelt osalt allahinnatuteks, kättesaamatuteks ja vähekasutatavateks. Informatsioonisüsteemide osakond ning terve organisatsioon peab soodustama õhkkonda, mis väärtustab neid ressursse.

Rationale: The organization's data resource is growing in size, complexity, and value. Despite this, it remains largely unrecognized, inaccessible, and underutilized. IS must develop a climate within its department and throughout the organization which values the data resource as a corporate asset.

26. Informatsioonisüsteemide Kasutamine Konkurentsivõime Tõstmiseks / Using Information Systems for Competitive Advantage

Seletus: Vabas turumajanduses on paljud organisatsioonid pikaajaliselt eluvõimelised ainult siis, kui nad kasutavad informatsioonisüsteeme konkurentsi tõstmiseks. Tihti ei saa firma teisiti tegutseda. Konkurentsivõime kasu tuleneb uute võimaluste leidmisest loovuse ja innovatsiooni kaudu ning nende kiirest rakendamisest. See on tavaliselt informatsioonisüsteemi osakonna nõrk külg.

Rationale: In many businesses, long-term survival is dependent on using information systems to gain competitive advantage. The business can be lost without it. Competitive advantage results from recognition of opportunities through creativity and innovation, followed by rapid implementation. These are historical weaknesses of IS.

27. Infosüsteemide Töötajate Suhtumise Muutmine / Changing the Attitudes of IS Employees

Seletus: Tuleb muuta töötajate suhtumist oma töösse, samuti arvutitesse ja infosüsteemidesse. Tuleks õhutada töötajaid oma initsiatiivi avaldama, loomingulist ja head tööd peaks väärtustama. Samuti peab muutma andmetöötluse negatiivseid stereotüüpe ja selgitama kaasaegsete infosüsteemide erinevust mineviku tsentraalse juhtimise ja planeerimise süsteemidest (AJS).

Rationale: The attitudes of workers towards their jobs, as well as towards computers and information systems needs to be changed. Employees should be encouraged to show initiative; creative and conscientious work should be rewarded. It is also necessary to change negative stereotypes about computing and to differentiate contemporary information systems from the central planning and control systems (AJS) of the past.

28. Puudused Koolituses / Educational Weaknesses of the Workforce

Seletus: Paljudel töötajatel puuduvad baasteadmised arvutustehnikast; seetõttu kujuneb vastuseis uuele tehnikale ja süsteemide rakendamise piiratus. Isegi väljaõppinud infotöötajate spetsialistidel on puudujääke teadmistes. Õppeasutused peavad parandama oma infotöötajate alaseid õppeprogramme.

Rationale: Many workers lack a basic familiarity with computers, resulting in resistance to new technologies and constraints on systems implementation. Even trained IS professionals have serious gaps in their knowledge. Schools and universities must improve the quality of their IS training programs.

29. Segased Poliitilised ja Seadusandlikud Olud / Unsettled Political and Regulatory Environment

Seletus: Seadusandlus on massiliste ümberkorralduste järgus. Valitseb ebakindlus selles, kuidas uued seadused organisatsioone mõjustavad. Infovajadused muutuvad pidevalt tehes uute süsteemide projekteerimise keeruliseks. Lahendamata poliitiline olukord lisab ebakindlust veelgi.

Rationale: Government laws and regulations are undergoing massive changes. There is great uncertainty as to how new legislation will impact organizations. Data requirements are changing constantly, making it difficult to plan new systems. The unsettled political situation adds to the uncertainty.

30. Viia Informatsioonisüsteemide Osakond Õigele Kohale Organisatsiooni Struktuuris / Aligning the IS Organization with that of the Enterprise

Seletus: Informatsioonisüsteemide osakonna efektiivsus organisatsiooni infovajaduste rahuldamisel oleneb informatsioonisüsteemi osakonna positsioonist organisatsioonis. Tihti juhtub, et informatsioonisüsteemi osakond ei ole organisatsiooni struktuuris õigel kohal.

Rationale: The effectiveness with which IS can support the enterprise's information needs is dependent on the IS department's position within the enterprise. Too often IS is not located appropriately within the organization.

**ÜLEJÄÄNUD TÄHTSAD PROBLEEMID, MURED JA KÜSIMUSED /
ADDITIONAL ISSUES**

Palun lisada teisi infosüsteemide juhtimise probleeme, muresid ja küsimusi Eestis.

Please indicate any additional issues of importance to Estonian IS managers.

Hinne / Rating	Teised Tähtsad Probleemid ja Nende Seletused / Additional Issues and Their Rationale
---------------------------	---

_____ 1.	_____
Seletus:	_____

_____ 2.	_____
Seletus:	_____

_____ 3.	_____
Seletus:	_____

INFORMATSIOON ANKEEDI TÄITJA KOHTA / BACKGROUND INFORMATION

Järgnev informatsioon on tarvilik selleks et kontakti Teiega pidada, informatsiooni klassifitseerida ja statistilisi analüüse teha. Teie vastused hoitakse täiesti anonüümselt.

The following information is needed so that we can keep in contact with you, for classification purposes and for statistical analysis. All responses will be kept in strictest confidence.

Nimi / Name _____

Organisatsiooni Nimi /
Name of Organization _____

Address / Address _____

Telefon / Telephone _____

Milline kategooria kõige paremini kirjeldab Teie organisatsiooni? /

Which category best describes your organization?

_____	Akadeemiline	/ Academic
_____	Riigi Organ	/ Government Department
_____	Riiklik Firma	/ State-Owned Company
_____	Eraettevõte	/ Private Company
_____	Aktsiaselts	/ Incorporated Company
_____	Ühisettevõtte	/ Joint-Venture Company
_____	Kooperatiiv	/ Cooperative

Mis on Teie organisatsiooni peamine tegevusala? /
What is the primary activity or business of your organization?

Mis on Teie praegune amet? /
What is your present position or title?

Mis on Teie otsese ülemuse ametiala? /
What is the title of the person to whom you report?

Mitu inimest töötab Teie organisatsioonis? /
How many people are employed by your organization?

Mitu kutselist arvutitöötajat töötab Teie organisatsioonis? /

How many computer professionals are employed by your organization?

Palun lühidalt kirjeldada milliseid riistvara ja tarkvara süsteeme ning rakendusi Teie organisatsioon praegu kasutab: / Please briefly describe the type of hardware and software systems and applications currently being used in your organization:

[illegible]

Palun märkida keeled mida valdate: /

Please check the languages in which you are conversant:

_____ Eesti keel / Estonian _____ Inglise keel / English
 _____ Vene keel / Russian _____ Saksa keel / German
 _____ Teised keeled / Other: _____

Aitäh Teie vastuste eest!

Thank you for completing this survey!

APPENDIX 3

Round 3 Questionnaire and Covering Letter

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Commerce
and Business Administration
2053 Main Mall
Vancouver, B.C. Canada V6T 1Y8

Telephone (604) 224-8500/224-8316
Fax (604) 224-8468

July 17, 1991

Thank you for your help in completing the previous questionnaire. We have now established a preliminary list of the most important MIS issues in Estonia. In order to complete this research, I require your help one final time so that we may determine the final ranking of the issues. Detailed instructions for this round are provided on the enclosed questionnaire.

Since I will be returning to Canada on August 3, I am a little worried about being able to collect all of the questionnaires before this date. To ensure that the data reach me, I am proposing a two stage plan for mailing the questionnaire back to me:

1/ Please mail the main questionnaire to me at the Institute of Cybernetics. I will arrange to have all the questionnaires that reach the Institute after August 3 forwarded to me in Canada.

2/ Please copy your ratings onto the single page questionnaire and mail that directly to me in Canada.

I am hoping that this will ensure that the data reach me safely and I have provided self-addressed and stamped envelopes to facilitate this plan.

If you are interested in seeing a copy of the results of this research, please indicate this on the questionnaire. I will continue working on this project over the next several months back in Canada, and will be able to forward you a copy of the highlights in the fall.

Again, your help in making this research possible is greatly appreciated.

Yours sincerely,

Enn Kiudorf

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Commerce
and Business Administration
2053 Main Mall
Vancouver, B.C. Canada V6T 1Y8

Telephone (604) 224-8500/224-8316

17. juuli 1991

Täna Teid abi eest eelmise küsimustiku täitmisel. Nüüdseks on koostatud Eesti tähtsamate infotöötlusprobleemide esialgne loetelu. Selle uurimistöö lõpetamiseks palun veel viimast korda Teie abi selleks, et saaksime neid probleeme tähtsuse järjekorras reastada. Lisatud ankeet annab selleks täpsemad selgitused.

Kuna ma pöördun tagasi Kanadasse 3. augustil, siis olen veidi mures selle üle, kas ma suudan ankeedi vastused selleks ajaks kätte saada. Andmete kättesaamise tagamiseks pakun välja järgmise kaheastmelise kava:

- 1) Palun saatke täidetud ankeet mulle Küberneetika Instituuti. (Korraldan nii, et kõik peale 3. augustit Küberneetika Instituuti saabunud ankeedid saadetakse mulle Kanadasse järele.)
- 2) Palun tehke oma hinnangutest koopia lisatud eraldi lehele ning palun saatke see mulle otse Kanadasse.

Aadressi ning markidega varustatud ümbrikud on lisatud. Loodan et selline korraldus ei tee Teile palju tüli ning et väärtuslikud andmed jõuavad turvaliselt minuni.

Kui Teid huvitavad selle uurimuse tulemused, siis märkige seda palun oma ankeedil. Jätkan selle projektiga tööd veel mitme kuu vältel ning sügisel võin saata Teile koopia töö tähtsamatest tulemustest.

Suur tänu Teie abi eest.

Lugupidamisega

Enn Kiudorf

**KÕIGE TÄHTSAMAD INFORMATSIOONISÜSTEEMIDE JUHTIMISE
PROBLEEMID, MURED JA KÜSIMUSED EESTIS**

KEY INFORMATION SYSTEMS MANAGEMENT ISSUES IN ESTONIA

Paluksin veel kord Teie abi kõige tähtsamate infotehnoloogia probleemide, murede ja küsimuste väljaselgitamises, mis avalduvad praegu Eestis ja mis järgmise kolme kuni viie aasta jooksul võivad ette tulla. Eesmärgiks on need probleemid reastada tähtsuse järjekorras. Järgnev probleemide loetelu on esitatud eelmise küsitlusringi tulemuste põhjal määratud tähtsuse järjekorras. Iga probleemi juures on esitatud küsitletud spetsialistide grupi keskmine hinnang ning Teie isiklik hinnang eelmise ankeedi põhjal. Palun vaadake need hinnangud ning seletused üle, tehke oma lõplik otsus ja kandke oma lõplik hinnang selleks jäetud tühjale kohale. Nagu eelmiselgi korral, palun hinnata igat probleemi skaalal ühest kümneni, kus 10 on kõige tähtsam hinne ja 1 kõige tähtsusetum. Kui Teie ei ole kindel probleemi tähtsuses, või kui Teil ei ole probleemist kindlat ülevaadet ega arvamust, siis palun jätta hinne andmata.

I am asking for your help in confirming the most critical issues facing information systems managers in Estonia over the next three to five years. The following list of issues is presented in the order of importance as determined from the previous round of questionnaires. The average group rating and your original rating are also provided. Please review these ratings and the accompanying rationale for each issue. Make a final decision and record it in the blank. Remember that each issue is to be rated on a scale from 1 to 10, where 10 indicates your highest priority issue(s) and 1 indicates your lowest priority issue(s). If you are uncertain about the importance of an issue, or have no opinion, please leave the rating blank.

HINDAMINE / RATING SCALE:

Üldse Mitte Tähtis				Keskpäraselt Tähtis				Väga Tähtis	
1	2	3	4	5	6	7	8	9	10
Not At All Important				Moderately Important				Critically Important	

Grupi	Teie	Teie
keskmine	eelmine	lõplik
hinnaang	hinnaang	hinnaang

Informatsioonitehnoloogia Probleemid ja Seletus

1. Telekommunikatsioonisüsteemide Projekteerimine ja Rakendamine / Planning and Implementing a Telecommunications System

9,0

Seletus: Kommunikatsioon on organisatsioonides äärmiselt tähtis. Peame parandama riiklikku telefonisüsteemi ning organisatsioonide telekommunikatsioonisüsteeme. Informatsioonisüsteemide mõju konkurentsivõime tõstmisele oleneb tunduvalt telekommunikatsioonitehnoloogiast. Kiired ja kaugeleulatuvad muutused sellel alal teevad selle ülesande keeruliseks.

Rationale: Communication is the lifeblood of the organization. Improvements must be made to both the government telephone system and intra-organizational telecommunications systems. Using IS for competitive advantage often depends heavily on telecommunications. Rapid and major changes in the industry complicate this task.

2. Liikuda Riistvara-, Tarkvara- ja Andmestandardite Poole / Promoting Standards for Hardware, Software and Data

8,6

Seletus: Andmeformaadid pole sageli ühilduvad. Paljud rakendused on loodud ilma süsteemide integreerimise vajadusi silmas pidades. Riistvara mitteühilduvus muudab remondi ja kokkuühendamise keeruliseks. Organisatsioonid peavad püüda kehtestada oma süsteemidele standardid ning mõjutama üldriiklike standardite kujunemist selleks, et vähendada integreerimise raskusi.

Rationale: Data formats are often incompatible. Many applications have been developed with little regard for the necessity of integrating systems. Hardware inconsistencies make repairs and connections difficult. Organizations must strive to establish standards for their systems, and to push for basic industry standards so that integration problems will be lessened.

3. Luua ja Korras Hoida Töökindlaid Informatsioonisüsteeme / Building and Maintaining Reliable Information Systems

8,3

Seletus: Peame parandama süsteemide usaldusväärsust. Süsteemide loojad peavad rõhku panema sellele, et tösta riistvara ja tarkvara töökindlust.

Rationale: The reliability of systems needs to be improved. Developers should place increased emphasis on maximizing the reliability of hardware and software.

4. Luua Liite ja Ühendusi Lääneriikide Organisatsioonidega / Establishing Alliances and Linkages with Western Organizations

8,2

Seletus: Luua liite, ühisettevõtteid ja muid ühendusi lääneriikide firmadega on tarvilik Eesti organisatsioonidele. Need ühendused läänega parandavad ligipääsemise võimalusi uutele tehnoloogiatele ja nende teenindamisele, vaba turumajanduse ekspertidele ning muule kasulikule informatsioonile.

Rationale: Establishing alliances, joint-ventures and other linkages with Western firms and organizations is necessary for Estonian organizations. These links with the West provide improved access to new technologies, services, business expertise and useful information.

5. Kindlustada Rakenduste Kasulikkus Kasutajatele ning Organisatsioonile / Ensuring that Applications Satisfy the Needs of Users and the Organization

8,2

Seletus: Möödunud aastatel on paljud rakendused ja süsteemid olnud tuntavalt kehvade disaini kvaliteetiga, mis vähendab nende süsteemide praktilist kasu. Lõppkasutajate vajadusi on tihti eiratud. Nüüd peame tõsiselt rõhku panema süsteemide kasutajate ning organisatsiooni vajaduste korralikule rahuldamisele.

Rationale: In past years, many applications and systems have been plagued by poor design quality, limiting the usefulness of these systems. End-user requirements have often been ignored. An increased effort needs to be made to ensure that new systems are able to satisfy the needs of users and the organization.

Grupi Teie Teie
keskmine eelmine lõplik
hinnang hinnang hinnang

Informatsioonitehnoloogia Probleemid ja Seletus

6. Arvutivõrkude Rakendamine ja Parandamine / Implementing and Improving Computer Networks

8,2

Seletus: Arvutite ühendamine võrku on vajalik andmete, rakenduste ja riistvara ühiseks kasutamiseks. Asutuste võime oma informatsiooni tõhusalt juhtida hakkab üha enam olenema arvutivõrkudest. Tuleb lahendada arvutivõrkude rakendamise tehnilised küsimused.

Rationale: Networking of computers is necessary for the sharing of data, applications and hardware. The ability of the organization to effectively manage information is becoming increasingly dependent on computer networks. Technical problems associated with implementing networks must be overcome.

7. Infoarhitektuuri Loomine / Developing an Information Architecture

8,0

Seletus: Infoarhitektuur on üks kõrgetasemeline plaan, mis näitab kuidas tähtsamad informatsiooniklassid on seotud organisatsiooni funktsioonidega. Korporatiivne/globaalne infoarhitektuur on tarvilik selleks, et identifitseerida kõige tähtsamad organisatsioonis kasutatavad informatsioonikategooriad ja nende seotus organisatsiooni tegevustega. See on vajalik, et juhtida rakenduste loomist ja võimaldada andmete integreerimist ja ühist tarvitamist.

Rationale: An information architecture is a high-level map that shows how major classes of information are related to major functions of the organization. A corporate/global information architecture is needed to identify the major information categories used within an enterprise and their relationships to business processes. It is a necessity to guide applications development and facilitate the integration and sharing of data.

8. Parandada Informatsiooni Kaitset ja Kontrolli / Improving Information Security and Control

7,8

Seletus: Organisatsioonide sõltuvuse kasvades infosüsteemidest suureneb risk, mis tuleneb andmete kadumisest või moonumisest, info soovimatust avaldamisest või infoteenuste katkemisest. Tugev julgeolekukontroll ja veakindel infoedastus muutub paratamatuks.

Rationale: As organizations increase their dependence on information systems, there is a greater risk from destruction and alteration of data, disclosure to outside sources, and disruption of information services. Tight security controls and fault tolerant information delivery are becoming a necessity.

9. Seadustada Autoriõigused Tarkvarale / Legislating Copyright Protection for Software

7,7

Seletus: Tarkvara kirjutajad ei ole saanud oma tööd kopeerimise eest kaitsta ja ametlikele tarkvara müüjatele on esitatud vähe nõudmisi litsenseeritud programmidele. Tarkvara kasutajad ei saanud vastavat toetust ja abi. Autoriõiguse seadusi on tarvis selleks, et neid probleeme vähendada.

Rationale: Software developers have been unable to protect themselves from pirating and retailers have had little demand for licensed programs. Organizations that use software have been unable to obtain adequate vendor support. Copyright protection legislation is needed to help rectify these problems.

10. Riistvara ja Tarkvara Finantseerimise Võimalused / Affordability of Hardware and Software

7,6

Seletus: Et kätte saada riistvara, tarkvara ja muid informatsioonitehnoloogiaid, on järgnevalt vajalik vaba turu poole vaadata. Aga siis on tavaliselt tarvilik maksta kõrgeid hindu valuutas, mis kitsendab nende tehnoloogiate praktilist kättesaamise võimalust.

Rationale: In order to obtain hardware, software and other information technologies, it is becoming increasingly necessary to turn to free market sources. This requires paying high prices and generally necessitates the use of hard currency which limits the affordability of these technologies.

Grupi Teie Teie
keskmine eelmine lõplik
hinnaang hinnaang hinnaang

Informatsioonitehnoloogia Probleemid ja Seletus

11. Kindlustada Arvutisüsteemide Kaitset / Ensuring the Physical Security of Computer Systems

7,6

Seletus: Suurem osa arvutisüsteemide ja muud informatsioonitehnoloogiad on kergesti vigastatavad ja kallihinnalised. Peame hoolitsema, et need tehnoloogiad oleksid varguste, vandalismi ja õnnetusjutumite eest kaitstud.

Rationale: Most computer systems and other information technologies are fragile and valuable. Care needs to be taken to ensure that these technologies are secure from theft, vandalism and accidental damage.

12. Segased Poliitilised ja Seadusandlikud Olud / Unsettled Political and Regulatory Environment

7,3

Seletus: Seadusandlus on massiliste ümberkorralduste järgus. Valitseb ebakindlus selles, kuidas uued seadused organisatsioone mõjustavad. Infovajadused muutuvad pidevalt tehes uute süsteemide projekteerimise keeruliseks. Lahendamata poliitiline olukord lisab ebakindlust veelgi.

Rationale: Government laws and regulations are undergoing massive changes. There is great uncertainty as to how new legislation will impact organizations. Data requirements are changing constantly, making it difficult to plan new systems. The unsettled political situation adds to the uncertainty.

13. Puudused Koolituses / Educational Weaknesses of the Workforce

7,3

Seletus: Paljudel töötajatel puuduvad baasteadmised arvutustehnikast; seetõttu kujuneb vastuseis uuele tehnikale ja süsteemide rakendamise piiratus. Isegi väljaõppinud infotöötlaste spetsialistidel on puudujääke teadmistes. Õppeasutused peavad parandama oma infotöötlaste alaseid õppeprogramme.

Rationale: Many workers lack a basic familiarity with computers, resulting in resistance to new technologies and constraints on systems implementation. Even trained IS professionals have serious gaps in their knowledge. Schools and universities must improve the quality of their IS training programs.

14. Efektiivselt Kasutada Andmeressursse / Making Effective Use of the Data Resource

7,3

Seletus: Organisatsioonide andmeressursid kasvavad suuruses ja väärtuses ning muutuvad üha komplikseeritumaks. Ometi andmeressursid jäävad suurelt osalt allahinnatuteks, kättesaamatuteks ja vähekasutatavateks. Informatsioonisüsteemide osakond ning terve organisatsioon peab soodustama õhkkonda, mis väärtustab neid ressursse.

Rationale: The organization's data resource is growing in size, complexity, and value. Despite this, it remains largely unrecognized, inaccessible, and underutilized. IS must develop a climate within its department and throughout the organization which values the data resource as a corporate asset.

15. Soodustada Organisatsioonis Info- Tehnoloogia Õppimist ja Kasutamist / Facilitating Organizational Learning and Use of IS Technologies

7,3

Seletus: Need organisatsioonid, kes õigesti ja sobivalt kasutavad uusi informatsioonitehnoloogiaid, on kindlasti samad, kellel majandus hästi edeneb. Paljudes olukordades peame muutma bisnisi harjumusi, protsessi ja ka organisatsiooni struktuure. Informatsioonisüsteemide osakond peab näitama, et nad oskavad õppida ja kasutada uusi tehnoloogiaid.

Rationale: Organizations that prosper will be those that make use of appropriate new IS technologies in their entire operation. Business practices and organizational structures will need to be modified in many cases. IS also must demonstrate its own ability to learn and use new technology.

Grupi	Teie	Teie
keskmine	eelmine	lõplik
hinnang	hinnang	hinnang

Informatsioonitehnoloogia Probleemid ja Seletus

16. Informatsioonisüsteemide Töötajate Valik, Värbamine ja Väljaõpe / Specifying, Recruiting and Developing Human Resources for IS

7,2

Seletus: Praegune ja tuleviku puudujääk kvalifitseeritud informatsioonitöötajatest ähvardab kahandada informatsioonisüsteemi osakonna võimalusi organisatsiooni vajaduste täitmisel. Töötaja karjääri võimalusi tuleb selgitada. Üha enam rõhku peab panema bisnisi oskuste arendamisele.

Rationale: Current and future shortages of qualified information systems personnel threaten the IS department's ability to keep up with the needs of its parent organization. Career paths need to be clarified. More emphasis needs to be put on developing business skills.

17. Tarkvara Arendamise Kvaliteedi Parandamine / Improving the Quality of Software Development

7,0

Seletus: Realiseerimist ootavate tarkvararakenduste järjekord on liiga pikk. Kasutajate kannatus väheneb. Seda probleemi võimendab tööjõu kallinemine. Siit tulebki tarvidus tösta süsteemide valmistamise efektiivsust.

Rationale: The application development backlog remains at unacceptably high levels. Users are getting impatient. Add to this the increasing costs of human resources, and the need for improved effectiveness in systems development becomes clear.

18. Infosüsteemide Töötajate Suhtumise Muutmine / Changing the Attitudes of IS Employees

7,0

Seletus: Tuleb muuta töötajate suhtumist oma töösse, samuti arvutitesse ja infosüsteemidesse. Tuleks õhutada töötajaid oma initsiatiivi avaldama, loomingulist ja head tööd peaks väärtustama. Samuti peab muutma andmetöötluse negatiivseid stereotüüpe ja selgitama kaasaegsete infosüsteemide erinevust mineviku tsentraalse juhtimise ja planeerimise süsteemidest (AJS).

Rationale: The attitudes of workers towards their jobs, as well as towards computers and information systems needs to be changed. Employees should be encouraged to show initiative; creative and conscientious work should be rewarded. It is also necessary to change negative stereotypes about computing and to differentiate contemporary information systems from the central planning and control systems (AJS) of the past.

19. Parandada Informatsioonisüsteemide Strateegilist Planeerimist / Improving IS Strategic Planning

6,9

Seletus: Et organisatsioonides toimiks edukas majandus, on järjest tähtsam, et nad koordineeriks oma üldist strateegilist plaani ja informatsioonisüsteemide plaani. Praegusel ajal on eriti tarvilik strateegilise planeerimise oskusi parandada, sest bisnisi ümbruskond muutub kiiresti, arvuti kasutajad võtavad planeerimisest rohkem osa ja tehnoloogia areneb kiirenevalt.

Rationale: It is increasingly critical to an organization's success that it align its long-range IS plan with its strategic business plan. Rapidly changing business environments, increased involvement of end-users, and accelerated technological change underscore the need to continue improving strategic planning skills.

Grupi	Teie	Teie
keskmine	eelmine	lõplik
hinnaang	hinnaang	hinnaang

Informatsioonitehnoloogia Probleemid ja Seletus

20. Integreerida Andmetöötlus, Büroo Automatiseerimine, Telekommunikatsioonid ja Tootmise Automatiseerimine / Integrating Data Processing, Office Automation, Telecommunications and Factory Automation

6,7

Seletus: Praegusel ajal on võimalik integreerida erinevaid tehnoloogiasüsteeme. Vastavalt sellele, kuidas organisatsioonid katavad integreerida tehnoloogiasid, on tarvis lahendada ka nende organisatsioonilised probleemid.

Rationale: The capability now exists to integrate systems that are based on these diverse technologies. As organizations try to integrate their technologies, organizational and managerial problems will need to be solved.

21. Sobiva Riistvara ja Tarkvara Ressursside Kättesaamise Võimalused / Availability of Appropriate Hardware and Software Resources

6,6

Seletus: Praegu põle riistvara ja tarkvara pakkumine piisav. Selle tulemusel on ootamisajad pikad. Tihti peame vastu võtma neid tehnoloogiasid mis on saadaval, ja mitte neid mis täpsemalt tarvis oleks. See piirab organisatsioonide võimalusi oma sihtide saavutamisel.

Rationale: There is an insufficient supply of hardware and software products, often resulting in shortages and long waiting periods. Often it is necessary to settle for what is available, rather than what is most appropriate. Shortages of these technologies limit the ability of the organization to meet its goals.

22. Kergendada ja Juhtida Arvuti Kasutamist / Facilitating and Managing End-User Computing

6,6

Seletus: Laienev personaalarvutite kasutamine ennustab paremat produktiivsust, aga võib ka kaasa tuua kontrollivõimaluse puudumise. Informatsioonisüsteemide juhid peavad siis õigesti kaaluma lõppkasutajate vabadusvajadust ning kontrolli nende üle. Tähtis on ka lõppkasutajatele selgitada nende rolli.

Rationale: The proliferation of end-user computing through personal computers offers the promise of improved productivity but also the dangers of inadequate management control. Information systems management must balance control against the need for slack. Clarification of IS and end-user roles is a necessity.

23. Soodustada Arusaamist Infosüsteemide Rollist ja Panusest / Increasing Understanding of the Role and Contribution of IS

6,5

Seletus: Informatsioonisüsteemidele vaadatakse mõnikord et nad on ainult üldkulud. Tihti on vähe arusaadav, kuidas IS toetab organisatsiooni. Seetõttu võivad organisatsiooni juhid esitada võimatuid nõudmisi ja vähendada informatsioonisüsteemi osakonna fonde. Selle tagajärjel võib aga organisatsioon kaotada mitmeid häid võimalusi.

Rationale: IS is sometimes viewed as an overhead expense with little appreciation of its contribution to the organization. This can lead executive management to make infeasible demands and to cut funding resulting in missed opportunities for the organization.

Grupi	Teie	Teie
keskmine	eelmine	lõplik
hinnaang	hinnaang	hinnaang

Informatsioonitehnoloogia Probleemid ja Seletus

24. Viia Informatsioonisüsteemide Osakond Õigele Kohale Organisatsiooni Struktuuris / Aligning the IS Organization with that of the Enterprise

6,5

Seletus: Informatsioonisüsteemide osakonna efektiivsus organisatsiooni infovajaduste rahuldamisel oleneb informatsioonisüsteemi osakonna positsioonist organisatsioonis. Tihti juhtub, et informatsioonisüsteemi osakond ei ole organisatsiooni struktuuris õigel kohal.

Rationale: The effectiveness with which IS can support the enterprise's information needs is dependent on the IS department's position within the enterprise. Too often IS is not located appropriately within the organization.

25. Mõõta Informatsioonisüsteemide Efektiivsust ja Produktiivsust / Measuring IS Effectiveness and Productivity

6,5

Seletus: Et efektiivselt juhtida informatsioonisüsteemi osakonda, siis peame selle osakonna jõudlust mõõtma. See on tulevikus isegi veel tähtsam, kuna organisatsioonid hakkavad investeerima rohkem ja rohkem raha informatsioonisüsteemidesse.

Rationale: The measurement of IS performance is crucial to its effective management. This is becoming more important as organizations invest more and more money in information systems.

26. Informatsioonisüsteemide Kasutamine Konkurentsivõime Tõstmiseks / Using Information Systems for Competitive Advantage

6,3

Seletus: Vabas turumajanduses on paljud organisatsioonid pikaajaliselt eluvõimelised ainult siis, kui nad kasutavad informatsioonisüsteeme konkurentsi tõstmiseks. Tihti ei saa firma teisiti tegutseda. Konkurentsivõime kasu tuleneb uute võimaluste leidmisest loovuse ja innovatsiooni kaudu ning nende kiirest rakendamisest. See on tavaliselt informatsioonisüsteemi osakonna nõrk külg.

Rationale: In many businesses, long-term survival is dependent on using information systems to gain competitive advantage. The business can be lost without it. Competitive advantage results from recognition of opportunities through creativity and innovation, followed by rapid implementation. These are historical weaknesses of IS.

27. Büroo Automatiseerimise Projekteerimine, Realiseerimine ja Juhtimine / Planning, Implementation and Management of Office Automation

5,9

Seletus: Paljud organisatsioonid installeerivad praegu ametikoha automatiseerimise tehnoloogiaid, selleks et tõsta teenistujate produktiivsust. Informatsioonisüsteemide osakondadel on ka selles ülesandes tähtis roll mängida.

Rationale: Office automation is being implemented by many organizations to improve 'white collar' productivity. The IS department has a role to play in this process.

Grupi keskmine hinnang Teie eelmine hinnang Teie lõplik hinnang

Informatsioonitehnoloogia Probleemid ja Seletus

28. Infosüsteemide Spetsialistide Siirdumine Välismaale või Välisfirmade Teenistusse / Loss of Skilled IS Workers to Foreign Bidders

5,8

Seletus: Kui arvestada ümber "kõvasse" valuutasse, siis on infotöötajate palgad väikesed. Praegused vahetuskursid ei võimalda kohalikel firmadel võrdväärset töötasu maksta. See põhjustab paljude tippspetsialistide siirdumist välismaisele tööturule ning viimane omakorda oskustööjõu defitsiiti kohapeal.

Rationale: Local IS salaries are low once they are calculated in hard currency equivalents. Current exchange rates make it impossible for local firms to pay competitive salaries. This causes many top IS professionals to seek work abroad, or with foreign firms, resulting in domestic shortages of highly skilled people.

29. Saavutada Juurdepääs Infosüsteemide Alastele Teadmistele ning Asjatundlikule Konsultatsioonile / Obtaining Access to IS Knowledge and Advice

5,4

Seletus: Infosüsteemide-alane kirjandus pole arusaadavas keeles. On puudus ka konsultatsioonifirmadest, kellelt saaks küsida head nõu. Need põhjused muudavad infosüsteemide efektiivseks juhtimiseks vajaliku teabe hankimise tülikaks.

Rationale: Many useful IS books, manuals and articles are not available in familiar languages. There is also a lack of consulting firms who could provide good advice. These factors make it difficult to obtain the information necessary for effective IS management.

30. Infosüsteemide Tegevuse ja Edasiarenduse Seadusandlik Piiramine / Regulatory Constraints on IS Activities and Ambitions

4,3

Seletus: Lääneriigid veel reguleerivad ja piiravad mõninga tehnoloogia ekspordi. Sisereeglid piiravad organisatsioonide tehnoloogia ja majanduse püüdlusi. Need reguleerimise faktorid teevad informatsioonisüsteemide korraldamise keerulisemaks.

Rationale: Western countries still maintain some restrictions on the exportation of certain technologies. Domestic regulations limit the technological and business aspirations of firms. These regulatory factors complicate the task of IS management.

INFORMATSIION ANKEEDI TÄITJA KOHTA / BACKGROUND INFORMATION

Nimi / Name

Organisatsiooni Nimi /
Name of Organization

Kas Teie soovite koopia
uurimistöö tulemustest? /
Would you like a copy of the results?

Jah / Ei /
Yes No

Aitäh Teie vastuste eest!

Thank you for completing this survey!

**KÕIGE TÄHTSAMAD INFORMATSIOONISÜSTEEMIDE JUHTIMISE
PROBLEEMID, MURED JA KÜSIMUSED EESTIS**

KEY INFORMATION SYSTEMS MANAGEMENT ISSUES IN ESTONIA

Palun tehke oma hinnangutest koopia sellele lehele ning palun saatke see mulle otse Kanadasse.

Probleem	Teie Lõplik Hinnang	Probleem	Teie Lõplik Hinnang
1.	_____	16.	_____
2.	_____	17.	_____
3.	_____	18.	_____
4.	_____	19.	_____
5.	_____	20.	_____
6.	_____	21.	_____
7.	_____	22.	_____
8.	_____	23.	_____
9.	_____	24.	_____
10.	_____	25.	_____
11.	_____	26.	_____
12.	_____	27.	_____
13.	_____	28.	_____
14.	_____	29.	_____
15.	_____	30.	_____

INFORMATSIOON ANKEEDI TÄITJA KOHTA / BACKGROUND INFORMATION

Nimi / Name _____

Organisatsiooni Nimi /
Name of Organization _____

Kas Teie soovite koopia
uurimistöö tulemustest? / Jah / Ei /
Would you like a copy of the results? Yes No