New Technology for a New Nation: Building an Internet Culture in Estonia

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## Introduction

Most work in history of technology has focused on the industrialized countries of Europe and North America. The research I will describe today is one attempt to pay serious attention to the way an emerging democracy goes about adopting high-tech innovations. In particular, I will be looking at the development of the Internet in the Baltic state and former Soviet Republic of Estonia.

Such a study offers several contributions. It raises (and can begin to answer) the question of how patterns of technology adoption might differ between more- and less-developed nations. It can also help us gain a more complete understanding of the technology itself—rather than assuming, for instance, that the American experience of the Internet encompasses all that is significant about this technology. And it can illustrate some of the ways in which technology is linked to issues of national identity.

Let me preface with a brief overview of Estonia and the reasons I chose it as a case study. Estonia is the northernmost of the Baltic Sea nations. It shares a border with Russia to the east, with Latvia to the south, and is across the water from Sweden and Finland; the Estonian language is related to Finnish. Since the 16th century Estonia has mainly been ruled by foreign powers, including Sweden, Germany, and Russia. Estonia and the other Baltic states of Latvia and Lithuania declared their independence from Russia in 1918 and enjoyed about 22 years of home rule before the Soviet Union annexed them in 1940. Estonia regained its independence from the USSR in 1991 and established a new constitution in 1992 with a parliamentary democracy. It is now in the process of applying to join the European Union. The country has a population of about 1.4 million people; about 2/3 of these are ethnic Estonians and most of the rest are ethnic Russians.


**Fig 1. Map of Estonia**

Estonia currently occupies an intermediate position among the world's nations: it is not exactly a "developing" country, since it has strong industrial and service sectors, but it is a newly capitalist country that has undergone substantial economic upheaval and dislocation. Nor is democracy new to Estonia; Estonians are quick to point out that their independence has been restored, not gained for the first time; but this is the first democratic government in most Estonians' lifetimes, and the nation has had to create new institutions. Moreover, the Soviet regime was devastating for Estonia. Thousands of Estonians were sent to Siberia or fled the country; thriving economic sectors were wiped out and replaced by money-losing collective farms and factories; there was severe environmental damage; and of course the people suffered a loss of political freedom and contact with the outside world. While Estonia is in a better position, politically and economically, than most of the former Soviet Union, it has much catching up to do relative to western Europe and the United States.

One might expect, therefore, that when it came to a complex system like the Internet, the introduction of this technology to Estonia would be slow, or would simply copy foreign models. Instead, I discovered to my surprise, Estonia has been one of the more advanced and innovative Internet users among the world's nations. The number of computers connected to the Internet has risen rapidly since independence. [transparency: growth of Estonian Internet hosts.] By the end of 1997 Estonia had more Internet hosts per capita than France, Spain or Italy.[fn?] About 15% of the population are regular Internet users, with the number growing by 40% per year. And Estonia is a producer as well as a consumer of information, software, and services. Estonia provides a good case study, therefore, of an emerging nation that has taken an active role in acquiring a sophisticated technological system.

How did the Internet become established so quickly in this small and struggling country? Estonians did not simply import foreign technology or have it imposed from outside by colonial powers or multi-national corporations; they reached out and claimed this technology for their own purposes and molded it to their own values. I will outline the stages and actors in this process and the ways in which Estonia's particular geographical, historical, and cultural situation fostered this effort. I will also point out some significant differences in the way the Internet grew in Estonia compared with the better-known case of the United States. These differences may be part of a more general contrast between patterns of Internet adoption in developed and emerging countries.

**Building the Internet in Estonia**

I have divided the process of building an Internet infrastructure and culture in Estonia into four phases. Although this is a simplification, it helps clarify the different actors and goals involved at each stage.

*Phase I: University computer scientists*

For countries that have been isolated, to some extent, from the technology of the developed world, the first step in technology adoption must be to acquire an awareness of the new technology and its potential benefits. Before the 1990s there were virtually no computer networks in Estonia. The country was largely cut off from computing developments in the West, and even such basic items as modems were unavailable.

Networking information first filtered into Estonia through its academic computer scientists. Through attendance at computer conferences and the resulting contacts with Western colleagues, Estonian computer scientists not only learned about the Internet but were able to arrange the first network links between their country and the rest of the world.

Estonia's first network link to the non-Soviet world was set up in early 1990 by a computer scientist at the Tallinn Technical University, which had just obtained its first modems. The researcher set up an experimental dial-up connection with a colleague's computer at Helsinki Technical University; a second connection was set up later that year.[1?] The Finnish computer scientists at donated a modem to the Estonians and provided the initial know-how. These were not an Internet connections, however; they just allowed researchers in the two countries to exchange email.

The first real Internet connection was set up in 1992, soon after Estonia reasserted its independence. This time the Estonian researchers were aided by colleagues in Sweden. With independence, a growing number of Estonian scholars visited universities in Finland and Sweden, where they observed their foreign colleagues using the Internet and began to want access to the same technology. A pair of professors at the Tallinn Technical Institute obtained funding from the Swedish Academy of Science and George Soros Foundation to pay for two satellite Internet links: one between Tallinn and the Royal Institute of Technology in Stockholm and a second from the Institute of Cybernetics in Tartu to Helsinki. These provided the first high-speed, continuous Internet connections.[2?]

Estonians quickly realized that they could also use these international satellite links to improvise a connection between their two university towns. Thus a researcher at Tartu University could send data from Tartu to Helsinki to Stockholm to Tallinn—a roundabout route, but it provided the first Internet connection within Estonia. In 1994 the computer group at Tartu decided to use the two satellite links as the basis for a national education network, called EENET. They began by setting up a direct link from Tartu to Tallinn; then they built local-area networks in each city to extend network access to other research and educational institutions. Once Estonians had Internet access it was not long before they learned about the World Wide Web; in 1993 the first Estonian Web server was set up at Tartu University.[fn?]

This first phase created both external and internal Internet links, though only for the research community. This technology transfer between scientific peers meant that the recipients very quickly built up the knowledge and experience they needed to run the system themselves, rather than continuing to depend on outside experts.[3] It also encouraged local control of the technology, since the foreign academics who were assisting with the technology had no economic or political incentive to try to maintain control over it.

*Phase II: Non-governmental organizations*

Non-governmental organizations have played an extremely important role in hastening the use of the Internet in Estonia. This is one of the most obvious ways in which emerging and established industrialized nations are likely to differ.

Probably the most important player has been the George Soros Foundation. The Soros

Foundation funds a number of organizations that are intended to promote "open societies" around the world. One of these is the Open Estonia Foundation, which provides funds to create Estonian-oriented Web content and to train the public in the use of the Internet. The Soros Foundation has also helped finance some Internet infrastructure (as with the satellite links to Sweden mentioned earlier). The Open Estonia Foundation helped fund the first web servers that offered information about Estonia to the outside world. These sites included facts about Estonia's history and natural environment, news, and tourist information, offered in both English and Estonian.

The United Nations Development Program has been particularly helpful in spreading Internet access to the more remote and underdeveloped parts of Estonia. It would be inaccurate to describe Estonia as a whole as a "developing country," but certain regions were left in an economically disastrous state after years of Soviet mismanagement. In particular, some parts of the countryside are depopulated and economically depressed. One of these areas is the island of Hiiumaa, off the west coast. The Estonian islands suffered greatly under Soviet rule. Independent fishermen and farmers were forced to give up their traditional and profitable occupations and work on loss-making collective farms and fisheries. In addition, to maintain security at Soviet naval bases, the islands were virtually cut off from the rest of Estonia.

To help revive the local economy, the UNDP's local Estonian representative, Linnar Viik, arranged to fund the establishment of public Internet access points around the island. These provide free computer and Internet services, with the aim of enabling local people to learn about economic opportunities, use the Internet to promote their businesses, and gain marketable computer skills. As a result, this remote and sparsely-populated island became one of the best-served areas of Estonia: Hiiumaa has 5 public Internet access points for a population of under 12,000. This contrasts with the United States, where, outside the universities, the market has generally determined who gets access to the Internet.


**Fig 2: Approach to Internet cafe in Sõru**

This Internet access point, located in a cafe in the port village of Sõru, was set up with funding from the UNDP. It is run by a housewife who manages the computer room as a hobby. About two dozen people per day come to use the computers. They are mainly kids, but there are also a number of old people who use the Internet to keep in touch with friends who fled abroad during the Soviet occupation. These older people have learned that the Internet is the least expensive means of international communication, and their lack of experience with computers does not deter them: often they get someone else (such as a grandchild) to type in their letters for them. Having a public computer center does not just save money; it also means that novice users can get assistance and makes the experience of using the Internet a more social one.


**Fig 3. Inside Sõru Internet cafe**

Another public Internet access point is located in a farmhouse on a remote part of the island called Paope. One room of the farmhouse has long been used as a public reading room, stocked with extra books donated by the government offices at Kurdla. This gave the local farmers and fishermen easier access to information, since Kurdla is far away and cars are scarce. The Internet access point simply updated an institution that was already in place to meet local needs. While the couple who own the farmhouse spend their time running the farm, the grandmother and grandson run the computer room.

**Fig 4: Farmhouse Internet access point, Paope**

In general, the public Internet access points on Hiiumaa reach populations that would otherwise not have access to this technology; they position the Internet within the context of familiar activities; and they link generations: kids who have computer skills and unemployed older people who have time on their hands.

*Phase III: Private sector*

Private sector involvement in Internet services came after non-profit university and aid agency efforts, but has been important in spread Internet access beyond the initial group of experts. The entrepreneurial spirit seems remarkably strong in Estonia. Estonians offer various explanations for this: they note that Estonia was the most liberalized part of the USSR, and they refer to its experience as an independent nation earlier in the century. Some even attributed the Estonian's readiness to engage in commerce to the country's cultural heritage from its days as a member of the Hanseatic League! Whatever the factors predisposing Estonians to business, the end of Communism added the spur of necessity. When the big, unprofitable Soviet-era companies folded, many skilled engineers and technicians lost their jobs; with few companies hiring workers, these people had little option but to start their own businesses.

Small enterprises mushroomed in the immediate aftermath of independence, including over 250 computer start-ups.[4] These companies began by reselling imported computers or assembling computers using imported parts, but they quickly sought out licenses from companies like Intel and Microsoft that would put them on the same footing as companies like Dell or Compaq. With their local knowledge and skilled workforce, Estonian computer companies have captured 80% of the local market.[5] Competition has helped keep prices for computers fairly low, which has

been one factor encouraging the spread of the Internet. On the software side, the Institute of Cybernetics has developed and spun off to the software companies Internet products such as encryption software and network firewalls that are now being exported from Estonia.[6]

Another example of private-sector innovation is banks. Commercial banks have been quick to adopt modern IT systems. Again, Estonia's position as an emerging economy has actually been an advantage here, since the banks have been able to start out with the most recent technology.[7?] Regional ties have also been important: many commercial banks in Estonia are partially owned by Swedish banks, and the parent banks have transferred their data communications techniques to the Estonian banks.[8?] In addition to the usual ATM and credit card services, Estonian banks began offering Internet banking in the spring of 1996. Today an astonishing one-third of Estonian Internet users conduct their banking online on a regular basis. Banks market their Internet services aggressively, and the Estonian people—who had never even used ATM machines until a few years ago—seem quite ready to try online banking.

Internet service providers (ISPs) provide the link between computer owners and the Internet. The first commercial ISPs were spin-offs from the nonprofit research network. In order to recover their costs for the EENET service, the research institutes would charge their users for network use, essentially reselling the Internet service. Some of these operations got so large that the academic institution would spin off its network service as a separate commercial network.[fn?] Currently there are four large Internet as well as many small ISPs that Internet service to their local area. Having succeeded in this highly competitive home market, some Estonian ISPs are now planning to expand their operations to other European countries and even the United States.[9?]

Most Estonians do not have Internet access at home. For them, an important commercial service is Internet cafes and other commercial Internet access points.

**Fig 5. Kohvik Virtuaal, Tartu**

This is the Kohvik Virtuaal (Virtual Cafe), a commercial Internet access site that opened in the university city of Tartu in December 1998. The owner, Mikhail Tsibern□i, is in the electronics business. He thought an Internet cafe would be a good opportunity because there are no public Internet access points in Tartu, and because "the Internet is the future." His enthusiasm for the technology is reflected in the elaborate decor of the cafe.

**Fig 6. Pärnu beach**

My last example comes from the resort town of Pärnu. It was set up in the summer of 1999 by two young men who own a small company called Arvuti Salong (Computer Salon). No one had ever heard of using the Internet on the beach, but they thought, "Why not?"


**Fig. 7. Internet and beer tent, Pärnu beach**

The tent has a steady clientele of young boys playing games or vacationing college students catching up on their email. This unconventional Internet site is typical of the Estonians' small-scale entrepreneurship as well as their widely held—and apparently justified—belief that the Estonian public is ready and eager to patronize such services.

*Phase IV: Government*

My story ends where the Internet itself began: with the national government. When the Internet was first created in the United States, the federal government (first the military and then NSF) funded and designed the network. But now that the system has been privatized and commercialized, the U.S. government has had relatively little part in shaping its content and use. In Estonia, the opposite has been true. The government had very little part in the beginnings of the Internet in Estonia—indeed, in the turbulent early 1990s, when the government was shifting from Soviet to Estonian control, it was in no position to play any such role! On the other hand, once the Internet was established in Estonia, the national government assumed a significant role in providing access and as well as content and services. These contrasting patterns reflect not only the different resources available in the United States and Estonia but also different objectives: in the United States the goals behind the Internet effort were primarily military and scientific, while in Estonia they have been social and political.

In terms of encouraging Internet infrastructure, the national government's most important act has been to rapidly move the country to a free-market economy. In 1987, while still under Soviet rule, the Estonian government opened up its economy and set out guidelines for people wishing to start their own companies, in an effort to encourage private enterprise and prepare for eventual independence.[fn?] These efforts accelerated after independence. But the most significant government efforts have been in providing content and in articulating policies and principles for Internet use in Estonia.

In 1998 the Estonian Parliament approved a document called "Principles of Estonian Information Policy," which describes "shared societal values that serve as a basis to make public policy decisions in supporting the rise of the information society."[10] These values include: "promot[ing] . . . democracy," "support[ing] the development of Estonian culture and language," and equality; the Principles note that "it is possible and advisable to avoid the creation of 'information haves' and 'information have-nots' [among] social groups and regions."[12] All Estonians should have "[e]qual and affordable access" to high quality communication facilities and achieve "electronic literacy."[13]

How has the Estonian government put the principles of universal access and computer literacy into action? One is public Internet access points. The national government has taken up the process begun by the NGOs of setting up free public Internet sites around the country. These are typically located in public libraries or community centers.

A second major initiative is in education. In 1997 the Ministry of Education launched a program to upgrade the nation's school system, using a combination of national and local investment. The program was called "Tiger Leap"; the name referred to the so-called Asian Tigers with their fast-growing economies, and was meant to imply that Estonia was poised to become the next "tiger." A key feature of Tiger Leap was a commitment to connect every school in Estonia to the Internet. This goal has now been achieved, with Tiger Leap currently giving support to about 720 primary and secondary schools. This includes about 100 schools that serve the Russian-speaking minority in Estonia, who are the furthest behind in computer skills. Tiger Leap funds computer purchases, trains school teachers in computer skills, and sponsors the design of educational software packages. As a result of these efforts, the generation of Estonians now in school will be

100% computer literate.[14]

An outgrowth of Tiger Leap has been an annual event called Tiger Tour, also known as the "Tiger Leap Roadshow." Tiger Tour combines government and private-sector sponsorship; it was organized by Linnar Viik, who had worked with UNDP to set up the first public Internet access points on Hiiumaa. The tour travels from one small town to another; the organizers erect a big tent in the middle of the town square, set up a hundred or so computers connected to the Internet, and invite the local residents to use the computers, set up free email accounts, and attend talks and seminars on how to take advantage of this technology in their business or personal life. The next day they move on to another town. Each year thousands of Estonians get their first Internet experience during the Tiger Tour. The aim is to reach Estonians who have not had a chance to use computers in school or at work, especially older Estonians who may feel left behind by the rapid technological change since independence. "There must be no lost generations," says Viik.

Finally, the government has been swift and thorough in providing information and services to Estonian citizens. The Principles require State bodies to provide public information "without delay"; with no charge other than "the direct costs of its duplication"; on an equal basis to anyone seeking it; and in a format that is "easy to comprehend."[15] Currently, every national ministry and regional government, as well as the President of Estonia, has a web site. For the national government these sites are organized under a single web page (www.gov.ee) for easy access. Every Estonian law is available on the Internet; every Estonian court decision is available on the Internet; all government forms and documents are being put online. Estonians can do property title searches on the Internet; they can register their cars on the Internet; they can pay their taxes on the Internet. One of the innovations where Estonia is ahead of most Western countries is in implementing legally binding digital signatures, which could be used for both government services and private business.[16]

In pursuing its information policy, the government has sought a middle way between capitalism and socialism. In fact, the Parliament sees Estonia's status as an emerging nation as an opportunity: the Principles state that "Estonia must utilise its special situation as a transitional society" to maintain valued social functions of government while encouraging private enterprise.[17] There is a clear sense that Estonia will mold this technology to suit its own cultural norms, rather than simply repeating what has been done in the West.

**Conclusions**

In addition to explaining Estonia's surprisingly fast adoption of the Internet, this study contributes to a number of broader concerns.

*Technology adoption in emerging nations*

As a model for how emerging nations take up new technologies, the Estonian case suggests some of the factors that favor rapid adoption. These include: having a critical mass of technically educated people and giving them the opportunity to learn from their peers in developed countries; forming partnerships with neighboring countries that already have the technology; getting aid in setting up the initial infrastructure; encouraging small private enterprise; and

formulating explicit policies for shaping the technology to local needs and values. While Estonia is not necessarily typical of all emerging nations, it provides a concrete example to start with and a basis for comparison with other case studies.

*Technology and national identity*

One of the most fascinating aspects of this research has been observing how Estonians have enlisted the Internet as part of their effort to construct a national identity. All national identities are, of course, constructs, but this most vividly evident in a country that has undergone dramatic political upheaval. The Estonians' recent past (under Soviet domination) is not one that they wish to celebrate, and thus they have been looking further back in their long history to find a usable past for their nation-building project. One can see this process in the way they talk about the Internet, and especially in the ways they account for Estonia's rapid embrace of this new technology.

Estonians see the Internet as both a sign of their unique national strengths and a means to preserve them. Estonians interpret their current success with the Internet as a continuation and confirmation of valued cultural traditions. For example, they compare the Internet access points to the public libraries that were built in every town as part of the 19th century nationalist movement; they refer to the Hanseatic League when explaining Estonian entrepreneurship; they point to a tradition of technological enthusiasm by referring to how 19th century Hiiumaa fishermen adopted new types of sailboats. Estonians are also using information policy as an instrument of social policy: to bolster democracy, to preserve the Estonian language, to prevent extreme economic disparities that might foster class and ethnic tensions, and to strengthen ties with Europe and West.

At the same time, the Estonian case shows how fluid the distinction between the nation-state as an actor and the external world can be. In adopting the Internet Estonia has engaged in a set of broader alliances and taken on different identities—whether Baltic, Nordic, European, or trans-Atlantic. At the same time, many actors have been operating through organizations or communities that crossed national borders, such as academic computer scientists or international aid agencies. These different overlapping identities bring both opportunities and constraints to the process of technology adoption.

*Understanding the technology*

Comparative studies can give us a better perspective on the technology itself and its essential attributes. For example, there has been much debate over the contention that Internet is inherently democratic: that it tends to undermine authoritarian governments, decentralize authority, and empower the individual. As a test case, the Estonian situation sheds some light on this question. The answer we find is: Yes, the Internet can be a force for democracy, equality, and personal empowerment—but only if there is conscious planning and a lot of hard work on the part of many people who are committed to those goals. Neither technology nor market forces can be expected to achieve social justice without explicit and shared social goals. Further case studies can provide a valuable check on the often careless generalizations made about the Internet and other technologies.

**Notes/References**

1. Anne Villems email; Mait M□□rsepp interview.

2. Mait M□□rsepp interview. This is reminiscent of the way MIT researchers used the early ARPANET to connect local MIT computers.

3. Estonian computer scientists were accustomed to having to figure out complicated computer systems without much documentation, since under Soviet rule they had relied largely on bootleg copies of software.

4. Estonian Information Technology Compass [1998], 6.

5. Estonian Information Technology Compass [1998], 7

6. Estonian Information Technology Compass [1998], 10

7. Aimur Liiva interview

8. Mait M□□rsepp interview

9. Jan Douma interview

10. Eesti Informaatikakeskus (Principles of Estonian Information Policy), I.3

11. Eesti Informaatikakeskus (Principles of Estonian Information Policy), III.9

12. Eesti Informaatikakeskus (Principles of Estonian Information Policy), III.11

13. Eesti Informaatikakeskus (Principles of Estonian Information Policy), V.19.2.1, VI.23.

14. Aimur Liiva interview

15. Eesti Informaatikakeskus (Principles of Estonian Information Policy), VII.25-27

16. Baltic IT Review. January-March 1999, 56

17. Eesti Informaatikakeskus (Principles of Estonian Information Policy), V.19.1.1