ICT CLUSTER FINLAND REVIEW 2003

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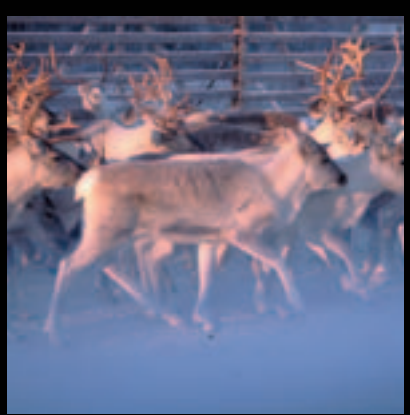

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[editorial]

Finnish Information Society – Still Going Strong

During the last few years Finland has made exceptionally well in numerous evaluations assessing Information Society development. According to the latest World Economic Forum's Global Competitiveness Report 2002–2003 Finland emerged as the number one nation in the world in networking as well as in IT use. Our basic infrastructure is of top quality, and citizens' access to networks and information services is outstanding. Furthermore, businesses and the public administration use ICT applications in a steadily increasing variety of operations. However, there are certain challenges as well. Though we are a top country in ICT, we have, as of yet, not gained full advantage of information technology use, rather concentrating in ICT production. During the last decade Finland developed into one of the top ICT manufacturers and exporters in the world. This has had a significant impact on the economy and the raising our competitive abilities from the early 1990's recession years.

There are numerous reasons behind Finland's high ranking in Information Society development. Open and numerous Public-Private-Partnerships, characteristic for Finland, enable the common use of limited resources and the formation of joint ventures. Other reasons are open telecommunications competition and the high quality educational system. It pays to remember also the Finns' basic nature with inborn interest in technology throughout history.

The well-being of all citizens is valued high in Finland. This characteristic reaches also to ICT field and the use of its applications. Thus, in our Information Society regional and socio-economic differences are practically nonexistent.

TIEKE Finnish Information Society Development Centre serves as the promoter of Finnish well-being in Information Society development. TIEKE creates networks among businesses and the public administration which, in turn, serve in Information Society development with the citizens and their needs as the starting point, by supporting business activities, developing public sector services, and by creating international liaisons in the constantly globalizing world. Public-Private-Partnerships have made also this very publication possible.

ICT Cluster Finland Review 2003 presents ICT field from both societal and business angles. A society based on information and knowledge needs human centered services. The prerequisite for their creation is research and development, product and content development, common agreements, and networking ability. All this we can offer and bring to the attention of the world.

Aatto J. Repo
Managing Director
TIEKE

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TIEKE Finnish Information Society Development Centre has a key networking role as a neutral and non-profit organisation in promoting the efforts of its members, within the public and private sectors alike, with an ultimate goal to create viable tools and expertise for use in the information society.

Oili Salminen
TIEKE

ICT in Finland

Finland is one of the world's most competitive economies and most technologically developed welfare and information societies. It is also a country currently specialized in the development and production of ICT products and services.

Photo Futureimagebank

Despite the globally experienced bankruptcies of dotcoms and collapsed stockmarket values of ICT companies, so far Finland has held her own in international comparison. Technological development progress and the deployment of ICT enabled methods adherent in the new economy advance steadily. Information and communications technologies (ICTs) are clearly paving the way towards the third industrial revolution. Consequences of this revolution have, and will be, particularly pronounced in Finland.

This situation has been achieved in a relatively short time as, during the 1990s Finland went from being one of the least ICT-specialized industrialized nations to become the most specialized one.

Public and Private Sectors Work Together

Some basic and far reaching features within the Finnish ICT sector are easily pinpointed: solid technological infrastructure, open competition, widely shared common vision and co-operation in the development of ICT and information society, government's active role, technology-oriented citizens with high quality education and top caliber skills, and knowledge-based technology centres, e.g. Helsinki metropolitan area and cities like Tampere, Oulu, and Jyväskylä, all promoting intense networking activities.

In the Finnish model for Information Society, the role of the government and one of the welfare state have been given considerable emphasis to guarantee the development of favorable atmosphere through infrastructure, legislation, and accessibility for all.

Interoperability – intense and broad interorganizational co-operation both within the industry as well as with other industries and the research sector – and neutral forums for promoting information society development have been key factors in Finland. These Public-Private-Partnership promotions have deepened the development enabling the work to be carried out on every societal level: individuals, localities, cities, nations, Europe, and globally.

Productivity Increased Through Hi-Tech

As far as competitive ability, Finland is a leading country within EU (World Economic Forum 2002).

Finnish ICT Evolution Path

Coexistence of both private and public telecom markets (since 1910s)

1917 INDEPENCE

Open markets to foreign suppliers

Radiotechnology expertising starts (1920s)

Over 800 private operators in Finland in the 1930s

1886
The Imperial Telephony Decree

A state telecom operator established

	IMD Total competitiveness			WEF Growth ability index			WEF Competitiveness corresponding to the time of evaluation		
	2000	2001	2002	2000	2001	2002	2000	2001	2002
USA	1	1	1	1	2	1	2	2	1
Finland	4	3	2	6	1	2	1	1	2
Singapore	2	2	5	2	4	4	9	10	9
Netherlands	3	5	4	4	8	15	4	3	7
Sweden	14	8	11	13	9	5	7	6	6
Canada	8	9	8	7	3	8	11	11	10
Hong Kong	12	6	9	8	13	17	16	18	19
Ireland	5	7	10	5	11	24	22	22	20
Switzerland	7	10	7	10	15	6	5	5	5
Germany	11	12	15	15	17	14	3	4	4

In addition to the above please note that in the year 2001 UNDP index (Human Development Index) Finland was the first nation, as also in sustainable development index by WEF in 2001.
WEF World Economy Forum
IMD International Institute for Management Development

Table 1.
The placement of national economies regarding certain competitive factors years 2000, 2001 and 2002.

Source: Memorandum of the Committee for the Future, The Finnish Parliament

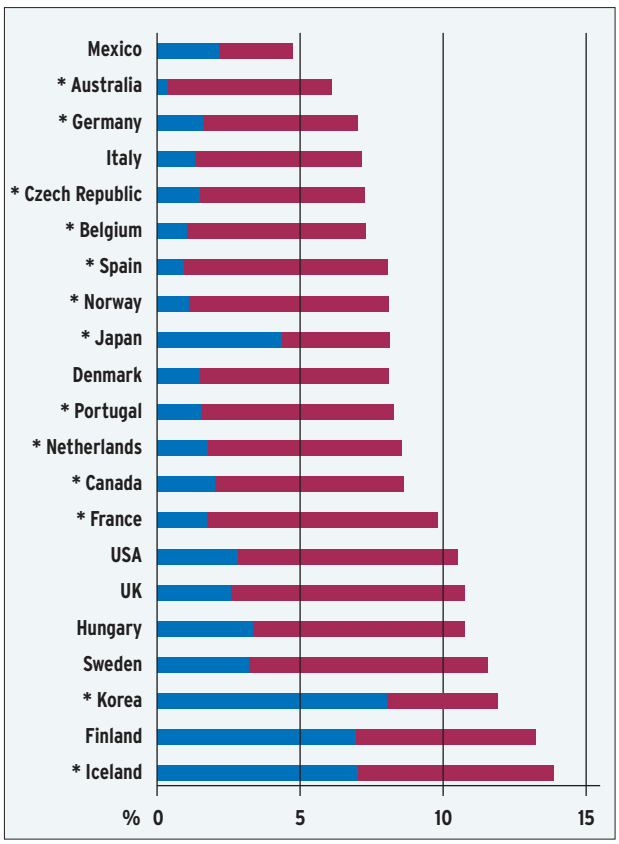

Figure 1.
Share of ICT value added in business sector value added, 1999.

Source: OECD, STI Scoreboard 2001

*not fully comparable

ICT goods production

ICT service production

High technology exports have tripled in five years; in industrial productivity Finland has caught up with the United States, which sets the standard for the rest of the world. More than half the growth in productivity is explained through high technology.

Approximately 10 per cent of the Finnish GNP already comes from the fields of information and communications technologies. In the future, the role of those technologies will increase significantly, as they are likely to develop faster than other fields. The overall productivity has increased since 1992 annually by 15 per cent, and in electro-technical and telecommunications fields 25 per cent. (ETLA)

Furthermore, the ICT sector employs in Finland a larger portion of the total labour force than in any other country, especially in the development and manufacture of services provided by the field. The productivity of the Finnish industry is excellent in electronics, as well as in several major fields of our traditional industry, like the forest industry within which ICT has enabled a wide-scale transition from traditional process industry operational models to technology driven expert organizations generating added value.

The productivity in services, however, including public services, is not equally high. One reason for that is that the application of ICT in services is not yet adequately realized. Finland has implemented several trials and pilot projects which, after the pilot stages, have not been utilized to their fullest nor have they been commercialized efficiently.

R&D Investments Are High

Investment in research and development has increased strongly in Finland for almost 20 years, and investments in R&D by companies in Finland are among the highest in the world. Though the growth rate has somewhat slowed down from the peak years, the R&D investments and the number of research and development experts are clearly on the increase.

The metal and electronics industry is, by far, the biggest investor in R&D. It is responsible for more than 80 per cent of all the research and development investment in Finland. In 2001 it spent over 4 billion euros on R&D.

The best way to encourage more innovation and

Welfare society idea (since 1960s)

Information technology emphasized in the 1980s, The Science and Technology Council of Finland established 1986

Between 1988 and 1994 the liberalisation of telecom competition

Competing licences granted for third-generation mobile networks 1999

Origin of "networked" Nokia 1980s

A global boom in demand for mobile phones (1990s) – Nokia grows

Mobile Internet

Nordic Mobile Telephone (NMT) standards and markets (1970s)

1987 Telecommunications Act

1990 GSM licences, first GSM networks opened 1991

1997 Telecommunications Market Act

2000–2001 Communications Market Act

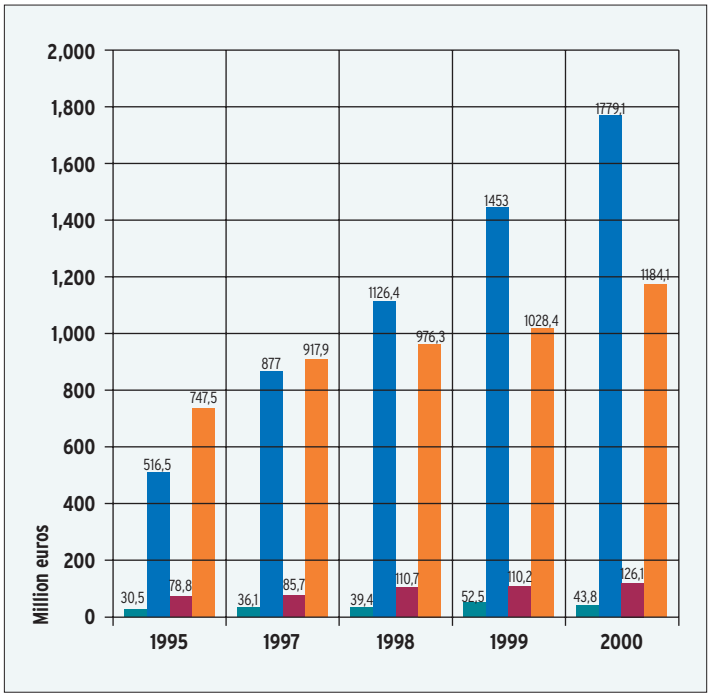

Figure2. R&D expenditure in the ICT sector and the other branches and public financing for both of them in 1995–2000, million euros.

Source: Statistics Finland, R&D statistics.

- Public financing for the ICT sector
- R&D expenditure in the ICT sector
- Public financing for other branches
- R&D expenditure in other branches

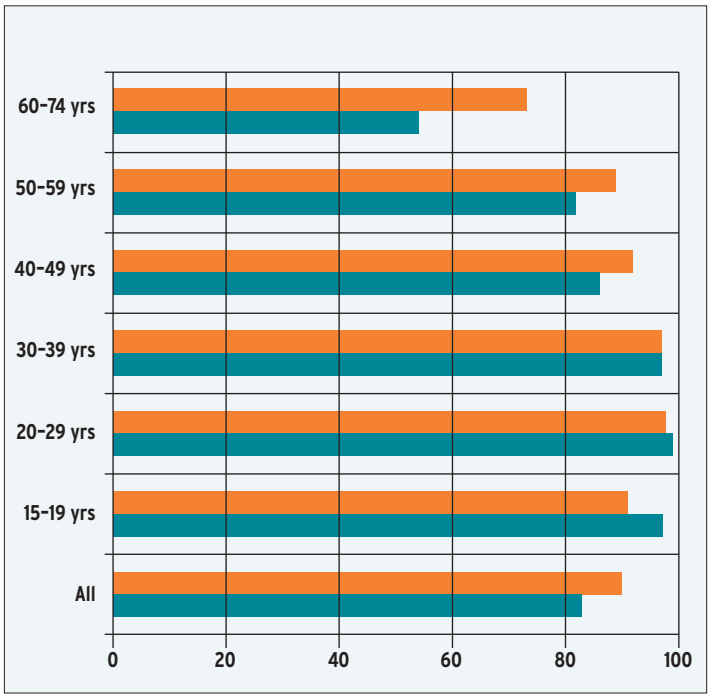

Figure 3. Mobile phone in own use by gender and age in spring 2002 (%).

Source: Statistics Finland, Net Commerce Survey.

- Men
- Women

competitiveness has proven to be the creation of framework for uninhibited interaction between ICT and other operators, both private and public.

People Innovate

The Finnish identity has developed during centuries, even milleniums, and could be considered some kind of a survival game. Being that Finland has been an independent nation only for three generations of lifetime, the national identity was preserved only through innovative measures to adapt to prevailing circumstances.

These traits are recognizable even now. Finns adapted to telecommunications and information devices without hesitation. Social acceptance to new technology developed fast. Finns take new innovations rapidly in use and find new ways to use them – one excellent example of this is the use of text messaging that grew beyond any expectations. One of the important enabling factors for this is country's high quality education – Finns have the skills to use technology.

Today there are more personal mobile phones per capita in Finland than in any other country in the world, and ICT use in places of work, in global comparison, is top level. The availability and use of information society technologies and services is widespread and geographically evenly distributed.

The degree of penetration of information technology to civil society is a crucial factor in gaining full benefits of it. Although Finns are heavy users of mobile phones, the Internet connections from homes still are not that common (about 40 % of house holds). This explains partly why B-to-C commerce has not really taken off. The access to the Internet tends to divide the population. Students and people employed have easy access to the net in schools and in working places. Older and unemployed people, however, do not have that (regardless of the fact that the net is available in public libraries, Internet cafes, etc). In these groups also the skills needed to use the Internet are lacking. In this, however, Finland is not alone, every country has similar problems.

About 140 operators in Finland

2003 Renewed communications Market Act with related clauses into force in July 2003

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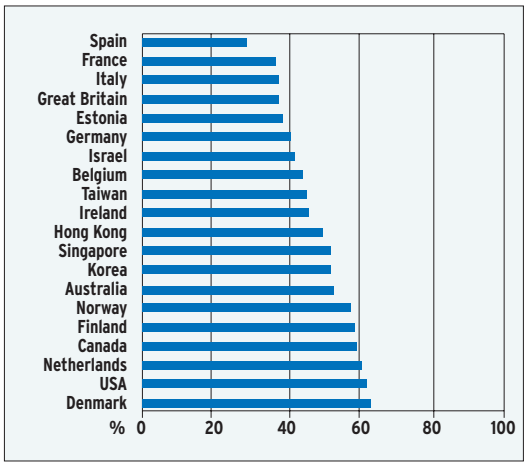


Figure 4. Percentage of the population who have personally used the Internet during the past month according to Taylor Nelson Sofres Interactive 2002.

Source: Global eCommerce Report 2002, Taylor Nelson Sofres Interactive 2002

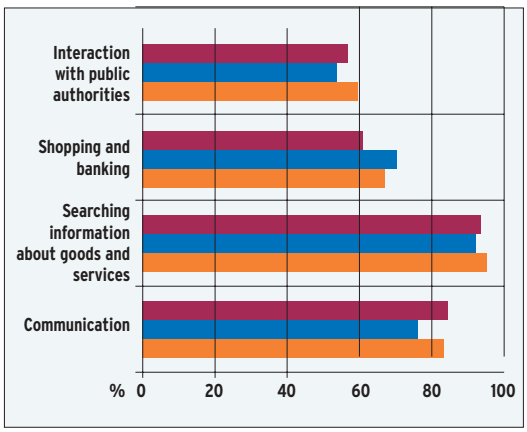


Figure 5 Personal uses of the Internet in Finland, Sweden, Denmark in spring 2002, per cent of Internet users aged 16–74.

Source: National Statistical Institutes in the Nordic Countries

Future Paths and Challenges

ICT infrastructure in Finland is one of the world's best. Challenge now is to rise the level of ICT use and the benefits to be derived from it. The most digital fields in Finland are the financial sector and communications. Services, on the other hand, trail behind. In the near future information and communications technologies will become a more concrete part of every day life.

Competitive information society needs a full range of services directed to both citizens as well as to companies. In this, the development of public sector services is a key element. A well organized information society supports general wellbeing by taking full advantage of what information technology can offer.

Technical Research Centre of Finland VTT has created a roadmap on information and communications technologies that covers the period of the next ten years. The most important communications technology areas for Finland are smart human environments, interoperability, and mobility in future networks, micromechanical radio frequency systems, and service architectures.

Participation in European research projects is of vital importance. The designs of future ambient systems – IT systems intimately integrated with everyday environments and supporting people in their activities – are likely to be quite different from those of current computer systems. Until today, Finnish scientists have contributed to Eureka projects in this field, and the topic of Ambient Intelligence is now a part of IST programme in the 6th Framework Programme.

A huge challenge for Finland is to learn to apply information technology in the service sector in areas like retailing and health care. This is especially important in public services due to the increasing pressure for cost-efficiency to lessen the tax burden.

From the point of view of the Finnish ICT cluster one key question is, how will the wireless culture and new third-generation technology at large evolve.

Businesses will benefit from closer networking and through better awareness of co-operational methods and partnerships in digital processes.

Digital Information Society – the best is yet to come?

Transitions from an industrial society through an information society to a society of knowledge, understanding, and wisdom pose major challenges for both individuals and communities. Desired results can only be achieved through determined hard work and clear vision of aims. It is the society's responsibility to create favourable preconditions and an inspiring atmosphere for the required change to take place. Each and everyone must build a strong personal educational base for lifelong learning.

The Finnish Road to Success

In Finland, at least, the general societal view is that national parliaments should generate preconditions for efficient, innovative activities by citizens and communities, and show examples of such activities in their own work, with the overall purpose being to improve the quality of life. Already in the beginning of 1980's major actions took place in Finland, implemented jointly by the public and private sectors in order to significantly increase R&D investments and research activities and, in so doing, to buttress technological know-how. As it was clear that the recovery from the 1990's recession was not to be achieved through traditional means, the recognized solution was to increase the over all know-how and investments in research and development.

Finland's Success Relies on Citizens' Skills

In accordance with the Finnish Government's Futures Report from 1998, the citizens' competence, their skills, and expertise are the only basis for Finland's success. In particular, the Government defined the following three policies:

1. Steady increase of resources available for research and development from the year 2000 on. At the same time, efforts to increase the returns from such investment.

2. Lead the transition to an information society, seeking a role in the European Union as an "information society laboratory". Use the information society as a tool for increasing Finland's human and social capital.

3. Introduce a system of lifelong learning encouraging skill enhancement and mobility during the entire individual life cycle. In business policy, emphasize quality, education, management skills, and personal development.

It is extremely important that these policies were also approved by the Parliament, as consolidated in the Committee for the Future's memorandum. In addition to these three national strategies, our national innovation system deserves to be highlighted as the fourth policy. Since the 1980s, Finland has taken determined efforts, through collaboration between the public and private sectors, to develop a national innovation system. This system is an intellectually and materially solid, versatile action environment that encourages the creation of new knowledge.

In the beginning of the new millennium the government and the Parliament have adopted these strategies as formal paths towards high caliber know-how Finland. In January 2003 the Parliament approved the Finland 2015 Report. Among the strategies presented in it perhaps the most interesting one is the one stating the keen interest to develop Finland into a global forerunner in innovativeness and education.

Human capital has extremely close connections with social capital, due to the fact that learning is a highly communal event and joint process, in addition to its strongly individual aspects. Social capital is generated by an intellectual culture, for which the action environment creates the prerequisites for birth and development. Essential components of social capital include networks, work processes, atmospheres, shared values and work methods, trust, and the capacity to think and interact with other people.

The profile of a knowledge professional consists of knowledge, expertise, and wisdom. With a steadily growing amount of knowledge-intensive work in a working community, an individual will have an increasing responsibility regarding his or her own competence.

New technology has a major impact on the volume of knowledge, and on its processing methods. According to experts, the increasing extent of change and the possibilities for action provided for people, plus global activities, will impose increasing requirements on technological development and its exploitation. This will increase the pressure for learning and for developing co-operational cultures.

Favourable Environment Generates Innovation

Innovativeness generates innovativeness – but only in a trustworthy and trusting growth environment. To be reliable, one must rely on others. It is only in a trusting working community, which equally appreciates various knowledge contributions by different employees, that the entire available competence capacity can be successfully exploited and increased.

Asking and questioning are equally important in the future work culture. New methods must be developed for leadership, practical lifelong learning, networking, and co-operation between the public and private sectors. People can no longer be guided using the methods of an industrialised society.

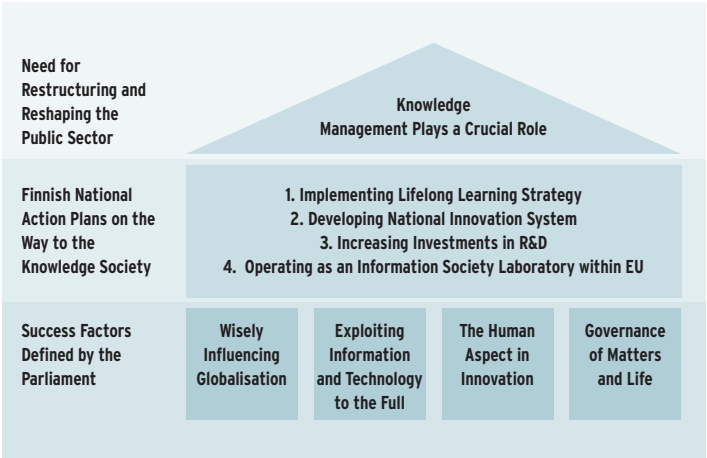
Politicians must also modernise their work methods and become aware of the underlying values in their activities, as well as the enormous possibilities that innovations and knowledge management offer. These factors were strongly emphasized during the first UNESCO Round Table on Science, Technology, and Innovation Policy, held in Helsinki in January 2003.

In terms of regional politics, various centres of excellence i.e. innovative environments, will be significant factors in a knowledge society for wealth creation both locally and nationally. Learning regions of this type will have the best prerequisites for success in a changing world. In an innovative environment, working relationships are often networks and networks "emerge" from the environment. Centres

Markku Markkula
The Chairman of TIEKE

Fundamental Factors for the Knowledge-Based Economy

1. Creativity and innovativeness are the driving forces.
2. Effective networking is a way of life in creating a shared knowledge reality among both individuals and organizations.
3. Increasing intellectual capital is the most important value base of work organizations.
4. Knowledge management and encouraging systematic lifelong learning are basis on building a concept of a learning organization.
5. The future of economic success is more and more built on national innovation system with special emphasis on well-targeted regional innovation policy.
6. Increasing the investments in research and development play a crucial role in governmental policy.



What is needed on National level? The Finnish Road to Success.

of excellence of this type must be exploited for the benefit of the entire nation, which will call for the wise management of knowledge, expertise, and skills. One of the challenges to regional development in a knowledge society is to guarantee a sufficient quality of life and technological infrastructure to the people who spend part of their lives outside the said innovative centres of growth.

The factors that affect the birth of a networked economy manifest themselves in cultural, social, and structural changes. In general, a network is thought of as an interconnected entity of mutually independent components. A successful network will be based on intellectual entrepreneurship, co-operational skills, and efficient distribution and exploitation of knowledge and competence developed by various actors. People's personal activity will be emphasized. Inside the production and consumer sectors, and between them as well, an interactive networked economy will emerge with multifaceted effects.

Educating people in creativity and responsibility from early childhood is a serious challenge to an information society. To achieve this goal, we must aim for a knowledge society. If we don't pay enough attention to learning processes and to the challenging work culture, the workload will be too heavy and our visions will not come true. The aim of this ICT Review 2003 is to bring forth those proven Finnish methods and their backgrounds, which best demonstrate our cultural insight on our way towards future.

We face several future scenarios. The effects of technology may take future generations in a direction where the said extensive interaction and networking will decrease rather than increase. The knowledge professionals of a future society will have to master three major themes and develop these throughout their lives. Knowledge is something that we already have within our reach. What will be required next are the capabilities to apply and to exploit knowledge, to get along and learn together with people from different cultural backgrounds, and to learn to use and develop further responsible and effective knowledge management on both personal and societal levels. ❙

Committee for the Future a Parliamentary Organ

Inventing the future through determined long-term process on societal level is a challenging task for democracy. With respect to this, a truly unique Finnish innovation is the establishment of the Committee for the Future as a parliamentary organ. After a vote the plenary approved permanent status for this Committee. The main task of to Committee is to formulate and evaluate the Government's regularly submitted reports on the future of the country over a time span of 5–15 years, as well as to prepare recommendations on a wide range of future related issues. The Committee also functions as a parliamentary organ assessing technological development and its societal consequences.

Among the future related issues the Committee recommends the Parliament to take on the following undertakings:

1. As far as Information Society goes, as the Committee for the Future has emphasized the services and opportunities the information society can offer must be within everyone's reach in order to facilitate a faster pace in the development of public sector ICT-based services.

2. The government should commence without delay a high profile research project, based on which the government, municipalities, and companies operating in the field can, in co-operation with one and other, further the use of ICT in Finland.

3. In public financing, the R&D activities must be provided sustainable development path without delay. The aim to be set is to increase Finland's R&D financing during the next few years to 4 % of GNP.

4. The lines of action carried out in creative projects buttressing regional innovation systems and locally carried out activities, must be developed into a more equal standing within the sphere of total public financing.

Hannele Pohjola
Head of Department

TT – The Confederation of Finnish Industry and Employers:
Finland's Far-Sighted Approach Bears Fruit

Finland has performed well in international competitiveness surveys especially in respect to information society and information technology. The basics of today's situation have their foundation largely on strategic definitions of policies made years ago.

In the early 1980's national objectives were set for research inputs. Both companies and the government increased their R&D inputs rapidly and by the turn of the millennium Finland had risen to second place worldwide in R&D expenditure as a ratio of GDP. Private sector's portion of this financing is over 70 per cent.

Another important decision was to deregulate the telecommunications sector at an early phase. Competition forced the players to develop new technology and efficient systems.

Competence and Efficient Networking Key Elements

The strategic importance of competence, knowledge, and education as a requirement for a small country's economy and welfare was realized much earlier. Efficient networking of electronics industry supplements the ground of the Finnish information society.

The economic situation, demographic development, and the need for productivity gains now turn the attention to eGovernment. Recommendations by the Information Society Advisory Board, representing both public administration and the private sector have been brought forth, and they include a wide selection of issues: service accessibility, recognition technology, co-ordination, and governance structure.

Finnish Government has 170 service entities available online, e.g. portals for Citizen's Handbook, as well as enterprise and researchs services. Taxes and import and export levies can be paid via the network. People who are seeking for work can do it online. Enterprises can transact through net with the Government on public procurement. Legal proceeding with the Court of Justice can be started electronically, etc. Also municipalities are developing services, which in many cases are nearer to the citizens.

"Efficient networking of electronics industry supplements the ground of the Finnish information society", emphasizes Hannele Pohjola.

Internet and Mobile Penetration Are Top Level

The Internet penetration rate of Finnish SMEs is about 95 per cent. On the other hand, only 12 % of the companies purchage via Internet and only 10 % of all Finnish enterprises made more than 1 % of their turnover from eCommerce.

Penetration in mobile services is high and Finland is the leading performer in the world in this area. There are several services where citizens can use the online banking system to pay charges via a mobile device. Online payment system via private banks is advanced, and Finnish banks have played a leading role also integrating the mobile communications with the private sector online banking system.

eBusiness Still Waits to Take Off

The volumes of e-business via the Internet are still fairly modest. Why aren't companies using Internet and e-commerce more? Main constraints are considerations regarding existing sales channels, non-suitable products for eCommerce, small customer potential, and logistical problems. Enterprises regard too frequent updates of software programmes as the biggest factor hampering the use of information technology. Biggest problems in the use of the Internet are connected with data security, which also includes possible problems arising from computer viruses and their prevention.

On the other hand, promoting company image is being seen as a major motivation factor in implementing Internet services. The desire to improve customer service and flexibility, finding new customers via the Internet, access to wider markets, finding new subcontractors, and the possible loss of markets are considered important.

By conceiving new online services, e.g. health and social security, educational, and enterprise sectors, public sector can boost e-business. The capacity of SMEs to participate in eCommerce should be strengthened by training, financing, consultancy projects, and practical tools. Development of platforms, broadband networks, mobile 3G, and digi-TV technology is an important condition to boost information society development.

Federation of Finnish Electrical and Electronics Industry, SET, is the main branch organisation of ICT industry in Finland representing the most advanced high technology companies. It's member companies manufacture more than 80 % of the electronics and electrotechnical products made in Finland.

The Finnish Electronics and Electrical Industry **High-end Products for Global Markets**

- SET brings the views of the sector to the attention of the government authorities and other interest groups. The economic outlook and employment trends play a role in the allocation of resources for training and education as well as research and development.

- SET is also a major co-operation forum. Its numerous committees and branch groups provide a solid basis of expertise in issues specific to the sector. SET is also represented in international – especially European – co-operation bodies and their working groups.

- SET is a member of EICTA which is the European Information and Communications Technology Industry Association – bringing together 22 national ICT associations from 16 European countries and 31 large ICT corporations with major operations in Europe - and ORGALIME, Liaison Group of the European Mechanical, Electrical, Electronic and Metalworking Industries.

- SET is also a member in Career Space Steering Committee, which was formed by the ICT Consortium to develop and update generic job profiles. It has developed in cooperation with European universities the ICT Curricula for the 21st Century.

- SET has also been invited to be a member in eLIG, eLearning Industrial Group.

The Finnish electronics and electrical industry is concentrating more and more on high-end products and production. Mass production is done near markets when Finnish subcontractors are offering more research and development as well as after-sales services for their globally acting clients.

The output of the electronics and electrical industry in Finland was seven times higher in the end of 2002 than it was in early 1990. Especially high growth rates were achieved in production of telecommunications equipment where the output was accordingly 20 times higher.

Many factors lie behind this success. For the high tech industry it is natural and also vital to invest in knowledge intensive resources.

R&D Essential

Research and development activities are essential for the success in coming years. The electronics and electrical industry has a share of two thirds of total industrial R&D-expenditure in Finland.

Companies are eagerly taking part in domestic research and development programmes where networking is creating new business opportunities. For example subcontractors are offering more and more research and development services as well as know-how in production processes.

These services must be offered globally when mass production is done near markets far from Finnish home base. Local existence is crucial to maintain a close relationship with customers and partners in different parts of the world. This means clear focus on core competence.

The growth potential of subcontracting is huge when only some 15 % of the production of electronics and electrical industry is outsourced globally.

Know-How Appreciated

The success of Finnish electronics and electrical industry has created a superior know-how. The co-operation between companies and universities and research organisations is unique in the world.

In Finland, there has been a significant increase in intakes in universities, and the conversional education of experts from neighbouring fields into electronics and electrical professions is progressing well. Professional upgrading programmes raise students from technician to Bachelor level and further to Master and Doctoral levels in engineering.

"Research and development activities are essential for the success in coming years. The electronics and electrical industry has a share of two thirds of total industrial R&D-expenditure in Finland", says Markku Alhonen, Deputy Director Economics and Communications.

Growth Will Continue

The expanding industry and the services sector supporting it offer good business opportunities. Key trends are the increased application of electronics in almost any product on one hand and in manufacturing technology and process automation on the other hand.

Manufacturing technology relies increasingly on electronics and electrotechnics. In addition to electronics assembly, fields close to the Finns are, naturally, process control and automation for paper machines and various kinds of measuring systems.

This development will continue in the future as well and create further demand for electronics and electrical products and applications in many new areas.

Additional information www.electroind.fi

Nokia's developments in Multimedia Messaging (MMS) are putting people within sight and sound of a whole new way of communicating. **"Getting the message"**

The Nokia brand has become synonymous with mobile communications but there's a lot more to it than "phones" and the infrastructure that supports them. True enough, people want the device in their pocket, briefcase, handbag, or car to look good. But it also has to do with business, and we now expect that to mean a lot more than talking to someone.

A decade ago, Nokia mobiles blazed a trail for text-messaging services that have since transformed the way people communicate. Putting people in the picture with images, graphics, and sounds looks set to become just as big.

If a picture paints a thousand words, the future looks promising for Multimedia Messaging Services (MMS) which offers users a much richer experience, including pictures, without waiting for Third Generation (3G) networks to become established.

MMS enables users to send and receive photos, graphics, animations and sounds as well as text.

It is a natural evolution from the hugely popular text messaging services (SMS) that have stimulated a spectacular growth in the way people use their mobiles to communicate over the recent years.

Photo Tuomas Harjumaaskola

Latest estimates show that almost 100 billion SMS messages are sent each month around the world.

In the early 1990s – when we launched the universally popular 2110 model capable of delivering SMS – the service was unheard of by the general public!

Whether MMS delivers a similar business model of exponential growth remains to be seen. But we believe that MMS will be successful and that it will provide huge opportunities for everyone in the mobile messaging industry.

The key players range from infrastructure and mobile terminal manufacturers to mobile operators, service providers, and software developers.

The beneficiaries will be end customers, whether young or old, business or private.

There is a common misconception that the enhanced visual and sound capabilities of MMS will have to wait for 3G. This is not so, although 3G will enable increased network capacity and better quality of service to cater for more complex applications and services.

But many of the benefits of MMS are with us now. And, as a result of Nokia's pursuit of open and interoperable standards, they are available globally regardless of the status of host networks and the capabilities of the terminals that people happen to own.

For example, a mobile phone might not be capable of showing a picture on screen but a Multimedia Messaging Service could tell the owner that an enriched message had been sent and how to access it by computer over the Internet.

We are currently launching a whole new family of MMS mobiles to build on the success of a model featuring a built-in digital camera designed to send high-quality pictures to any similar device, or by e-mail to any computer in the world.

"Over the next few years, a large part of personal and professional communications will be in a wireless environment."

Before long, we aim to cascade MMS throughout all our major product categories. But the manufacture of new products – whether aimed at business professionals, early-adopters and trendsetters, or the youth market – is merely the beginning of the story.

We believe that the technology that underpins MMS will stimulate creativity throughout the market as a whole.

How creative consumers will be in utilizing the opportunities ahead remains to be seen, but the possibilities will be broadened by the services that operators and other service providers offer, and by the attractiveness of the new applications being developed for the new medium.

"With the Nokia 6800 phone, messaging reaches new levels of ease and efficiency".

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MOBILE COMMUNICATIONS PRODUCTS

Nokia is the world leader in mobile communications. Backed by its experience, innovation, user-friendliness and secure solutions, the company has become the leading supplier of mobile phones and a leading supplier of mobile, fixed broadband and IP networks. By adding mobility to the Internet Nokia creates new opportunities for companies and further enriches the daily lives of people.

Personnel approx. 52,000

Software developers within the worldwide Forum Nokia community are currently working on a variety of new MMS applications covering information, sport, news, weather, entertainment, and games. Examples include:

- The ability to exchange "talking heads" or synthetic video driven by simple text or speech input to make messaging more fun.
- Real time financial news and stock exchange data that is automatically updated as market conditions change.
- Christmas content including greetings from Santa and other winter scenes can be downloaded or sent with an optional text greeting to friends and family.
- A subscription-based video push service initially offering video clips about news, sport and entertainment topics.
- Music video clips that provide an excellent vehicle for record companies and artists to promote their latest releases.
- Downloadable movie trailers.
- People looking for a new home or car can download pictures and information tailored for their needs.

Support and Tools for the Development of Existing Content

Our aim is to give both the software industry and consumers around the world all the tools and support they need to create exciting content. But the final choices about the applications they want to develop, and use, will ultimately rest with them.

The components we provide are a growing range of mobile devices to cater for everyone's needs; a software toolkit to support developers working on new MMS ideas and a network solution to provide the infrastructure that operators need to introduce MMS to their customers.

The network solution is a service platform designed to put operators on the fast-track to revenue by enabling "ready-to-go" services.

It is being sold to operators around the world and recent deals have been struck in Australia, Thailand, the UK, Singapore, the Czech Republic, Hungary, Taiwan, and Poland – the list of network customers is growing all the time.

Key elements include a Multimedia Messaging Service Center that stores and forwards messages and a Nokia Terminal Gateway that enables users of incompatible equipment to benefit through seamless links to text messaging, e-mail, and Web pages.

Throughout our long history within the mobile communications industry, Nokia has been an evolutionary force and an instigator of change.

Today, the mobile media is changing in much the same way as radio migrated towards TV and music recordings developed from vinyl, through cassettes and CDs to downloadable MP3 over the Internet.

In much the same way, mobile devices will never be the same again. Many of the benefits of MMS are with us now and will improve further as 3G becomes widely adopted. We believe that the market potential is huge as text messaging has already demonstrated.

Harri Pursiainen, Director General
Ministry of Transport and Communications

Finnish Telecom Policy is **Removing Obstacles and Encouraging the Markets**

The large sums invested in education, research, product development, and information and communications technology products have expanded Finland's exports substantially.

Ministry of Transport and Communications

"The Finnish telecommunications policy relies strongly on market forces rather than on regulatory intervention", says Harri Pursiainen, Director General of Ministry of Transport and Communications.

Finland is one of the leading countries internationally in progressing towards the information society. We are investing large sums in education, research, and product development, and information and communications technology products have expanded the country's exports substantially. Technological development is leading to convergence of the different information and communication technology sectors, and mobile communications and network-based applications are spreading rapidly.

Many factors lie behind why Finland is a forerunner in ICT, the first of which is that Finland is a sparsely populated country with extremely long distances. Secondly, we have a well-functioning regulative environment; and thirdly, heavy investments are made in education and R&D. Furthermore, Finland has a long history of liberalisation of the telecommunications market, which can be seen as one of the main reasons for the success and growth of the ICT sector.

Finland never had one single incumbent. The history of the Finnish telecommunications itself started from the independent companies that were created in the beginning of the last century in order to offer local telephone services in towns. It was left to the state – and later to a state-owned telecommunications company – to link the local telephone companies together and to operate the long distance as well as international telephony.

Liberalisation Led to Open and Competitive Market

Against this background, the liberalisation process of the telecommunications market, which started in 1987, was quite a simple task. There were already more than 40 private companies on the market offering local services. It was easy for the government to allow them to broaden their activities to the fields of long distance, international, and mobile telephony, which were traditionally operated by the state. Liberalisation gave boost to especially digital mobile markets (GSM) which, as a result of several operators, began to grow very fast. And in 1990, the mobile phone market was opened to competition.

The early start towards liberalisation made the telecom market open and competitive. Today, we have approximately 140 operators. The Finnish policy has been essentially neutral towards operators of different age and size, not biased against the many old operators, or against entrants, except for some obligations imposed on operators with Significant Market Power. Efficient competition has led to a wide selection of

Photo Nokia

high-quality services at affordable prices. In fact, in most telecom segments, the prices rank among the lowest in OECD countries.

It is the Ministry of Transport and Communications' aim to ensure that all operators have access to telecom networks and information services at affordable costs. Indeed the Ministry highlights the importance of lowering the end user costs through promoting competition. The regulation of customer prices is not seen as an appropriate tool. Today, the convergence is a major challenge in ensuring the technological neutrality of legislation.

Despite the convergence, it is particularly the wireless communication that has become the standard way of communications due to the high penetration rate of mobile phones. Today, the rate is over 80 per cent.

Mobile Telecom Licensing Major Aspect

A significant aspect of the Finnish communications sector is our mobile telecom licensing regime. It is simple, fast, and transparent. Finland was the first country to grant licences for a third-generation mobile communications network in March 1999. Finland does not favour auctioning or other ways of extra "taxation" in its licensing policy. The Ministry believes that such measures put further pressure on end-user prices and hamper the fast development of future markets and services in the information society.

The statistics show that our strategy has succeeded: Finland is said to be the most wired and most mobile country in the world. We have also understood that by using market dynamics also societal aims can be reached.

There are also plenty of challenges ahead. New third-generation technology brings whole new dimensions to wireless communications such as mobile Internet, fast data transfer, a worldwide system, and new kinds of services.

In this situation, governments not only have to respond to the growing importance of the converging sectors, but they also have to encourage the development of Internet-based technologies and mobile communications applications. They can assist the private sector by promoting competition and market liberalisation. Obstacles to entrepreneurial activities should be removed, together with additional tariffs, customs duties, and taxes.

Telecommunications Policy by Market Forces

However, the main responsibility of the government is still that of a regulator. The Finnish telecommunications policy relies strongly on market forces rather than on regulatory intervention. The policy has been to rely on competition and use regulatory intervention mainly as a last resort. The power to use intervention is in many cases sufficient, thus making its actual use unnecessary.

Whenever possible, Finnish policy makers and the regulator intentionally avoid defining how competition should take place and which alternatives are "politically acceptable". A technology neutral policy is applied. The market should decide on technology, not the policy maker or regulator.

The technology neutral approach is emphasised in the new communications legislation enacted in 2002. The legislation is common to telecommunications and broadcasting networks, and does not distinguish between different network.

We also have to bear in mind the demands of globalisation. It is vital that common rules of business conduct be formulated worldwide. We need to create a global environment, where enterprises can thrive and economic development can produce wealth for citizens.

In Finland, we intend to stay in the lead in mobile communications. We know that it takes a lot of work and the first place must be won every day, but we are willing to accept the challenge.

In the New World of Communications, the Right Partners are Prerequisites for Success. TeliaSonera Knows **How to Manage Connections**

The traditional role of operators is changing. Today it is no longer enough to just switch calls: a new challenge for operators is to connect users to various kinds of content – irrespective of the terminal.

Ossi Kuittinen, Head of the Technology Team of TeliaSonera Finland, has a nightmare: that the world is full of different types of terminals that cannot communicate with each other, and plenty of content is available for the devices.

"The mission of Sonera is to offer consumers, besides traditional telephone operator services, an open service network where you can access any service from any terminal. Wouldn't it be nice if, for instance, a movie ordered by mobile phone started running straight away on your home TV!"

"In order for the consumer to get what he wants, we must be able to integrate different networks and services with all their complicated components, but above all, we must understand what the consumer's ultimate need is. The consumer chooses the service provider that offers the best way to satisfy his needs – a way that at the same time is easy, useful, and competitive in terms of price", reminds Mr Kuittinen.

Thus, Sonera's objective is to offer customers reliable, secure, and managed connections to the services they want to use, irrespective of the access mode selected. Traditionally, telecom operators have sought to control the entire value chain of telecommunications by controlling all of its components, for instance networks and the operation of them as well as services and content. In future, these vertical value chains will fall apart and instead new, horizontal ones will emerge, where companies operate within the limits of their core competence.

Co-operation is the Key to Success

Sonera's role in tomorrow's world of communications is to act as an enabler of different services (Cross Business Enabler). This means that Sonera will offer managed connections and standard interfaces for all value chains of electronic communications. We at Sonera are aware that the offering of functioning connections requires cooperation with more than one player.

"Co-operation is needed on all levels of the value chain. For instance our service technologies utilize components from equipment and software manufacturers. Correspondingly, we enable e.g. content providers to easily reach customers, distribute their content, and carry out their invoicing, irrespective of the technology or terminals used by the customers", explains Mr Kuittinen.

"TeliaSonera's role can be compared to that of a city or municipality whose basic services (communication, business lots etc.) are an essential precondition for the creation of new businesses and for customers to be able to access the businesses and shops", he sums up.

In the new value chain of communications, Sonera's essential competence areas include customer and billing relationship management, management of customer and usage information, service management interfaces, interfaces offered to content providers and other third parties, as well as roaming.

Sonera's leadership in the product development environment of the Nordic market and communications sector strengthens its position as an attractive cooperation partner. Sonera is a big player also in terms of volume.

Partnership Leads to Open Interfaces

A prerequisite for success is the ability to partner in an open and creative manner. This requires an open and highly developed technological architecture, instead of

"The mission of Sonera is to offer consumer, besides traditional telephone services, an open service network, where you can access any service from any terminal."

"The consumer chooses the service provider that offers the best way to satisfy his needs – a way that at the same time is easy, useful, and competitive in terms of price", reminds Ossi Kuittinen, Head of the Technology Team of TeliaSonera Finland.

the closed, operator-specific solutions that we have become accustomed to.

"Sonera aims to create new business opportunities with partners that share our view of the importance of a service network and an open interface. We want to ensure open standard solutions for the consumers – solutions that are more cost-effective than closed ones in the long run", says Mr Kuittinen.

"As a result of the cooperation, the technology-centredness of the services will diminish and the focus of business will transfer to the production of a unified customer experience", concludes Mr Kuittinen.

Partner cooperation and open interfaces enable rapid adaptation to new ways of doing business and the development of new services. Through this line of action, Sonera will be well prepared for the growing and increasingly diversified communications environment.

TELIASONERA IS NORDIC AND BALTIC TELECOMMUNICATIONS LEADER

Telia and Sonera are creating the leading telecommunications group in the Nordic and Baltic regions – TeliaSonera. Our overall focus is on best serving our customers in our core business and creating value for shareholders through stronger profits and cash flows. TeliaSonera is listed on the Stockholm Exchange, the Helsinki Exchange and Nasdaq Stock Market in the USA. Pro forma net sales in 2001 amounted to SEK 80.9 billion (EUR 8.9 billion). The number of employees was 30,000 on June 30, 2002.

TeliaSonera's home market comprises the Nordic countries and the Baltic region. TeliaSonera operates under the Telia brand in Sweden and Denmark, under the Sonera brand in Finland, and under the NetCom brand in Norway. In the Baltic regions TeliaSonera operates through subsidiaries and associate companies.

www.sonera.com

A strong change in the market situation has made Elisa define the Group's strategic starting points in more detail over the past year. **Focus On Core Business**

"We have grown from a local telephone operator in the Helsinki Metropolitan area to a major nationwide telecommunications group. Our current strategy is based on the objective of being the leading service company in the Finnish telecommunication sector by 2005", says **Matti Mattheiszen**, President and CEO. During the past 15 years, Elisa's growth has been rapid. Until 2001, the Group expanded strongly because of acquisitions. Nevertheless, the rapid change in the economic cycle has caused growth to drop from the recent two-figure percentages to approximately three per cent in the next few years.

"Such a strong change in the market situation has naturally made us define the Group's strategic starting points in more detail over the past year. Our focus lies on our core business, profitability, and increasing the cash flow."

Knowing its own limits, Elisa did not enter the UMTS auctions in Germany or anywhere else in Europe. "We did not even consider entering such an auction. As a network and service operator, we were satisfied with the Finnish UMTS licence."

Co-operation with Strategic Partners

At the moment, Elisa holds a market share of approximately 31 % in Finland. "In order to reach our strategic objective of being the leading telecommunications company in Finland by 2005, it is important for us to find partnerships with competent and reliable cooperation partners. We live in a situation where the telecom-

"Elisa did not even consider entering the UMTS auctions in Germany or anywhere else in Europe", tells Matti Mattheiszen, President and CEO of Elisa Communications Corporation.

ELISA COMMUNICATIONS CORPORATION

Elisa Communications Corporation is a telecommunications group whose shares are quoted on the Helsinki Exchanges.

Its core business areas comprise service operator, mobile and network business as well as business operations in Germany.

The Group's revenue in 2001 amounted to EUR 1.44 billion (1.24).

At September 30, 2002 the Group employed 8,531 people.

www.elisa.com/english

The Group's Goals

The Group's goal is to be Finland's leading and most appreciated service company in the telecommunication business, implementing the best and competitive solutions for its customers with its co-operation partners.

The Group is a customer-oriented service company with extensive command of product develpoment and technology.

In its internetional operations, the Group implements innovative tele-communication solutions with its co-operation partners in selected markets.

Group Structure

ELISA COMMUNICATIONS
Group Management
Group Functions and R&D

Elisa Mobile	ElisaCom	Elisa Networks	Elisa Kommunikation	Other Companies
Radiolinja in Finland and in Estonia	Service Operator in Finland	Network Operator in Finland	Germany-based Business	Comptel Yomi IT Estera

munications and IT sectors and content production are approaching one another. However, rather than do everything ourselves, we will coordinate the service production of our partners with our own to provide a comprehensive service for our customers."

Focus on Telecommunications

The Group has streamlined its business by grouping the companies to four business areas. Elisa Mobile carries out mobile operator business and ElisaCom focuses on fixed network service operator business, while Elisa Networks concentrates on network business and Elisa Kommunikation operates in Germany. The operative entity also includes a number of other companies.

"In the future, companies operating in various business sectors will be more closely integrated. This way we will achieve economies of scale in, for example, marketing, product development, R&D, as well as in network-related investments."

Furthermore, during the last couple of years the Group has sold certain operations outside its core business, including network construction and directory operations. "Telecommunications is our core business. We will focus on what we do best. The holdings in our IT subsidiaries Comptel and Yomi have been constructed through strategic ownership. Today, these companies are part of the Elisa Group. In the future they will certainly also be regarded more as financial investments."

Facing the Future, Chase for Expenses Notwithstanding

"In a tight market situation you must focus on the profitability of operations. The growth in the industry has clearly slowed down and top-level years are no longer foreseen within the next few years. For this reason we must be able to increase the efficiency of our operations. Cost-effectiveness and improving the utilisation rate of investments are key factors for the success of our company."

While the Group has and will continue to emphasise the role of cost-effectiveness, the long-term corporate strategy also incorporates other dimensions. "It is a question of rationalising our operations, not starving the company to death because of savings."

"It is the goal of the Group to be a customer-oriented service company with extensive product development and technological expertise. The roles of the customer and customership must be emphasised in all our operations: we are creating comprehensive service solutions for our customers to ensure their success and well-being."

Research and product development, as well as technological competence, have played and continue to play an important role in the development of the customers' services. "In general we can say that, properly allocated, investments in research and development are a prerequisite for success."

Photo Kai Tirkkonen/Finnet-kuvapankki

Finnet is a Finnish telecommunications group, which offers its clients all local and national voice, data, and digital television services. The Finnet Association, which belongs to the group, operates as a lobbying and co-operation organisation for the private telecom operators and their subsidiaries and associated companies.

Finland's first telephone companies including, for example, Finnet companies Vaasan Läänin Puhelin and Oulun Puhelin, started their operations 120 years ago. The predecessor of the Finnet Association, The Association of Telephone Companies in Finland, was founded already in 1921. A lot has of course changed over the years but what is Finnet doing right now, **Seppo Toivonen**, Managing Director of the Finnet Association?

"At Finnet we are currently living through some interesting moments. In May 2002 a decision was made to establish Finnet Ltd, a company that began its operations in the beginning of 2003. The group consists of Finnet's nationally operating companies which are DNA Finland, Suomen 2G, Kaukoverkko Ysi, Nettiportti, Suomen 3KTV, Finnet Logistiikka, and dna+. The hiring of key personnel was begun in good time, so the operations could start right away."

The Structure of Finnet Will Be Renewed in 2003

Finnet Ltd is owned by local telephone companies. According to Mr Toivonen, the most important aim in forming the Finnet Ltd is to make service production and marketing more efficient and to construct qualifications for more comprehensive customer service on a national level. "In the future we can benefit better from our local know-how and also serve those companies that have offices in different parts of Finland. I could say that we are nation-

Year 2003, the Finnish Telecommunications Markets are Living through some Interesting Moments.

A Time of Change

ally local; we are familiar with local conditions, and we can also link different points into a wide network."

Sights Are Set on Strong Growth

In 2001 Finnet grew quicker than any other Finnish operator. "The Finnet group has an excellent starting point. The financial position is stable since our group's equity ratio is over 70 per cent. And the biggest investments for example on mobile networks have already been made, so that we have a nation-wide and technically modern network infrastructure", says Mr Toivonen.

"Finnet is looking for growth from the challenger's position, as a third national operator in Finland. Finnet's market share from Finland's telecommunications services total market is about 15 per cent, and the share of fixed-line telephone connections is about 30 per cent. Growth is sought especially from our country's largest growth centres. We consider mobile communication business our leading point."

A Firm Foundation Brings Reliability to Clients

"A strong and solid financial position brings security also to our clients. Especially now, when there have been companies with very short life spans, customers are looking for a partner that is and will stay on the market. Usually clients are looking for long and durable cooperation," says Mr Toivonen.

"Finnet's position is financially stable and in addition we also have other significant strengths. The basis of Finnet's national service supply is its own, Finland-wide and technically modern GSM/GPRS-network and a supporting national main trunk, which is based on fibre optics. A significant strength is also our long experience in telecommunications. Finnet has strong operator know-how as well as a solid market position on its own, traditional areas. This is a good place to expand and to develop from."

Changes Can Be Expected

"Up until now Finnet's national operations have been taken care of by different companies. Now these operations are regrouped and strengths are concentrated on Finnet Ltd. This will naturally change competitive positions. There will be changes on these markets and market positions will be dealt again. We are not the only ones who are experiencing big changes: also Elisa, Sonera, and Telia are living through changes", says Mr Toivonen.

"Customers will see this as new choices, new products, and services. The market has received us in a positive manner as a third national operator since for the clients the increased competition is positive and long awaited."

Companies in the new Finnet Ltd.

Finnet Ltd is owned by 34 Finnet telephone companies. The new group consists of seven nationally operating companies:

- **DNA Finland** is Finnet's national mobile operator, which offers services to both companies and consumers utilising GSM/GPRS technology.
- **Suomen 2G** is a GSM- network operator whose GSM/GPRS network carries calls, messages and services.
- **Kaukoverkko Ysi** is a national telecommunications operator, which is wholly responsible for the planning, constructing, usage, maintenance, and marketing of a circuit switched long-distance network and a broadband main trunk network. Kaukoverkko Ysi's subsidiary Finnet Plus offers products and services to companies in the Helsinki area and in Tampere, and handles company clients, which have operations in several localities. Another subsidiary RSL COM Finland concentrates on offering total solutions to companies in the Helsinki area, Turku and Tampere.
- **Nettiportti** is a national Internet service operator.
- **Suomen 3KTV** is Finland's biggest cable television distribution network. It produces digital television services to local telephone companies or to cable television companies, which are owned by the telephone companies either totally or partly.
- **Finnet Logistiikka** is a national negotiation organisation which coordinates the acquisition operations of goods and services of its owner companies both from Finland and abroad.
- **Dna+** (Suomen 3P) is Finnet's national sales channel.

FINNET

Finnet is a Finnish telecommunications group, which offers its customers all local and national voice, data, and digital television services. The group consists of 45 individual companies: telephone companies and national business companies, as well as the Finnet Association and its subsidiary Finnet Focus Ltd.

The Finnet Association was founded in 1921 and it is a lobbying and cooperation organisation for the private telecom operators and their subsidiaries and associated companies.

Finnet Ltd consists of Finnet's nationally operating companies: DNA Finland, Suomen 2G, Kaukoverkko Ysi, Nettiportti, Suomen 3KTV, Finnet Logistiikka and dna+. Finnet's other co-operative organizations include for instance Suomen 3G, a company that has one of Finland's umts licenses, and Omnitele, a concultancy company. Finnet Ltd is a member of the Finnet Association.

Further information on http://www.finnet.fi/eng/

Finnish telecommunications industry now lives economically.

Exaggerated Self-Criticism After the Hype

In 2002, the operations of Finnish telecommunications technology companies were characterised by savings. Many of the companies increased their efficiency by postponing investments and reducing personnel. After the strong hype, the self-criticism of the sector may even seem somewhat exaggerated.

The greatest financial mistake in the history of Europe, the UMTS auctions, gave rise to far too high tax-like costs for the participating operators, which froze their investments. The whole telecommunications sector, and above all the actors that in some manner participate in the building of telecommunication networks, now suffer from the postponed investments of operators.

In addition to the general economic recession, the slower than expected introduction of terminal equipment to the market and general development of network technology cut down network investments. Broadband connections can be established in the existing copper network with DSL solutions without any additional investments, and a larger volume of simultaneous data can be transferred trough the existing optical fibre network.

Despite the slower development phase, telecommunications and information technology are a central part of modern society. Digital government services and the use of web services in general have increased at the same time as the data security of the Internet has improved, data transmission has become more rapid, and new kinds of digital services have been introduced to the market.

New Directives Rationalized Regulation

The legislation regarding the telecommunications and communications technology sectors was thoroughly reformed in 2002.

"The government can promote the favourable development of the information society with the right legislative measures. In addition, it must show the way for others in its use of information technology by, e.g. developing the opportunities to use digital services", says Reijo Svento, Managing Director of FiCom.

In the spring, the European Union approved an extensive communications directive package, where more than 20 separate directives were summed up to five directives and one regulation.

The principles of competition legislation were incorporated as such in the new communications legislation. This will require close co-operation between communications and competition authorities. According to the directives, the European Commission and national authorities must establish co-operation and hear different actors and authorities in the sector when new regulations are being prepared.

In no other EU country has the national introduction of the communications directives advanced as rapidly as in Finland. The Finnish government has given a proposal for the amendment of the Communications Market Act to the parliament, which intends to pass the new act before the general election in the spring of 2003.

The legislation regulating the sector has also otherwise been amended regarding, e.g. digital government services and trade, data security and protection, as well as coercive measures like remote surveillance and monitoring.

Data Protection Was a Major Issue

The aim of the eEurope programme is to improve the competitiveness of the EU as compared with, for example, the US. In 2002, the eEurope 2002 programme was followed by the eEurope 2005 programme, which aims at introducing the now approved objectives in practice. The objectives of the programme include increasing the number of broadband connections and promoting services, trade, health care, and education over the Internet.

In 2002, data security and protection emerged as major issues in the sector. The security and protection of data is the precondition of customer confidence, which

FICOM, FINNISH FEDERATION FOR COMMUNICATIONS AND TELEINFORMATICS

FiCom is an industrial co-operation and lobbying organisation in the field of industrial policy concerning the Finnish telecommunications and message transfer sectors.

FiCom's members are companies and other entities that operate in the telecom sector in Finland. The total turnover from Finland of FiCom's members is about EUR 6,7 billion. Approximately 43,000 people work in their different locations.

Additional information: www.ficom.fi

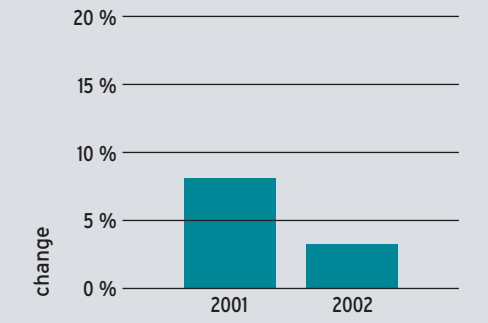
no actor in the sector can neglect. In the public debate that arose during the latter part of 2002, many false generalisations were made about the practices of the entire sector regarding remote identification crimes.

According to a study made by FiCom among its members in October, the companies in the sector still believe that their net sales will increase more rapidly than the GNP. In 2002, companies have made major efforts to improve the efficiency of their operations by postponing investments and reducing personnel. These measures are expected to result in better finances as soon as 2003. This will, however, also require an improvement of the general economic situation.

Government Measures Needed

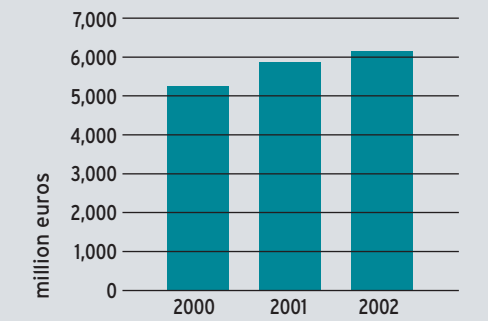
The sector also needs government measures in order to recuperate. As general demand falls, the government must speed up its own projects and investments related to eGovenment and the development of the information society. The government can promote the favourable development of the information society with the right legislative measures. In addition, it must show the way for others in its use of information technology by, e.g. developing the opportunities to use digital services.

In 2002, FiCom has for the first time selected the most important act of the year promoting the development of the information society. This recognition will be given annually to an act that has in a concrete way promoted the development of the information society in Finland. This year, the winner was the programme for digital government services drawn up under Mr **Jouni Backman**, Minister of the Environment, under the heading "Public Services in the New Millennium – Programme of Action to Promote Online Government".



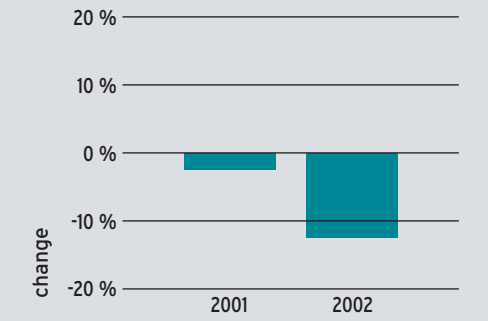
The change of the turnovers compared to the previous year.

In 2001 FiCom's member companies' turnovers increased 8 % in average. In 2002 the growth of the turnover is estimated to be 3 % and in 2003 the turnovers are estimated to grow slightly more than in 2002.



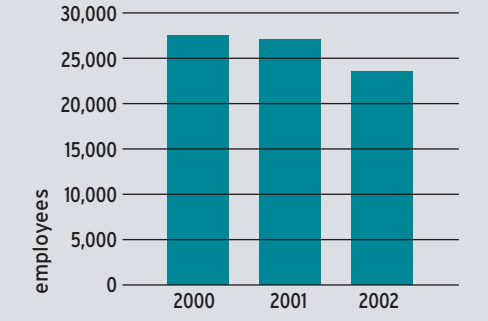
The development of companies' turnover.

In 2001 the economic situation of the companies of the Finnish telecommunications sector weakened but the turnovers were still incresing. The growth is believed to continue also in 2003.



The change of personnel compared to the previous year.

In 2002 the personnel of FiCom's member companies decreased 11–14 %. A year before the companies predicted that they would cut down personnel during 2001 and 2002 just 5–10 % in total. The forecasts were too optimistic.



The development of the personnel.

The figure does not tell the whole truth about the decrease of the telecoms employment, since also the transfer of employees through acquisitions is shown in the figure.

Kimmo Halme, Science and Technology Policy Council of Finland

A Renewed Policy to Promote Innovation

The positive development of the Finnish economy during the past decade has been driven by high technology and by its effective application. This has generated continuous increases in exports, most clearly of high tech goods and services. As a consequence, Finland has achieved top rankings in numerous international comparisons – in particular in those focusing on the overall economic competitiveness. Fortunately these achievements have not incurred at the cost of other important policy-areas, such as the environmental sustainability.

"Research in Finland" provides a comprehensive description of the Finnish innovation system and its key operators. The document is also available in electronic form at the Finnish research portal www.research.fi.

Finland can well be considered to be a knowledge society, or at least fast progressing towards one. From a policy perspective, this can be regarded as a consequence of a long-term commitment to the society, which facilitates and promotes knowledge creation and diffusion. Instead of looking at education, science, or technology separately, there is a tradition in Finland to look at these as an operational entity – as a dynamic innovation system. In the light of international evaluations, this approach has proven to be successful.

Determined Input into Research and Development

One distinctive feature of the Finnish science and technology policy has been the strong growth of public sector's and, in particular, the private sector's research funding. The information and communication cluster has been at the very core of this growth, as roughly half of all the national research input is used in or for the benefit of this cluster. In higher education the proportion is nearly the same: some 35 per cent of all the university and polytechnic graduates have an education in ICT or its neighbouring fields. Pooling of resources of this magnitude would not have been possible without good co-operation between the public and private sectors.

In 2001, altogether more than 4.5 billion euro were spent on research and development in Finland – an amount that equals to 3.4 percent of the Gross Domestic Product. This proportion puts us among the leading countries of the OECD. In absolute terms however, Finland will always remain a marginal operator in the global research and development, as our investment volume accounts merely for 0.7 percent of the OECD total. The long-term development is also encouraging. The volume of research and development in Finland has grown ten-fold since the early 1970's.

Besides research investments, the number of research personnel in Finland has increased and the education level of research personnel has risen. At least two issues have influenced this positive development: the starting of national graduate schools in 1995 and the increased participation of women in research work. Today, there are approximately 70,000 persons carrying out research in Finland. This equals to nearly three percent of the labour force and is clearly the highest share among the OECD countries.

Sustaining the advantage achieved with the knowledge-intensive industries presents a major challenge for a small country like Finland. In this respect, it is crucially important to extend the economic base to new knowledge intensive fields, while at the same time co-operation should be

Photo Veikko Kallio/Nokia

Nearly three percent of the labour force is carrying out research in Finland. This is clearly the highest share among the OECD countries.

enhanced with the more traditional fields. Maintaining the competitiveness of the innovation environment and improving the employment situation will require continuous input in increasing both the overall level of knowledge in all fields, as well as ensuring the availability of skilled labour force in fast growing, knowledge intensive fields.

Finland as Part of the Global Community

Today, science, technology, and innovation develop regardless of geographical borders. Policies must take into account much wider view than the national operating environment, as internationalisation permeates the whole innovation system. Among other things, this means internationalising national research and development institutions, their activities, measures, and programmes. The challenge is to make the most of globalisation by exploiting the positive aspects of the trend.

In the field of European research, internationalisation is shown most clearly in the construction of the European Research Area. This offers European researchers and research organisations more possibilities to operate outside their home countries. It is anticipated that the increased number of international research projects and the closer networking of centres of excellence will amplify European research and eventually further improve its quality.

The integration and enlargement of Europe will also have concrete influences on how science and technology policies evolve within the member states. One foreseeable consequence will be the increased mobility of human resources. In this respect, Finland still has much to improve, as our share of foreign researchers and experts is well below the EU average. Keeping in mind the upcoming retirement of larger age groups and our limited own resources, there is a need to make better use of the international expertise.

Towards a National Strategy

Keeping on the knowledge path will require continuous and versatile development of the national innovation system. According to the Science and Technology Policy Council, an innovation policy with a wide spectrum of measures should form the core of the Finnish national strategy for the coming years. The key topics of the proposed strategy touch upon the following development issues.

It is of utmost importance that the Finnish major knowledge and know-how assets – national competencies – can be further developed. Today, these competencies relate particularly to the information and communications cluster, the forest cluster, and the metal cluster. Alongside the current competencies, there is a need to widen the competence-base by investing in other promising research fields and to achieve a sufficient volume and quality in those.

Besides technological innovation, systematic input into social innovation is also needed to prevent societal and social development from diverging from economic and technological development. In this respect, it is for the Ministries to assume greater responsibility as strategic development organisations and users of social innovation.

What comes to public research organisations, their future role is seen as active and dynamic cooperation partners for business and industry. Similarly, universities' legal and operational environment should better encourage active development of education, researcher training, and research and to promote the utilisation of research findings.

THE SCIENCE AND TECHNOLOGY POLICY COUNCIL OF FINLAND,

chaired by the Prime Minister, advise the Finnish government and its ministries in questions relating to science and technology. The Council is responsible for the strategic development and coordination of Finnish science and technology policy as well as of the national innovation system as a whole. The membership consists of seven other Ministers and ten other members well versed in science and technology.

The Council adopted its latest review "Knowledge, Innovation and Internationalisation" in December 2002. The review examines the development challenges facing Finnish science and technology policy in the coming years and outlines relevant policy, with particular attention paid to the rapidly internationalising innovation environment.

More information about the Council and its policy recommendations at www.research.fi

Eddy D. Hawkins
Photos Juha Sarkkinen

Adapting technologies to meet the needs of the elderly will be a huge growth industry. **Technology Serving the Elderly**

New mobility aids could increase the functional capacity of the aged and may even improve their state of health. The elderly could even better avoid institutional care, manage living at home, and have more independent control of their own affairs. The great challenge is to design products and interfaces that elderly users will accept.

Intelligent Moving Aids for the Elderly is a project aimed at creating prototypes of a mobility aid that offers better physical support than the current devices, as well as completely new services utilising wireless communication.

The motivation for this project stems from the aging of the population of Finland. It has been predicted that the share of elderly people (over 65 years) will grow to 26 % of the population by 2030. It is clear that maintaining the current quality of life of the elderly – not to mention improving it – will require much more efficient utilisation of resources. This holds true for the whole of the developed world.

The project is focused on designing and developing a better walking aid and a wireless multi-media communications terminal especially suited to the needs and use of the elderly. "I would not say that the technology is the main challenge," says the project manager, Professor **Jukka Riekki** of the University of Oulu's Intelligent Systems Group. "The key is to first develop something that users really need, the next is to make it so easy to use that it really will be adopted. The third challenge is to get that product to be a part of a real service."

Broad-Based Expertise

The nature of this approach demands a broad base of participants. The University of Oulu's Intelligent Systems Group has the responsibility for developing the technology and creating prototypes. The same university's Work Science Laboratory is

expert in user studies and usability studies. The Department of Industrial Design at the University of Lapland has designed and built a prototype of the walking aid and is designing the mounting of the wireless communication terminal, the user interface seen on screen, as well as the physical interface.

Nokia has been actively involved because of its interest in new design principles, new techniques for specifying the requirements, new methods for user and usability studies, scalable user interfaces, multimodality, and detailed design of a user interface. Of the other project partners, Helkama Velox is a bicycle producer which provides know-how as a manufacturer, and Videra Ltd brings its expertise in communications technologies and software. The Oulu Deaconess Institute is involved as a service provider which offers health services, care, and housing for the elderly. The local operator Oulun Puhelin provides telecommunication services and may also implement computing and data storage facilities. CCC is a software group that specializes in industry-specific solutions including health care, and sees potential for doctors and nurses accessing and updating patient information using a mobile terminal; in this project it is interested in service concepts as well. Yet another participant is the Riihi Foundation, a builder of residential housing for the elderly.

Tekes, the National Technology Agency, provides overall coordination and financing under the auspices of its iWell technology programme (see box).

Meeting Real Needs

The communications device, HomeHelper has been designed especially for aged users, most of whom have not had any previous experience with computers. All the functions of the prototype built by Videra Ltd are executed by touching large buttons on the screen, including video telephony and the use of Internet and e-mail.

"We started with a desktop, non-mobile PC," explains Jukka Riekki. "More recently we have started working with a wireless version. The target is an easy-to-use mobile device for video calls and Internet services with a touchscreen, camera, and speakers. It is a tablet PC and the current version operates in a wireless local area network. We are also working on an even smaller PDA version." The same device can also be connected to home automation technology and be used for safety monitoring.

The project group believes that basic properties such as agility, steadiness, and appearance of moving aids can be improved considerably. The threshold for acceptance can be decreased by industrial design. According to the head of the design team at the University of Lapland, **Ismo Alakärppä**, it is short-sighted for a company to think that it is enough to simply sell an assistive device to a customer.

"From the perspective of the individual, following the sale of an assistive device, only the first threshold has been passed. The acceptance of changes in one's ability is the most significant factor influencing the acceptance of aids. Functionality, external appearance, image, and attitudes follow this acceptance. The use of assistive devices could be promoted by increasing the range on offer, as well as by focusing on marketing and end-users, by making the guidance on their use more efficient, and by developing products in accordance with needs."

iWell is a Tekes technology programme which focuses on the development of competitive well-being technology for world markets. Its aim is to take information and communication technology and solutions that were originally developed for production, logistics, and construction sectors and turn them into well-being applications.

The programme is targeted at creating solutions that can promote healthy and balanced living. Such technology is especially well-suited to the ageing population, the disabled, and those suffering from long-term illnesses, as it gives them a better chance of living independently. However, the working age population will also be able to monitor and improve its health with the resulting applications.

Tekes launched the iWell well-being and health technology programme in early 2000, and it will be concluded in 2003. So far, iWell has funded 63 company R&D projects and around 30 research projects. Total programme volume is around EUR 42 million of which EUR 18.5 million is provided by Tekes.

www.tekes.fi/english/programmes/iwell

Professor Jukka Riekki
jukka.riekki@ees2.oulu.fi

TEKES, THE NATIONAL TECHNOLOGY AGENCY OF FINLAND

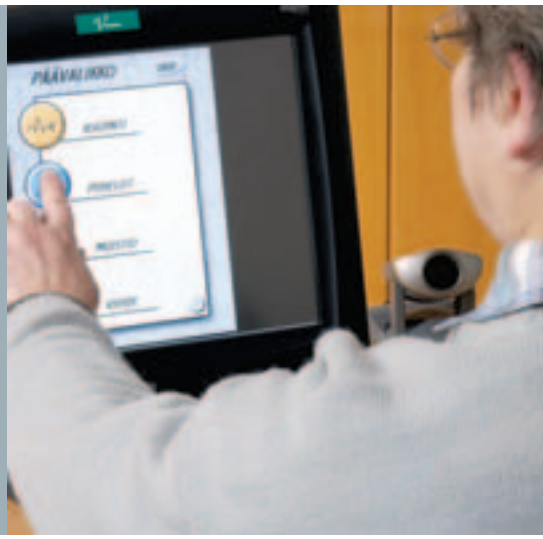
TEKES is an organization which finances research and development projects of companies and universities in Finland. The funds are awarded from the state budget via the Ministry of Trade and Industry.
Other key activities of Tekes are the coordination and financing of Finnish participation in international technology initiatives and its technology programmes which offer excellent channels for cooperation with Finnish key players in R&D.

Technology programmes are used to promote development in specific sectors of technology or industry and to pass on results of the research work to business in an efficient way. The duration of the programmes ranges from three to five years; their volumes range from EUR 6 million up as high as hundreds of millions of euros. Tekes usually finances about half of the costs of the programmes. The remainder is provided by participating companies.

During 2002, a total of around 45 extensive national technology programmes were under way in all technology fields.

Tekes is headquartered in Helsinki, Finland with overseas offices in Brussels, Tokyo, San Jose and Washington, D.C.

www.tekes.fi



State-of-the-Art Technology Can Provide You with Just the Help You Need. **Novo's Niche Solutions**

If you are trying to plan shifts or process invoices more efficiently, information technology is at your service. Furthermore, if you're trying to find a bus station in Wuxi, China, or planning sailing routes in the Gulf of Mexico, you will find not only maps, but also state-of-the-art technology that can provide you with just the help you need.

With human resources becoming the most important resource for more and more companies, information technology provides new solutions for managing even the most complex planning situations.

In labour-intensive sectors, workforce management is often the most costly and time-consuming aspect of running a business. Diverse and seemingly irreconcilable issues such as the optimisation of resources, the possession of enough flexibility to cope with unexpected changes, employee satisfaction, and legal or union matters, all affect the ability of a business to satisfy its customers.

Novo's shift planning solution is an intelligent human resource planning tool, incorporating an exceptionally flexible rule engine that guarantees that the shifts and schedules produced are in harmony with government legislation, union rules, and company-defined policies. It is particularly well suited to sectors in which people working on the same shift require a range of skills.

Photo Fons Sluiter

How to Run a Police Force with the Minimum Manpower?

Police forces can use this system to support their operational processes when migrating towards a result driven and process controlled organisational model.

Novo's human resource management solution is already being used by the Dutch Police force, with its 45,000 employees located in 26 regions in Holland.

The system offers specialised planning functionality in support of operational processes which are specific to police organisations. It supports the entire workflow, beginning from the top with the interpretation of guidelines issued by the Ministry responsible for the police force, all the way through to the execution of tasks on the operational level. In this way, an optimal match is achieved between tasks which need to be carried out and the available workforce, thus guaranteeing the most efficient use of personnel.

Optimisation takes place according to minimum manpower requirements and additional criteria, for example service level. The required capacity can depend directly on the amount of work, or can be influenced by the desired quality level or mandatory safety requirements.

The solution also allows the transfer of actual working hours, allowances and premiums to back office systems, such as payroll.

Photo Jeff Sherman

In addition to the Dutch Police Force, other branch-specific products based on the same technology are used by Finnair, 40 percent of Dutch home care organisations, and the Finnish shipping company, Silja Line.

The main selection criterion for Novo's solutions is its leading edge technological architecture, both in terms of hardware and software.

Niche Solutions World Wide

In Finland, Novo offers a full range of integrated IT services: software services, operating and network services, and services related to IT infra-structures. In international markets, Novo operates in selected business sectors with products and solutions in which it has special expertise. Additionally, Novo serves its international Finnish customers all over the world.

The company's niche areas include human resource planning systems, systems for mobile sales, those based on the use of geographic information, and electronic invoicing and archiving solutions.

GIS Aids Navigation in Cities and at Sea

Novo's most recent international activities include its web-based geographic information service (GIS), providing tourist information in Wuxi, China, and a flood management IT system for the Changjiang (Yangtse) River in China in co-operation with the Chinese Changjiang Water Resource Commission. For the flood management project, a system was built using new technology to minimise flood damage.

Novo's map service is also being used to complement Suunto Ltd's new leisure sailing instrument package. In addition to the Suunto M9, with its positioning technology, the package includes PC software and an Internet service at suuntosports.com, which includes Novo's nautical chart viewer service. This service makes it possible to plan and save sailing routes. For example, information on suitable harbours and hazardous shoals can be uploaded into the service and made available to other product owners on the Internet, as needed. It also offers the possibility, to anyone who wishes, to browse nautical chart images freely.

Geographical Information can also be combined with Information Technology to track people or vehicles, or to provide online public transport information. For tracking, Novo has developed a system which enables service companies to locate the employee, whether a locksmith or a doctor, who is nearest to the customer and available at the time needed. Either the Internet or wireless data networks, such as mobile phones, can be used to transfer the required data.

Complete IT Service

As one of the leading IT-providers in the Nordic Area, Novo offers its clients products and services that span the entire IT spectrum. This means, that a customer who chooses Novo's shift planning solution or, let's say, electronic invoicing software, can also obtain all of the necessary related services, from system integration and consulting to hardware.

Novo runs a nationwide service network in Finland and has subsidiaries in Germany, Great Britain, Estonia, the Netherlands, the USA, and China.

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Information Technology Services: Software products, customised software solutions, operating and network services and hardware services

Number of personnel: 2,400

Net Sales 309 million euros in 2002

Established in 1972

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"The customer's account may simultaneously store money for making calls and for sending text messages, space for accumulated bonus money, and a certain amount reserved for international calls, movie tickets and bus tickets, etc. The account also allows a real-time credit limiting service", says Director Tapani Lehtinen.

The billing systems developed by Fujitsu Invia's On-Line Billing Solutions (OBS) unit have managed to gain a global market share of more than three per cent in less than two years. OBS expects to multiply the market share and reach 20 per cent with its billing solutions developed for mobile operator networks.

OBS's billing system enables the operator to set up flexibly operating prepaid, postpaid, and hybrid accounts for its mobile customers.

"The customer's account may simultaneously store money for making calls and for sending text messages, space for accumulated bonus money, and a certain amount reserved for international calls, movie tickets and bus tickets, etc. The account also allows a real-time credit limiting service", says Director **Tapani Lehtinen**.

OBS's innovative payment solutions with their open interfaces not only support mobile payment and m-commerce, but also virtual mobile operators (MVNO). Virtuality here means that the actual network operator provides the mobile connection service, that is being sold and managed by another party under its own brand, range of phone numbers and value added services.

Real-Time Roaming

OBS's customers include the Austrian ONE (Connect Austria GmbH) to which Fujitsu Invia, in collaboration with Hewlett-Packard Telecoms have developed an intelligent network roaming solution using the CAMEL network protocol.

"When a mobile phone is used outside its home network, roaming is traditionally billed afterwards. The system we developed for ONE is able to check that the prepaid client's account balance and calls are charged in real-time, even when outside the coverage of the home network. ONE is among the first operators to offer this sort of service on a global scale", Lehtinen says.

All of OBS's customers operate internationally. Besides ONE, the unit has developed solutions for the British mmO2 (former BT Cellnet) and for operators in Australia and Canada.

In North America, ANSI (American National Standards Institute) network technology is predominantly used, instead of the GSM. Traditionally the customer initially calls the operator's customer service to open an ANSI account. Together with its partner, Integrated Telecom Solutions OBS, has developed a solution that enables the customer to activate an account over the Internet.

"The Internet enables the customer to make use of various services and to receive a real-time list of previously made calls. These services alone bring the operator annual savings of more than four million euros", Tapani Lehtinen calculates.

In developing real-time billing solutions it is Fujitsu Invia's strategy to ensure the operator's freedom to choose any system integrator. This openness is well manifested in Invia's collaboration with ITS.

FUJITSU INVIA

Fujitsu Invia is a Nordic service provider and operator of advanced information systems, implementing and developing systems that bring business benefits for the needs of the networked economy. We assume responsibility for the customer's entire IT infrastructure from design to maintenance.

Fujitsu Invia's net sales for financial year 2001/2002 were EUR 290 million.

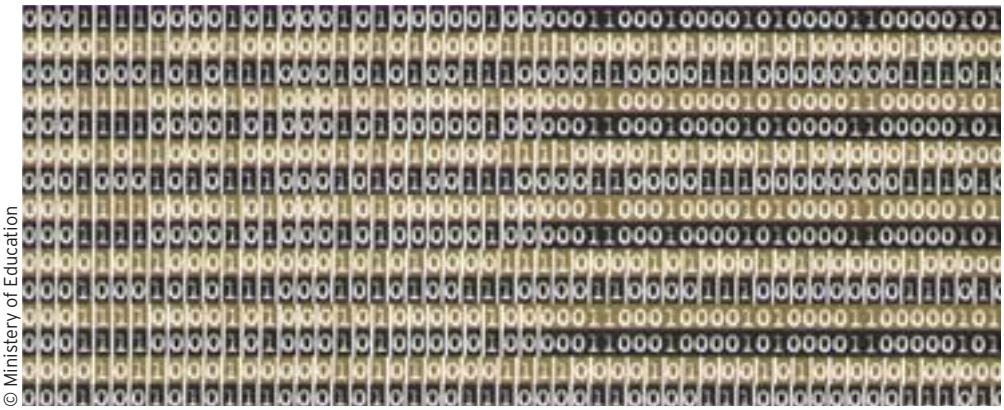
The company employs 2,300 people in Finland, Denmark, Norway and Sweden.

www.invia.fujitsu.com

Fujitsu Invia's On-Line Billing Solutions (OBS) unit has achieved a global market share of more than three per cent.

Gaining Ground in Mobile Payment Market

Finland Aims to Increase **International Content Industry**



© Ministery of Education

A major challenge is to internationalise digital content creation, but with a strong domestic bias. The aim is that in 2007 Finland has some 100 internationally successful enterprises.

The Future Aims

- Finland becomes a leading country in digi know-how, with user training of the highest standard.
- Finland has a significant number of nationally and internationally successful companies in the content field.
- Finland rises to be the leading Nordic country in content creation.
- Domestic content production in the old and new media is abundant and of a high quality both in content and technologically.
- Finland has active, well-resourced R&D in content creation.
- The Government promotes actively access to public information and knowledge resources and develops the forms of digital public information and its commercialisation.
- The communications infrastructure is solid and communications legislation is in order.
- The public and private sectors carry out extensive regional, national and international cooperation with a view to ensuring sufficient intellectual and financial resources for the content industries.
- In order to promote content creation, the Government will develop an administrative model for programme leadership which provides for close collaboration between different ministries in content creation.

A committee coordinated by the Ministry of Education and representing different ministries, institutions, and the information industry, has looked into the strengths and opportunities of Finnish content creation, as well as obstacles and challenges in it. Based on numerous surveys, reviews, and debates, the committee formulated a strategy, including recommendations up to the year 2007. The views presented in it also constitute proposals for the next government negotiations after the 2003 parliamentary elections.

The content creation strategy is based on digital and audiovisual products relating to knowledge and culture. The main aims and their implementations are: prerequisites for business, content know-how, overall telematic framework, and content creation as part of the national innovation system.

The central government is responsible for creating favourable conditions for content creation, for safeguarding the freedom of speech, and for promoting diversity and pluralism. It is thus for the Government to promote high quality and to facilitate the supply of diversified content. The content economy will grow out of the markets created for these products.

A stronger content creation field will entail larger and more international business enterprises, although the decisive factor is always a good business idea. The competitiveness and profitability of enterprises can be improved through networking and partnerships. Content production has a bearing on the entire knowledge and communications cluster, and its employment effect is seen in the growth of knowledge-intensive services industries. The aim is that in 2007 Finland has some 100 internationally successful enterprises which show strong initiative for development.

R&D and the creation and piloting of new innovative content products and services are crucial for the development of the content industry. The best domestic professionals will be gathered together for R&D projects, and co-operation between partners in the value network and the opportunities available in international co-operation will be used to the full.

Further information

www.minedu.fi/opm/hankkeet/sisu/index.html

New Possibilities in Sight

eLearning as a New Export Item

Lifelong learning is both a challenge and an opportunity for all living in an information society. Rapid changes in everyday life pose continuous demands to evaluate personal competence in what ever we do. Information technology and IT connections ease the learning process, however, they do not bear intrinsic value.

Photo Futureimagebank

Finland has a strong cultural foundation and solid expertise in both education and learning using traditional as well as modern equipment. Furthermore, Finns possess tremendous potential for innovation to develop different types of information and communications technology methods – as proof the field abounds thousands of projects and pilots of various kinds. Still, Finland is lacking the total picture and clear policy in the development of eLearning. The freshly published report prepared by the eLearning one-man-committee, Mr. **Markku Markkula,** M.P., dives in depth into the future eLearning scenarios and strategies.

According to Mr. Markkula, the future principle in e-Learning is that Finland will adopt the strategy buttressing lifelong learning and the methods supporting it. The starting point according to him is to combine the numerous small projects and pilots to form major scale undertakings with permanent impact on eLearning.

The future vision also includes commercialization of e-Learning methods, services, and solutions for export. For that Finland needs systematic cooperation via networking of the operators within the field and, especially, the creation of eLearning applications meeting the learners' needs.

Among the eLearning operators are the providers of eLearning materials, providers of eLearning services, and providers of related technological services, as well as educational/learning organizations, the cooperation among which must be developed closer than what it presently is.

eLearning is a field in itself with great growth potential, and one with significant impact on national economy as a whole, firstly by bringing productivity and flexibility advantages to different types of organizations in connection with quality in learning, costs, and speed, as well as in offering a possibility to cut expenses in training. On the other hand, a wide-scale eLearning use will generate new commercial activity in the development of digital contents, technological tools, and eLearning systems, as well as on the service sector supporting them. Also, the markets are global and sizable in volume.

Vaikuttamo Activates Young People

Photo Vaikuttamo

CEO Ville Laurinen (Ambientia Ltd.) and Project Manager Mika Kantola (Media Centre) with Content Manager application and www.vaikuttamo.net website.

Can young people be influenced in that they begin to take an interest in local affairs, at the same time strengthening local democracy through the use of ICT technology? This was the question underlying the project "Students and Local Decision-Making", initiated by the Hämeenlinna Media Centre, the new media company Ambientia and the education authority of the City of Hämeenlinna in 2001.

The very important part of this project is the website "Vaikuttamo" ("Influencer"). The website is designed to disseminate and transfer information, to provide a channel for exerting an influence, and to act as an interactive learning environment.

During its less than two years of operation, the "Students and Local Decision-Making" project and its key element, the website "Vaikuttamo", have proved functional: the young people have worked very actively within the project and have succeeded in making their voice heard better than before. The city is also committed to the project and is serious about improving the opportunities of young people. The project has also been recognised internationally: the "Students and Local Decision-Making" project was selected as the best eLearning project of 2002 in the Eschola competition arranged by the European Schoolnet.

One key point to the great success has been the very flexible and fruitful co-operation between public and private sectors, Media Centre, and Ambientia. Media Centre strives to promote the ICT-skills of individuals and communities in the Hämeenlinna sub-region. Ambientia has designed the visualization and installed their Ambientia Content Manager application to easily manageable content and structure of the website.

The Association of Finnish eLearning Centre

The Association of Finnish eLearning Centre is a newly established, independent national association that promotes knowledge sharing, best practices and quality in eLearning. The Centre distributes information and acts as a contact point for finding partners, experts and service providers in the Finnish eLearning market.

The Centre acts is a networking organisation for the numerous Finnish eLearning projects and regional clusters. We participate in national eLearning policy making and in the work of the both Finnish eLearning programmes in the Finnish Centres of Expertise Programme. The Centre is pleased to provide contact information for international organizations and experts interested in co-operating with Finnish eLearning experts, organizations and projects.

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OPIT. A true eLearning service for K-12 education.

OPIT in Finnish language means "you learn" or "you learned" as well as different disciplines of science.

Photo Futureimagebank

What do schools need from eLearning? That was the question we asked at Werner Söderström Corporation (WSOY) when we designed our eLearning service. Our answer was OPIT, a personal, Internet-based learning service, designed to serve the everyday needs of primary, secondary, and vocational education.

The OPIT eLearning service offers a managed learning environment, customer and systems support and maintenance, and an extensive supply of modular educational content.

The Main Page of the OPIT Service

OPIT is an open learning environment that facilitates the use and purchase of content of any content publisher. Purchased by subscription by the school or the educational department of the city administration, the service is accessible to the end users with an ordinary web-browser and connection to the Internet. The service is hosted and maintained on a 24/7-basis throughout the school year.

OPIT is based on a holistic view on eLearning. At WSOY, we believe that best results are achieved when OPIT is used in "blended learning" – not isolated from the more traditional ways of teaching. Hundreds of experts of eLearning, pedagogy, and multimedia have been involved in the design and development of the OPIT environment and its contents, constantly utilising the feedback we receive from teachers and students.

OPIT is designed to support the everyday needs and routines of schools. The OPIT customer and user support includes pre-sales consulting, consultation in deployment phase, teacher training, and technical support by telephone and email, only to mention a few of the practical features that we have included in the service.

OPIT gives an excellent opportunity to enrich traditional subject-bound teaching by allowing the users to concentrate on

SANOMAWSOY
– LEADING MEDIA COMPANY IN NORDIC AREA

Werner Söderström Corporation – WSOY – is Finland's leading book publisher and the market leader in general literature, educational materials, and a number of specialist publications.

WSOY is a division of SanomaWSOY Group, which is the leading media company in the Nordic region with a presence in 14 European countries. The Group has a strong position in Finland e.g. as a newspaper, magazine and book publisher and in television, kiosk, press distribution, bookstore and printing operations.

SanomaWSOY is also Europe's fifth-largest magazine publisher with leading position in Belgium, the Netherlands, Finland, Czech Republic and Hungary. SanomaWSOY's pro forma net sales totalled about € 2.3 billion in 2001 and it has some 18,000 employees.

www.wsoy.fi/opit/inenglish.htm

problem-based learning and combine information from different subjects and sources. Moreover, OPIT serves as a communication channel, not only between teacher and pupil, but also between teacher and parent.

OPIT offers ready-made contents for the teacher, geared to different subjects, individual topics, or class requirements. In addition, OPIT provides tools for the teacher to produce own material and share it. And monitoring the pupils' progress is easy with a built-in system for feedback.

The OPIT Managed Learning Environment is developed by WSOY in co-operation with Elisa Solutions, one of the leading communications service providers in Finland. WSOY is the market leader in general literature, educational materials, and a number of specialist publication sectors in Finland. WSOY is a division of SanomaWSOY Group, which is the leading media company in the Nordic region with a presence in 14 European countries.

The main page of the OPIT service (above). Below an example of a page for learning English. The names of the objects in the classroom are to be moved to the correct places.

The expertise in digital gaming industry is growing rapidly. Remedy is one of the success stories.

Conquering the Game Markets: Max Payne

Finland is nowadays widely known for its leading communication device and other hardware innovations and companies offering them, like Nokia, Vaisala and Instrumentarium, which was recently sold to General Electrics. On the other hand, it seems that other countries are quicker to develop content and services to these devices and networks innovated in Finland.

In the middle of 1990's there were only a few software companies in Finland all together. Most of them were more or less hobbyist groups rather than business modeled companies. These groups coded so called demos ie. audiovisual computer demonstrations for early home computers, like Commodore64 and Amiga.

Some serious game efforts, however, were made during that time in Finland. Most notably Remedy was founded and two early stage game companies, Bloodhouse and Terramarque, merged to form Housemarque.

By the end of 1990's the results of assiduous programming started to show up in Finland. Data security companies F-Secure, SSH Communications Security, and Stonebeat were listed on the Helsinki Stock Exchange.

Smaller projects from the companies were followed by more ambitious endeavors. Housemarque published its game called Supreme Snowboarding, which was followed by TransWorld Snowboarding to Xbox console with Infogrames in 2002. As early as 1998 the game magazines started the hype about Max Payne game from Remedy.

Playing a Game Business

Max Payne was launched for PC in the summer of 2001. Max Payne is a game classic in every aspect. Basically it is a playable story about Max Payne, a man with nothing to lose.

Max Payne is a New York Ccity policeman who finds his family murdered. Max is caught in the gray no-man's-land between good and evil in his search to seek out those behind the murder of his loved ones in the seedy underbelly of NYC.

Film Noir influences are evident in the extensive and mature plot. A real hook and differentiating point was the bringing of effects from action movies. The game is fueled by the use slow motions, cinematic camera angles, and visual effects normally experienced only in movie theaters.

Max Payne was not only a hit game, it also collected dozens of industry and press awards. The average critic's rating was 90 / 100 for the PC game. Subsequently it was released to Xbox, Playstation2 and a Macintosh version was made. Rights to a Hollywood movie have also been acquired.

There was a time when a single programmer could make a smash hit game. Nowadays the reality of game development is far from the image of a single nerd programming by nights with chips and coke.

Even if someone could make a killer game alone, the actual game development (tools, creation, design; AI physics, 3D, and other programming, as well as the multi-

Kari A. Hintikka
Photos: Remedy &

"The key factor is how the work of twenty young and talented professionals – programmers, level designers, graphic designers, animators, writers – comes together", points out Matias Myllyrinne, Business and Finance Director of Remedy.

tudes of art required) would be only one part of the project. A big question is how to get the players to buy the game?

Matias Myllyrinne, Business and Finance Director of Remedy, points out the importance of creative and technical talents coming together, as well as the external network.

"In our team there are about twenty persons: programmers, level designers, graphic designers, animators, writers... all young professionals and experts in their respected fields, who work tightly together. The key factor is how this all comes together. How the different areas work together and complement each other."

"One of our strengths is that Remedy is effectively networked. Globally we are a focused niche player and we focus on things we can do best. We also own a limited part of the value chain.", Myllyrinne says.

Remedy works in cooperation with multiple key partners, such as 3D Realms, Take Two Interactive, AMD, ATI, Futuremark, Intel, and Nvidia.

"Focus is one of the key principles of our way of doing business. We are very clear about our priorities. We remain lean and flexible. We outsource what is not within our core competency or not a key success factor. We will not divert our own efforts to go after secondary goals, but would consider spinning off what is fundamentally valuable but not in our focus", he adds.

Forming the Strategy

From this basis Remedy has created its current strategy in the game market. "First, develop leading edge game technology and create a hit game with it. The key is to build a brand, not simply another game."

"Once you have the game engine and a recognized hit game, build this into a franchise", Myllyrinne explains.

"Then expand this franchise with outsourced partners, e.g. console ports and game additions. Use this success as a showcase for the companies' technological and design ability and leverage it", he continues.

One key to the success of Max Payne was the enormous and long-lasting hype before the game was released. "The key to building a consumer brand in the entertainment field is word of mouth. Public relations and press relations play a key part in building the right kind of word of mouth – this can later be supported by advertising efforts. I don't believe it could have been done any other way", says Myllyrinne.

"Developing and building intellectual property is the key part in the equation. Successful entertainment brands can have tremendous value, e.g. in many ways Max Payne is The cinematic action game", Matias Myllyrinne emphasizes.

"The way the cost structure works and the hits-driven nature of sales dictate that a brand can have enormous value. The way that game brands are built is not rocket science, it all goes back to basics", Myllyrinne thinks.

"We think a lot in terms of differentiation, positioning, and unique selling points. Naturally these must be reflected in actually delivering what you promise... and the game has to be fun and appealing, not only properly branded and recognizable. Branding is not something you do post-facto, it is a part of the game development process."

Juhani Korhonen, Councellor
Olli-Pekka Rissanen, Project Manager
Ministry of Finance

Online Government: **Progress Report**

Electronic government opens up opportunities for more effective procedures, structural reform, higher administrative productivity, and for improving the quality of service. Information and telecommunications technologies provide one of the most important tools for responding to future challenges.

Information and telecommunications technologies continue to offer remarkable opportunities for public administration renewal. They also provide one of the most important tools for responding to future challenges. Finland, like other industrialized nations, is faced with a change in society's age structure that will shift demand for public services toward labour-intensive services while, at the same time, public services will undergo a changeover of its own personnel as a result of retirement.

Electronic government, and the application of IT in general, opens up opportunities for more effective procedures, structural reform, higher administrative productivity, and for improving the quality of service. Procedures can be lightened and resources, thus, freed reallocated to traditional-type personal services required by seniors.

The Programme of Action to Promote Online Government, published in December 2001, has accelerated progress towards electronic government throughout public administration. This action programme for the years 2002–2003 was formulated by a task group established by the Information Society Advisory Board and chaired by the then MP and current Minister of the Environment, Mr **Jouni Backman**. The programme was accepted by the Ministerial Committee for Administration.

FICOM, Finland's Cooperation Council for Communication and Information Technologies, an ICT industry body, chose the Action Programme for its title of "Information Society Deed of 2002". The programme focuses on the bottlenecks in online government and makes concrete proposals for their solution. It also outlines a vision for the role of public administration in the second half of this decade.

Brush up Your Service Strategies

Networked services and the utilization of ICT cannot be separate islands, as they form a crucial part of an agency's core activities. Merely automating an existing service does not suffice. Service processes have to be re-evaluated. The central proposal of the action Programme is that each agency should formulate an electronic services (ES) strategy that is integrated with its overall functional and service strategy.

Strategy training to support agencies in this work was begun in September 2002. Assistance is given in drawing up a work plan as a basis for agencies to elaborate independently their own ES strategies. Interest in strategy training exceeded expectations, with 48 out of 130 government agencies taking part.

ES strategies will become part of the government budget process by including them in the activities and financial planning cycle of each administrative branch.

Municipalities need ES strategies as well. The Association of Finnish Local and Regional Authorities is preparing a document, "Local e-Government 2002" in order to provide municipal authorities with guidance in the design of their ES strategies.

Management Training for Online Government

One of the main recommendations of the Action Programme concerns top management training to enable it to take advantage of ICT. The task group that authored the Programme (the group itself was made up of top managers) saw a genuine need for such training.

The provision of online services implies the adoption of new activity and service paradigms. This presents a tough challenge, in particular to management. A generalist manager is likely to feel insecure when faced with the procurement of a new IT system or service. This feeling is reinforced by the special terminology, acronyms, and neologisms in the field.

The training programme is designed to provide the manager with competence to seize the opportunities offered by technology for the development of the services and the overall functioning of his agency.

The aim is to attract about a quarter of the managers in central and municipal government, or about one thousand persons, to attend this training that will start in early 2003.

Banks' ID Procedures Accepted for Public Services

The secure identification of clients of online services is a topic for continuing debate. Electronic authentication based on

Jouni Backman

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the Public Key Infrastructure has not caught on as rapidly as expected, although the Population Register Centre has been providing digital certificates since 1999. New approaches will be available soon as the electronic ID card will be modified to contain health insurance information, thus making the card more widely useful. Work is under way to allow for the attached processor card (SIM card) of a mobile phone to be used for authentication. However, it will take time before PKI-based authentication is in wide use.

The Action Programme suggests that the use of banks' authentication systems for online banking should be permitted for using public services. These systems are usually not based on digital certificates but on more "light-weight" methods such as a set of one-time passwords. Over half of adult Finns do online banking and are, thus, familiar with these authentication procedures. In principle, online banking authentication could be adapted for most public services, particularly for those that carry a charge.

In August 2002, the Ministry of Finance followed up on this suggestion with a recommendation that central government online services may offer online banking authentication in addition to or instead of PKI-based authentication.

Challenges Ahead for Welfare and Health

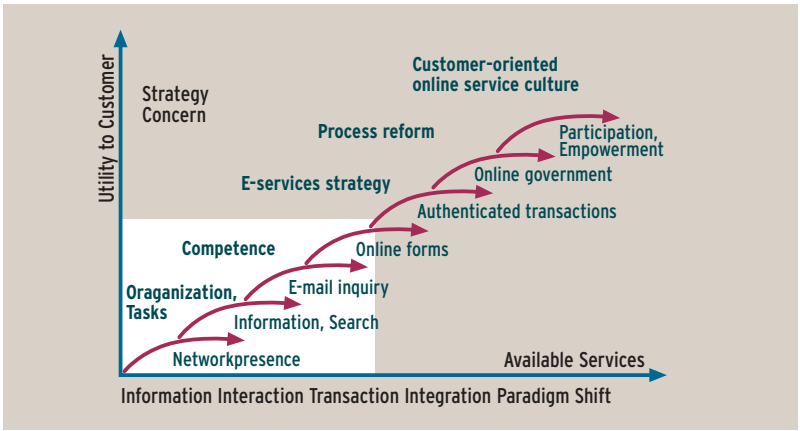
The sectors of Social Welfare and Health are expected to face the severest challenges as the age structure of population changes. Although privacy considerations place limits to the processing of the huge masses and flows of data in health care, the potential benefits of increased ICT application in this area are great, perhaps greater than in any other sector of public administration. So far, this potential has been tapped to a limited extent only.

To support the development of electronic applications and online services, the Ministry of Social Affairs and Health has established three projects or task groups:

- Seamless service chains and supporting IT solutions
- Steering group on technology development
- Social Welfare and Health Information Systems 2005 overhaul.

Action Under Way

The Action Programme on Online Government has been well received both in and out of public administration. It is seen as a useful device for promoting electronic services in government. The Programme has given new impetus to a number of matters that otherwise would have progressed more slowly or not at all. Although the proposed time schedules are tight, a great majority of the Programme's sixteen action items have got off to a good start, although some of them have been slightly delayed.



Steps to Online Government

The Action Programme was premised on austerity in that its implementation would not necessarily depend on new money but could be, in most cases, financed by the reallocation of existing budgets. Only three of the proposed projects require separate financing. In spite of the premise and the scarcity of financing, implementation of the Action Programme is off to a flying start.

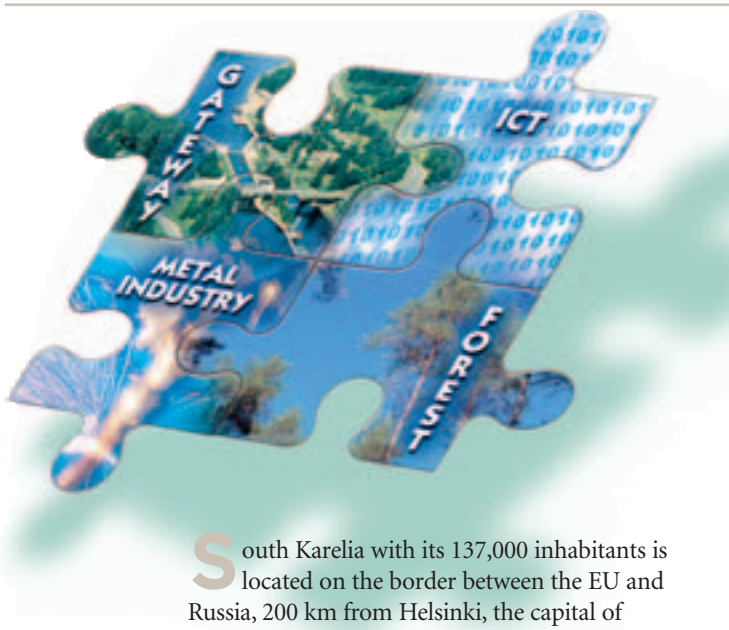
Now, at the halfway mark of the Programme, it is time to ask, where do we go from here? Finland will hold parliamentary elections in March 2003. Expectations are directed at the next government and its programme. In its report at the end of 2002, the Information Society Advisory Board recommended that the next government initiate an Information Society Programme under the responsibility of one single minister.

The Information Society Advisory Board was established in 1996 to assist the Finnish Government in formulating and evaluating information society policies. A cabinet minister chairs it and its members are permanent secretaries and other high level civil servants from state and municipal administrations as well as IT industry leaders.
See the website: www.infosoc.fi.

Additional information on the Programme of Action to Promote Online Government:
www.infosoc.fi (Reports in English)

South Karelia Region

Crossing the Border in ICT Business



South Karelia with its 137,000 inhabitants is located on the border between the EU and Russia, 200 km from Helsinki, the capital of Finland, and 200 km from the 7 million inhabitants metropolis St Petersburg. With this strategic location, South Karelia has prospered from international commerce for centuries – and the business prospects are now better than ever before. The EU – Russia cross-border operations are everyday activities in business, logistics, research and technology transfer – making the region an ideal base for international trade.

Bridging the EU to Russia, South Karelia educates Finnish students in Russian business and Russian students in information technology, thus creating a strong resource base with high education, cultural awareness and linguistic proficiency.

Prospering with the Forest Industry – Innovating with the ICT

The combination of ICT and industrial expertise creates new business opportunities in the region.

South Karelia treasures an exceptional technology intensive hub of forest industry, with several large research and production units of international enterprises, supported by research and higher education of Lappeenranta University of Technology (LUT) and Polytechnic. South Karelia is a natural home base for both small and large scale subcontracting, consulting and ICT companies dedicated to serve the forest industry around the world.

LUT along with Technology Centre Kareltek – with its business premises and development services on-campus – have served as catalysts for innovation and business expansion in the ICT sector, especially in mobile technology. South Karelia also boasts a growing number of innovative ICT companies specialized in high value-added IT services for forest, energy, as well as process and manufacturing industries. The trend will be further stimulated by the interdisciplinary research institutes like Telecom Business Research Centre (TBRC) and Intelligent Industrial Systems Laboratory Center.

Due to the geographical location South Karelia is an optimal place for an international ICT company to set up a base for Russian business. Lower cost level than e.g. in Helsinki area and committed high skilled employees make South Karelian R&D sites most profitable in comparison with the other regions in Finland. In addition to the Russian market potential there are ICT resources available. The St. Petersburg region develops an ICT hub of top universities, research units, and dynamically developing local and international companies. The range of ICT companies with experience of co-operation with western partners is expanding all the time; interesting prospects for outsourcing are available in software and software component development as well as testing with benefits of a cost structure.

In an ICT "proximity center" the partnering companies from the both sides of the EU – Russia border can have offices next to each other in the EU. The daily co-operating development teams can be located in e.g. Technology Center Kareltek in Lappeenranta, while the programmers can work in their hometown on the other side of the border. When needed it is also easy to have a business meeting on the Russian side of the border during a working day.

In South Karelia people value the environment in which they live and work. The region is the place for global ICT companies that value committed people.

ADDITIONAL INFORMATION:

www.kareltek.fi
www.ekarjala.fi

Jyväskylä
Human Technology City

Jyväskylä Science Park is located around the beautiful lake Jyväsjärvi.

During the past decade, Information and Communication Technology (ICT) has become one of the cornerstones of industry in Jyväskylä. ICT businesses in Central Finland currently employ about 4,000 professionals with the number of new openings increasing at an annual rate of 15–20 %. The slow development of Electronic industry has been more than compensated by the positive development of software sector. Strong growth is predicted to continue in the near future and the number of employees in the region's ICT industry is expected to more than double in the next years reaching nearly 10,000 by 2010. ICT professionals will also be employed in other fields and industries effectively transforming the region into an Information Society.

Tap into Our Knowledge Base

The fast growth of vacancies in the ICT industry is largely a result of increased educational opportunities provided both by the University of Jyväskylä and Jyväskylä Polytechnic. With some 700 new ICT majors admitted in autumn 2002, the total number of students in the field will rise to 3,500 by 2004. The correct timing of educational investments has enabled quick development of ICT business activities in Central Finland. Thanks to additional investments in education and training, the availability of ICT professionals in Jyväskylä will be good in the years to come.

Globally Oriented Growth Business

ICT companies in Central Finland focus on software, data communications, digital media, utilization of network technologies, and industrial automation. The teaching and research practiced at the University of Jyväskylä and Jyväskylä Polytechnic provide ample support for the region's current ICT businesses as well as expertise for future needs in fields such as digital media, the Internet, mobility, content, and their combination. One of the future breakthrough areas will definitely be handheld devices and mobile applications for their worldwide exploitation.

Nokia started its operations in Jyväskylä at the end of 1999. Nokia's units in Jyväskylä include Nokia Mobile Phones and Nokia Networks. Nokia Mobile Phones focuses its product development on cellular phones and TETRA (Transeuropean Trunking Radio) terminals while Nokia Networks developes software for IP (Internet Protocol) mobility networks. Besides Nokia's own staff, that has since 1999 risen to about 400 people, Nokia employs a number of local subcontractors.

Most ICT companies in Central Finland operate in global markets. Some of the biggest players include Nokia's units mentioned above, the Yomi Group, TeliaSonera, Enermet, and TietoEnator. Small and medium-sized growth companies have been involved in the national Global Software Program targeting the U.S. markets. The program provides software companies with the opportunity to implement their internationalization strategy through "hands on" training.

Incubator Services for Newcomers

Jyväskylä is also the site of one of the best technology company incubators among the Finnish Technology Centers. Incubation activities in Jyväskylä, managed by the Jyväskylä Science Park, have ten years history during which some 140 companies have been incubated. Three fourths of the companies work in the ICT industry and by 2010 an estimated 300 tech companies with a total revenues of hundreds of millions of euros have undergone the incubation process. In addition to injecting more versatility into the region's industry, the incubation activities have also helped several startup companies grow into considerable medium-sized enterprises.

Most technology companies are located by the lake, in the center of Jyväskylä. The Jyväskylä Science Park area, also near the lake and adjacent to the University and Polytechnic, is well on its way to housing a considerable part of the region's high-tech businesses. The district currently employs some 2,400 people in 170 companies with a target of 3,000 employees in 2004. Adding to this figure other people involved in the ICT industry, including ICT teachers, researchers, and majors, the total number of ICT persons that are working in the vicinity of the Jyväskylä Science Park will rise from 7,000 to 10,000 by 2006.

Jyväskylä – a Good Place to Live

Jyväskylä is a youthful and lively city. The bustling university and the dynamic polytechnic help to give the city its international flavour. It is easy to get to Jyväskylä either by land, water, or air. It is one of the fastest growing cities in Finland. Jyväskylä's multicultural character and international contacts are its wealth. They broaden the worldview and bring colour to the life of its citizens.

Jyväskylä has the advantages of a small town, without the drawbacks of a big city. Comfort and safety characterise the city, as well as short travel distances. Housing on offer ranges from your own lakeside home to a flat in the heart of the city centre. Services of high quality are provided to citizens of all ages. The multi-faced environment provides excellent opportunity for relaxation and leisure. The Jyväskylä region is the sportsperson's paradise. Those who love culture are no less fortunate either. In Jyväskylä, you sense the original Finnish culture, and you are bound to feel at home, wherever you come from.

Manuel Castells and Pekka Himanen:
The Information Society and the Welfare State.
The Finnish Model. Oxford University Press, 2002

The core of the Finnish model is a virtuous cycle between the state and business, between the welfare state and the information economy. The welfare state means a public, free, high-quality education system, where you are paid a student salary for going to the university. Health care is also public, mainly free and high-quality and a universal right not depending on the employment status. Basic pension is also covered regardless of your work status. There's also a public and affordable child care system, which is run by highly educated child development experts. The welfare state covers all people. The welfare state also includes the fact that 80 % of the labor is unionized, compared to 13 % in the US. All of this protection has made big changes possible in Finland (such as the network enterprise with more flexible labor) because people don't feel that their basic security is threatened.

The welfare state also produces highly educated people for the IT companies to continue their success. The Finnish model is also business-driven like the United States or Silicon Valley, but the state has facilitated the transformation of the Finnish economy into the information economy.

The state has promoted an open regulation and standard environment, which has been a very critical factor for the Finnish mobile telecommunications success through transnational standards like the NMT and GSM.

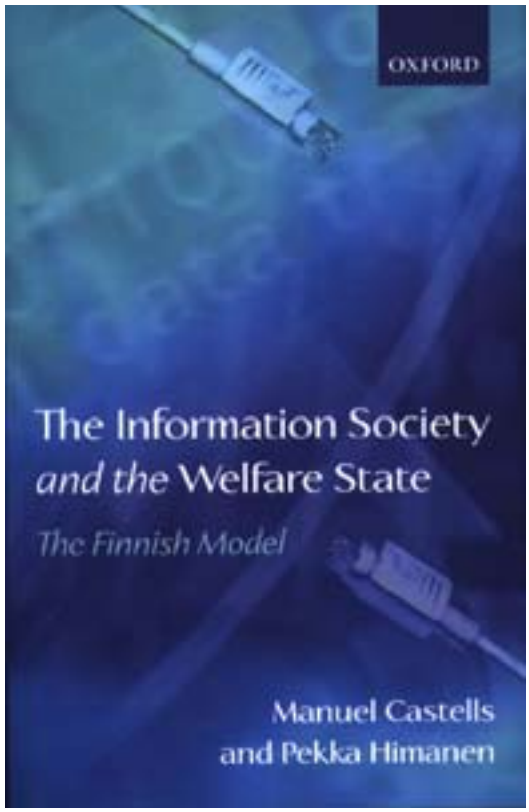
Agencies like SITRA, the public capitalist, and TEKES, the public R&D fund, have had a significant role in pushing Finnish companies to high tech and financing this risk.

The state invests in the education and research system. The national R&D investment is 3.1 %, compared to 2.6 % by the US and 2.0 % by the advanced economies on average. And it's especially geared toward scientific and technological knowledge. 27 % of tertiary students are in science and engineering, which is almost the double of the average in the advanced economies.

The education system is also one of the key elements of inclusion in the Finnish model. In Finland, the children's opportunities to get a high-level education don't depend on the status of their parents but basically everyone has equal opportunities. This means that the potential of the Finnish talent is used very fully. Currently, more than 2/3 of the new age classes get a university level education.

Ultimately, this unique Finnish combination of the welfare state and the information society results in an economically and socially positive virtuous circle: the welfare state produces highly skilled people to innovate in the IT companies, which creates economic growth that makes it possible to continue the financing of the generous welfare state and further public investment in the nation's innovation capacity. The protection that people feel because of the welfare state makes even big changes that the information economy requires socially possible, and the fact that the benefits of the growth are enjoyed more equally makes this model socially sustainable.

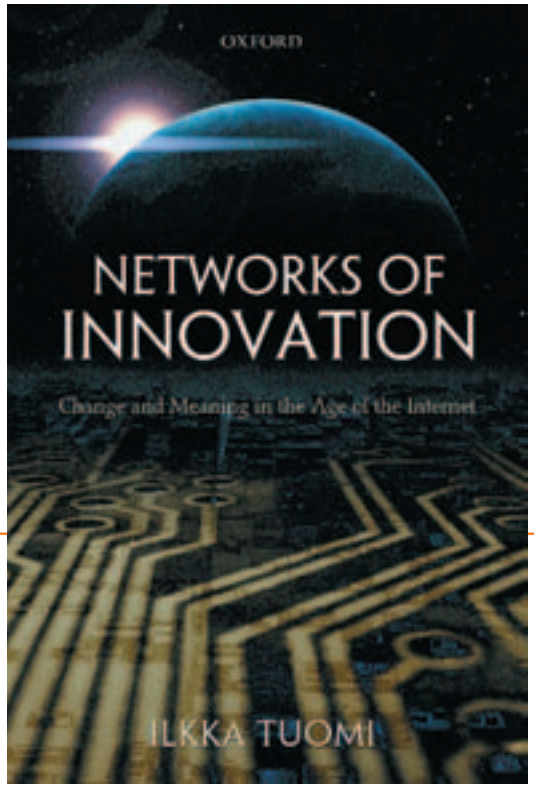
This is very critical in our time where the global information society is widely seen as a threat and thus resisted. Although Finland can't provide a model to imitate for others and is in no way without its problems, there are elements in the Finnish model that we can learn from. And to prevent the deepening of the current global social tensions, we had better to start seriously thinking about how the information economy can be socially sustainable.



Pekka Himanen

[book resources]

Ilkka Tuomi:
Networks of Innovation.
Oxford University Press, 2002



We are moving towards a networked innovation economy and it is becoming increasingly important to understand those social processes that underlie innovation and technological change. The traditional concept of innovation emphasised the role of heroic innovators who were understood to be the key actors in the emergence of new technologies, products, and services. The history of technology is packed with stories of inventors and entrepreneurs fighting against odds, solving problems, realising opportunities, and finally making the future real.

Well, reality, strictly speaking, was never created that way. Instead of heroic innovators, the future of new technologies was often created by heroic users who misused new products and technologies for their own particular purposes. Almost always the dominant uses of new technologies became as a surprise to inventors and entrepreneurs.

You know: Telephone was to be a medium for broadcasting concerts, church services, advertisements, and lullabies; The World Wide Web was to be a document management system; The Short Message Service in the GSM was to be used to let the phone user know there was voice mail waiting.

Engineers and entrepreneurs almost always seem to get it wrong. This relatively simple observation made me curious. How, actually, new technologies become real? What theoretical approaches could we use to build a better theory of innovation? In particular, I was interested in connecting research on social learning and knowledge creation to innovation and technology studies.

To build elements of such a theory I focused on the analysis of the emergence of some key Internet-related innovations. The rationale was simple: although Internet-related innovations may be special in the sense that they are inherently networked and software-intensive, in the network society such innovations will play an increasingly important role. If the Internet, email, and the World Wide Web, for example, were key innovations of the last century, certainly it would be interesting to understand how they became what they are. Linux was also an interesting case. Its open source development model relied extensively on social and technical networks and seemed to break the assumptions of the conventional theories of innovation and economy. So I decided to do an in-depth study on the evolution these technologies.

The position from where I approached these questions was perhaps somewhat exceptional. I guess I was among the first Finns to join the Internet. My first book on hackers and computer networks came out in 1987, the same year that I was recruited to the knowledge technology group in Nokia Research Center. For over twelve years, I lived at a busy crossroad of science, technology, business strategy, and organisational development. Since the early 1990s, I had been working intensively in knowledge management, both in theory and in practice, at the same time trying to make sense of the transformation of the information society. From that position it was relatively easy to see how important it is to connect theories of social change, learning, sense making, and technology development. Moreover it was clear that such a study would have implications for technology policy, innovation management, and, for example, intellectual property rights.

Networks of Innovation is the result of this work. It integrates multiple theoretical disciplines and detailed analyses of the evolution of Internet-related innovations, and develops foundations for a new theoretical and practical understanding of innovation. It covers topics ranging from fashion to history of art, and includes the most detailed analysis of the open source development model so far published. I

Photo Elina Söyri

Ilkka Tuomi

Pentti Sydänmaanlakka:
An Intelligent Organization.
Integrating performance, competence and knowledge management. Capstone, 2002

Wherever we are employed, the likelihood is that we are working long hours and dedicating a huge amount of our time to the organization. That makes it particularly tragic that so many of them are operating inefficiently. But the pressures grow by the day, both from internally and from the external global environment. So it is imperative that we learn to continuously develop our operations to enable our organization to stay competitive. And we need to do that in an intelligent way, by taking account the perspective of the individuals, the teams and all the personnel that form the organization. A competent and motivated personnel is ultimately the only permanent competitive edge that a company can achieve.

The purpose of the book is to find answers to how we can develop the ideal organization for the future, one that is efficient, capable of learning, and sensitive to the well-being of its personnel all at the same time.

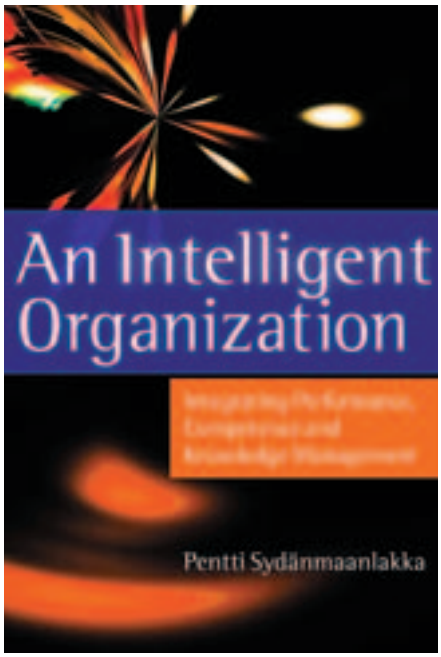
Since the profits of our organization must continuously improve if it is to survive, then the performance of the organization and its personnel need to improve at the same rate. And that performance depends on the competence we have in our organization, our teams and individuals. It consists of knowledge, skills, attitudes, experience, and contacts, as well as the organization's processes, operational models and culture. Competence management has become a success factor for our organization.

The purpose of the book is to answer the following questions:

- How can we improve the organization's capacity to learn?
- How can we manage and systematically develop the competence needed in the organization?
- How can we improve the performance of the personnel and the entire organization?
- How can we achieve better business results?
- How will we manage in the ever more competitive global business environment?

And, perhaps most importantly, we will look at how to achieve all these objectives at the same time as thinking about the viewpoint of individuals. That means integrating the efficiency, the renewal and the well-being of the organization.

The content of the book is divided into five chapters. In the first chapter, we will try to understand what



Pentti Sydänmaanlakka

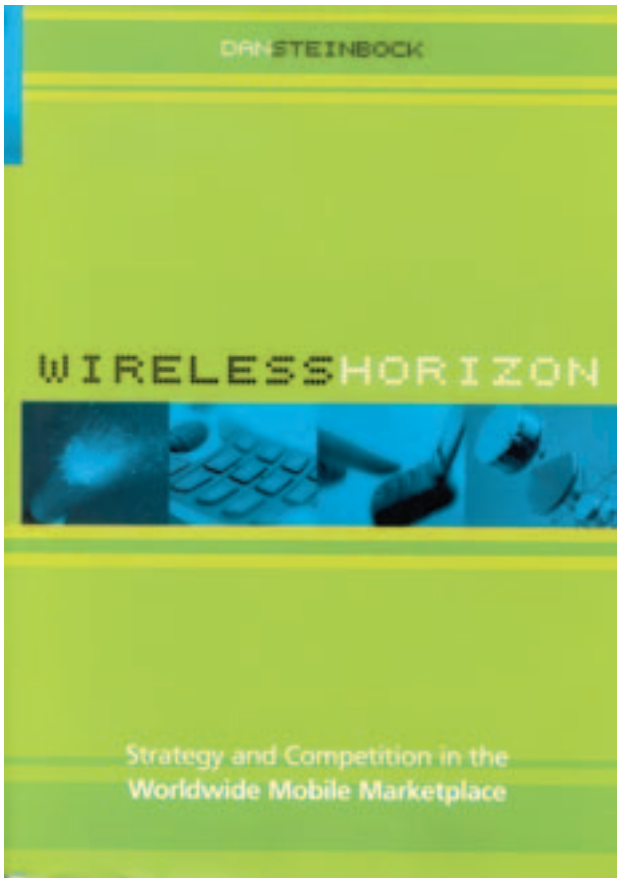
organizational learning is all about–defining it as the ability of the organization to renew itself by changing its values, practices and processes. The second chapter deals with performance management, and the third chapter deals with competence management. In the following chapters we deal with knowledge management and discusses what makes a truly intelligent organization.

The process of building an intelligent organization is not necessarily an easy one. It demands a radical change in the way we think. We have to build a new framework that will help us to perceive the world differently and to see just how the individual, the team and the whole organization interrelate with one another to form an intelligent entity. We have to challenge our present beliefs (paradigms). We have to renew our thinking. In today's changing environment we need to dismantle our present beliefs and create new values.

And these new organizations will display intelligence itself in a new form. It will be composed of intellectual, emotional and intuitive intelligence, together forming a creative intelligence. And this creative intelligence will help us to create a bright future where enlightened organizations will make it good to work and, correspondingly, even better to live.

[book resources]

Dan Steinbock: **Wireless Horizon.** Strategy and Competition in the Worldwide Mobile Marketplace. Amacom Books, 2002



Dan Steinbock

In the annals of business, few industries have experienced more explosive growth than mobilecommunications. And few have struggled so hard to achieve it. Faced with complex regulations, fierce competition, and perpetual change, the companies and nations at the forefront of the worldwide mobile marketplace have forged brilliant strategies, policies, and innovations for dominance in a near borderless industry.

What factors have made some companies succeed and others fail? Why are excellence in differentiation, cost, and innovation no longer enough to win? How was a venerable company like Motorola overtaken by a faraway vendor like Nokia? Why did NTT DoCoMo stumble when it tried to transport its phenomenally successful i-mode to overseas markets? At what point did China surpass the U.S. in number of cell phone users? What is Microsoft doing behind the scenes to try to dominate the mobile Internet?

These questions and thousands more are answered in Wireless Horizon, a comprehensive and in-depth study of the fast-paced, ever-changing wireless communications industry. While other books focus on a single region-giving readers a one-sided, myopic vision of this vast, worldwide business-Wireless Horizon provides the first truly global perspective, including:

- An insightful analysis of the strengths and weaknesses of all core clusters and lead markets: the United States, Western Europe and the Nordic countries, Japan, and China-including a thorough investigation of the world's leading network operators
- Invaluable studies of the competitive strategies employed by the world's leading equipment manufacturers-Motorola, Ericsson, Nokia, and newcomer Qualcomm (and their contractors)-including what worked and what didn't
- An intriguing glimpse at the struggle between mobile leaders and IT giants like Microsoft, Intel, and America Online to dominate the next-generation wireless Web
- A brief history of the wireless industry, from Guglielmo Marconi's 19th-century introduction of a commercially viable wireless telegraph...to the emergence of AM wireless communications...to the transition to FM and pre-cellular service platforms...to the successive waves of new cellular standards
- A clear overview of the technologies that have revolutionized the way we work and socialize, including the rise of AMPS, the explosive growth of GSM and digital cellular, the emergence of CDMA, and the future transition to broadband cellular
- An informed projection of what lies ahead for the future of mobile communications.

Complete with a wealth of photographs, charts, and graphs, this in-depth, behind-the-scenes overview of the mobile communications industry is invaluable for industry practitioners, policy makers, technology observers, trade specialists, globalization experts, investment analysts, market researchers, and general business readers.

Looking for partners in Finland?

Trying to find someone to serve as a retailer, partner, ITC supplier, etc? Try the below listed companies in TIEKE's database PERTTI! Additional information available via http://palvelut.tieke.fi/pertti/search.eng.shtml

A

Abako Mediat Oy
Almare Systems Oy
Altcomp Finland Oy
AM-Consulting Oy
Analyste Oy
Aronet Oy
AtBusiness Communications Oy
ATK-Kumppani Oy

B • C • D

BellStream Oy
Cardinal Information Systems. Oy
CE Computer Excellence
Code 59 Oy
Coder Oy
Compusystems Oy
ConCom Consultig Oy
Contastic Oy
Data Tree Oy
Datafrank Oy
Datamar Oy
DM Soft Oy
DP-Group Oy Ab
DT-Link Oy

E • F

EC Project Solutions Oy
Edimaster Oy
Elinar Oy Ltd
Elma Oy Electronic Trading
Eneris Solutions
Enfo Oy
Entegra Oy
EP-Engineering Oy MediaSolution
EscNet Oy
Esdata Ab
Espina Oy
Eterra Systems Oy
Everscreen Mediateam Oy
Expericon Oy
Finnish Support Center FSC Oy
Fivetec Solutions Oy
Flowman Oy
Fortum Oil and Gas / Neste Data
4 C Center Ltd
FRENDS Technology Oy
Fujitsu Invia Oyj
Futursoft Oy

G • H • I

Gordion-talousjärjestelmä Oy
Gutta Oy
Hand Held Systems Oy
Hannu Säles Oy
HCI Productions Oy
Helsoft Oy
ID Application Oy
ID-Systems IDS Oy
IFS Finland Oy Ab
Inmecon Oy
Innofactor
Innosyst
Innovatics Ky
Insinööritoimisto Visetec Oy
Iocore Solutions Oy
iQs Partners Finland
IT Mill Oy
IT Solicom Oy
IW-Net Oy - Image World

J • K • L

JA Tietoteollisuus Oy
Javerdel Oy
Joensuun Tiedepuisto Oy
JPP-Soft Oy
Jukanlan Dataranch Oy
Jyväskylän Teknologiakeskus Oy
Kauniskaari Oy
Kehätieto Järjestelmäpalvelut Oy
Konsultointitoimisto
Kirjava kana Oy
Kunnondata Oy
Link Line Oy
Logium Oy

M • N

MajorBlue Company Oy
Mansoft Oy
Manycom Software Oy
MAR Innovation
MAVI-Systems Oy
Mediamaisteri Oy
Melba-Group Oy
Mikrolinna Oy
Mobisoft Oy
MSG Software
MultiCom Software Oy
Nasta-Tieto Ky
Neliapila Ohjelmistot Oy
Netek Professional Services Oy
Netwell Oy
Nitro FX Oy
Nixu Oy
Nolics Oy
Nomini Networks
Nomis Oy
Novo Group Oy
Novo Meridian Oy
NSD Consulting Oy

O • P • Q • R

Obin
OF-Open Forms Oy
Ohjelmointi Yhtymä Oy P&O Oja
Onesta Solutions Oy
Oracle Finland Oy
People Group Data PGD Oy
Positron Oy (Alpha Positron Oy)
Procomp Solutions Oy
Profium Oy
Progman Oy
Prog-Net Oy
Prosessilaskenta Oy
Prosolv-Problem Solver
PT-Controlnet Oy
Purmon Tietotupa Oy
Quartal Oy
Ravensoft Oy
RAXCO Finland Oy
Regex Oy
Republica Oy
Rex Partners Oy

S

SAIMAsoft Oy
Samlink Oy
Saraware Oy
SeBitti Oy
Siemens Business Services Oy
Smilehouse Oy
Softconnection Oy
Software Point Oy
Solagem Oy
Space Systems Finland Oy
SQ Consulting Oy
Stonesoft Oyj
Sybase Finland Oy
Syncron Tech Oy
SysOpen Yhtiöt Oy
System Profes Oy
Systems Garden Oy

T

Takapiru Oy
Tampereen Teknologiakeskus Oy
Hermia
Team4 b Oy
Teamware Interactive
Telekonsultointi Ilmonen Oy
Thinking Business Group
Tietoenator/Lean System
TietoEnatorTechnology Oy
Tietoniksi Oy
Tietonovo-yhtiöt Oyj
Tietosuunta Oy
Tietotapio Ky
Tieto-X Oyj
Tinero Oy
TJ Group Oyj
Trival Oy
TTKK, Teollisuustalous
Turun Teknologiakeskus/
DataCity Center

U • V • W • Y

Uniknit Oy
Unite Oy
Vakka-Data Ky
Valimo Wireless Oy
Wapice Oy
Western Systems Oy
Vetokonsultit Oy
Viasys Oy
Visulaway Design Oy
WM-Data Consulting Oy
VoiceNet Oy
Yomi Solution Oy

Helena Roine-Taylor
TIEKE Finnish Information Society Development Centre

http://www.e.finland.fi

The new site, officially introduced in the early autumn of 2002, brings you to Finland, the technological heartland of Northern Europe.

e.Finland.fi offers its visitors accurate and up-to-date information on Finnish ICT know-how and Finnish Information Society functions and solutions in a nutshell, introducing Finland as what it has rapidly become – a country where Information Society of tomorrow is a reality today.

The daily updated site offers information in the form of timely expert articles, statistics, and fresh news on a wide range of Information Society related topics under the main headings of eBusiness, eGovernment, eEducation & eCulture, Mobility, and Research & Development.

Finnish Information Society in Facts and Figures

Finland is often referred to as an Information Society laboratory and, as such, has become a subject of keen curiosity the world over. e.Finland.fi was estab-

Visit e.finland.fi – experience Finnish Information Society!

For additional information contact Editor-in-Chief Helena Roine-Taylor, TIEKE
tel. +358-9-4763 0312 or
e-mail helena.roine-taylor@tieke.fi

A Window to Finnish Information Society

lished for global audiences to satisfy this curiosity, offering all Information Society related facts and figures focused into the single site.

During the few months of its existence, the site has proven to be an appreciated and frequently visited tool for those it is primarily directed to, mainly international businesses, R&D organizations and, in general, parties engaged and interested in the development of global and local information societies. Presently by far the largest group of daily visitors are from the United States with EU countries and Asia coming next. Over all more than 80 % of the visitors are either from foreign countries or users of .edu, .org, .com, etc. domains.

Bi-Weekly News Letter and Articles of the Month

e.Finland.fi serves its audiences by publishing a bi-weekly News Letter and timely, sharply focused Articles of the Month.

The News Letter reaches its steadily growing group of subscribers on all continents of the world.

The articles of the month concentrate on topics ranging from new trends ICT has introduced into education, to achieving accessibility to all regardless of age, social standing, or handicaps, to data security and data protection challenges posed by Information Society activities, and even zooming in on the Finnish model of information society.

Joint Venture in Wide Co-operation

e.Finland.fi is built and maintained in wide cooperation with several ministries and national promoters of information society. The basic idea of the site is to provide all interested parties a single site offering a concentration of Finland's information society activities, thus eliminating the need to search for information from several sources.

Ministry for Foreign Affairs
http://www.formin.fi

Ministry of Finance
http://www.vm.fi

Ministry of Transport and Communications
http://www.mintc.fi

Ministry of Education
http://www.minedu.fi

National Technology Agency (Tekes)
http://www.tekes.fi/eng/default.asp

Finnish National Fund for Research and Development (Sitra)
http://www.sitra.fi

TIEKE Finnish Information Society Development Centre
http://www.tieke.fi

Related sites:

Basic Information about Finland
http://virtual.finland.fi/

News from Finland
http://virtual.finland.fi/news/

Finland in Brief

Photos Ossi Partanen and Futureimagebank

Midsummer celebrations during the summer solstice on June 21 mark the longest day in the Northern hemisphere. This most important holiday in Finland during the summer is celebrated with bonfires, dancing outdoors, and eating and drinking galore, often to excess! Being that Midsummer technically is also the beginning of the end of summer as, from this point on, the sun will traverse the sky at lower altitude on each subsequent day, it just has to be celebrated to its fullest!

Geography

- Total area: 338,000 square kilometres, of which 10 % is water and 69 % forest
- 187,888 lakes, 5,100 rapids and 179,584 islands; Europe's largest archipelago, including the semi-autonomous province of Åland.

Distances

- 1,440 km north to south, 540 km west to east
- Finland's land border with Russia (1,269 km) is the eastern border of the European Union.

Climate

The climate of Finland is marked by cold winters and fairly warm summers. In the far north of the country the sun does not set for about 73 days, producing the white nights of summer. In winter the sun remains below the horizon for 51 days in the far north.

In summer the temperature quite often rises to +20 Celsius or more and occasionally goes close to +30 in southern and eastern parts of the country. In winter, temperatures of -20 Celsius are not uncommon in many areas. Finnish Lapland invariably has the lowest winter temperatures. The mean temperature in Helsinki in July is +17 Celsius and in February -5.7 Celsius.

The People

- Population: 5.2 million, 17 inhabitants per square kilometre
- 67 % live in towns or urban areas, 33 % in rural areas
- About one million people live in the Helsinki metropolitan area
- Finland has a Sami (Lapp) population of 6,500.

Principal Cities

Helsinki (559,716)
Espoo (221,597)
Tampere (199,823)
Vantaa (181,890)
Turku (174,619)
Oulu (124,588)

Languages

Finland has two official languages, Finnish and Swedish.

Finnish, a Finno-Ugric language, is spoken by 93 % and Swedish by 5,6 % of the population. Sami (Lappish) is the mother tongue of about 1,700 people.

Religion

85 % Lutheran and about 1 % Orthodox.

History and Governance
Some important events in the history of Finland:

- 1155 The first crusade to Finland by the Swedes. Finland becomes part of the Swedish realm
- 1809 Finland is handed over to Russia by Sweden and becomes a partly autonomous Grand Duchy under the Russian emperor
- 1917 Finland's declaration of independence on December 6.
- 1919 The present constitution is adopted and Finland becomes a republic
- 1955 Finland joins the United Nations
- 1995 Finland becomes a member of the European Union.

President
The head of state is the President of the Republic. The President is elected for a six-year term by direct popular vote. The incumbent, President Mrs. **Tarja Halonen**, was elected in 2000.

Parliament
Parliament consists of one chamber with 200 members. The members are elected for a four-year term by direct popular vote under a system of proportional representation. Elections will be held in March 2003.

The Government
The Government formed in April, 1999, is headed by Prime Minister **Paavo Lipponen**, the leader of the Social Democratic Party. The coalition consists of the Social Democratic Party, the National Coalition (conservative), the Left Wing Alliance and the Swedish People's Party.

The Economy
In 2002, Finland's GNP per capita was 26,872 euros.

Value of Exports
In 2002 the value of export was 47,05 billion EUR (advance estime, source: National Board of Customs)

- EU total 25,37 billion EUR
- External trade 21,67 billion EUR

Value of Imports
In 2002 the value of import was 35,37 billion EUR (advance estime, source: National Board of Customs)

- EU total 19,72 billion EUR
- External trade 15,64 billion EUR

Currency
The Finnish currency unit is the euro. Finland was one of the 12 EU countries that started using euro denomination in 2002.

More information about Finland:

Virtual Finland
http://virtual.finland.fi

Parliament of Finland
http://www.eduskunta.fi/efakta/index01.htm

President of Finland
http://www.president.fi

Goverment
http://valtioneuvosto.fi/liston/base.lsp?k=en

[editorial] Finnish Information Society – Still Goin
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In the New World of Communica- tions, the Right Par
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Payment Market. | Fin- land Aims to Inc
Sight Export Item from eLearn-
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OPIT. | The expertise in digital gaming industry is
growing rapidly. Remedy is one of the success
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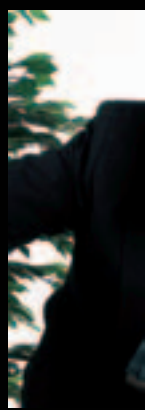

relia Region: the Proximity Center for ICT Business | Jyvä

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