EST_IT@2018

ICT FORESIGHT: CONCLUSIONS AND POLICY RECOMMENDATIONS

ARENGUFOND
ESTONIAN DEVELOPMENT FUND

The Estonian Development Fund launched the EST_IT@2018 foresight with the objective of identifying the areas in which information and communication technologies (ICT) could contribute the most to the development of Estonia's economy and society during the next ten years.

Foresight offers insights into the future of Estonia's economy and gives decision-makers the inspiration and substance to make future-oriented strategic decisions and initiate related changes. Foresight has no value, if it does not lead to better decisions. This is why we have made this policy brief.

Implementation of the recommendations made in this policy brief does not necessarily require significant additional resources. It requires rather the pooling of already existing resources and directing various on-going activities towards a common goal.

How does Estonia's ICT capability stand in international comparison?

- Even though the development of ICT is fast, it is quite predictable. Most of the technologies that will be widespread by 2018, exist in an embryonic form already today in the top laboratories throughout the world.

- Most of the more fundamentals of ICT systems are created in major industrialised countries, i.e. outside Estonia. Therefore, it is very important for Estonia to be able to utilise the technologies created elsewhere.

- Estonia's current ICT capabilities lag behind the global forefront. Estonia has to strengthen its ICT competencies in the emerging key ICT areas.

> We need government investment into higher education so that we would be able to continue creating jobs here. Without that we have nobody to give jobs to.
>
> Josh Silverman
> President of Skype
> Eesti Päevaleht newspaper
> 7 March 2009

Over the past decade, ICT has accounted for half of Europe's productivity growth.

How could Estonia benefit most from information technology?

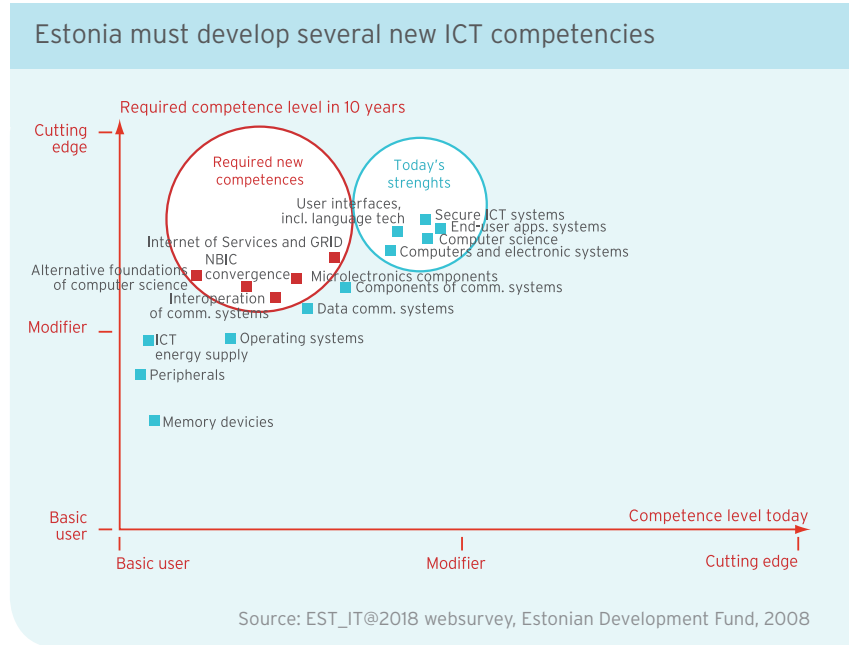| Fact	Recommendation
To keep up with global ICT development, Estonia has to significantly strengthen its technological capabilities in a number of ICT areas.	**1.** Higher education in ICT has to be upgraded to an internationally attractive level.
Competition is becoming increasingly international and forces Estonian ICT companies to enter more actively into foreign markets.	**2.** Master's level technology and business management programmes need to be launched in order to foster ICT product development and exports.
Significant socio-economic challenges represent a new rapidly growing markets for new ICT solutions.	**3.** ICT development and implementation roadmaps have to be drafted in six target areas: education, health care, manufacturing, energy, financial services and ICT security systems.

Recommendation 1:
Raise ICT higher education to internationally attractive level

Estonia needs to increase its ICT labour supply whilst simultaneously improving the quality of higher education in the field of ICT. Estonia has to build up several new areas of competence in ICT, e.g. Internet of Services and GRID, integration of communication systems, new basic technologies in the areas of convergence of microelectronics, bio- and nanotechnologies, and alternative theoretical foundations of ICT systems (e.g. cognitive systems, quantum computing, etc.).

In order to fast-track the internationalisation of Estonia's ICT higher education, at least 5 or 6 distinguished professors, both foreign or expatriates should be attracted to Estonia simultaneously. This is the most effective way to fill the above key ICT areas where Estonia has relative weaknesses with acknowledged specialists. Having said that the existence of host university's internationalisation plan stating the desired objectives and schedules should be seen as a prerequisite for inviting foreign lecturers to Estonia. Furthermore, to build up critical mass needed for attracting also international students, it is expedient to recruit those new professors into a single structure at a time.

Similar experiences of Ireland, Finland and Singapore in attracting foreign talents demonstrate that competitive salary offer is a prerequisite, but not necessarily sufficient. If Estonia wants to become

Estonia must develop several new ICT competencies

Source: EST_IT@2018 websurvey, Estonian Development Fund, 2008

competitive in importing top researchers, it has to offer integral package covering the issues related to salary and research costs, as well as issues concerning relocation of accompanying family members and their adaption to the new environment.

High-quality international higher education will make the ICT programmes in Estonian universities more attractive to local students while also attracting more foreign students. Bringing foreign lecturers to Estonia and enabling Estonian students to pursue post-graduate studies (partly) abroad will eventually upgrade the ICT programmes offered in Estonian

universities to a strong international level. Regardless of whether smarter foreign students will after graduation be employed by Estonian companies or return home, student exchange will in turn underpin the internationalisation of the Estonian economy and particularly of its ICT companies.

Moreover, upgrading ICT higher education to an internationally recognised level should be seen as a pilot project in Estonia which would provide experience for renewing the entire higher education system in Estonia.

What is the role of ICT in Estonia's economy?

Increasing Estonia's ICT export requires contacts and professional sales.

Taavi Kotka
CEO of Webmedia

• The ICT sector itself accounts for only a small part of the Estonian economy. Nevertheless, the contribution of ICT to economic and social development is immense.

• The main contribution of the ICT manifests itself through productivity growth achieved with smart take-up of ICT throughout the economy.

• In order to increase the export of high value-added ICT products and services, international business skills of Estonian enterprises need to be improved significantly.

Recommendation 2:
Strengthen international business management skills in ICT companies

Entrepreneurs have identified during the foresight process the lack of specialists possessing international product development and sales skills as well as insufficient experience as a significant bottleneck affecting the development of Estonia's ICT sector. Strengthening of international technology and business management as well as marketing training is thus of crucial importance, if the competitiveness of Estonia's ICT sector and the economy at large is to be strengthened.

Development Fund recommends **Estonian universities** to start to offer to technology specialists, middle managers or heads of small companies (executive) MBA programmes in technology and business management with a strong ICT focus. Similar programmes are offered in the Netherlands (Leiden University), the United Kingdom (University of St Andrews and University of Westminster) and elsewhere globally. However, they are not yet very common. Consequently, there are also good chances to start to offer such high-quality education provided with the involvement of foreign lecturers also to foreign students.

The ICT education itself has also to become more interdisciplinary. A practical way to achieve that is to include compulsory business management courses in ICT syllabuses. Technology students would benefit foremost from courses on technology strategies, business management, marketing and other subjects. Besides the above-mentioned business and technology management courses, graduate students in technology also need access to courses in design, psychology, etc.

Which are the key areas for the application of ICT for Estonia?

- Each of the major socio-economic challenges Estonia faces represent a new rapidly growing market for smart take-up of ICT applications.

- The areas that Estonia has to focus in take-up of ICT foremost are education, health care, manufacturing, energy, financial services and ICT security systems.

- In all of these target areas, demand for innovative ICT solutions is growing not only in Estonia but also in Europe and beyond thus extending the export possibilities of Estonian ICT solutions.

Recommendation 3: Develop roadmaps for the application of ICT in target areas

In the course of the foresight exercise, six target areas were identified for the application of ICT in Estonia. These areas are education, health care, manufacturing, energy, financial services and ICT security. Planning a future application for ICT requires a good perception of the technological possibilities, but in itself, it is hardly a technological issue. Therefore, the effective application of ICT requires an understanding of strategic focal points of the above target areas as well as knowledge of technologies and markets.

With this, each of the socio-economic challenges Estonia faces represents a fast-growing market for new ICT solutions.

One possibility for analysing strategic choices in the target areas and related possibilities for application of ICT is to draw up long-term roadmaps for the take-up of ICT.
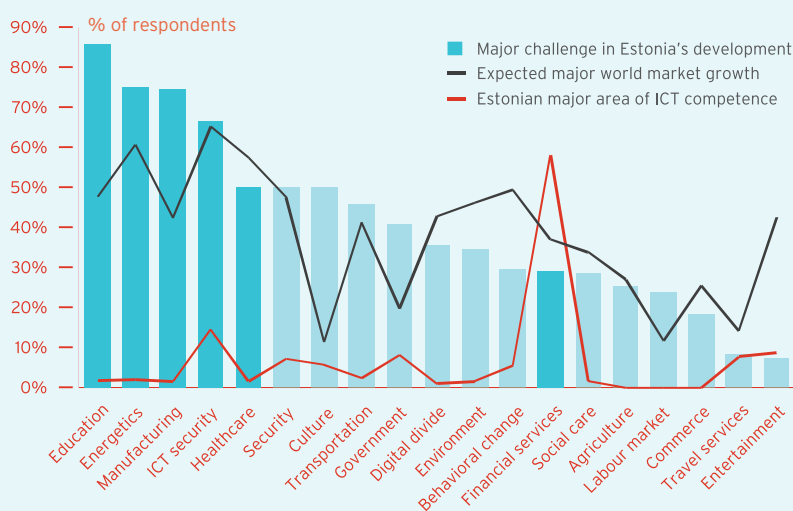
Politicians start making decisions only when there is nothing else left to do. For that matter, soon we will be in a very favourable situation for decision-making.

Mart Laar
Member of the Parliament and the Supervisory Board of the Estonian Development Fund
EST_IT@2018 Forum
11 December 2008

Roadmapping is a strategic planning tool used for identifying common long-term goals, ways to achieve these goals and the milestones on the way. Roadmaps describe important changes in the society and the economy, global trends in technology and markets, expected future activities of entrepreneurs (new products and services) as well as resources (people, funding) required for achieving specific strategic goals.

To address the key challenges in the six target areas, Estonian Development Fund is initiating the development of roadmaps that envision possible future developments in the respective areas and draw up action plans for the application of ICT.

Main challenges in Estonia's development mark the fast-growing markets for new ICT solutions

Legend:
- Major challenge in Estonia's development
- Expected major world market growth
- Estonian major area of ICT competence

Y-axis: % of respondents (0% to 90%)

X-axis categories: Education, Energetics, Manufacturing, ICT security, Healthcare, Security, Culture, Transportation, Government, Digital divide, Environment, Behavioral change, Financial services, Social care, Agriculture, Labour market, Commerce, Travel services, Entertainment

Source: EST_IT@2018 websurvey, Estonian Development Fund, 2008

How did we come up with these recommendations?

With ICT foresight we were jointly setting the target. Now we have to act and make Estonia and its ambitions visible in the world.

Marek Tiits
economic expert at the Estonian Development Fund, co-author of the EST_IT@2018 report

ICT foresight is one of the three foresight projects (alongside the manufacturing industry and the service economy) undertaken by the Estonian Development Fund in order to prepare and contribute to the subsequent more broad-based foresight, the objective of which is to formulate Estonia's growth vision for the coming decade.

In the ICT foresight, we commenced by mapping the global ICT and socio-economic trends affecting Estonia the most. Then we conducted interviews with the 20 most influential Estonian ICT specialists and decision-makers representing companies, academia and the public sector. Based on the interviews and trend analyses, an interim report was drawn up and conclusions presented in report were introduced and discussed at a one-day workshop.

In September 2008, we conducted an extensive web survey with the purpose of defining Estonia's ICT development priorities. Based on the survey, we defined the most relevant areas in order to upgrade Estonia's ICT education and research to an attractive level. We also identified six target areas where Estonia needs to boost the take-up of ICT solutions.
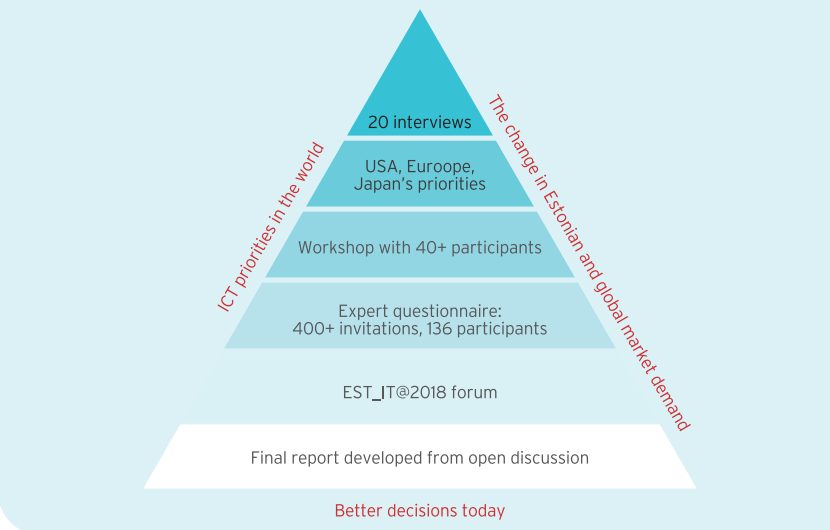
In December 2008, a major forum assembling 140 experts and decision-makers was held to discuss Estonia's ICT development visions and collect additional input for elaborating the final report.

The EST_IT@2018 foresight final report "EST_IT@2018: Estonian information technology outlooks" was published in February 2009. Full report is electronically available only in Estonian, executive summary also in English.

See: www.arengufond.ee

EST_IT@2018 was a joint effort of many experts and decision-makers

ICT priorities in the world — The change in Estonian and global market demand

- 20 interviews
- USA, Euroope, Japan's priorities
- Workshop with 40+ participants
- Expert questionnaire: 400+ invitations, 136 participants
- EST_IT@2018 forum
- Final report developed from open discussion

Better decisions today

See also:

Foresight materials of EST_IT@2018 at:
www.arengufond.ee/eng/foresight/estit2018/

Executive Summary of final report of EST_IT@2018 at:
www.arengufond.ee/eng/news/foresight/news913/