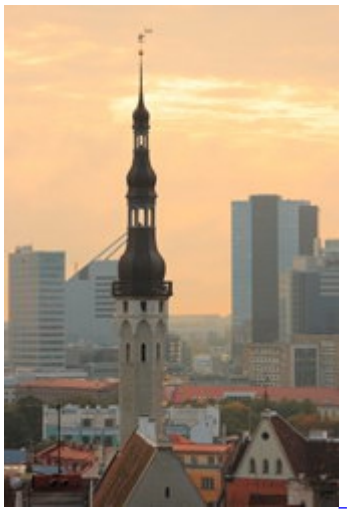
Digital Single Market

Projects news and results8 August 2012

Estonia, highly networked and highly innovative

Estonians may not have invented the internet, but when it comes to doing interesting, innovative or just plain useful things online the small Baltic country has long been several steps ahead.

 [1]

A highly networked country where online banking and paying for parking with cell phones are the norm, Estonia was the first country to hold legally binding general elections over the internet in 2005 - and it has been holding them successfully ever since. Not surprisingly, Estonia's internet security sector is one of the most advanced in Europe thanks in part to a government-supported 150-member national Cyber Defence League and being home to NATO's Cooperative Cyber Defence Centre of Excellence.

Estonian developers, meanwhile, have been active in many other areas as well: the software behind programmes such as Skype and the file-sharing application Kazaa was developed by Estonians, just a small sample of the innovations to emerge from this nation of 1.34 million people.

Now, Estonian researchers are sharing their expertise and experience. In the EU-funded iRegions [2] (1) project, for example, the Baltic Innovation Agency in Tartu, Estonia, has been working with

partners in Germany and Sweden to set up so-called Living Labs to create favourable real-world conditions for the development and deployment of new internet and mobile technologies.

The aim of the labs, located in Tartu Science Park in Estonia, CyberForum in Germany and Kista Science City in Sweden, is to foster innovation through public-private partnerships, bringing together companies, public agencies, universities, institutes and citizens to stimulate the creation, prototyping and testing of new services, products and systems in real-life situations. With funding from public bodies and private companies, the labs are home to initiatives that range from training programmes for young researchers to deploying key research infrastructure for different technologies, from ambient assisted living applications and intelligent transport networks to cloud computing. These innovation ecosystems, as they are also known, should in the long term lead to new business models and markets with potentially important social and economic benefits.

A similarly far-reaching project, particularly at a regional level, is BalticGrid-II [3] (2), in which multidisciplinary teams from 13 institutions in seven countries have worked on establishing a reliable, interoperable grid infrastructure across the Baltic region and parts of Eastern Europe, including Belarus. The project, which involved the Estonian National Institute of Chemical Physics and Biophysics, successfully deployed technologies that today are enabling researchers to harness the distributed processing power of grid computing for work in fields as diverse as nanoscience, engineering, data mining, bioinformatics and environmental research.

As one example of what researchers can do with these networked grid computing resources, the Institute of Mathematics and Computer Science, University of Latvia, is using the LatvianGrid system, and its link to BalticGrid, for comparison of protein structures using Evolutionary Secondary Structures Matching (ESSM). Grid computing allows researchers to carry out all-against-all comparisons of whole protein databases (like CATH, where the number of pairwise comparisons is a few billion) for the exploration of the evolution of protein structures. Another example is NWChem, a computational chemistry package designed to run on high-performance parallel supercomputers and workstation clusters. The software uses the BalticGrid for the development of models for quantum-, nano- and mesoscopic computing.

However, for new grid and internet technologies to live up to their potential, faster, higher capacity networks are needed. It is an issue Estonian researchers are addressing in the Accordance [4] (3) project. This pan-European initiative, which involves a team from Tallinn-based company, Euprocom, is developing an ultra-high-capacity optical network capable of reaching data transfer speeds of up to 100 gigabits-per-second (Gbps). The approach, based on a novel optical application of a multiplexing technology, called Orthogonal Frequency Division Multiple Access, promises to increase network speed and range, extending high-speed services to a wide range of user communities, all at relatively low cost.

The Accordance team believes the proposed architecture will change the way low-cost ultra-broadband connectivity is provided to end-users, supporting the creation of wider market opportunities from new classes of applications and accelerated uptake of next-generation services.

How Estonians are extending the benefits of ICT

Estonian researchers are also helping various sectors embrace the benefits of information and communications technology (ICT). The construction industry, for example, has generally been slow to embrace the potential of ICT to improve productivity and efficiency. That, however, could change thanks to a project coordinated by the Estonian Innovation Institute.

Focused on helping construction SMEs across Europe improve their competitiveness and performance, the Mobi3Con [5] (4) project has provided end-user communities with a low-cost mobile system for data management at construction sites. Using a touch-screen mobile device fitted with a highly accurate positioning system, users are able to access real-time information about building designs and features that was previously locked away offsite in construction company databases, and visualise it all onsite in 3D.

Full remote access to the detailed project plans stored on construction company databases allows project management to consult diagrams and specifications of individual components or whole buildings, and compare them with the actual situation at the construction site, reducing the risk of errors and allowing problems to be solved quickly and efficiently. Virtual reality and 3D graphics also allow workers to navigate and visualise buildings during all stages of their construction. The project team estimates that this technology could save EUR 6.2 billion annually and reduce design deviations in construction SMEs estimated at EUR 2.8 billion.

Another project involving Estonian company Epler & Lorenz promises similar cost and productivity benefits to the manufacturing industry, or more precisely, the remanufacturing industry. The Premanus [6] (5) initiative is developing innovative technology to provide lifecycle information about different products, such as how long it has been used or if component parts need replacing. This information can then be used to efficiently remanufacture products - from cars to kitchen appliances and mobile phones - at the end of their life, essentially returning them to a like-new functioning state and reducing the need for new products to be produced. The upshot is less waste and a dramatic reduction in resource use, thereby helping protect the environment, and potentially large cost savings for consumers.

In other fields, Estonian researchers are also making innovative use of ICT. In the Dreaming [7] (6) project, for example, a team at East Tallinn Central Hospital are running trials with an eInclusion platform designed to help elderly people live independently in their own homes, stay healthy and safe, and keep in touch with friends and family. The low-cost system incorporates health and environmental sensors and alarms linked to a support centre, as well as communications technology such as TV-based videoconferencing. In the event of an accident or a sudden change in health signals, the support centre could automatically alert emergency services, or a user could talk with their doctor via videoconferencing if they are feeling unwell, potentially avoiding a trip to the hospital.

In the Intelleo [8] (7) initiative, researchers from Tallinn University and Eesti Opetajate Liit, along with other European partners, are developing a new paradigm for cross-organisational collaborative learning and knowledge-building activities. Called an Intelligent Learning Extended Organisation, the idea is to use ICT to support the creation of formal and informal learning communities across different organisational cultures, from industry, research or academia.

And in Filose [9] (8), coordinated by Tallinn University of Technology, researchers have been using new technology to gain a deeper understanding of how fish move and sense their environment. They are using that information to develop novel bio-inspired fish-like robots for surveying and monitoring marine environments. The project team says their research will lead to less complex, more efficient and quieter underwater robots that exhibit a greater degree of autonomy, manoeuvrability and adaptability to environmental changes than current technology. Marine robots are already used for underwater mapping, or oil spill monitoring, and by improving understanding of fish locomotion, the project team could help push these applications further.

The projects featured in this article have been supported by the EU’s Seventh Framework Programme (FP7) for research.

(1) 'Internet-based and mobile technologies for regions in the net economy' (iRegions)
(2) 'Baltic Grid second phase' (BalticGrid-II)
(3) 'A converged copper-optical-radio OFDMA-based access network with high capacity and flexibility' (Accordance)
(4) 'Developing mobile 3d data collection, processing and dissemination solution for construction SMEs' (Mobi3Con)
(5) 'Product remanufacturing service system' (Premanus)
(6) 'Elderly-friendly alarm handling and monitoring' (Dreaming)
(7) 'Intelligent learning extended organisation' (INTELLEO)
(8) 'Artificial fish locomotion and sensing' (FILOSE)

Useful links:

- FP7 on CORDIS [10]
- iRegions on CORDIS [11]
- BalticGrid-II on CORDIS [12]
- Accordance on CORDIS [13]
- Mobi3Con on CORDIS [14]
- Premanus on CORDIS [15]
- Dreaming on EUROPA [16]
- INTELLEO on CORDIS [17]
- FILOSE on CORDIS [18]

Date: 2012-08-08

Share this page

Links
[1] https://ec.europa.eu/digital-single-market/sites/digital-agenda/files/newsroom/offer_id_9155_3291.jpg
[2] http://www.iregion.de/
[3] http://www.balticgrid.org/
[4] http://www.ict-accordance.eu/
[5] http://mobi3con.eii.ee/
[6] http://www.premanus.eu/
[7] http://www.dreaming-project.org/
[8] http://intelleo.eu/
[9] http://www.filose.eu/tiki-index.php
[10] http://cordis.europa.eu/fp7/home_en.html
[11] http://cordis.europa.eu/projects/rcn/89381_en.html
[12] http://cordis.europa.eu/projects/rcn/86601_en.html
[13] http://cordis.europa.eu/projects/rcn/93072_en.html
[14] http://cordis.europa.eu/projects/rcn/92514_en.html
[15] http://cordis.europa.eu/projects/rcn/100713_en.html
[16] http://ec.europa.eu/information_society/apps/projects/factsheet/index.cfm?project_ref=225023
[17] http://cordis.europa.eu/projects/rcn/90619_en.html
[18] http://cordis.europa.eu/projects/rcn/89451_en.html