

Luxembourg shows 'bigger is not always better'

April 19 2013



Credit: AI-generated image ([disclaimer](#))

Sometimes good things come in small packages and this is indeed true of Luxembourg when it comes to information and communication technologies (ICT). Take the example of broadband rollout. Being a small country means there is less territory to cover, so ultra-fast fixed-line internet connections are widely available and mobile broadband

penetration is one of the highest in the EU at 64.8 %, and growing.

This is important as access to ICT is often related to the level of innovation in a country. In 2011, 86 % of the population used the internet regularly (at least once a week), compared to the EU average of 68 %. Luxembourg is ahead of the curve in terms of e-inclusion with 76 % coverage of disadvantaged groups - well above the EU average of 53 %.

Luxembourgers have clearly embraced the ICT revolution, but how much influence do they have on how the industry evolves? One measure of this is how much businesses and the [public sector](#) spend on ICT research and development. It appears that Luxembourg is below the EU average on these scores. However, as active participants in a number of national and European-funded technology projects and initiatives, Luxembourg's research community is clearly keen to change that.

At the national level, Luxembourg's Gabriel Lippmann Public Research Centre is devoted to applied scientific research and technological development, as well as to [technology transfer](#) and high-level training. The Centre focuses on [innovative materials](#) technology including nanotech, managing natural resources, and technologies promoting the information society.

Out of the dark

Luxembourgers have certainly discovered the benefits of ultra-fast internet access in their homes and, increasingly, on the move with their smartphones. But for people in larger, more remote parts of Europe, [broadband internet](#) is not a given. The fibre-optic cables and infrastructure for delivering the wider bandwidth needed for e-commerce or heavy film downloads is too expensive or disruptive to install. Even combined with mobile solutions to deliver broadband to the

door (the last mile), some regions are still in the 'dark' - with no access to broadband. Researchers have turned to satellite communications (Satcom) to help bridge this so-called 'broadband gap'.

But there is a problem to overcome first. With all the new services and technologies (digital TV, emergency services, goods tracking) demanding their own little piece of the radio spectrum, the airwaves have become a very crowded space. Authorities have decided who can use what part of the spectrum, but there are physical limits, so it is up to scientists to find better ways to optimise the airwaves to include more Satcom internet services.

It is here that the European [Corasat](#) study, again involving the University of Luxembourg, comes in. Corasat is investigating, developing and demonstrating cognitive radio techniques, which work like neural pathways to find the most efficient way for Satcom systems to use and share the available spectrum.

According to the project, the cognitive approach has already demonstrated its potential for terrestrial systems, while Satcom is needed to achieve fast broadband access for everyone - since it can reach those areas where wired and wireless networks are not economically viable. Corasat therefore brings these two elements together, identifying scenarios and use cases, focusing on broadband applications and considering other services, such as interactive broadcasting and narrowband applications, where cognitive radio can improve spectrum exploitation.

Quiet achievers

Heinrich Johann Nepomuk von Crantz is not a name you hear every day, but he was a pioneering advocate of greater hygiene standards long before the links between bacteria and infection were fully documented.

This Luxembourg-born obstetrician, botanist and lecturer published several volumes the 18th century, including 'Commentatio de instrumentorum in arte obstetricia historia utilitate et recta ac praepostera applicatione' (1757) and 'Materia medica et chirurgica' (1762).

His achievements perhaps deserve wider recognition. The same could be said of many other well kept secrets about Luxembourg. Indeed, quiet achievement is a theme among Luxembourg's researchers who are playing a key role in a number of innovative projects.

Take the [Artreat](#) project, led by Sword Technologies, which produced decision-support tools to help clinical cardiologists provide personalised, real-time care and advice during operations such as inserting stents to open blocked arteries. The project developed a patient-specific computational model of the cardiovascular system (a 3D arterial tree anatomy) which also serves as a realistic training tool for clinical cardiologists.

Sword Technologies has also taken the lead in the [Smart-vei](#) project, which set out to design and develop a portable 'predictive-adaptive' driver-assistance system for smart vehicles of the future. 'In developing systems that proactively assist drivers (and occupants), human intent is a critical piece of information for determining whether the system's actions will help or hinder the user,' notes the team.

Smart-vei researchers managed to navigate this highly complex pairing of technology and cognitive psychology. The technology they developed had to continuously monitor not just the surrounding environment and vehicle state but also the driver's behaviour and recorded ability to process information.

Follow my lead

Continuing in the cognitive research line, the University of Luxembourg is taking part in the [Contrast](#) project which is developing human-computer interfaces (HCI) and cognitive training support to help stroke victims regain as much independence as possible. The team plans to bridge the 'gap between clinical rehabilitation and care' with easy-to-use, automatically-adapting HCIs.

The EU-funded [Digibic](#) network, with Luxembourg's Henri Tudor Centre of Public Research as a partner, is helping Europe's creative industries deploy and market digital technologies (especially related to cultural heritage and e-libraries). The project promotes exchanges and know-how between researchers, innovators, SMEs, industry and finance involved in this sector.

Dr Joshua Reiss, Queen Mary University of London, credits Digibic for helping his team find an angel investor prepared to provide start-up money for the automatic music production system they developed with earlier support from European digital culture project, [Easaier](#). Listen to Dr Reiss' testimonial [here](#).

The network also hosts the [Digibic Award](#) which showcases the impact of successful technology deployment on the growth and development of individual companies in the creative industries. Digibic partners have also recently published a draft roadmap of the 'grand challenges' (from the end-user's perspective) faced in this sector. The final roadmap, due in 2013, will inform policy-making in this important sector.

Reliable partners

While creative industries attract attention for the right reasons, some fields of research are less sexy and tend to get more attention when something goes wrong. Behind the scenes, ICTs are performing critical

tasks every day, making our ground and air transport networks run smoothly, and that our power grids keep up with every-changing demand.

Luxembourg partners are playing an important role in several projects requiring mission-critical accuracy, from warning systems and data security, to spectrum management for the satellite communications sector.

The [MICIE](#) project, with iTRUST Consulting as a partner, developed a risk analysis (predictive) tool and alert system which identifies, in real time, the threat level on critical infrastructure when 'undesirable' events occur. The colour-coded warning system provides a hierarchy of thresholds - with corresponding actions - to mitigate the risk of potentially dangerous system failures.

Meanwhile, researchers at the University of Luxembourg are helping teams across Europe deal with emerging information security risks. They are developing sophisticated tools to better predict, prioritise and ultimately prevent the increasingly complex attacks on data and computing systems.

'New attacks cleverly exploit multiple organisational vulnerabilities, involving physical security and human behaviour,' explains the team. Defenders need to make rapid decisions on the most pressing and threatening attacks to block. The tools being developed by the EU-backed [Trespass](#) project will help organisations 'navigate' this fast-changing environment.

The project team are therefore combining knowledge from the technical sciences (how vulnerable are protocols and software?) and social sciences (how vulnerable are patterns of human behaviour and why?) in order to identify weak points in organisations and their infrastructure,

visualise them, and so help users to select the most effective countermeasures.

Luxembourg-based organisations are also innovating in technology areas such as networked media, software and services, micro- and nano-systems, and systems for critical infrastructure. In total, under the current EU Framework Programme for research (FP7), Luxembourg partners are coordinating eight projects and participating in 28 more - worth nearly EUR 10 million altogether.

This small nation has maintained a consistent level of participation in EU-backed multidisciplinary projects since FP5, emerging as a strong player in ICT for health, energy efficiency, governance and enterprises - and showing that bigger does not always mean better.

The projects featured in this article have been supported by the Competitive and Innovation Programme's (CIP) ICT-Policy Support scheme or the EU's Framework Programmes for research.

More information: [European Commission's Digital Agenda website](#)

Provided by CORDIS

Citation: Luxembourg shows 'bigger is not always better' (2013, April 19) retrieved 14 August 2024 from <https://phys.org/news/2013-04-luxembourg-bigger.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.