

## Digital Single Market

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# Slovenia: Welcome support for technological boost

With its beautiful countryside and crystal clear rivers and lakes, Slovenia is well established on the tourist itinerary, at least for those adventurous travellers and outdoor enthusiasts that like to get away from the crowds. But this country of mountains and rivers also likes to push itself forward on the international scene. In particular, Slovenian universities, research institutes and businesses view FP7 as an opportunity to expand and develop the country's capabilities in ICT so it becomes a renowned centre of expertise.



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But this country of mountains and rivers also likes to push itself forward on the international scene. As a small country with a population of just over 2 million, it recognises the importance of collaboration and cooperation and maintains a strong, outward European perspective.

For Slovenia, EU membership means opportunity: a chance for the country to share its own expertise and innovation whilst benefiting from partnering with others to build up its economic base.

### Technology breaks down barriers

In particular, Slovenian universities, research institutes and businesses view FP7 as an opportunity to expand and develop the country's capabilities in ICT so it becomes a renowned centre of expertise. With a strong service industry, the country needs an excellence ICT infrastructure and a strong digital

economy if it is to compete at the European and global level. Investment and expertise in ICT will ensure that Slovenia does not fall victim to a 'digital divide' where small and peripheral countries fall behind and fail to compete.

However, it may not be a technological divide that makes it hard for Slovenia to compete. The language barrier could be far more damaging in the long run, which is why the country's participation in the EUR 4.5 million X-LIKE (1) project is so important. This project is developing technology to monitor and aggregate knowledge that is currently spread across global mainstream and social media, and to enable cross-lingual services for publishers, media monitoring and business intelligence. Knowledge is locked in language, but it is important that EU countries and regions with minority languages have equal access to this knowledge - and an equal ability to share their own knowledge and ideas with others. Otherwise it would be easy for Slovenia's capacity for innovation and research to go below the radar, lost due to 'lack of translation'.

X-LIKE also involves the Slovenian Press Agency, the University of Zagreb in Croatia and a software company located about 20 km outside Barcelona in Spain. All these project participants all use minority languages and are keen to exploit the power of computational linguistics, machine learning, text mining and semantic technologies to overcome the language barrier.

The PlanetData (2) project, which includes the participation of the Slovenian Jozef Stefan Institute, also buys into the idea that technology can break down barriers and help people benefit from collaboration and cooperation without borders. Language, nationality and access to information should not prevent the coming together of minds.

PlanetData is a 'Network of excellence' which brings together many experts and research organisations who all share the same dream: that data can be openly accessed and shared for analysis and exploitation. The aim of the network is to establish a sustainable European community of researchers that supports organisations in exposing their data in new and useful ways.

The data can come in the form of data streams, (micro)blog posts, digital archives, eScience resources, public sector data sets, and the Linked Open Data Cloud. Open access and integration of these data sources would allow businesses, governments, communities and individuals to take decisions in an informed manner, ensuring competitive advantages, and general welfare.

Research through PlanetData is focusing on the main challenges that need to be addressed for effective data exposure in a usable form at global scale. 'We will provide representations for stream-like data, and scalable techniques to publish, access and integrate such data sources on the web. We will establish mechanisms to assess, record, and, where possible, improve the quality of data through repair,' the project team say.

Again, it is clear that Slovenia (and the Jozef Stefan Institute in particular) is using an area of specialist knowledge to build systems, networks and contacts that will help to integrate it into EU society. It is a classic example of mutually beneficial cooperation.

### Slovenia's R&D powerhouse

With its coordination of X-LIKE and its key involvement in PlanetData, the Jozef Stefan Institute is undoubtedly Slovenia's key player when it comes to EU-funded research. Around 850 staff specialise in research in physics, chemistry and biochemistry, electronics and information science, nuclear technology, energy use and environmental science. The Institute's participation in European Framework Programme projects (whether FP6 or FP7) has been key to its success; 98 of the Institute's

248 research projects have received funding through a succession of Framework Programmes.

Today the Jozef Stefan Institute manages a total budget of EUR 10 million for its involvement in a number of projects, especially in the field of data processing and mining, an area of expertise which received an especial boost through the Institute's involvement in FP6-IST (for example the IQ project (3)).

Electronic engineering, including robotics and automation, is another area of strength for the Jozef Stefan Institute, which it has been able to strengthen by participating in a number of projects in FP7's specific programme 'People' (the Marie-Curie actions). This programme acknowledges that one of the main sources for gaining a competitive edge in science and technology is the quantity and quality of human resources.

Slovenian organisations are involved in 20 FP7 Marie-Curie projects which allow Slovenian researchers to travel abroad to visit and access the expertise of other research institutions. These projects may also be set up to attract research specialists to spend some time in Slovenia; this contact helps to broaden the country's contacts and networks within the scientific community as well as help researchers acquire new skills and perspectives for their work.

In the area of electronics, the Jozef Stefan Institute was awarded a European Reintegration Grant for the ERESIN project (4). The purpose of the project was to attract a Slovenian scientist back to Slovenia and boost the Institute's expertise in nanoelectronics.

#### Boost for business

Although the Jozef Stefan Institute accounts for almost half of Slovenia's total ICT funding from FP7, the country enjoys strong participation from SMEs (25 % of FP7 ICT funding overall). Small and inexperienced in collaborative research, most companies only have the capacity to participate in single, focused project, usually receiving funding around EUR 200,000 to contribute their specific area of expertise or provide use-case scenarios and studies for projects.

Etrell, for example, is one of Europe's leading suppliers of software and hardware for smart-grid charging infrastructure for electric vehicles. The company is participating in SMARTV2G (5), a project to develop platform technologies that will link electric vehicles to the power grid and data networks in ways that will optimise safe and secure energy flows through the grid.

Slovenian IT and software provider XLab is certainly playing its part to ensure that Slovenia is not left behind in the growth and application of 'Cloud computing'. With expertise in distributed systems, XLab has so far received almost EUR 1.5 million in FP7 funding and the company is involved in four FP7 ICT projects. Through the CONTRAIL (6) project, XLab hopes to be at the forefront of a paradigm shift for cloud computing. 'To allow open access to shared computing resources, the vision of the CONTRAIL project is that any organisation should be able to be both a cloud provider, when its IT infrastructure is not used at its maximum capacity, and a cloud customer in periods of peak activity.'

CONTRAIL will design, implement, evaluate and promote an open source system in which resources that belong to different operators are integrated into a single 'federated cloud' that users can access as they need, irrespective of the physical location of these computing resources.

XLab has also benefited from its participating in another FP7 project: SLA@SOI (7). This completed project implemented a complete management framework for 'Service level agreements' (SLAs), as well as support for its integration with the existing service-provision platforms. The project's finished

platform is able to make services more predictable, as well as providing for negotiations of SLAs and service provision based on those SLAs. At runtime, the system provides continuous SLA monitoring and readjustment to fulfil the negotiated SLA. XLab is using the platform for its videoconferencing service.

Another SME, Korona Inzeniring, is marrying Slovenia's expertise in smart grids and cloud computing in a single project: [HiPerDNO](#) [2] (8). 'Future electricity distribution networks with mass deployment of network equipment sensors and instrumentation, millions of smart meters, small-scale embedded generation, and responsive load will generate vast amounts of data requiring near to real-time analysis,' according to the project. 'So-called cloud and grid computing will enable scalable data mining, feature extraction, and near to real-time state estimation.'

The project is taking high-performance computing tools and techniques that have been developed for genomics, particle physics and other areas of science and engineering and applying them to distributed grid management.

Be part of IT

From the application of semantic technologies to remove language barriers to the development of new models and technologies for distributed cloud computing, a common thread runs through most of the FP7 projects involving Slovenian organisations: collaboration. Slovenia wants to be an active member of the EU; ICT helps to remove many of the barriers to competition and participation.

More than 35 organisations have enjoyed participating in FP7 ICT projects so far; the funding they have received and their interactions with like-minded people from other countries will certainly create capacity and an appetite for more cooperation in the future. The introduction of an 'open, fast and light' funding scheme for Horizon 2020 should ensure that Slovenia continues to be a welcome participant at the heart of EU research.

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The projects featured in this article have been supported by the Competitive and Innovation Programme's (CIP) ICT-Policy Support scheme or the Seventh Framework Programme (FP7) for research.

- (1) X-LIKE : Cross-lingual Knowledge Extraction
- (2) PlanetData: PlanetData
- (3) IQ: Inductive Queries for Mining Patterns and Models
- (4) ERESIN: Electronic response of single inorganic nanowires
- (5) SMARTV2G: Smart Vehicle to Grid Interface
- (6) CONTRAIL: Open Computing Infrastructures for Elastic Services
- (7) SLA@SOI: Empowering the service economy with SLA-aware infrastructures
- (8) HiPerDNO: High Performance Computing Technologies for Smart Distribution Network Operation

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