Austria ICT: exporting ICT excellence

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Their country may be surrounded by mountains and have no access to the sea, but Austrians are by no means isolated. Boasting over 6,000 km of rail tracks, nearly 2,000 km of motorway and six international airports, this picturesque landscape has an impressive transport infrastructure. Austria's involvement in the EU's FP7 research projects, in ICT research in particular, is certainly a success story; with more than 3.6 % of all ICT funding going to Austrian participants and 64 projects coordinated by Austrians, it is clear that the country is making the most of the opportunities available.

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This physical connectivity of the country has been achieved despite its challenging topography; the most recent figures published by the European Commission showed that penetration of fixed broadband in Austria had reached 26 % of the population, which is a bit below the European average (28 %). The country is quickly catching up, however, and shows the fastest growth in broadband penetration of any EU country.

Alongside these infrastructure investments, Austrian technology and hi-tech research institutions are playing a leading role in developing the next generation of internet and ICT systems and applications. Austria scores above the EU average in the Commission's Innovation Scoreboard and is classed in the second tier of European performers, along with Belgium, France, the Netherlands and the UK.

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Trust and the Internet

Concerns about online safety, privacy and hacking may be one factor holding back take-up of broadband and online technologies. Working on research that could assuage some of that fear is TECHNIKON Forschungs und Planungsgesellschaft, an independently owned ICT research company. TECHNIKON is coordinating the Tcloud [1] (1) project which is looking at cross-border infrastructures, such as cloud technologies, and making them more resilient to future attacks.

Another project is looking at how to ensure that our personal data remains secure as we increasingly share this information and log on to networks wherever we go. The increasing connectivity of everyday objects - not just mobile phones, but cars, TVs, radios, supermarket scanners, perhaps even your fridge at home - changes their functionality and alters the way we interact with these objects and with the wider world.

It is this trend for pervasive ICT, and the level of trust that we place in these new internet-enabled devices and objects, that Utrustit [2] (2), an ICT FP7 project coordinated by the Centre for Usability

Research and Engineering (CURE) in Vienna, looks to address.

This project's participants argue that the ubiquitous and pervasive nature of networked systems makes it increasingly difficult to track where our information is going, who holds it or how the applications can use it. Utrustit aims to create and implement tools for building trust, thereby giving the user a clear idea of where their information could end up in future.

Other Austrian-led projects seeking to keep online environment robust and secure are SOFI [3] (3) and Service Web 3.0 [4] (4).

The SOFI project, led by STI Research and Consultancy in Austria, focuses on the role of services in a future economy. It is supporting a cluster of EU-funded projects that are designing, developing and testing new infrastructures and platforms to enable an 'Internet of Services'. SOFI has played an active role in the Future Internet Assembly (FIA), a pan-European collaboration group for all projects and actors involved in Future Internet activities.

The Service Web 3.0 project is also supporting the development of a future 'Internet of Services'. It is helping FP7 projects to cluster around themes such as the Semantic Web in order to draw up a road map for research and development in this field. The project will bring together expertise from across Europe and produce a European International Position Strategy.

Leading the way in e-learning

Austrian participation in FP7 ICT is dominated by research organisations. Four of the top educational institutes in the country (Technical Universities of Graz and Wien, University of Innsbruck and the Joanneum Institute) take 35 % of overall funding.

E-learning seems to be a noticeable area of expertise. The Institute of Information Systems in Graz, for example, is coordinating (Next-Tell) [5] (5), which supports ICT-embedded classroom design and provides teachers and students with information about ICT learning. The project will develop methods and software to model every stage in the design of ICT-embedded assessment. Through the project, teachers will contribute to the development of high-quality formative e-assessment for learning skills.

Also in Graz, the city's Technische Universität is involved in the Brain-I-Nets [6] (6) e-learning project. The project delves further into the subject of e-learning and the neurological processes of learning. Using cutting-edge experimental techniques, the participants hope to publish a set of 'rules' that describe the processes that take place in the brain while it is acquiring new information. The overall goal of the project is to transpose essential features of learning into current and next-generation neuromorphic hardware, using software recently developed in the FP6 project Factes.

The Hermes [7] (7) project, coordinated by CURE in Vienna, is also investigating cognitive functions, this time in the elderly. The purpose of the project is to develop cognitive therapy and training support through assistive technology. The project is combining ICT and insights into neurology and cognition to use the functional skills of a person to reduce age-related cognitive decline. The scientists hope that this support will reduce the need for active care and increase a person's ability to cope with everyday life, so they can live more independently in old age.

Strength in manufacturing

With a heritage in engineering and manufacturing, it is unsurprising that Austria's research organisations are also involved in projects to exploit the power of ICT in manufacturing. The Technische Universität Wien coordinated the [8](Genesys) [9] (8) project. The collaborative project united key players involved in the fabrication and development of embedded systems to agree on a cross-domain reference architecture for such systems. The architecture sets out the requirements for networking, security, diagnosis and resource management and should help to stimulate the market for embedded devices. The Artemis Joint Undertaking, a public-private partnership, is working through a 10-year R&D programme, with a significant focus on developing the architecture to support commercial applications of embedded systems.

Austrian engineering firms recognise the value of embedded systems to make their products 'smart', 'intelligent' and responsive. The Athenis [10] (9) project, for example, drew on Austria's solid reputation in transport technology and combined it with expertise in ICT. Athenis worked from the principle that roughly 20 % of a car's value comes from embedded electronic systems. To keep costs low and save space, additional functionality and features on vehicles would require greater integration of electronic components, such as low- and high-voltage devices and memory on a single 'System-on-a-chip' (SoC). Athenis provided a proof of concept for the first SoC technology platform that can address the current problems of component integration in the car industry.

Austrian firms have also been instrumental in developing novel electronic components within FP7 projects. By collaborating with partners from across the EU, these specialist companies are helping to maintain Europe's position as a leader in innovative microelectronics.

Konarka Austria Forschungs und Entwicklungs GmbH have been involved in two projects. The Olatronics Project [11] (10) looked at the production of electronic devices based on organic thin-film materials, while Flexibility [12] (11) aims at significantly advancing the competitiveness of Europe in the area of multifunctional, ultra-lightweight, ultra-thin 'Organic and large-area electronics' (OLAE) systems. Components resulting from this research will include disposable and rechargeable batteries, solar cells, DC-charging electronics, loudspeakers and audio amplifiers.

From development to mass market

So even though Austria may not be the most ICT-enabled society in the EU, it clearly has significant capacity for ICT R&D. With significant strengths in e-learning, embedded systems, trust and privacy in the Future Internet and microelectronics design and fabrication, Austria is home to powerful and successful research partners in collaborative projects. It now remains for the country's SMEs to seize the opportunities on offer so that the exciting developments made by EU projects find their way back into the Austrian economy.

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

(1) Tclouds : Trustworthy Clouds ? Privacy and Resilience for Internet-scale Critical Infrastructure
(2) SOFI: Service Offering for the Future Internet
(3) Utrustit: Useable TRUST in the Internet of Things
(4) Service Web 3.0
(5) Next-Tell: Next Generation Teach and Learning for Life
(6) Brain-I-Nets: Novel brain-inspired learning paradigms for large-scale neuronal networks
(7) Hermes: Cognitive care and guidance for active aging
(8) Genesys: Generic Embedded Systems Platform
(9) Athenis: Automotive tested high-voltage embedded non-volatile memory integrated SoC
(10) Olatronics Project: Development and integration of processes & technologies for the production of Organic Low-cost & large-Area flexible Electronics
(11) Flexibility: Flexible Multifunctional Bendable Integrated Light-Weight Ultra-Thin Systems

Link to project on CORDIS:
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- Tclouds on CORDIS [14]
- SOFI on CORDIS [15]
- Utrustit on CORDIS [16]
- Service Web 3.0 on CORDIS [17]
- Next-Tell on CORDIS [18]
- Brain-I-Nets [19]
- Hermes [20]
- Genesys [21]

- Atheni [22]
- Olatronics Project [23]
- Flexibilit [24]

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- European Commission's Digital Agenda website [25]

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[5] http://cordis.europa.eu/newsearch/index.cfm?page=docview&collection=EN_PROJ&reference=96788&position=8&Highlights=ATCOUNTRI,FP7ICT&prevPage=resultList&similarity_id=2327759
[6] http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&TXT=&FRM=31&STP=10&SIC=&PGA=FP7-ICT&CCY=ATCOUNTRY&PCY=&SRC=&LNG=en&REF=93065
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[11] http://www.olatronics.org/
[12] http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&TXT=Flexible+Multifunctional+Bendable+Integrated+Light-Weight+Ultra-Thin+Systems&FRM=1&STP=10&SIC=&PGA=&CCY=&PCY=&SRC=&LNG=en&REF=100146

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