

Telecommunications Software and Systems Group

Aiming for converging knowledge

The TSSG is a research centre in Waterford Institute of Technology in Ireland employing over 120 research staff and students working on over 36 Irish and European funded research projects and programmes

TSSG research activity covers a basic research programme, an applied research programme and an innovation and commercialisation strategy. At the heart of the TSSG ethos is the philosophy that research in an applied technology domain requires a full engagement with all aspects of the research lifecycle: open-ended 'blue sky' ideas generation and investigation, applied investigation of the use of technologies to create solutions to real world problems, development of focused near market pre-product demonstrations, and engagement with technology transfer and commercial exploitation of research results

Strategically-oriented basic research in the TSSG is focused on theoretical research that develops and investigates new knowledge that can support the

research and development of future communication systems, including the management of communications networks and services.

One major part of this activity to date has been funded under the Irish Higher Education Authority (HEA), in the Programme for Research in Third Level Institutes (PRTLII) Cycle 3. The TSSG was awarded funding under this scheme (with TCD and CIT in Ireland as partners) for M-Zones (www.m-zones.tssg.org), a research programme looking at issues in the management of smart spaces and pervasive computing environments.

A second pillar of the strategically-oriented basic research is enabled by a joint PI award from Science Foundation Ireland (SFI) to conduct research in Autonomic Management of

Communications Networks and Services (AMCNS www.tssg.org/autonomic-netman/). This research seeks to investigate mechanisms for communications networks and services to exhibit self-governance. The main partner is Motorola Labs in Chicago; the two PIs (Principal Investigators) being Dr. Willie Donnelly of the TSSG and John Strassner VP in Motorola. In order to achieve autonomic management capabilities in communication systems, the research includes modelling information and knowledge required to drive network behaviour, derived from industrially agreed standards. At the same time, this knowledge is also integrated with a Policy Based Management System that evaluates this information and configures network elements in response to any changes from the environment or changes from the business goal. The research also includes investigation of processes and algorithms for network infrastructure that supports global stability,

robustness, and scalability. The developments of these algorithms and processes are modelled largely from various biological systems that exhibit self-governance behaviour. A separate SFI award, to Dr Brendan Jennings under the Research Frontiers programme, focussing on charging for composed services, complements this activity.

In parallel the TSSG's applied research has developed a proven track record in Europe initially carrying out research on communications network management, but then expanding to include mobility, security, autonomies, software development tools, pervasive computing and digital multimedia.

IPv4 and IPv6 infrastructures.

The second centre, Pervasive Communications Services (PCS), focuses its research on distributed software services, and currently explores the semantic composition of services to implement a set of scenarios for integrated services on pervasive devices, a cluster of activity based on Accounting and Billing as part of an integrated telecommunications management infrastructure and a cluster of activity around location and positioning in pervasive systems as an exemplar of the general issue of context awareness for pervasive systems. The emphasis in PCS is on managing the increasing complexity in services that

the TSSG combines academic excellence in networking and services with pragmatic software engineering and business skills to produce a unique research environment

Starting out with five FP4 ACTS projects, followed by eight funded FP5 IST projects (the TSSG led three of these: AlbatrOSS, OPIUM and Flexwork) and most recently in the FP6 IST programme where the TSSG have participated in 12 FP6 projects and one Eureka Celtic project. So over the past 10 years the TSSG have worked with more than 150 European and international industrial and academic partners.

Applied research in the TSSG is thematically structured into two competence centres. The first centre, Communications Infrastructure Management (CIM), focuses on telecommunications management research, and currently has an integrated activity set which includes telecommunications and infrastructure management, security both as a high-level strategic concept and as a lower level IP-based network issue and testbed activities focused on building and deploying reusable hardware and software testbeds for software interoperability testing and repeatable experimental analysis of performance issues. The emphasis in CIM is on the convergence of traditional fixed telecommunications networks and mobile networks, based on

existing and future pervasive networks, and the use of mobile devices as an end-user platform for these services (again using IPv4 and IPv6 infrastructures).

Some of the FP6 projects in the TSSG portfolio include:


- Daidalos (Communication Technology) (www.ist-daidalos.org/)
- DBE (Enterprise Networking) (www.digital-ecosystem.org/)
- SecurIST (Security) (www.securitytaskforce.org/)
- BrainBridges (Collaborative Working Environments) (www.brainbridges.info)

For a full listing of project details please visit: www.tssg.org/projects.html.

The TSSG is also a member of the steering board for the NEM European Technology Platform (ETP) and have initiated the NEM clusters on NEM Security and NEM Management, as well as being active members of the eMobility & NESSI ETP's.

The Centre for Converged Telecommunications Services (3CS), www.3cs.info, was established to

leverage the TSSG's knowledgebase to undertake applied research that has particular relevance to industry, and explore the different models for turning research results into solid business enterprises. This division is organised into a number of Product Centres, each with a number of commercially oriented research projects that are pushing the boundaries of innovative software development, using a common agile software development process managed by TSSG's Verification and Validation Group. The key aims of this group are to ensure a professional quality of software development, and to foster an entrepreneurial environment for spin-outs. The main areas that 3CS is actively working on at the moment include IMS (IP Multimedia Subsystem) services, Information Syndication (RSS/Atom) systems, architectures and services and Mobile and multimedia frameworks and services. Through the work of 3CS the TSSG is in the process of spinning off a number of communications software companies.

The TSSG believes that the research and innovation lifecycle is a non-linear process where exciting new ideas can emerge from any one of these different types of focus, and cross-fertilise the other areas. 

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