

Autonomous Control for a Reliable Internet of Services – An Overview of the Activities of COST Action ACROSS

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ABSTRACT

Over the past few decades, the use of the Internet has grown explosively and has fundamentally changed the global society. The emergence of (cloud) concepts like SOA, SaaS, PaaS, IaaS has catalyzed the migration from the information-oriented Internet into an Internet of Services (IoS). The emergence of new, powerful network concepts like 5G and the aforementioned advanced cloud technologies – complemented with the nearly unlimited data access nowadays – will provide unbounded possibilities and flexibility in the creation and implementation of new, innovative services. As a consequence, modern societies and economies become more and more heavily dependent on ICT. Failures and outages of ICT-based services (e.g., financial transactions, industrial processes, logistic chains, smart energy systems, Web-shopping, governmental services) may cause economic damage and affect people's trust in ICT. Therefore, providing reliable and robust ICT services (resistant against system failures, cyber-attacks, high-load and overload situations, flash crowds, etc.) is crucial for our economy and society at large.

A challenging factor in service reliability and quality provisioning is the highly dynamic nature of these complex emerging ICT environments, imposing a high degree of uncertainty in many respects (e.g., in terms of number and diversity of the service offerings, the system load of services suddenly jumping to temporary overload, demand for cloud resources, system failures, etc.). This raises the need for online control methods that quickly adapt or – even better – anticipate to changing circumstances. Motivated by this, COST Action IC1304 “Autonomous Control for a Reliable Internet of Services” (COST ACROSS) has been established in 2014. Its goal is to create a European network of experts, from both academia and industry, working on the development of autonomous control methods and algorithms for a reliable and quality-aware IoS. COST ACROSS is organized in three Working Groups (WGs), viz. (i) Autonomous Control Methods, (ii) QoS/QoE Monitoring & Prediction, and (iii) Pricing & Competition. In order to further streamline the research a number of task forces (TFs) has been formed on various topics mostly crossing multiple WGs. Currently more than 80 researchers from 31 different countries are involved. COST ACROSS will finish its activities at the end of 2017.

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We will present and discuss the main scientific/technical activities and results of COST ACROSS obtained so far, as well as the collaborations that has been established and dissemination activities that has been deployed throughout the years. In addition, we will present the Action's plans for 2017 and beyond.

Keywords

COST IC1304 ACROSS; Internet of Services; Autonomous Control; QoS/QoE Monitoring & Prediction; Pricing and Competition.

Short Bio

Hans van den Berg (M.Sc. and Ph.D. degree in Applied Mathematics from the University of Utrecht, the Netherlands, 1986 and 1990 respectively) has more than 30 years of experience in ICT research and innovation. His main research contributions are in the field of design and performance optimization of communication networks and service platforms, with special emphasis on autonomous control methods since the last 10 years. He has been active in many national and European research projects and platforms (FP3-FP7, COST, ITEA) and acted as coordinator of the successful FP7 project SOCRATES (2008-2011) on self-organisation in mobile networks. He is co-founder and vice-chair of the COST Action IC1304 “Autonomous Control for a Reliable Internet of Services” (COST ACROSS, 2014-2017). Hans van den Berg has been a member of the Steering Committee of the International Teletraffic Congress (ITC), and has been active as TPC member of numerous international conferences. He has been editor of Springer's Telecommunication Systems Journal (1994-2002), and is currently editor of Elsevier's International Journal of Electronics and Communications. He has published more than 150 refereed papers in international journals and conference proceedings and is co-editor of several books. Since 2003 Hans van den Berg is with TNO and holds a part-time position as full professor at the Faculty of Electrical Engineering, Mathematics and Computer Science of the University of Twente. Since May 2016 he is also affiliated with CWI, the Dutch national research institute for mathematics and computer science.

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