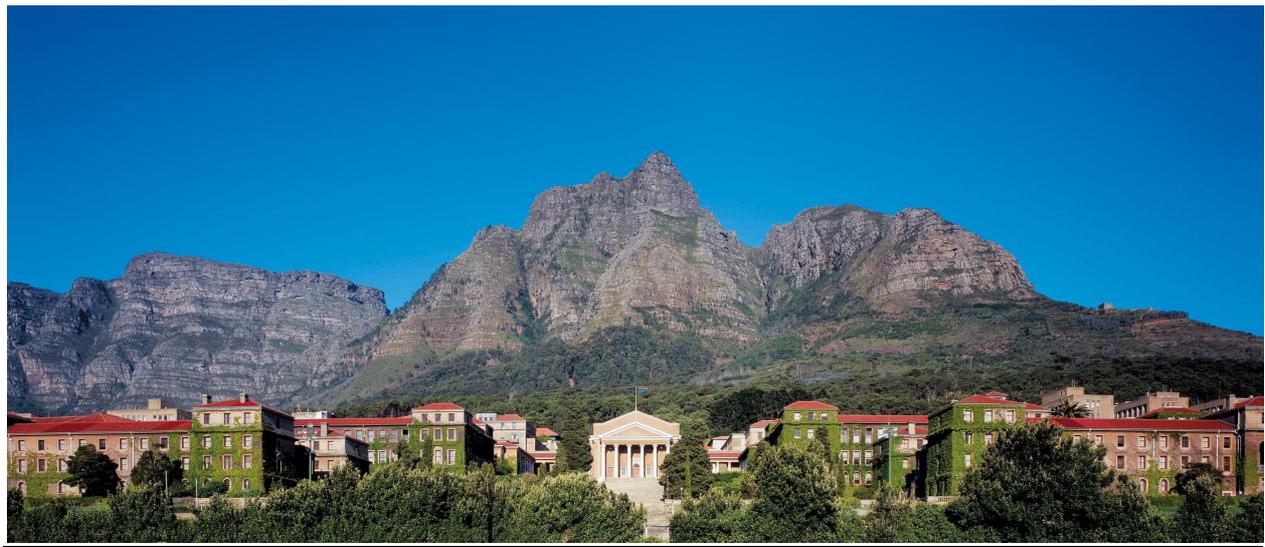




**Mini-Symposium**  
**The Internet of Things, Machine to Machine Communication and**  
**Smart Cities**



**Department of Electrical Engineering**  
**University of Cape Town**

**When:** 5<sup>th</sup> of September 2013, from 11:00 to 13:00  
**Venue:** Lecture Theatre 10,  
3<sup>rd</sup> Floor, Menzies Building  
Upper Campus

**PROGRAM:**

11:00 – 11:05	Welcome by Neco Ventura
11:05 – 11:50	Title of the Talk: <i>The Web of Things: Towards Smart Pervasive Environments</i> Presenter: Andreas Pitsillides, Department of Computer Science, University of Cyprus
11:50 – 12:00	Discussions
12:00 – 12:45	Title of the Talk: <i>Smart Communication Platforms for Prototyping Smart City Applications</i> Presenter: Thomas Magedanz, Department of Electrical and Computer Science, Technische Universität Berlin
12:45 – 12:55	Discussions



**Title of the Talk:**     *The Web of Things: Towards Smart Pervasive Environments*  
**Presenter:**         **Professor Andreas Pitsillides, Department of Computer Science,  
University of Cyprus**

**Abstract:** Sensors and wireless sensor networks are being deployed around the world, capable of measuring the local environmental conditions. Their sensing functionality can potentially enable context-aware ubiquitous platforms, middleware and applications to proliferate. Moreover, residential smart meters, smart power outlets and smart appliances have appeared in the market, facilitating electricity metering and control of individual electrical appliances, extending homes into smart energy-aware environments. Residences can be transformed into smart homes, incorporating embedded sensors and ubiquitous technology. In recent years, new technologies like short-range wireless communications, RFID and real-time localization are becoming largely common, allowing the Internet to penetrate into the real world of physical objects. The Internet of Things (IoT) allows physical devices to seamlessly communicate through the Internet. Inspired from embedded Internet connectivity, the Web of Things (WoT) is about reusing well-accepted and understood Web principles to interconnect the quickly expanding ecosystem of embedded devices, built into everyday smart things. In this talk, we identify contributions that have enabled the vision of Web-enabling smart objects. We will present promising applications of the WoT in domains such as smart homes, urban environments, and the forthcoming smart grid of electricity. We will also discuss and identify challenges in this domain, and how the WoT can constitute a driver towards an energy-efficient, sustainable future.

## **Professor Andreas Pitsillides**



Andreas Pitsillides is a Professor in the Department of Computer Science, University of Cyprus, and heads the Networks Research Laboratory (NetRL, <http://www.NetRL.cs.ucy.ac.cy>). Andreas is also a Founding member and Chairman of the Board of the Cyprus Academic and Research Network (CYNET) since its establishment in 2000. His research interests include fixed and mobile/wireless communication networks, the Internet- and Web- of Things and their application in Smart Homes, and Internet technologies and their application in Mobile e-Services, especially e-health, and security. He has a particular interest in adapting tools from various fields of applied mathematics such as control theory, game theory, nature inspired techniques, and computational intelligence to solve problems in computer networks. Published over 230 referred papers in flagship IEEE, Elsevier, IFAC, and Springer journals, international conferences and book



chapters, he is the co-author with Josephine Antoniou of the book *Game Theory in Communication Networks: Cooperative Resolution of Interactive Networking Scenarios* (CRC, ISBN: 978-1439848081, 2012), he is the co-editor with Petros Ioannou of the book on *Modelling and Control of Complex Systems* (CRC Press, ISBN: 978-0-8493-7985-0, 2007), participated in over 30 European Commission and locally funded research projects with over 4.5 million Euro as principal or co-principal investigator, presented keynotes, invited lectures at major research organisations, short courses at international conferences and short courses to industry. He serves on the editorial boards of the *Journal of Computer Networks (COMNET)* and *International Journal of Handheld Computing Research (IJHCR)*, served on international conferences as General Chair (ICT2011, EuroMedNet'98), Vice General Chair (WiOpt'07), international co-chair (INFOCOM 2003), technical program chair (MCCS05, ISYC06), and on executive committees (e.g. INFOCOM 2001–2003, and ICT98), technical committees, guest co-editor, invited speaker, and as a regular reviewer for conference and journal submissions. He is also a member of the International Federation of Automatic Control (IFAC) Technical Committee (TC 1.5) on Networked Systems, IFAC TC 7.4 on Transportation Systems and the IFIP working group WG 6.3. (<http://www.NetRL.uct.ac.za>).



**Title of the Talk:**     *Smart Communication Platforms for Prototyping Smart City Applications*  
**Presenter:**           **Professor Dr Magedanz, Director of the NGNI Competence Center, Fraunhofer Institute FOKUS, Full Professor at TU Berlin, Visiting Professor at UCT**

**Abstract:** Due to the increasing adoption of internet technologies in our daily lives, we are moving rapidly into a world of total interconnection of humans and machines. This means that after fixed mobile convergence (FMC) and voice data integration, which has coined the evolution of telecommunication infrastructures in the last two decades, we are now witnessing the start of a much broader convergence of quite different application domains with different value chains and used technologies.

This convergence will be enabled by the evolution of Internet technologies under the banner of the Future Internet (FI) research, comprising the Internet of Services (IoS), Internet of Things (IoT), and the Network of the Future (NoF). The most prominent application context for prototyping, piloting, and adopting FI research results are so called „Smart Cities“, in which an integrated „smart communication infrastructure“ represents the foundation for the efficient and fast provision of smarter applications.

Thus different transport and control platforms, as well as data platforms need to evolve into an integrated future internet service platform, enabling an open set of application domains by so-called common or generic enablers on top of different fixed and mobile network infrastructures.

Based on an introduction to Smart Cities and an requirements analysis of the communication requirements of different Smart City application domains, such as Smart Grids, eUtilities, eLogistics, eAutomotive, eGovernment, eHealth, and advanced Entertainment, this talk will outline a potential reference architecture for emerging Smart Cities based on an evolution of existing fixed and mobile Next Generation Networks (NGNs) control platforms and the related standards towards the Future Internet. Starting from Intelligent Networks (IN) representing still today a key telecommunications architecture, the talk will look briefly at the 3GPP IP Multimedia Subsystem (IMS) for providing advanced human to human (H2H) multimedia communication services, the emerging 3GPP Machine Type Communications (MTC) platforms enabling optimized machine to machine (M2M) communications, and the 3GPP Evolved Packet Core (EPC) providing seamless broadband connectivity for both H2H and M2M communications across different wireless network technologies. In addition, the talk will review relevant Service Delivery Platform (SDP) concepts and related service enablers and Application Programming Interfaces (APIs) as defined by ETSI, 3GPP, GSMA and OMA for supporting H2H and M2M capabilities needed by various application domains on top of fixed and mobile networks.

The talk will also give a short introduction to relevant toolkits and laboratories from Fraunhofer FOKUS and Technical University Berlin, which are used by various international network operators and vendors to prototype Smart City ICT platforms and applications.



## **Prof. Dr.-Ing. Habil. Thomas Magedanz**



Prof. Magedanz is an outstanding Computer Science and Telecommunications expert placing a strong emphasis on applied research in order to link academia and industry within an emerging global networking and services market.

Over the last 20 years Prof. Magedanz has performed pioneering research and globally recognized education courses for master, diploma and PhD students in the field of converging fixed and mobile telecommunications, the internet and information technologies. In this context he has initiated and managed numerous national and international R&D projects centered around Next Generation Service Delivery platforms on top of both legacy and next generation networks based on worldwide recognized technology testbeds.

He received his Diploma and his Ph.D. in computer science from the Technical University of Berlin, Germany in 1988 and 1993, respectively. In 2000 he finished his “Habilitation” for Applied Computer Sciences at Technical University of Berlin. In 1989 he joined as the first research associate the Department for Open Communication Systems (OKS) of the Technical University Berlin and helped to set up the chair. After his PhD he became assistant professor and continued his education and research activities with a strong focus on distributed computing and telecommunications.

Besides his employment as university lecturer and researcher he has been involved in several international strategic studies and research projects related to Intelligent Networks, Telecommunications Management Systems, Personal/Mobile Communications, TINA/Next Generation IN, and Mobile Agents / mobile Middleware within Deutsche Telekom AG, EURESCOM and the European RACE / ACTS / IST research programmes. From 1996 - 1998 he chaired the "Intelligent Communication Environments" research department at the GMD Research Center (now being part of Fraunhofer) for Open Communication Systems (FOKUS), where he was responsible for several projects related to the evolution of service delivery platforms in face of most recent IT, namely IN, TINA, CORBA, J2EE, Intelligent/Mobile Agents. In those days he has lead the development of the globally recognized Grasshopper Mobile Agent Platform. From 1998 –2002 he worked as R&D coordinator for the IKV++ Technologies AG, a spin-off company of GMD FOKUS, which provided consultancy services and developed advanced telecommunication middleware and service products.

In 2002 Thomas Magedanz was appointed as full university professor in the Electrical Engineering and Computer Science Faculty at the Technische Universität Berlin, Germany, leading the new chair for next generation networks (Architektur der Vermittlungsknoten - AV in German), sponsored by the Fraunhofer Gesellschaft, where he is concentrating on the education of master and PhD students, performing special

lectures and project courses in the field of Service Oriented Architecture (SOA) based service delivery platforms for converged media and communications services on top of next generation networks and the future internet.

In addition, he acts as managing director of the “next generation network infrastructure” competence center of the Fraunhofer Institute FOKUS, which also provides various testbeds and tools in the context of Next Generation Networks and Open Converged Service Delivery Environments. The most popular ones include the Open IMS Playground established in 2004 and the Open Source IMS Core System published in 2005.

In 2007 he opened the new Open SOA Telco Playground for IMS/Web2.0/SOA service prototyping on top of NGNs and legacy circuit switched telecom networks.

In spring 2010, he opened the Future Seamless Communication Playground based on the new FOKUS Open Evolved Packet Core software toolkit ([www.OpenEPC.net](http://www.OpenEPC.net)) in order to enable applied research on IP core network evolution and seamless mobility support in multi access wireless network environments. In 2011, he entered with his team also into the machine 2 machine (M2M) communications domain by developing the Open Machine Type Communications software toolkit ([www.open-MTC.org](http://www.open-MTC.org)).

In addition to all this, Prof. Magedanz has lead the German GLab DEEP Project and joined in 2007 the European FIRE (Future Internet Research Experimental Facilities) Expert Group, in which he is actively promoting the federation of NGN and future internet research testbeds. In this context he was and still is very active in several FIRE projects, such as Openlabs, BonFIRE, and Fed4FIRE. In addition, he and his team are very active within the more Industry targeted FI Private Public Partnership (PPP) Program, in which the developed OpenXXX toolkits are used as enabling technologies within the FI PPP flagship projects FIWARE, XIFI, and FISTAR. In all of these above mentioned initiatives Prof. Magedanz is actively prototyping the evolution of Next Generation Networks towards the Future Internet and establishing a Smart City enabling platform based on the aforementioned toolkits.

All this has lead in 2013 to the establishment of the new Smart Communications Playground, which enables the rapid and seamless creation and provision of Smart City Applications, enabled by a set of generic human to human and machine to machine communication APIs and SDKs making strong use of emerging HTML5, WebRTC and cloud-based service delivery platforms.

In this NGN evolution context Prof. Magedanz and his team is working closely with major international network operators around the globe (including Deutsche Telekom, Vodafone, Telefonica, PT Inovacao, Orange, BT, NTT, Saudi Telecom Company, Telkom Indonesia, Telkom South Africa, Entel S.A., etc) as well as equipment manufacturers (such as Qualcomm, Intel, NSN, Ericsson, Samsung, Huawei, etc.) which make use of the aforementioned toolkits and testbeds to prototype innovative applications and test interoperability and network migration scenarios.

Since 2005 Prof. Magedanz organizes the famous IMS Workshop series, which has been renamed in 2010 into FUSECO Forum, bringing together every year 200-300 international experts from more than 30 nations ([www.fuseco-forum.org](http://www.fuseco-forum.org)). Since 2009 he is organizing the international IEEE Workshop Series on Open NGN and IMS Testbeds - ONIT ([www.onit-ws.org](http://www.onit-ws.org)).

Prof. Magedanz aims also for global academic networking. In this context, Prof. Magedanz is acting since 2006 as Visiting Professor for Next Generation Networks and Services at the Department of Electrical Engineering of the University of Cape Town, South Africa ([www.ee.uct.ac.za](http://www.ee.uct.ac.za)). From 2007 – 2009, he was also Visiting Professor to the Department of Mathematics, Physics and Computing at the Waterford Institute of Technology in Ireland ([www.wit.ie](http://www.wit.ie)). Since October 2012 he is also a Visiting Professor at the Departamento de Ingeniería Eléctrica (DIE) at the Universidad de Chile ([www.die.uchile.cl](http://www.die.uchile.cl)). In 2012, he started a DAAD project Unified Future Internet Testbeds ([www.daad-unifi.org](http://www.daad-unifi.org)), which is aiming to harmonize education and research infrastructures (i.e. testbeds) and corresponding lectures across TU Berlin and four partner universities in the southern hemisphere, namely Universidad de Chile, University of Cape Town, Hanoi University for Technology, and Chulalongkorn University in Bangkok.