Seventh ITU Kaleidoscope Academic Conference
"Trust in the Information Society"

Barcelona, Spain, 9-11 December 2015

Final Report

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1. ITU Kaleidoscope 2015 overview

The ITU Kaleidoscope conference 2015 (K-2015) was hosted by the Universitat Autònoma de Barcelona, Spain, which provided excellent logistics.

Over 90 delegates from 28 countries participated in the conference. A few people used the remote participation facilities, which were managed by Leslie Jones (ITU/TSB). Some photos will be available shortly at the Kaleidoscope webpage.

Cellnex (Spain) kindly offered the coffee breaks of the three days of the conference.

The event was technically co-sponsored by the Institute of Electrical and Electronics Engineers (IEEE) and IEEE ComSoc, and the Institute of Electronics, Information and Communication Engineers of Japan (IEICE).

K-2015 partnering organizations supported the promotion of the conference: Waseda University (Japan), the Institute of Image Electronics Engineers of Japan (I.I.E.E.J.), the European Academy for Standardization (EURAS), the University of the Basque Country (Spain), the Chair of Communication and Distributed Systems at RWTH Aachen University (Germany), and the Universidad Politécnica de Cartagena (Spain).

A 12 month, substantial preparatory process was required for this Kaleidoscope edition. This process involved the efforts and collaboration of four TSB staff, a Steering Committee of four members (SC), a Host Committee (HC), and a Technical Programme Committee of 88 members (TPC), all internationally recognized ICT experts from academia, research institutes and the private sector.

Special thanks go to Pilar Dellunde (Vice-Rector, Universitat Autònoma de Barcelona, Spain), Kaleidoscope 2015 General Chairman, and to Pilar Orero and Remo Suppi (Universitat Autònoma de Barcelona, Spain); to the Technical Programme Committee Chairman, Kai Jakobs (RWTH Aachen University, Germany), for ensuring transparency through the double-blind peer-review process, and to the Steering Committee members: Christoph Dosch (ITU-R Study Group 6 Chairman; IRT GmbH, Germany); Kai Jakobs; Mitsuji Matsumoto (Waseda University, Japan); and Mostafa Hashem Sherif (AT&T, USA).

Alessia Magliarditi, ITU Kaleidoscope Coordinator, supported Kai Jakobs in chairing the meeting of the Award Committee members which selected the winners of the awards for best papers. The Award Committee was composed of five conference attendees: Martin Adolph (ITU/TSB), Christoph Dosch, Kai Jakobs, Mostafa Hashem Sherif, and Remo Suppi. At the Ceremony, Alessia announced the winners of the best paper awards whose certificates were kindly delivered by Ferran Sancho Pifarré (Rector, Universitat Autònoma de Barcelona, Spain); she also announced the recipients of the Young Author Recognition certificates that were kindly

delivered by the SC members and Martin Adolph. At the Closing session, the Rector gave his closing remarks and Alessia presented some highlights of the conference and thanked all the people that contributed to its success.

2. Conference Programme

The opening ceremony included welcome remarks from the Host University (Pilar Dellunde); welcome remarks from the Host Country (Francisco Pérez Bes, General Secretary, Spanish National Cybersecurity Institute, Spain); Opening Address by the Director of the Telecommunication Standardization Bureau (TSB), Chaesub Lee ; and a Keynote Speech on "*The evolution of connectivity to benefit our customers' digital life*" by Enrique Blanco (Global CTO, Telefonica, Spain).

On behalf of Mr Zhao, ITU Secretary-General, TSB Director, Mr Lee, delivered certificates of appreciation to Mitsuji Matsumoto (Prof. Emeritus Waseda University, Japan) and to Eva Ibarrola (Prof. at the University of the Basque Country, Spain), both founding ITU Academia members, for their outstanding contributions to the Kaleidoscope conferences and the Union.
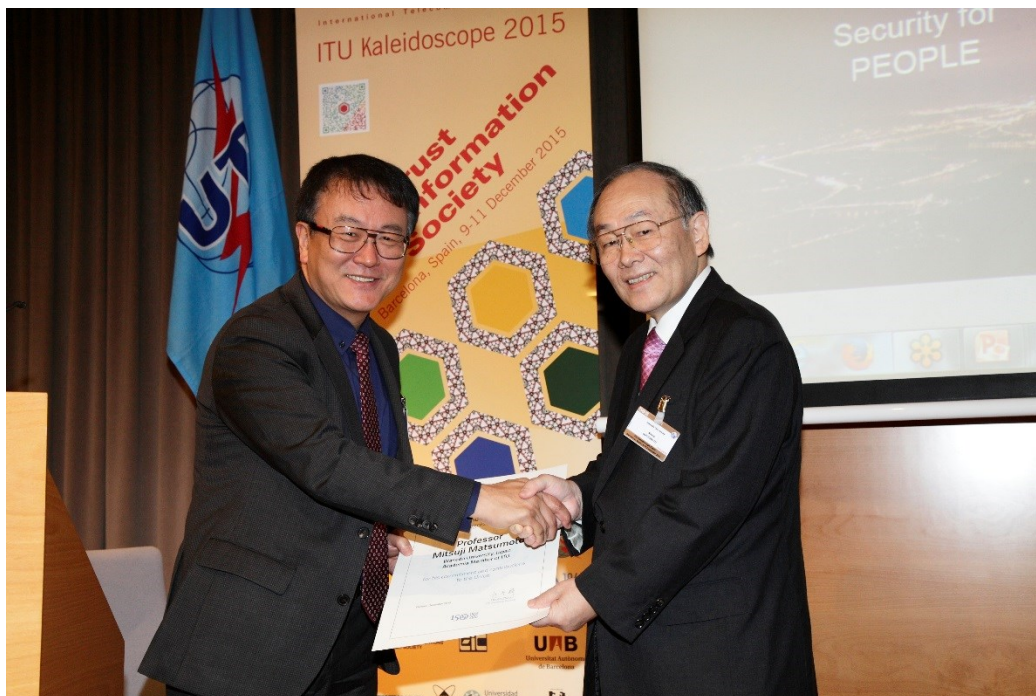
After the Opening, TSB Director was interviewed by Mariann Unterluggauer, a journalist of Deutschlandfunk (DLF), a German public broadcasting radio station, broadcasting national news and current affairs. The article was published and is available here. Reinhard Scholl, TSB Deputy Director, was interviewed by the Press of the Host University, Universitat Autònoma de Barcelona, for a newslog to be published at the University webpage. In addition, the following article was published in a local newspaper.

La Universitat Autònoma acull un congrés de les Nacions Unides

S'acabarà aquest divendres i tracta sobre Tecnologies d'Informació (TIC)

Experts de tot el món analitzen a Kaleidoscope 2015 com augmentar la confiança dels usuaris en la Societat de la Informació a través de plataformes estandaritzades i segures.

EDURNE CONCEJO

Kaleidoscope 2015 és el congrés anual que organitza la Unió Internacional de Tele-comunicacions (ITU). És tracta de l'agència especialitzada en Tecnologies de la Informació i la Comunicació de les Nacions Unides.

Des de dimecres i fins divendres, s'imparteixen una trentena de ponències, a més de conferències magistrals i presentacions convidades a càrrec dels millors experts de tot el món, tant de l'entorn universitari, com de l'àmbit empresarial.

Els professionals més reconeguts del món acadèmic, industrial, governamental i dels millors centres de recerca aportaran els seus coneixements al servei de la temàtica d'enguany: La confiança.

L'objectiu és buscar solucions sobre infraestructures que augmentin la seguretat, la fiabilitat i la previsibilitat de les interaccions dels ciutadans en la xarxa. La fiabilitat del Big Data, la privacitat al núvol o a la Internet de les Coses són els focus d'actuació primordials.

En aquest congrés hi participen els millors experts del món tant universitari com empresarial

Un dels organitzadors del congrés, el professor de la UAB Remo Suppi afirma: «Les TIC han esdevingut un servei gairebé imprescindible en la nostra vida, estan al centre de la innovació en àrees tan diverses com la gestió energètica, el transport, la sanitat, l'educació o els serveis financers, el que fa essencial que els usuaris hi puguin confiar».

150è aniversari

L'edició d'enguany de Kaleidoscope, coincideix amb el 150è aniversari de la Unió Internacional de Telecomunicacions (ITU). A més, es reconeixerà a la comunitat global d'experts la seva contribució a la innovació continuada del sector.

Els organitzadors mantenen que la història de la ITU «és un exemple de cooperació internacional entre governs, indústria, societat civil, universitats i centres de recerca».

«Estem orgullosos de la nostra història com a plataforma clau per proporcionar cohesió a la comunitat internacional en matèria d'innovació en el sector de les TIC, i Kaleidoscope 2015 celebrarà la contribució immensa de l'acadèmia per aconseguir l'objectiu de la ITU de connectar el món», conclouen ∎

In addition to Enrique Blanco's keynote speech delivered at the opening, three **keynote speeches** were included in the programme:

1. *The Networked society – challenges and opportunities*. [Presentation]
   Ulf Wahlberg (Vice President, Industry and Research Relations, Ericsson Group Function Technology, Sweden)

2. *Accountability in the Cloud*. [Presentation]
   Siani Pearson, HP Security and Cloud Research Labs, Bristol, UK

3. *The role of trust and standardization in the adoption of innovation*. [Presentation]
   Eric Viardot (Director of the Global Innovation Management Centre, EADA Business School, Spain)

Ulf Wahlberg replaced Jan Färjh, Vice President, Head of Standardisation and Industry, Ericsson. In his keynote summary he affirmed that the journey to the Networked Society has started and to continue this journey it is important that people, business and society can trust that their communication networks are secure, and reliable and that information carried over the networks is not manipulated or miss-used. In his talk an overview of what is currently happening in their industry, a vision of the future and some technical challenges were also presented.

In her keynote paper, Siani Pearson explains how strongly accountability can contribute to supporting the development of trustworthy information infrastructures, especially within cloud computing, and how this relates to other complementary data protection mechanisms.

After recalling the importance of the adoption phase in the innovation management process, Eric Viardot's keynote paper proposes a detailed examination of three different categories of innovation adopters: the early adopters, the early majority of mainstream adopters and the late majority of mainstream adopters. Then the author defines the role of trust with three main components: integrity, credibility and benevolence. Finally, he discusses the association between standardization and trust and their role in the adoption of innovation.

In addition to the keynote speeches, the programme included **two invited papers.** The first invited paper entitled "*Strengthening Trust in the Future ICT Infrastructure*" [Presentation] analyzed the concept of trust as it relates to future cyber-physical-social systems, in addition proposing a generic architectural framework for trust provisioning and the associated requirements on supporting standardization work. It was presented by Tai-Won Um (Electronics and Telecommunications Research Institute (ETRI), Korea) and co-authored with Gyu Myoung Lee (Liverpool John Moores University (LJMU), United Kingdom) and Jun Kyun Choi (Korea Advanced Institute of Science & Technology (KAIST), Korea)".

Antonio Skarmeta presented his invited paper on "*A Required Security and Privacy Framework for Smart Objects*" [Presentation], co-authored with José Hernandez-Ramos, and Jorge Bernal

Bernabe (University of Murcia, Spain). This second invited paper responds to the urgent need to address trust in the context of the Internet of Things (IoT), proposing an integrated design to manage security and privacy concerns through the lifecycle of smart objects. Skarmeta's approach is framed within an ARM-compliant (ARM processors require fewer transistors than typical processors, which reduces costs, heat and power use) security framework intended to promote the design and development of secure, privacy-aware IoT-enabled services.

96 papers from 30 countries were submitted for review, 31 of which were accepted for publication and presentation (23 in the lecture sessions, 8 in the poster session) from 18 countries (almost all from academic circles – only 2 from industry and 2 from governments). After selection, 4 papers were withdrawn (2 LEC papers and 2 POS papers).

All continents were represented in the conference programme. Session 3, in particular, on "*Trust in the Cloud*", chaired by Helena Mitchell (Georgia Institute of Technology, USA; ITU academia member) included four continents: Europe, Asia-Pacific, Africa, and Americas.

One LEC paper was exceptionally presented remotely as the author was not able to receive his visa on time. One LEC paper was not presented as the authors did not join the conference.

The research results submitted are related to various ITU activities, including pervasive and trusted platforms and infrastructure; virtualization of resources including network functions virtualization and software-defined networking; data-aware networking (DAN) / information-centric networking (ICN); architecture for machine-oriented communications such as M2M, IoT, sensor networks; security-, privacy-, and trust-enhancing technologies; trustworthy infrastructure for content delivery networks; quality of service, quality of experience, quality of security service; Internet speed measurements; protocol architecture convergence and interoperability; trust in ubiquitous applications and services: connected vehicles, healthcare, etc; trust in cloud computing; privacy, trust and big data; emerging video services and applications; robots and drones; strategies and policies enabling an information society; societal impact of ICTs, etc. As in previous editions of the conference, a number of papers address radio-related issues such as 3G/4G/5G mobile.

Presenters made reference to ITU-T Recommendations, study group activities and other ITU initiatives, including Recommendations ITU-T Y.2060, Y.3031, Y.3033, Y.3501; draft Recommendation ITU-T Q.FW_Int_sp_test; ITU-T G Suppl. 55; ITU-T Focus Group on IMT-2020, ITU-T Study Group 20; Connect 2020 Agenda for Global Telecommunication/ICT Development; reports presented on OTT at ITU Global Symposium for Regulators; etc.

An overview of Kaleidoscope papers and a mapping of papers and ITU activities (i.e. Study Groups, Focus Groups, etc.) will be prepared for the ITU Telecommunication Standardization Advisory Group (TSAG), and also for the ITU Radiocommunication Advisory Group (RAG) and the ITU Telecommunication Development Advisory Group (TDAG).

Representatives of **thirteen ITU academia members** submitted papers to the conference (ten of which were included in the conference programme): **Waseda University**, **Tokyo University**, and Keio University (Japan); **University of Geneva** (Switzerland); **Czech Technical University** in Prague (Czech Republic); **Saint-Petersburg State University of Telecommunications** (Russian Federation); **Technische Universität Berlin** (Germany); **Universidad Tecnológica Nacional**, Buenos Aires University and **Instituto Universitario Aeronáutico** (Argentina); **University of the Basque Country** (Spain); University of the Witwatersrand (South Africa); **Korea Advanced Institute of Science and Technology** (Korea). The authors of the Universidad Tecnológica Nacional who presented a paper on "*Smart Doorbell: an ICT Solution to Enhance Inclusion of Disabled People*" were all undergraduate students!

The authors of the award winning papers shared the prize fund of 10,000 USD.

- **1st prize** (5,000 USD): *5G Transport and Broadband Access Networks: The Need for New Technologies and Standards*. [Presentation]
  Tien Dat Pham, Atsushi Kanno and Naokatsu Yamamoto (National Institute of Information and Communications Technology, Japan); Tetsuya Kawanishi (Waseda University, Japan). The authors affirm that, in addition to new radio technologies, end-to-end transport networks will play a vital role in future 5G (and beyond) networks. In particular, access transport networks connecting radio access with core networks are of critical importance. They should be able to support massive connectivity, super high data rates, and real time services in a ubiquitous environment. To attain these targets, transport networks should be constructed on the basis of a variety of technologies and methods, depending on application scenarios, geographical areas, and deployment models. They presented several technologies, including analog radio over-fiber transmission, intermediate-frequency-over-fiber technology, radio-on-radio transmission, and the convergence of fiber and millimeter-wave systems that can facilitate building such effective transport networks in many use cases. For each technology, they presented the system concept, possible application cases, and some demonstration results. They finally discussed potential standardization and development directions so that the proposed technologies can be widely used.

- **2nd prize** (3,000 USD): *Regulation and Standardization of Data Protection in Cloud Computing*. [Presentation]
  Martin Löhe (Technical University Berlin & Fraunhofer FOKUS, Germany); Knut Blind (Berlin University of Technology, Germany). This paper shows that standards are often considered as an alternative form of regulation to legislative rule setting. However, standards also complement legislative acts, supporting their effective implementation and providing precise definitions for sometimes vague legal concepts. Authors say that standards are not mere technical regulations but relate to sensitive political issues. The genesis and contents of ISO/IEC 27018 illustrate the interaction between both forms of regulation in the case of data protection in cloud computing. While the standard has been written with intensive

consideration of the legal framework, authors argue that the standard could reciprocally influence legal rule-making in the same domain.

- **3rd prize** (2,000 USD): *Raising trust in security products and systems through standardisation and certification: the CRISP approach.* [Presentation]
  Irene Kamara (Vrije Universiteit Brussel, Belgium); Thordis Sveinsdottir (Trilateral Research & Consulting, LLP, United Kingdom); Simone Wurster (Technische Universität Berlin, Germany). This paper focuses on the need for security systems and related ICT solutions which poses new challenges to the individuals in terms of fundamental rights such as the right to privacy. Those challenges generate mistrust at the same time to the end-users. Standardisation and certification can have a significant role in changing the picture and help reinstate the lost confidence. This paper examines the concept of "trust" to ICT employed for security purposes, identifies the needs of the stakeholders and concludes with recommendations for the potential role of standardisation and certification through the implementation of a pan-European seal based on robust standards.

The Kaleidoscope Steering Committee decided to give a **special mention** to Eduardo Casanovas, Tomas Exequiel Buchaillot and Facundo Baigorria (Instituto Universitario Aeronáutico, Argentina) for their paper "*Vulnerability of Radar Protocol and Proposed Mitigation*" presented in Session 1 "*Trust in the Infrastructure*", [Presentation], as their research work will immediately and significantly impact on the safety of millions of people daily.

Alongside the winners of cash prizes, **sixteen** entrants received **Young Author Recognition Certificates:** Facundo Baigorria and Tomas Buchaillot (Instituto Universitario Aeronáutico, Argentina); Irene Kamara (Vrije Universiteit Brussel, Belgium); Jorge Viguri (Universitat Jaume I, Spain); Jairo López (Waseda University, Japan); Chihiro Maru (Ochanomizu Universiy, Japan); Quang Nguyen (Waseda University, Japan); Eneko Atxutgi (University of the Basque Country, Spain); Lucas M Alvarez Hamann, Luis Lezcano Airaldi, Maria E Baez Molina, Mariano Rujana, Juliana Torre (Universidad Tecnológica Nacional - Facultad Regional Resistencia, Argentina); José Vinícius de Miranda Cardoso (Federal University of Campina Grande - UFCG, Brazil); Juan Vicente Pradilla (Universitat Politecnica Valencia, Spain); Leckraj Bholah (University of Edinburgh, United Kingdom).

For the fourth time at Kaleidoscope, a short "Fast-forward Poster Preview" session, chaired by Martin Adolph, in the conference plenary gave more prominence to poster presenters. Presenters had 2 minutes and not more than 2 Powerpoint slides each to pitch their research and to stir the participants' interest in the following **poster session**.

All papers presented at the conference are included in the [Conference Proceedings](), which are freely available for download on the Kaleidoscope 2015 webpage. They will be also listed in the IEEE Xplore digital library.

Programme, presentations, abstracts and biographies are available [online]().

Relevant recommendations and conclusions from the technical sessions, drafted by the Session Chairs and presented by the Wrap up session moderator, Mostafa Hashem Sherif, are available online in PDF format on the programme webpage, [Wrap up session]().

The fifth edition of the **[Jules Verne's corner]()** (JVc) **" Preparing for the Data Deluge"**, asked participants to forecast the future of data, exploring the new frontiers becoming within reach thanks to advances in data collection and analysis. The quantity of data is soaring to previously unimaginable heights, and its growth rate is always accelerating. Our increasing ability to capture and draw useful information from huge volumes of data is giving rise to a wealth of new possibilities, as well as a variety of challenges and risks. Considering the great diversity in the existing data environment, how will we discover, collect, store and analyze data most efficiently, and can we introduce interoperability to improve our navigation of data? In the face of regular theft and misuse of data, what are the safeguards capable of preventing malevolent uses of data, and how will we trust that data will be used for the purposes expressed by data custodians?

Kaleidoscope's Jules Verne's corner is a space to imagine the potential of today's technology and articulate visions of its implications for our future. Paolo Rosa (former ITU Secretariat) was introduced by the Session Moderator, [Christoph Dosch](), as the inventor of the Kaleidoscope series and the JVc special sessions. Paolo introduced a video that was produced, under his coordination, in 2010, on the occasion of the 1st JVc edition. The video shows ITU's main achievements and Jules Verne's revolutionary ideas to inspire visionary minds, with the ability to

think 50 years into the future and beyond. The 2015 JVc edition, *Preparing for the Data Deluge*, featured two speakers with 60 years of academic and industry experience between them: [Jun Kyun Choi](#) of Korea's Advanced Institute of Science and Technology, and [Mahmoud Daneshmand](#) of the Stevens Institute of Technology in New Jersey, USA.

All participants received a CD which included an electronic version of the proceedings.

3. Next Kaleidoscope event

At the Closing session, it was announced that the next Kaleidoscope conference will take place in Bangkok, Thailand, mid-November 2016, in conjunction with ITU Telecom World 2016.

Additional information will be available soon [here](#).

Annex – Side Event

Consultation on ITU-Academia Collaboration

Agenda

This consultation on ITU-Academia collaboration (8 December) provided an opportunity to exchange views on what ITU can do to best meet the needs and expectations of Academia. The format was informal and interactive. This was a hands-on session involving about 35 participants representing institutions from all over the world. The programme is available here.

➢ Opening/ Welcome by Dr. Chaesub Lee, TSB Director, ITU
➢ Presentation: ITU and its Academia related activities
➢ Presentation: Experiences and Perspectives of an ITU Academia Member
➢ Presentation: Outcomes of the online academia consultation
➢ Presentation: Outcomes of the ITU-D Academia Network Meeting

Way Forward

The ideas and proposals from this interactive consultation have been captured in a report from the meeting to be shared with participants, and will be used to help ITU develop a forward-looking strategy and plan of action to strengthen ITU-Academia collaboration.