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Editorial: Special Issue on "Global Cities Digitalization (GCD)"

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The 22nd Edition of Strategic Workshop (SW'19) was held in, HM JAIME III Horrech Moya Hotels S.L. Passeig de Mallorca, 14 B, 07012 Palma, Illes Balears, Spagna (Spain) on May 13–15, 2019. The focus during the active 2-day discussion was Global Cities Digitalization (GCD) discussing the vision and smart innovation, technology-based digitalised business models for sustainability and global partnership, policies, network and security, safety standards and future global strategies with similar project proposal discussions.

The theme of the Workshop was "Global Cities Digitalization (GCD)". In addition to the scientific presentations on (GCD), the focal objective of the Workshop was to examine the actions that can expedite the relevant technologies and its branding by innovation as well as looking into the affirmative collaboration linking different institutions, industries and academia. We determined that the fundamental and inevitable challenge of the twenty-first century is to high-grade people means of living in cities. We discussed the idea of digitalisation and urbanisation is basically to inaugurate an innovative horizon for sustainable infrastructure and stable economic development for the global cities. We also presented new humane questions, and dilemmas concerning privacy, safety and security regarding GCD.

To satisfy the purpose as specified above, we designed a dedicated Panel and Sessions in the field of global cities Digitalization (GCD). Throughout that Workshop, we attempted to perceive how to develop a healthy competition among cities for digitalisation as well as big data analytics, internet of things (IoT), data management plans and security standards with business models for global partnerships. Many challenges for sustainability-related to environment, policies and practices, ICT, operational assistance, connectivity and human resources were considered. The Workshop stressed that the critical point is to look for a collective negotiation among stakeholders, local

Chosen Topics from the Strategic Workshop, May 13–15, 2019, HM JAIME III Horrech Moya Hotels S.L. Passeig de Mallorca, 14 B, 07012 Palma, Illes Balears, Spagna (Spain).

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population and business communities for amplifying transparency in policies, communication and mutual partnerships.

The Special Issue highlights chosen fourteen papers that focus on a wide range of scientific analyses in Global Cities Digitalization (GCD) as well as address the utilization, co-operation and soundness in evolving wireless technologies. With that, technology-based innovative business models for Global cities Digitalization and correlated co-operations are discussed in the following papers.

The First Paper ''Digitalization of Global Cities and the Smart Grid'', by Sarmistha De Dutta, Ramjee Prasad.

In this paper, the authors illustrate that cities are extending to accommodate population growth. Though, this accelerated increase leads to the demand for cities to implement infrastructure support to give their residents a good quality of life by lessening the carbon footprint. Blockchain provides more reliable management of energy data while meeting the energy requirements of a smart city of the future. The paper stipulates that the blockchain technology platform can be used to protect microgrid data resulting in a more secure power grid system, a necessity to keep today's digital cities operating cost-effectively, efficiently, and securely.

The Second Paper ''Blockchain-Based Academic Records Verification in Smart Cities'', by Muhammad Aamir, Furqan Ali Khan, Rehan Qureshi, Muhammad Huzaifa.

In this paper, the authors offer architecture for digital verification of academic records using blockchain Technology. The article also presents an implementation of this architecture as a proof of concept.

The Third Paper ''From the Internet of Things to the Social Innovation and the Economy of Data'', by Luis Sanchez and Luis Munoz.

The research paper outlines the evolution of one of the pioneering city, Santander, where an Internet of the Things infrastructure was deployed a decade ago. In this time, multiple technologies and services have been developed and used in smart city pilots. The paper discusses the key lessons learnt from the digitalization of the city and the new challenges that have arisen as we were paving the way for a smarter and more liveable city.

The Fourth Paper ''Multi Business Model Innovation in a world of Smart Cities'', by Peter Lindgren.

The author implies that the real potential and challenge of the increasing urbanization is to experience the shared accomplishment and exterminate poverty. The critical barrier here is to find a collective negotiation among stakeholders, local population and business associations for developing transparency in policies, communication and mutual partnerships. The paper speaks these challenges in the context of Future Wireless technologies, business models and business ecosystems.

The Fifth Paper ''Architecture and Operational Model for Smart Campus Digital Infrastructure'', by Risto Jurva, Marja Matinmikko-Blue, Ville Niemelä, Suvi Nenonen.

This article proposes a technical architecture for future Smart Campus consisting of 5G and IoT networks complemented by distributed computing and data analytics. The increasing complexity of the digital environment calls for a specific actor to operate the Smart Campus infrastructure and also services, which has not been widely discussed. It is foreseen that the university IT Administration is probably not willing to adopt the responsibility of enlarging infra and the growing number of devices. Similarly, mobile network operators (MNO) are not seen as appropriate to take this role being commonly profiled to offer merely connectivity. To tackle this question, a novel operational model for Smart Campuses is presented based on the recently proposed micro operator concept. Moreover,

a case study of the University of Oulu campus is presented, where smarts technology in the form of 5G-test network has been deployed.

The Sixth Paper ''D2D Resource Allocation with Power Control Based on Multi-Player Multi-Armed Bandit'', by Fang-Chang Kuo, Christian Schindelhauer, Hwang-Cheng Wang, Chih-Cheng Tseng.

In this paper, the authors describe that Device-to-device (D2D) communication is defined as the direct communication between two D2D user equipment (DUE) without traversing the evolved NodeB (eNB) of an LTE network. With the underlying mode of resource reusing, DUEs are allocated with resource blocks (RBs) that are also used by the cellular user equipment (CUE) to improve the system throughput by reusing the spectrum. To further enhance the performance of reusing, an extended version of the reinforcement learning algorithm, Multi-Player Multi-Armed Bandit (MP-MAB), is employed to control the transmission power of the DUEs to reduce the induced interference. Three learning strategies, namely Epsilon-first, Epsilon-greedy, Upper-Confidence-Bound, are applied for the simulation. The results reveal a good effect in terms of the average transmission power of D2D pairs; the ratio of unallocated D2D pairs, energy efficiency, and total throughput.

The Seventh Paper ''Overview of LTE for Vehicular Communications'', by Antonio Cerezo Barranco, Jose Antonio Yebenes Galvez, Jesus Aguilar Armijo, Mari Carmen Aguayo-Torres, Juan Carlos Ruiz Sicilia, Gerardo Gomez.

The paper contextualizes in the mobile communications systems and, in particular, in vehicular communications. It provides an overview of vehicle-to-everything communications (V2X) about the latest Long Term Evolution (LTE) standards. We present the primary vehicular services and give a brief review of vehicular communication systems over LTE for both infrastructures to vehicle (I2V) communications over the broadcast/multicast LTE service and vehicle-to-vehicle (V2V) communications over the LTE sidelink. Following, it analyzes the performance of vehicular systems using link simulations for several different vehicular channel models implemented over a simulator called WM-SIMA. Finally, we draw out conclusions from the impact of the use of different modulation levels and coding rates, as well as the interference Level in communication performance.

The Eighth Paper ''A Pseudo-cache-based IoT small files management framework in HDFS Cluster'', by Isma Farah Siddiqui, Nawab Muhammad Faseeh Qureshi, Bhawani Shankar Chowdhry, Muhammad Aslam Uqaili.

This paper suggests a novel technique pseudo-cache-based small files management framework (PSFMF) that bypasses default HAR with its unique logical file association mechanism and avoids huge memory to build HDFS blocks. The evaluation shows that PSFMF reduces the usage of memory consumption, increases MapReduce performance and reduces tasks workload over HDFS cluster.

The Ninth Paper ''From Cloud RAN to Open RAN'', by Liljana Gavrilovska, Valentin Rakovic, Daniel Denkovski.

This paper displays the generic definitions, fundamental functionalities and current research trends in C-RAN and its derivatives, V-RAN and O-RAN. Moreover, the article provides practical results, insights, and lessons learned regarding the limitations and unforeseen issues of RAN virtualization. The paper also discusses the potential developments and possibilities for the commercial roll-out of novel RAN approaches.

The Tenth Paper ''Performance Analysis of 5G Fixed Wireless Access Networks with Antenna Diversity Techniques'', by Isiaka. A. Alimi, Romilkumar K. Patel, Nelson J. Muga, Paulo P. Monteiro.

In this paper, the authors explain the different network requirements of the 5G FWA systems. Also, a comprehensive overview of the broadband schemes' technical

challenges is presented, and we proffer viable solutions for achieving cost-effective and scalable 5G FWA solutions. Moreover, we consider the different system and channel models for the 5G FWA. Based on the models, we evaluate and simulate the path-loss and average transmission rate for different use cases.

The Eleventh Paper "Connections of Chronic Diseases and Socio-dynamic cues for Integrating ICT with Care Plan Adherence", by Sadia Anwar, Ramjee Prasad.

The Paper describes that chronic disease requires healthy patient behaviour to follow the care plan that becomes very vital if the patient has multiple chronic conditions and disability. Integration of Information and Communication Technologies (ICT) and focal health care business models provide high-grade answers to achieve adherence with a care plan to overcome socio-economic cost and improve the workforce. Analysis of the socio-dynamic cues (SDC) among different regions and interpretation models for data gathering through the ICT infrastructure can assist in better diagnosis, treatment, finding relevance between chronic diseases among regions of the world and the extent by which a patient follows the care plan with optimization strategies. The paper highlights that technology trust and implementation requires regulations as well as the multidisciplinary approach at all sectors as a deciding element for care plan adherence as well as shows how to make connections among diseases with a preliminary framework to make business model efficient in the health care sector.

The Twelfth Paper ''Enabling Virtual Radio Functions on Software Defined Radio for Future Wireless Networks'', by Wei Liu, Joao F. Santos, Jonathan van de Belt, Xianjun Jiao, Ingrid Moerman, Johann Marquez-Barja, Luiz DaSilva, Sofie Pollin.

In this paper, the authors introduce the concept of Virtual Radio Function and illustrate how softwarized/virtualized radio functions can be placed and initialized at runtime, allowing radio access technologies and spectrum allocation schemes to be formed dynamically. Finally, we focus on embedded Software-Defined Radio as an end device and illustrate how to realize the placement, initialization and Configuration of virtual radio functions on such kind of devices.

The Thirteenth Paper ''Literacy and socio-dynamics cues insights decision analytics for care plan adherence'', by Sadia Anwar, Ramjee Prasad, Bhawani S. Chowdhry.

The paper describes that literacy is a tool to analyze a problem in different scenarios. In the healthcare ecosystem, eHealth literacy is very critical for the promotion of a product/service when it comes to the patient for following or selection of a care plan or doctor level for communication at patient level as well as at a technological level. Different stakeholders should consider the level of literacy; deep dig into technological advancement while making policies for the Health care ecosystem and cultural aspects for technological promotion to ensure eHealth solutions to be followed. A business model should be improvised concerning eHealth literacy and culture literacy in different countries in the health care sector for the promotion of a particular assistive technology product/device/service. This paper highlights the various essential aspects concerning eHealth literacy, cultural influences its importance while following a specific plan of care and its adherence at the patient as well as the policy-making level for the healthcare ecosystem.

The Fourteenth Paper ''A Philosophy of Security Architecture Design'', by Geir M. Køien

The research paper discusses the Threats, assessed and various countermeasures. The totality of these measures, for successful cases, may be defined as security architecture. The goal of security architecture will primarily be to secure the system robust and resilient in the face of an adversary. The paper argues that this is not enough. Modern security

architecture designs must go one step further and improve the defences when faced with hostile actions. That is, the security architectures must become antifragile.

The Fifteenth Paper ''Development of IOT Based Smart Instrumentation for the Real Time Structural Health Monitoring'', by Bhawani Shankar Chowdhry, Ali Akbar Shah, Muhammad Aslam Uqaili, Tayab Memon.

The research paper believes that the development of an IOT based instrumentation for analysing the health of a structure using an accelerometer (ADXL335) and Node MCU. The accelerometer sensing paves the way in determining the health of a structure by observing the non-linear vibrations in the structure. The data fetched from the sensor is being transmitted to a cloud platform (Thingspeak) using a secure API communication that helps secure the data. The entire instrumentation has a latency of 15 s, is power efficient and is a low cost, which is remarkable.

The Sixteenth Paper ''The future role of multi-business model innovation in a world with digitalization and global connected smart cities'', by Per Valter, Peter Lindgren, Ramjee Prasad.

In this paper, the author addressed that currently there is no indication that the business environments would stabilize within the near future, on the contrary, it seems like this trend would continue at an even faster evolution cycle in the future. However more factors are also contributing, and one of those is the organizational boundaries when we are considering smart cities from the socio-technical system perspective, it's evident that smart cities need to be facilitated by a business model ecosystems consisting of many different organizations, therefore to an archive high-level smartness in the towns, the interconnectedness of the various services provides by the different organizations are needed. It is where multi-business model innovation with its business model ecosystem could have a potential positive impact, and we conduct a walkthrough of a digital multi-business model innovation tools within the frame of global connected smart cities to explore the potentials.

Dr. Ramjee Prasad is a Professor of Future Technologies for Business Ecosystem Innovation (FT4BI) in the Department of Business Development and Technology, Aarhus University, Denmark. He is the Founder President of the CTIF Global Capsule (CGC). He is also the Founder Chairman of the Global ICT Standardization Forum for India, established in 2009. GISFI has the purpose of increasing the collaboration between European, Indian, Japanese, North-American and other worldwide standardization activities in the area of Information and Communication Technology (ICT) and related application areas. The University of Rome "Tor Vergata", Italy as a Distinguished Professor of the Department of Clinical Sciences and Translational Medicine honoured him on March 15, 2016. He is Honorary Professor of University of Cape Town, South Africa, and University of KwaZulu-Natal, South Africa. He received Ridderkorset af Dannebrogordenen (Knight of the Dannenberg) in 2010 from the Danish Queen for the internationalization of top-class telecommunication research and education. He has received several international awards such as IEEE Communications Society Wireless Communications Technical Committee Recognition Award in 2003 for making a contribution in the field of "Personal, Wireless and Mobile Systems and Networks", Telenor's

Research Award in 2005 for impressive merits, both academic and organizational within the area of wireless and personal communication, 2014 IEEE AESS Outstanding Organizational Leadership Award for: "Organizational Leadership in developing and globalizing the CTIF (Center for TeleInFrastruktur) Research Network", and so on. He has been Project Coordinator of several EC projects, namely, MAGNET, MAGNET Beyond, eWALL, and so on. He has published more than 30 books, 1000 plus journal and conference publications, more than 15 patents, over 100 Ph.D. Graduates and a more significant number of Masters (over 250). Several of his students are today worldwide telecommunication leaders themselves. Under his leadership, magnitudes of close collaborations are being established among premier universities across the globe. The collaborations are regulated by guidelines of the Memorandum of Understanding (MoU) between the collaborating universities.

Marina Ruggieri is Full Professor of Telecommunications Engineering at the University of Roma "Tor Vergata", therein: member of the Board of Directors; Chair of the President's Advisory Committee for the relationship with the Italian Space Agency (ASI); co-founder and Steering Board Chair of CTIF—an Interdisciplinary Research Center on Information and Communications Technology and its verticals, that belongs to a broad research network, with nodes in USA, Europe and Asia. She has been: Vice President with the responsibility of the ASI Technical and Scientific Council and member of the Research Policy Experts Advisory Committee of the University and Research Ministry. She is the arbitrator of the Italian Industries Federation for Aerospace, Defense and Security (AIAD). She has been a member of the Technical-Scientific Committee of the Center for Aeronautical Military Studies and Vice President of the Roma Chapter of AFCEA. She is Principal Investigator of the 40/50 GHz TPD#5 Communications Experiment onboard Alphasat (launched on July 2013). She is IEEE Aerospace and Electronic Systems Society (AESS) Officer and member of the Board of Governors (2019–2021). She has been IEEE 2018 Chair, TAB Strategic Planning Committee; 2017 Vice President, Technical Activities; 2014–2015 Director of IEEE Division IX; 2010–2011 AESS President. She has been a member of many IEEE Committees, including Public Visibility, Fellow, Governance, Nominations and Appointments, Women in Engineering, Awards Board, and of the IEEE Board of Directors. She is the recipient of 1990 Piero Fanti International Prize; 2009 Pisa Donna Award for women in engineering; 2013 Excellent Women in Roma Award; 2011 AESS Service Award. She has been inducted as a Professional into the IEEE Honor Society Eta Kappa Nu (HKN). She is IEEE Fellow "for contributions to millimetre-wave satellite communications" She is author/co-author of 335 papers, one patent and 12 books.