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16th Conference on Water Distribution System Analysis, WDSA 2014

Preface

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This volume contains the papers presented at the 16th International Conference on Water Distribution System Analysis (WDSA2014) held in Bari (Italy), July 14-17, 2014. The WDSA conference was established in the USA in 1999 (Tempe - Arizona) as a symposium within the ASCE Water Resources Planning and Management conference, aimed at presenting and publishing research in this field. Thereafter, the first independent WDSA conference was held in 2006 in Cincinnati (Ohio) and, since then, it was organized as a stand-alone conference each even year and as a symposium within the ASCE Environmental and Water Resources Institute (EWRI) conference each odd year. Previous editions of the WDSA conference were held at Kruger National Park (South Africa) in 2008, in Tucson (Arizona) in 2010 and in Adelaide (Australia) in 2012. Then WDSA2014 is the first time in Europe following the urgent need of the *old Continent* to effectively allocate investments for managing existing water distribution infrastructures.

Indeed, the complexity of water distribution systems management in Europe is increasing due to the joint effect of the expansion of urban areas in consequence of socio-economic trends, abnormal water consumption due to climate changes and natural deterioration of the asset, sometimes built one century ago. All these factors expose such infrastructures to an increasing risk of supplying inadequate quantity of water of scarce quality to citizens, especially under failure events. It is estimated that water consumption by the public, industry and agriculture in Europe would increase by 16% by 2030, while about 20-40% of available water is wasted (leakages in the supply infrastructures, no water saving technologies installed, etc.).

Ineffective management of water distribution systems results into depletion of water resources and increasing CO2 emissions related to energy waste as well as to the treatment of increasing water volumes. From such perspective, water resources and asset management are relevant issues also in the smart cities paradigm, where the analysis and management of integrated urban hydraulic systems is an emerging topic. In such context, the fast advancements in information and communication technology (ICT) in the water sector is providing detailed information on the hydraulic systems that should be exploited to perform advanced analyses and support decisions for water system planning and management.

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All these circumstances are putting pressure on decision makers to increase the effectiveness of the investments aimed at improving system efficiency and sustainability.

Integrating the expertise of researchers, software developers, practitioners and stakeholders from public and private water sector is necessary to provide sustainable solutions in order to preserve water and energy resources for future generations. The WDSA 2014 conference, whose main theme was "*Urban Hydroinformatics and Strategic Planning*", joined the best expertise on water distribution sector from all over the world to share new paradigms and solutions in such a challenging framework. It was attended by about 250 people and 220 papers were presented by authors coming from 42 countries (Fig. 1), thus demonstrating the world-wide increasing interest to the urban hydraulic infrastructure management.

The presentations were divided in 19 sections covering different topics such as: sustainable resilient water infrastructures; intelligent use of energy in water distribution systems; phasing the development of water distribution networks; water distribution network modelling; urban hydraulics and system integration; water quality; network segmentation and smart management; modelling "flows" in water infrastructure asset management; smart water and ICT; pressure and leakage; real-time management of smart water systems using big data; water demand modelling and forecasting; water distribution systems modelling for security enhancements; aquifers as subsurface reservoirs for drought management; rainwater harvesting and water reuse; transients in pipe systems; water distribution network model calibration; leakage analysis and management and water resources management.

Fig. 1. Nationalities at WDSA 2014 conference.

The conference also held the *Battle of Background Leakage Assessment in Water Networks* (BBLAWN) that is the fifth in a series of "Battle Competitions" dating back to the Battle of the Water Networks (BWN) in 1985 and more recently the Battle of the Water Sensor Networks (BWSN) in 2006; the Battle of the Water Calibration Networks (BWCN) in 2010, and the Battle of the Water Networks design (BWN-II) in 2012.

The BBLAWN calls for teams/individuals from academia, consulting firms and utilities to propose a design methodology for reducing water losses due to background leakages also considering the cost for upgrading the hydraulic system capacity – i.e. by possible replacement/parallelization of pipes, installation of new parallel pumps

and enlarging tanks – the cost of the optional installation of pressure control valves (PVs) and the cost of the energy and water losses. Apart from the competition *per se*, the aim was to stimulate the technical-scientific community in proposing methodologies to face the complex technical issue, dealing with conflicting cost objectives (i.e. asset upgrading versus energy cost and leakage reduction versus system pressure reduction using costly control valves) on the C-Town network, already used in previous battle editions (Fig. 2).

Fourteen teams took part to the BBLAWN and the proposed methodologies were presented during a plenary session of the conference and described in relevant papers of this volume. More details about the problem are reported in a paper of this volume authored by the BBLAWN Organizers (and available at www.water-system.org/wdsa2014).

Fig. 2. Example of solution presented at the Battle of Background Leakage Assessment in Water Networks.

Finally, we would like to remark the brilliant keynote lectures given during the conference by: Dr. Mirjam Blokker (KWR Watercycle Research Institute – The Netherlands) on *Water Demand Modelling and Its Applications*; Prof. Yves Filion (Queen's University – Canada) titled *There Is Energy in That Drinking Water! How the Shape and Management of Water Distribution Systems Affect Energy and Environmental Impact*; and Prof. Dragan Savić (University of Exeter - Centre for Water Systems – United Kingdom) on *Optimization in Water Distribution System Analysis*.

See you all in Cartagena de Indias (Colombia) for the WDSA 2016 conference!