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Truly Smart Urban Water Systems

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The proliferation of cyber infrastructure, including sensors of various types, large-scale and widespread data acquisition, increasingly sophisticated modelling tools (including Artificial Intelligence), information and communication technologies (ICT), “Internet of Things” (IoT), and the roll-out of 5G wireless networks promise to enhance city living in the years to come and may lead to the emergence of the so-called ‘smart cities’. As for the urban water systems, which are part of the essential city infrastructure, the ultimate goal is to deliver sustainable and resilient water management. This can only be achieved through integration of the aforementioned cyber (‘smart’) infrastructure elements with the physical infrastructure (i.e. urban water networks) and their synergistic management. This is what in the literature is often termed as ‘smart water systems’.

However, focusing only on the design and implementation of the cyber components of the smart urban water infrastructure neglects the importance of the physical infrastructure and ways to make it better, more efficient, sustainable and resilient. In other words, planning, design, operation and maintenance/rehabilitation of the physical water infrastructure has also to be ‘smart’. For example, the design of an urban water supply network entails the selection of pipes (i.e. material, diameter, wall thickness) and location of pipes (spatial coordinates and connections), valves, hydrants, etc. This selection is driven by regulation/design requirements (e.g., pressure, water quality, traffic loads, etc.) and scenarios of future demand. A smart design would take all these aspects into account.

This presentation will discuss a concept of truly smart urban water systems where both cyber and physical infrastructure components are considered equally important and are developed synergistically. Examples of approaches to achieve that in urban water supply systems will be also shown.