

Kolloquium der Abteilung 8
Medizinphysik und metrologische Informationstechnik

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Integrated intelligent water-energy metering systems, informatics, and analytics: multi-scale opportunities and challenges

Rethinking of management strategies for water, energy, and human networks is key for meeting future demands under changing socio-economic and climate conditions and inform systems governance and operations in normal conditions or emergency situations (e.g., the recent COVID-19 restrictions). A growing body of work aims to capture these elements by analyzing the role of digital technologies and data analytics in the digital transformation of water and energy utilities, relying on high-resolution data, emerging technologies and sensors, and advanced analytics. Following previous developments in the energy sector, over the last two decades, water smart metering programs have been launched in a number of cities worldwide to nearly continuously monitor water consumption at the single household level. The availability of data at such very high spatial and temporal resolution advanced the ability in characterizing, modeling, and, ultimately, designing user-oriented residential water demand management strategies, complementing more traditional sensor-based network-scale applications (e.g., leak detection). Moreover, advanced metering technologies coupled with informatics create an opportunity to form digital multiutility service providers. These providers will be able to concurrently collect customers' medium-high resolution water, electricity, and gas demand data and provide user-friendly platforms to feed this information back to customers and supply/distribution utility organisations. Providers that can install low-cost integrative systems will reap the benefits of derived operational synergies and access to mass markets not bounded by historical city, state, or country limits. In this talk, demonstrative research cases showcasing the opportunities and challenges deriving from smart meter developments and coupled water-energy analytics will be presented. Interdisciplinary challenges spanning through technology (e.g., sensor battery life, detection of faulty meters), data and data privacy, security, business, and social aspects will be discussed. Finally, we will provide an overview of the transformative R&D priorities to realise the vision of a multi-utility.

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