

## CWS hosts successful IWA UK National Young Water Professional Conference

The Centre for Water Systems welcomed over 85 people for the 13th IWA Young Water Professionals conference in April. This provided an ideal opportunity for young professionals working in all sectors of the water industry, academic, utility, and consulting, from all over the world to meet their peers and keep up-to-date with the latest research and innovation. It was also an opportunity for them to meet more senior practitioners to discuss careers, opportunities and to develop useful networks.

A great deal of energy and enthusiasm was expressed throughout the conference, aided by diverse and interesting talks ranging from the latest wastewater treatment technologies through to the water industry's involvement in the design and implementation of a major airport extension in Saudi Arabia. Prizes were awarded for the best poster, best oral presentation and the best poster or oral presentation related to International Development.

Lynn Cooper, Chief Executive of the Institute of Water, said, "Without a doubt this has been the most successful IWA UK YWP Conference to date."



Some of the organizers and delegates relaxing at dinner  
(Photos thanks to 'Thru A Lupe Photographic Services')

## Environment Agency backs research

Results obtained by Professor Zoran Kapelan in his contribution to the project "Water Resources Planning Tools" (UKWIR WR27) have featured in the Environment Agency's Water Resources Planning Guidelines (published May 2012). The project looked at methodologies, guidelines and modelling approaches used in the production of integrated water management plans and the relevant water security issues in the UK. Tools were developed in the project to enable planners to choose and use techniques appropriate for their individual needs, when considering planning issues, levels of risk and the data sets available to them. The project also evaluated the potential need for new forms of water systems analysis in response to specific longer term planning requirements, such as new forms of risk-based economic appraisal that aid decision making.

The project was led by the Halcrow Group Ltd with other contributions from ICS Consulting and Imperial College. The project was supported by the Environment Agency and OFWAT. Contact: Zoran Kapelan ([z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)).

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### Special points of interest:

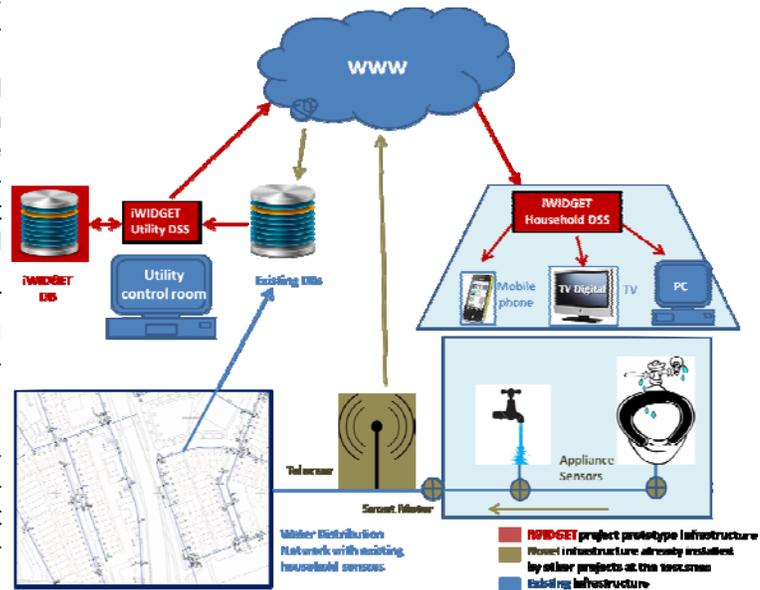
- Young Water Professionals conference success
- News of the partnership with the University of South Florida
- New Centre for Business and Climate Solutions

## Current Research

### CWS wins new EU funded project: iWIDGET

The aim of iWIDGET is to advance knowledge and understanding about smart metering technologies in order to develop novel, robust, practical and cost-effective methodologies and tools to manage urban water demand in households across Europe. This will be achieved by reducing wastage, improving utility understanding of end-user demand and at the same time reducing customer water and energy costs.

The main scientific challenges for iWIDGET are the management and extraction of useful information from vast amounts of high-resolution consumption data. This will entail the development of customised intervention and awareness campaigns to influence behavioural change and the integration of iWIDGET concepts into a set of decision-support tools for water utilities and consumers, applicable in differing local conditions.



In order to meet these aims and challenges, iWIDGET will investigate: (i) how best to provide the dynamic accurate measurement and data transfer of useful information about end-user water consumption, (ii) how best to use consumption data to improve the operation of utilities and influence end-users to modify their behaviour, (iii) how to arrive at the best business model to convert a promising technology into a useful and cost-effective product, and (iv) how to demonstrate and validate the new methodologies on two case studies in the North and South of Europe. **iWIDGET will thus show how ICT can make a contribution to delivering a sustainable, low carbon society and help progress towards the Europe 2020 targets on climate and energy.**

For more information contact: Professor Dragan Savic ([d.savic@exeter.ac.uk](mailto:d.savic@exeter.ac.uk))

## New STREAM EngD studentships

The Centre for Water systems has won three more full EngD studentships to start in September 2012. The four year programme of study, leading to an EngD doctoral degree, is funded by the EPSRC through the [Industrial Doctorate Centre for the Water Sector \(STREAM\)](#).

**Rainwater harvesting in the wild:** Working with Severn Trent Water, this project will focus on investigating the performance of a number of rainwater harvesting systems. In addition, the project will develop a clear methodology to allow systems to be designed that will focus on differing objectives e.g. saving potable water, reducing flood flows, minimising energy consumption, maximising water quality and performance under climate change scenarios.

**Dynamic licensing-integrated control of urban wastewater systems:** Given the dynamic nature of receiving waters and their changing ability to accommodate varying discharge quality profiles, the project with Scottish Water will investigate the feasibility and benefits of adopting a dynamic licensing approach that align the real time operation of wastewater treatment works in harmony with the dynamic capacity of receiving waters.

**The optimisation of wastewater treatment systems using adjoint solutions for CFD-based simulations:** This project will be looking into innovative technologies for the treatment and control of stormwater and wastewater with Hydro International.





## New Centre for Business and Climate Solutions established

Professor David Butler has secured £1 million of funding from the European Regional Development Fund to create a Business Technology Centre. The Centre for Business and Climate Solutions will help businesses in the South West get a head start in understanding the opportunities and challenges presented by future climate change. Supported by the Met Office, Plymouth Marine Laboratory, Regen SW and IBM, the Centre will significantly enhance the region's leadership in environmentally-focused innovation.

The aim of the Centre is to give businesses in the South West a competitive advantage as they plan for the future, through access to world-leading climate modelling technology, expertise and capability. The Centre will help businesses develop expertise, products and services to adapt to and mitigate future climate change and extreme weather events, support carbon reduction targets and to take advantage of commercial opportunities from climate change.



At the heart of the Centre will be the Met Office's world leading climate modelling and forecasting technology

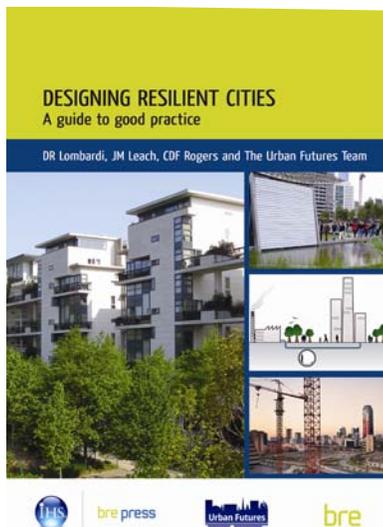
Contact the Commercial Manager for more information: Rebecca Adams [r.adams@exeter.ac.uk](mailto:r.adams@exeter.ac.uk).

## Maximising Adaptive Capacity in Flooding and Coastal Erosion Risk

A project is underway which aims to identify new ways of enhancing adaptive capacity in FCERM decisions (by using techniques such as Real Options), matching methods to decisions, testing and demonstrating the methods on case studies and transferring the knowledge gained in the process in an accessible way, through guidance and other knowledge transfer materials.

Professor Zoran Kapelan is part of the research team working on this project, which is funded by the Environment Agency. The project is led by the JBA Consulting with contributions from Sayers and Partners LLP, Universities of Oxford and Exeter, Haverlea Consulting and the JBA Trust. Contact Prof. Zoran Kapelan ([z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)) for further details.

## Urban Futures—project completed



CWS research has contributed to the recently published BRE report, **Designing Resilient Cities: A guide to good practice** and the Urban Futures Interactive Tool that underpins it. The Guide sets out a framework (the Urban Futures Method) for implementing robust, future-proofed solutions for regeneration. The Guide is supported by illustrative case studies in eight areas (Biodiversity; Air quality; Water and wastewater; Sub-surface built environment, Infrastructure and utility services; Surface built environment and open spaces; Density and design decision making; Organisational behaviour and innovation; Social needs, aspirations and planning policy). It demonstrates how far a selection of sustainable urban regeneration 'solutions' (such as incorporating density gradients around a transport hub or implementing grey-water recycling throughout a residential development) are resilient to future change.

Urban Futures was a four year research project funded by the Engineering and Physical Sciences Research Council (EPSRC). The project consortium was led by the University of Birmingham and included the Universities of Exeter, Lancaster, Birmingham City and Coventry. For more details, please contact Dr Raziye Farmani ([r.farmani@exeter.ac.uk](mailto:r.farmani@exeter.ac.uk)).

## Overseas Partnerships

Professor Pradeep Mujumdar from the **Indian Institute of Science, Bangalore, India**, was awarded a Royal Academy of Engineering Distinguished Visiting Fellowship to visit the Centre for Water Systems for a month in January 2012. He was hosted by Dr Guangtao Fu.

Professor Mujumdar's research focuses on uncertainty modelling in hydrology and water resource systems using the theoretical frameworks of imprecise probability, possibility theory, fuzzy systems, grey systems and Bayesian methods. During his visit, Professor Mujumdar gave lectures on new uncertainty and impact analysis methods for water systems, held discussions with academic members at the Centre for Water Systems, and visited other universities.

For more details please contact Dr Guangtao Fu ([g.fu@exeter.ac.uk](mailto:g.fu@exeter.ac.uk)).



Professor Akbar Javadi has received funding from the British Council and **UAE University in United Arab Emirates** for collaborative research in the area of modelling and control of seawater intrusion. This project is led by Exeter University and involves UAE University in the United Arab Emirates, Sultan Qaboos University in Oman, Kuwait Institute for Scientific Research in Kuwait, Exeter, Cardiff and Newcastle Universities in UK, Hydro International plc in UK and Schlumberger Water Services in Abu Dhabi and Qatar.

Dr Fayyaz Ali Memon delivered an invited inaugural lecture on sustainable water management at the three day NEAR (Network for Environmental Assessment and Remediation in Aquatic Systems) workshop in **Tbilisi, Georgia** (April, 2012). The workshop was co-ordinated by the University of Geneva with NEAR programme funding from the Swiss National Science Foundation. Its aim is to strengthen water related research in the Eastern European countries of Poland, Romania, Ukraine, Bulgaria, Moldova, Georgia and Azerbaijan.



Professor Dragan Savic and Professor Abdullah Saeed Al-Ghamdi delivered a short course on "Design and Operation of Water Distribution Systems" in **Jeddah (Saudi Arabia)** in April. Organised by the **Saudi Society of Civil Engineering**, the course was attended by 45 engineers from across different organisations in the Kingdom, including the National Water Company, King Abdulaziz University and water consultants, who wanted to keep up to date with new technical developments. Attendance counted towards their continuing professional development, recognised by the Saudi Society of Civil

Engineering.

The course covered a wide range of topics, including optimised design, rehabilitation and operation of water distribution systems with a number of computer based tutorial sessions. Professor Savic, who also acts as a consultant to the Chair in Water Distribution Networks at the **Water Research Centre** at **King Abdulaziz University**, also visited the Centre where he delivered a special lecture to the students and discussed future joint research with the staff.



The CWS partnership to develop research and academic ties with the **University of South Florida** continues apace. Arlin Briley and Weiwei Mo visited Exeter in March. They held meetings with CWS researchers and gave presentations on their work. Topics covered included GANetXL software and optimization of water supply systems and water/energy systems analysis and optimization with applications to policy pricing and regulatory structure.

A group from CWS, Professor David Butler, Dr. Guangtao Fu and Dr. Diego Gomez were hosted by USF in May for discussions on green water infrastructure topics. These included: mining and energy industry impacts on water resources, management of urban water systems, sustainability and carbon footprint of urban water infrastructure, impact of land use on energy use in water supply and treatment systems. They were taken to see a number of local sites including a tour of a wastewater treatment plant at the city of Clearwater, and the Patel Center for Global Sustainability at USF. These exchange visits are funded by a British Council mobility grant.

In addition, Professors Akbar Javadi and David Butler (Exeter) and Professor Mahmood Nachabe of **University of South Florida** have been awarded funding from University of South Florida to establish a collaborative project on groundwater modelling and rehabilitation of urban water infrastructure.



Exeter—USF partnership in Exeter



Exeter—USF partnership in Tampa

Following the successful first two phases of the project to demonstrate the application of the off-line optimisation methodology and develop software for pump scheduling and real-time optimal pumping and system control for the **Hong Kong Water Supplies Department (WSD)**, the CWS team have been supporting WSD and their IT contractors in implementing and integrating software elements with Department's IT and SCADA systems to deliver benefits of pump scheduling in real time. The project is in its third and final phase and it is expected to be finalised by the end of the year.

Professor Zoran Kapelan was in **Dublin** for the IWA Water, Climate and Energy Congress recently to present research work on the real-time parameter and state estimation under uncertainty in water distribution systems. This new methodology, developed largely by CWS research fellow Dr Chris Hutton, is based on the Particle Filtering method and it enables effective updates of demands and other system parameters in real-time. This work is part of the EU FP7 PREPARED project. For more information please contact Prof. Zoran Kapelan ([z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)).

## Overseas news in brief

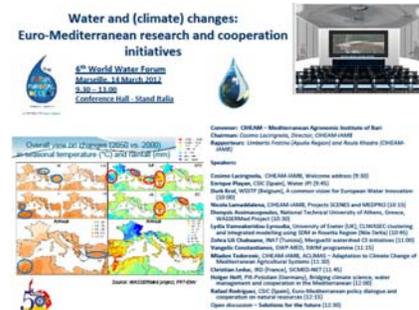
CWS research, developing methodologies for integrated catchment modelling, within the EU FP7 funded project WASSERMed (Water Availability and Security in Southern Europe and the Mediterranean, [www.wassersedu](http://www.wassersedu)) was presented at the following **international events**:

The international workshop "*Water Resources at the Kairouan plain: natural constraints and social evolution*", **Tunis** (16-17 November 2011);

The Science-Policy Conference Day on *Climate Change and Water in Southern Europe and neighbouring countries*, organised by the FP7 CLIWASEC cluster ([www.cliwasec.eu](http://www.cliwasec.eu)) and the Ludwig-Maximilians-Universität München, in **Munich**, Germany (14-15 February 2012);

The International Conference *Water Management in Europe*, **Lille**, France 23-24 February 2012), organised by CIWEM with ASTEE, EWA and EFAEP;

The 6<sup>th</sup> World Water Forum 2012 in **Marseilles**, France (March 11-18, 2012), where Dr Lydia Vamvakieridou-Lyroudia was the invited speaker and member of the experts' panel.



## CWS in the Press

The **EPSRC Annual Report 2010-11** identified CWS research excellence. Under the heading 'Supporting Excellence' it noted: "The Ashford's Integrated Alternatives project has been exploring the feasibility of a more integrated urban utility service provision as a way to improve the sustainability of urban development. The consortium, led by the University of Exeter, has been looking at technology options, the role of stakeholders in decision-making, and new business models. They have been tackling the issues of scale, integration and delivery in an attempt to reduce resource use, limit emissions, manage innovation and improve the quality of life in a case study set in Ashford, Kent." Contact Professor David Butler, [d.butler@exeter.ac.uk](mailto:d.butler@exeter.ac.uk) for more information about this project.



The French newspaper **Le Monde**, startled by the thought of draught in South East England during the winter, sought Professor Dragan Savic's comments on the problem. He discussed public reluctance to invest in new reservoirs, despite low levels of rainfall in an area of dense population.



## News of Past and Present CWS Members



Professor Akbar Javadi delivered a keynote lecture on modelling and control of seawater intrusion at the Symposium on Environmental Problems in the Arab World (26-28 February 2012) in Muscat, Oman.

Dr Fayyaz Ali Memon was invited to deliver a keynote lecture on "Water and Energy Interactions" at the 2<sup>nd</sup>

International Conference on Energy, Environment and Sustainable Development (February 2012). The three day conference was held at Mehran University of Engineering and Technology, Sindh, Pakistan and was supported by the Higher Education Commission of Pakistan.



Professor Zoran Kapelan gave a talk, "Risk-based Modelling for Wastewater Infrastructure Asset Management" at an international workshop in London in December 2011. For additional information please contact Zoran Kapelan ([z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)).



Associate Research Fellow Dr Sarah Ward, is one of only 27 candidates participating in the fiercely competitive Water Environment Federation's Water Leadership Institute (WLI). Sarah is the only non-US candidate in this year's cohort. The WLI program encourages innovation, entrepreneurship and professional commitment from future leaders in the water sector. Participants develop their leadership skills by taking part in live webinars, sharing knowledge and experiences through Wefcom and by examining core texts on management and leadership. More detail on the WLI can be found at: <http://www.water-leadership-institute.org/>

## Welcome! CWS welcomes:

Associate Research Fellows working on the TRUST project with Professor Zoran Kapelan, Dr Aisha Bello-Dambatta, Dr Kourosh Behzadian, and Dr Mark Morley;

New PhD students: Mohammed Hussain working on modelling seawater intrusion, supervised by Professor Akbar Javadi and Emma Clarke, working on the Impacts of Nanoparticles on Wastewater Treatment Systems, who will be supervised by Dr Diego Gomez;

Visiting PhD students working with Professor Dragan Savic: Francesco Costanzo, from the University of Calabria, Haixing Liu, from Harbin Institute of Technology and Joao Marques, PhD student at the University of Coimbra; and working with Professor Zoran Kapelan: Frederico Keizo Odan, from the University of Sao Paulo in Brazil.



## MSc in Urban Water Systems

The **MSc in Urban Water Systems** is offered by the Centre for Water Systems at the University of Exeter and is the only course of its type in the UK. It draws on the experience and cutting-edge research capability of the Centre staff together with external lecturers from leading companies and government agencies, ensuring delivery of a theoretically sound, yet practically relevant course.

This programme trains students in the essentials of urban water supply and urban drainage technology together with the hydroinformatic tools for simulating their performance, all in a context that encourages a wide, integrated systems approach to their implementation.

For full programme details and information about how to apply visit: [www.exeter.ac.uk/cws/msc](http://www.exeter.ac.uk/cws/msc)

Topical issues covered on the course include: **Water losses and leakage, Water efficiency, Climate change, Sustainability, Asset management, Whole-life costing, Urban flooding, Integrated modelling, Risk and uncertainty.**

Full or part time attendance is possible. The individual Research Project can be undertaken at a place of work with a University supervisor. A Postgraduate Diploma and Certificate can be studied over a shorter period.

For further information please contact Zoran Kapelan [z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk).



**MSc in Urban Water Systems:**  
**now accredited as a Technical course by JBM providing 'further learning' for those intending to become Chartered Engineers**

## Recent Publications

Water Demand Management is exported to China:

'Water Demand Management' edited by Prof. David Butler and Dr Fayyaz Ali Memon, published by IWA, has been translated into Chinese.

*Report.*

Akande, K., von Lany, P., Reid, S., McIntyre, N., Kapelan, Z. and Hardwick, S., (2012), "Water Resources Planning Tools 2012: Evaluation of New Methods for 2019 and Beyond", UKWIR WR27 Project Report, p. 62.

*Journal Papers*

Giacomello, C., Kapelan, Z. and Nicolini, M., (2012), "Fast Hybrid Optimisation Method for Effective Pump Scheduling", *ASCE Journal of Water Resources Planning and Management*, doi: [http://dx.doi.org/10.1061/\(ASCE\)WR.1943-5452.0000239](http://dx.doi.org/10.1061/(ASCE)WR.1943-5452.0000239)

Chen A. S., Evans B., Djordjević S. and Savić D. A. (2012). [A coarse-grid approach to representing building blockage effects in 2D urban flood modelling.](#) *Journal of Hydrology*, Vol. 426-427, 1-16.

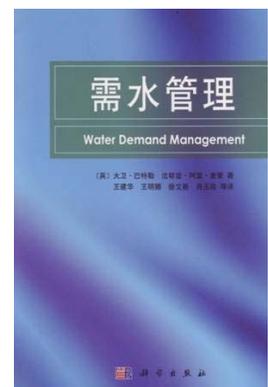
Sun S., Fu G., Djordjević S. and Khu S.-T. (2012). [Separating aleatory and epistemic uncertainties: probabilistic sewer flooding evaluation using probability box.](#) *Journal of Hydrology*, Vol. 420-421, 360-372.

A. Johari, A.A. Javadi, M.H., Makiabadi, A.R. Khodaparast (2012). Reliability assessment of liquefaction potential using the jointly distributed random variables method, *Soil Dynamics and Earthquake Engineering*, 38, 81-87; doi:10.1016/j.soildyn.2012.01.017.

Fu G, Kapelan Z, Reed P. (2012) Reducing the complexity of multi-objective water distribution system optimization through global sensitivity analysis, *ASCE-Journal of Water Resources Planning and Management*, volume 138, pages 196-207

Gomez, D. E., and P. J. J. Alvarez (2010), Comparing the effects of various fuel alcohols on the natural attenuation of Benzene Plumes using a general substrate interaction model, *J. Contam. Hydrol.* 113:66-76. doi:10.1016/j.jconhyd.2010.02.002

Fu G, Butler D. (2012) Frequency analysis of river water quality using integrated urban wastewater models, *Water Science and Technology*, volume 65, no. 12, pages 2112-2117



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Please contact us to  
find out more about  
any of the items in  
this newsletter

### Training event

18—22 June 2012 University of Exeter  
SANITAS TRAINING WEEK  
Programme details from Dr Guangtao Fu ([g.fu@exeter.ac.uk](mailto:g.fu@exeter.ac.uk))

**21-29 June 2012 University of Exeter**  
EGYPTIAN (TEMPUS) TRAINING WEEK  
Programme details from Professor Dragan Savic  
([d.savic@exeter.ac.uk](mailto:d.savic@exeter.ac.uk))

### Conferences:

14-18 July 2012, Hamburg University of Technology  
**10th International Conference on Hydroinformatics (HIC 2012)**  
See: [www.hic2012.org](http://www.hic2012.org)

4-7 September 2012, Belgrade, Serbia  
**9th International Conference on Urban Drainage Modelling**  
See: <http://hikom.grf.bg.ac.rs/9UDM>

5-7 September 2013, University of Exeter  
**International Conference on Flood Resilience – Experiences in Asia and Europe**

24-27 Sep 2012, Adelaide, Australia  
**14th Water Distribution Systems Analysis Symposium (WDSA 2012)**, (<http://wdsa2012.com/index.html>) - includes Battle of the Water Networks (BWN-II)

## Current CWS projects

- [ReVISIONs](#) SUE II Consortium (EPSRC) Contact: [d.butler@exeter.ac.uk](mailto:d.butler@exeter.ac.uk)
- [STREAM Industrial Doctorate Centre](#) (EPSRC) Contact: [g.fu@exeter.ac.uk](mailto:g.fu@exeter.ac.uk)
- [CADDIES Simplified Dual-Drainage Modelling](#) (EPSRC) Contact: [d.savic@exeter.ac.uk](mailto:d.savic@exeter.ac.uk)
- [CORFU](#) – Collaborative research on flood resilience in urban areas (FP7) Contact: [s.djordjevic@exeter.ac.uk](mailto:s.djordjevic@exeter.ac.uk)
- KTP with Yorkshire Water Services 1: DSS for Real-time Failure Management (EPSRC /TSB) Contact: [z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)
- KTP with Yorkshire Water Services 2: Automated Model Building (EPSRC / TSB) Contact: [z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)
- [PREPARED Enabling Change](#) (FP7) Contact: [d.savic@exeter.ac.uk](mailto:d.savic@exeter.ac.uk)
- [WASSERMed](#) – Water Availability and Security in Southern Europe and the Mediterranean (FP7) Contact: [d.savic@exeter.ac.uk](mailto:d.savic@exeter.ac.uk)
- [TRUST – Transitions to the Urban water Services of Tomorrow](#) (FP7) Contact: [z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)
- [@qua ICT for Water Efficiency](#) Contact: [d.savic@exeter.ac.uk](mailto:d.savic@exeter.ac.uk)
- [Bridging the Gaps: Exeter Science Exchange](#) — Contact: [d.butler@exeter.ac.uk](mailto:d.butler@exeter.ac.uk)
- [Land of the MUSCOs](#) (EPSRC) Contact: [d.butler@exeter.ac.uk](mailto:d.butler@exeter.ac.uk)
- KTP with United Utilities: Real-time Pipe Burst Detection System (EPSRC/TSB) Contact: [z.kapelan@exeter.ac.uk](mailto:z.kapelan@exeter.ac.uk)
- SANITAS - Sustainable and Integrated Urban Water Management (FP7/ITN) Contact: [d.butler@exeter.ac.uk](mailto:d.butler@exeter.ac.uk)