

Newsletter

December 2018 | Issue 3

DATA4WATER: Excellence in Smart Data and Services for Supporting Water Management
H2020-TWINN-2015, CSA-690900
Project website: <https://d4w-twinn.pub.ro>



The **DATA4WATER** project is part of the H2020 - Spreading Excellence and Widening Participation - Twinning program and was carried out between January 1, 2016 and December 31, 2018. The objective of the project is to enhance the S&T abilities in the field of smart, data driven e-services in water management. The complexity of research related to water management is extremely high and covers several ICT-related research domains: Big Data and Smart Data; Semantic Internet of Things; Context-aware and event-based systems; Cloud Computing; Web services; and social Web, as well as a profound understanding of the water related phenomena and processes.



This project is funded by the European Union

Call: **H2020-TWINN-2015**
Topic: **H2020-TWINN-2015**
Type of action: **CSA**
Project number: **690900**
Proposal acronym: **DATA4WATER**
Project website: <http://data4water.eu>
Networking and Knowledge E-Environment
<http://data4water.pub.ro>

OUR MAIN ACTIVITIES

Final project event "Excellence in Smart Data and Services for Supporting Water Management" – 23 November 2018, Bucharest, Romania

The final event is organized as a workshop that aims to identify interdisciplinary research topics, in line with the priorities of different stakeholders at national and European level in the field of smart data driven e-services for water management.

This event focuses on collaboration between diverse stakeholders with common interests to identify sustainable interdisciplinary research opportunities in water resource management, based on cutting-edge technologies.

The methodology of the workshop involves the analysis and collaborative construction of competitive niche scenarios in various areas, such as e-Services in water management; Water-Agriculture nexus; Hazard management in water-related processes with high risk potential; Urban waters, based on relevant emerging technologies.



CSE 2018 – 21st IEEE International Conference on Computational Science and Engineering and IEEE EUC 2018 – 16th International Conference on Embedded and Ubiquitous Computing 29-31 October 2018, Faculty of Automatic Control and Computers, University Politehnica of Bucharest, Romania



<https://cse2018.hpc.pub.ro>

<https://euc2018.hpc.pub.ro>

OUR MAIN ACTIVITIES



3rd Data4Water Information and Networking Event in Milano – 5th October 2018, Milan

Currently, the processes in water resources management are undergoing major transformations during its transition from the sectorial approaches of the past (e.g., water use for only irrigation, hydropower, or navigation) to contemporary ones that are integrative and comprehensive approaching water management as complex system with

interrelated processes surrounding the water cycle. This transformation comes at a time when acute problems are rising in water resources by direct (land use change) or indirect (climate change) human interventions in the natural systems within which we live.

The complexity of research related to water management is extremely high and requires deep expertise in several ICT-related research domains. The new ICT-supported management approaches require processing of a huge amount of information with different levels of accessibility and availability and in various formats (from digital to hardcopy formats). Given the relevance of the data for practice, often the data acquisition needs to be acquired, transmitted and accessed in real time. Not all the required data neither is critical nor of equal quality, therefore screening and conditioning has to also be conducted in real time. There are situations when information is to be accessed only by designated stakeholders, but there is a huge amount of information that is, and should be handled, as public information. In this Data4Water workshop different research projects will present their ongoing research, findings and results.

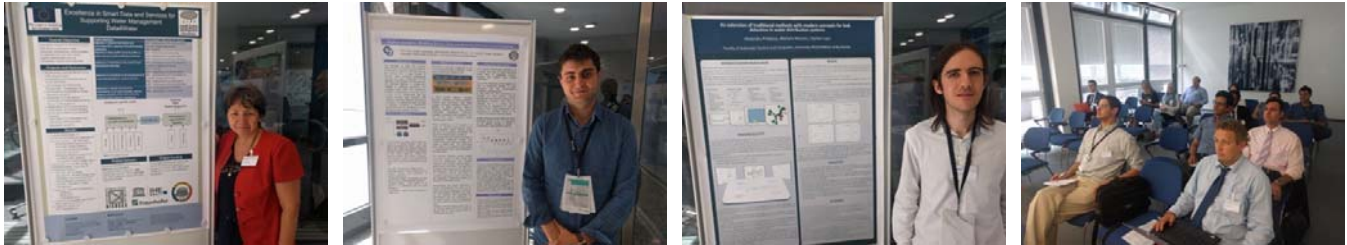


The 3rd Info Day and networking event had the main role to put together researchers and practitioners in the field of water management and discussing different on-going subject like: data and computational model used in water resource management, research and innovation for sustainable energy, Service Level Agreement Characteristics of water resources monitoring, digital-services for Water-Energy Nexus, Water Distribution Network calibration with few field measures, the experience of Società Acquedotti Tirreni, a public institution in Italy, the experience of Metropolitana Milanese in Milan (Integrated Water Cycle management), the analysis of Milan Metropolitan area groundwater, presentation of some H2020 ongoing projects: GeneGIS and the SMART Water Management, quality for drinking water ecosystem and monitoring strategies in a prevention perspective.

Data4Water Meetup and Poster Session @ BIS 2018, 18 July 2018, Fraunhofer FOKUS, Kaiserin-Augusta-Allee 31, 10589 Berlin, Germany

The event joining international researchers had the main aims discussing the wide range of the development, implementation, application and improvement of business applications and systems. UPB team has the chance to present and obtain comment on their research, to hear about the work of their peers at other universities, and to interact today's leading researchers from different universities and countries. It is also an opportunity to meet interesting people and make new collaborations. The attendance was represented by researchers and practitioners at different career stages: advanced researcher who have a clear topic and research approach as well as application in market (like water authorities in Berlin). The concrete actions are represented by now consortia establishment for H2020 projects (UPB and Fokus are partners) and the new possibility to organize scientific events in conjunction with well-established conferences.

<https://bis.ue.poznan.pl/bis2018>



DISSEMINATION AND NETWORKING ACTIVITIES



Participation at ICT2018: Imagine Digital - Connect Europe. ICT 2018 took place in Vienna on 4-6 December 2018. This research and innovation event focused on the European Union's priorities in the digital transformation of society and industry. It presented an opportunity for the people involved in this transformation to share their experience and vision of Europe in the digital age. Three project team members (prof. Mariana Mocanu, PhD, lecture Silvia Anton, PhD and eng. Silvia Bădulescu) and two doctoral students that are involved in researches related to smart data and services for water management (Alexandru Predescu and Ciprian Nuțescu), all from UPB, participated at the event.

<https://ec.europa.eu/digital-single-market/en/events/ict-2018-imagine-digital-connect-europe>



Normative Multi-Agent Systems 2018 (NORMAS 2018). The multi-disciplinary workshop on Normative Multi-Agent Systems (NORMAS 2018 22.4.-27.4.2018, Dagstuhl, Germany) attracted leading international scholars from different research fields (e.g. theoretical computer science, programming languages, cognitive sciences, law, and social sciences). Prof. Dr. Adrian Paschke presented about Smart Contracts and SLAs for Data4Water e-Services in Water Resource Management.

Applied Machine Intelligence (API 2018). Prof. Dr. Adrian Paschke and Dr. Thomas Hoppe organized the workshop on applied machine intelligence (03-06.6.2018, Dagstuhl, Germany) and presented about the applied ML in the Data4Water project.

2018 IFAT. The Fraunhofer Water Systems Alliance and D4W used the 2018 IFAT, the world's leading trade fair for water, sewage, waste and raw materials as a showcase for the water solutions of

tomorrow in Hall B2/Booth 215/314 from May 14–18, 2018 in Munich.

Summer School on Service Oriented Computing (SummerSOC). The 12th Symposium and Summer School on Service-Oriented Computing (SummerSoc 2018), June 24 – June 29, 2018 in Crete, Greece, is a well-established summer school and symposium focusing on service-oriented computing. Prof. Dr. Adrian Paschke presented a lecture about the Data4Water project.

AgriWare 2018 Workshop. Dr. Naouel Karam attended the proposal workshop at the Politecnico di Torino Corso in order to present results from the Data4Water project and discuss how this can contribute to a new EU project proposal.

Participation in the Water Across Time in Engineering Research (WATER 2018). Participation in the Water Across Time in Engineering Research (WATER 2018) conference, held in Constanta from 21-23 June 2018, had as main objectives the presentation of the results of the Data4Water project and the formation of links with people from the same fields of interest. The main topics addressed in these conferences and workshops were: Sustainable Development and Environmental Protection, Water Quality and Ecosystem Health, Integrated Water Management, GIS and Remote Sensing in Water and Environmental Management, Water Management and Interoperability, Water in Engineering Education.

Attended the “International Conference Efficient use and management of water 2018”. The attendance of Dr.ing. George Iordache at conference had several outcomes. First was the interaction with the participants at this conference. Second, several good quality articles were presented. For the Data4Water project several articles about water were of interest: reduction of water loss in the Romanian city of Constanta by using satellite spectrometry; protecting water infrastructures: reducing the vulnerabilities of critical infrastructure and increasing their resilience is one of the major objectives of the EU; continuous monitoring of the water infrastructure by using the geo-radar, unmanned aerial vehicle and satellite technology; water loss reduction based on the implementation of a personalized software for monitoring the water infrastructure; the SCADA technology used in monitoring water infrastructures, saving in databases information's about the behavior of water infrastructures, cost reduction based on water loss detection and fixing, modeling of a top consumption level based on the functionality of the water infrastructure system, optimizing the energy costs and building of a detection and prevention of water loss system with a central point; an article about “Flygt Concertor® The World's First Wastewater Pumping System

with Integrated Intelligence; reduction of the carbon footprint that comes from wastewater; monitoring the Danube waters by using 21 monitoring stations; the implemented system measures the water quality parameters: temperature, conductivity, depth, PH, turbidity and Oxygen Redox Potential.

Participation at SIWI. World Water Week is one of the highlights of the year in the field of water related events. (<http://www.siwi.org/publications/world-water-week-programme-2018/>). It gives the participants a chance to move forward on solutions to one of the biggest challenges of our time, as well as to connect with people concerned with solving water problems from all over the world. The theme of this year's World Water Week was Water, Ecosystems and Human Development. With climate change, increased water variability and stressed ecosystems, we need new approaches to development and planning so that we can build more resilient and resourceful societies. World Water Week has a key role to play in the creation of this new, more water-efficient world. At SIWI the best minds in water come together. In the programme there were almost 300 sessions, to inspire, educate, and challenge us to work even harder for a water wise future. Prof. Mariana Mocanu attended the event that included plenary presentations, sessions, networking sessions and field visits. Prof. Mocanu participated at events that focused mainly on use of ICT in water systems, however all events tackled both combined technical and socio-economic aspects. She attended:



Prof. Mocanu also participated at the Field trip to Ericsson studio: Information and communication technology. The company experts presented their results applied worldwide and the research topics they are involved in.

Participation at the 25 YEARS OF EXCELLENCE IN RESEARCH OF RIVER-DELTA-SEA SYSTEMS IN ROMANIA, 15-16 November, Bucharest. Assoc. prof. Ioana Popescu, Prof. Dimitri Solomatine and Assoc. prof. Biswa Bhattacharya attended this event (<http://danubius-pp.eu/25-years-of-excellence-in-research-of-river-delta-sea-systems-in-romania/>) as a networking activity to discuss with all the specialists that are in that project.

Related Projects

SPERO – <https://spero.ici.ro>

The project *SPERO – Space technologies used in the management of disasters and major crises, manifested at local, national and regional levels* has received funding from the Minister of Research and Innovation, UEFISCDI, project reference: PN-III-P2-2.1-SOL-2016-03-0046, under grant agreement no 3Sol/2017, program PNCDI III, duration: April 2017 – September 2020. UPB is partner in this project.



Disaster management involves activities aiming to organize and manage resources and responsibilities to minimize human and material losses. The need for solid, real-time information to support authorities' intervention, coordinate humanitarian activities and remove civilian security threats requires the use and analysis of satellite and multi-source data as well as fast mapping methods. The overall objective of the SPERO project – “Space technologies used in the management of disasters and major crises, manifested at local, national and regional levels” is to create a support platform for the management of emergency situations generated by natural disasters, industrial accidents, humanitarian crisis situations or extreme atmospheric and space phenomena.

ForestMon - <https://forestmon.hpc.pub.ro>

The project *ForestMon – Experimental Software System in Cloud Architecture for Woodland Vegetation Coverage Monitoring* has received funding from the European Regional Development Fund through the Competitiveness Operational Program 2014-2020, project reference: 1270 / 22.01.2018, under grant agreement MySmis: 105976, Contract 53/05.09.2016, program NETIO: Ecosystem of Research, Innovation and Development of ICT Products and Services for a Company Connected to the Internet of Things, duration: March 2017 – March 2019. UPB is the coordinator in this project. The partner is TERRASIGNA S.R.L.



The overall objective of the project is to improve existing algorithms for processing satellite imagery, to adapt them to work in the Cloud architecture and to implement them in an experimental system. The acquired satellite images are primarily processed and transmitted to the Cloud system, where by appropriate algorithms they divide them into geographic sub-areas. The Cloud system performs parallel and distributed data processing and returns re-assembled images to the original geographic areas. The results of the processing allow the specialists to make immediate interpretations and predictions of the phenomena studied for the monitoring of the cover with woody vegetation.

TEL-MONAER - <https://telmonaer.beia-consult.ro>

The project *TEL-MONAER – Mobile air quality monitoring system* has received funding from the European Regional Development Fund through the Competitiveness Operational Program 2014-2020, project reference: 1223 / 22.01.2018, under grant agreement MySmis: 105976, Contract 53/05.09.2016, program NETIO: Ecosystem of Research, Innovation and Development of ICT Products and Services for a Company Connected to the Internet of Things, duration: March 2017 – March 2019. UPB is the coordinator in this project. The partner is BEIA CONSULT INTERNATIONAL.



The TEL-MONAER project aims to develop an IT system using the Internet of Things and Edge / Cloud Computing technologies to monitor and analyze real-time risk factors for the environment and public health. TEL-MONAER will provide a mobile, extensible and scalable system capable of simultaneously monitoring parameters such as SO₂, NO_x, CO, O₃, COV, PM₁₀, PM_{2.5}, C₆H₆, Pb and other toxic metals, Cd, As and Hg, aromatic polycyclic aromatics (PAH), respectively weather parameters (wind direction and speed, pressure, temperature, solar radiation, relative humidity, precipitation), etc.

Research issues related to ICT for Water Management identified during networking sessions

Optimization of the water supply management · Improvement of the river monitoring · Public access to the hydrological data · Data infrastructure · Water Data Modelling, structure of the collected data · Algorithm for analytics to build smart decision systems · Data cleaning and aggregation · Ontologies on Smart Data for Water Management · Computing intensive algorithms · Standards and protocols for water resource management · Interoperability between different systems · E-Services for Water Management · Appropriate Sensors, Networks, Software · Big amount of data (smart analysis, smart insight, security) · Automatic data versus manual measurements · Satellite data · Data collections between different sites · Access to data provided by different companies · Internet of everything · Telemetry use cases

Publications

Scientific papers

- Alexandru Predescu, Cătălin Negru, Mariana Mocanu, Ciprian Lupu, Antonio Candelieri; **A multiple-layer clustering method for real-time decision support in a water distribution system**, Publication in Conference proceedings/Workshop, will be published as a volume in Lecture Notes in Business Information Processing, BIS 2018 - Workshop on Scientific Challenges & Business Opportunities in Water Management, Springer Verlag., Vol 320, 2018
- Claudia Ifrim, Marko Harasic, Adrian Paschke, Florin Pop, Valentin Cristea; **A review of the current state of research on water resources management**, Publication in Conference proceedings/Workshop, will be published as a volume in Lecture Notes in Business Information Processing, BIS 2018 - Workshop on Scientific Challenges & Business Opportunities in Water Management, Springer Verlag., Vol 320, 2018,
- Muhammad Haris Ali, Thaine H. Assumpção, Ioana Popescu, Andreja Jonoski; **Automated updating of land cover maps used in hydrological modelling**, Publication in Conference proceedings/Workshop, will be published as a volume in Lecture Notes in Business Information Processing, BIS 2018 - Workshop on Scientific Challenges & Business Opportunities in Water Management, Springer Verlag., Vol 320, 2018,
- Alexandru Predescu, Mariana Mocanu, Ciprian Lupu; **Real time implementation of IoT structure for pumping stations in a water distribution system**, Publication in Conference proceedings/Workshop, 2017 21st International Conference On System Theory, Control And Computing (ICSTCC), pp. 529-534, ISBN:978-1-5386-3842-2, ISSN: 2372-1618, IEEE, 2017
- Marian Muste, Andrea Carson, Haowen Xu, Mariana Mocanu; **Community Engagement in Water Resources Planning Using Serious Gaming**, Publication in Conference proceedings/Workshop, 2017 13TH IEEE International Conference On Intelligent Computer Communication And Processing (ICCP), pp. 445-451, ISBN:978-1-5386-3368-7, ISSN: 2065-9946, IEEE, 2017
- Catalin Negru, Florin Pop, Mariana Mocanu, Valentin Cristea; **Storage Solution of Spatial-Temporal Data for Water Monitoring Infrastructures used in Smart Cities**, Publication in Conference proceedings/Workshop, 2017 21st International Conference On Control Systems And Computer Science (CSCS), pp. 617-621, ISBN:978-1-5386-1839-4, IEEE, 2017
- Alexandru Predescu, Mariana Mocanu, Ciprian Lupu; **Modeling the effects of leaks on measured parameters in a water distribution system**, Publication in Conference proceedings/Workshop, 2017 21st International Conference On Control Systems And Computer Science (CSCS), pp. 585-590, ISBN:978-1-5386-1839-4, IEEE, 2017
- Sorin N. Ciolofan, Mariana Mocanu, Valentin Cristea; **Cloud Based Large Scale Multidimensional Cubic Spline Interpolation for Water Quality Estimation**, Article in Journal, University Politehnica Of Bucharest Scientific Bulletin Series C-Electrical Engineering and Computer Science, Volume: 79, Issue: 2, pp. 25-36, ISSN: 2286-3540, eISSN: 2286-3559, POLYTECHNIC UNIV BUCHAREST, 2017
- Dumitru Cristian Tranca, Daniel Rosner, Rares Curatu, Adrian Surpateanu, Mariana Mocanu, Stefan Pardau, Alexandru Viorel Palacean; **Industrial WSN node extension and measurement systems for air, water and environmental monitoring IoT enabled environment monitoring using NI WSN nodes**, Publication in Conference proceedings/Workshop, 2017 16TH ROEDUNET CONFERENCE: NETWORKING IN EDUCATION AND RESEARCH (ROEDUNET), pp. 1-6, IEEE, 2017
- Costin Gabriel Chiru, Mariana Ionela Mocanu, Monica Dragoicea, Anca Daniela Ionita; **Digital Services Development Using Statistics Tools to Emphasize Pollution Phenomena**, Publication in Conference proceedings/Workshop, EXPLORING SERVICES SCIENCE, IESS 2017, Book Series: Lecture Notes in Business Information Processing, Vol. 279, pp. 370-382, ISBN:978-3-319-56925-3; 978-3-319-56924-6, ISSN: 1865-1348, SPRINGER INTERNATIONAL PUBLISHING AG, 2017
- Sorin N. Ciolofan, Aurelian Draghia, Radu Drobot, Mariana Mocanu, Valentin Cristea; **Decision support tool for accidental pollution management**, Article in Journal, ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH, Vol. 25, Issue: 7, pp. 7090-7097, ISSN 0944-1344, Springer, 2017
- Madalin Colezea, George Musat, Florin Pop, Catalin Negru, Alexandru Dumitrascu, Mariana Mocanu; **CLUeFARM: Integrated web-service platform for smart farms**, Article in Journal, COMPUTERS AND ELECTRONICS IN AGRICULTURE, Vol. 154, pp. 134-154, ISSN: 0168-1699, ISSN: 1872-7107, ELSEVIER SCI LTD, 2018
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- Ion Dorinel Filip, Bogdan Ghita, Florin Pop, George-Valentin Iordache, Catalin Negru, Ciprian Dobre; **EdgeMQ: Towards a Message Queuing Processing System for Cloud-Edge Computing: (Use Cases on Water and Forest Monitoring)**, Publication in Conference proceedings/Workshop, 2018 17th International Symposium on Parallel and Distributed Computing (ISPDC), pp. 46-52, ISBN: 978-1-5386-5330-2, IEEE, 2018
- George-Alexandru Musat, Madalin Colezea, Florin Pop, Catalin Negru, Mariana Mocanu, Christian Esposito, Aniello Castiglione; **Advanced services for efficient management of smart farms**, Article in Journal, JOURNAL OF PARALLEL AND DISTRIBUTED COMPUTING, Vol, 116, pp. 3-17, ISBN 0743-7315, ELSEVIER SCIENCE INC, 2018
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- Bianca Banica, Catalin Negru, Florin Pop; **Machine-to-Machine Model for Water Resource Sharing in Smart Cities**, Publication in Conference proceedings/Workshop, will be published as a volume in Lecture Notes in Business Information Processing, BIS 2018- Workshop on Scientific Challenges & Business Opportunities in Water Management, Springer Verlag., Vol 320, 2018,
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- Alexandru Predescu, Mariana Mocanu, Ciprian Lupu; **A fault sensitivity analysis for anomaly detection in water distribution systems using Machine Learning algorithms**, Publication in Conference proceedings/Workshop, 2018 IEEE 14th International Conference on Intelligent Computer Communication and Processing (ICCP), pp. 191 – 196, ISBN: 978-1-5386-8444-3, IEEE, 2018

Books

- Insights and Views in Smart Data and e-Services for Water Management, Bucharest, Politehnica Press, 2018, ISBN 978-606-515-843-6
- Big Data Platforms and Applications - Case Studies, Methods, Techniques, and Performance Evaluation, Springer Nature, to appear on April 2019

Special Issues (ICT)

- High-Performance Computing in Edge Computing Networks, *Journal: Journal of Parallel and Distributed Computing*, Volume 126, April 2019, *Impact factor: 1,815*, *Editors: W Tu, F Pop, W Jia, J Wu, M Iacono*
- RM-BDP: Resource management for Big Data platforms, *Journal: Future Generation Computer Systems*, Volume 86, September 2018, *Impact factor: 4,639*, *Editors: F Pop, R Prodan, G Antoniu*
- Human-Driven Edge Computing and Communication: Part 1, *Journal: IEEE Communications Magazine*, Volume: 55, Issue: 11, November 2017, *Impact factor: 9,270*, *Editors: Jiannong Cao; Aniello Castiglione; Giovanni Motta; Florin Pop; Yanjiang Yang; Wanlei Zhou*
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- Advanced Services in Heterogeneous Distributed Systems, *Journal: Studies in Informatics and Control*, Volume: 26, Issue: 4, December 2017, *Impact factor: 1,020*, *Editors: Florin Pop, Gabriel Neagu, Andrei Niculescu*



Data4Water: Network of Excellence and Partnership in Smart Data for Water Management.

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This project is funded by
the European Union



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