

**2<sup>nd</sup> International Join Conference on  
Water Distribution System Analysis (WDSA)  
& Computing and Control in the Water Industry (CCWI)**



**Department of Hydraulic Engineering and Environment  
Universitat Politècnica de València (Valencia Tech)  
VALENCIA, SPAIN  
18-22 JULY, 2022**

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## PREFACE

Dear friends and colleges,

Welcome to the 2<sup>nd</sup> International Joint Conference on Water Distribution System Analysis (WDSA) & Computing and Control in the Water Industry (CCWI). After several years of pandemic, we have been able to meet again to exchange research, developments and experiences related to the water industry and water distribution systems. Welcome to the Universidad Politècnica de València (UPV) where the activities will take place. Welcome to Valencia which will host all the attendees during the week of the conference.

The most recent events have made it clear that infrastructures related to the water industry, especially supply, drainage and sanitation, are essential to ensure not only the survival of cities but also their sustainability and progress. In such difficult times, water supply has become a strategic element; water drainage has become possibly one of the greatest challenges related to climate change; and sewerage systems have become a way to control the sustainability of the system and at the same time serve as a control and warning of diseases and pandemics.

The importance of the water industry is palpable throughout the world. Beyond the existence of the Sustainable Development Goals, specifically Goal 6 (Clean Water and Sanitation), there is a growing interest in investing in water infrastructure. In the United States, the Bipartisan Infrastructure Law will deliver more than \$50 billion to the Environmental Protection Agency to improve drinking water, wastewater, and stormwater infrastructure. The European Union, through its Cohesion Funds, will allocate 15 billion euros to water management. The Government of Spain has approved a Strategic Project for the Recovery and Economic Transformation of the country focused on the Digitalization of the Water Cycle. The project aims to modernize the sector and move towards more efficient and sustainable management. This project has an investment of more than 3,000 million euros and is estimated to create around 3500 jobs.

The main theme of this Conference is 'Smart Water and Circular Economy: the next challenges'. After decades of evolution from the first mathematical models to the emergence of hydro-informatics, an evolution of network management using a digital environment and the tools associated with artificial intelligence has been necessary. The perception of water has also changed. It is no longer a service but a product. Integral use within a circular economy will become critical in the coming decades.

After the Call for Abstracts, more than 300 proposals were received, analyzed and evaluated by the Scientific Committee. About 270 abstracts were approved. Finally, 225 papers with authors from more than 35 different countries will be presented during the conference. We would like to thank all the authors and conference attendees for their dedication and hard work in preparing the abstracts, full papers and presentations.

The papers to be presented during the conference are grouped into the following areas: drainage and sewer systems; analysis, modeling, design, planning and optimization of water distribution systems; water quality in water networks; demand modeling, leak analysis and control and energy optimization in water distribution networks; sensor placement, sectorization operation and control of water distribution systems; risk analysis and asset management; hydraulic transients in water distribution networks; intermittent supply

of water distribution networks; wastewater and water treatment plants; and smart solutions for water systems.

During the conference, the results of the Battle of the Intermittent Water Supply (BIWS) will be presented. A new edition of the Battle of the Water Networks challenge series. On this occasion, 16 different teams have participated to provide their solutions to the problem of migrating from an intermittent supply system to a continuous supply system.

We would like to highlight the participation of more than 30 papers presented in the Industry Track, where applications and innovations from the world of the water industry are presented. These works have been developed in areas such as: design & digitalization; asset management; demands, leakage control and network operation in water distribution systems; and water quality.

Finally, we would like to thank all those who have made this event possible:

- To the WDSA and the CCWI for giving us the opportunity to organize this event.
- To the UPV that has offered all its infrastructure at our disposal.
- To the Department of Hydraulic Engineering and Environment, for their constant help.
- To the sponsors and collaborators for their invaluable support in the organization.
- To the members of the Steering Committee for their vigilance, suggestions and indications that have guided us.
- To the members of the Scientific Committee for their rigorous and hard work in reviewing the papers presented.
- To the members of the Local Organizing Committee, all their professors, students and collaborators. We would not have been able to organize this event without them.

This booklet provides the most important information related to the conference program of activities: the general and detailed program; access maps to the different venues of the activities and events; and access to the proceedings book and to the folder containing all the papers presented. An expanded online version of this booklet will be available on the conference website so that attendees will have up-to-date information at all times.

We wish you a highly enjoyable and informative conference.

**Conference Co-Chairs**

Pedro L. Iglesias-Rey

Fernando Martínez Alzamora

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## 1. GENERAL INFORMATION

The 2<sup>nd</sup> International Joint Conference on Water Distribution System Analysis (WDSA) & Computing and Control in the Water Industry (CCWI) will take place at Valencia (Spain). The conference venue will be the Vera Campus of the Universitat Politècnica de València (UPV), located to the north of the city in a peaceful setting that borders with traditional farmland. It has 60 buildings arranged in an orderly manner around the Agora, which is the centre of life on campus. There are over 108,000 square meters of green spaces that house an open-air museum of sculpture. All academic activities of the congress will be held in this campus.

### 1.1. How to get the city

There are different ways to access the city of Valencia, depending on the means of transport used to get there: plane, train, bus or car.

#### 1.1.1. Plane

Valencia Airport is located in the nearby town of Manises, about 8 km away from the city. Flights arriving from major Spanish and European cities land there. Furthermore, Valencia connects with destinations all over the world through Madrid and Barcelona. For more information, call the following number (+34) 96 159 85 00.

From that spot, you can take a taxi, the underground or a bus.

- **By taxi.** You can catch a taxi from Manises to the University; the journey takes about 25 minutes.
- **Underground.** At the airport you can take line 3 (heading to Rafelbunyol), get off at Benimaclet and switch to line 4 (heading to Doctor Lluch). The second stop leaves you in front of the Universitat Politècnica de València. For information on stops, timetables and fares, please consult the website of Metrovalencia, the public company in charge of underground and tram.
- **Bus.** You can take the bus 150 Valencia-Airport: its itinerary is Airport-Manises-Quart de Poblet-Mislata-Valencia. In the city of Valencia, you have stops on Cid Avenue, Cuenca Street, 'Gran Vía' Fernando el Católico and Pío XII Avenue. You can obtain more information by consulting the website of [EMT-Valencia, the city's public bus transportation company](#).

#### 1.1.2. Train

Valencia has two train stations that are quite close, with different routes: Joaquín Sorolla Station and Valencia North Train Station. Joaquín Sorolla Station has the following long-distance routes: Madrid, Barcelona, Alicante, Castellón and Albacete. All other long-distance, middle-distance and suburban routes leave from Valencia North Train Station. The distance between the two stations can be covered on foot in 10 minutes or by an exclusive Renfe bus, which is free when you show your train ticket. Both stations are located in the middle of the city. For information on destinations and schedules, please consult the website of RENFE, the national railway company.

From both stations, you can take a taxi, a bus or the underground.

- **Taxi.** In Valencia you can stop a cab directly on the street or go to one of the cab ranks throughout the city. You can also order a cab by phone or online.

- **City bus.** From Joaquín Sorolla Station, you can take bus number 9 to go to Universitat Politècnica de València. The stop is on San Vicente Mártir Street. From the North Train Station, you can take number 40. The stop is on Alicante Street. Check the routes of buses 9 and 40 on the EMT-Valencia website.
- **Underground.** Next to Joaquín Sorolla Station, you have the underground station of the same name. You must take line 5 (heading to Marítim-Serreria or Neptú), get off at the fourth stop (Alameda), switch to line 3 (heading to Rafelbunyol), get off at the second stop (Benimaclet) and switch to line 4 (heading to Doctor Lluch). The second stop leaves you in front of the university. From the North Train Station, the journey is shorter, since you need a switch less. In front of the North Train Station, you can find an underground station (Xàtiva). You must take line 3 (heading to Rafelbunyol), get off at the fourth stop (Benimaclet) and switch to line 4 (heading to Doctor Lluch). Get off at the second stop and you are already at the UPV. You can obtain detailed information about stops, timetables and fares on the Metrovalencia website.

### 1.1.3. Bus

The coaches that connect towns in the Valencian Community with other Spanish towns usually terminate at the bus station, located to the North of the city. Once you are at the bus station, you can take a taxi, a bus or the underground to get to the Vera Campus Site.

- **Taxi.** Information on the use of cabs is the same as if arriving by plane or train.
- **City bus.** In the nearby Ricardo Micó street, you have a bus stop: take number 29 to Universitat Politècnica de València. In half an hour, you will be in the heart of the University.
- **Underground.** Coming on the underground may be a little more complicated: you will have to combine up to three different underground lines. To start with, you must go the Nuevo Centro shopping centre, where you have the entrance to the Turia underground station. Take line 1 (towards TorrentAVINGUDA). Get off at Ángel Guimerá and transfer to line 3 (towards Rafelbunyol). Five stops afterwards, at Benimaclet, you can connect with line 4 (towards Doctor LLuch). The second stop leaves you at the UPV entrance.

### 1.1.4. Car

There are three different ways to access the city by car:

The first one is from Madrid through the N-III motorway.

The second is from Alicante or Albacete via the A-7 motorway and the Pista de Silla.

The third is from Barcelona via the A-7/E15 motorway, which has direct access to the UPV.

### 1.1.5. Interesting links

- [Interactive map of the campus site](#)
- [Interactive map of the points of interest at the Conference \(Google Maps\)](#)
- [Printable map of the campus site](#)
- [Street map of Valencia \(open in a new windows\)](#)
- [Location of the Vera Campus site on a city map](#)



## 1.2. About Universitat Politècnica de València

The Universitat Politècnica de València is a public, dynamic and innovative institution dedicated to research and teaching which, while maintaining strong ties with the community in which it carries out its activities, strives for a strong presence abroad.

It is a young university, which celebrated its 50th anniversary during the 2018-2019 academic year. Therefore, it has been here for over half of a century providing uninterrupted teaching.

Its community is currently made up of around 28,000 students, 2,500 teaching staff and researchers and 1,500 administration and service professionals, spread across its three campuses in Alcoi, Gandia and València. The UPV comprises 13 university centres, of which 9 are higher technical schools, 2 are faculties and another 2 are higher polytechnic schools. In addition, it has a Doctoral School and 3 affiliated centres (Florida University, Berklee College of Music and EDEM Business School).

### 1.2.1. Our history

The Universitat Politècnica de València's history dates back to 1968, when Instituto Politécnico Superior de Valencia (IPSV) was created by Decree-Law 5/1968 of 6 June 1968, on Urgent University Restructuring Measures and, four months later, under Decree 2731/1968 of 24 October 1968, the centres that would comprise the IPSV were established:

- The School of Agricultural Engineers
- The School of Architecture
- The School of Civil Engineering
- The School of Industrial Engineering (ETSII)

In the 1968-69 academic year, Agriculture studies and the first three Architecture courses were included, in addition to the first courses of the newly-created School of Civil Engineering and School of Industrial Engineering of València.

The School of Agricultural Engineers (ETSEA) of València had been created by Decree 1283/1959, of 16 July 1959, and its academic work began in the year 1960-61, in the Valencian town of Burjassot, within the old "estación naranjera" ('orange-growing station'). Years later, specifically during the 1965-66 academic year, its premises were moved to Burjassot, to a newly-constructed building designed for that purpose, at number 21 of what was formerly Paseo de Valencia al Mar (now, Avinguda de Blasco Ibáñez) in the city. And at the beginning of the 1980s, it was finally moved to its current location, on the Vera campus.

It was urgently necessary to bring agricultural engineering studies to the Valencian Community, given the production potential of its farming industry. The achievements made by the classes of agricultural engineering graduates and the contributions made by the institution in the realms of academia, education and research have been and are extremely valuable and they have warranted the recognition of society in València, Spain and abroad.

Chronologically, it was the second agricultural engineering school in Spain, only preceded by the Agricultural School of Madrid, which was created in 1855.

After operating as the ETSEA for forty years (from 1960 to 2010), in 2010 the school decided to merge with the UPV's former University School of Agricultural Technical Engineering, which in turn had become the School of the Rural Environment and Oenology in 2002, merging to create a single centre, which is now called the School of Agricultural Engineering and the Environment (ETSEAMN).

The School of Architecture (ETSA) of València was created on 24 October 1968, although two years earlier, in 1966, the first classes had been taught on this subject in the old Exhibition Centre in València, serving as a delegated department of the School of Architecture of Barcelona. Since its inception, this school has had a decisive impact on the configuration of the city of València and its surroundings.

Chronologically, it was the third school of architecture in Spain, following the ones in Madrid and Barcelona, which were created in 1844 and 1875, respectively.

The School of Civil Engineering (ETSECCP) of València was also created on 24 October 1968. It was born out of the need to expand and improve the infrastructures involved in development planning in Spain in the 1960s, in particular on the Mediterranean corridor. This led to further specialisation in these areas of engineering studies, thus increasing the educational offering and, consequently, the number of qualified professionals. Since its inception, it has been and remains a ground-breaking centre for the integration of degrees and a leading institution in Spain.

Chronologically, it was the third school of civil engineering in Spain, following the one in Madrid, created in 1802, and the one in Santander, established in 1963.

The School of Industrial Engineering (ETSII) of València was newly created by decree in 1968. However, in the middle of the 19th century, the creation of special, higher schools had already been proposed in different parts of Spain due to the need to strengthen the industrial sector. It was in the 20th century, in a new economic climate, when a significant number of these university schools were finally created, including the ETSII in València, which has provided substantial support for the establishment of prominent companies in the Community, especially in the field of education, as it has trained thousands of university graduates who engage in this profession both within and outside our borders.

Chronologically, it was the sixth industrial engineering school in Spain, following those in Barcelona (1851), Bilbao (1899), Madrid (1901), Terrassa (1962) and Seville (1963).

### **1.2.2. The Universitat Politècnica de València (1971). The Vera campus**

On 11 March 1971, under Decree 495/1971, the Instituto Politécnico Superior became the Universitat Politècnica de València. This meant more than a change of name, it involved becoming fully integrated into the university system, which had an impact on the organisation and management of educational centres, degrees, teaching staff access, etc. In short, it had the same legal impact as the General Education Act had for universities in general. Moreover, the hitherto President of the IPS became the Rector of the UPV.

This was the first time that polytechnic universities had been created in Spain. On the same date, the first three polytechnic universities were created in three successive decrees: the ones in Barcelona, Madrid and València.

From October 1968, with the newly-created IPSV, it was established that the four schools would start teaching that very year. In those days, the School of Agricultural Engineers and the School of Architecture already had suitable facilities - they had established the curricula, hired teaching staff and tenured professors and allocated students. But this was not the case for the Civil and Industrial Engineering schools, which were assisted by being provided with classrooms by the School of Agricultural Engineers, adapting and optimising the use of shared spaces and resources. Provisional curricula were very quickly drawn up for the new centres. They expanded the search for and hiring of the necessary additional teaching staff.

In short, within just three months of its creation, the IPSV managed to start running all of the degree courses in its various centres.

This situation continued for two academic years, 1968-69 and 1969-70, because in 1970 the facilities from the primera phase of the Vera campus project came into operation. The Civil and Industrial Engineering schools were based there for a time. They were joined by the School of Architecture soon after. And at the start of the 1980s, with the second phase of the construction of the campus completed, the School of Agricultural Engineers moved and the other three schools were relocated.

### 1.3. How to get the Vera campus site (UPV)

#### 1.3.1. Bus

You can easily travel around Valencia using the EMT's urban bus network. In the following links, you can find extensive information on buses, fares, tickets and passes, timetables, special services for handicapped people among

- [Vera Campus Site Interactive Map with bus stops](#)
- [Empresa Municipal de Transporte \(EMT\)](#)

#### 1.3.2. Underground

Getting around Valencia is very easy with the underground as you avoid traffic jams. You can get detailed information on underground stations, timetables and fares on their website. Moreover, you can use the interactive route planner in order to reach your destination using the shortest possible route.

- [Valencia Underground](#)

#### 1.3.3. Taxi

Taxis in the city of Valencia are white and are available 24 hours a day. They may be reserved by telephone or via the Internet. There are also taxi ranks across the city and vehicles can usually be seen driving around the main roads. The airport taxi rank is situated in Terminal 1 Arrivals. Taxi rates are always the same across official companies and must be made visible to the public. Rates vary according to zone (urban zone 1, urban zone 2, interurban) and time of day (prices rise at night). The total price of journey must be displayed on the taximeter and invoice receipts may be requested. The majority of taxis also carry a chip and pin machine, allowing passengers to pay by credit card.

Valencia has several taxi companies. If you need a taxi, call any of these numbers:

- Radio Taxi: (+34) 96 370 33 33
- Tele Taxi: (+34) 96 357 13 13
- Valencia Taxi: (+34) 96 374 02 02
- Onda Taxi: (+34) 96 347 52 52
- Taxi Valencia: (+34) 644 015 655

#### 1.3.4. Bike

If you like to exercise, you can come to the university by bike. Inside the Vera campus (Valencia), you will find four public Valenbisi bike stations. In addition to this, you will find more Valenbisi bike stations close to the university. And, of course, you can come with your own bicycle, as you will find designated bike parking.

- [Map of the Valenbisi bike stations in the Vera campus \(Valencia\)](#)
- [Valenbisi](#)

#### 1.4. How to get to the venues of the Conference

Figure 1 shows the main points for monitoring the activities at the Vera Campus of the UPV. The Conference venue is the Auditorium (Paraninfo) of the UPV, located on level 1 of building 3A (point 1 of Figure 1). Access can be made directly by cab to the Main Entrance (Point A in Figure 1). The indications to the cab driver should be: "Universidad Politécnica de Valencia - Rectorado". It is also possible to access the campus by any other means of public transport (EMT, Tram, Bike, Taxi) from the entrance "El Toro" (point B in Figure 1), which is clearly distinguished from the outside by the presence of a large figure of a bull. From this point you can walk either to the Auditorium or to the ETSII (Building 5F, level 1, point 3 of Figure 1), where the Short Courses will be held on Monday, July 18. The Agora (UPV Main Square) and the ETSIAMN, the school where the Sessions will be held in parallel (Building 3P) are also shown on the map.

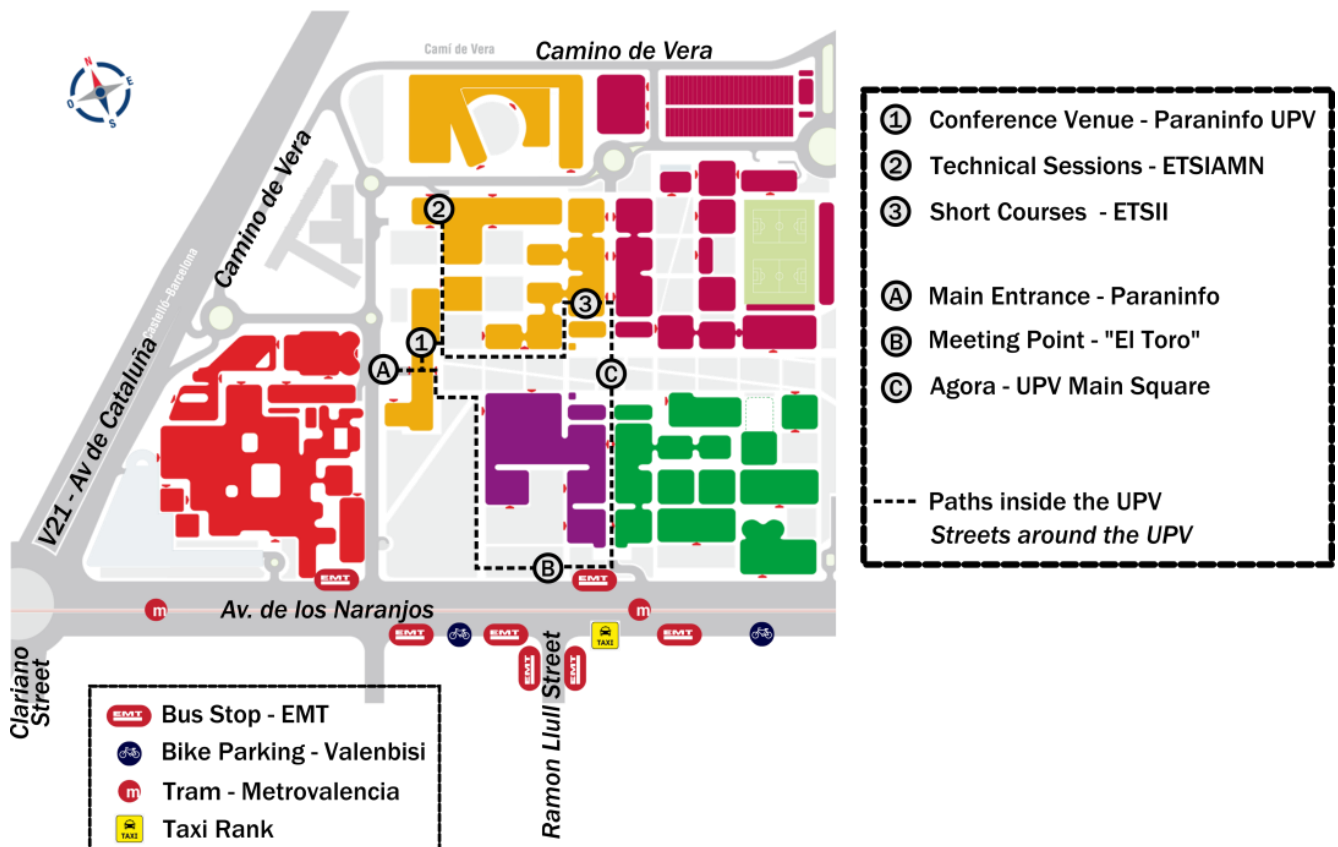


Figure 1. Map with the main points of reference at the UPV.

#### 1.5. How to get the Plenary Conference Site

#### 1.6. How to get the Parallel Sessions Site

#### 1.7. Access to Internet

All conference attendees have personalized internet access via ref wifi. For this purpose, they were given access codes at the Registration Desk as shown in the Figure 2. **Each attendee was given a different one.**

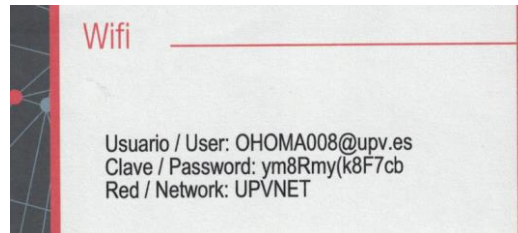


Figure 2. Example of the Wifi Access Keys.

UPVNET wireless network offers Internet and UPV computer resources access. The devices connected to the UPVNET Wi-Fi, will not be able to offer any public service to the Internet. It isn't guaranteed that connected equipment can communicate with each other. There is also connection to the EDUROAM network throughout the UPV campus.

### 1.8. Oral Presentations Instructions

The instructions to be followed by all presenters are:

- Upload the presentation to the conference cloud to have it available during the technical session. To do this, please contact the staff at the Registration Desk.
- Arrive at the Technical Session room 5-10 minutes before the start of the Technical Session and contact the Session Moderator.
- Provide the Moderator with a brief introduction of the person who is going to present the paper (maximum 3 lines).
- Verify with the technical staff of the organization present in the room that the file to be used during the presentation is available and works correctly.
- Attend the technical session from the beginning. It is possible that there may be last minute changes that alter the order of presentation of the papers in a session.
- Strictly comply with the maximum presentation time (12 minutes).

### 1.9. Instructions for Moderators

The moderators of the different Technical Sessions should follow the following instructions:

- Arrive at the room 10 minutes before the start of the session and identify yourself to the staff of the organization that will be present in the room.
- Contact all the presenters of the different papers before the start of the session. They should provide you with a brief introduction (maximum 3 lines) in order to be able to present them properly during the session.
- Check that all presentations are available on the computer in the room.
- Manage both the time for presentations and the time for questions. In no case may the total time of the Technical Session be exceeded in order to avoid overlapping with other conference events.
- Contact the organization's staff in case there are any problems in the room.
- Water sources

The UPV is full of drinking water fountains accessible to anyone. The UPV has launched the UPV Water mobile application to reduce the university community's consumption of plastic water bottles. One more step to becoming, in the year 2030, a carbon-neutral university, free of CO<sub>2</sub> emissions.

In the following [link](#) you will find detailed information about this application that allows you to locate all the sources:

In any case, if you need help, please contact any person of the conference organization.

### 1.10. COVID Protocol

First of all, we would like to send a message of caution to all participants. The intensity of COVID in our society has decreased, but the danger has not yet disappeared. Most of the protective measures have been disappearing with the increase in vaccination, but there is no such thing as zero risk.

We at the conference organization have been concerned from the beginning about the risk from COVID. Therefore, most of the social events, meals and some of the coffee breaks will be held outdoors.

The following is a summary of the COVID protocol currently in force at the UPV, which the conference organizers have made our own:

- The use of face masks inside the buildings is not mandatory, it is only recommended.
- Hydroalcoholic gel will be available to all those who require it.
- If you have any symptoms compatible with COVID we ask you to wear a mask and go to a medical center as soon as possible in order to know your health condition.

### 1.11. Identification of the different attendees

All conference attendees will be given an identification badge as shown in the following figure. Please wear this badge at all times:

- It allows attendees to identify each other
- It is necessary for the organization to control attendees in social events, meals, coffee breaks and other activities.

The people of the local organization will wear a distinctive light blue circle in the ID (Figure 3). In addition, people specially focused on the organization will be distinguished by a light blue polo shirt with the conference logo.





Figure 3. Identification badge of a member of the organization

Those attendees who have expressed any type of food intolerance or special dietary requirements will be asked to wear a distinctive colored circle in the ID (Figure 4, red for allergies and green for special diet requirements). Most meals and social events are served in cocktail mode. This identification will allow waiters to easily identify people with special diets or intolerances.



Figure 4. Identification for people with food allergies (red) or special dietary requirements (green)

## 2. SUMMARY PROGRAM

### DAY 1 - MONDAY JULY 18, 2022

08:00 - 09:00	Registration - ETSII (UPV)
9:00 - 13:30	<p>Short Courses held in parallel:</p> <ul style="list-style-type: none"> <li>• The Digital Transformation and the New Perspectives for Planning and Management of Aqueducts: the role of the digital twins (Orazio Giustolisi, Politecnico di Bari, Italy). ETSII, Room 424.</li> <li>• Deep Learning with PyTorch for Urban Water Networks: from Multilayer Perceptrons to Graph Neural Networks (Riccardo Taormina, Dr. Riccardo Taormina – AldroLab, Department of Water Management, TU Delft, Netherlands). ETSII, Room 521.</li> <li>• Introduction to the EPANET-MATLAB Toolkit for Smart Water Networks research (Demetrios Eliades, KIOS Research and Innovation Center of Excellence, University of Cyprus). ETSII, Room 123</li> <li>• Transient simulations in water networks (Lina Sela, Department of Civil, Architectural, and Environmental Engineering, The University of Texas at Austin, USA). ETSII, Room 124</li> <li>• Managing Advanced Hydraulic Models with QGISRed plugin. From EPANET to Digital Twins (Fernando Martínez, Research Institute of Water and Env. Eng., IIAMA, Universitat Politècnica de València (Spain). ETSII, Room 421</li> </ul>
9:00 - 11:00	Short Courses - Part I
11:00 - 11:30	Coffee Break
11:30 - 13:30	Short Courses - Part II
19:30 - 20:30	Check-in (Las Arenas Hotel)
20:00 - 22:30	Icebreaker Party <i>Las Arenas Hotel</i>

### DAY 2 - TUESDAY JULY 19, 2022

08:00 - 09:00	Registration - Conference Venue (Paraninfo UPV)
09:00 - 10:00	Opening Ceremony
10:00 - 10:30	Coffee Break
10:30 - 12:15	<p>Parallel Sessions 1</p> <p>1A. Drainage and Sewer Systems - I. <i>Moderator: Daniel Aguado García</i></p> <p>1B. Design of Water Distribution Systems - I. <i>Moderator: Maria Cunha</i></p> <p>1C. Water Quality in Water distribution systems - I. <i>Moderator: Dominic L. Boccelli</i></p> <p>1D. Analysis and Modeling of Water Distribution Systems - I. <i>Moderator: Olivier Piller</i></p> <p>1E. Demand Modeling of Water Distribution Systems - I. <i>Moderator: Steven Buchberger</i></p> <p>1F. Industry Track I - Water Quality. <i>Moderator: Donghwi Jung</i></p>
12:45 - 13:30	Plenary Session A. Dr. Pilar Conejos (Idrica) <i>Digital Twins for Water Distribution Systems</i>
13:30 - 15:15	Lunch



15:15 - 16:30	Parallel Sessions 2 2A. Drainage and Sewer Systems - II. <i>Moderator: Fulvio Boano</i> 2B. Design of Water Distribution Systems - II. <i>Moderator: Mario Castro-Gama</i> 2C. Water Quality in Water distribution systems - II. <i>Moderator: Yves Filion</i> 2D. Analysis and Modeling of Water Distribution Systems - II. <i>Moderator: Orazio Giustolisi</i> 2E. Demand Modeling of Water Distribution Systems - II. <i>Moderator: Jochen Werner Deuerlein</i> 2F. Industry Track II - Asset Management. <i>Moderator: Paolo Vezza</i>
16:30 - 17:00	Coffee Break
17:00 - 18:00	Parallel Sessions 3 3A. Drainage and Sewer Systems - III. <i>Moderator: Luigi Berardi</i> 3B. Risk Analysis in Water distribution systems. <i>Moderator: Robert Sitzenfrei</i> 3C. Water Quality in Water distribution systems - III. <i>Moderator: Joby Boxall</i> 3D. Analysis and Modeling of Water Distribution Systems - III. <i>Moderator: Joaquim José de Oliveira Sousa</i> 3E. Leakage Analysis and Control - I. <i>Moderator: Kobus van Zyl</i> 3F. Industry Track III - Design & Digitalization. <i>Moderator: Bruno Brentan</i>
18:00 - 19:30	Networking / UPV Campus Tour
19:45	Bus transfer to Welcome Dinner
20:30 - 22:30	Welcome Dinner <i>Nou Racó Restaurant - Show Cooking Paella - Sunset at La Albufera Natural Park</i>
22:30	Bus transfer to UPV

**DAY 3 - WEDNESDAY JULY 20, 2022**

9:00 - 10:00	Plenary Session B. Prof. Helena Ramos (Instituto Superior Técnico—IST, Lisbon) <i>Water-energy-food nexus as a management strategy in smart cities and grids</i>
10:00 - 10:30	Coffee Break
10:30 - 12:15	Parallel Sessions 4 4A. Battle of Intermittent Water Supply - I. <i>Moderator: F. Javier Martínez-Solano</i> 4B. Energy Optimization of Water Networks - I. <i>Moderator: Helena Ramos</i> 4C. Water Quality in Water distribution systems - IV. <i>Moderator: Mirjam Blokker</i> 4D. Analysis and Optimization of Water Distribution Networks. <i>Moderator: Adeshola Ayodeji Illemobade</i> 4E. Leakage Analysis and Control - II. <i>Moderator: Dídia Covas</i> 4F. Industry Track IV - Operation of Water Networks. <i>Moderator: Kevin E Lansey</i>
12:45 - 13:30	Plenary Session C. Dr. Carles Sanchis (Valencian Center for Irrigation Studies) <i>The end of a myth? Lights and shadows over the Valencia Water Court</i>
13:30 - 15:15	Lunch
15:15 - 16:30	Parallel Sessions 5 5A. Intermittent Supply of Water Distribution Networks - I. <i>Moderator: Raziye Farmani</i> 5B. Energy Optimization of Water Networks - I. <i>Moderator: Riccardo Taormina</i> 5C. Water Quality in Water distribution systems - V. <i>Moderator: Stewart Husband</i> 5D. Operation and Control of Water Distribution Networks - I. <i>Moderator: Avi Ostfeld</i> 5E. Leakage Analysis and Control - III. <i>Moderator: David Bernhard Steffebauer</i> 5F. Industry Track V - Demands in Water Distribution Networks. <i>Moderator: James Uber</i>
16:30 - 17:00	Coffee Break

17:00 - 18:00	Parallel Sessions 6
	6A. Intermittent Supply of Water Distribution Networks - II. <i>Moderator: Enrico Creaco</i> 6B. Battle of the Leakage Detection and Isolation Methods (BattLeDIM, 2020). <i>Moderator: Demetrios G. Eliades</i> 6C. Water Quality in Water distribution systems - VI. <i>Moderator: Vanessa Speight</i> 6D. Operation and Control of Water Distribution Networks - II. <i>Moderator: Sarai Díaz García</i> 6E. Leakage Analysis and Control - IV. <i>Moderator: P. Amparo López-Jiménez</i> 6F. Industry Track VI - Leakage Control and Network Operation in Water Distribution Systems. <i>Moderator: Pilar Conejos Fuertes</i>
20:00 - 23:00	Conference Dinner <i>City of Arts and Sciences - Palau de Les Arts - Los Toros Restaurant</i>

#### DAY 4 - THURSDAY JULY 21, 2022

9:00 - 10:00	Plenary Session D. Prof. Raziye Farmani (University of Exeter) <i>Intermittent Water Supply Systems: Challenges, Opportunities and Solutions</i>
10:00 - 10:30	Coffee Break
10:30 - 12:15	Parallel Sessions 7
	7A. Battle of Intermittent Water Supply - II. <i>Moderator: Juan Saldarriaga</i> 7B. Asset Management. <i>Moderator: Zoran Kapelan</i> 7C. Water Quality in Water distribution systems - VII. <i>Moderator: Richard Collins</i> 7D. Sensor Placement and Sectorization. <i>Moderator: Frances Pick</i> 7E. Leakage Analysis and Control - V. <i>Moderator: Pilar Conejos Fuertes</i> 7F. Smart Solutions for Water Systems - I. <i>Moderator: Miguel Angel Jimenez Bello</i>
12:45 - 13:30	Plenary Session E. Industry Track Nicolás Monterde (Idrica); Yolanda Martínez (Molecor); Vicente Sansaloni (Talis, Belgicast); Fernando Bernal (Bermad)
13:30 - 15:15	Lunch
15:15 - 16:30	Parallel Sessions 8
	8A. Battle of Intermittent Water Supply - III. <i>Moderator: Stefano Alvisi</i> 8B. Free 8C. Hydraulic Transients in Water Distribution Systems. <i>Moderator: Lina Sela</i> 8D. Water Distribution Network Planning. <i>Moderator: Miguel Angel Jimenez Bello</i> 8E. Wastewater and Water Treatment Plants. <i>Moderator: P. Amparo López-Jiménez</i> 8F. Smart Solutions for Water Systems - II. <i>Moderator: Dragan Savic</i>
16:30 - 17:00	Coffee Break
17:00 - 17:45	Plenary Session F. Battle of Intermittent Water Supply (BIWS) <i>Prof. F. Javier Martínez Solano (UPV)</i>
17:45 - 18:00	Awards Ceremony - Venue for the next conference - Closing Ceremony

#### DAY 5 - FRIDAY JULY 22, 2022

8:30 - 13:30	Technical Tours
	La Albufera Natural Park. Visit to the Milia Artificial Wetland Turia Garden. Why does the city have a garden where there should be a river? La Presa Water Treatment Plant, a plant built in the 19th century and still in operation

### 3. DETAILED PROGRAM

#### 3.1. Session 1. Tuesday July 19, 2022, 10:30-12:15

##### 3.1.1. Session 1A. Room: A.1.06. Tuesday July 19, 2022, 10:30-12:15. Drainage and Sewer Systems - I. Moderator: Daniel Aguado García

- [14201 - Optimal design of sewer networks including topographic criteria and drop manholes \(Juan Saldarriaga, Juana Herrán & Pedro L. Iglesias-Rey\)](#)
- [14791 - Economic comparison between an optimized sewer system design and a traditional design \(Maria Alejandra Gonzalez, Juan Guillermo Saldarriaga\)](#)
- [14050 - Is water quality based stormwater management actually feasible? A SWMM-based study on the trade-offs of various stormwater management approaches \(Kristjan Suits, Anatoli Vassiljev, Ivar Annus, Nils Kändler\)](#)
- [14186 - An approach to improve drainage networks based on the study of flood risk. \(Leonardo Bayas-Jiménez, F. Javier Martínez-Solano, Pedro L. Iglesias-Rey & Fulvio Boano\)](#)
- [14138 - UrbanLemma: A serious game to support adoption of sustainable urban drainage solutions \(Aashna Mittal, Lisa Scholten, Zoran Kapelan\)](#)
- [14144 - GIS-integrated pluvial flood risk assessment methodology for urban areas \(Murel Truu Truu, Ivar Annus, Nils Kändler\)](#)

##### 3.1.2. Session 1B. Room: A.1.07. Tuesday July 19, 2022, 10:30-12:15. Design of Water Distribution Systems - I. Moderator: Maria Cunha

- [14516 - A review on staged design of water distribution networks \(Lydia Tsiami, Christos Makropoulos, Dragan Savic\)](#)
- [14709 - Multiobjective optimization of water distribution system under uncertainty using robust optimization \(Avi Ostfeld, Sriman Pankaj Boindala\)](#)
- [14808 - An augmented multi-objective evolutionary algorithm for robust scenario-based optimization with application to water distribution systems design \(Chao Zhang, Haixing Liu, Raziye Farmani & Huicheng Zhou\)](#)
- [14627 - Dynamic edge betweenness centrality and optimal design of water distribution networks \(Mohsen Hajibabaei, Sina Hesarkazzazi, Amin Minaei, Dragan Savić, Robert Sitzenfrei\)](#)
- [14437 - An optimization framework for large water distribution systems based on complex network analysis \(Robert Sitzenfrei\)](#)
- [14104 - Water distribution system design with behind-the-meter solar energy under various discount rates \(Qi Zhao, Angus Simpson, Wenyan Wu & Ailsa Willis\)](#)

##### 3.1.3. Session 1C. Room: A.1.10. Tuesday July 19, 2022, 10:30-12:15. Water Quality in Water distribution systems - I. Moderator: Dominic L. Boccelli

- [14143 - Towards chemical free drinking water distribution \(Natalie Sarah Teresa Lamb, Isabel Douterelo, Stuart Knott, Adam Brookes & Joby Boxall\)](#)
- [14139 - Modelling of water mixing and renewal time in storage tanks \(Didia Isabel Cameira Covas, Alexandre Pinheiro, Sofia Vaz, Laura Monteiro, Nuno Martins & Ana Margarida Ricardo\)](#)

- [14040 - Experimental study of mixing phenomenon in water distribution networks under real-world conditions \(Reza Yousefian, Sophie Duchesne\)](#)
- [14734 - Disinfection by Products Estimation in a Water Distribution Network \(Laura Vinardell Magre, Irene Jubany Güell, Ramon Pérez Magrané\)](#)
- [14789 - Grey-box dynamic model of a drinking water treatment plant \(Blaž Korotaj, Mario Vašak, Hrvoje Novak\)](#)
- [14732 - Disinfection scheduling in water distribution networks considering input time-delay uncertainty \(Stelios G. Vrachimis, Demetrios G. Eliades, Marios M. Polycarpou\)](#)

**3.1.4.Session 1D. Room: A.1.11. Tuesday July 19, 2022, 10:30-12:15. Analysis and Modeling of Water Distribution Systems - I. Moderator: Olivier Piller**

- [14074 - COSMOS – A framework for containerised, distributed creation, execution and analysis of hydraulic water distribution system models \(Georg Arbesser-Rastburg, David Camhy, Daniela Fuchs-Hanusch\)](#)
- [14170 - On the use of SINDy and DMD for WDN \(Mario Castro-Gama\)](#)
- [14776 - Domain Analysis of Water Distribution Networks \(Luigi Berardi, Francesco Gino Ciliberti, Daniele Biagio Laucelli & Orazio Giustolisi\)](#)
- [14842 - Loop Breaking Strategy for Drinking Water Network Skeletonization \(James Uber\)](#)
- [14748 - Data Driven Monitoring of Water Distribution Networks \(Rohit Raphael, Sridharakumar Narasimhan\)](#)
- [14761 - Multi-objective insights and analysis on data driven classifiers for anomaly detection in water distribution systems \(Elizabeth Pauline Carreño-Alvarado, Mayra Hernández Alba, Gilberto Reynoso Meza\)](#)

**3.1.5.Session 1E. Room: Salón de Actos. Tuesday July 19, 2022, 10:30-12:15. Demand Modeling of Water Distribution Systems - I. Moderator: Steven Buchberger**

- [14145 - TEmporal Scale Sigmoid Curve \(TESIC\): A tool to characterize short-term demand variability at water supply systems \(Emilio Ruiz Gómez, Sarai Díaz García, Javier González Pérez\)](#)
- [14067 - Comparison between the Top-down and Bottom-up approach for the diffuse-dispersive phenomenon analysis \(Stefania Piazza, Mirjam Blokker, Mariacrosetta Sambito & Gabriele Freni\)](#)
- [14088 - Using high-resolution data to test the robustness of an automated method for water end-use disaggregation and classification \(Filippo Mazzoni, Mirjam Blokker, Stefano Alvisi & Marco Franchini\)](#)
- [14771 - Testing the Portability of Non-Intrusive Load Monitoring Algorithms to Water End-Use Disaggregation \(Giovanni Francesco Santonastaso, Anna Di Mauro, Andrea Cominola & Armando Di Nardo\)](#)
- [14774 - pySIMDEUM - An open-source stochastic water demand end-use model in Python \(David Bernhard Steffebauer, Bram Hillebrand, Mirjam Blokker\)](#)
- [14903 - Water use in collective student housing \(Lien De Backer, Laura De Jonge, Elisa Van Kenhove\)](#)

**3.1.6.Session 1F. Room: Salón de Grados. Tuesday July 19, 2022, 10:30-12:15. Industry Track I - Water Quality. Moderator: Donghwi Jung**

- 14763 - Increasing Water Utility Resilience in the United States (Pacia Diaz)
- 14720 - Application of additive manufacturing for the improvement of chlorination performance in drinking water tanks, by dispensing hypochlorite at various points regulated from the data of the sensors of the tank itself (Sergi Grau Torrent, Borja Batlle Sánchez, Sergi Compte, Daniel Galera, Marc Peramiquel Castellà, Xavier Figuls Blanch, Rubèn López Farrés, Jofre Obradors Via, Albert Duran Sandoval & Xavier Amores Bravo)
- 14937 - HYDROGENIE: Intelligent Control Valve Pilot (Virginie Meugnier, Vicente Sansaloni, Joan Galtés)
- 14756 - Optimization Algorithms for Contamination Warning System Design for Water Distribution Network Security: A State-of-the-Art Review (Shweta Rathi)
- 14448 - Forecasting the Resilience of Integrated Urban Water Management: The Effect of Salt Water on an Infrastructure System in a Coastal Community (Pacia Diaz, Mark R. Hafen, Mark R. Hafen)
- 14069 - Analysis of Discolouration Customer Contacts to Assess Performance and Intervention Efficacy. (Dominic Michael Cook, Duncan McLeud, Joby Boxall & Stewart Husband)

**3.2.Session 2. Tuesday July 19, 2022, 15:15-16:30**

**3.2.1.Session 2A. Room: A.1.06. Tuesday July 19, 2022, 15:15-16:30. Drainage and Sewer Systems - II. Moderator: Fulvio Boano**

- [14105 - Graph based method for critical pipe analysis in urban drainage networks and the effect of loop degree \(Aun Dastgir, Martin Oberascher, Sina Hesarkazzazi, Robert Sitzenfrie\)](#)
- [14738 - Infrastructure benchmarking for semi-real urban drainage networks \(Robert Sitzenfrie, Sina Hesarkazzazi, Mohsen Hajibabaei\)](#)
- [14787 - A stochastic sewer model to predict pipe flows and pollutant loads in an urban drainage system \(William Addison Atkinson, Albert Chen, Fayyaz Memon & Jan Hofman\)](#)
- [14699 - A Bayesian Generative Adversarial Networks to Generate Synthetic Time-Series Data, Application In Combined Sewer Flow Prediction \(Amin Ebrahim Bakhshipour, Alireza Koochali, Ulrich Dittmer, Andreas Dengel, Ahmed Sheraz & Ali Haghighi\)](#)

**3.2.2.Session 2B. Room A.1.07. Tuesday July 19, 2022, 15:15-16:30. Design of Water Distribution Systems - II. Moderator: Mario Castro-Gama**

- [14098 - Pumping Station Design with an Analysis of Variability of Demand and Considering Techno-Economic and Environmental Criteria through the AHP Method \(Christian Xavier Briceno, Pedro Luis Iglesias Rey, Francisco Javier Martinez Solano & Enrico Creaco\)](#)
- [14779 - Why aren't surrogate reliability indices so reliable? Can they be improved? \(Joaquim José de Oliveira Sousa, João Muranho, Marco Bonora & Mario Maiolo\)](#)
- [14132 - The Use of Resilience and Performance Metrics to Support Decision Making in Drinking Water Systems \(Joana Carneiro, Dália Loureiro, Dídía Covas\)](#)



- [14739 - Methodology for analysis of the SDGs compliance in urban water systems. Implementation in case studies in the Valencian Community \(Camila Andrea Garcia Rodriguez, Pilar Conejos Fuertes, Jaime Castillo Soria, Petra Amparo López Jiménez & Modesto Perez Sanchez\)](#)

**3.2.3.Session 2C. Room: A.1.10. Tuesday July 19, 2022, 15:15-16:30. Water Quality in Water distribution systems - II. Moderator: Yves Filion**

- [14181 - Disinfection Residual Behaviour within Drinking Water Distribution Systems \(Jade Rogers, Katherine Fish, Vanessa Speight, Hunter Fairley, Graham Knowles & Joby Boxall\)](#)
- [14084 - The impact of drinking water network model spatial and temporal scale on hydraulic metrics indicating discolouration risk \(Reinar Lokk, Mirjam Blokker, Joby Boxall, Michele Romano, Anna Provost & Stewart Husband\)](#)
- [14778 - Investigating water quality management in WDN using data modelling approaches \(Francesco Gino Ciliberti, Laura Vanessa Enriquez, Daniele Biagio Laucelli, Juan Saldarriaga & Orazio Giustolisi\)](#)
- [14007 - Water Quality in Drinking Water Distribution Systems: A Whole-Systems Approach to Decision Making \(Sally L Weston, Manuel Rodriguez, Sonja Behmel\)](#)

**3.2.4.Session 2D. Room: A.1.11. Tuesday July 19, 2022, 15:15-16:30. Analysis and Modeling of Water Distribution Systems - II. Moderator: Orazio Giustolisi**

- [14722 - Digitalization in small water utilities: the case of Pamplona, Colombia \(Carlos Alexis Bonilla Granados, Bruno Brentan, Idel Montalvo Arango & Joaquín Izquierdo\)](#)
- [15007 - Building digital twins of water supply networks with QGISRed plugin for QGIS \(Fernando Martínez Alzamora, Nestor Lerma Elvira\)](#)
- [14797 - Assessing the Performances and Transferability of Graph Neural Networks Metamodels for Water Distribution Systems \(Roberto Bentivoglio, Bulat Kerimov, Jorge Alexander Garzon Diaz, Elvin Isufi, Franz Tscheikner-Gratl, David Bernhard Steffelbauer & Riccardo Taormina\)](#)
- [14760 - Valve Loss Curve Estimation Using Real-Time SCADA Data \(SM Masud Rana, Gal Perelman, Elad Salomons & James G Uber\)](#)

**3.2.5.Session 2E. Room: Salón de Actos. Tuesday July 19, 2022, 15:15-16:30. Demand Modeling of Water Distribution Systems - II. Moderator: Jochen Werner Deuerlein**

- [14750 - Coupling Agent-based Modeling with Water Distribution System Models to Simulate Social Distancing and Water Infrastructure Performance during COVID-19 \(Brent Vizanko, Leonid Kadinski, Avi Ostfeld, Emily Berglund & Christopher L Cummings\)](#)
- [14829 - Non-intrusive water usage classification considering limited training data \(Pavlos Pavlou, Stelios G. Vrachimis, Demetrios G. Eliades & Marios M. Polycarpou\)](#)
- [14721 - Uncertainty analysis and model development for urban residential water consumption patterns \(Qiang Xu, Jiaxin Zhang, Kuo Liu, Zhimin Qiang & Xin He\)](#)
- [14886 - Water consumption analysis during night hours of residential customers \(Arianne Isabella Estrada Estrada, Francisco Arregui de la Cruz, Javier Soriano Olivares, Román Ponz Carcelén & David Torres Toro\)](#)

**3.2.6.Session 2F. Room: Salón de Grados. Tuesday July 19, 2022, 15:15-16:30. Industry Track II - Asset Management. Moderator: Paolo Vezza**

- 14725 - PVC-O pipes the most efficient solution for the transport of water under pressure (Marcos Rincón Benito)
- 14726 - The Sanecor® system, a sustainable solution for sewerage networks (Edgar Llopis)
- 14004 - Post-treatment PFAS contamination of drinking water (Gopinathan R. Abhijith, Avi Ostfeld)
- 14042 - Providing a strategy plan for optimal sampling location to reduce the in effect duration of drinking water warning advisory (Reza Yousefian)

**3.3.Session 3. Tuesday July 19, 2022, 17:00-18:00**

**3.3.1.Session 3A. Room: A.1.06. Tuesday July 19, 2022, 17:00-18:00. Drainage and Sewer Systems - III. Moderator: Luigi Berardi**

- [14158 - BiAceptadoinetic and Artificial Intelligence Models for the Simulation of Nitrous Oxide Emissions from Wastewater Treatment Plants \(Siddharth Seshan, Johann Poinapen, Jules B. van Lier & Zoran Kapelan\)](#)
- [14875 - Biofungus: fungus MBBR pilot plant on Murcia Este WWTP \(E. Mena, A. Gadea, A. Monreal-Bernal, S. López-García, V. Garre, A. J. Lara-Guillén\)](#)
- [14247 - Roadmap towards Smart Wastewater Treatment Plants \(Daniel Aguado García, Henri Haimi, Michela Mulas & Francesco Corona\)](#)
- [14249 - Metadata: a must for the digital transition of wastewater treatment plants \(Daniel Aguado García, Frank Blumensaat, Juan Antonio Baeza, Kris Villez, M<sup>a</sup> Victoria Ruano, Oscar Samuelsson, Queralt Plana & Janelcy Alferez\)](#)

**3.3.2.Session 3B. Room: A.1.07. Tuesday July 19, 2022, 17:00-18:00. Risk Analysis in Water distribution systems. Moderator: Robert Sitzenfrei**

- [14135 - Advanced fire flow risk analysis using EPANET \(Alexander Nicholas Sinske, George Adrian van Heerden, Altus Hugo de Klerk\)](#)
- [14830 - Water for firefighting: A comparative study across several cities \(Adeshola Ayodeji Ilemobade\)](#)
- [14534 - Performance evaluation of buried uPVC pipes by numerical simulation of soil-pipe interaction \(Milad Latifi, Ramiz Beig Zali, Raziye Farmani, Akbar Javadi & Suhayl Zulfiquar\)](#)
- [14766 - Analysis of PDA-based Water Distribution System Suspension Risk using statistical and machine learning method \(Yoojin Oh, Haekeum Park, Jinseok Hyung, Taehyeon Kim, Kibum Kim & Jayong Koo\)](#)

**3.3.3.Session 3C. Room: A.1.10. Tuesday July 19, 2022, 17:00-18:00. Water Quality in Water distribution systems - III. Moderator: Joby Boxall**

- [14802 - Optimization of reservoir treatment levels considering uncertainty in mixing at cross junctions in water distribution systems using Info-gap decision theory \(Sriman Pankaj Boindala, G Jaykrishnan, Avi Ostfeld\)](#)

- [14016 - Characterizing the effects of water distribution system topology modifications on its dynamic behaviour through connectivity metrics \(Valentina Marsili, Stefano Alvisi, Filomena Maietta, Caterina Capponi, Silvia Meniconi, Bruno Brunone & Marco Franchini\)](#)
- [14799 - PatholInvest: Pathogen Contamination Investigations during Emergencies \(Sotirios Paraskevopoulos, Stelios Vrachimis, Marios Kyriakou, Pavlos Pavlou, Dimitris Kouzapas, George Milis, Patrick Smeets, Demetrios G. Eliades, Gertjan Medema, Marios Polycarpou, Christos Panayiotou\)](#)
- [14116 - Measuring drinking water temperature changes in a distribution network \(Mirjam Blokker\)](#)

**3.3.4.Session 3D. Room: A.1.11. Tuesday July 19, 2022, 17:00-18:00. Analysis and Modeling of Water Distribution Systems - III. Moderator: Joaquim José de Oliveira Sousa**

- [14142 - Flow dynamics in a pipe containing uneven roughness elements \(Katrin Kaur, Anatoli Vassiljev, Murel Truu, Ivar Annus & Nils Kändler\)](#)
- [14061 - Assessment of water distribution networks skeletonization methods based on stochastic supply and demand scenarios \(Thomas Pirard, Sébastien Erpicum, Michel Pirotton, Benjamin Dewals & Pierre Archambeau\)](#)
- [14168 - Hydraulic State Estimation: pilot implementation in a water distribution system \(Emilio Ruiz Gómez, Sarai Díaz García, Javier González Pérez\)](#)
- [14054 - Using High-Order Algorithms for the Pressure-Driven Modeling of Water Distribution Networks \(Enrico Creaco, Armando Di Nardo, Michele Iervolino, Giovanni Francesco Santonastaso\)](#)

**3.3.5.Session 3E. Room: Salón de Actos. Tuesday July 19, 2022, 17:00-18:00. Leakage Analysis and Control - I. Moderator: Kobus van Zyl**

- [14078 - Water Consumption variation in Latin America due to COVID-19 Pandemic \(Catalina Ortiz, William Clavijo, Jürgen Mahlnecht & Juan Saldarriaga\)](#)
- [14107 - NRW Estimation and Localization in Water Distribution Networks via Hydraulic Model Calibration using 24/7 Continuously Monitoring Data \(Alvin Wei Ze Chew, Zheng Yi Wu, Rony Kalfarisi, Meng Xue, Jocelyn Pok, Jianping Cai, Kah Cheong Lai, Sock Fang Hew, Jia Jie Wong\)](#)
- [14085 - Leak detection and location in a real water distribution network using a model-based technique \(Bruno Ferreira, Nelson Carriço, Dídía Covas\)](#)
- [14153 - An Experimental Study On Early Leak Localization In Water Distribution Networks \(Yannick Deleuze, Arley Nova Rincón, Yves-Marie Batany, Teodulo Abril, Damien Chenu & Nicolas Roux\)](#)

**3.3.6.Session 3F. Room: Salón de Grados. Tuesday July 19, 2022, 17:00-18:00. Industry Track II - Design & Digitalization. Moderator: Bruno Brentan**

- 14882 - An example to the new vision of network's digitalization (Pepe Chambó, Jorge Helmbrecht)
- 14140 - Robust design of water distribution networks considering different demand conditions and multiple objectives (Maria Cunha, Roberto Magini, Joao Marques)
- 14841 - Establishing a Distribution System Digital Twin at Nashville Metro Water Services – An Operator-Focused Design Approach (James Uber)



- 14159 - Improving multi-objective optimization method NSGA II of water distribution systems (Rahel Amare Kidanu, Maria Cunha, Elad Salomons & Avi Ostfeld)

### 3.4.Session 4. Wednesday July 20, 2022, 10:30-12:15

#### 3.4.1.Session 4A. Room: A.1.06. Wednesday July 20, 2022, 10:30-12:15. Battle of Intermittent Water Supply - I. Moderator: F. Javier Martínez-Solano

- [14077 - A Phased Methodology for the Optimal Rehabilitation of a Network with Intermittent Supply of Water Based on Hydraulic Criteria \(Juan Saldarriaga, Jessica Bohorquez, Camilo Salcedo, Alexander Garzón, Laura Enriquez, David Celeita, Juana Herrán, Andrés Ariza, María Alejandra González, Santiago Gómez, Laura Serje, Laura González Díaz, Danna Velásquez, Catalina Ortiz\)"](#)
- [14178 - Rehabilitation of existing intermittent water supply network under fund constrains using marginal increase in resilience to marginal increase in cost method \(Dr. Rajesh Gupta, Satyam Rajesh Tiwari, Aniket Sharma, Prerna Pandey & Dr. Shilpa Dongre\)](#)
- [14096 - A Step Wise Algorithm for Converting Intermittent to Continuous Water Supply \(Amirabbas Mottahedin, Amin Minaei, Robert Sitzenfrei & Enrico Creaco\)](#)
- [14719 - A genetic algorithm approach to rehabilitate an Intermittent Water Supply System \(Brent Vizanko, Cade Karrenberg, Faisal Alghamdi, Jorge Pesantez, Morgan DiCarlo & Emily Berglund\)](#)
- [14028 - A multi-step optimization approach to rehabilitate a deteriorated and intermittent water distribution network \(David Ayala-Cabrera, Mario Castro-Gama, Claudia Quintiliani, Sotudeh Hoseini-Ghafari\)](#)
- [14501 - Modeling the Final Solution using Multilevel Sector Analysis and Machine Learning for Optimizing Progressive Investments in a Distribution Water Network. \(Xavier Torret, Yennifer Cufiño, Sergi Grau, Pablo Marques, Oscar Vegas, Diego Guedes, Edgar Fusté, Sergi Maspons & Ramon Perez\)](#)

#### 3.4.2.Session 4B. Room: A.1.07. Wednesday July 20, 2022, 10:30-12:15. Energy Optimization of Water Networks - I. Moderator: Helena Ramos

- [14781 - Energy equations to analyse pressurized water transport systems \(Roberto del Teso March, Elena Gómez Sellés, Elvira Estruch-Juan & Enrique Cabrera Marcet\)](#)
- [14773 - Energy diagnosis of pressurized water systems with the ENERGOS tool \(Elena Gómez, Roberto del Teso, Enrique Cabrera, Elvira Estruch-Juan, Pascual Jose Maximino, Miguel Ortiz, Guillermo del Pozo & Carlos Marco\)](#)
- 15005 - Assessment of the energy cost of water stored in tanks by tracking the energy flows (Fernando Martínez Alzamora, Joan Carles Alonso Campos, Miguel Angel Jimenez Bello)
- [14843 - Real-time Operation of Drinking Water Network using Multi-objective Optimization for Pump Cost Minimization and Operation Reliability \(SM Masud Rana, Dominic L Boccelli\)](#)
- [14823 - Search space reduction for pumping station design optimization problem through automatic identification of infeasible flow distributions \(Jimmy H. Gutierrez-Bahamondes, Daniel Mora-Melia, Bastian Valdivia-Muñoz & Pedro L. Iglesias-Rey\)](#)

- [14154 - Water Distribution Network operation optimization: an industrial perspective \(Marco Lauricella, Felix Lenders\)](#)

**3.4.3. Session 4C. Room: A.1.10. Wednesday July 20, 2022, 10:30-12:15. Water Quality in Water distribution systems - IV. Moderator: Mirjam Blokker**

- [14091 - Dual estimation of iron oxide deposition on drinking water PVC pipes using calibrated turbidity data and brightfield microscopy in a full-scale laboratory system \(Artur Sass Braga, Yves Filion\)](#)
- [14093 - Model for fast deposition of fine iron oxide particles on PVC pipe mains during the passage of a suspended particle plume in a full-scale laboratory system \(Artur Sass Braga, Yves Filion\)](#)
- [14133 - Aquarellus: a numerical tool to calculate accumulation of particulate matter in distribution systems \(Joost van Summeren, Mark Morley, Jip van Steen, Amitosh Dash & Luuk de Waal\)](#)
- [14094 - The identification of variable shear strength of particles deposited on drinking water PVC pipes after the passage of a suspended particle plume in a full-scale laboratory system \(Artur Sass Braga, Yves Filion\)](#)
- [14574 - Effect of swabbing cleaning method on biofilm communities of a drinking water distribution system in Madrid \(Spain\) \(Carolina Calero Preciado, Emelina Ruth Rodríguez Ruiz, Manuel José Arias Guedón\)](#)
- [14141 - Discovering Differences in Iron and Manganese Behaviour in Service Reservoirs \(Anastasia Doronina, Stewart Husband, Joby Boxall & Vanessa Speight\)](#)

**3.4.4. Session 4D. Room: A.1.11. Wednesday July 20, 2022, 10:30-12:15. Analysis and Optimization of Water Distribution Networks. Moderator: Adeshola Ayodeji Ilemobade**

- [14770 - Mass Balance Calibration of Water Distribution Networks: application to a real case study \(Daniele Biagio Laucelli, Orazio Giustolisi, Francesco Gino Ciliberti & Luigi Berardi\)](#)
- [14176 - Advances in premise plumbing modeling \(William Platten, Regan Murray, Juneseok Lee, Robert Janke, Terra Haxton, Walter Grayman, Jonathan Burkhardt, Steven Buchberger\)](#)
- [14784 - The Shape of Water Distribution Networks - Describing local structures of water networks via graphlet analysis \(Bulat Kerimov, Franz Tscheikner-Gratl, Riccardo Taormina & David Steffelbauer\)](#)
- [14815 - A Nonlinear Model Predictive Control Framework for Dynamic Water Network Optimization \(Ernesto Arandia, James Uber\)](#)
- [14267 - Optimal Design-for-Control of Water Distribution Networks via Convex Relaxation \(Filippo Pecci, Ivan Stoianov, Avi Ostfeld\)](#)
- [14753 - Which flow and pressure constraints for sustainable operation of Water Distribution Systems? \(Olivier Piller, Jochen Deuerlein, Sylvan Elhay & Angus Simpson\)](#)

**3.4.5. Session 4E. Room: Salón de Actos. Wednesday July 20, 2022, 10:30-12:15. Leakage Analysis and Control - II. Moderator: Dídía Covas**

- [14053 - Stochastic modelling of DMA leakage incorporating material-linked failures patterns \(Soheila Beygi, Jakobus van Zyl\)](#)

- [14418 - Developing a comprehensive leak detection model through recognition, localization, and response management. \(Brett Snider, Gareth Lewis, Albert Chen, Lydia Vamvakieridou-Lyroudia, Dragan Savic\)](#)
- [14749 - A methodology for single and double-leak location in pressurised Water Distribution Networks using flowrate-dependent pressure residuals vectors \(Clara Maria Corzo, Leonardo Alfonso Segura, Gerald Corzo Perez, Iulian Mocanu & Dimitri Solomatine\)](#)
- [14857 - Experimental analysis for the losses assessment in water distribution systems \(Giovanna Darvini, Luciano Soldini\)](#)
- [14056 - Multi-leak detection and isolation in water distribution network \(Debora Alves, Joaquim Blesa, Eric Duviella & Lala Rajaoarisoa\)](#)
- [14073 - Leak detection based on graph signal processing of pressure data \(Daniel Bezerra Barros, Carlo Giudicianni, Manuel Herrera, Gustavo Meirelles & Bruno Brentan\)](#)

**3.4.6.Session 4F. Room: Salón de Grados. Wednesday July 20, 2022, 10:30-12:15. Industry Track IV - Operation of Water Networks. Moderator: Kevin E Lansey**

- 14253 - Collective Intelligence: Human-In-The-Loop AI in Water Systems (James Cooper)
- 14057 - Comprehensive Study on Performance Comparison of Predictive Modeling Methods for Smart Water Grid Near Real-Time Decision-Making Support (Rony G Kalfarisi, Alvin Chew, Jianping Cai, Meng Xue, Jocelyn Pok & Zheng Yi Wu)
- 14058 - Automatic Training and Benchmarking on Smart Water Grid Anomaly Detection and Classification (Jocelyn Pok, Jianping Cai, Meng Xue, Rony Kalfarisi & Zheng Wu)
- 14059 - Improving Near Real-Time Anomaly Event Classification with Trend Change Detection for Smart Water Grid Operation Management (Meng Xue, Zheng Yi Wu, Alvin Wei Ze Chew, Jocelyn Pok, Jianping Cai & Rony Kalfarisi)
- 14187 - Technological evolution of the Telecontrol of Valencia (Jesús Pérez Chiva)
- 14810 - What do we learn about household water consumption from smart meters? (Marten Hutten, Yvonne Hassink, Mario Maessen)

**3.5.Session 5. Wednesday July 20, 2022, 15:15-16:30**

**3.5.1.Session 5A. Room: A.1.06. Wednesday July 20, 2022, 15:15-16:30. Intermittent Supply of Water Distribution Networks - I. Moderator: Raziye Farmani**

- [14136 - Data Driven Approach for Equitable Supply in Water Networks \(Adhityan R, Varghese Kurian, Sridharakumar Narasimhan\)](#)
- [14740 - A Comparative Analysis of Intermittent Water Supply Models \(Omar Abdelazeem, David Donald James Meyer\)](#)
- [14013 - A Model of Intermittent Water Supply Simulating the Inequitable Distribution of Water \(Matthew Henry MacRorie, Sally Weston, Vanessa Speight, Robin Price & Richard Collins\)](#)
- 15006 - Modelling the real behaviour of domestic tanks and intermittent water supply systems with EPANET (Fernando Martínez Alzamora, Pilar Conejos Fuertes)

**3.5.2.Session 5B. Room: A.1.07. Wednesday July 20, 2022, 15:15-16:30. Energy Optimization of Water Networks - I. Moderator: Riccardo Taormina**

- [15003 - Development of a tool for the optimization and regulation of hydraulic microgeneration systems adapted to the demand and flow variations aimed at the clean energy recovery in water supply networks \(Melvin Alfonso Garcia Espinal, Modesto Pérez-Sánchez , Francisco Javier Sánchez-Romero , P. Amparo López Jiménez & Pilar Conejos Fuertes\)](#)
- [14071 - Maximisation of power in Pump As Turbines : Applying model predictive control as a way to maximise power \(Nilki Aluthge Dona, Aonghus McNabola, Biswajit Basu\)](#)
- [14155 - Optimal charging station placement for autonomous robots in drinking water networks \(Mario Castro-Gama, Yvonne Hassink-Mulder\)](#)
- [15474 - Including GHG emissions for water distribution network expansion and optimal pump scheduling \(Swati Sirsant, Mohamed A. Hamouda, Mostafa F. Shaaban\)](#)

**3.5.3.Session 5C. Room: A.1.10. Wednesday July 20, 2022, 15:15-16:30. Water Quality in Water distribution systems - V. Moderator: Stewart Husband**

- [14741 - Profile sampling to detect dissolved lead in household drinking water \(Amitosh Dash, Jip van Steen, Mirjam Blokker\)](#)
- [14055 - Sensitivity Analysis of Water Distribution Networks Deterioration in Hydraulic and Economic Parameters \(Leandro Alves Evangelista, Gustavo Meirelles Lima, Bruno Melo Brentan\)](#)
- [14818 - Study on iron dispersion law and control measures of dead-end branch pipe \(Jianxun Chen, Jinliang Gao, Wenyan Wu, Guanghui Wang, Qiang Ding, Shihua Qi & Bo Li\)](#)
- [14827 - Application of black-box models based on artificial intelligence for the prediction of chlorine and TTHMs in the trunk network of Bogotá \(Laura Enriquez, Laura González & Juan Saldarriaga\)](#)

**3.5.4.Session 5D. Room: A.1.11. Wednesday July 20, 2022, 15:15-16:30. Operation and Control of Water Distribution Networks - I. Moderator: Avi Ostfeld**

- 14758 - Multi-objective controller tuning of pressure control in water distribution systems (Gilberto Reynoso Meza, Elizabeth Pauline Carreño-Alvarado)
- [14024 - Local control schemes for real-time optimization of variable speed pumps \(Elad Salomons, Mashor Housh, Uri Shamir\)](#)
- [14161 - Flow ratio and pressure control in a low losses WDS – Analysis of dynamics \(Bogumil Ulanicki, Philippe Beaujean, Juliaan Plancke & Bastien Leruth\)](#)
- [14164 - PRVs working in parallel configurations – Analysis of dynamics \(Bogumil Ulanicki, Philippe Beaujean, Juliaan Plancke & Bastien Leruth\)](#)

**3.5.5.Session 5E. Room: Salón de Actos. Wednesday July 20, 2022, 15:15-16:30. Leakage Analysis and Control - III. Moderator: David Bernhard Steffelbauer**

- [14082 - Analysis of online pressure for resilience phase characterisation of leakages/burst events \(Sotudeh Hoseini Ghafari, Jorge Francés-Chust, Olivier Piller & David Ayala-Cabrera\)](#)

- [14109 - Acoustic Data Analysis Framework for Near Real-Time Leakage Detection and Localization for Smart Water Grid \(Alvin Wei Ze Chew, Zheng Yi Wu, Rony Kalfarisi, Meng Xue, Jocelyn Pok, Jianping Cai, Kah Cheong Lai, Sock Fang Hew, Jia Jie Wong\)](#)
- [14560 - Leak localisation method using a detailed hydraulic model combined with high resolution pressure sensors applied to a real network \(Sergi Grau Torrent, Ramon Pérez Magrané, Xavier Torret Requena & David Casado Ruiz\)](#)
- [14751 - Iteratively tuning the regularisation parameter in an inverse method for localising leaks in water distribution networks \(Yuanyang Liu, Ivan Stoianov, Filippo Pecci\)](#)

**3.5.6.Session 5F. Room: Salón de Grados. Wednesday July 20, 2022, 15:15-16:30. Industry Track V - Demands in Water Distribution Networks. Moderator: James Uber**

- 14464 - Prediction of Water Consumption Using Quantile Regression Neural Network for Burst Detection in Drinking Water Supply Network (Haochen Zhang)
- [14831 - Supervised machine learning models for leak detection in water distribution systems \(Lochan Basnet, James Levis, Downey Brill, Ranji Ranjithan & Kumar Mahinthakumar\)](#)
- 14506 - South West Water Smart Metering Trial: An Industry / Academia Partnership (Gareth Lewis)
- 14185 - Integration of turbines in supply networks, a smart solution for drinking water in the city of Valencia (Mari Carmen Barrachina Gimeno)

**3.6.Session 6. Wednesday July 20, 2022, 17:00-18:00**

**3.6.1.Session 6A. Room: A.1.06. Wednesday July 20, 2022, 17:00-18:00. Intermittent Supply of Water Distribution Networks - II . Moderator: Enrico Creaco**

- [14111 - Modelling of Air Pocket Entrapment during Pipe Filling Events in Intermittent Water Supply Systems \(Joao Ferreira, David Ferras, Didia Covas & Zoran Kapelan\)](#)
- [14044 - Optimal Operation in Sectorized Networks with Intermittent Water Distribution \(Rui Gabriel Souza, Gustavo Meirelles, Bruno Brentan\)](#)
- [14173 - Effects of consumer patience on energy loss in intermittent water supply networks \(Hamidreza Mohabbat, David D.J. Meyer\)](#)
- [14821 - Investigation of groundwater consumption to cope with the inadequate piped water supply in continuous and intermittent supply systems: A case study in Bangalore, India. \(B.N Priyanka, Bharanidharan B, Sheetal Kumar KR, MS Mohan Kumar, VV Srinivas, Sanjana R Nibgoor & Kishore Y\)](#)

**3.6.2.Session 6B. Room: A.1.07. Wednesday July 20, 2022, 17:00-18:00. Battle of the Leakage Detection and Isolation Methods (BattLeDIM, 2020). Moderator: Demetrios G. Eliades**

- Special Session to present some of the results of the Battle of the Leakage Detection and Isolation Methods (BattLeDIM). This session should have been held at the Beijing Conference (2020). During the session there will be an introduction to the Battle statement and some of the participants will present their solutions.



**3.6.3.Session 6C. Room: A.1.10. Wednesday July 20, 2022, 17:00-18:00. Water Quality in Water distribution systems - VI. Moderator: Vanessa Speight**

- [14777 - Development of prediction model of ozone dosage and residual ozone concentration using machine learning methods in ozone process of drinking water treatment process \(Jaeyoung Kwon, Jinseok Hyung, Taehyeon Kim, Haekuem Park, Jayong Koo\)](#)
- [14703 - Machine learning methodologies to predict possible water quality anomalies as a support tool for online monitoring of organic parameters \(Leonid Kadinski\)](#)
- [14730 - Evaluation of physical and water quality indicators in aductors in hydraulic transient events \(Mariele de Souza Parra Agostinho Agostinho, Danieli Mara Ferreira, Cristovão Vicente Scapulatempo Fernandes\)](#)
- [14614 - Interpretable machine learning-based corrosion rate prediction model of water pipes \(Taehyeon Kim, Jinseok Hyung, Haekeum Park, Kibum Kim & Jayong Koo\)](#)

**3.6.4.Session 6D. Room: A.1.11. Wednesday July 20, 2022, 17:00-18:00. Operation and Control of Water Distribution Networks - II. Moderator: Sarai Díaz García**

- [15011 - Potential reduction of leakage volume by combining dynamic pressure management and energy recovery in Valencia \(Alejandra Guarachi Quiñones, Francisco Javier Martínez Solano, Carmen Sánchez Briones & Andross Pérez Lleó\)](#)
- [14103 - An improved control strategy for high-pressure pumping irrigation systems \(Ye Wang, Qi Zhao, Erik Weyer, Wenyan Wu, Angus Simpson & Ailsa Willis\)](#)
- [14835 - Teaching pipe and pump hydraulics: hands-on laboratory exercises using the Aqualibrium model \(Kobus van Zyl, Colin N. Whittaker, Naser Mostashiri, Kelly Cokorudy, Zoe Martin, Santiago Carrillo Trivino, Claire Donald\)](#)

**3.6.5.Session 6E. Room: Salón de Actos. Wednesday July 20, 2022, 17:00-18:00. Leakage Analysis and Control - IV. Moderator: P. Amparo López-Jiménez**

- [14005 - Investigating an alternative to exhumed grey cast iron water pipes for small-scale fatigue tests \(Edward D'Arcy Aston John, Joby Boxall, Richard Collins, Elisabeth Bowman & Luca Susmel\)](#)
- [14127 - Advancing towards semi-automatic labeling of GPR images to improve visualizations of pipes and leakage in water distribution networks using multi-agent systems and machine learning techniques \(Gemma Stanton, David Ayala-Cabrera\)](#)
- [14124 - Machine-learning-based fault diagnosis of gate valves \(Hyunjun Kim, Kwangjun Jung, Sumin Lee\)](#)
- [14814 - An innovative electrical approach for real-time monitoring of pumping systems focusing on fault diagnosis and operating efficiency \(Jorge Estima, Francisco Rolo, Marco Ferreira\)](#)

**3.6.6.Session 6F. Room: Salón de Grados. Wednesday July 20, 2022, 17:00-18:00. Industry Track VI - Leakage Control and Network Operation in Water Distribution Systems. Moderator: Pilar Conejos Fuertes**

- [14131 - Performance assessment of leak localisation method for locating small leaks in water distribution networks \(Martijn Bakker\)](#)
- [14177 - Fibre optic-based monitoring system for the detection of leaks in drinking water pipelines \(Pablo Durán Zafrilla\)](#)

- [14653 - Mains burst and discolouration contacts in drinking water distribution systems \(Manar Al-Saffar, Grigorios Kyritsakas, Stewart Husband\)](#)
- 14146 - Benchmarking as a first step towards building decision making machine learning models in the water management sector. The Global Omnium case. (David Torres Toro)

### 3.7.Session 7. Thursday July 21, 2022, 10:30-12:15

#### 3.7.1.Session 7A. Room: A.1.06. Thursday 21, 2022, 10:30-12:15. Battle of Intermittent Water Supply - II. Moderator: Juan Saldarriaga

- [14075 - Five-years rehabilitation plan of a water distribution network \(Giorgia Lucrezia Guarino, Luca Preite, Giulia Scaletti, Giacomo Ferrarese & Stefano Malavasi\)](#)
- [14175 - Multi-staged conversion from intermittent to continuous water supply \(Dondu Sarisen, Faten Ayyash, Vasilis Koukoravas & Kondwani Simukonda\)](#)
- [14083 - Rehabilitating Intermittent Water Supply Systems Through A Multi-Objective Optimization Method Based On Hydraulic Simulations \(Irene Marzola, Valentina Marsili, Filippo Mazzoni, Stefano Alvisi & Marco Franchini\)](#)
- [14513 - Optimal rehabilitation procedure for intermittent water supply systems \(Ariele Zanfe, Rui Souza, Andrea Menapace, Bruno Brentan, Gustavo Meirelles, Idel Montalvo, Maurizio Righetti & Joaquin Izquierdo\)](#)
- [14705 - Multi-Staged Many-objective Optimization Approach to Rehabilitating a Deteriorated Water Distribution Network \(Zilin Li, Xudong Zhang, Zheng Luo, Yi Wu, Qiuyuan Xu, Chao Zhang & Haixing Liu\)](#)
- [14805 - Battle of the intermittent water supply: a two-stage optimization approach through linear approximation and model aggregation \(Greg Hendrickson, Meghna Thomas, Lina Sela\)](#)

#### 3.7.2.Session 7B. Room: A.1.07. Thursday 21, 2022, 10:30-12:15. Asset Management. Moderator: Zoran Kapelan

- [14636 - Hydraulic and Co-located Pipe Criticalities in the Rehabilitation of Water Distribution Mains \(Amin Minaei, Mohsen Hajibabaei, Enrico Creaco, Robert Sitzenfren\)](#)
- [14792 - Criticality of isolation valves in water distribution networks \(Richárd Wéber, Ákos Délei, Tamás Huzsvár, Csaba Hős\)](#)
- [14813 - High resolution water pressure monitoring for the assessment of fatigue damage in water distribution pipes \(Carlos Jara-Arriagada, Ivan Stoianov\)](#)
- [14755 - Important Factors For Water Main Break Prediction Across 13 Canadian Systems \(Rebecca Dziedzic, Sadaf Gharaati\)](#)
- [14112 - A decision-making approach to assess and prioritise intervention solutions in water distribution systems \(Marta Cabral, Dália Loureiro, Dídía Covas\)](#)
- [14775 - Designing advanced asset management for Water Distribution Networks: application to a real case study \(Daniele Biagio Laucelli, Serena Spagnuolo, Antonio Rinaldi, Gianluca Perrone, Luigi Berardi & Orazio Giustolisi\)](#)

**3.7.3.Session 7C. Room: A.1.10. Thursday 21, 2022, 10:30-12:15. Water Quality in Water distribution systems - VII. Moderator: Richard Collins**

- [14014 - Big data to understand and estimate the risks of iron exceedance in drinking water distribution systems \(Joby Boxall, Vanessa Speight, Grigorios Kyritsakas, Ehsan Kazemi, Stewart Husband & Katrina Flavell\)](#)
- [14838 - Identifying Cyber-Physical Attack Scenarios on Water Distribution Systems using Finite State Processes \(Cade Karrenberg, Juan Benavides, Emily Berglund, Eunsuk Kang & John Baugh\)](#)
- [14780 - Utilizing machine learning in an agent-based modelling framework to optimize response to contamination events in water networks during a global pandemic \(Leonid Kadinski, Brent Vizanko, Emily Berglund & Avi Ostfeld\)](#)
- [14793 - A Thorough Cybersecurity Dataset for Intrusion Detection in Smart Water Networks \(Riccardo Taormina, Andrés F. Murillo, Nils Ole Tippenhauer & Stefano Galelli\)](#)
- [14169 - Modelling a comprehensive relation between water quality and leaching in the drinking water distribution network \(Karel Antonie van Laarhoven, Alex Hocking, Martin Korevaar\)](#)
- [14125 - Machine-learning-based detection of water hammer events in water distribution networks \(Hyunjun Kim, Kwangjun Jung, Sumin Lee\)](#)

**3.7.4.Session 7D. Room: A.1.11. Thursday 21, 2022, 10:30-12:15. Sensor Placement and Sectorization. Moderator: Frances Pick**

- [14562 - Development of a graph dynamic sectorization tool using QGIS/PostgreSQL to plan and operate water distribution networks \(Xavier Torret Requena, Sergi Grau Torrent, Ramon Pérez Magrané & Enric Amat Miralles\)](#)
- [14869 - A Critical Review of Lakage Detection Strategies including Pressure and Water Quality Sensor Placement in Water Distribution Systems - Sole and Integrated approaches for leakage and contamination intrusion \(Shweta Rathi\)](#)
- [14733 - Pressure sensor placement in water networks based on sensitivity matrix: a real instrumentation project plan \(Joan van Eeckhout, Josep Cugueró, Ramon Pérez\)](#)
- [14063 - Optimal flow meters placement for uncovering the water network flow distribution \(Mashor Housh, Elad Salomons, Uri Shamir & Ilan Newman\)](#)
- [14038 - Sensor Placement in Water Distribution Networks Using Centrality Guided Multiobjective Optimization \(Michael Emmerich, Jacob Lan, Iryna Yevseyeva, Robert Sitzenfrei, Kegong Diao\)](#)
- [14828 - Optimal Location of Multiple Confirmatory Sampling Locations in Water Supply Networks in Real-Time Using Information Theory \(Camilo Salcedo, Avi Ostfeld, Dominic L. Boccelli\)](#)

**3.7.5.Session 7E. Room: Salón de Actos. Thursday 21, 2022, 10:30-12:15. Leakage Analysis and Control - V. Moderator: Pilar Conejos Fuertes**

- [14152 - Multidimensional data generation in water distribution systems using the Cycle-GAN \(Sehyeong Kim, Donghwi Jung\)](#)



- [14803 - Combining Hydraulic Knowledge with Deep Learning for Water Distribution Burst Detection \(Sanghoon Jun, Kevin E Lansey\)](#)
- [14035 - Searching for a universal water loss indicator using correlation and frontier analysis \(Suvi Ahopelto, Riku Vahala\)](#)
- [14812 - Quantification of Leak Discharge-pressure Relationship Through Directly Measurement of Leak Area for Linear Elastic Deforming Pipes \(Yuanzhe Li, Jinliang Gao, Jianxun Chen, Hangwei Zheng, Guosheng Sun & Chengzhi Zheng\)](#)
- [14817 - Leakage control of water distribution system by drop-restore pressure based on viscoelastic mechanism \(Jinliang Gao, Jianxun Chen, Wenyan Wu, Liqun Deng, Kunyi Li & Yi Yuan\)](#)

**3.7.6.Session 7F. Room: Salón de Grados. Thursday 21, 2022, 10:30-12:15. Smart Solutions for Water Systems - I . Moderator: Miguel Angel Jimenez Bello**

- [14441 - Long-Term Transitioning of Water Distribution Systems: ERC Water-Futures Project \(Dragan Savic, Marios Polycarpou, Phoebe Koundouri & Barbara Hammer\)](#)
- [14419 - Towards digital twins of city-scale waterways using sensors, IoT and open access data \(Chris Sweetapple, Peter Melville-Shreeve\)](#)
- [14095 - W-NET4.0 – Integrated Platform and Digital Twin for Small and Medium Sized Water Supply Utilities \(Jochen Werner Deuerlein, Thomas Bernard, Naga Mamatha Gonuguntla, Jorge Thomas, Armin Canzler, Heiko Keifenheim, Susanne Wiese, Ruediger Hoeche, Joachim Rapp & Salomé Parra\)](#)
- [14126 - Augmenting Digital Twin Intelligence for Smart Water Grid Anomaly Detection and Classification \(Zheng Yi Wu, Alvin Chew, Xue Meng, Jianping Cai, Jocelyn PAcceptado, Rony Kalfarisi, Kah Cheong Lai, Sock Fang Hew & Jia Jie Wong\)](#)
- [14580 - A Participatory Hybrid Decision Support Framework for Industrial Symbiosis: The Symbiotic Water Cycle Framework \(F-SWC\) \(Otto Chen, Barry Evans, Mehdi Khoury, Lydia Vamvakieridou-Lyroudia, Nav Mustafee, Albert S. Chen, Slobodan Djordjević & Dragan Savić\)](#)
- [14788 - IoT.H2O - Supervision and Control for Water Systems based on Low-Cost Hardware and Open-Source Software \(Harald Roclawski, Laura Sterle, Martin Böhle, Thomas Krätzig\)](#)

**3.8.Session 8. Thursday July 21, 2022, 15:15-16:30**

**3.8.1.Session 8A. Room: A.1.06. Thursday July 21, 2022, 15:15-16:30. Battle of Intermittent Water Supply - III . Moderator: Stefano Alvisi**

- [14837 - Battle Intermittent Network \(Mayra Hernández Alba, Elizabeth Pauline Carreño-Alvarado, Gilberto Reynoso-Meza\)](#)
- [14820 - Multi-objective optimal coupled engineering judgement for the Battle of Intermittent Water Supply \(Jinliang Gao, Jianxun Chen, Bowen Duan, Kunyi Li, Zichuan Wang & Qidong Que\)](#)
- [14172 - Optimizing Rehabilitation Strategies for a Deteriorated Water Distribution System Providing Intermittent Supply Using a Heuristic Technique \(Gal Perelman, Lu Xing, Mashor Housh, Venu Kandiah, Barak Fishbain & Ehsan Shafiee\)](#)

- [14148 - A payoff based solution for the BIWS challenge \(Tamás Huzsvár, Richárd Wéber, Csaba Hős\)](#)

**3.8.2.Session 8B. Room: A.1.07. Thursday July 21, 2022, 15:15-16:30.**

- No scheduled activities in this room at this time.

**3.8.3.Session 8C. Room: A.1.10. Thursday July 21, 2022, 15:15-16:30. Hydraulic Transients in Water Distribution Systems . Moderator: Lina Sela**

- [14782 - Unsteady Friction Modeling Technique for Lagrangian Approaches in Transient Simulations \(Mohamad Zeidan, Avi Ostfeld\)](#)
- [14819 - Analysis of friction models during simulations of filling processes in single pipelines \(Vicente S. Fuertes-Miquel, Óscar E. Coronado-Hernández, Mohsen Besharat & Pedro L. Iglesias-Rey\)](#)
- [15002 - Energy Analysis of Transient Flow in Viscoelastic Pipeline Based on Quasi-2D Model \(YueBin Wu, YaNan Zhao, Ying Xu\)](#)
- [14696 - Abnormality Identification Scheme for a Heterogeneous Pipenetwork System \(Sanghyun Kim\)](#)

**3.8.4.Session 8D. Room: A.1.11. Thursday July 21, 2022, 15:15-16:30. Water Distribution Network Planning . Moderator: Miguel Angel Jimenez Bello**

- [14742 - Roadmap Drinking Water Distribution: an inventory of the challenges of the Dutch Water companies and research needs towards a future proof water supply \(Mirjam Blokker, Karel van Laarhoven, Petra Holzhaus, Jan Vreeburg\)](#)
- [14768 - Efficiency analysis and evaluation model development of water distribution system rebuilding project using DEA method \(Haekeum Park, Kibum Kim, Jinseok Hyung, Taehyeon Kim & Jayong Koo\)](#)
- [14752 - Determination of the cost of extraction and sale price of water for drinking use: a case study \(M<sup>a</sup> Magdalena Sánchez Astello, L.A. Bravo Anaya\)](#)
- [14118 - Small community water supplies in the Isiolo County, Kenya \(Paolo Vezza, Roberto Arnesano, Fulvio Boano & Andrea Bessone\)](#)

**3.8.5.Session 8E. Room: Salón de Actos. Thursday July 21, 2022, 15:15-16:30. Wastewater and Water Treatment Plants. Moderator: P. Amparo López-Jiménez**

- [14200 - Estimation of the spatial distribution of substances in an Anaerobic Digestion Tanks with CFD \(Soroush Dabiri, Prashant Kumar, Wolfgang Rauch\)](#)
- [14736 - Introducing CHAD - an ADM1 solver for direct linking to Lagrangian CFD software \(Prashant Kumar, Zhenghao Yan, Wolfgang Rauch\)](#)
- [14702 - Sustainable wastewater treatment solutions for water-smart circular economy \(Daniel Aguado García, Henri Haimi, Ana Mikola, Ana Soares & Ulf Jeppsson\)](#)
- [14549 - Modelling wastewater treatment processes in a sequential batch reactor using deep learning methodology \(Anjana G Rajakumar, Vinoth Kumar, Rucha Vaidya, M S Mohan Kumar & Lakshminarayana Rao\)](#)

**3.8.6. Session 8F. Room: Salón de Grados. Thursday July 21, 2022, 15:15-16:30. Smart Solutions for Water Systems - II. Moderator: Dragan Savic**

- [14191 - Survey Exploring Customer Complaint Management and Smart Water Technology Adoption Across U.S. Water Systems \(Morgan DiCarlo, Emily Zechman Berglund, Nikhil Kaza, Andrew Grieshop, Adam Behr & Luke Shealy\)](#)
- [14800 - Data-driven modeling of green wall water demand - Project Meadow \(Michael Pointl, Bernhard Pucher, Daniela Fuchs-Hanusch\)](#)
- [14833 - Water distribution network disruptive events. Generation and exploration of an incident hub to increase the network preparedness \(David Ayala-Cabrera, Jorge Francés-Chust, Sotudeh Hoseini-Ghafari, Gemma Stanton & Joaquín Izquierdo\)](#)
- [14062 - Smart water applications vs information and communication technologies – an integrative selection framework \(Martin Oberascher, Wolfgang Rauch, Robert Sitzenfrei\)](#)

**3.9. Live broadcast of the Conference Sessions**

If it is not possible to attend any of the courses, technical sessions, and plenary sessions, the Microsoft Teams platform is available to be able to broadcast the sessions live.

In the following [link](#) the document will be updated with the links to the different meetings.

**4. CONFERENCE EVENTS**

**4.1. Registration**

During the conference there will be three different Registration Desks:

- Monday, July 18, 2022, from 8:00 to 9:00 a.m. Registration only for Short Courses attendees. This registration will take place at ETSII (Escuela Técnica Superior de Ingenieros Industriales), level 1. Point 3 of Figure 1
- Monday, July 18, 2022, from 19:30 a 20:30. This registration will take place at Hotel Las Arenas and it will only provide the ID for access to the conference and social events. Those registering for the first time at this point will pick up their conference bag at the registration desk on Tuesday, July 19.
- Tuesday, July 19, from 8:00 to 9:00 a.m. General registration for all attendees. Collection of the conference bag for those attendees who already have their ID. General registration for all attendees. Collection of the conference bag for those attendees who already have their ID. This registration will take place at the UPV Auditorium (Point 1 in Figure 1, level 2), where the Registration Desk will be located throughout the conference.

A Registration Desk will always be available during the Conference, either at the UPV Auditorium or at the ETSIAMN. Please contact these points or any person of the organization for any questions or problems you may have.

## 4.2. Short Courses

On Monday, July 18, five Short Courses will be held. Those attending these workshops should go to the registration desk located at the ETSII (point 3 of the map in Figure 2). The schedule of the five courses will be the same, from 9:00 am to 1:30 pm with a coffee break from 11:00 am to 11:30 am.

The instructors and rooms where the courses will be held are as follows:

- The Digital Transformation and the New Perspectives for Planning and Management of Aqueducts: the role of the digital twins (Orazio Giustolisi, Politecnico di Bari, Italy). ETSII, Room 424.
- Deep Learning with PyTorch for Urban Water Networks: from Multilayer Perceptrons to Graph Neural Networks (Riccardo Taormina, Dr. Riccardo Taormina – AldroLab, Department of Water Management, TU Delft, Netherlands). ETSII, Room 521.
- Introduction to the EPANET-MATLAB Toolkit for Smart Water Networks research (Demetrios Eliades, KIOS Research and Innovation Center of Excellence, University of Cyprus). ETSII, Room 123.
- Transient simulations in water networks (Lina Sela, Department of Civil, Architectural, and Environmental Engineering, The University of Texas at Austin, USA). ETSII, Room 124.
- Managing Advanced Hydraulic Models with QGISRed plugin. From EPANET to Digital Twins (Fernando Martínez, Research Institute of Water and Env. Eng., IIAMA, Univesitat Politècnica de València (Spain). ETSII, Room 421.

## 4.3. Plenary Sessions

All Plenary Sessions, registration and sponsors' stands will be located at the UPV Auditorium. Figure 5 shows a plan of the area around the Auditorium (Point 1 of the plan in Figure 5).

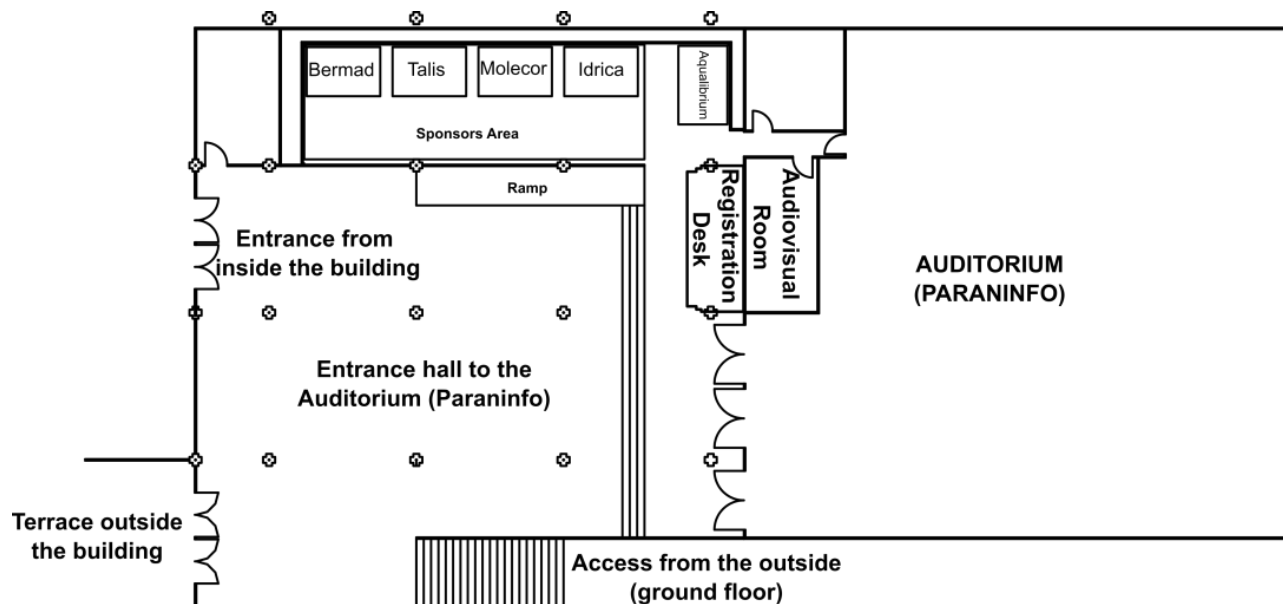


Figure 5. Map of the area around the Auditorium

## Parallel Sessions

Parallel Sessions will be held at the School of Agricultural Engineering and Environment (ETSIAMN, acronym for the Spanish name, Escuela Técnica Superior de Ingeniería Agronómica y del Medio Natural), located in the 3P building (Point 2 in Figure 2). In all technical sections there will be 6 rooms in parallel:

- A. Room A.1.06. Building 3P. Level 1.
- B. Room A.1.07. Building 3P. Level 1.
- C. Room A.1.10. Building 3P. Level 1
- D. Room A.1.11. Building 3P. Level 1
- E. Room Salón de Actos. Building 3P. Level 0
- F. Room Salón de Grados. Building 3P. Level 0

The location of all these rooms can be found in the plans in Figure 6.

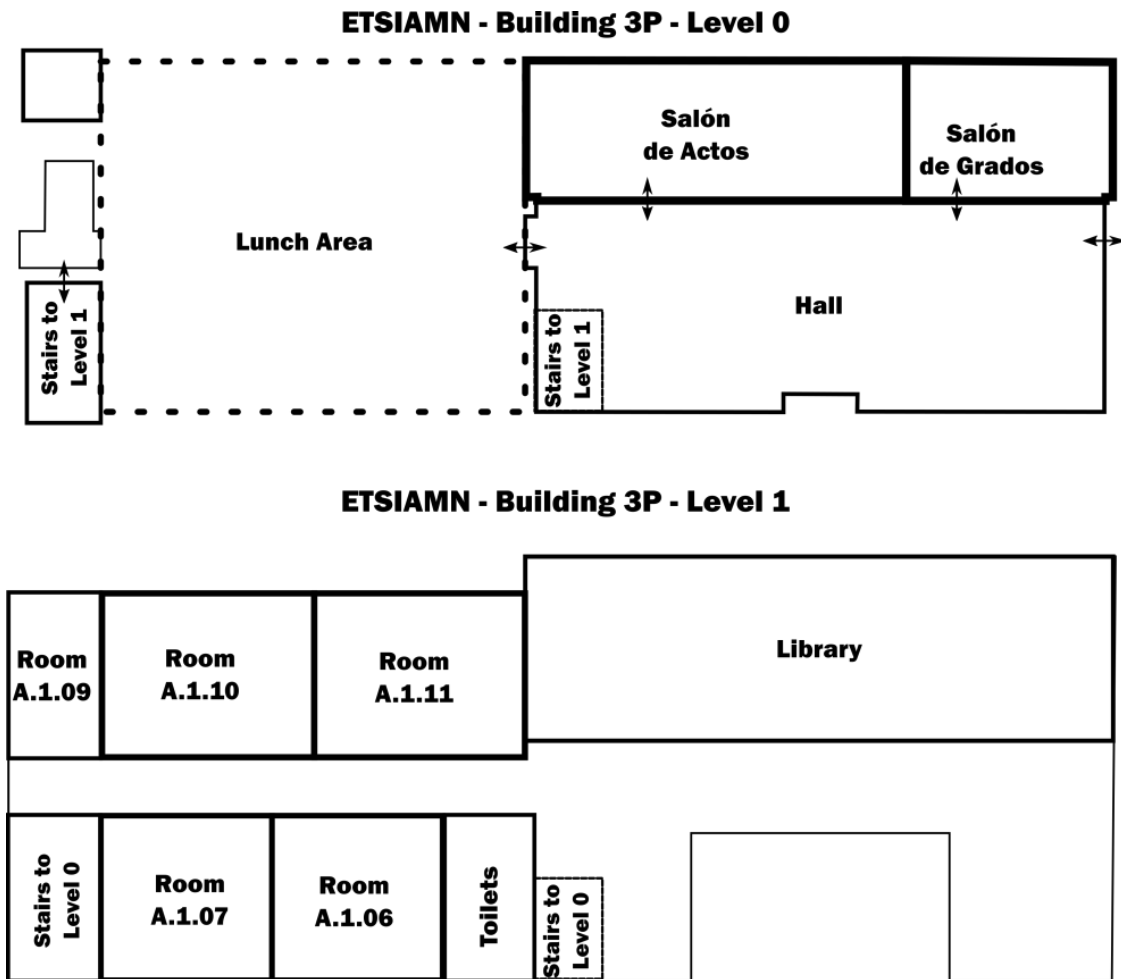


Figure 6. Plans of Building 3P (ETSIAMN)

#### 4.4. Social Events

Three social events will be held during the conference. All attendees are invited to participate in them. Accompanying persons who have been properly registered will also be able to participate in these events.

##### 4.4.1. Icebreaker Party

The Ice-Breaker Party will be held on Monday, July 18 at 20:30 at Hotel Las Arenas (point D of Figure 7). From 20:00 to 20:30 hours will be open at the same hotel the Check-In for the party. Those attendees who have registered in the morning should come with their accreditation. Those attendees who come to the event without having passed through the Registration Desk will find a Desk where they will be given the ID to be used during the conference. Cocktails will be served at 8:30 pm.



#### 4.4.2. Welcome Dinner

The Welcome Dinner will be held at the Nou Racó Restaurant, in the Albufera Natural Park, on Tuesday, July 19 at 8:30 pm. All attendees will be transported to the restaurant from the UPV "El Toro" entrance (point B in Figure 1). Buses will leave at 19:45 hours. The following activities will take place during the dinner: Paella Show Cooking, Traditional music, Sunset in the Albufera, Tasting of typical Valencian products. At the end of the dinner the buses will drive the attendees back to the UPV.

#### 4.4.3. Conference Dinner

The Conference Dinner will be held at Los Toros Restaurant, at the Palau de Les Arts in the City of Arts and Sciences of Valencia (point D in Figure 5). Dinner attendees will be welcomed at the main entrance of the building and will be taken to the room where the event is being held via one of the panoramic elevators. Attendees are requested to arrive at the main entrance at 8:00 pm. The dinner appetizer will begin to be served at 8:30 pm. All attendees should bring their conference badge.

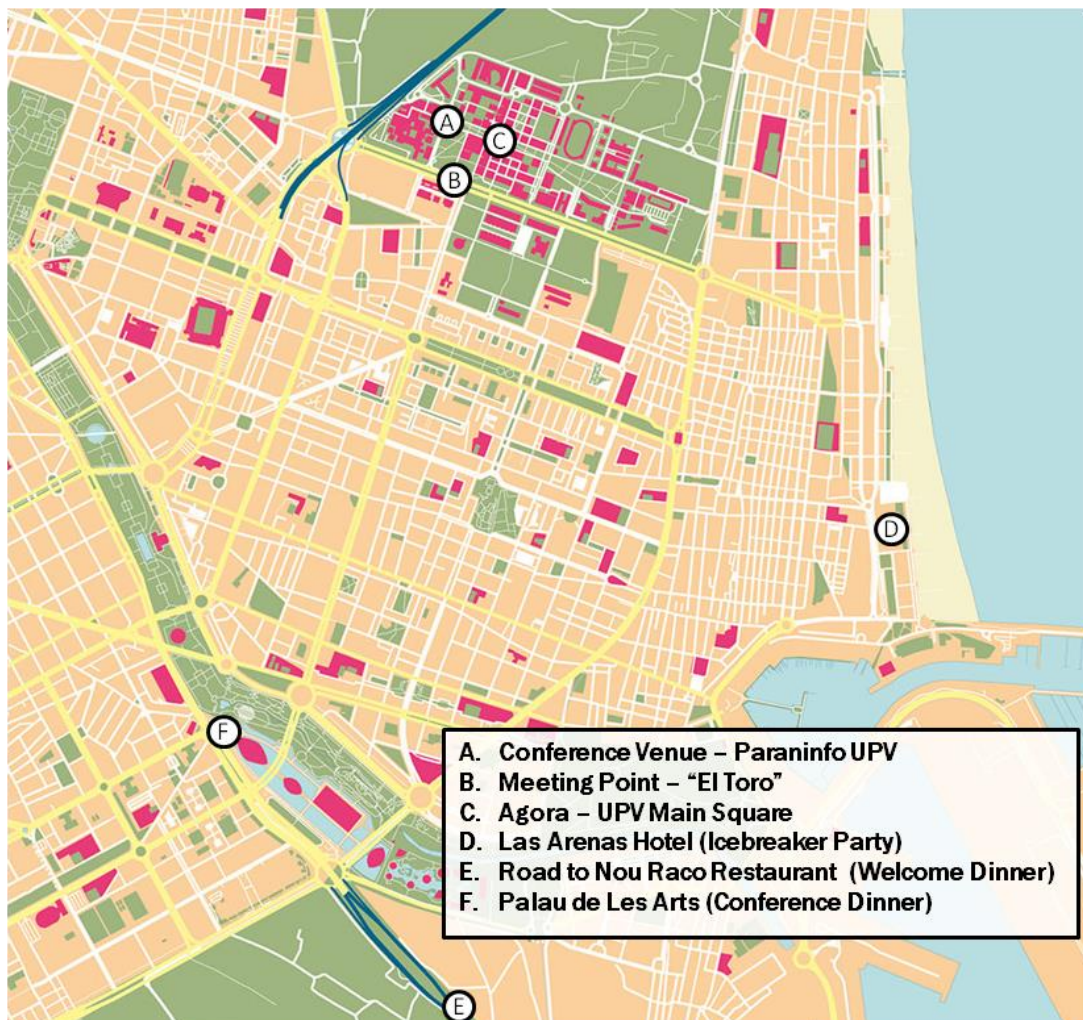


Figure 7. Location of the Social Events and the Conference Venue

#### 4.5. Technical Visits

On Friday, July 22, the Technical Sessions scheduled for the Conference will be held. We recommend that you confirm availability for each of the visits. Some of the visits are already closed. Buses for the three visits will depart at 8:30 a.m. from the UPV "El Toro" entrance (point B in Figure 1). The three tours are:

- La Albufera Natural Park. Visit to the Milia Artificial Wetland. Sunscreen is recommended.
- Turia Garden. Why does the city have a garden where there should be a river? Sunscreen is recommended.
- La Presa Water Treatment Plant, a plant built in the 19th century and still in operation.

When you registered you were asked about the technical visit you would like to make. **Please confirm that you have a place on the tour you selected. If you did not select any option, please check availability.**

### 5. KEYNOTE SPEAKERS

#### 5.1. Dr. Pilar Conejos (Idrica). Digital Twins for Water Distribution Systems

Dr. Pilar Conejos is a Digital Twin Manager at Idrica and a Part Time Assistant Professor at the Universitat Politècnica de València. She is an industrial engineer and has a PhD in water and environmental engineering. Pilar has over 20 years of experience in water management. Formerly the Head of Network Control and Regulation for Valencia and its Metropolitan Area at the water utility Global Omnium. She recently joined Idrica as a water consultant expert, bringing an extensive experience about digital twins and water networks.

#### 5.2. Prof. Helena Ramos (Instituto Superior Técnico—IST, Lisbon). Water-energy-food nexus as a management strategy in smart cities and grids

Professor Helena M. Ramos is a Professor at Instituto Superior Técnico—IST (the Engineering Faculty from University of Lisbon) and a member of CERIS in Civil Engineering Department. She has participated in 31 Scientific projects and has been the supervisor of 11 PhD students, 46 MSc theses. She has more than 6377 citations, index h 41 and i10 128. She has been a Member of various Editorial Teams and Reviewer of different scientific journals. She has several publications, more than 160 in International Journals with referees, more than 150 in Conferences, 36 book chapters, 7 books: in particular Small Hydropower Plants (2000), and Pump as Turbines (2018), among other technical and scientific documents. She has received more than 6 International Scientific recognitions. She is an expert in transients, hydrodynamics, hydropower, pumped storage and hybrid renewable solutions, water –energy nexus and leakage detection.

#### 5.3. Dr. Carles Sanchis (Valencian Center for Irrigation Studies). The end of a myth? Lights and shadows over the Valencia Water Court

Dr. Carles Sanchis Ibor, is MSc in Geographic Information Systems (University of Girona) and a PhD in Geography (University of Valencia). He has worked as a researcher at the Valencian Center for Irrigation Studies (CVER) of the Universitat Politècnica de València (UPV, Valencia Tech), and as lecturer in the Department of Geography of the University of Valencia (UV) since 2001. He has developed his research activity on water from various perspectives, from hydraulic policy to fluvial geomorphology, but mainly focusing on Mediterranean irrigation. He is also founder and member of the board of trustees of the Fundació Assut, focused on the protection of Mediterranean wetlands and traditional irrigation systems, and President of the Governing Council of the Albufera Natural Park (Ramsar site).

#### 5.4. Prof. Raziye Farmani (University of Exeter). Intermittent Water Supply Systems: Challenges, Opportunities and Solutions

Raziye Farmani is an Associate Professor of Water Engineering and Industrial Fellow of Royal Academy of Engineering at Centre for Water Systems, University of Exeter, UK. She is the Chair of IWA's Intermittent Water Supply Specialist Group. She specialises in urban water systems modelling, water resources management and asset management and has expertise in multi-objective optimisation of water networks. Her research interests covers evolutionary optimization; artificial intelligence and data mining and their applications in real-time control of water systems; asset management of water distribution systems; leakage, pressure and energy management; reliability, resilience and sustainability; asset failure and deterioration modelling.

## 6. CONFERENCE PROCEEDINGS

The final publication of the Conference Proceedings Book will be made after the end of the Conference. The book will have ISBN and each paper will have doi. All slod doi of the conference will have the following structure: <https://doi.org/10.4995/WDSA-CCWI2022.2022.xxxxx>, where xxxxx is the reference number of the paper used during the whole review process (OCS platform of the UPV).

A provisional version of the Proceedings book has been prepared so that conference attendees can access the full text of the papers. It will be possible to access the complete book or a folder containing all the papers presented. All papers will always be identified with an identifier. This identification is the same as the one included in the detailed program of the parallel sessions (Section 3 of this booklet).

The address where the folder with all the papers can be found is:

[https://drive.google.com/drive/folders/1G6BSAdeHLUCac5VJEJkc\\_iLOqcp\\_ws4h?usp=sharing](https://drive.google.com/drive/folders/1G6BSAdeHLUCac5VJEJkc_iLOqcp_ws4h?usp=sharing)

The address where the proceedings book is located is:

<https://drive.google.com/file/d/1ckf8BOVpVraFodqsnQCDCFKH2Cs43sxo/view?usp=sharing>

In addition, these two addresses can be accessed through the QR codes shown in Figure 8.



Folder with proceedings



Proceedings Book

Figure 8. QR codes for access to the folder and the proceedings book



## 7. COMMITTEES

### 7.1. Steering Committee

Dominic Boccelli	University of Arizona (USA)
Joby Boxal	The University of Sheffield (UK)
Steven Buchberger	University of Cincinnati (USA)
David Butler	Univ. of Exeter (UK)
Kegong Diao	De Montfort University (UK)
Ives Fillion	Queen's University (Canada)
Orazio Giustolisi	Technical University of Bari (Italy)
Walter Grayman	Walter M. Grayman Consulting Engineer (USA)
Pedro Iglesias	Universitat Politècnica de València (Valencia Tech) (Spain)
Zoran Kapelan	TU Delft (Netherlands)
Javier Martínez	Universitat Politècnica de València (Valencia Tech) (Spain)
Fernando Martínez	Universitat Politècnica de València (Valencia Tech) (Spain)
Regan Murray	US EPA (USA)
Avi Ostfeld	Technion - Israel Institute of Technology (Israel)
Juan Saldarriaga	Universidad de Los Andes (Colombia)
Dragan Savic	KWR-Water Research Institute (Netherlands)
Angus Simpson	The University of Adelaide (Australia)
Ivan Stoianov	Imperial College London (UK)
Kobus van Zyl	The University of Auckland (New Zealand)

### 7.2. Local Organizing Committee

The Local Organizing Committee is formed by staff and students of the Department of Hydraulic Engineering and Environment of the UPV.

Pedro L. Iglesias-Rey	Fernando Martínez-Alzamora
F. Javier Martínez-Solano	Pilar Conejos Fuertes
Vicente S. Fuertes Miquel	Jorge García-Serra
Francisco J. García Mares	Salvador García Todolí
Elena Gómez Sellés	Miguel Angel Jiménez Bello
Gonzalo López Patiño	Javier Soriano-Olivares
Christian Xavier Briceño Leon	Leonardo Bayas Jimenez
Gustavo A. Delgado Sandoval	Arianne I. Estrada Estrada
Melvin A. García Espinal	Alejandra Guarachí Quiñones
Angélica G. Simbaña Pumisacho	F. Sarahi Pecina Nuñez
Elisa Martínez Martínez	Ester Martínez Martínez

### 7.3. Scientific Committee

Mohsen Aghashahi	Texas A&M University (USA)
Francisco Arregui	Univ. Politècnica de València (Spain)
Luigi Berardi	Università degli Studi "G. d'Annunzio" (Italy)
Mirjam Blokker	KWR-Water Research Institute (Netherlands)
Dominic Boccelli	University of Arizona (USA)
Joby Boxal	The University of Sheffield (UK)
Bruno Brunone	Università degli Studi di Perugia (Italy)
Steven Buchberger	University of Cincinnati (USA)
David Butler	Univ. of Exeter (UK)
Ricardo Cobacho	Univ. Politècnica de València (Spain)
Didia Covas	Instituto Superior Técnico (Portugal)
Enrico Creaco	University of Pavia (Italy)
Maria C. Cunha	Universidade de Coimbra (Portugal)
Graeme Dandy	The University of Adelaide (Australia)
Jochen Deuerlein	3S Consult (Germany)
Kegong Diao	De Montfort University (UK)
Demetrios G. Eliades	University of Cyprus (Cyprus)
Raziyeh Farmani	University of Exeter (UK)
Ives Filion	Queen's University (Canada)
Marco Franchini	Università degli Studi di Ferrara (Italy)
Orazio Giustolisi	Technical University of Bari (Italy)
Walter Grayman	Walter M. Grayman Consulting Engineer (USA)
Pedro L. Iglesias	Univ. Politècnica de València (Spain)
Adesola Ilemobade	University of Witwatersrandt (South Africa)
Donghui Jung	Korea University (South Korea)
Zoran Kapelan	TU Delft (Netherlands)
Bryan Karney	University of Toronto (Canada)
Joong Hoon Kim	Korea University (South Korea)
Martin Lambert	The University of Adelaide (Australia)
Kevin Lansey	The University of Arizona (USA)
Juneseok Lee	Manhattan College (USA)
P. Amparo Lopez	Univ. Politècnica de València (Spain)
Christos Makropoulos	National Technical University of Athens, (Greece)
Javier Martínez	Univ. Politècnica de València (Spain)
Fernando Martínez	Univ. Politècnica de València (Spain)
Daniel Mora	University of Talca (Chile)
Regan Murray	US EPA (USA)
Lindell Ormsbee	University of Kentucky. College of Engineering (USA)
Avi Ostfeld	Technion - Israel Institute of Technology (Israel)
Olivier Piller	INRAE, ETBX Research Unit (France)
Heber Pimentel	Universidade Federal da Paraíba (Brazil)
Dusan Prodanovic	University of Belgrade (Serbia)
Raido Puust	Tallinn University of Technology (Estonia)

Helena Ramos	Instituto Superior Técnico (Portugal )
Juan Saldarriaga	Universidad de Los Andes (Colombia)
Dragan Savic	KWR-Water Research Institute (Netherlands)
Hwee See	Mott MacDonald (UK)
Angus Simpson	The University of Adelaide (Australia)
Robert Sitzenfrei	University of Innsbruck (Austria)
Javier Soriano	Univ. Politècnica de València (Spain)
Vanessa Speight	The University of Sheffield (UK)
David Steffelbauer	Norwegian University of Science and Technology (Norway)
Ivan Stoianov	Imperial College London (UK)
Ricardo Taormina	TU Delft (Netherlands)
Ezio Todini	Freelance Consultant (Italy)
James G. Uber	CityLogics (USA)
Kobus van Zyl	The University of Auckland (New Zealand)

#### 7.4. Battle of Water Networks Committee

The members of the Committee in charge of the proposal and evaluation of the Intermittent Water Supply Battle are:

Pedro L. Iglesias	Univ. Politècnica de València (Spain)
Javier Martínez	Univ. Politècnica de València (Spain)
Fernando Martínez	Univ. Politècnica de València (Spain)
Avi Ostfeld	Technion - Israel Institute of Technology (Israel)
Gustavo Delgado	Univ. Politècnica de València (Spain)