



E 2.3.2 Report on the initial state of TWIST Living Labs

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TWIST

European Regional Development Fund





Authors

Spanish team (CENTA)

Contributions

Portuguese team (AdTA, ISA, IST)

French team (OIEau, UNILIM, IFTS)

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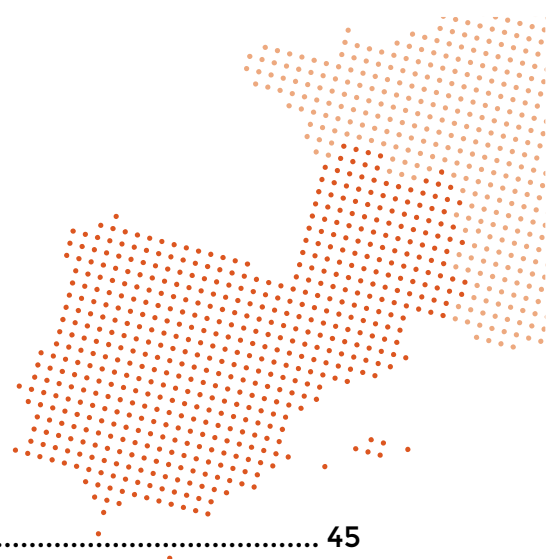
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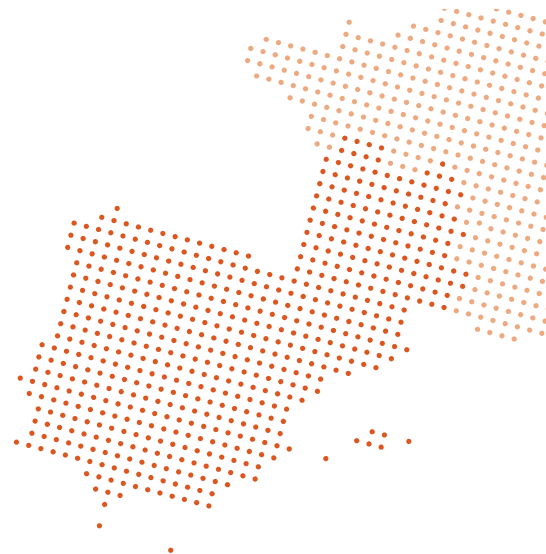


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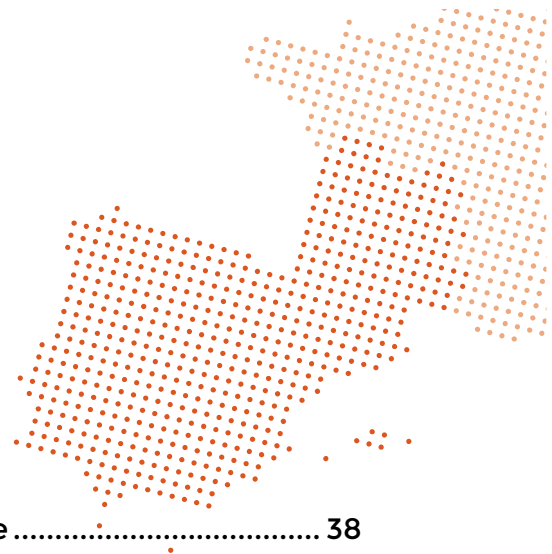


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List of acronyms

- AdTA** – Águas do Tejo Atlântico, S.A. - Portugal
- CENTA**– Fundación Centro de las Nuevas Tecnologías del Agua - Spain
- CNFME** – Centre National de Formation aux Métiers de l'Eau - France
- EU** – European Union
- IFTS** – Institut de la Filtration et des Techniques Séparatives - France
- IST** – Instituto Superior Técnico - Portugal
- ISA** – Instituto Superior de Agronomia - Portugal
- OIEAU** – Office International de l'Eau - France
- R&D** – Research and Development
- UNILIM** – Université de Limoges - France

1 Introduction

TWIST creates an innovative model of transnational and trans-regional organization and collaboration for the co-creation, experimentation and evaluation of innovative products through 3 Living Laboratories (I-Labs).

These take advantage of existing experimental infrastructures in Andalusia, Nouvelle-Aquitaine and Lisbon, selected for the availability of access to wastewater and the existing trans-regional cooperation between neighbouring regions (Andalusia + Murcia; Lisbon + Alentejo; Nouvelle-Aquitaine + Occitanie). Each I-Lab will specialise in different and complementary aspects:

- in Spain, Open Water Lab (OWL2) will specialise in wastewater treatment and regeneration,
- in France, Lavis Living Lab will specialise in solutions for wastewater treatment and associated infrastructure management,
- in Portugal, Urban Lisbon Living Lab (uL3) will specialise in wastewater treatment for reuse and resource recovery (water, nutrients and energy).

In each Living lab all the members of the partnership (according to their different profiles) will support these recipients in the different phases of the development of their innovations: conception, search for funding sources, implementation in the L-Lab, validation, intellectual protection and promotion in the SUDOE space market.

The role of the associates will favour that the living lab is a real meeting place for all the quadruple helix agents.

This report includes the initial state of the living labs, the steps taken to implement them, which include:

- the institutions involved in the constitution of the Living Labs
- the advances in the definition of internal management and regulation,
- the available resources and technology,
- the target groups contacted, and
- the current services offered

2 Open Water Lab (OWL2) – Spain

2.1 Introduction

The TWIST Living Lab in Spain, named Open Water Living Lab (OWL2), is headquartered in the Experimental Centre of the CENTA Foundation (Carrión de los Céspedes, Seville) oriented to the co-creation, exploration and evaluation of innovations in the field of wastewater treatment and regeneration.

It will provide direct service to the regions of Andalusia and Murcia (and the rest of Spain), and will work in a network with the other two L-Labs to enhance transnational projects.

It currently has 4.1 hectares of surface for research and validation of technologies. It receives urban wastewater generated in a nearby population, which is treated in several purification systems (green and conventional technologies) under real conditions (TRL 5-6). It also has analysis laboratories, visitor reception centre, meeting and training rooms.

2.2 Institutions involved in the constitution of the Living Lab

The **Public Foundation Centre of New Water Technologies** is a water research centre promoted by the Regional Ministry of the Environment of the Government of Andalusia with the support of other public and private bodies from the water sector. With a research career backed by more than 20 years of experience in the water purification sector wastewater and water resources management, CENTA has become a reference undisputed internationally.

The CENTA Foundation works extensively as a knowledge agent and research centre and has signed collaboration agreements with eight of the ten Andalusian universities. It carries out projects in collaboration with other Spanish universities, such as the University of Alcalá de Henares in Madrid and the Polytechnic University of Catalonia; it collaborate closely with other top level research centres (the Study and Experimentation Centre -CEDEX-, the Catalan Water Research Institute -ICRA-, the Higher Council of Scientific Research -CSIC -, the Technological Institute of the Canary Islands -ITC- and the Institute of Advanced Studies in Madrid -IMDEA-, among others).

The **mission** is to contribute, through the generation and dissemination of excellence and knowledge, to the efforts made by the public administrations, research centres and companies to make Andalusia a reference point in the field of water.

The values:

- **Innovation**: incorporating knowledge for the development of new technologies and processes, developing new solutions and / or improving existing ones.
- **Transfer**: with an incessant effort to get knowledge where it is needed and should be applied, improving the competitiveness of the sector, as well as the quality of life of citizens.
- **Outsourcing**: incorporating a holistic vision of the world and its relationships that favours the flow of knowledge and experience and the creation of collaborative networks.
- **Commitment**: promoting the transmission of social and environmental values and developing technologies for the most disadvantaged, thus contributing to the achievement of the Millennium Development Goals and the Europe 2020 Strategy.
- **Knowledge**: as the core of its activity and understood as a public good, developed based on the intellectual capacity and scientific and technical activity of its human team.

CENTA's mission is addressed through two types of **objectives**, strategic and operational, which are described below:

Strategic objectives:

- Improve the competitiveness and internationalization of the water sector in Andalusia and generate new activities and employment through the generation of knowledge and its application to respond to market demands.
- Contribute to maximize the competitive advantages of the Andalusian water sector, and position it as an area of strategic innovation in the national and international context.

- Provide independent scientific-technical support based on proven facts during all phases of Andalusian policy development and advice for adaptation to European standards.

Operational objectives:

- Generate knowledge: Developing own research projects and in collaboration with other regional, national and international entities.
- Disseminate and transfer knowledge: Creating transfer networks and enhancing its role as a dynamic sector, promoting synergies between the different scientific, economic, financial agents, and society in general, promoting the concept of the Living Laboratory in the Carrión Experimental plant of the lawns.
- Strengthen R&D and investment in innovation in the water sector: Seeking efficiency in our own activity, influencing the R&D agendas of the sector and favoring collaborative strategies among the different agents of the knowledge system .
- Promote the use of technologies, products and services to support the generation of knowledge and experimentation on a semi-industrial scale among companies, knowledge agents and administrations acting as a gateway between research and the market.
- Develop and generate tools for training around the opportunities of innovation and creation of new markets.

2.3 Available resources and technologies

2.3.1 Human resources

The human team of the CENTA Foundation consists of:

- Researchers and technical experts who support the CENTA's core business, by providing its entire range of services.
- Support staff: ancillary staff for the maintenance of the experimental centre and laboratories.
- Management resources: this group includes the managing, administrative resources, institutional relations, communication, secretariat, etc.

In addition to the permanent team, there are researchers from other centres and institutions.

2.3.2 Experimental centre

The Experimental Centre of CENTA Foundation is located in the village of Carrión de los Céspedes (2,500 inhabitants), 30 km from Seville. Next to the A-49 motorway, the Experimental Centre covers an area of 41,000 m² which house its Experimental R&D&I Centre, its laboratories and the main building used as headquarters of the Foundation and for dissemination and training activities.

The Experimental Centre was constructed in 1990, as a fundamental part of the Non-Conventional Technology Wastewater Treatment Research & Development Plan run by the Andalusian Regional Ministry of the Environment (1987-nowadays). The Water Andalusian Agency is the owner of the facilities and the Centre for New Water Technologies is responsible of its management.

This experimental centre which has a treatment capacity of 700 m³/day and 40 different treatment systems is unique in the world due to its scale, its technological diversity and its traceability.

This technological platform, consisting of a large technology pool containing the most sophisticated systems together with the most natural ones, supports the CENTA in its research activity, and other scientific agents as well as companies working in the water sector.

Research projects or experimental developments are assessed under the same test conditions (characteristics of the effluents, climate conditions, laboratory and technical equipment), which allows for sound comparative studies.

One of its specificities is, undoubtedly, its versatility, its capacity for combining technologies and the fact that it can offer both research centres and companies the opportunity to carry out their research.

Its facilities also include a complete analysis laboratory and an official weather station. It is no doubt a centre endowed with great singularity and dynamism where technology and biodiversity go hand in hand.



Figure 2.1 Aerial view of the experimental plant of CENTA in Carrión de los Céspedes (Sevilla)

2.3.3 Treatment units

The Experimental Centre has been working mainly on the development, implementation and diffusion of non-conventional technologies for the wastewater treatment, which are generated by small towns. However, since 1995, the PECC has accepted prototypes in a studying or testing step from diverse companies which commercializes wastewater treatment systems.

The experimental plant counts on a **pretreatment unit** that receives the raw wastewater from the village Carrión de los Céspedes. The preliminary treatment and distribution characteristics are:

- **Screening:** automatic screening with a bar screen (3 cm) and a sieve (3 mm) and a manual screening with a bar screen (2 cm).
- **Grit and grease chamber:** aerated grit and grease removal chamber, sand classifier and grease concentration.
- **Pumping tank:** 3 Pumps (2+1) (2 kW unit power)

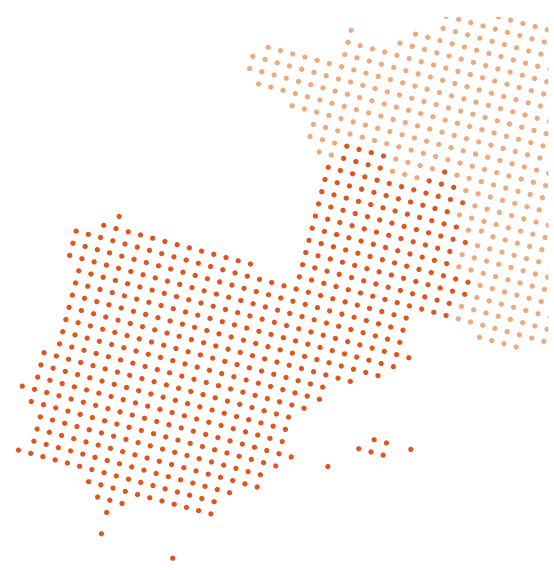
- Distribution system: with a volume of 18 m³. Level controlled by probes. 11 exits equipped with an electro-magnetic flow meter.



Figure 2.2 Pretreatment unit of the CENTA experimental plant



Figure 2.3 Water distribution system of the CENTA Experimental Centre



The main **primary treatment** unit is an Imhoff tank that treats 60 m³/day.



Figure 2.4 Imhoff tank at the CENTA Experimental Centre

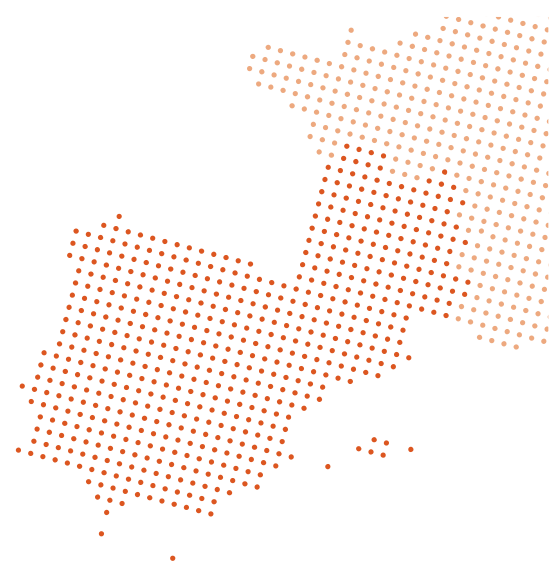
In a single area covering 41.000 m², conventional and non-conventional technologies are represented. The non-conventional are: Green Filters (GF), Stabilisation Ponds (SP), Peat Filters (PF), Constructed Wetlands (CW), intermittent sand filters (ISF) and different combinations of these, as well as Trickling Filter (TF) and Rotating Biological Contactor (RBC). There are also conventional systems such as Activated Sludge, MBR, etc.



Figure 2.5 Extensive technologies at the CENTA Experimental Centre



Figure 2.6 Intensive technologies at the CENTA Experimental Centre



There is also a sludge treatment system composed by a sludge centrifuges and a sludge thickener.



Figure 2.7 Sludge centrifuges and a sludge thickener

The Experimental Centre has also a technologies validation area where companies can validate their prototypes.



Figure 2.8 Technologies validation area

2.3.4 Reuse facilities

The experimental centre counts on an experimental irrigation area for water reuse of 1,200 m².

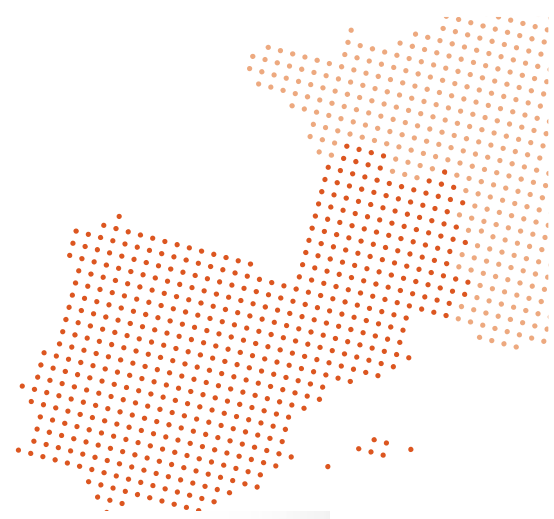


Figure 2.9 Irrigation area for reuse of recycled water

2.3.5 Main building

The main building housing the Foundation is singular and modern, although it is integrated into the rural environment where it is located. Its design is based on elements from bioclimatic construction, which minimise its energy consumption while providing a healthy habitat.

Its surface area of over 500 m² houses researchers and administrative staff, as well as a training classroom. On the upper floor, there is a large exhibition area for dissemination and cultural activities.

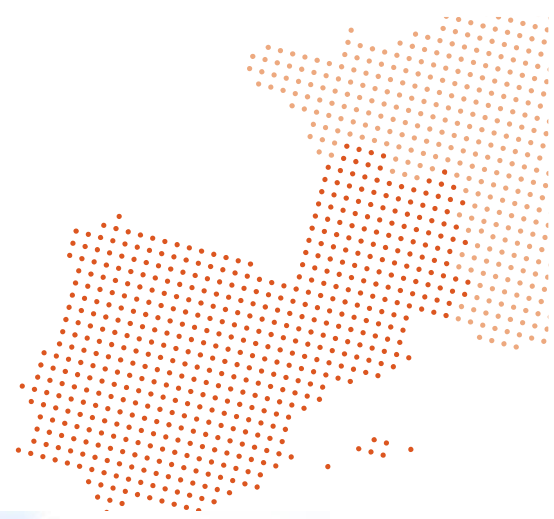


Figure 2.10 Main building

2.3.6 Laboratory

Its facilities also include a complete **laboratory** for analysing wastewater samples which are part of the research studies and other works carried out in its facilities. This laboratory has modern equipments for physical, chemical and microbiological analysis. The aim of this laboratory is to support the research activity of the PECC and to control the prototypes installed.



Figure 2.11 Laboratory for wastewater analysis of the experimental centre

2.3.7 Weather station

There is an official weather station, belonging to the State Agency of Meteorology of the Ministry of Environment. Each technology validation report that CENTA prepares is accompanied by a report of the meteorological parameters of the period. This information can be very important for certain technologies. The information of the weather station can be consulted online.

2.4 Definition of the management body and internal regulation of the Living Lab

The current organization chart is the following:

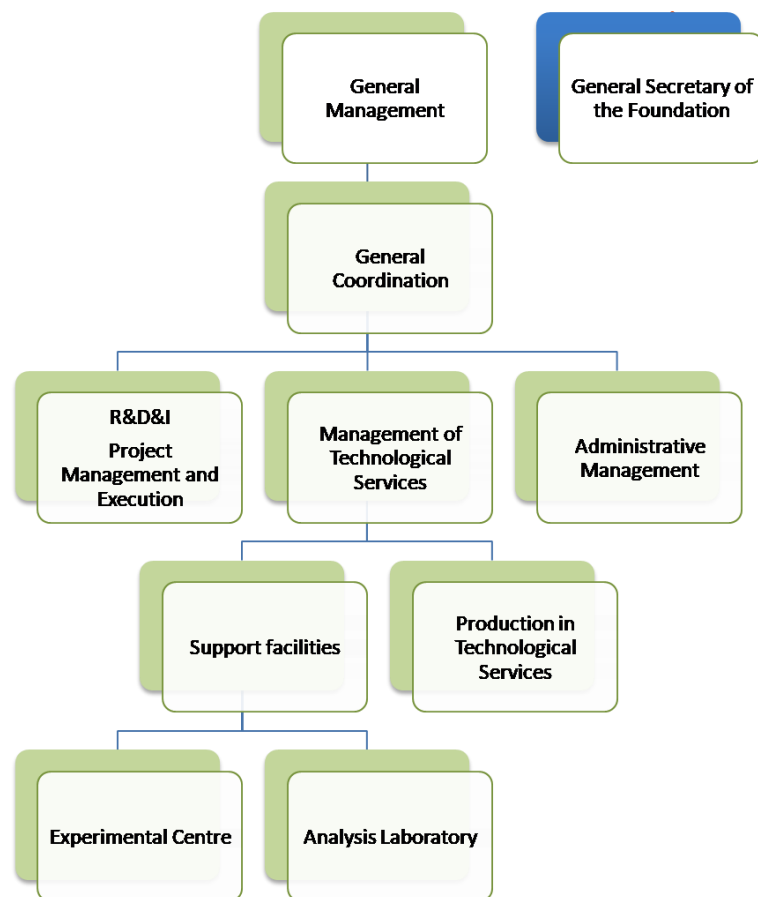


Figure 2.12 Organization chart of CENTA Foundation

2.5 Target groups

Target groups in Andalusia and Murcia have been identified:

National public administration

- Confederación Hidrográfica del Guadalquivir (CHG)
- Confederación Hidrográfica del Guadiana (CHGn)
- Sociedad Estatal Aguas de las Cuencas de España (AcuaEs)
- Confederación Hidrográfica del Segura

Regional public administration in Andalusia

- Dirección General de Planificación y Gestión del Dominio Público Hidráulico

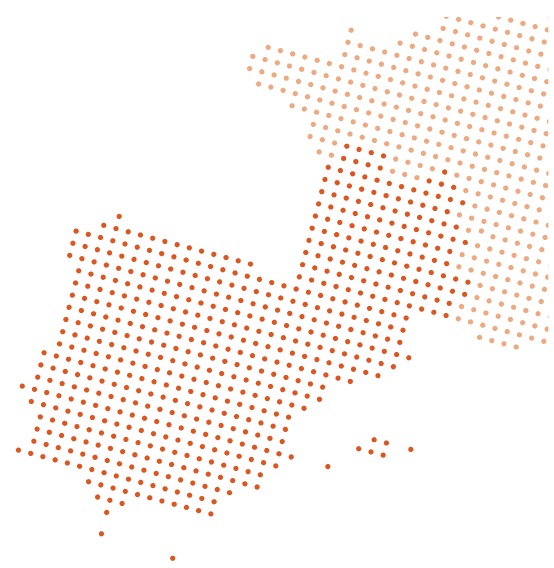
- Agencia de Medio Ambiente y Agua (AMAYA)
- Comisión de Autoridades Competentes de las Demarcaciones Hidrográficas de las Cuencas Guadalete y Barbate, Tinto , Odiel y Piedras y Mediterránea Andaluza
- Corporación Tecnológica de Andalucía (CTA)
- Agencia Andaluza de la Energía (AAE)
- Andalucía Emprende, Fundación Pública Andaluza
- Andalucía Tech
- Agencia de Gestión Agraria y Pesquera de Andalucía (AGAPA)
- Consejería de Agricultura, Pesca y Desarrollo Rural (CAPDER)

Regional public administration in Murcia

- Dirección General de Agua, Agricultura, Ganadería y Pesca
- Servicio de Estudios y Planificación Hidrológica
- Servicio de obras hidráulicas
- Instituto de Fomento de la Región de Murcia (INFO)
- Fundación Séneca (fSENECA)

Local administration in Andalusia

- Mancomunidad de Municipios Bahía de Cádiz
- Mancomunidad de Municipios de la Comarca de La Janda
- Mancomunidad de Municipios de la Comarca del Campo de Gibraltar
- Mancomunidad de Municipios de la Sierra de Cádiz
- Servicio Municipal de Aguas de San José del Valle
- Mancomunidad de Municipios de Los Pedroches
- Mancomunidad Cuenca Minera
- Mancomunidad "Campiña-Andévalo"
- Mancomunidad de Servicios de la Provincia de Huelva (MAS)
- Gestión Integral del Agua Costa de Huelva, S.A. (GIAHSA)
- Mancomunidad de Municipios del Aljarafe
- Mancomunidad de Municipios "Sierra Norte de Sevilla"
- Mancomunidad Intermunicipal de Coria del Río, Gelves, La Puebla del Río y San Juan de Aznalfarache
- Consorcio de Abastecimiento y Saneamiento "Plan Écija"
- Consorcio de Aguas de la Sierra Sur



- Consorcio del Huesna
- Consorcio de Aguas de la Zona Gaditana (CAZG)
- Consorcio Provincial de Aguas de Sevilla, S.A.

Local administration in Murcia

- Museo de la Ciencia y el Agua
- Agencia Local Energía Murcia (ALEM)

Local operators (water supply and sanitation companies) in Andalusia

- Aguas Sierra de Cádiz
- Agua y Gestión de Servicios Ambientales, S.A.
- ACCIONA Agua Servicios, S.A.U.
- Aguas de Baena (Agua y Gestión del Ciclo Integral, S.L.U.)
- Aguas de Cádiz, S.A. (ACASA)
- Agencia de Régimen Especial Ciclo Integral Aguas del Retortillo (ARECIAR)
- Aguas de La Janda, S.L (Agua y Gestión del Ciclo Integral, S.L.U.)
- Aguas de Lucena, S.L. (Aquagest Sur, S.A.)
- Medina Global, S.L.
- Aguas de Montilla, S.A. (HIDRALIA)
- Empresa Mixta Aguas de Ubrique, S.A. - Aqualia (EMAUSA)
- Aguas del Huesna, S.L.
- Aguas Sierra De Cádiz, S.A.
- Aguas de Jerez Empresa Municipal, S.A. (AJEMSA)
- Aguas del Puerto Empresa Municipal, S.A. (APEMSA)
- Grupo Energético de Puerto Real, S.A. (GEN)
- Aqua Campiña, S.A.
- AQUAGEST SUR, S.A. (Grupo AGBAR)
- Hidralia Gestion Integral de Aguas de Andalucia, S.A. (HIDRALIA)
- Aqualia Gestión Integral del Agua, S.A. (AQUALIA)
- Aguas y Residuos del Campo de Gibraltar, S.A. (ARCGISA)
- Aguas de Rota Empresa Municipal, S.A. - Aqualia (AREMSA)
- Chiclana Natural, S.A.M.
- SOCAMEX, S.A.U (Grupo Urbaser) (SOCAMEX)
- Empresa Municipal de Aguas de Córdoba, S.A. (EMACSA)
- Empresa Municipal de Aguas de Huelva, S.A. -Aguas de Huelva (EMAHSA)



- Empresa Municipal de Aguas de Algeciras, S.A. -grupo FCC Aqualia (EMALGESA)
- Empresa Metropolitana de Abastecimiento y Saneamiento de Aguas de Sevilla, S.A. (EMASESA)
- Empresa Provincial de Aguas de Córdoba, S.A. -Aguas de Córdoba (EMPROACSA)
- Empresa Municipal de Servicios Integrados, Guillena, S.L. (EMUSIN GUILLENA)
- Empresa Mancomunada del Aljarafe, S.A. (ALJARAFESA)
- Empresa de Servicios y Gestión Medioambiental de Puente Genil, S.A. (EGEMASA)

Local operators (water supply and sanitation companies) in Murcia

- Aguas de Murcia (EMUASA)
- Entidad de Saneamiento y Depuración de Aguas Residuales de la Región de Murcia (ESAMUR)
- HIDROGEA

Engineering firms in Andalusia

- Aganova Grupo-Detección de fugas
- Ayesa
- Cyclus
- Inerco
- Bioazul

Technology suppliers in Andalusia

- Abengoa

Technology suppliers in Murcia

- Ambientalia Levante, S.L.
- CAASA Tecnología del Agua, S.A
- HIDROTEC Tratamiento de Aguas S.L.

Professional/technical associations in Andalusia

- Asociación de Abastecimientos de Agua y Saneamientos de Andalucía (ASA)



- Asociación Española de Operadores Públicos de Abastecimiento y Saneamiento (AEOPAS)
- Cooperativas Agroalimentarias Andalucía (COOPAGr)

Professional/technical associations in Murcia

- Asociación Española de Desalación y Reutilización (AEDyR)

Universities/research centres in Andalusia

- Universidad de Cádiz (UCA)
- Universidad de Córdoba (UCO)
- Universidad de Huelva (UHU)
- Universidad de Sevilla (US)
- Universidad Pablo de Olavide (UPO)
- CEI CAMBIO
- Consejo Superior Investigaciones Científicas (CSIC)
- IFAPA
- OTRI Universidad de Almería (OTRI/UAL)
- OTRI Universidad de Cádiz (OTRI IUCA)
- OTRI Universidad de Córdoba (OTRI UCO)
- OTRI Universidad de Granada (OTRI UGR)
- OTRI Universidad de Huelva (OTRI UHU)
- OTRI Universidad de Jaén (OTRI UJA)
- OTRI Universidad de Málaga (OTRI UMA)
- OTRI Universidad de Pablo Olavide (OTRI UPO)
- OTRI Universidad de Sevilla (OTRI USE)
- Joint Research Centre- Sevilla (JRC)

Universities/research centres in Murcia

- Instituto del Agua y Medio Ambiente de la Universidad de Murcia (INUAMA)
- Chair of Water and Sustainability EMUASA-UMU
- Departamento de Ecología e Hidrología - Universidad de Murcia
- Centro de Edafología y Biología aplicada del Segura (CEBAS-CSIC)
- Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA)
- Centro Tecnológico de la Energía y Medioambiente (CETENMA)
- Universidad Politécnica de Cartagena (UPCT)

- Fundación Instituto Euromediterráneo del Agua (IEA)

2.6 Current services offered

The achievement of the operational objectives is pursued through actions in four specific **lines of work**:

1. Generation of Knowledge: investigation according to demand: CENTA acts as a bridge to guide the R&D lines of research centres and companies towards the needs of the public sector and favour the development of processes of Innovative public purchase. In its facilities, CENTA has experimental plots for the development and validation of R&D&i in real operating conditions, analysis laboratory, reception centre for visits, and meeting and training rooms. Research is focused on technologies for the treatment of urban wastewater, small scale industries wastewater, minimisation of by-products generated during the treatment, water reuse, resources recovery, water quality, urban water management and ecosystem water management.

The CENTA Foundation is registered in the Andalusian Registry of Knowledge Agents with code ICI069. The differentiating element of the R&D&i carried out by the CENTA is its experimental nature and with a vocation of applicability to comply with the demand.

The research results are not intended to be exploited but to be transferred and applied. The CENTA establishes as a quality criterion that all the R&D&i projects that it develops are carried out within the framework of competitive calls, thus proving the quality of both the projects and their researchers.

2. Technological intermediation: As a technological intermediary, CENTA has maintained a very active role as a revitalizer of the wastewater treatment sector, developing various initiatives aimed at favoring the interrelation of generators and users of knowledge (public and private). Through the identification of joint needs of the public sector in the field of water, CENTA acts as a bridge to guide the R&D&i lines of research centers and companies towards the needs of the public sector and favor the development of processes of Innovative public purchase.

3. Technological transfer: CENTA provides advice and support for technology transfer, innovation and entrepreneurship. With this objective, the existing facilities in the Carrión de los Céspedes Experimental Plant offer technological

support to companies and SMEs in the sector to carry out technical and economic feasibility studies of their technologies and services. This technological support serves its users to make a correct validation of R&D&i results before they are put on the market and therefore to develop more competitive products at European level. It is, therefore, an ideal environment to promote initiatives such as StartUps incubation or promotion of Technology-Based Companies as well as opening new lines of innovation in existing companies.

4. Technology validation: CENTA is recognized internationally as a technology validation entity. Its unmatched experimental facilities make it the largest testing laboratory and a true Living Lab in terms of water treatment Technological validation that provides the following competitive advantages to companies installed in the Experimental Center:

- It serves to prove the performance of technologies at all levels of technological maturity (TRL), which differentiates them from other competing technologies.
- Validate the innovative features that make the technology truly unique.
- It serves the company both to increase market share and to facilitate the access of technologies to new national or international markets.

5. Technological surveillance: CENTA performs a systematic procedure for capturing, analyzing and exploiting useful information for strategic decision making: market forecast, existing R&D&i systems and products, current public-private investments at the level European, are some of the information necessary to highlight the current panorama of R&D&i and detect trends for the future. CENTA participates on the one hand in the identification of the needs of the Administration, and on the other in the identification of innovative products and services that are being carried out in the region and that are ready for exploitation in the market.

6. Technical assistance: CENTA carries out technical, exclusive and continuous advice through the projects in which participate, as well as entities that want to apply unconventional techniques in wastewater treatment. These projects facilitate the technical training of qualified personnel, in order to guarantee both the maintenance of the facilities and to favor the implementation of these technologies in other areas of the country. Technical advisory activities include

solutions to small municipalities, adaptations of treatments according to the conditions of the territory, adaptation to new regulations, etc. A task of utmost importance is technical support in new constructions.

7. Specialized training: One of the lines of training is the realization of comparative analyses of the different national legislations in the matter of sanitation and purification of urban wastewater and the technical training of human resources of the public institutions of the countries where we give courses on sewage treatment. Another of the training lines, financed through different agents (AACID, AECID, etc.), consolidates the presence of the CENTA in Central America where, for several years, technical training initiatives have been developed in several countries.

8. Dissemination of Knowledge: CENTA also disseminates knowledge through publications such as guidelines, books, contributions to scientific Conferences and publications in scientific and specialized journals. CENTA also counts on a programme of visits intended for different sectors of society and divided into secondary and high school students, university students, technical, institutional and citizen's groups.

2.7 Extraordinary starting conditions for being a Living Lab

The objective of this Living Lab is to favour in the Spanish regions of the SUDOE space the implementation of an open innovation model, in the field of wastewater treatment and reuse, which allows eliminating and reducing the barriers that hinder the innovation process.

It is thus conceived as an instrument that helps the innovation process from beginning to end, enabling holistic support and monitoring of the process. Therefore, it must be configured for the collection and analysis of information and to generate and validate solutions in real environments, before they are fully inserted in the market.

Far from being conceived as a test bench or as a closed scientific laboratory where researchers conduct experiments under controlled conditions, the Open Water Living Lab will be an open and flexible space where users, researchers,

developers, entrepreneurs, associations, administrations, academics, etc. join and cooperate to promote innovation projects.

Undoubtedly, the Experimental R&D&I Center of the CENTA Foundation, offers a very solvent starting point for the deployment of a Living Lab, since both its physical space and its portfolio of services already combine today a good part of these factors, providing an inner environment that will undoubtedly favour the start of the project. In more than 30 years of operation, has been able to establish a wide network of relations and synergies with companies, administrations, as well as with other research centers.

Although it cannot be said that today it is fully a Living Lab, it has approximated this model enough, since it has been interacting with the scientific community, companies, administration and also society, through an extensive work program.

Undoubtedly, its great dynamism and synergies with a broad group of stakeholders from different sectors of the quadruple propeller, makes this experimental centre an excellent precursor for the development of a Living Lab specialized in wastewater treatment and reuse, giving Direct service to the regions of Andalusia and Murcia, given its high capacity to mobilize and value the innovation generated in existing R & D & I projects as well as new projects.

However, to fully configure the Carrión de los Céspedes Experimental Centre as a Living Lab, its organizational and functional model must be defined and structured in a way that guarantees the establishment of a true open innovation system, which favours the incorporation of innovative products and/or technologies to the market, and favour innovation processes in the public sector.

3 Living Lab Lavisso - France

3.1 Introduction

LaViso is a partnership between the International Office of Water, the Institute for techniques separation and filtration and the University of Limoges. It is in the south-west of France and its focus is on waste-water treatment technologies and associated infrastructure management. While this may be its primary focus, the living lab is not limited in its capacities and interest to provide support for solutions in a wide range of applications.

3.2 Institutions involved in the constitution of the Living Lab

OIEau is a non-profit making organization created in 1991 State approved. The missions of the association are:

- to gather competencies of public organizations and private companies
- to provide services of public interest in the water field
- to promote French know-how for sustainable management of water resources at international level

IFTS, the Institute of Filtration and Separative Technology, is a non-profit association founded in 1981.

- IFTS's expertise is based on a long experience of separation techniques, state-of-the-art testing facilities and a team of scientists, engineers and technicians who are among the best in their fields of expertise.
- The knowledge developed at IFTS applies to all industries. Thus, daily, the teams of the institute meet the needs of various industrial sectors such as aeronautics, agribusiness, chemistry, environment, mechanics, nuclear, pharmacy ...

The **University of Limoges** and in particular the laboratory Peirene-Eau, a research unit of the University of Limoges, brings together state-of-the-art expertise in the field of the environment in various disciplines: chemistry, biology, microbiology, soil sciences and process engineering. The 40 permanent employees provide answers to environmental problems for the services of



economic and social actors in the field of diagnosis as well as in that of the process. Peirene is developing in a national and international context where the environment is a priority with the existence of strong partnerships with companies as part of research, development or training courses for students and engineering students.

The team is part of the Federative Research Institute GEIST (Genomic Institute, Environment, Immunity, Health and Therapeutics) of the University of Limoges. It is attached to PRES Limousin Poitou Charente. It is also part of the Environmental Research Federation for Sustainable Development (FREDD).



Figure 3.1 Location of the different sites of OIEau

3.3 Available resources and technologies

OIEau:

The infrastructures of the living-lab are located in Limoges and La Souterraine. The technical experts that will be involved for testing the pilots are member of the National Training Centre for Water Professions (CNFME –Centre National de Formation aux Métiers de l'Eau).

CNFME:

- employs 30 permanent trainers;
- owns 30 000 m² of pedagogical units:
 - 18 training rooms;
 - 20 technical plants.
- open 600 training sessions (on catalogue and on demand) each year;
- trains 6 000 professional a year.

In Limoges, the presentation materials and operational installations are gathered in two technical halls, representing 800m² of covered and heated educational space. Outdoors, the centre has an experimental network of mesh, buried and leaking drinking water pipes and a functional ditch (for stormwater management).

In La Souterraine, the centre brings together educational facilities dedicated to the laying of pipes, sanitation networks (self-monitoring, control and inspection, intervention, etc.), non-collective sanitation and operational pilots dedicated to the production and refining of drinking water and processes, urban and industrial wastewater treatment, WWTP sludge treatment, flow-metering and remote management. In 2010, an additional 700m² was created, a large part of which is dedicated to laboratory and analytical techniques. OIEau have made classical technical studies involving the pilots before 2018 but clearly the civil society was not involved as a co-creation actor. Technical training plants: Pumping and hydraulic regulation plant.



Figure 3.2 Pumping and hydraulic regulation plant



Figure 3.3 Show room for leak research and pipe detection materials



Figure 3.4 Place dedicated to drinking water supplies



Figure 3.5 Plant for laying out of drinking water pipelines



Figure 3.6 Unit dedicated to water meters and metrology



Figure 3.7 Automation and remote management training session

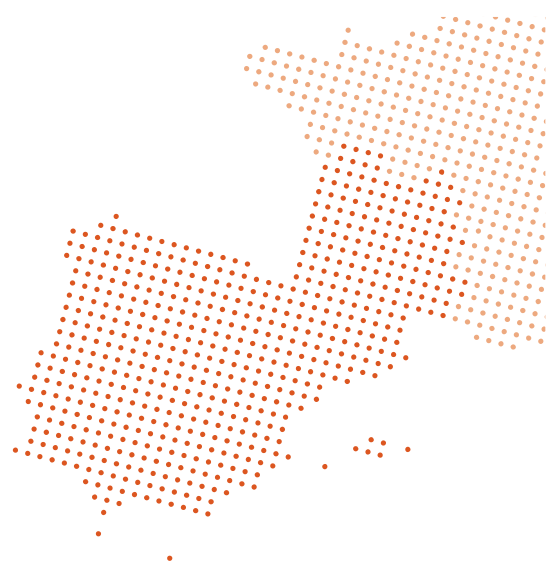


Figure 3.8 Process and drinking water production plant



Figure 3.9 Metrology canal

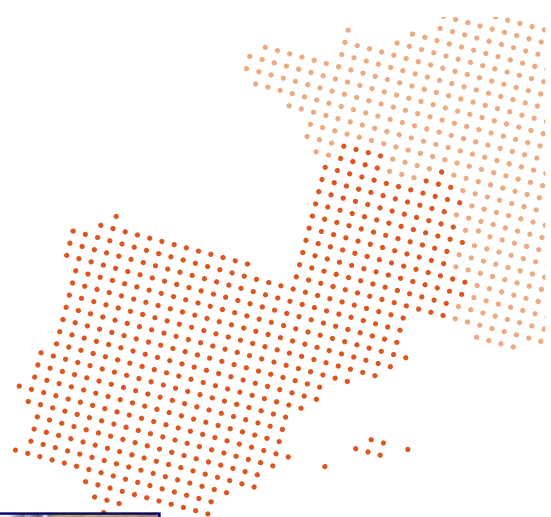


Figure 3.10 On-site sanitation systems

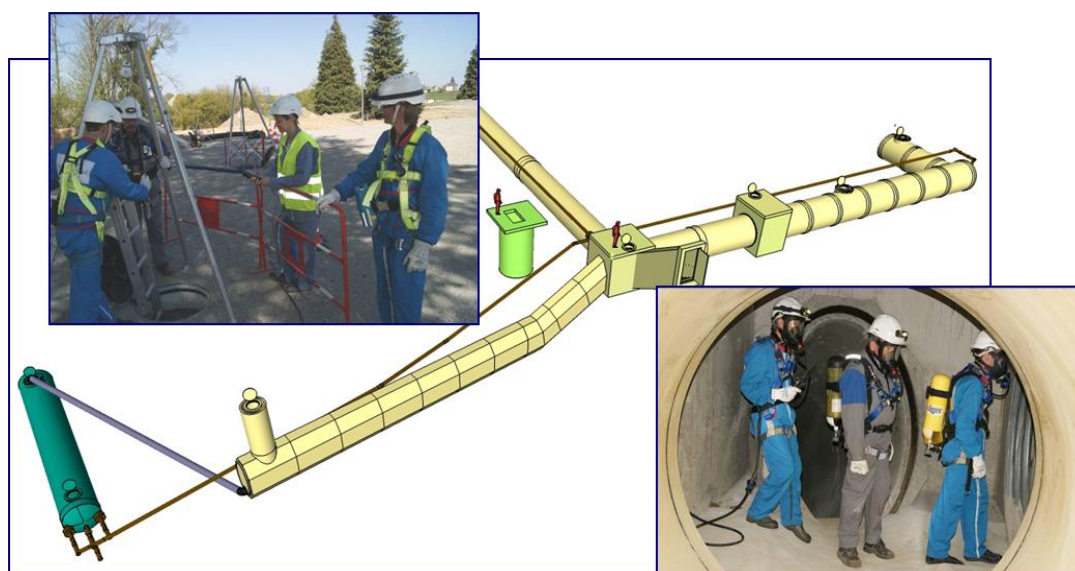


Figure 3.11 Underground sanitation network that can be accessed



Figure 3.12 Urban and industrial wastewater treatment plant



Figure 3.13 Water analyses laboratory

IFTS:

IFTS's expertise is based on a long experience of separation techniques, state-of-the-art testing facilities and a team of scientists, engineers and technicians who are among the best in their fields of expertise.

The knowledge developed at IFTS applies to all industries. Thus, daily, the teams of the institute meet the needs of various industrial sectors such as aeronautics, agribusiness, chemistry, environment, mechanics, nuclear, pharmacy...

Based in Foulayronnes, between Bordeaux and Toulouse in southwestern France, IFTS has an international positioning and has two subsidiaries: one in the USA (Middlesex, NJ) and the other in China (Shanghai). The Chinese subsidiary has integrated a new building in 2014, where our local sales team is based as well as a testing laboratory for filters and cleanliness control.

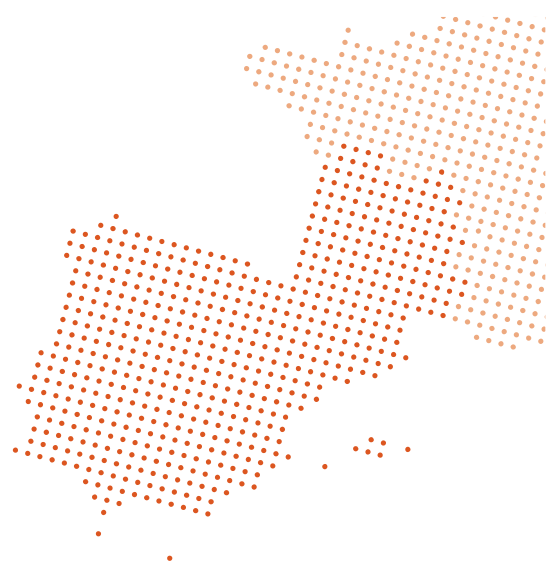


Figure 3.14 Laboratory for Liquid/Solid separation process studies - Feasibility - Optimization



Figure 3.15 Laboratory for filter testing



Figure 3.16 Laboratory for Characterization and cleanliness



Figure 3.17 Laboratory for Water analysis



Figure 3.18 Laboratory for studies and expertise in membrane separation

Already inaugurated at the end of 2018, IFTS will make fully operational, in early 2019, its brand-new Roger Ben Aïm Test Centre, a research and experimental centre designed to evaluate the behaviour of pilots and industrial equipment on real waters with specific characteristics.

Located in Lot-et-Garonne, in Agen (France), the Roger Ben Aïm Test Center is located between two sites in the city: the drinking water production plant and the effluent treatment plant. This positioning gives him direct access to their water through a network of interconnected pipes. It is also close to the Garonne and the Canal des Deux-Mers between Atlantic and Mediterranean.

The Centre has ideal working conditions for its personnel who offer their services to private companies to test and prove objectively the performance of any technologies or innovations in order to treat water or sludge over a significant period of time (a few days , weeks or several months continuously ...), in complete confidentiality to:

- Evaluate and qualify technologies and equipment for treatment and reuse of water or sludge management,
- Test and compare competing technologies at the pilot or semi-industrial scale, under controlled conditions,
- Organize equipment demonstrations in real conditions,
- Establish the equipment consumption budget in real conditions of use,
- Evaluate in-situ measuring instruments and online sensors,
- Test the endurance of equipment and sensors ...



The Test Centre is also intended to conduct research (researchers, doctoral students, academics...) by French and international teams, including tests on natural waters or at various stages of their treatment of clarification, purification or on sludge.

The building, on stilts to avoid the risk of flooding, has at the first level, a parking and experimentation area covering several underground water storage tanks. Upstairs, a large space of 360 m² is dedicated to experimentation of treatment devices, a mechanical workshop, offices and a meeting room. It is surmounted by a soon vegetated roof which will serve as ground for experiments of irrigation and air cooling by the plants.



Roger Ben Aim Test Center



V1 - 08/03/2019

Présentation Centre d'Essais Roger Ben Aim

4

Figure 3.19 Roger Ben Aim Test Centre



An exceptional location



V1_08/03/2019

Présentation Centre d'Essais Roger Ben Aim

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Figure 3.20 Location of the Roger Ben Aim Test Centre

Few pictures of the test center



Experimentation area



Experimentation area



Water lab

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Présentation Centre d'Essais Roger Ben Aim

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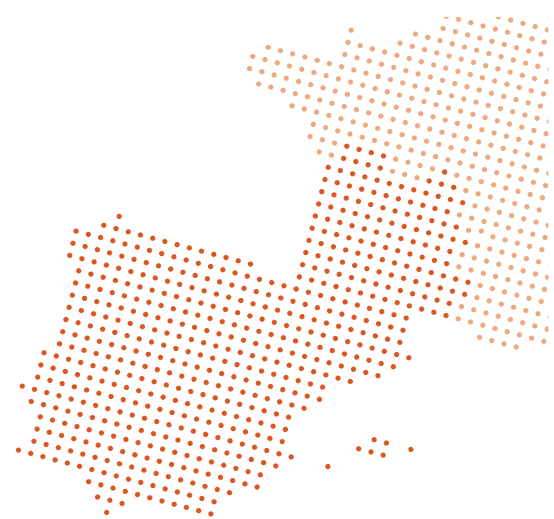
Figure 3.21 Facilities of the Roger Ben Aim Test Centre

UNILIM's research themes in the field of water and the environment are as follows:

- Evaluation of the mobility of contaminants in complex environments:
 - Natural environment (sediment, water bodies, soil)
 - methods for treating water or sludge
- Determination of the mechanisms controlling the mobility of contaminants
 - Adsorption/desorption mechanisms; dissolution/precipitation; redox
 - Interactions between solid / liquid / gas phases
 - Interactions with organic matter
- Innovative sampling methods:
 - Passive sampling
 - Inorganic contaminants ♦ DGT
 - Inorganic Contaminants ♦ POCIS, Chemcatcher
 - Macrophytes

The contaminants studied are the major elements in the environment, the parameters of the quality of wastewater; organic and inorganic trace elements. The analytical tools available are:

- Sampling material for soils and sediments:
 - drill&auger, sieves
- Water sampling material (surface and ground water) and flow measurements:
 - automatic samplers (as ISCO), sampler for piezometer, piezometric probe, passive samplers, flowmeters
- Sample preparation:
 - micro-wave mineralisator, lyophilizator, ASE for organic pollutant extraction in solid or biologic matrix, SPE automat, evaporator for small volumes
- Solid characterization:



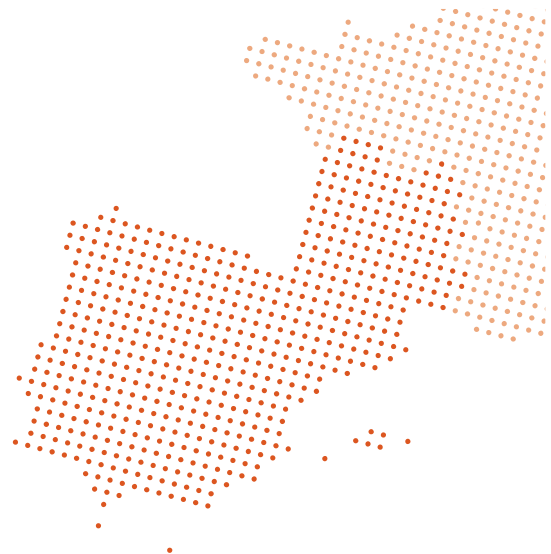
- Optic microscopy and picture analyse, SEM, XR-diffraction (Carmalim platform of Limoges University), XRF, CHONS analyzer, zetameter
- Materials for metals and metalloids analyse:
 - inducted coupled plasma mass spectrometry (ICP-MS), microwave plasma atomic emission spectrometer (MP-AES), atomic absorption (flame and furnace), polarography
- Analytical materials for organic compounds:
 - LC MS QToF - LC detector DAD/fluorescence - GC MS/MS QQQ - LC MS QQQ to obtain soon
- Analytical materials for water characterization:
 - TOC/TN meter, ionic chromatography, automatic titrator, global parameters (pH, conductivity, O₂, ...), spectrophotometers (UV and fluo) and field material for water analysis
- Test laboratory:
 - Pilot units, columns, pumps, ...
- In vitro culture material, histology, molecular biology:
 - Electrophoresis DGGE, PCR (non-quantitative)

3.4 Definition of the management body and internal regulation of the Living Lab

The partners have not agreed on the structure of the living lab. The preference is for a memorandum of understanding between the partners.

3.5 Target groups

- Agence de l'Eau Adour Garonne
- Agence de l'Eau Loire Bretagne
- Agence Française pour la Biodiversité
- Agence pour la valorisation de la recherche universitaire du Limousin
- Agglomération de Limoges



- Agglomeration du Niortais
- APESA
- Bordeaux Métropole
- BRGM
- CCI Nouvelle Aquitaine
- Communauté d'agglomeration de La Rochelle
- Communauté d'agglomeration du Bassin de Brive
- Communauté d'agglomeration Grand Angoulême
- Communauté d'Agglomeration le Grand Périgueux
- Communauté d'agglomeration Pau Béarn Pyrénées
- Communauté d'agglomeration Pau Béarn Pyrénées
- CRITT Génie des Procédés et Technologies Environnementales (GPTE)
- DREAM
- EGIS
- Ester Technopole
- Grand Poitiers Communauté Urbaine
- Guéret
- IRSTEA EABX - Ecosystèmes aquatiques et changements globaux
- l'Association Scientifique et Technique pour l'Eau et l'Environnement
- l'Evaluation des Procédés Nouveaux d'Assainissement des petites et moyennes Collectivités
- la mission d'assistance à la gestion de l'eau et de l'assainissement Dept Gironde
- Les sociétés d'accélération transfert de technologies
- Ministère de la transition Ecologique et Solidaire
- Ministère de la transition Ecologique et Solidaire
- ODESSOL
- OPURE
- Pôle Environnement
- Régie Municipale des Eaux de Mont de Marsan.
- SAUR
- Service d'Assistance Technique en Epuration et Suivi des Eaux Charente
- Service d'Assistance Technique en Epuration et Suivi des Eaux Charente-Maritime
- Service d'Assistance Technique en Epuration et Suivi des Eaux Deux-Sèvres

- Service d'Assistance Technique en Epuration et Suivi des Eaux Landes
- Service d'Assistance Technique en Epuration et Suivi des Eaux Lot et Garonne
- Service d'Assistance Technique en Epuration et Suivi des Eaux Pyrennes Atlantique
- Service d'Assistance Technique en Epuration et Suivi des Eaux VIENNE
- Service d'Assistance Technique en Epuration et Suivi des Eaux Correze
- Service d'Assistance Technique en Epuration et Suivi des Eaux Creuse
- Service d'Assistance Technique en Epuration et Suivi des Eaux Dordogne
- Service d'Assistance Technique en Epuration et Suivi des Eaux Haute-Vienne
- Service Gestion des Eaux de l'Agglomération d'Agen

3.6 Current services offered

Support for innovation

The three main partners and their represented organizations offer to support entrepreneurs in the development of new technological processes and the marketing of innovative products and services.

At the beginning of the innovation process, we can propose the facilitation of discussions in a climate of innovation and development of water technologies in the New Aquitaine region. For this we set up co-creation workshops with CODEmaker and mobilize a co-design organization hosted at the University of Limoges. These workshops can include all the key stakeholders identified in the quadruple helix concept (academy, industry, government and public).

Generate innovative research

The Living Lab aims to respond to technological needs with the construction of research projects that will bring together expertise in the fields of environment and water technologies, including chemistry, biology, microbiology, science soil and process engineering. LaViso can propose trials on a pilot scale or process on semi-industrial units with performance monitoring thanks to the expertise of the project partners.

LaViSo offers assistance in research funding for research and technology transfer projects, the construction of appropriate consortia and the implementation of technical studies hosted on test platforms.

Technology transfer

"Technology transfer and research-industry cooperation are powerful levers of innovation and for companies, a development accelerator. »CCI France LaViSo wants to sustainably strengthen the competitiveness of companies by providing innovative solutions of a high technological level that will lead quickly to the establishment of new products and services. With the presence of several networks in the consortium such as Water and Climate, the expertise available within each consortium member, the availability of platforms, LaViSO offers technical support covering all levels of preparation, ranging from the definition from concept to technology validation. The transfer can lead to a financial transaction, and materialize in different ways: patent acquisition, cooperation, provision of human resources, etc.

Training

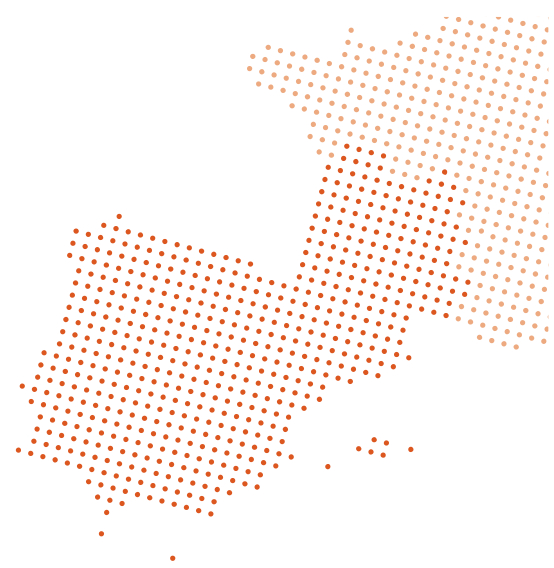
The partners are experts in many technologies and methodologies that will benefit from the innovation process, with the expertise to provide leading edge water treatment technology. It will also be possible to provide on-demand training for technical processes.

Labeling. Normalization

LaViSo makes an important contribution to the development of vocabulary standards, measures or tests that contribute to the clarification of technical and commercial exchanges, for example IFTS creates standardization commissions, researches and develops new procedures for essays and drafts the draft standards on which all agree.

Intellectual property

Thanks to the support services for innovation and transfer from the University of Limoges grouped together in AVRUL, the work done within the framework of the SVSO will ensure that intellectual property rights are taken into account throughout the entire period. process.



Market Analysis and Marketing

The consortium also aims to provide studies on market opportunities for technologies that will be evaluated, in particular through the external partners of the TWIST project, such as the CCIIs in New Aquitaine. The partnership also has access to a wide range of support actors.

4 Urban Lisbon Living Lab (UL3) – Portugal

4.1 Introduction

The Portuguese partners of the TWIST project will develop the Urban Lisbon Living Lab (UL3) under the topic of management, treatment, recycling and product recovery (water, nutrients and energy) from wastewater.

All activities and correspondent facilities will be located in Lisbon.

4.2 Institutions involved in the constitution of the Living Lab

The partnership includes Instituto Superior Técnico (IST), Instituto Superior de Agronomia (ISA) and Águas do Tejo Atlântico, S.A. (AdTA). At the beginning of TWIST each institution had its own independent research, although collaboration had existed in the past between all of the institutions.

Águas do TejoAtlântico, S.A. (AdTA) is a public company and is responsible for managing and operating the wastewater treatment system of Greater Lisbon and West¹, guaranteeing the quality, continuity and efficiency of the service. It exploits a system that includes 104 Water Resource Recovery Facilities (WRRF), 292 pumping stations and 922 km of main sewage system, and treats around 244 Mm³/yr, serving a population of 2,4 million inhabitants (23 municipalities).

AdTA has as mission contributing to the pursuit of national objectives in wastewater collection and treatment within a framework of economic, financial, technical, social and environmental sustainability. AdTA is a strong and well recognised R&D+i agent within the industry – which includes its own R&D+i dedicated department. It has already in its profile several R&D activities in partnership with other institutions, companies and universities in a wide range of subjects, including novel treatment processes and implementation of management and simulation tools for optimizing wastewater treatment and collection. R&D activities include the participation in several national as well as in European projects and international awards recognition, by International Water Association (IWA) with a Global Honour Award for the project “AQUASAFE”

¹NUTS III

developed in partnership with European SME, which is related to operational platform for decision support systems in Lisbon sewage system.

By partaking on TWIST, AdTA has the opportunity not only to share its knowledge, but also to improve in skills, its human capital in relevant topics, such as, nutrients recovery, wastewater treatment and reuse and/or processes modelling and optimization. AdTA will put at disposal of TWIST project and Portuguese partners its infrastructure for N/P recovery and wastewater reuse.

Currently, AdTA hosts at its facilities and in partnership with other water industry related companies and academia, experimental projects, related with energy efficiency, operational management optimization, wastewater treatment for reuse, among others.

It is also common AdTA receive master and doctoral students to conduct their Master thesis in partnership with academia.

Instituto Superior Técnico (IST) is a Higher Education Institution, the largest school of Engineering, Science and Technology in Portugal. IST's mission is to contribute to the development of society by providing top quality higher education in the areas of Engineering, Science, Technology and Architecture, at undergraduate and postgraduate levels, as well as developing Research, Development and Innovation (RD&I) activities to allow it to provide teaching in line with the highest international standards. Its mission is therefore expressed in the three functions which characterize the concept of a modern university: to generate knowledge, to transfer skilled professionals and to transfer and apply knowledge and innovation.

IST consists of 9 departments and is involved in some of the most prestigious RD&I and technology transfer institutions in Portugal, with remarkable impact internationally in many scientific and technological domains. There are about 10,500 full-year equivalent under and post graduate students, and about 1,500 full time equivalent teaching and non-teaching staff.

The contribution of IST to apply knowledge and innovation is also described by the creation of 53 Spin-off companies since 2009, which further apply into society the research developed in this institution. IST also stimulates intellectual property protection as a means of fostering knowledge valorization currently has a portfolio of more than 250 patents, being the Portuguese institution with the largest

number of patents registered. Many of these patents result from research projects involving companies that have preferential rights for commercial exploitation. Licensing other intellectual property rights, such as computer programs copyright or technology products associated brands, among others, is also carried out by IST. Some of IST's startups have license agreements that enable exploitation of intellectual property rights of the school and associated research centers.

Research at IST is organised in 23 Centres and Institutes that pursue challenging research programmes with a strong social impact in the fields of Architecture, Engineering, Science and Technology. These Centres and Institutes address a multidisciplinary research in an international and multicultural atmosphere.

The **School of Agriculture, Instituto Superior de Agronomia (ISA)** is one of the faculties of the University of Lisbon. The core mission of ISA is Higher Education, Research & Development, and Technology Transfer in the scientific fields of Agriculture, Forestry and Natural Resources Engineering, Food Science and Engineering, Animal Production Engineering, Environmental Engineering, Biology, and Landscape Architecture. Within Higher Education, ISA is attended by 1500 undergraduate, master and PhD students. The 130 professors and 125 Researchers are PhD graduates with recognized scientific work published in international journals. Presently, ISA is involved in more than one hundred research & development projects, financed by EC and national funds. ISA is also involved in several projects concerning technology transfer with research institutes and private enterprises.

ISA hosts three nationally recognized scientific research centres: i) the Forest Research Centre (CEF) is a research unit devoted to the integrated research of forestry and related ecosystems, forestry products and forest related service, ii) the Centre Linking Landscape, Environment, Agriculture and Food (LEAF) focused on the entire Agro-Food chain, combining basic and applied sciences, from the cell and microorganisms to the landscape, for the knowledge and promotion of effective solutions aiming at the conservation of natural resources and the production and food quality, iii) the Research Network on Biodiversity and Evolutionary Biology (Associated Laboratory), in partnership with CIBIO, University of Porto and iv) the Centre for Applied Ecology "Prof. Baeta Neves" (CEABN) an integrated research centre integrates a whose mission is to promote scientific

research in applied ecology to forest and agricultural ecosystems, contributing to management and use.

4.3 Available resources and technologies

The Urban Lisbon Living Lab at IST will be developed under the framework of the Environmental Engineering laboratory, which will host small-scale, proof-of-concept projects that can be further validated in ISA or AdTA facilities at a prototype demonstration scale.

The Environmental Engineering laboratory is part of the R&D centre CERIS - Civil Engineering Research for Innovation and Sustainability and hosts technologies to accomplish biological, chemical and water quality analysis regarding environmental engineering research projects. The main experimental facilities currently available are:

- wastewater treatment using constructed wetlands;
- greywater treatment in modified green walls;
- manhole with drop to study H₂S release in sewer systems.

The laboratory also includes field probes to analyze several water quality parameters and has the capacity to analyze several physico-chemical parameters in water samples.

The Urban Lisbon Living Lab at ISA will be developed under the framework of the university campus of Tapada da Ajuda, a territory that has 100 hectares, able to host and to validate proof-of-concept projects and demonstration pilot plants. Currently, Tapada da Ajuda campus comprise an agricultural zone of more than 32 hectares, an urban farming zone open to the nearby community, forest areas and several biodiversity hotspots, among them a temporary river and a small lake. Tapada da Ajuda offers a real full scale opportunity within the water-food-energy-ecosystem nexus.

4.4 Definition of the management body and internal regulation of the Living Lab

The three institutions that form the Urban Lisbon Living Lab will maintain their autonomy and the Living Lab projects will be based in one of them, selected on a case-by-case basis. The location of the project will depend on its TRL level and the topic to be addressed. The remaining two institutions will collaborate in the project according to the type of tasks involved.

For each project a Mutual agreement memorandum or protocol will be developed, which will include the definition of roles, tasks to perform, resource allocation and benefits associated with each organization.

4.5 Target groups

In the beginning of TWIST project, the target groups working with the Urban Lisbon Living Lab were mostly research institutions (universities and research centres). With the development of the Urban Lisbon Living Lab it is expected that the target groups will also include:

- companies involved in the water sector,
- middle schools for water education purposes,
- municipalities and other local and regional government institutions,
- non-profit organizations involved in the water sector and in sustainability issues.

Include the organisms, bodies, administrations, agencies, companies, etc. contacted for the workshops and other activities, and the possible target groups for the future.

4.6 Current services offered

In the beginning of TWIST project the services offered by the Urban Lisbon Living Lab included mostly research studies and testing of equipment under a specific research project. Some Academic training in the Urban Water Cycle also occurred.

It is expected that the portfolio of services to be offered by the Urban Lisbon Living Lab includes also product and services development together with other stakeholders, more extensive training and dissemination events to raise awareness.