Co-UDlabs

Building Collaborative Urban Drainage research Labs communities

D2.3. Intermediate report on staff development

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Background: about the Co-UDlabs Project

Co-UDlabs is an EU-funded project aiming to integrate research and innovation activities in the field of Urban Drainage Systems (UDS) to address pressing public health, flood risks and environmental challenges.

Bringing together 17 unique research facilities, Co-UDlabs offers training and free access to a wide range of high-level scientific instruments, smart monitoring technologies and digital water analysis tools for advancing knowledge and innovation in Urban drainage systems.

Co-UDlabs aims to create a urban drainage large-scale facilities network to provide opportunities for monitoring water quality, UDS performance and smart and open data approaches.

The main objective of the project is to provide a transnational multidisciplinary collaborative research infrastructure that will allow stakeholders, academic researchers, and innovators in the urban drainage water sector to come together, share ideas, co-produce project concepts and then benefit from access to top-class research infrastructures to develop, improve and demonstrate those concepts, thereby building a collaborative European Urban Drainage innovation community.

The initiative will facilitate the uptake of innovation in traditional buried pipe systems and newer green-blue infrastructure, with a focus on increasing the understanding of asset deterioration and improving system resilience.

List of acronyms

Acronym / Abbreviation	Meaning / Full text
GA	Grant Agreement
IP	Intellectual Property
JCUD	Joint Committee on Urban Drainage
JRA	Joint Research Activity
PLS	PArtial Least Squares
RI	Research Infrastructure
TA	Transnational Access
UDS	Urban Drainage System
WP	Work Package

Executive summary

This document is a deliverable of the Co-UDlabs project, funded under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008626.

Deliverable 2.3 is the first document reporting on development and mobility of personnel staff of Co-UDlabs that is taking place among partners of the consortium to build internal capacity relevant to Transnational Access and Joint Research Activities by facilitating the exchange of know-how and best practices among the project staff members and the participants working in the RIs. For example, these mobilities will allow partners to:

- Develop new collaborations on green roof experiments and testing for improved urban water management (INSA with IKT)
- Develop a better understanding of how to manufacture representative in-pipe defects to conduct experiments with a high level of repeatability (UFSD with IKT)
- Examine potential methods to automate the handling and assessment of in-pipe CCTV images (UFSD with IKT)
- Transfer practical experience on the monitoring of urban wastewaters with optical methods (INSA with EAWAG)

In total, the partners planned 37 missions, from several days to weeks, counting for a total of 157 days of mobility. UDC and UFSD are the partners with the highest number of mobilities planned, while EAWAG will take part in the longest mission, having planned to stay 30 days at UDC to carry out rainfall-runoff experiments in the context of SuDS. So far, 7 missions have been already implemented, for a total of 18 days.

In summary, the development and mobility of staff is on track, as many of the missions required some preparation and will be realized in the remainder of the project. A Final report on staff development (D2.4) will be provided at the end of the project (M48).

1. Staff mobility plan

To provide optimal services to the Transnational Access users, the relevant staff of the consortium have to be proficient in data harmonization and interoperability methods. The aim of staff mobility is to build internal capacity relevant to Transnational Access and Joint Research Activities and ensure that each partner can master a variety of experimental techniques. This activity will furthermore support the networking and trust between all partners, stimulate exchange, development and inspire new ideas for improved quality and services.

To optimize the results of the mobilities, it is performed according to the following agreed procedures:

- Prior to respective assignments of personnel, the sending partner should specify the planned activities of the staff as well as the purpose and duration of the mission;
- The hosting partner is responsible for enabling the implementation of the assigned person's tasks, including the granting of necessary access to facilities and shall also be responsible for the respective working and safety conditions.
- The sending partner will support the costs incurred for the personnel mission (travel, accommodation and living expenses), using their own defined budget.
- After completion of the mission, the assigned person writes a report on his/her activities during the mission, which is sent to Euronovia (task leader) after being approved by the coordinator of his/her research group.

It is to be noted that staff mobility activities and visits have been re-organised and re-scheduled to be shorter but more frequent than originally planned at proposal stage (i.e. one week duration) because it was decided that, in order to optimize the use of resources, some of the activities can be carried out remotely among partners after a first face-to-face meeting on site.

An overview of the staff mobility plan is available in Table 1 below while more details, including dates and objectives of the missions, are available in Table 2 (see Annex 1).

A total number of 37 missions is planned, counting for 157 days of mobility. UDC and UFSD are the partners with the highest number of mobilities planned (at least one mission at each of the other partners), while EAWAG will take part in the longest mission, having planned to stay 30 days at UDC. At the time of writing (April 2023), 7 mobility sessions have been already implemented (cells in green in the table below), for a total of 18 days.

Hosting \ Sending	*UDC*	*UFSD*	*DEL*	*EAWAG*	*IKT*	*INSA*	*AaU*
UDC							
UFSD						5 days	
DEL							
EAWAG							
IKT		3 days				0,5 days	
INSA		2 days		2 days	0,5 days		
AaU	5 days						

Table 1 – Overview of the Co-UDlabs staff mobility plan

2. Staff mobility status at M24

During the first half of the project, project partners have participated in 7 mobility sessions:

- EAWAG --> INSA - from 20/09/2021 to 21/09/2021
- USFD --> INSA - from 01/09/2022 to 02/09/2022
- IKT --> INSA - on 01/09/2022
- USFD --> IKT - from 10/10/2022 to 12/10/2022
- UDC --> AaU - from 24/10/2022 to 28/10/2022
- INSA --> IKT - on 09/01/2023
- INSA and Deltares --> USFD - from 16/04/23 to 21/04/23

A report of each mobility session is provided in the following paragraphs.

2.1. EAWAG to INSA (September 2021)

From (dd/mm/yy):	20/09/2021
To (dd/mm/yy):	21/09/2021
Duration (in days):	2
Purpose of the mission:	Knowledge transfer for i) optical water quality monitoring methods in sewers, i.e. using submerged spectrometers and turbidity sensors, ii) data quality control and uncertainty analysis and iii) the organization of Task 6.1 (T6.1). Knowledge transfer in the field of spectrometry helps to advance the current skills in Co-UDlabs by allowing researchers from Eawag and practitioners to build on the work of INSA and others. By sharing information and experiences, we pave the way for the development of new methods, techniques, and technologies that are more effective and efficient. Also, knowledge transfer is essential for maintaining quality control in Co-UDlabs. By sharing information about best practices and quality standards between Eawag and INSA, we ensure that our work meets the highest standards of accuracy and reliability. Ultimately, this mission was vital for the ultimate goal of Co-UDlabs to promote innovation in spectrometry and sewer monitoring. Specifically, Eawag is developing and testing non-contact monitoring approaches using Hyperspectral images (T6.1, WP9). By sharing new ideas and technologies, we contribute to developing new approaches to problem-solving and push the boundaries of what is possible in the field.
Planned activities:	Day 1: 20/09/21 • Morning: visit of the monitoring site of Chassieu, close to Lyon, including a presentation of the testing bench: wastewater pumping, sensor installation and maintenance. • Afternoon: meeting with Co-UDlabs partner to discuss about of WP6.2

Day 2: 21/09/21

- Morning: knowledge transfer about spectrometry and the operation and maintenance of submerged spectrometers, the installation of their S::CAN probes and monitoring of suspended solids.
- Afternoon: work for WP6.1: selection of 6 sensors and planning of future tasks.

	Figure 1 - (top) The stormwater monitoring station of INSA at their Chassieu field laboratory, which uses a bypass system to facilitate the installation and maintenance of online sensors to continuously monitor stormwater quality (bottom) Overview of the site.
Main achievements and challenges:	Work for WP6: Previously, INSA gathered from the consortium a list of 55 sensors to be tested in the framework of the Co-UDlabs project. As leaders of the corresponding T6.1, INSA (Jean-Luc, Mathieu) and Eawag (Jörg Rieckermann, Pierre Lechevallier) met online to critically analyze the 55 propositions. The aim of this analysis was to identify sensors that fulfilled the project's criteria, i.e. novelty, feasibility, and relevance. A list of 15 sensors was selected (see Deliverable 6.1). The next step was to plan for the coordination of further actions. Is was agreed to organize a vote among the project's institutions to select 8 sensors that would be tested as part of the project. The coordination of the testing phase will also involve selecting leader for the testing of each 8 sensors. Knowledge transfer: Mathieu Lepot shared his experience with Pierre over a period of two days. First, they visited the stormwater monitoring station of Chassieu, in particular to discuss about their online monitoring station. This included information about wastewater pumping, data collection, sensor maintenance, and data analysis. This information very relevant, as Pierre is planning to use a similar facility at the HALL infrastructure of Eawag, the experimental flume. Second, they discussed about the analysis of spectrometric data, with a particular focus on the Spectrolyser (S::CAN) submerged spectrometer sensor. This sensor is commonly used for on-site absorbance measurement and is also available at Eawag. Finally, Mathieu discussed the measurement of suspended solids using an online turbidity probe. He emphasized the importance of building a site-specific calibration curve for accurate results.
Lesson learnt / know how or best practice to be re-used to improve the quality of our RIs and services:	As Pierre Lechevallier was in the beginning of his work for Eawas and Co-UDlabs, the main objective was to get to transfer the knowledge on the maintenance, calibration and data handling of the submerged spectrometer probes. One important lesson was that, for data analysis, the best-performing method was PArtial Least Squares (PLS) and that more advanced data driven methods, such as Random Forest or Neural Network approaches do not seem to provide better predictions from the observed absorbance spectra. In addition, the Eawag researcher got to know the INSA partners and how they organize their work, especially regarding the continuous stormwater monitoring and handling of monitoring data. In this, the onsite visits were especially valuable to discuss specific challenges and solutions. Last, but not least, this onsite meeting helped to plan the work package 6.1 more efficiently.

2.2. UFSD to INSA (September 2022)

From (dd/mm/yy):	01/09/2022
To (dd/mm/yy):	02/09/2022
Duration (in days):	2
Purpose of the mission:	The objective of the mission was to meet and discuss WP8 activities with representatives from UDC, IKT and Lyon. In addition, partners took the opportunity to attend the 1st Symposium on Urban Flood Experiments that was an expert-group event hosted by INSA Lyon on 1-2 September 2022.
Planned activities:	Workshop discussion, presentations, inspection of laboratory facilities and consideration of future work activities.
Main achievements and challenges:	• Sharing of the current state of the art in measurement techniques and modelling associated with urban flooding; • Planning the activities of PhD students to be recruited at USFD in 2023; • Discussing the use of bespoke PIV particles produced at INSA Lyon for use at USFD facilities.
Comments:	Potential for greater collaboration was explored. This will be carried forward through more regular WP8 meetings.

2.3. IKT to INSA (September 2022)

From (dd/mm/yy):	01/09/2022
To (dd/mm/yy):	01/09/2022
Duration (in days):	0,5 (morning)
Purpose of the mission:	1st visit of IKT at INSA Lyon, held on 01 September 2022 in the morning, for mutual presentation and exploration of possible future collaborations. Visitors: Thomas Brüggemann, Marcel Goerke, Bert Bosseler and Matteo Rubinato.
Planned activities:	Presentations and visits

Main achievements and challenges:	• Presentation of INSA Lyon (laboratory DEEP) activities in the field of urban drainage and hydrology (Figure 2). • Visit of the GROOF platform on the INSA campus for experiments on green roofs • Visit of the OTHU SUDs facilities on the INSA campus (porous parking, infiltration trench and swale) for experiments on stormwater management.  *Figure 2 – Group photo of the visit of IKT at INSA Lyon on 01/09/2022*
Lesson learnt / know how or best practice to be re-used to improve the quality of our RIs and services:	Greatest potential collaboration has been identified on the topic of green roofs.

2.4. UFSD to IKT (October 2022)

From (dd/mm/yy):	10/10/22
To (dd/mm/yy):	12/10/22
Duration (in days):	3
Purpose of the mission:	• Organising ad coordinating cooperation within WP7 (JRA 2) between IKT and UFSD in detail • Examining current EU calls and other funding sources. Aim to learn different bidding approaches and constraints. • Examining potential synergies between funded projects at both IKT and UFSD
Planned activities:	Day 1: 10th October 2022 (Simon Tait, Iain Naismith, Thomas Bruggemann) • Describe historical activities at IKT and UFSD and current facilities, and identify potential collaborative opportunities

- Examine the exchange of knowledge on pipe defect manufacture – see photographs below.

Day 2: 11th October 2022
(Simon Tait, Iain Naismith, Bert Bossler, Thomas Briuggemann)

- Discuss links with EU knowledge organisations (e.g. Eureau/EWA/Water Europe)
- Consider Horizon CL5-2022-04-02-01 call. Hold brainstorming workshop and produce project concept note

Day 3 - 12th October 2022:
Participants: Simon Tait, Thomas Bruggemann (part), Iain Naismith, Ton Bennan (part-online), Irene Scheperboer (part), Yongxiang Qian (part)

- Online meeting/discussion on TA AIR project to be held IKT and potential future links to current work in UK.
- Discuss potential to link with UK pipebots project.
- Discussion on using image analysis on historical CCTV image to better link with ZeMus project

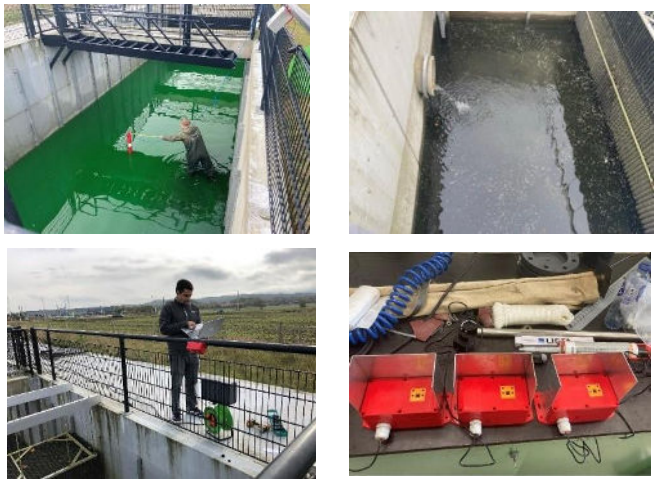
Below are examples of the full-scale pipe defects that have been previously manufactured at IKT.

Figure 3 - Examples of full-scale pipe section containing specific defects that have been manufactured at IKT.

Main achievements and challenges:	• EU project proposal concept note developed and circulated to potential partners. • Exchange of information on automated techniques for defect identification. Exchange of knowledge about requirements for automated image processing • Exchange of information on physical testing/inspection of full-scale sewers pipes
Lesson learnt / know how or best practice to be re-used to improve the quality of our RIs and services	Both partners developed a better appreciated their capability to lead EU funding bids and to better understand the EU funding landscape and how it may be possible to improve links with UK water utilities. Lessons were learned regarding how to manufacture pipe defects and how results from full scale defect testing could be interpreted. The potential and challenges for using image analysis in the historical CCTV data was identified.

2.5. UDC to AaU (October 2022)

From (dd/mm/yy):	24/10/2022
To (dd/mm/yy):	28/10/2022
Duration (in days):	3
Purpose of the mission:	The installation of LSPIV equipment in the Aalborg retention pond is a milestone within the Joint Research Activities of Co-UDlabs project. This activity was carried out from 24/10/2022 to 28/10/2022 during the visit of Juan Naves (University of A Coruña - UDC) to Aalborg University (AAU)Co-UDlabs team. The visit was carried out in the scope of the Networking Activity WP2 (Capacity building), which foster the scientific collaboration between Co-UDlabs Partners.
Planned activities:	Day 1 - Tuesday, 25th October 2022 • Planification meeting. Jesper E. Nielsen (AAU) and Juan Naves (UDC) • Design and fabrication of pieces for protective hermetic boxes • Visit to AAU retention pond Day 2- Wednesday, 26th October 2022 • Assembly of equipment • Preliminary test and tuning of cameras in the facility Day 3- Thursday, 27th October 2022 • Planification meeting. Jesper E. Nielsen (AaU) and Juan Naves (UDC) • Definitive installation of cameras and calibration • Experiments (inlet and outlet sections)
Main achievements and challenges:	Installation of LSPIV The first step of the activity was protecting the equipment from the rain and other elements. The required equipment to use the LSPIV technique in the retention pond consisted of 3 NOIR Picameras V2.1 controlled by Raspberries Pi 4. The raspberries record, storage and transmit the videos to be processed via Wi-Fi. To do this, hermetic protective boxes were adapted with 3D-printed pieces to mount the cameras and keep the Raspberries Pi inside. A metal cover has also been added to prevent rainwater on the lens of the cameras. The raspberries have been installed in the lateral of the retention tank, one recording the inlet section and the others capturing the outlet section of the tank. The raspberries and the cameras were installed inside the boxes assembled. Power supply has been provided through outdoor electrical boxes. To rectificate the perspective of the frames recorded by the cameras it has been necessary to measure the dimensions of the tank and obtain the coordinates of reference elements.

	Initial experiments The first experiment performed was focused at the inlet section of the retention tank. The first camera was used, and a video of 5 minutes was recorded while 800 L of water, previously storage before the inlet gate of the facility, were introduced to the facility. Sawdust was used as tracer particles and distributed on water surface before the experiment started. Cameras 2 and 3 were used to record the movement of the particles used in the emptying of the retention tank at the outlet section. The pumps of the facility were used and videos of 1 minute were recorded during the time of emptying. When the water depth of the tank decreased, two additional video of 5 minutes were recorded to better register the last part of the process in order to analyse how velocities increased and sediment deposited may be resuspended.  *Figure 4 – Pictures from the initial experiments with the retention tank at AaU*
Comments:	The results of the first tests are promising and the data obtained will be analysed for calibration and validation of the CFD models. Further experiments with the cameras installed are being planned and the collaboration between AaU and UDC will continue within the scope of Co-UDlabs and this research line.

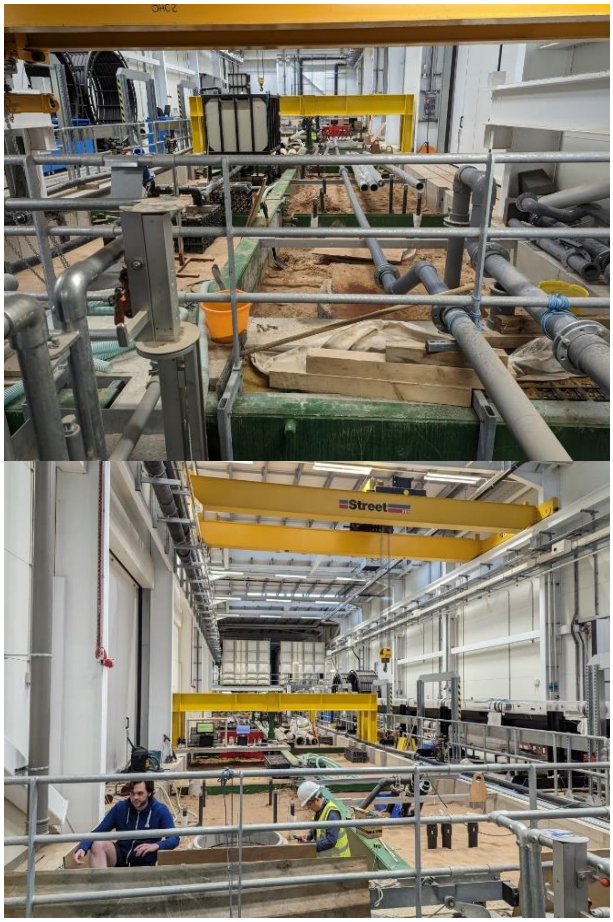
2.6. INSA to IKT (January 2023)

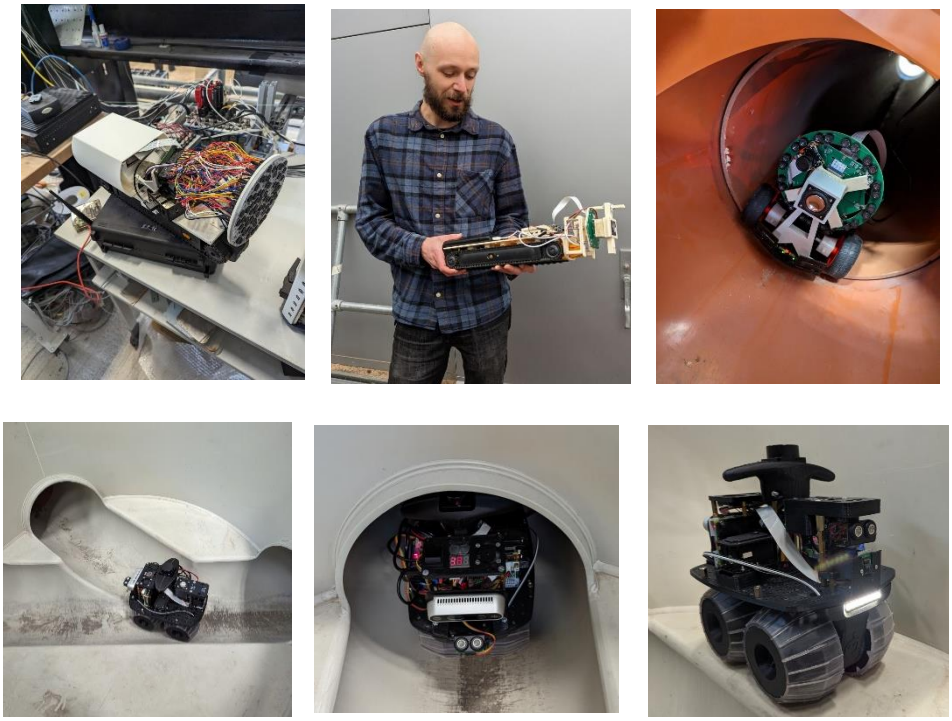
From (dd/mm/yy):	09/01/2023
To (dd/mm/yy):	09/01/2023
Duration (in days):	0,5 (afternoon)
Purpose of the mission:	1st visit of INSA Lyon at IKT for mutual presentation and further collaboration. This visit is the reciprocal visit of IKT at INSA Lyon held on 01 September 2022 (see above section 2.6). Visitor: Jean-Luc Bertrand-Krajewski
Planned activities:	Presentation and visits

Main achievements and challenges:	• Introduction and presentation of IKT • Tour of the IKT experimental hall • Discussing cooperation INSA-IKT within Co-UDlabs and beyond
Comments:	After these two short visits, potential collaborations have been discussed and a longer visit is now planned from 10 to 13 July 2023 (INSA Lyon to IKT) to further work on i) metrology (UDMT webapp developed in Co-UDlabs) and ii) collaboration on green roof experiments.

2.7. INSA and Deltares to UFSD (April 2023)

From (dd/mm/yy):	16/04/2022
To (dd/mm/yy):	21/04/2022
Duration (in days):	5
Purpose of the mission:	• Organising and coordinating cooperation within WP7 (JRA 2) between INSA, Deltares, IKT and UFSD in detail • Discussion WP6 and WP7, more especially task 6.3 to anticipate the organisation and work • Visit the UFSD facilities at ICAIR and discuss potential research collaboration • Advance the writing of a book on Urban Drainage Asset Management with specific contributions from UFSD researchers • Attend the Pipebots Internal Demonstration day • Discuss European Sewer Asset Management research network activities in relation to the JCUD working group UDAM
Planned activities:	<u>Day 1 - Monday, 17th April 2023</u> • Planification of the week • Visit of UFSD facilities (city center) • Work on the Urban Drainage Asset Management book • Meeting dedicated to WP7 <u>Day 2 - Tuesday, 18th April 2023</u> • Meeting with researchers from UFSD • Work on the Urban Drainage Asset Management book <u>Day 3 - Wednesday, 19th April 2023</u> • Pipebots Internal Demonstration Day • Visit of UFSD facilities (ICAIR) <u>Day 4 - Thursday, 20th April 2023</u> • Meeting dedicated to WP6 • Work on the Urban Drainage Asset Management book • Planning future activities

Main achievements and challenges:	Regarding Co-UDlabs work packages, the meeting related to WP6 and WP7 have greatly help anticipating future difficulties and better engage in a collaborative work. During the WP7, the discussion has been focused on the incoming tasks such as a review of asset condition grading and its improvement and how to gather inspection data (CCTV reports, videos from pipe inspections) from numerous Europe countries. The objective is to achieve a representative distribution of defects per country and for the whole Europe. Videos will be used to train and improve the tool under development at UFSD. The discussion has also led to a very important consideration on the future of sewer asset management, with a shift from a (necessary but limited) condition-based approach to a (broader but still difficult to achieve) defect-based approach. The WP6 meeting was dedicated to tasks 6.2 and 6.3. The main focus was how to consider the measurement uncertainties in the assessment of water bodies quality and impact of combined sewer overflows (Water Directive Framework). Next step will be to propose a parallel approach (in relation to country-specific regulation) of this question. The Urban Drainage Asset Management book is edited by Frederic Cherqui (INSA), Francois Clemens (DELTARES) and two other editors not part of Co-UDlabs. The meeting of the editors (3 in person and 1 online) at UFSD has significantly advanced the book, with a first draft due in early September 2023. The visit was also the opportunity to visit UFSD facilities at ICAIR and more especially the Full Scale Buried Cell Flume.  *Figure 5 - Full Scale Buried Cell Flume facility*

	Last but not least, the visit was the opportunity to attend to the Pipebots internal demonstration day at the ICAIR buried asset test facility, used for TA in WP9. Pipebots aims to revolutionise buried pipe infrastructure management with the development of micro-robots designed to work in underground pipe networks. The whole day was dedicated to demonstration and discussion related to the different aspects of the project: (i) mobilisation, localisation and autonomy, (ii) sensing, measurement and defect classification, (iii) communications and networking; (iv) business planning.  *Figure 6 - Micro-robots designed to work in underground pipe networks*
Lesson learnt / know how or best practice to be re-used to improve the quality of our RIs and services:	The visit allowed a significant progress on WP6 and WP7. It also strengthened the synergy within the Co-UDlabs project (better knowledge of each other's expertise and of the UFSD experimental devices), and to plan each other's actions for the months to come. It also enabled the foundations to be laid for collaboration, particularly through the submission of joint research projects. The exchanges carried out within the framework of the Pipebots project are very innovative and will also be continued in the future.

Annex 1. Planning of Co-UDlabs mobilities

n°	Sending partner	Hosting institution	*Duration planned in the GA (in weeks)*	Proposed duration (in days)	Staff #1 (first name - familly name)	Staff #2 (first name - familly name)	Staff #3 (first name - familly name)	Purpose of the mission	Activities to be performed	Related WP	Planned date
1	UDC	UoS	*1*	4	Luis CEA			Learn about experiment standardisation		WP8	TBC (1st quarter 2024)
2	UDC	DELTARES	*1*	5	Juan NAVES	Daniel CARRERES		Sharing experiences about imaging techniques for UDS		WP8	July - September 2023
3	UDC	EAWAG	*1*	TBC	Juan NAVES	Daniel CARRERES		Sharing experiences about imaging techniques		WP6	TBC (1st quarter 2024)
4	UDC	IKT	*1*	4	Jose ANTA	Joaquín SUÁREZ		Share experienceson permeable pavement testing	Development of permeable pavement clogging experiments	WP8	from 12/06/23 to 15/06/23
5	UDC	INSA	*1*	5	Jose ANTA			Share best practices in OTHU monitoring		WP8	TBC (aut 23/winter 24)
6	UDC	AaU	*1*	5	Juan NAVES			Installation of LSPIV equipment in the Aalborg retention pond	Preparation and installation of the cameras. Calibration. Performing of initial experiments	WP8	from 24/10/2022 to 28/10/2022
7	UoS	UDC		3	Kaeli			Learn about experiment standardisation		WP8	from 14/6/23 to 16/6/23
8	UoS	UDC	*2*	3	James Shucksmith			Collaboration UDC-UoS on Task 8.2	Visit of the Street and Block facilities of the Hydraulics Lab at UDC. Discussion of activities to be performed on Task 8.2 and potential collaborations	WP8	from 14/06/2023 to 16/06/2023
9	UoS	DELTARES	*2*	5	Henry Orime			Hydrodynamic modelling of defects (WP7 collaboration)		WP7	TBC (2024)
10	UoS	EAWAG		5	Isabel Douterelo			Visit urban water observatory and discuss research possibilities in relation with water quality issues		WP6	from 26/6/23 to 30/6/23
11	UoS	EAWAG		2 (TBC if budget left)	Alma Schellart			Collaboration on open CSO data, learn from Swiss & UK practice	prepare collaborative journal paper extending Novatech abstract work	WP6	TBC (aut 23/winter 24)
12	UoS	EAWAG	*2*	5	Simon Tait			Data management strategy and operational techniques (WP2 collaboration - linked to WP6)		WP6	TBC (spring 2024)
13	UoS	IKT	*2*	3	Simon Tait			Technical knowledge exchange and investigation of feasibility of developing project submission for latest EU calls.	Discussion on laboratory defect manufacture and the use of image based analysis to identify in-pipe defects. Joint meeing on AIR TA project to discuss technical issues. Examained feability of developing consortium/ project for 2023-24 calls for funding	WP7	from 10/10/22 to 12/10/22
14	UoS	INSA	*2*	2	James Shucksmith			Discussion of WP8 and exchange of best practices	Discussion of labratory facilities and complentary tests and timescales.	WP8	from 01/09/2022 to 02/09/2022
15	UoS	INSA		2 (TBC if budget left)	Alma Schellart			Collaboration on open CSO data, learn from French & UK practice	Prepare collaborative journal paper extending Novatech abstract work	WP6	TBC (aut 23/winter 24)
16	UoS	INSA		3 or 4	Henriette Jensen			Learn about methods for priority pollutants		WP6	TBC

17	UoS	INSA		3 (TBC if budget left)	James Shucksmith			Share best practice in WP8		WP8	TBC (autumn 2023)
18	UoS	AaU	*2*	3 or 4	Henriette Jensen			Learn about techniques for microplastics quantification		WP6	TBC
19	DELTARES	UoS	*2*	3 or 4	Antonio Moreno	Danko Boonstra	Francois Clemens	Collaboration on open CSO data, learn from UK practice, publication on optical sewer monitoring techniques	Data management strategy and operational techniques (WP2 collaboration - linked to WP6)	WP6	First stage (19-21st May 2023, second stage TBD)
20	DELTARES	IKT	*2*	3 or 4	Antonio Moreno	Danko Boonstra		Publication on optical sewer monitoring, Asset and data management strategy (WP2 collaboration), - learn from German practice	Work on joint publication	WP6	TBD (early 2024)
21	EAWAG	UDC	*1*	5	Prabhat Joshi			Collaboration on greef roof/ SUDS	To check the possibilities of adjusting the existing rainfall generator and to get to know the overall experimental set up	WP8	from 15/05/2023 to 19/05/2023
22	EAWAG	UDC		30	Prabhat Joshi			Collaboration on greef roof/ SUDS	Run the experiment to check how SUDS performance can change over time.	WP8	from 18/09/2023 to 20/10/2023 (TBC)
23	EAWAG	UoS	*0,50*	2	Simon Bloem			Collaboration on experimental techniques for hydraulic monitoring in the lab and in the field	Hydraulic experiments and sensor calibration procedure	WP6	TBC (2024)
24	EAWAG	INSA	*0,75*	2	Pierre LECHEVALLIER			Knowledge transfer spectrometry and sewer monitoring	Visit of the monitoring facility. Knowledge transfer about spectrometry and S::CAN use and work on T6.2	WP6	from 20/09/2021 to 21/09/2021
25	IKT	UDC	*2*	5	Marcel Goerke			Collaboration on SUDS: clogging of permeable pavement and green roofs (JRA 3)	Knowledge exchange SUDS about clogging permeable pavement and green roofs (JRA 3), discusing measurement concepts	WP8	autumn 2023
26	IKT	INSA	*0*	5	Marcel Goerke			Collaboration on SUDS: green roofs	Knowledge exchange SUDS about green roofs, discussing measurement concepts	WP8	summer 2024
27	IKT	UoS	*2*	5	Thomas Brüggemann			Collaboration on deterioration assets	Knowledge exchange deterioration assetts: discussing test concept and first test results	WP7	autumn 2023
28	IKT	DELTARES	*2*	3	not yet known			Collaboration on SUDS	Knowledge exchange SUDS (JRA 3); discussing test and measurement concepts about microplastic of roads	WP8	not yet known
29	IKT	DELTARES	*0*	3	not yet known			Collaboration on deterioration assets	Konwledge exchange on deterioration assets	WP7	not yet known
30	IKT	INSA	*0*	0,5	Thomas Brüggemann	Marcel Goerke	Matteo Rubinato	Mutual presentation and exploration of possible future collaborations.	Presentations and visits		01/09/2022
31	INSA	UoS	*1*	5	Frédéric Cherqui			Knowledge transfer pipe condition assessment technologies	Visit, experimental facility, data sharing, discussion on WP7	WP7	from 16/04/23 to 21/04/23

32	INSA	EAWAG	*1*	3	Mathieu Lepot			Discussion on spectrophometry and hyperspectral imaging / LoRa sensors	Visit, experimental facility, data sharing, discussion on WP6 and WP7	WP6	from 12/06/23 to 16/06/23
33	INSA	IKT	*0*	0,5	Jean-Luc Bertrand-Krajewski			Mutual presentation and further collaboration.	Presentation and visits		09/01/2023
34	INSA	IKT	*1*	4	Jean-Luc Bertrand-Krajewski			Green roof experiments and modelling (continuation of 1st visit in January 2023)	Labooraty analysis and discussions	WP6	from 10/07/23 to 13/07/23
35	INSA	AaU	*1*	4	Gislain Lipeme-Kouyi			Infiltration processes	Visit, experimental facility, data sharing	WP8	from 15/05/2023 to 18/05/2023
36	AaU	UDC	*2*	4	Jesper Ellerbæk Nielsen			Knowlegde trasnfer on LSPIV measuremenst	Infiltration rate measurements in growing soil - use for model verification	WP8	TBD 2024
37	AaU	INSA	*2*	4	Jesper Ellerbæk Nielsen			Prepare the experiments to *Assess green roof performance in the long-term*	Discussion of LSPIV Check rainfall generator and flow sensors availability.	WP8	TBD 2023
		TOTAL	*38,25*	**157**							

Table 2 – Detailed planning of Co-UDlabs mobilities (mobilities that have already taken place are highlighted in green)