



SYnergy of integrated Sensors and Technologies for urban sEcured environMent

D10.3 Second Risk Review Report

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V3.0



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Abstract	The report assesses the tests conducted by project partners from ethical, safety, privacy, points of view. The analysis delves on a questionnaire administered to partners in charge of the tests. The analysis shows that, overall, the research activities do not pose risks to the rights and freedom of both research participants and citizens in general. Areas deserving further attention are highlighted in the view of the next testing activities.

Editor	Sergi Vazquez Maymir, Eugenio Mantovani and Paul de Hert (VUB)
Contributors	Acqualatina, WUT, HSF, NAKA, ISEMI, UniBWM
Reviewers	Simona Cavallini (FORMIT), Roberto Mugavero (OSDIFE)
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VUB	V1.1	20/08/2021	Collection and analysis of first answers	Clarification of obscure parts of the answers to the questionnaire and contact with individual partners
VUB	V1.2	1/09/2021	Half of answers received. Incoming tests in Munich and Rome. Decision to include them	Writing of the core text of the document
VUB	V1.3	28/09/2021	Interview on tests in Munich	- Determined structure of the deliverable Writing of the core text of the document
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VUB	V1.4	15/10/2021	First draft	First draft complete
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FORMIT	V2.0	15/12/2021	1 st review	Minor comments
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FORMIT	V3.0	11/01/2022	Final draft	//

Every information is updated to the date of issue of this document

This document is composed of 35 pages

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List of acronyms and abbreviations

CA	Consortium Agreement
DoA	Description of Action
GA	Grant Agreement
GC	Gas chromatography
GSM	Global System for Mobile
HME	Home-made explosives
LC-MS	Liquid Chromatography Mass Spectrometry
LEA	Law Enforcing Agency
MSE	Municipal Sewage Company
PDMS	Polydimethylsiloxane
QTOF	Quadrupole time-of-flight
SCW	Smart Cable Water
TATP	Triacetone triperoxide
uS/cm	Microsiemens per centimeter
VOC	Volatile Organic Compound
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

This document constitutes the second Risk review report of the SYSTEM project, which is part of the project's Work Package 10 (WP10), the WP dedicated to identifying and mitigating the non-technological, viz. legal, social or ethical risks raised or emerging during SYSTEM's project activities. From July 2021 to September 2021, tests were performed in cities outside the precincts of project partners' institutions (non controlled environments). This report presents the analysis of the risks raised or emerging during these tests from legal, privacy and data protection specifically, social or ethical viewpoints. Overall, this assessment tells that research activities conducted in non-controlled environments did not pose any risks in terms of safety, or in terms of privacy or other fundamental rights. As the information provided by research partners indicates, the installation of sensors was performed by qualified personnel, with a contract, and respecting existing safety protocols. Neither the quantity and not the quality of the substances discharged in the manhole (notably, salt water) posed any risk to employees of the sewage companies or the wastewater companies or of the urban waste collecting services. No risk was posed to the environment or to other citizens either.

As for the collection of data, no personal ones have been collected. Purpose of these tests has been, in layman terms, to check the communication of data between sensors installed in the sewage and the external server. The data collected concerned only the communication between the sensors in the sewage and external servers. In no way can this data be processed to identify any individual. Partners have however appointed a DPO in their organisations; they have also selected adequate security measures for storing the data, to reduce the impact that loss or leak of the collected data could have on the rights and freedoms of others.

Finally, partners have taken the appropriate measures to ensure transparency of research activities. Partners have taken seriously the requirement, discussed in D10.2, for SYSTEM research activities to strike a balance between confidentiality and secrecy, on the hand, and transparency and accountability, on the other. Heeding the procedures and practice in place under each jurisdiction, partners have got in touch, informed, and obtained, where needed, the authorisation from local authorities to carry out the tests, cordon off the streets, enter the manholes. As tests are carried out in urban areas, it may be necessary for partners to be ready also to address questions that may come from passers-by.

1. MAIN ELEMENTS OF THIS DELIVERABLE

1.1 INPUT FROM OTHER PROJECTS

D10.3 “Second Risk Review Report” receives no particular inputs from other projects.

1.2 INPUT FROM OTHER WPs AND RELATION WITH OTHER SYSTEM DELIVERABLES

The deliverable provides an assessment that details how research activities conducted in non-controlled environments did not pose any risks in terms of safety, or in terms of privacy or other fundamental rights. Therefore, the information has been provided by research partners within the framework of the demonstration activities in WP8.

1.3 APPLICABILITY

The second Risk review report of the SYSTEM project is part of the WP10, dedicated to identifying and mitigating the non-technological, viz. legal, social or ethical risks raised or emerging during SYSTEM’s project activities.

1.4 REFERENCE DOCUMENTS

In order to set a framework in matter of a conflict between the Project Operational and Management Plan (D12.1) and other documents such as the Description of Actions (DoA) or the Grant Agreement, the following hierarchy will be applied:

1. Grant Agreement (GA);
2. Consortium Agreement (CA);
3. The Project Operational and Management Plan (D12.1).

The hierarchy related to the documents above implies that the latter document needs to be consistent with the former. In case of issues, this hierarchy of documents is mandatory.

1.5 PURPOSE OF THE DOCUMENT

The deliverable aims at the identification and mitigation of the non-technological, i.e. legal, social or ethical risks raised or emerging during SYSTEM demonstrations/tests in non controlled environment.

1.6 STRUCTURE OF THE DOCUMENT

The document is structured in the following way:

2. Chapter 2 provides an introduction to the deliverable;
3. Chapter 3 details a summary of tests in non-controlled environment;
4. Chapter 4 defines the main elements of the questionnaire about legal and ethical impacts of tests in non-controlled environment;
5. Chapter 5 describes the structure of the deliverable;
6. Chapter 6 provides some general information about the answers to the questionnaire provided by partners in charge of the tests;
7. Chapter 7 to 11 details the results regarding the risk review in relation to the activities carried out in Munich, Petržalka, Idstein-Beuerbach, Warsaw, Latina and Rome;
12. Chapter 12 provides an analysis of what identified by the assessment of the impacts of tests in non-controlled environment;
13. Annex 1 includes the questionnaire used for the assessment of tests and demonstrations in non-controlled environments.

2. INTRODUCTION

This document constitutes the second Risk review report of the SYSTEM project, which is part of the project's Work Package 10 (WP10), the WP dedicated to identifying and mitigating the non technological, viz. legal, social or ethical risks raised or emerging during SYSTEM's project activities. The first Risk review report dealt with tests conducted in controlled environments and labs. This report presents the analysis of the risks raised or emerging during the tests undertaken in non-controlled environments, that is, in areas outside the precincts of project partners' institutions. As in the previous report, the WP10 leader i.e. VUB circulated a questionnaire investigating the impacts of the activities from privacy, data protection and fundamental rights perspectives. The answers to the questionnaire, as well as the clarifications obtained via direct contacts, are reported and analysed in this document.

3. SUMMARY OF TESTS IN NON-CONTROLLED ENVIRONMENTS

During the period between July and September 2021, amid the constraints posed by the COVID-19 pandemic, the SYSTEM project partners conducted a series of tests in these cities: Munich (DE), Petržalka (SK), Idstein-Bauerbach (DE), Latina (IT), and Rome (IT). The COVID-19 pandemic has affected the organisation of the tests forcing to postpone most of them (see the SYSTEM Contingency Plan).

Testing activities are described and organised in WP8. Tests in non-controlled environment in SYSTEM are organised as "visits" in small and large cities. The small cities are Idstein, Latina, Rome and Warsaw. The large cities are Petržalka and Munich. The large cities' activities are supported by tests/visits/demonstrations carried out in small cities (i.e., Idstein, Latina, Rome, Warsaw).

The tests started after having carried so called coordination visits: these visits, carried out only in large cities (Munich and Petržalka) aimed at defining the possible test sites and the risks / opportunities associated with the tests themselves, as well as any further needs represented by the public service operators involved and / or by the LEAs.

4. QUESTIONNAIRE ABOUT LEGAL AND ETHICAL IMPACTS OF TESTS IN NON-CONTROLLED ENVIRONMENTS

In general, SYSTEM aims at developing a tailored network of sensing devices, which are integrated through a data fusion monitoring centre. SYSTEM components will support the detection of home-made explosives (HME) and synthetic drugs manufacturing by detecting intermediates and impurities of the production process and precursors used for their synthesis.

SYSTEM will acquire and process data from the sewage wastewater and solid waste networks as well as air emissions from target areas in real-time. These utility networks will be monitored continuously to detect and relate the occurrence of abnormal use of chemicals transported/provided within the whole area covered by SYSTEM. In this regard, networks of sensing devices – working in different and complementary utilities and environments – will be integrated into SYSTEM to be deployed across different urban areas in six cities, and their data will be fused into an improved data-based decision support system (SYSTEM DoA Annex 1, Part B, p. 9).

The process of technology development entails a series of activities, or tests, aimed at checking, in essence, whether the sensors and the data fusion deliver results that are accurate enough and adequate to investigating needs of LEAs.

For this questionnaire, the focus is on verifying whether the research activities are carried out in line with ethical principles and with legislation during the whole life cycle of the project. The relevant legislation and the ethics principles to be taken into consideration have been defined and discussed at length in the Report on the Legal, Ethical and Social Acceptance aspects of the SYSTEM formed of D10.1 (legal) + D10.8 (ethics and Social acceptance A) = D10.2.

The structure of the questionnaire has been simplified as compared to its initial version due to iterations within the consortium. These changes reflect the feedback received from partners concerning the clarity and the purpose of some questions. Furthermore, the questions have been reformulated to tackle directly issues that have emerged as critical in the second year of the project. This is notably the case of some questions in “Transparency of research activities” section. This specific benchmark, already detailed in D10.2, applies precisely for tests are conducted in urban areas. The purpose of this benchmark is not safety, which must be guaranteed by default, but serves to instil in SYSTEM (and in projects alike) a proactive approach towards informing, as appropriate, citizens, and/or local authorities (such as municipalities) about the main elements of tests, their purpose as well as their duration. Give the policing scope, projects like SYSTEM must find the appropriate transparency solution: the appropriateness of the solution cannot be unique. The reason for this is that European countries have different histories and, consequently, different levels of trust exist between citizens and public authorities. While respecting subsidiarity, however, some common principles remain, namely: total opacity or no communication is not justifiable, a strike should be found between the reasons of confidentiality and the right to be informed of citizens. The decision not to inform must be supported by serious motives and properly documented.

Moreover, unlike in the previous questionnaire, under the section “Area of data processing activities”, within the subsection “Data protection safeguards and requirements”, the partner organization is requested to merely confirm the contact details of the data protection officer (which appointment was a requirement to be accomplished at the beginning of the project).

The structure of the questionnaire includes four sections:

- A) Test and demonstration general information
- B) Area of Ethical issues
- C) Transparency of research activities
- D) Area of data processing activities

The complete template of the questionnaire is available in Annex I.

5. STRUCTURE OF THIS DELIVERABLE

The deliverable unfolds as follows: we report the answers received by partners in each test site, Munich (two tests), Petržalka, idstein-Beuerbach, Warsaw, Latina, and Rome. Subsequently, we analyse the answers received, leveraging on the frameworks and benchmarks identified and described in the SYSTEM Baseline report on the LESA frameworks (legal, ethical, and social acceptance). The analysis seeks to assess whether SYSTEM research activities are carried out in line with ethics in research standards and international and national legislation. A final section concludes the document and offers a recommendation to be taken into consideration in the incoming tests and demonstrations.

6. ANSWERS TO THE QUESTIONNAIRE PROVIDED BY PARTNERS IN CHARGE OF THE TESTS

This section reports the answers received by partners. The order of the questions (and answers) reflects the structure of the questionnaire. Only minor issues (typos, errors) have been amended. When possible, the replies have been reported verbatim. In other instances (i.e. where the interpretation was clear but the dictum obscure), the authors have used the indirect discourse. The questionnaires are available upon request to eugenio.mantovani@vub.be.

7. MUNICH

The research activities in Munich were performed in two rounds between 24 August 2021 and 24 September 2021. In both cases, the purpose of the tests has been similar, namely: to test the communication between ring shaped sensor (i.e. MicroMole) installed in the sewage and the data server of project partner RESI. Salt water was the chemical compound discharged in the manhole/sewage to activate the sensor.

MUNICH I

GENERAL INFORMATION

Institution hosting the test	UniBWM
Date of the test and duration	23.08.2021 – 27.08.2021
Location	Munich, a residential neighborhood in the area called Hasenberg.
Envisaged activities	<ul style="list-style-type: none"> • Installation of microMole rings • Data transmission to monitoring centre • Conduction of salt discharges • Validation of deployment planning strategy • Validation of localisation algorithms • Recording background (noise) concentrations of pH and electric conductivity in wastewater

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

The installation of the rings is performed by experts employed in the company “Blasy + Mader GmbH”. This company is accredited and approved by the official wastewater company of the municipality “Münchner Stadtenwässerung”. All workers involved are trained about safety protocols and instructions.

RISKS

Only known risks are incumbent, namely Toxic gas emissions out of sewers, danger of individuals slipping / falling; hygienic risks in sewers. Albeit impossible to be completely eliminate, these risks are mitigated by following the standard safety procedures.

QUALITY ASSURANCE AND MONITORING

In the performance of its tasks, UniBWM abides by a code of conduct of the professional association “Berufsgenossenschaft” and the regulations and standards of the national authority DWA (<https://en.dwa.de/en/>).

INCIDENTAL FINDINGS

The research activity did not include tests or chemical analysis, that justified the preparation of an incidental findings policy.

HUMAN PARTICIPANTS

Human participants in the tests are invited members of the SYSTEM consortium and workers from the Blasy + Mader GmbH company. The Blasy & Mader under the terms stipulated in the subcontract with UniBWM. A list of participants has been drawn.

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

The subcontract is the legal basis. Employees of “Münchner Stadtentwässerung” and employees of „Blasy + Mader GmbH” have been fully informed about the test’s purpose, means, risks and safety instructions before the deployment activities.

DISSEMINATION OF RESULTS

The results will be reported in project deliverable.

TRANSPARENCY OF RESEARCH ACTIVITIES

The city of Munich is informed about the test week through its wastewater company “Münchner Stadtentwässerung”.

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING REAL-LIFE PILOT

Sensor data:

- pH
- electric conductivity

DETAILS ON THE PROCESSING OF COLLECTED DURING REAL-LIFE PILOT

Collected data to be used for:

- Comparison with outcomes of the hydraulic model
- Validation of localisation algorithms

SECURITY OF DATA IN PILOT SITE

No sensitive data are acquired during test session. Access to data is only provided to project members.

ENCRYPTION OR OTHER MEASURES

No encryption.

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

Dr. Donald Riznik, +49 6004 4519, Donald.riznik@unibw.de

MUNICH II

GENERAL INFORMATION

Institution hosting the test	UniBWM
Date of the test and duration	20-24.09
Location	Munich
Envisaged activities	A residential neighborhood in Munich, in the area called 'Hasenberg'. A cordoned off area covering six manholes. The purpose: to install sensors in the sewage (micromole sensors) and perform communication tests with local server and RESI server.

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

Standard procedures and appropriate clothing. The area was cordoned off. Similarly to the previous test, Blasy & Mader subcontractor of UniBWM, was in charge of installing the sensors.

RISKS

As in previous test, only known risks are incumbent. No other relevant risks reported. The substance introduced in the manhole was salt water.

QUALITY ASSURANCE AND MONITORING

As mentioned in the previous test, in the performance of its tasks, UniBWM abides by a code of conduct of the professional association "Berufsgenossenschaft" and the regulations and standards of the national authority DWA (<https://en.dwa.de/en/>). This is the first installation of MicroMole rings: the purpose of the test was to test and solve problems of communication of the data.

INCIDENTAL FINDINGS

As reported in the previous test, there was no justification for incidental findings.

HUMAN PARTICIPANTS

Representatives from SYSTEM partners in Munich, Formit, Frahofer, Munich Sewage Company The Blasy + Mader under the terms stipulated in the subcontract with UniBWM

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

Legal basis was the contract where the terms of the collaboration are clearly spelt. Employees of „Münchner Stadtentwässerung“ and employees of „Blasy + Mader GmbH“ have been fully informed about the test's purpose, means, risks and safety instructions before the test.

DISSEMINATION OF RESULTS

Nothing planned except SYSTEM deliverables.

TRANSPARENCY OF RESEARCH ACTIVITIES

UniBWM obtained permission of the Munich sewage company (MSE).

UniBWM informed the city of .Munich via the Municipal Sewage Company (MSE).

UniBWM informed the main responsible engineer at MSE and the Managing Director.

Blasy + Mader informed the Municipal Road and Transportation Authority.

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING REAL-LIFE PILOT

During four days, the test involved testing the communication of sensor data such as pH and Conductivity measured by the micromole devices.

DETAILS ON THE PROCESSING OF COLLECTED DURING REAL-LIFE PILOT

Purpose of the test: to test the communication between sensors and servers

SECURITY OF DATA IN PILOT SITE

Standard security adopted in local UniBWM servers and RESI server

ENCRYPTION OR OTHER MEASURES

No encryption

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

As UniBwM didn't record any data, no action was needed by UniBwM.

DPO remains unchanged, Dr. Donald Riznik, +49 6004 4519, Donald.riznik@unibw.de

8. PETRŽALKA

GENERAL INFORMATION

Institution hosting the test	NAKA, ISEMI
Date of the test and duration	Over 20 days between July and August 2021 (see below)
Location	Bratislava, Petržalka
Envisaged activities	Environment: garbage collecting car + water sewerage network Object: target compound VOC + meth waste Duration: Two hours, two days, 20 days Expected outcome: detection of methwaste + VOC (explosives)

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

The team involved in the demonstrations uses protective coveralls and masks while manipulating the hazardous testing samples. No other hazards have arisen that requires further protections.

RISKS

Partner reports that no major risks are foreseen. It is known that workers from the garbage collecting trucks have been, in the past, exposed to dangerous items or substances left in the garbage bins. As mitigating measure, the sensor SKAM GaSens provides additional protection at work for the drivers and persons manipulating the garbage.

QUALITY ASSURANCE AND MONITORING

Similarly to Munich, the Slovak partner refers to standard protocols imposing rules on documentation and reporting of experiments that may have any impact on the environment.

INCIDENTAL FINDINGS

Besides known risks, the Slovak partner states that research activities do not entail unforeseen risks. It is highly unlikely that, while performing the tests, events potentially endangering the safety of researchers, such as light explosions in the garbage bins, occur.

HUMAN PARTICIPANTS

Employees of the sewage companies (i.e. BVS) and urban waste collecting services are directly involved in the preparation (i.e. deployment) and performing of the demonstrations.

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

Workers involved in the demonstrations are consent that the photographs may appear in any dissemination material. Photos report workers wearing helmets on which a GaSens is installed.

DISSEMINATION OF RESULTS

Various actors from the public and private sectors are invited to the demonstrations, and presentations are provided to LEA; additional short articles are published at least once a year. Results

are also presented at meetings and discussions with potential users, the Bratislava city police, the firefighters, and the private companies producing garbage bins.

TRANSPARENCY OF RESEARCH ACTIVITIES

The organising partner declares that “we have informed the public authorities of the great municipality of Bratislava about the sensing technology, and they expressed great interest in its use in the criminality policy of the city.” Also, “we work directly with a member of the Bratislava-Petrzalka city parliament. The person is involved in the development of the GaSens sensor. However, we do not intend to inform the citizens because the technology use will have a contra-productive effect.”

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING THE REAL-LIFE PILOT

Data from sensors are directly presented/visualised online, and everybody provided a link to the server, especially LEA, can follow the monitored compounds online

DETAILS ON THE PROCESSING OF COLLECTED DURING THE REAL-TIME PILOT

Data are presented and followed online. By this, we mean that data are transferred to end-users via the internet and the means of server communication any time we have installed and functioning sensors

SECURITY OF DATA IN THE PILOT SITE

Data are stored on a secured server. ISEMI is using a highly protected infrastructure according to the security clearance of the organisation. No data are publicly released.

ENCRYPTION OR OTHER MEASURES

Data are presented on a secured online server, and the server is encrypted accordingly.

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

Galya Terzieva terzieva@isemi.sk

The partner adds a further comment: “We expect further development of the power-related issues of the sensing system, which will allow us to install the sensors in sewage for a longer time and monitor the detected compounds online. In addition, we plan to install more SKAM GaSens sensors by the end of October in garbage bins and garbage collecting cars, at least 5-7 pieces. We plan to install at least two SKAM WaSens sensors in the sewage network simultaneously by the end of October.”

9. IDSTEIN-BEUERBACH

GENERAL INFORMATION

Institution hosting the test	Hochschule Fresenius gem. GmbH (HSF)
Date of the test and duration	26 th of July to 30 th of July
Location	Idstein-Beuerbach
Envisaged activities	<p>In this testbed session, which was carried out from the 26th to the 30th of July, the sewage wide area monitoring and sewage mainline monitoring to detect discharge of TATP or amphetamine synthesis wastes were performed. Therefore, the LC-MS analysed the WWTP influent of the catchment area Idstein-Beuerbach to detect synthesis specific substances of an amphetamine synthesis waste, while the MicroMole rings were installed in the three main sewer lines to detect abnormal pH and conductivity. All data was sent to the monitoring center for data fusion. Passive sampling using PDMS silicon rods and a commercial ORI sampler with a data logger were used as backup option. The autosampler of the LC-MS was programmed to collect 1 mL samples every 10 minutes as backup samples.</p> <p>Controlled discharges of aqueous solutions containing high salt and/or pH as well as of amphetamine synthesis wastes and TATP wastes were performed. It is expected to detect a discharge at least with one sensor or passive sampler.</p> <p>A new ionization source coupled to a QTOF mass spectrometer was successfully tested to detect TATP.</p> <p>Two flow sensors were installed in two important sewer lines to observe the flow speed in the pipes.</p> <p>The analysis of wastewater using the micromole rings and flow sensors was prolonged until the 9th of August to generate background information.</p> <p>During the testbed session, new locations to install the micromole rings for mainline and inline sewage monitoring were visited and data communication was tested. These locations should be used in the next visit and the environments air and solid waste should be included as well.</p>

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

Project partner HSF reports that, to ensure safety, researchers and participants have received an introduction to the WWTP Idstein-Beuerbach, the WWTP Idstein-Beuerbach about safety instructions and as well as and for the Covid-19 situation. Specifically, the manager of the water company WWTP. who, having direct daily work experience in the sewage system, who explained the safety measures. For installation of sensors, specific materials were used, such as triangles, gas warning systems, appropriate clothing.

The safety protocols as well as the signatures of participants in the tests are collected and can be shared upon request. Suffice is to say that without the safety introduction, individual persons are not allowed to work either at the WWTP Idstein-Beubach, in the sewage system or at the laboratory. As far as sensors, self-made sensors have a self-certification of safety in line with ATEX certification scheme.

RISKS

Through the safety introductions, potential risks are minimized.

QUALITY ASSURANCE AND MONITORING

Prior the testbed session, the partner organised several meetings to discuss the agenda of the session. The agenda of the day was approved by all participants prior to the session. Afterwards, the testbed session is summarized in minutes and meetings are planned to discuss the results.

INCIDENTAL FINDINGS

At the current time, only expected risks are likely to arise, in line with the original purpose of the research.

DISSEMINATION OF RESULTS

Project partner explains that it is too soon to say if the results from the tests can be used for publication/dissemination.

HUMAN PARTICIPANTS

Beside SYSTEM partners, only employees of the sewage company were involved in the installation and dismantling of the sensors.

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

Only in house workers at the sewage company and researchers from SYSTEM attended the tests.

TRANSPARENCY OF RESEARCH ACTIVITIES

The project partner as well as the management of the sewage company and the municipality of Idstein were informed “directly and in person” about the testbed sessions and demonstrations. Partner adds that there was no need to inform all citizens in the light of the purpose and means of the testbed session, which did not involve any processing of personal data.

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING REAL-LIFE PILOT

Data were collected from sensors

- Micromole: pH and conductivity of wastewater, at the instalment location of the rings
- LC-MS: synthesis-specific substances of an amphetamine production waste
- Passive: sampling synthesis-specific substances of an amphetamine production waste and TATP from production waste
- Flow sensors: velocity and filling level of wastewater in the sewage system

DETAILS ON THE PROCESSING OF COLLECTED DURING REAL-LIFE PILOT

1. LC-MS: Data was collected on the internal memory of the computer and was send to the monitoring center, data was sent form HSF to RESI, data was sent and stored from the 27th to the 30th of July
2. Micromole: Data was collected on a SD memory in the gateways and was send to the monitoring center, data was sent from WUT/FHG to RESI, data was sent and stored from the 26th of july to the 8th of August
3. Flow sensor: Data was collected on an internal memory from the 27th (30th) of July until the 8th of August (in brackets was the second flow sensor)
4. Passive sampling: Data will be collected on the internal memory

SECURITY OF DATA IN PILOT SITE

The data is stored on computers that are connected to the instrument or on memory cards on the sensor. Only SYSTEM partners will have access to these data. The data will be also stored on the RESI monitoring center

ENCRYPTION OR OTHER MEASURES

Project partner reports that there is encryption protocol in place.

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

T (office) +49 6126 9352-238
froemel@hs-fresenius.de

10. WARSAW

GENERAL INFORMATION

Institution hosting the test	Warsaw University of Technology
Date of the test and duration	18/06/2021, 7 days
Location	Warsaw
Envisaged activities	<p>We install three sets of pH and electrical conductivity sensors (micromole devices), and one device capable of taking physical samples of wastewater (the S2M device) on demand in a sewer main line in the center of Warsaw near WUT campus. All devices were mounted from 18/06/2021. The sampling device was extracted on the 22/06/2021 due to a hardware failure. All other devices were extracted on the 25/06/2021.</p> <p>Then, for purposes of testing, we discharge different chemicals in a nearby toilet of a building of WUT, which is connected to the sewer mainline where the sensors are mounted.</p> <p>The main goal of the test is to observe the difference in the levels of pH and conductivity over time and space due to the discharge events, and when no discharge events are carried out. We expected to observe 1) a significant change in the pH and electrical conductivity of the wastewater after each discharge event, and 2) traces of the discharged chemicals in the collected samples by the S2M.</p>

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

The Micromole and S2M devices should be installed in a manhole. Any access to a manhole should be made with caution, as lethal gases may be present and wastewater can be considered biohazardous. All protocol established by the sewage company of Warsaw were followed.

Some of the substances used for the discharge experiments are dangerous in concentrated form. The discharges were made by Central Forensic Laboratory of the Police - CFLP, following their internal security protocol. First dangerous substances were dissolved in water to obtain concentration on expected level. Moreover, protective clothing (e.g. gloves, glasses, lab coats) were used during discharges.

RISKS

Inhalation of dangerous gases during access to a manhole, leading to unconsciousness and a subsequent fall through the manhole. Measures to prevent such situations include: measurement of gases prior ingress to the manhole, usage of protective equipment, attachment to a security line.

Concentrated sulphuric acid reacts violently with many organic matters to produce a lot of heat and releasing hydrogen so diluted solution were used for discharges. Sulphuric acid is irritating for skin or eyes and may cause damages or serious injuries, so the solutions were prepared on open area outside the building and the staff was equipped in protective clothing. The risk was similar for sodium hydroxide used for experiments.

Installation of any equipment in a sewage - highly bioactive environment (a lot of bacteria and fungi) - is dangerous for peoples' health so special protective clothing was used as well as disinfectants for equipment cleaning.

QUALITY ASSURANCE AND MONITORING

Measurements in the sewage system were carried out under the supervision of the Municipal Water and Sewerage Company. All restrictions and safety procedures appropriate for the operation of the sewage network were applied.

INCIDENTAL FINDINGS

During the tests, we observe a regular abnormal and unexpected variation of electrical conductivity, with peaks rising to 3000 uS/cm every 30-50 mins, even in moments where there were no discharges or experiments.

After an internal discussion, it is concluded that the definitive reason for this is unknown, but most likely could be related to the disposal of some waste from air-conditioning system for large buildings in the area.

DISSEMINATION OF RESULTS

Not by WUT or CFLP.

HUMAN PARTICIPANTS

WUT and CFLP personnel attended the tests. The installation and deinstallation of the devices were carried out by the sewage company of Warsaw and WUT personnel.

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

The Sewage Company of Warsaw (AFAK, participating to test not as a SYSTEM partner /subcontractor) helped in installing and deinstalling the devices in the sewage. There is contract signed between AFAK and the CFLP (partner) whose object is carrying out these specific activities.

TRANSPARENCY OF RESEARCH ACTIVITIES

The partner refers to Formit, the coordinator.

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING REAL-LIFE PILOT

Data from sensors:

- pH and Electrical conductivity with timestamps of wastewater from three manholes

Data from collected samples by S2M:

- no traces of specific marker (ethanol, which was added to discharged solutions) were detected using GC. There are two possible reasons: 1. the concentration of the marker was

too small because of dilution or 2. wrong samples were collected (not in a good time). Considering sensitivity of GC used for analysis the second option is more likely.

DETAILS ON THE PROCESSING OF COLLECTED DURING REAL-LIFE PILOT

Data collected by the MicroMole sensors will be used by WUT in WP3 for testing purposes of the data fusion algorithm. The data can be shared with any participant of the project upon request. No requests of this type have reached us.

Data collected by the GC from CFLP will be used by WUT in S2M improvement as well as for data fusion algorithm.

SECURITY OF DATA IN PILOT SITE

MicroMole sensor data is stored at WUT and BTEC servers.

ENCRYPTION OR OTHER MEASURES

There were no telecommunication security protocols put in place for this test session.

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

Fernando Solano, delegated data protection officer for this project at WUT.

11. LATINA

GENERAL INFORMATION

Institution hosting the test	Acqualatina
Date of the test and duration	14 July 2021
Location	Borgo Piave (LT) treatment plant
Envisaged activities	<p>Tests were performed in wastewater with the Smart Cable Water (SCW) device. We spilled a number of compounds at a manhole located on the main high traffic road and the sensor was installed inside a large receiving sink at about 60 meters distance, this is the main inlet inside the water treatment plant.</p> <p>The first objective was to test reliability of sending data with GSM connectivity. For the purpose we drove the sensor outside the plant for about 30 minutes in areas of poor GSM reception.</p> <p>Other objectives where to spill key explosive precursors and to detect them and to correctly classify. The final objective was to verify reception from the RESI remote monitoring station of all classified data and to prove resilience to poor GSM connectivity. All experiments were performed in one working day.</p>

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

All participants spilling substances, handling the devices, working on the installation and in general getting in close proximity of wastewater were obliged to wear gloves.

RISKS

Biological contamination from wastewater was the main risk. Excessive inhalation of compounds to be spilled also was a hazard. In both cases gloves and face masks were worn.

QUALITY ASSURANCE AND MONITORING

Partner explains that quality assurance and monitoring were attained if the experiments to be successful, namely if the expected results were achieved.

INCIDENTAL FINDINGS

There were no incidental findings.

DISSEMINATION OF RESULTS

n.a

HUMAN PARTICIPANTS

there were a few employees of Acqualatina the wastewater company, all other participants were from the SYSTEM consortium.

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

No external participants were present at the test session.

TRANSPARENCY OF RESEARCH ACTIVITIES

The partner refers to Aqualatina, who hosted the test, and to the coordinator Formit.

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING REAL-LIFE PILOT

Data collected were measurements of the chemical interaction of spilled compounds with sensors in the wastewater environment.

DETAILS ON THE PROCESSING OF COLLECTED DURING REAL-LIFE PILOT

Throughout the experiments, data from multiple sensors integrated on the SCW was acquired, processed locally to obtain a list of classified substances. The table was sent in real-time to the RESI remote monitoring station by means of a GSM network.

SECURITY OF DATA IN PILOT SITE

Please provide a description of where you plan to store the data collected after each pilot session: where do you store it who can have access to it.

ENCRYPTION OR OTHER MEASURES

No encryption.

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

Roberto Simmarano

12. ROME

GENERAL INFORMATION

Institution hosting the test	ACEA (Acea Ato2 Spa)
Date of the test and duration	21-22. 09. 2021
Location	Rome
Envisaged activities	<p>A residential area in Rome, Case Rosse. A road about 700 meters long was cordoned off. The purpose of the one day test was to verify the sensors in the manholes in terms of functioning and communication. A number of substances was released in the manholes:</p> <ul style="list-style-type: none"> - Formic acid (CH₂O₂) - hydrogen peroxide (H₂O₂) - acetone (C₃H₆O) - sulphuric acid (H₂SO₄) - sodium hypochlorite (NaOCl) - TATP production waste

AREA OF ETHICAL ISSUES

HEALTH AND SAFETY PROCEDURES

ACEA put in place all the safety protocols and conditions that it adopts routinely in any intervention involving descending into manholes according to Italian Law Dlgs 81/08 and to internal procedures and to the *Documento di Valutazione dei Rischi* (Risk evaluation document).

RISKS

No major risks besides known risks of inhalation, heating. A responsible for the safety from ACEA was present.

QUALITY ASSURANCE AND MONITORING

The purpose of the test the capacity of sensors to stay active and communicate data about precursors dispersed in the water.

INCIDENTAL FINDINGS

No incidental findings expected

DISSEMINATION OF RESULTS

n.a

HUMAN PARTICIPANTS

Representatives from SYSTEM project partners ACEA, Carabinieri, Sensichip, Resi, Formit participated in the test.

CONSENT OF THIRD-PARTY HUMAN PARTICIPANTS

No external participants took part in the tests.

TRANSPARENCY OF RESEARCH ACTIVITIES

Acea ATO 2 Spa belongs to Acea Group. The holding Acea Spa, listed in Milano Stock Exchange is controlled by Roma Capitale (51%)

ACEA informed the municipality and the Carabinieri (LEA) who took part in the test.

In order to operate safely ACEA informed the municipality to have traffic restrictions in the interested area.

AREA OF DATA PROCESSING ACTIVITIES

DATA COLLECTED DURING REAL-LIFE PILOT

Data from the *smart cable water sensors*

DETAILS ON THE PROCESSING OF COLLECTED DURING REAL-LIFE PILOT

The purpose of the test was not the collection of data but the testing of the ability of the sensors to collect and communicate data.

SECURITY OF DATA IN PILOT SITE

n.a

ENCRYPTION OR OTHER MEASURES

n.a

DATA PROTECTION SAFEGUARDS AND REQUIREMENTS (CONFIRM THE CONTACT DETAILS OF THE DATA PROTECTION OFFICER OF YOUR ORGANISATION)

Alessia Zeppieri privacy@aceaspa.it

13. ASSESSMENT OF THE IMPACTS OF TESTS IN NON-CONTROLLED ENVIRONMENTS

This section provides an assessment of the SYSTEM research activities against the benchmarks established by the project in SYSTEM Baseline report on the LESA frameworks (legal, ethical, and social acceptance).

In the field identified as “area of ethical issues”, and more specifically in the sector of Health and safety, the answers received show that all partners took the appropriate measures to ensure the safety of the test. In all cases, the installation of sensor in the sewage through the manhole was performed by qualified personnel following established procedures and wearing appropriate clothing and safeguards. Entering manholes is risky because lethal gases may be present and wastewater itself may be biohazardous. No unforeseen risks have emerged. The substances discharged in the manhole were also innocuous, salt water, or precursors in small quantities, eliminating any further risk to health and safety. Overall, the safety procedures adopted are adequate to stem known risks associated to the research activity such as inhalation, heating, danger of individuals slipping / falling; hygienic risks in sewer.

Research activities did not reveal any unexpected finding. In Warsaw, however, during the tests, Warsaw University of Technology observe a regular abnormal and unexpected variation of electrical conductivity, with peaks rising to 3000 uS/cm every 30-50 mins, even in moments where there were no discharges or experiments. After an internal discussion, it is concluded that the definitive reason for this is unknown, but most likely could be related to the disposal of some waste from air-conditioning system for large buildings in the area.

Participation in the tests was restricted to SYSTEM partners’ researchers and water companies’ employees. In all cases, the partners and the water companies worked on the basis of formalised relations of collaboration between them. This means that employees of the water companies. Sewage companies, waste disposal services had been fully informed about the purpose and the means of the test; They also participated in the study actively, together with partners’ researchers. This collaboration is either based institutional arrangements, as in Rome and Petržalka, or based on contracts, such as in Warsaw and Munich either on the basis of contract or subcontract.

Transparency of research activities is an important area. As detailed in D10.2, our legal and ethical analysis commends a proactive approach to inform the public about the tests, *in the appropriate form*. “In the appropriate form” means that it is up to partners to decide to which public entity or sector information about tests or demonstrations should be provided. Abandoning the perimetry of wastewater sites or police precincts and entering the city means cordoning off some urban streets; this means that city authorities must be imperatively informed, and, in case, authorisations obtained. Istein-Beuerbach, Latina, Rome, Petržalka have informed the public by reaching out to the local authorities, water companies, sewage companies, police. These measures are well described in the questionnaire. It is important, however, that the partners keep documented evidence of the activities they carry out under the chapter “transparency”, for instance when they meet a city council official or the head of the water company.

In addition, partners must start thinking about their relationships with citizens when they are out in the streets. It is equally important that citizens and passers-by who are curious, who see researchers at work, and wishes to know what is going on gets some information. In this respect, progress can be

made. There is indeed some justified reticence and scepticism on the side of some LEAs. Slovak police thinks that it is downright inappropriate to give any information to citizens. But what if someone asks? It is worth repeating the rationale behind the requirement of transparency: it is avoid creating a chilling effect on citizens, who may fear that something is going on about them, “under” them quite literally, to them unbeknownst; that they are being watched and surveyed. We must avoid creating this chilling effect. One way is for SYSTEM partners to be ready to answer questions about the research if citizens ask.

This holds true even if, in fact, not a single test surveyed in this document can be said to have collected or processed any personal data, other than those personal data of the people participating actively in the test, of course. The data collected – about the communication between sensor in the sewage and server outside - can in no way identify a natural person: they include measurements of the interaction of spilled compounds with sensors in the wastewater environment, flow data, data about pH and Electrical conductivity, etc. In all tests, no personal data has been collected.

As for the security of such data, the departing situation is “this is not personal data thus there is no risk to data privacy.” Accordingly, each partner stored the data locally and shared the data with partners RESI, whose server acts as the central brain of SYSTEM without using encryption. Likewise, most partners did not adopt extra security measures for storage, judging the data not vulnerable to any misuse or likely to be stolen or leaked with adverse consequences for data subjects. In case data is lost, the damage would be only for the research; and a limited one, for that matter. If criminals gained access to SYSTEM data collected in the test, what would happen? Also in this event, the risk of any harms seems minimal. This is justified by the nature of the data collected, which are not personal data.

All partners have confirmed that a DPO is in place at the partner institution in charge of the tests.

In conclusion, the assessment indicates that the SYSTEM research activities in non-controlled environments have been carried out in line with recognised standards of ethics in research, in line with the local rules and in respect of the rights and freedom of the persons who participated in the tests and citizens in general. Participants abided by safety protocols reducing risks of physical harm. No personal data has been collected. Information to the public has been provided by means of information to city authorities. Smart cities and sensor technologies have at times sparked public backlashes. Given the innovative nature of SYSTEM, it is necessary to invite public oversight and accountability. Informing public authorities must continue.

For the future tests, perhaps partners could think about ways of informing the passer by walking the dog near a cordoned-off area. A viable option could be to discuss with city authorities the best ways to communicate to citizens during research activities in urban areas.

The WP10 leader (in charge of legal and ethical aspects) will monitor relationships between LEAs and the organisations responsible for garbage trucks, their involvement (roles, responsibilities) must be defined better. So far, drones do not appear in the tests. Drone-mounted thermal cameras are very intrusive since, in a sense, they can pick out a person in their home, possibly even through (visual) obstacles. If applied, drone surveillance is likely to raise own questions, in case it is tested in urban areas.

14. LIST OF ANNEXES

Annexes of this deliverable are:

- Annex I - SYSTEM Questionnaire for tests and demonstrations in non-controlled environments.

15. ANNEX I SYSTEM QUESTIONNAIRE FOR TESTS AND DEMONSTRATIONS IN NON-CONTROLLED ENVIRONMENTS

SYSTEM QUESTIONNAIRE FOR TESTS AND DEMONSTRATIONS IN NON-CONTROLLED ENVIROMENTS

July 2021

Executive Summary:

SYSTEM “*Questionnaire for tests and demonstrations in non-controlled environments*” is part of SYSTEM’s ethics management strategy, described in WP10 and in Section 5.1, Proposal 787128 - SYSTEM - Part B Annex 1.

Research activities must be carried out in line with ethical principles and with legislation during the whole life cycle of the project. SYSTEM research activities include tests in controlled environments as well as in real life settings or non-controlled environments

As SYSTEM project partners are undertaking tests in real life settings, VUB, in its capacity of SYSTEM’s Legal and Ethical Manager, would like to address to them a series of questions.

These questions are designed to assess the risks to legal and ethical frameworks (so called LESA framework) and the mitigating measures put in place to ensure the tests are conducted in an ethically and legally sound fashion.

The risk areas have been previously identified in Report on the legal, Ethical and Social Acceptance aspects of the SYSTEM project[M19](VUB) submitted) (formed of (D10.1 (legal) + D10.8 (ethics and SA)= D10.2), and in Legal and Ethical Management (Task 10.3)- Legal and ethics support package [M3](VUB) (D10.4) _(submitted).

The questions’ aim, to assess how risks have been tackled, requires that partners take the time to refresh the notions discussed those deliverables and try to provide an answer as comprehensive as possible. A succinct explanation is added to some questions.

The answers received will be analysed and systematised in the WP9 second Risk Review Report.

In case partners think that a question is not relevant, have doubts or not enough information, if partners are prevented from sharing information to respect confidentiality obligations, they are expected to state so.

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A) TEST AND DEMONSTRATION GENERAL INFORMATION	
Institution hosting the test	
Date of the test and duration	
Location	
Envisaged activities	<p>Please describe in layman language what you are doing in this test. Please indicate what is the environment of the test, the object of the research, the duration, and the expected outcome (purpose, what you want to test)</p> <p>....</p>

B) AREA OF ETHICAL ISSUES	
0. Health and safety procedures	<p>Specify if there are any procedures, situations or material that may be hazardous, and what precautions are taken to ensure the safety of researchers and participants. In the event internal protocols will be used please mention them.</p>
1. Risks	<p>Describe any potential risks – physical, psychological, emotional, legal, or other – associated to the research activity or to the participants, and assess the likelihood of occurrence and describe the mechanisms in place for protecting against or minimizing any potential risks identified.</p> <p>If you do foresee any relevant risks, please state so.</p>
2. Quality assurance and monitoring	<p>Please indicate whether there is any mechanisms set up to oversee the research activity. Mention, for instance, any research protocol, code of conduct, piece of legislation or internal or deliberation from any internal or external boards who have commented on or approved on the research activity.</p>
3. Incidental findings (1)	<p>Incidental findings are defined as results that arise that are outside the original purpose for which the test or procedure was conducted. Secondary findings arise and are actively sought but they do not represent the primary objective of the test or the procedure</p> <p>Can you reasonably foresee that as a result of the envisaged research activities any incidental findings might arise?</p> <p>If, please explain.</p>
4. Dissemination of Results	<p>Specify whether the results of this research activity will be used for dissemination outside the project and discuss the publication policy that applies.</p>

<p>5. Human participants</p>	<p>Indicate if individuals that will be involved in the test include persons belonging to the SYSTEM consortium or already working with project partners and if individuals, or groups of individuals external to the consortium have been invited. In particular, please indicate whether employees (e.g., of sewage companies or of urban waste companies) are involved.</p>
<p>6. Consent of third-party human participants</p>	<p><i>Please confirm that participants who external to the project and take part in the test they do so voluntarily and are well aware of the test's purpose, means and risks. Keep</i></p> <p>Remember that when images are processed, a specific consent must be obtained. Keep the consent documents on file.</p>

C) TRANSPARENCY OF RESEARCH ACTIVITIES

<p>0. Information to the public</p>	<p>As detailed in D10.2, In the event a test or demonstration in urban areas, SYSTEM recommends a proactive approach to inform, as appropriate, citizens, and/or local authorities, municipalities, about the main elements of tests, and in general, its purpose and means as well as its duration.</p> <p>A strike should be found between confidentiality of SYSTEM activities and the right to be informed, while total opacity or no communication is not justifiable.</p> <p>Please indicate which authorities and channels you use to inform the citizens or the authorities about SYSTEM research activities in urban settings. and how.</p> <p>If you do not plan to inform about your activities, please motivate your decision.</p>
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D) AREA OF DATA PROCESSING ACTIVITIES

<p>0. Data collected during real-life pilot</p>	<p>Please indicate which data you are collecting</p> <ul style="list-style-type: none"> - Example: - Data about Human participants (Employees i.e waste truck drivers) - Data from sensors (Readings from utility networks; air emissions) - : Images from thermal cameras <p>Please add as many rows as data sets you need</p>
<p>1. Details on the processing of collected during real-life pilot</p>	<p>Please describe, in layman terms, the envisioned data flow in the test indicating data recipients (where to where? whom to whom?, scale (how much? how many?) Time (when? how long?)</p>
<p>2. Security of data in pilot site</p>	<p>Please provide a description of where you plan to store the data collected after each pilot session: where do you store it who can have access to it.</p>
<p>3. Encryption or other measures</p>	<p>Please indicate which security protocol you use to protect data in transit</p>
<p>4. Data protection safeguards and requirements</p>	<p>Please confirm the contact details of the data protection officer of your organization</p>

Please add any comment if you wish to make