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5G for a Better Tomorrow: Protecting Lives and the Environment in Riga and Turin
Grant Agreement No 101133716

5G4LIVES D1.2 DATA MANAGEMENT PLAN

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5G4LIVES
D1.2. Data Management Plan

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ABSTRACT

In an era where technology is advancing at an unprecedented pace, the project takes center stage as an initiative committed to harnessing innovation for the greater good. This project unfolds its transformative vision across two distinct geographic clusters, Latvia and Italy. It strategically leverages 5G connectivity alongside cutting-edge technologies such as Unmanned Aerial Vehicles (UAVs or drones) and alternative hydrogen power. With a dual mission of enhancing public safety and environmental health, the project "5G for a Better Tomorrow: Protecting Lives and the Environment in Riga and Turin" (5G4LIVES) unfolds a narrative where data-driven forecasting and real-time aerial situational awareness become the bedrock of a more secure, efficient, and sustainable future.

At its core, the project seeks to enable optimal emergency management and data-driven forecasting, a mission encompassing the entirety of public safety. Through the dynamic fusion of 5G connectivity and UAVs, this initiative aims to provide real-time aerial situational awareness and automatic vulnerability assessment for at-risk areas. The project's scope extends beyond traditional rescue operations, pushing the boundaries of innovation to safeguard both human lives and the environment.

The project in Latvia involves using drones and 5G technology for monitoring and rescue operations, especially at Vecaku Beach and Kisezers Lake in Riga. This approach aims to enhance police efficiency, particularly in challenging terrains. In Turin, the focus is on developing a 5G-enabled service for situational awareness and vulnerability assessment to counter natural disaster threats. This includes testing anti-drone hacking technology, integrating satellite data, and improving pilot-drone command for better emergency response. The project also includes research in Riga on safety protocols and procedures for urban drone operations and beyond-visual-line-of-sight (BVLOS) flight methodologies with the European Union (EU)-wide relevance. A significant aspect of the project is to engage in extensive communication to inform and educate local, national, and EU networks about these technological solutions.

By leveraging 5G and drones, the project promises quicker and more effective emergency response, addressing staff shortages in law enforcement and expanding their skill set. In Latvia, the use of drones and 5G connectivity will empower law enforcement to intervene more swiftly, addressing staff shortages, and expanding the skill set of police officers. In Italy, the project will mitigate the threat of natural disasters and test innovative anti-drone hacking technologies, leading to more efficient emergency responses. Additionally, developing safety protocols, and procedures for urban drone flights, and validating BVLOS flight methodologies will set new standards for public safety and security. The project emphasizes community involvement and knowledge sharing, ensuring that the benefits of these technological advancements extend beyond immediate emergency management to foster a more resilient and informed society.

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ABBREVIATIONS AND ACRONYMS

5G	The Fifth Generation of Wireless Cellular Technology
AI	Artificial intelligence
BVLOS	Beyond-visual-line-of-sight
D	Deliverable
DMP	Data Management Plan
DOI	Digital Object Identifier
EU	European Union
EUR	Euro
FAIR	Findable, Accessible, Interoperable and Reusable
FWA	Fixed wireless access
ID	Identification
IP	Internet Protocol
ISSN	International Standard Serial Number
LEP	Legal and Policy Officer
LTE	Long-term Evolution
Mbps	Megabits per second
PII	Publisher Item Identifier
RM	Riga Municipality
SGEI	Socially Responsible Public Services
STEM	Science, Technology, Engineering, and Mathematics
T	Task
TB	Terabyte
UAV	Unmanned Aerial Vehicles
WP	Work Package

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EXECUTIVE SUMMARY

A data management plan (DMP) is a formal document that outlines how data will be handled during and after a research project. Documenting a plan for the research data is a best practice and will help data comply with widely accepted policies for responsible data management. At the same time, research is all about discovery, and the process of conducting research sometimes requires revising the intended path. The DMP is a living document that you may need to alter to reflect changes in the research. Any time when research plans change, DMP is reviewed to ensure that it serves its initial target.

This task is highly relevant to address from the beginning of the project how ethics and data management aspects will be dealt. Two aspects are tackled: privacy (to ensure that proprietary or personal data is not externally accessible) and ethics (to make appropriate use of AI technologies where relevant and avoid the identification of individual persons from data streams, further than performing a correct use of data). Moreover, this task will continually assess and improve the requirements of knowledge exchange, ensuring data and outputs are managed in line with the FAIR principles. This entails development of a robust Data Management Plan (D1.2). It will clearly define what data will be published, as open data might generate a wider interest towards the project.

The present deliverable D1.2. T1.4 of the 5G4LIVES project is developed by the annotated model grant agreement and FAIR (Findable, Accessible, Interoperable and Reusable) principles. Data management is the process of organizing, storing, protecting, and maintaining data throughout its lifecycle. This includes tasks such as data entry, quality control, storage, retrieval, and archiving. In the context of the 5G4LIVES project, data management tasks involve ensuring that all data collected and generated during the project is properly managed and utilized for the project's objectives. This includes establishing protocols for data collection, ensuring data quality and accuracy, storing data in a secure and accessible manner, and implementing procedures for data sharing and dissemination.

Data management also involves addressing issues related to data privacy and protection, ensuring compliance with relevant regulations and guidelines. Effective data management is critical to the success of the 5G4LIVES project, as it enables informed decision-making, efficient resource allocation, and effective communication among project partners and stakeholders.

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INTRODUCTION

The main goal of the 5G4LIVES project is to design, test and create a 5G-enabled scalable, sustainable, innovative, and high performing emergency management and risk prevention service - focusing on search and rescue operations in Riga and on the management of natural disasters in Turin.

To achieve this goal, the project will leverage the synergies of modern and sustainable technologies, such as 5G, UAVs, with an eye on scaling the service with the support of 6G and beyond, spaced-based network infrastructure. Riga's platform key features for command and control and Turin's emergency management and risk assessment service will encompass technical accessibility to land/hilly and hard-to-reach areas for aerial monitoring and smart data collection, 5G enabled efficient data transmission and processing for quality decision-making, and green power technologies such as hydrogen.

At the operational level, this will lead to shorter reaction times which are critical in life-saving operations as in the case of people who may have gotten lost, be stranded in water and caught in fire outbreaks, or whose life is in danger because of landslides, floods, earthquakes and other earth-driven emergencies. Effective monitoring of vast, hard-to-reach land and water areas will also enable timely identification, tracking and prevention of potential life-threatening risks for inhabitants, as well as more efficient work of field officers and land experts, as in the case of Turin. In this context, 5G solutions will ensure reliable connectivity to support the functioning of public administrations and authorities as well as the provision of services of general economic interest.

In the longer term, the platform will enable the provision of services of general interest and Socially Responsible Public Services (SGEIs). By leveraging the power of 5G and other advanced technologies, the 5G4LIVES project aims to enhance public safety and emergency management by conceptualizing, implementing and evaluating a new scalable and sustainable service of general economic interest to the benefit of inhabitants and the environment.

The use of UAVs is intended for the BVLOS flights mode. The main safe operation component of drone BVLOS is the ability of the drone operator to control drones and to send commands to them in any phase of flight when they are out of sight. When piloting a drone in BVLOS mode using a cellular network (LTE/5G), The cellular network provides the critical communication channel in this situation. To achieve the project's goal, the solution will use a mobile network prediction tool to provide near-real-time information on 5G network availability, thereby increasing security and enabling BVLOS drone deployment. With the help of this tool, the mobile network operator will be able to plan the deployment of 5G coverage more precisely, and the drone operators will be able to theoretically check the network availability before the operation, ensuring that all critical communication network parameters are met and a safe BVLOS flight will be performed.

Although mobile network coverage forecasting tools, which are usually implemented in the form of specialized computer programs, can obtain relatively accurate theoretical coverage results, they do not guarantee that the mobile network will operate in real conditions providing the obtained characteristics calculated in theory. Under the influence of several objective factors that cannot be included in theoretical calculations, there are practically always greater or lesser differences between the theoretically calculated and the actual obtained characteristics in operating conditions, as well as due to various technical reasons, the mobile communication network may work differently in reality than was theoretically planned. The added value and scope of the 5G use cases created by the project lie in the enhancement of emergency response capabilities, specifically for locating missing persons and vessels in different scenarios such as water or ice. By utilizing the advanced capabilities of 5G networks, drones will be quickly deployed to monitor and locate individuals or vessels in distress, providing critical information to emergency responders and enabling quicker and more efficient rescue operations. In addition, the project contributes to the dissemination of experience gained through early adoption of concrete 5G use cases, which can help increase maturity for 5G-based applications in different sectors. The dissemination of these use cases can help inform policy decisions and provide valuable insights for future 5G projects.

The project's synergy aspect is in line and contributes to achievement of objectives envisaged under the European Green Deal [1], which includes policy planning and implementation documents with the aim of achieving the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030,

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compared to 1990. A further aim is to achieve Climate neutrality by 2050 by achieving net zero greenhouse gas emissions for the EU countries. As a constituted part for reaching the objectives of Green Deal is the Renewable Energy Directive, which establishes common rules and targets for the development of renewable energy across all sectors of the economy. The project corresponds and creates synergy with NextGenerationEU [2] recovery instrument for the EU. NextGenerationEU is the EU's EUR 800 billion instrument to support the economic recovery from the coronavirus pandemic and build a greener, more digital and more resilient future. The European Commission's (EC) inaugural NextGenerationEU issuance took place in June 2021, and it will last for 10 years. Our project also supports and is in line with the EU hydrogen policy. The EU strategy on hydrogen was adopted in 2020 and put forward a vision for the creation of a European hydrogen ecosystem from research and innovation to scale up production and infrastructure to an international dimension [3]. Hydrogen is also an important part of the EU strategy for energy system integration. 5G solutions and data processing are important cornerstones for the development of Artificial intelligence (AI). AI contributes to a more innovative, efficient, sustainable and competitive economy, while also improving safety, education and healthcare for citizens. It also supports the fight against climate change. 5G4LIVES via 5G solutions contributes for further development of AI. The first major 5G initiative announced by the EC was the 5G Action plan which was announced in 2016. It established pioneer bands and set 5G targets [4]. One target was the commercial launch of 5G services in all EU countries by 2020.

Most EU countries achieved this goal, with only a few still pursuing it. In 2016, the EC launched the Gigabit Society [5]. It sets out a vision for connectivity in the EU over the next decade. Major targets include 100 Mbps speed networks for all households and gigabit speeds for key businesses and institutions. 5G can help in achieving these speeds through technologies such as fixed wireless access (FWA). The initiative also sets 5G specific targets such as uninterrupted 5G coverage in all urban areas and major transport paths and access to mobile data everywhere by 2025.

Structure of the project

5G4LIVES activities span across the six working packages (WP), which corresponds to the following objectives of the project:

- WP 1 will ensure the management, the coordination and the ethics requirements of the overall project. The main objective of this WP is to tackle all the necessary central management functions to achieve all the objectives defined in the Grant Agreement and to coordinate by organizing regular networking meetings and annual assemblies. Moreover, WP1 will be responsible to elaborate DMP ensuring that the EU and national data protection rules are respected. WP1 responsibility is to ensure that all project activities are performed efficiently, in a coordinated and integrated manner, within schedule and budget and in a way that the high research, scientific, technological and stakeholders' expectations are fully met by RCC, acting as Project Coordinator and will bring in its experience from various previous projects to guarantee a successful communication within the Consortium. RCC will be the WP1, T1.1, T1.2, T1.3, and T1.4 leader. The rest of the Consortium Partners will participate as contributors in the project management activities.
- WP2 has been designed to establish the necessary groundwork and project plan. The objectives of this work package focus on identifying the needs and challenges presented during the design and conceptualization phase of 5G4LIVES 4 use cases, 2 of which taking place in Riga and the other 2 in Turin. The tools and architecture of the 5G systems will also be crystallized, and regulatory or other obstacles to the foreseen solutions will be identified. To begin with, a common phase of requirement engineering will be undertaken across all activities within WP2 to lay the groundwork for the Reference Architecture. This phase will review the status quo in terms of 5G, hydrogen, and UAV technologies and solutions, system flexibility, regulations, and other factors. From this analysis, requirements for the software solutions developed in the project will be derived, considering the previous analysis and the use cases. The municipality of Turin will manage this work package by assisting RCC and RMP as an end user of the planned system. By doing so, they will be able to ensure that the software solutions meet the requirements of the end-users and

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effectively address the identified needs and challenges. Additionally, this work package will help identify any regulatory or other obstacles that may hinder the implementation of the planned solutions. This will enable the consortium to proactively address these issues and ensure the successful implementation of the project. Overall, WP2 plays a critical role in establishing the foundation for the 5G4LIVES project, defining the baseline criteria and challenges that needs to be addressed and overcome from a scenario, technological, regulatory and societal perspective, engaging end-users in the identification of operational requirements that will drive the selection of the most appropriate technologies under WP3. By carefully analyzing the needs and challenges of the use cases, and identifying any regulatory or other obstacles, the consortium will be well-prepared to move forward with the project and ultimately achieve its goals.

- WP3 aims to integrate the proposed Reference Architecture and functional specifications from WP2 into a fully interoperable and interconnected system, consisting of innovative lifesaving solutions, digital platforms and tools for lifeguards, a tool for 5G4LIVES system operation, safety protocols and procedures, services for lifesaving, and a monitoring tool. The integration of 5G with environmentally friendly technologies and UAVs will be incorporated into the use cases. The main objective of WP3 is to develop and implement a monitoring platform, which will act as the central hub connecting all technologies and solutions according to the 5G4LIVES concept. The monitoring platform will also implement security protocols and procedures to ensure the efficiency and effectiveness of search and rescue operations. The monitoring platform will perform connectivity services for 5G. The monitoring platform will be tested and verified in various sessions and in all use cases to ensure its functionality and effectiveness. The results obtained will be further refined and optimized to ensure seamless integration and interoperability of all components. Overall, WP3 aims to develop a comprehensive and efficient monitoring platform that will enhance the effectiveness of search and rescue operations and ultimately save lives.
- WP4 benefits from WP2 and WP3 and the definition of the scenario as well as the technological architecture and its deployment and integration. WP4 is responsible for overall planning, implementation and management of the 5G4LIVES service across scenarios and technological solutions' application. On the side of Riga, WP4 is composed of 3 building blocks as follow: scenario detailing, pre-demo stage and full demo operation. The full demo phase in Latvia consists of four integrated parts to be implemented across seasons as follow: testing to be taking place during the cold and warm seasons, verification of the results during the third season and the performance indicators of the concept. In the third season, the full concept is planned to continue as in seasons 1 and 2, so that the results achieved will be qualitatively and quantitatively evaluated and verified. During the full demo operation phase, the fourth part involves analysing and evaluating the results. The results obtained in three seasons will be compared to the pre-project data, and a quantitative and qualitative comparison and evaluation will be conducted. Data such as changes in rescue time, assessment of the effectiveness of the use of technology, changes in the number of people saved, etc. will be analysed.
- WP 5 objective is to evaluate as well as to assess the 1) the overall impact of project results on organizational to international level; 2) potential to scale and replicate the results achieved in the use cases. Focus of this work package is given on assessing the acceptance of the 5G4LIVES concepts and tools by the stakeholders (and the social stakeholders as well) which will take place twofold: in replication scenarios of the outcomes, providing a replication and scalability roadmap, as well as using a methodological framework for assessment of 5G4LIVES from a technological, economic, societal, environmental, regulatory perspective. End user training will be performed based on WP4 results. This WP will develop, benchmark, and test the novel model of the life protection and rescue system of the demo sites and demonstrate its viability. The key goal is to design inclusive models fostering 5G, while viewing environmental protection as an opportunity. The WP will analyse integration of 5G, UVAs and hydrogen to accelerate rescue operations diffusion with UVAs by becoming attractive alternatives. The work will perform evaluation and monitoring of progress of technical solutions and assessing their sustainability. These insights are

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critical in realizing efficiency of solutions and new value creation for replicability potential in the EU and the rest of the world.

- WP 6 Work Package 6 is dedicated to the dissemination, exploitation, and standardization of the results of the 5G4LIVES project. The main objective of this work package is to ensure that the results of the project are communicated effectively to a wide range of stakeholders, including industry, policymakers, end-users, and the public. This will involve the development of a comprehensive dissemination and exploitation strategy, which will be implemented throughout the project. The activities of WP6 will include the following:
  - Dissemination activities: This will involve the development of a dissemination plan, which will include a range of activities such as conferences, workshops, seminars, webinars, press releases, social media, and other outreach activities. The aim is to ensure that the project results are disseminated effectively to a wide range of stakeholders.
  - Exploitation activities: This will involve the development of an exploitation plan, which will identify the potential commercial and societal impact of the project results. The aim is to ensure that the project results are exploited to their full potential, including the development of new products, services, and business models.
  - Standardization activities: This will involve the identification of relevant standardization bodies and the development of standardization strategies for the project results. The aim is to ensure that the project results are aligned with relevant standards and to facilitate their adoption and implementation.
  - Collaboration with other projects and initiatives: This will involve collaboration with other relevant projects and initiatives, both at the national and international level, to ensure that the project results are integrated into broader initiatives and contribute to the development of the 5G ecosystem. Monitoring and evaluation: This will involve the monitoring and evaluation of the dissemination, exploitation, and standardization activities, to ensure that they are effective and that the project results are being communicated to the relevant stakeholders.

DATA SUMMARY

5G4LIVES's general data management policy that is presented in this document has been developed by the Consortium by FAIR principles of data management, open data requirements and implementation guidelines. It applies mainly to new results that are produced in 5G4LIVES and that are to be made available by the project team as open source, open science and open data.

When possible, open 5G4LIVES results will be assigned a Digital Object Identifier (DOI) to make content easily and uniquely quotable. The 5G4LIVES project relies on external services since DOIs can only be assigned by DOI registrants through a DOI registration agency.

Open 5G4LIVES results that are deposited in institutional repositories, repositories of scientific publishers or other data and research repositories will be at least indefinable by a persistent URI. If the institution is a DOI registrant that has an agreement with a DOI registration agency, a DOI will be assigned, too. Whether scientific publications will be assigned a unique identifier like DOI, Publisher Item Identifier (PII), International Standard Serial Number (ISSN) depends on the open access strategy chosen by the editors and thus also on the respective scientific publisher and the chosen research repository.

Providing open access to peer-reviewed scientific publications can be ensured either by publishing in green or gold open-access journals with or without author processing fees. Green open access Green open access or self-archiving means that the published article or the final peer-reviewed manuscript is archived by the researcher itself in an online repository, in most cases after its publication in the journal. The journal must permit the researcher to self-archive the final peer-reviewed article, at the latest, 12 months after publication. Gold open access means that the publication is available by the scientific publisher as open access. Some journals require an author-processing fee for publishing open access. Author-publishing fees for gold open-access journals can be reimbursed within the project period and budget. Some publishers allow the researcher to deposit a copy of the article in a repository, sometimes with an embargo period [6].

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Authors of scientific publications arising from the 5G4LIVES project are encouraged to seek an agreement with the scientific publisher of the publication that allows the authors to retain the ownership of the copyright for their work and to deposit the publication in an Open Access repository.

While additional forms of disseminating open-access papers, including academic social network sites such as ResearchGate (*www.researchgate.net*) are possible, an electronic copy of the publication must be deposited in the suitable open-access repository in the first place. According to the European Research Council's Guidelines on Open Access, "Venues such as Research Gate or Academia.edu that require users to register to access content do not count as repositories." [7].

All open 5G4LIVES results deposited in any repository will provide search keywords together with the metadata. Keywords for open data will be selected from controlled vocabularies that are suitable for the specific type of data.

FAIR DATA

Making data findable, including provisions for metadata

The description of procedures to generate data is associated to a dataset (collection of data). At this stage of development of the project, the specific typology and total number of variables in a single dataset table cannot be defined precisely.

However, each dataset is also associated with a DOI. The service is provided by the DOI community [8]. The use of a DOI guarantees, at the same time, unique identification of the single dataset and the possibility of automatic data web retrieval. After this step, the dataset is univocally associated to an identifier. The implementation of the data description depends on the typology of datum considered. In most cases, a text description is appropriate.

Metadata for describing the data that is collected and generated by the 5G4LIVES project is not only needed for facilitating open access to the data, but it may also be needed when searching or accessing data. There are many different meta-data standards for many different types of data, and it may not be possible to find one that fits all purposes. Therefore, a pragmatic and feasible approach is to agree on a common and minimal catalogue metadata schema for those datasets that are published in public catalogues and data repositories and to use data-type specific schema extensions, if necessary. Standard vocabulary for metadata description will be used.

Making data accessible

By default, only data related to publications will be made openly available. In general, decisions will be made on a case-by-case basis in which data can be released to avoid issues related to IP rights protection or access. All data and metadata files will be uploaded onto a cloud storage and sharing facility specifically dedicated to the 5G4LIVES project. The 5G4LIVES cloud is provided by means of OneDrive utility in Microsoft Office365. The unique identification (ID) code allows the retrieval of data and metadata files to registered users.

The main features of the 5G4LIVES cloud storage and sharing facility are the following: restricted access to registered users only if needed, at least 1 TB of storage, sharing of documents/metafiles by/with authorized project users, document status and drafting can be checked online.

Making data interoperable

All open data will be made available in open formats compliant with commercial/open software to allow as much as possible data exchange between researchers and institutions. Standard vocabulary for metadata description will be used, and 5G4LIVES does not intend to introduce new project-specific ontologies or vocabularies.

Increase data re-use

The data will be available for re-use upon the decision of the project management. Once the data is made openly available, they will remain open. Within the strategy of development of data management plan, the dataset that will be firstly available are those reported in publications originated from the project, thus

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intrinsically made for being reused. The data quality is assured by each partner, that bears the responsibility of them.

Included in the publication are all generated raw data and scripts, as well as final versions of text data and tables. Intermediate results of processing and analysis steps, which can all be generated from the provided data and scripts, are not part of the publication. The publication follows the recommendations of the Open Access Policy [9].

ALLOCATION OF RESOURCES

There are no immediate costs anticipated to make the open results generated in the 5G4LIVES project. Especially no costs are foreseen for storing open results in the project's default repository. Additional details will be reported, as needed, in future versions of the data management plan.

Data management activities concern the whole project and need to be coordinated and monitored both at project and WP level. Data management is also linked to the publication of project results and thus dissemination activities. In particular, the data providers (scientists) are responsible for informing the project activities' management when new open data and/or papers ready for publication are available; describing the data (by means of appropriate metadata) or scientific publication in accordance with the 5G4LIVES data management guidelines (according to the chosen metadata standard) and with help of the tools (template, web form) provided by the project; depositing (publishing into a repository) the data or scientific publication in accordance to the 5G4LIVES data management policy.

DATA SECURITY

In accordance to Consortium Agreement [10], where necessary, the partners shall cooperate in order to enable one another to fulfil legal obligations arising under applicable data protection laws (the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 [11] on the protection of natural persons with regard to the processing of personal data and on the free movement of such data and relevant national data protection law applicable to said partners) within the scope of the performance and administration of the project and of the agreement. In particular, the partners shall conclude a separate data processing, data sharing and/or joint controller agreement before any data processing or data sharing takes place.

Data will be stored and shared in the private collaborative platform with restricted access to authorized users. As an initial step, only the project partners will have access to the cloud storage where dataset and metadata are stored.

Due to the project complexity and the enhanced interaction with the end -users with 5G4LIVES, a complete ethics self-assessment has been carried out to ensure that the proposal is compliant with applicable international, EU and national law. Only one area of concern for ethical issues has been identified: "Personal data" (research involving personal data collection and/or processing). Starting from this consideration, a set of procedures will be adopted to ensure the participants' rights and the data protection of the involved end-users.

Information managed by the project consortium during its activities may be of a private or confidential nature,
thus, access to sensitive information will be carefully controlled with restriction policies where appropriate. The specific role of LEP (Legal and Policy Officer) has been identified in the project management structure to supervise and ensure the wise data processing and deal with ethical issues throughout the project.

This section defines how research will be executed in 5G4LIVES regarding the collection, storing and processing of personal data. It is described: 1) Relevant sources of Law and Ethical principles. 2) Procedures to inform and engage end-users and active stakeholders and guarantee their rights. 3) How data is collected, stored, processed and protected. 4) The consortium agreed procedures and structures to ensure privacy. To identify applicable legislation, policies, and ethical guidelines, all relevant national and international sources of law and ethical principles will be analyzed. Every involved person will comply with ethical standards and guidelines. On the European scale, this includes, but is not limited to: i) Regulation 2016/679; ii) Art. 3, 7, 8 of the Charter of Fundamental Rights of the European Union [12]; iii) Art. 8 of the Convention of the Council No.

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5 for the protection of human rights and fundamental freedoms [13]; iiii) Convention No. 108 of the Council of Europe for the protection of individuals with regard to automatic processing of personal data [14].

Events will be held in the demonstration sites to inform all the stakeholders and active participants about the activities, goals and purpose of the project. Additionally, an overview of the project and the procedures to be followed will be distributed written in the local language and in a way that will be easily understandable. Moreover, emphasis will be placed on the fact that it is persons choice to actively participate and up to what extent and make known the mechanisms that the consortium has put in place to protect their privacy and rights (anonymity, security, data storage etc.). Also, contact information for the project's working group will be provided and a complaint procedure will be available. Regarding images or recordings to be made publicly available, the participants will be asked for their permission to be used in workshops, conferences, presentations, websites or any other public means. Hence the project will establish a mechanism to own and use a person's or an entity's image or voice in specified, public ways. The Consortium guarantees that the storage of personal data sets will comply with the requirements of all relevant regulations and guidelines and that all necessary measures will be taken to protect the data from potential unauthorized access, such as cyber-security attacks. It will not keep personal data longer than necessary for the project's purposes and will destroy or delete the data afterwards.

Project partners' data security provisions

Extra data security measures are provided by the project partners in accordance with their established data protection and securing policy frameworks. Namely, RCC must collect, process and use certain types of information about individuals and organizations, to perform its direct functions and services in the most effective way. Depending on the requested or provided service or the performed function, the processing of personal data may take place in accordance with provisions of Regulation 2016/679. Personal data may refer to both the former and current users of Riga Municipality (RM) services; former, current and potential employees of RM; suppliers, service providers and persons who cooperate and communicate with RM. In accordance with external legislation (laws, regulations of the Cabinet of Ministers, binding regulations of the Riga City Council), RM from time to time needs to collect, process and use certain types of personal data that is necessary for the municipality to fulfil its functions and obligations.

With this its Data Protection Policy, the RM wishes to emphasize its strong commitment to provide the protection of personal data and states that in all your communication and cooperation with the RM, it will try to ensure the security of the processed personal data. RM generates, collects and otherwise processes personal data on a large scale and in various ways. This information may be obtained from you by submitting applications, or by using the RM portal *e-riga* to receive RM services, as well as we obtain information about you from other sources, for example, from the government information systems, third parties and public sources when it is necessary to ensure the functions and tasks assigned to the local government by regulatory acts.

The Controller of the data is the RM, in the person of specific department or institution that determines the purposes and means of processing personal data.

Established principles of data protection are as follows:

- processes personal data in a lawful, fair and transparent manner to the data subject;
- processes personal data adequately, appropriately and only to the extent necessary for the purposes of the processing;
- processes personal data in such a way as to ensure adequate security of personal data, including protection against unauthorized or unlawful processing and against accidental loss, destruction or damage by appropriate technical or organizational measures;
- personal data are kept for no longer than is necessary for the purposes for which the personal data concerned are being processed;
- you will be informed why Municipality needs your personal data and what will be done with your personal data;
- only accurate personal data are processed and, if necessary, kept up to date;

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- collects personal data only for specified, explicit and legitimate purposes and will not process it further in a way incompatible with those purposes. Except if necessary to fulfil the statutory functions and obligations.

When submit personal data to one unit or institution of RM, the data may be transferred to other units and institutions within the municipality – including Riga Municipal police, to the extent that it is appropriate, proportionate and proportionate for the City of Riga to perform its functions and provide its services.

RM may transfer personal data to other organizations when it is necessary and permissible or it will be required by law, including, it will possibly transfer to other state and municipal authorities. Personal data may be transferred to processors (natural or legal person, public authority, agency or other institution that processes personal data on behalf of a municipality) if it will be necessary for the performance of municipal functions and services. The RM may transfer personal data to third parties, but only when it is necessary to fulfil your legal obligations or as permitted by personal data protection legislation.

For instance, RM may transfer your personal data to Office of Citizenship and Migration Affairs', State Revenue Service, Ministry of Education, Social service providers, State Land Service, etc. Also, in accordance to provisions of Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA, the data can be shared with competent authorities like The State Police of Latvia for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, including the safeguarding against and the prevention of threats to public security [15].

RM will exchange personal data with organizations or suppliers or service providers who provide sufficient guarantees that appropriate technical and organizational measures will be implemented in a way that the data processing will comply with legal data protection requirements and the data subject's rights will be protected, as well as those who are able to fulfil the obligations laid down in the legislation on the protection of personal data. These warranties and conditions are set forth in the agreements with organizations and third parties.

Data protection policies of the City of Turin council are outlined in the document "Responsible data protection in the City of Turin" ("Responsabile Protezione Dati personali del Comune di Torino") [16].

LMT, the other project partner, as a controller of personal data processing, carries out the processing of personal data and ensures their protection in accordance with the laws and regulations on the protection of data processing. Everybody can freely choose – to give or not to give consent to the processing of his/her personal data, and at any time easily and conveniently, by contacting us, to withdraw the consent, without affecting the processing done before the withdrawal. Likewise every person may exercise the rights of data subjects stipulated in the laws and regulations, including the right to receive information on his/her data, to object against the processing, including the use of legitimate interests, as well as to submit an application on the rectification, deletion, restriction and transferring of data, to give his/her opinion and to ask to review the decision adopted within the automated process, as well as in case of need to submit a complaint to the supervisory institutions regarding personal data protection issues [17].

In addition, the third project partner Wind Tre collaborates with law enforcement agencies and other public agencies and public authorities, to ensure that its users respect the laws, the rights of other users and third parties, including their intellectual property rights. Therefore, your personal data may be communicated, for example, to public entities, if this is necessary for purposes of defense, state security, prevention, detection or repression of crime, in compliance with the rules governing this matter. These public entities have the right to request and obtain personal information about you, even when this is necessary or appropriate for investigations relating to the commission of fraud, computer fraud, violation of intellectual property rights, acts of computer piracy or other illegal activities, which could expose Wind Tre or our users to legal, civil or criminal liability.

In addition, according with Wind Tre data protection policies, the data subjects have the right, pursuant to art. 15 to 22 of the European Regulation, to obtain at any time, the confirmation of the existence or otherwise

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of their personal data, to know their content and their origin, verify their accuracy or request an integration or update or rectification. Pursuant to the articles, the user has the right to request the cancellation, the transformation into anonymous form or the blocking of data processed in violation of the law, and to oppose in any case, for legitimate reasons, their treatment. Wind Tre reserves the right to make changes to the Site, to this Web Privacy Policy and Cookies wherever published on the Site, at any time. Upon consultation, the user must always refer to the current version to the text published. The changes will become effective when they will be published on the Site. In case of changes, the site surfing continuation by the user will be considered as acceptance of such changes. All users may check at any time, by connecting to the Site, the latest version of the Web Privacy Policy and Cookies as updated by Wind Tre [18].

Additional cybersecurity measures

In the context of the 5G4LIVES project, cybersecurity is an important consideration given the use of UAVs and 5G networks for surveillance and emergency response in water areas. To ensure cybersecurity in the project, several measures will be taken. These include:

- Authentication and access control: Only authorized personnel will have access to the UAVs and the 5G network.
- Access will be restricted by requiring strong authentication, such as usernames and passwords, and access control lists.
- Encryption: All communication over the 5G network will be encrypted to prevent unauthorized access or interception of data.
- Firewall and intrusion detection: A firewall will be used to protect the 5G network from unauthorized access, and intrusion detection systems will be implemented to detect and respond to any attempts to breach the network.
- Regular security updates: The software and firmware of the UAVs and the 5G network will be regularly updated to ensure that any known security vulnerabilities are addressed.
- Training and awareness: All personnel involved in the project will receive training on cybersecurity best practices and will be made aware of the potential risks and threats to the project's cybersecurity.

By implementing these measures, the project can ensure the cybersecurity of the UAVs and the 5G network, reducing the risk of unauthorized access, data theft, or damage to the project's infrastructure. These measures can also serve as best practices for other projects that involve the use of UAVs and 5G networks in sensitive or critical applications.

ETHICS

The 5G4LIVES project recognizes the importance of ethics in research and innovation and is committed to upholding ethical principles throughout the project. The project will comply with all relevant ethical guidelines and regulations, including those related to data protection, privacy, and informed consent. The project team will also ensure that the research is conducted in a transparent and accountable manner, with open communication and engagement with stakeholders and the wider public. The project will seek to involve stakeholders and end-users in the research process and ensure that their perspectives and interests are considered in decision-making.

The 5G4LIVES partners follow the ethical guidelines as defined in The European Code of Conduct for Research Integrity [19] to ensure privacy and security of activities involving the participation of end-users or professionals and guarantee ethical standards within the project.

To ensure that the benefits of this project are equally distributed among all members of society, the gender dimension has been taken into consideration in its design and implementation. Women are an important part of the communities in which the project will be deployed, and it is important to ensure their needs and perspectives are considered. One aspect of the gender dimension in the 5G4LIVES project is the representation of women in the development and testing of the technology. Women are often underrepresented in the STEM fields [20], including engineering and technology, which are essential for the

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development of drones and other advanced technologies. Therefore, efforts have been made to encourage the participation of women in the project, both in the development and testing stages. This includes outreach to women in STEM fields, as well as partnerships with organizations focused on promoting women in technology.

Additionally, the project will consider the potential impact on women as end-users of the technology. Women may have different levels of access to technology or may be more hesitant to use it than men, particularly in cultures where gender norms dictate certain roles and behaviors. Therefore, efforts will be made to ensure that the technology is accessible to all individuals, regardless of gender, and that it is user-friendly and easy to operate. Overall, the gender dimension is an important consideration in the 5G4LIVES project, and efforts are being made to ensure that the technology is developed and deployed in a way that is inclusive and equitable for all members of society. By considering the needs and perspectives of women, the project will be better equipped to address the unique challenges of emergency situations and improve the safety and security of all citizens, regardless of gender.

OTHER ISSUES

The 5G4LIVES project does not make use of procedures for data management other than those described in this data management plan.

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CONCLUSION

The present data management plan of the 5G4LIVES project introduces a detailed data management policy in line with open data requirements and guidelines on FAIR data management [21]. The FAIR policy defines comprehensible and easy to follow administrative and technical procedures and clear responsibilities for embedding data management activities in the complete project lifecycle.

The 5G4LIVES data management plan relies on state-of-the-art technical solutions and standards like DOI and other initiative for the implementation of these procedures and their seamless technical integration into 5G4LIVES's data management scope. This will ensure that the results of the project, including open data, open science publications and open-source software, are preserved and stay accessible and usable after the end of the project.

The data management plan is a living document and can be updated with new results from the continuous data survey, or when/if the common data management policy needs to be updated.

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REFERENCES

1. The European Green Deal. Available at https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
2. NextGenerationEU. Available at https://next-generation-eu.europa.eu/index_lv
3. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A hydrogen strategy for a climate-neutral Europe. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0301
4. 5G Action plan. Available at https://digital-strategy.ec.europa.eu/en/policies/5g-action-plan
5. Connectivity for a European Gigabit Society. Available at https://digital-strategy.ec.europa.eu/en/library/connectivity-european-gigabit-society-brochure
6. Understanding green and gold open access publishing. Available at https://www.library.yorku.ca/web/research-learn/research/oapublishing/publishoa/
7. Guidelines on the Implementation of Open Access to Scientific Publications and Research Data in Projects supported by the European Research Council under Horizon 2020. Available at https://erc.europa.eu/sites/default/files/ERC_Guidelines_Implementation_Open_Access.pdf
8. DOI Foundation. Available at https://www.doi.org/the-foundation/about-us/
9. Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities. Available at https://openaccess.mpg.de/Berlin-Declaration
10. CONSORTIUM AGREEMENT BETWEEN: the Coordinator RIGAS PILSETAS PASVALDIBA, LATVIJAS MOBILAIS TELEFONS SIA, BIEDRIBA "VEFRESH", VALSTS AKCIJU SABIEDRIBA "ELEKTRONISKIE SAKARI", WIND TRE S.P.A., COMUNE DI TORINO AND DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING,
    POLITECNICO DI TORINO, Proposal number: 101133716
11. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Available at https://eur-lex.europa.eu/eli/reg/2016/679/oj
12. CHARTER OF FUNDAMENTAL RIGHTS OF THE EUROPEAN UNION (2000/C 364/01). Available at https://www.europarl.europa.eu/charter/pdf/text_en.pdf
13. Convention for the Protection of Human Rights and Fundamental Freedoms as amended by Protocol No. 15. as from its entry into force on 1 August 2021. Available at https://rm.coe.int/1680a2353d
14. Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data. Available at https://rm.coe.int/1680078b37
15. Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA
    Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32016L0680
16. Responsabile Protezione Dati personali del Comune di Torino. Available at http://www.comune.torino.it/amministrazionetrasparente/bm~doc/INTERIM_DPO_al_15012021.pdf
17. LMT. Agreements and terms and conditions. Available at https://www.lmt.lv/en/data-processing
18. Wind Tre. Privacy. Available at https://www.windtregroup.it/EN/Governance/Privacy.aspx
19. The European Code of Conduct for Research Integrity. Available at https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/european-code-of-conduct-for-research-integrity_horizon_en.pdf
20. Kāpēc tik svarīgi mācīties STEM? Available at https://www.rtu.lv/lv/nac-studet/blogs/atvert/kapec-tik-svarigi-macities-stem

5G4LIVES project has received funding from European Union's CEF Digital programme 5G for Smart Communities under grant agreement no. 101133716

21. H2020 Programme Guidelines on FAIR Data Management in Horizon 2020. Available at https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

5G4LIVES project has received funding from European Union's CEF Digital programme 5G for Smart Communities under grant agreement no. 101133716

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