5GLOGINNOV

Open Call for Innovative Start-ups

Tender Conditions

www.5g-loginnov.eu

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List of abbreviations and acronyms

Abbreviation	Meaning
4G/5G	4th/5th Generation (of cellular networks)
AI	Artificial Intelligence
AR	Augmented Reality
ATP	Automated Tuck Platooning
CAD	Connected Automated Driving
CAdES	CMS (Cryptographic Message Syntax) Advanced Electronic Signatures
CAM	Connected Automated Mobility
CAN	Controller Area Network (vehicular bus standard)
CNF	Cloud Native Functions
EC	European Commission
EU	European Union
FMS	Fleet Management System (vehicular communication standard)
FTED	Floating Truck and Emission Data
GLOSA	Green Light Optimal Speed Advisory
ICT	Information and Communication Technology
IoT	Internet of Things
ITS	Intelligent Transportation Systems
KPI	Key Performance Indicator
LL	Living Lab
MEC	Multi-access Edge Computing
ML	Machine Learning
OEM	Original Equipment Manufacturer (often referred to car-makers)
PAdES	PDF Advanced Electronic Signatures
PERT	Project Evaluation and Review Technique
QoS	Quality of Service
SME	Small-Medium Enterprise
TLF	Traffic Light Forecast
TMS	Traffic Management System
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicle
UC	Use Case
UHD	Ultra-High Definition (images)
USIM	Universal Subscriber Identity Module
VNF	Virtual Network Functions
WBS	Work Breakdown Structure
WLTP	Worldwide-harmonized Light vehicles Test Procedure
WP	Work Package

1 GENERAL INFORMATION

1.1 Issuing Body

This tender is issued by ICOOR, with its third-party University of Modena and Reggio Emilia (UNIMORE), with registered office in Modena (Italy), via Accademia 4, as a representative for the 5G-LOGINNOV project partnership, and as the legal contracting company for the services.

1.2 Scope and Terms of the Open Call

1.2.1 Aim and General Objectives

The project **5G-LOGINNOV**[1], funded by the European Union's Horizon 2020 research and innovation programme, **organises an Open Call for the selection of five innovative start-ups and SMEs** aiming to develop 5G-based solutions in the framework of activities carried out at the **three Living Labs of the project** (see chapter 2.4).

The Open Call is reserved to start-ups and SMEs **complying with the conditions described in chapter 1.2.3**. The scope of such Open Call is intentionally left as general as possible, given that all candidate solutions shall apply to the physical context and infrastructure of (one of) the three Living Labs; however, chapter 4.2 provides some specific areas of interest that have been individuated by the Living Labs during the scoping phase.

1.2.2 Type of Contract

The selected applicants will be incorporated in 5G-LOGINNOV consortium through a **service contract providing a global price of max. € 50.000 each (VAT included).** The service contract will be granted by ICOOR and UNIMORE (University of Modena and Reggio Emilia) on behalf of the whole consortium, i.e. the services will be for the benefit of other beneficiaries of the Project.

The services provided by selected applicants will include:

1. The design and development of proposed ICT solution.
2. The provision of all paper/media documentation needed for its on-field operation.
3. The deployment of proposed ICT solution in the physical context and infrastructure of (at least) one of the three Living Labs of the project.
4. On-site support to the deployment, installation and validation of the solution.
5. Any other support to project management activities (including demonstration and/or provision of additional information to the European Commission and/or INEA Officers), as requested by the Project Coordinator through ICOOR.

Deployment and other on-site activities (points 3 and 4 of the list above) will be detailed and agreed between selected applicants and related Living Lab Leaders during the contracting phase (see chapter 4.4), depending on the operation of proposed solutions and their level of integration with the physical context and infrastructure of the Living Labs.

No financial reporting will be requested to selected applications, i.e. the contract will grant a lump sum corresponding to the total costs declared in the Application Form (see chapter 4.1, point 7) without need to declare/justify the different cost items.

No additional cost claim (travel/subsistence/equipment/service) **will be accepted outside the scope of the service contract**.

[1] https://5g-loginnov.eu

1.2.3 Eligibility Criteria

The call is open to start-ups in the form of SMEs legally established in an eligible country according to chapter 1.2.4. A SME will be considered as such if accomplishing with the Commission Recommendation 2003/361/EC[2] and the SME user guide[3]. As a summary, the criteria which define a SME are:

- Headcount in Annual Work Unit (AWU) less than 250.
- Annual turnover less or equal to € 50 million or annual balance sheet total, less or equal to € 43 million.

The applicant must declare the willingness **to deploy and validate its ICT solution (prototype) in the physical context and infrastructure of (at least) one of the three Living Labs** of the project, which will be indicated at the time of application on the application form. The technical terms of deployment and validation will be agreed with the relevant Living Lab(s) Leader(s) during the contracting phase.

The applicant must guarantee **appropriate on-site support to the deployment/validation phase**, as agreed with the relevant Living Lab(s) Leader(s) during the contracting phase. There are no travel and subsistence allowances/reimbursements planned for on-site activities, i.e. such costs must be considered as integral part of the global price as above mentioned.

The applicant shall ensure the **free-of-charge usage of its ICT solution by any project partner/appointed stakeholder** involved in the execution of selected Living Lab(s) for the entire duration of the project; further commercial/production exploitation of the solution after the termination of the project may be agreed separately by the parties.

The applicant shall foresee the **necessary reporting and contribution to the regular team and project meetings**, in line with the project's related timelines and deliverables.

Selected applicants are bound to **participate to project dissemination activities**, including virtual/physical events, which will be organized by the project management along the duration of the project. The possible participation to physical events will be covered by 5G-LOGINNOV through the reimbursement of travel and subsistence costs (outside the scope of the service contract).

Only **one entity per application will be admitted**, so activities in co-operation will not be considered eligible.

The applicant must be completely independent from project partners, their affiliated entities and/or their controlled companies. Institutions, organizations or other kind of legal entities funded by or **otherwise affiliated with a 5G-LOGINNOV partner are not eligible**.

The applicant recognises **the mandatory presence at the 5G-LOGINNOV start-up event at the ITS World Congress Hamburg[4]**. The related costs (target € 1.500 and additional entrée fees for the applicant's staff) should be included in the applicant's offering.

5G-LOGINNOV retains the right to discard the selected application in case one (or more) of the conditions above are not satisfied.

1.2.4 Eligible Countries

Only applicants legally established and operational in any of the following countries will be eligible:

- The Member States of the European Union, including their outermost regions.

[2] European Commission Recommendation 2003/361/EC, 2020, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:en:PDF
[3] The new SME definition, 2020, http://ec.europa.eu/growth/content/revised-user-guide-sme-definition-0
[4] https://itsworldcongress.com

- The Overseas Countries and Territories linked to the Member States[5].
- H2020 Associated countries: according to the updated list published by the EC at http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf.
- The UK applicants are eligible under the conditions set by the EC for H2020 participation at the time of the deadline of the call.

1.2.5 Reference Documents

In addition to present document, applicants may refer to the following public deliverables[6] and attachments available on the 5G-LOGINNOV Open Call page *https://5g-loginnov.eu/open-call/*:

[1] **Project Deliverable D1.1 - 5G-enabled logistics use cases**: the document contains a thorough description of the three Living Labs (Athens, Hamburg and Koper) and related use cases.
[2] **Project Deliverable D4.1 - Plan for boosting marketplace and emergence of new actors**: the document contains the guidelines for the successful development and commercialization of 5G-related applications in the logistics domain.
[3] **Open Call Attachment 1 - Luka Koper (Port of Koper) - Rules on Internal Order**.
[4] **Open Call Attachment 2 - Luka Koper (Port of Koper) - Online Visitor Announcement Tool** (User Instructions).
[5] **Open Call Attachment 3 - Luka Koper (Port of Koper) - Access Permit Form**.
[6] **Open Call Attachment 4 - Luka Koper (Port of Koper) - Regulations on Trade Secrets Protection**.
[7] **Open Call Attachment 5 - Luka Koper (Port of Koper) - Statement of Protection and Confidentiality**.

1.2.6 Applicable law and tendering procedure

The service contract will be awarded and will be carried out in compliance with the Italian law, i.e. the Legislative Decree no. 50/2016 (Italian Code of Public Contracts), laying down the Implementation of Directives 2014/23/EU, 2014/24/EU and 2014/25/EU on the award of concession contracts, public contracts and the procurement procedures of entities operating in the water, energy, transport and postal services sectors, as well as for the reorganisation of the existing rules on public contracts for works, services and supplies.

In particular the present procedure consists in the acquisition of expressions of interest to participate in the negotiated procedure pursuant to Article 36, paragraph 2, letter b) of the Legislative Decree no. 50/2016.

The market survey notice is published in accordance with the Article 216, paragraph 9, of Legislative Decree no. 50/2016, for a period of min. 15 days on the institutional website of UNIMORE (https://www.unimore.it/).

1.2.7 Other applicable dispositions

The service contract will be qualified as “subcontract” in accordance with the Article 13 of the Grant Agreement of the Programme Horizon 2020 (hereinafter referred to as “GA”).

In particular, the provider (“the subcontractor”) shall as follows:
a) Allow checks, review, audits and investigations on carried out by the Commission/Agency, European Court of Auditors, European Prosecutor Office and OLAF (see Article 22 GA).

[5] Entities from Overseas Countries and Territories (OCT) are eligible for funding under the same conditions as entities from the Member States to which the OCT in question is linked.
[6] The two deliverables D1.1 and D4.1 have not yet been validated by INEA. Any position therein reported reflects the sole position of 5G-LOGINNOV consortium, without any implicit/explicit endorsement by INEA and/or the European Commission.

b) Permit the evaluation of the impact of the action carried out by the Commission/Agency under the Article 23 GA.
c) Avoid any conflicts of interest in the performance of the service (see Article 35 GA).
d) Maintain the confidentiality in accordance with the Article 36 GA.
e) Promote the action and shall give visibility to the EU funding (see Article 38 GA).
f) Indemnify the contractor of any damages deriving of the implementation of the service contract.
g) According to the Article 46 GA, the subcontractor shall not consider the Commission/Agency as responsible of the damages arising from the service contract and the relationship with the beneficiaries.

1.2.8 IPR clauses

Applicants will indicate their background IPR in their proposal which they consider relevant.

Selected applicants will retain this background IPR of their proposed solutions, but they are obliged to enable free-of-charge usage to the project (and appointed stakeholders) for the entire duration of the project. Specific post-project exploitation agreements may be signed between selected applicants and involved stakeholders.

The foreground IPR, generated by in a common action between the selected applicant and the 5G-LOGINNOV partners during the execution of the action, will be handled by the specific contracts. The clauses will need to be compliant to the general IPR clause applied in the already established Grant Agreement of the project partners.

Non-selected partners will retain ownership of their background IPR of their proposed solutions, but the 5G-LOGINNOV project partnership is entitled to give reference to the their background IPR, in any of its dissemination activities.

2 PROJECT OVERVIEW

5G-LOGINNOV proposes a strategic, innovative framework addressing integration of technologies as part of an overall architecture representing a subset of 5G network functions. 5G-LOGINNOV is supported by 5G technological blocks, including new generation of **5G terminals** for future **Connected and Automated Mobility** (CAM), new types of **IoT-5G devices** for field data acquisition and control, **data analytics**, next generation **traffic management** and emerging subsets of 5G networks functions, **for port areas and city-ports** to handle upcoming and future capacity, traffic, efficiency and environmental challenges. 5G-LOGINNOV project will also implement and deploy a **green truck initiative** using CAD/CAM and **automatic truck platooning** based on 5G technological blocks.

The project develops and validates **beyond-state-of-the-art solutions** that will increase efficiency and optimize land-use, while being financially viable, respecting circular economy principles and being of service to the urban environment. Through 5G-LOGINNOV, **ports will minimize their environmental footprint** to the city and will decrease disturbance to the local population through a significant reduction in the congestion around the port. The solutions developed by the project are being deployed and validated in three Living Labs in the ports (or neighbouring city areas) of Athens (Greece), Hamburg (Germany) and Koper (Slovenia), addressing challenges taken by the mega-vessel era as well as those relevant for medium-sized ports with limited investment funds for 5G infrastructure and automation.

5G-LOGINNOV will also boost economic development and business innovation, **promoting innovative high-tech start-ups and SMEs** to new markets through the present Open Call and other communication and networking initiatives.

2.1 Project Vision

The vision of 5G-LOGINNOV is to pave the way towards efficient freight and traffic operations at ports and logistics hubs by using new innovative concepts, applications and devices supported by the **disruptive 5G technologies**, including Internet of Things (IoT), data analytics, next generation traffic management and CCAM (Cooperative, Connected and Automated Mobility) in logistics corridors.

The project has a strong interest in the **emergence of new market players**, such as SMEs and start-ups, taking advantage of the growing adoption of distributed cloud computing technologies in 5G networks and making it possible opening innovation at service level in the logistics and Industry 4.0 sectors.

2.2 Project Objectives

In order to meet capacity and efficiency targets, lower its environmental impact and establish a truly bidirectional relation with the urban space surrounding it, a port-city area needs to invest in equally important **technological and societal innovations, novel business models and changes of mind-set**, which are reflected in 5G-LOGINNOV high-level objectives:

- **Objective 1 (O1)**: Develop and deploy next generation ports and logistics hubs operation system architecture integrated in 5G networks at three main ports in Europe (Athens, Hamburg and Koper), utilising new types of 5G IoT sensors and devices.
- **Objective 2 (O2)**: Optimise ports and logistics hubs operation and maintenance, for reducing their operational costs with innovative concepts and use cases.
- **Objective 3 (O3)**: Reduce significantly ports and logistics hubs operation emissions (CO_2/NOX) and regulate the resulting freight traffic on the future 5G logistics corridor in EU, including CAM truck platooning management.

- **Objective 4 (O4)**: Regulate the freight traffic generated by ports and logistics hubs on the future 5G logistics corridors in EU, and integrate future connected and automated truck platoons according to the EU Green Deal program.

- **Objective 5 (O5)**: Boost ports and logistics hubs operation/maintenance innovation with involvement of new market actors including SMEs and start-ups. 5G-LOGINNOV will support the creation of innovation incubators and will be connected to local research-intensive and innovative high-tech start-ups and the business community in order to promote innovation in the heart of economy.

- **Objective 6 (O6)**: Support standardisation of 5G-enabled next generation ports and logistics hubs operation system, in order to ensure interoperability, platform openness and operation harmonisation around future 5G Logistics cross-border corridors.

- **Objective 7 (O7)**: Support adoption and take up of 5G-enabled next generation ports and logistics hubs operation system in Europe and beyond.

2.3 Project Activities and Timing

5G-LOGINNOV is organised in **7 work packages (WPs)**, each corresponding to a main activity in the project; tasks within these WPs are assigned to leaders and participants with the required specific expertise:

- **WP1** - Living Labs requirements and specifications (led by VICOMTECH).
- **WP2** - Living Labs development and deployment (led by ERTICO).
- **WP3** - Living Labs trials and evaluation (led by T-SYSTEMS).
- **WP4** - Marketplace and emergence of new actors (led by ICOOR).
- **WP5** - Dissemination and exploitation (led by CIRCLE).
- **WP6** - Project management (led by ERTICO).
- **WP7** - Ethics (led by ERTICO).

The present Open Call, as well as most of the work of selected applications, **will be carried out in the context of WP4**, with strong interactions with Living Labs' execution **(WP3)** and dissemination/ exploitation activities **(WP5)**; both WP4 and WP5 will last until the end of the project (month 36, i.e. August 2023), while Living Lab activities (WP3) will terminate on month 32 (i.e. April 2023).

The objective of WP4 is to analyse the current and future market linked to the 5G core technologies innovations that are addressed in the 5G-LOGINNOV Living Labs, i.e. products, services and solutions at TRL7 or beyond, which exploit the potential of 5G to improve logistics operation. **WP4 will provide opportunities to start-ups and SMEs to create new businesses and emerge in the market**. The work package will:

- Define the gaps between the current and future market scenarios.
- Involve start-ups and SMEs in the proposition of new products and services based on 5G core technologies.
- Provide a market strategy for new stakeholders.
- Facilitate the introduction of 5G core innovation technologies in logistics operations.
- Support the participation of new actors in Living Labs' activities (WP4).
- Create and moderate a network of start-ups to be supported for addressing the development of economic opportunities of 5G-enabled next generation logistics hubs and port operation, liaising with WP5 (in particular Clustering and Networking task).

2.4 Project Living Labs

The solutions developed by the project (including those brought by selected applications) will be deployed and validated in **three Living Labs** in the ports (or neighbouring city areas) of **Athens** (Greece), **Hamburg** (Germany) and **Koper** (Slovenia), through a total of **11 use cases**:

- **UC1** - Management and Network Orchestration Platform (Koper).
- **UC2** - Device Management Platform Ecosystem (Athens).
- **UC3** - Optimal Selection of Yard Trucks (Athens).
- **UC4** - Optimal Surveillance Cameras and Video Analytics (Athens).
- **UC5** - Automation for Ports: Port Control, Logistics and Remote Automation (Athens, Koper).
- **UC6** - Mission Critical Communications in Ports (Koper).
- **UC7** - Predictive Maintenance (Athens).
- **UC8/9** - Floating Truck & Emission Data (Hamburg).
- **UC10** - 5G GLOSA & Automated Truck Platooning (ATP)-under 5G-LOGINNOV Green Initiative (Hamburg).
- **UC11** - Dynamic Control Loop for Environment Sensitive Traffic Management Actions (Hamburg).

Applicants may frame their solutions in the context of **existing use cases**, as well as **proposing new ones**.

The following chapters provide a brief overview of the main motivations and objectives of the three Living labs; applicants are invited to read project deliverable **D1.1 - 5G-enabled logistics use cases** [1] for further information about Living Labs and related use cases (download from 5G-LOGINNOV Open Call page *https://5g-loginnov.eu/open-call/*).

2.4.1 Living Lab 1 - Athens

5G-LOGINNOV will address several key aspects of day-to-day port operations at Piraeus Container Terminal (PCT) in Athens. The current local fleet size (about 170 operational trucks daily), in addition to incoming external trucks, imposes significant challenges in port operations that in turn affect various work chains in Piraeus. Efficiently managing and coordinating the movement of yard trucks within the port is of vital importance, as the majority of operations heavily rely on internal yard trucks for the horizontal movement of containers between stacking areas and loading/unloading areas for vessels and rail.

Unfortunately, current localization services lack several key elements for optimally allocating container jobs to yard trucks (given the availability pool), where often the selected trucks are not the ones closest to the container; this results in (unnecessary) longer travel duration for trucks, increased fuel consumption (and relative CO_2 and NO_x emissions) and traffic jam incidents, which have a direct impact in productivity levels and operational costs. The enhanced localisation services and low latency transmissions will constitute the key element blocks for the optimal assignment of container jobs to 5G-connected yard trucks.

Another issue relates to the safety of employees and other personnel within the premises of PCT. Frequent incidents involving boom collisions, gantry collisions or stack collisions, along with the presence of stevedoring personnel in the area, make the risk for serious bodily injuries considerable. A far-edge (low latency) computing approach, integrated into a pioneering 5G-IoT device, will detect human presence in areas not allowed, based for instance on innovative machine learning techniques.

A similar technological approach will be applied to remote automation of port operations and logistics support, focusing on detecting the presence/absence of container seals. Currently, the identification of presence or absence of container seals occurs manually, i.e. by an appointed employee, raising safety concerns, sub-optimal use of human resources in yard equipment and port operations, and increased manual effort (e.g. manual database update, etc.). Through far-edge computing (5G-IoT), devices

operating at port machinery (such as lifts, forklifts, terminal tractors, etc.) will automate and manage end-to-end the life cycle of the service for detecting container seals.

Finally, a key concern at PCT is storing and managing bulky assets (such as spare/repair parts) that occupy significant space of the port; 5G-LOGINNOV will implement a predictive maintenance tool for analysing telemetry data (e.g. CAN-Bus and other on-truck sensor data) collected from the fleet of 5G-connected trucks, to potentially predict possible breakdowns, reduce downtime for repairs and optimise stock of spare parts, increase the service life of yard vehicles and optimise operational efficiency through minimisation of breakdowns.

Overall, 5G-LOGINNOV will optimise port operations in PCT through a number of use cases, including the optimal assignment of container jobs based on localisation (and other) data of internal trucks, improvement of personnel safety through analytics of 4K video streams, predictive maintenance of yard equipment and reduction of the environmental footprint in port operations.

2.4.2 Living Lab 2 - Hamburg

With around 10 million containers, the Port of Hamburg is ranked No.3 in Europe. The disadvantage of the 70 km Elbe restricting access to the Northern Sea is compensated by the excellent rail network in the port and hinterland, of special importance for inter- and multimodal transport and logistics. Due to special situation as a city port, several terminals for container handling are spread across different parts of the city, which makes an efficient hand-over and automation within the intermodal transport chain (port internal transfers) of great importance for Hamburg's long-term competitiveness.

Hamburg Living Lab will demonstrate the potential of leveraging positive environmental impacts by using 5G for sustainable traffic management, and will develop and implement a methodology to capture the effect of the traffic infrastructure on regional emissions, thus making them comparable by quantifying relevant factors (driver profile, vehicle profile, loading, etc.) in the context of Traffic Management System (TMS) measures.

In intelligent traffic control, traffic flow and speed characteristics are usually considered at “macro” level (i.e. “average speed” or “average emission” by vehicle class), while it is proven that vehicle dynamics on “micro” scale (stop/accelerate/decelerate) are most relevant for emission peaks or energy consumption. The Hamburg Living Lab will automate the analysis and quantification of micro-scale dynamics according to the context (vehicle, load, driver, infrastructure, TMS situation, etc.) and will introduce a Traffic Light Forecast (TLF) service to be used in vehicle applications such as Green Light Optimal Speed Advisory (GLOSA); this chain will enable a cooperative micro-manoeuvre behaviour of vehicles, avoiding unnecessary energy spending and reducing pollutants to a considerable degree. The GLOSA app will use the TLF service (which provides signal switching time information) to determine the optimal speed towards the next intersection, thus avoiding energy consuming manoeuvres.

Furthermore, current vehicle trajectories (such as speed or position) can be handed back in the return low-latency channel; such data, when available in near-to-real-time mode to the traffic control system, will enable the cooperative intersection control action of intersection, thus bringing further energy savings. This feature, out of the scope of 5G-LOGINNOV, will be possibly developed in the framework of future activities in Cooperative Intelligent Transport Systems (C-ITS).

2.4.3 Living Lab 3 - Koper

Port of Koper is one of the most dynamic ports in Europe and one of the front runners of innovation. Located in the area of Koper municipality, it is the only Slovenian multi-purpose port connecting central Europe with access to the Adriatic and Mediterranean, and its activity influences the development of the region, Slovenian economy, and logistics in this part of Europe.

The Koper Living Lab targets implementation of 5G technologies and cutting-edge prototypes tailored to be operated in port environment. Novel virtualization and cloud-based principles such as VNF (Virtual

Network Functions) and CNF (Cloud Native Functions), as well as industry-proven infrastructures (e.g. Kubernetes and OpenStack), will be used as baseline technology to build private 5G system in the port of Koper.

Building upon this, the Living Lab will target Industry 4.0 related port operation with a focus on scenarios related to port control, logistics and remote automation. More specifically, the Living Lab will feature a video analytics system for identification of container markers and detection of structural damages and an advanced telemetry system for remote monitoring of operating machines (e.g. terminal tractors); furthermore, several activities related to the port security operation will be introduced through real-time video surveillance (using 5G-enabled body-worn cameras carried by security personnel) and automated drone-based surveillance.

2.5 Specific Areas of Interest

The following chapters describe a set of gaps and/or additional features that have been individuated within the analysis of Living Labs scope, in order to provide focused suggestions to the applicants. Such suggestions are merely indicative and do not set any binding constraint to the scope of proposed applications.

2.5.1 Living Lab 1 - Athens

Augmented Reality (AR) Platforms-as-a-Service can fully exploit their potential by using a fully developed 5G infrastructure. AR is placed on the real-world but offers a more comprehensive experience and perception of it by overlaying additional data. These services introduce new ways for content creation, consumption, and in how such data is communicated, that will undoubtedly help a wide variety of industries, in particular ports and their operations, to increase productivity levels, change the way they do business and view/plan/shape the evolution of their operations.

Through 5G-LOGINNOV, at Piraeus Container Terminal, applicants are invited to develop their platform solutions targeting innovative AR applications, including (but not limited to) the generic scope of the following use cases:

1. *AR-assisted guidance to speed up repairs in port assets (e.g. trucks, lifts, cranes, etc.)*. Production/operation lines are becoming increasingly complicated, hence, (unplanned) asset downtime is a potential (serious) revenue loss for port operators, and thus, cutting downtime for repairs is of paramount importance.
2. *Increase quality in manual production tasks and lower the chance of errors in warehouse operations*. AR-guided cargo load/unload operations (e.g. in open or closed space storehouses) can significantly speed up day-to-day port functions which are potentially part of other service chains in port operations, and thus, significantly improve the overall operational efficiency.
3. *Reduce training time at port operations and related assets, with on-the-job real-time tuition*. Training new personnel in highly complex port operations and relevant assets (e.g. quay cranes) can pose significant challenges for port operators. AR-guided tuition can speed up the training process, minimize the possibility of errors, and contribute to optimal human resource allocation.

Additional areas of interest include use cases that involve distracted driver & drowsiness detection. Distracted driving comprises any activity that takes away the (truck) driver's attention from the road. Drowsy driving signs, according to the American Academy of Sleep Medicine, are frequent yawning, difficulty keeping your eyes open, "nodding off", and having trouble keeping your head up. Technical 5G-enabled solutions, based on e.g. advanced computer vision and artificial intelligence, capable of recognizing -in video streams- indicators for both distracting and drowsy driving in real-time, are of paramount importance for within (and outside) port operations, to increase road (and asset) safety.

2.5.2 Living Lab 2 - Hamburg

From the overall design of the Hamburg LL, the 5G infrastructure enables the collection of extended Floating Car Data and expands this data to Floating Truck and Emission Data (FTED). A typical example is the detected fuel consumption available via CAN-Bus and FMS, which is transferred to the MEC platform (Multi-access Edge Computing) and used for further calculations and evaluations. By this way, the derived CO_2 emissions can be quantified much more reliable than the emissions derived from the WLTP reference cycle, measured in [%].

There are numerous other examples of available data from CAN-Bus and other sensor data which can be transferred from the vehicle to the MEC. This leads to the following possible topic of interest:

1. *Applications can make use of the given 5G-LOGINNOV infrastructure (e.g. MEC, Telematics Device, etc.)* and based on this:
   a. Design innovative value-added services for sustainable traffic management beyond the use cases described in 5G-LOGINNOV.
   b. Extend the 5G-LOGINNOV services beyond traffic management, making use of available data sets from the truck.
   c. Enrich 5G-LOGINNOV FTED by additional data from other sources inside the vehicle and the environment (e.g. additional in-vehicle sensors, weather data, environmental sensors).

GLOSA will be used first time for Automated Truck Platooning (ATP) and sustainable traffic management measures in a 5G environment. The platoon(s) will be operated manually during the demonstration; the technical transfer from this demonstration scenario to in-vehicle components (which will trigger fully automated operation) is not part of the Living Lab. This leads to the following possible topic:

2. *Contributions can elaborate an uptake of the described GLOSA-ATP for Hamburg LL to an OEM-centric integration vehicle data sources and their data fusion*. The objective is to use the Floating Truck Emission Data available in GLOSA-ATP as input for automated driving functions used directly for vehicle operation, e.g. gear shift.

The traffic management services proposed for implementation in 5G-LOGINNOV are based on the GLOSA principles. They do not consider other mobile services which will help to reduce emissions. Nevertheless, truck data is highly valid when used by modern navigation software, which leads to the following topic:

3. *How can navigation systems make use of FTED for "Green Navigation"*? Given the planned truck and emission data closely linked to Traffic Light Forecast, the calculation of routes can be expanded to emission reduction criteria, generating a strong environmental impact given the wide usage of mobile navigation.

Besides "Green Navigation", the truck and emission data can also be used for eco-drive training, nowadays very common by truck OEMs to promote their brands towards energy-efficiency. This leads to the following topic:

4. *How can 5G-LOGINNOV support Eco-Drive training out of the generated data and the data fusion out of 5G (MEC, etc.)*?

SMEs and start-ups who intend to apply for a demonstration in Hamburg LL may address all of these topics or make use of parts mentioned above.

2.5.3 Living Lab 3 - Koper

5G combined with the emerging technologies, such as UAVs (Unmanned Aerial Vehicles, e.g. drones) and AI-assisted video analytics deployed in cloud, presents immense potential for the development of innovative applications targeting services for the established vertical industries such as logistics, industry 4.0. and security.

As part of 5G-LOGINNOV Open Call, innovative SMEs are invited to develop beyond-state-of-the-art solutions and applications addressing security and environmental aspects of port operation, to be integrated, tested and showcased in live port theatre. Special attention should be given to the following supportive services and use cases:

1. *Providing autonomous operation of UAVs (e.g. drones without human pilots) in harsh industrial and port environment*, targeting technologies and applications for supporting automated charging of UAV, self-flying and self-piloting actions, scheduled and event triggered UAV take offs, mission control planning, head back to the landing/charging station and finally receiving mission data in real and non-real time as part of fully automated process.
2. *AI- and ML-based applications for cloud environments targeting support services for the port security operation*, based on the exploitation of real-time video streams from moving and stationary drones to recognize security-related events and to identify objects of interest in real time.
3. *AI- and ML-based applications for cloud environments targeting port safety and environment monitoring on the land and sea*, based on the exploitation of UHD video streams from moving and stationary drones and other supportive sensors to identify environmental, safety and other hazardous events that may present damage to the health of people and other organisms. These events can be oil and chemical spill and other maritime pollutants coming from the cargo ships and open cargo already stored in the port area.

Presented use-cases should not limit applicants to propose other novel beyond-state-of-the-art technologies and applications incorporating 5G and other supportive systems that are addressing security, safety and other environmental challenges of modern EU-based ports.

3 TECHNICAL BACKGROUND

This section illustrates the ICT infrastructure of the three Living Labs of the project, providing the basic information needed to understand how the candidate application will be integrated in there.

3.1 Living Lab 1 - Athens

At Piraeus Container Terminal (PCT), in Athens, the focus of the Open Call will be in two main areas of interest regarding the development of:

i. Pioneering AR applications and systems to support port operations, and
ii. Far-edge computing enabled services for detecting distracted drivers' symptoms (e.g. drowsiness, etc.) in yard trucks.

For AR applications, PCT will provide the following equipment for the development of the pilot case:

- EPSON MOVERIO BT-350 glasses.
- Access to the Brochesia B View software.
- Virtual servers based on the ESX platform and located at PCT private data centre (server specifications will be determined during the contracting phase).
- Access to the 4G/5G network (costs related to data transfer over the 4G/5G network will be assumed by PCT).

The glasses have a small camera on them to send image/video data to the support centre, while the lens can also display information (e.g. images, annotations, pdf manuals) transmitted back from the support centre. The glasses are connected via a cable to an Android device the size of a mobile phone (e.g. smartphone or tablet) through which communication is established with the support centre based on WiFi. In areas with no WiFi coverage (e.g. Quay Cranes, Rail Mounted Gantry Cranes, etc.) a mobile hotspot is deployed to establish communication over a 4G network at PCT facilities. Based on the current network type (4G or WiFi) and the channel dynamics, the transmitted image/video quality from (and back to) the AR glasses is adjusted dynamically, whereas features to annotate/mark objects in the user's field of view (by the support centre) as well as voice communications are also available for a full immersive AR experience. Suggested but not limited uses cases include:

- AR-assisted guidance to speed up repairs in port assets (e.g. trucks, lifts, cranes, etc.).
- AR-guided cargo load/unload operations (e.g. in open or closed space storehouses).
- AR-training service at port operations and related assets, with on-the-job real-time tuition.

For the driver condition use case, PCT will provide the following equipment for the development of the pilot:

- A Jetson Xavier NX Developer Kit to be used as a far-edge device.
- An HD camera installed in the yard truck cabin at a location that will not hinder operations and will not introduce security risks.
- A 10-inch tablet (Windows or Android based on use case requirements) or a Raspberry PI.
- A 4G/5G router located in the yard truck cabin.
- Virtual servers based on the ESX platform and located at PCT private data centre (server specifications will be determined during the contracting phase).
- Access to the 4G/5G network (costs related to data transfer over the 4G/5G network will be assumed by PCT).

Far-edge computing is a pioneering technology that enables the evolution to 5G and beyond architectures, designed to put applications and data closer to devices and their users in order to overcome the intrinsic problems of the traditional cloud, such as high latency and the lack of security. Applicants are invited to design and develop their innovative 5G-IoT devices (including hardware and software components) that will locally execute video analytics tasks, based e.g. on machine learning models (also developed by the applicant), to detect truck drivers' symptoms such as fatigue and

drowsiness. The proposed device will be placed inside (and powered by) the yard trucks, receiving a direct video feed of the respective driver's reactions, and executing analytics locally. The inference of the model (e.g. with 90% confidence, the yard truck driver suffers from drowsiness) will be transmitted from the 5G-IoT device to the back-end application at PCT terminal, triggering the necessary actions to prevent potentially dangerous situations.

3.2 Living Lab 2 - Hamburg

The overall service architecture as planned for Living Lab Hamburg is shown in Figure 1. On the right, one can see soft- and hardware systems linked to the city traffic management centre, from where traffic signal states (including forecast) are exchanged with the platoon. Additionally, external environmental data will be collected and made available for the virtual traffic management centre. On the left side, data is transferred from the floating vehicles equipped with telematic devices.

All telematic devices use the public 5G mobile network as available in inner urban area in the city of Hamburg. The foreseen telematic devices are:

1. Tec4U Entruck CarPC collecting raw CAN-Bus data and aggregating them as calculated data.
2. Continental IoT box selecting CAN-Bus data plus additional IoT devices.
3. T-Systems Smartphone LCMM App collecting GPS speed profiles for pre-configured vehicle parameters.

All of these data are transferred via the Telekom 5G public network to the service centre in charge of the use cases. For UC8 and UC9, the LL partners are focusing on floating vehicle emission data collection, evaluated by the three telematic devices running inside the platoon. The devices transmit detailed data sets of single vehicles and platoons including taxi fleet data. The data of UC8 and UC9 helps traffic managers to evaluate emissions along the road network and to help developing strategies for clean air policy measure (short-term and mid-term). Compared to this, UC10 evaluates traffic signal forecast data within the GLOSA APP sent previously from the virtual traffic centre. Additionally, 5G based precise positioning technology will be used to improve the accuracy of all calculations executed within the uses cases.

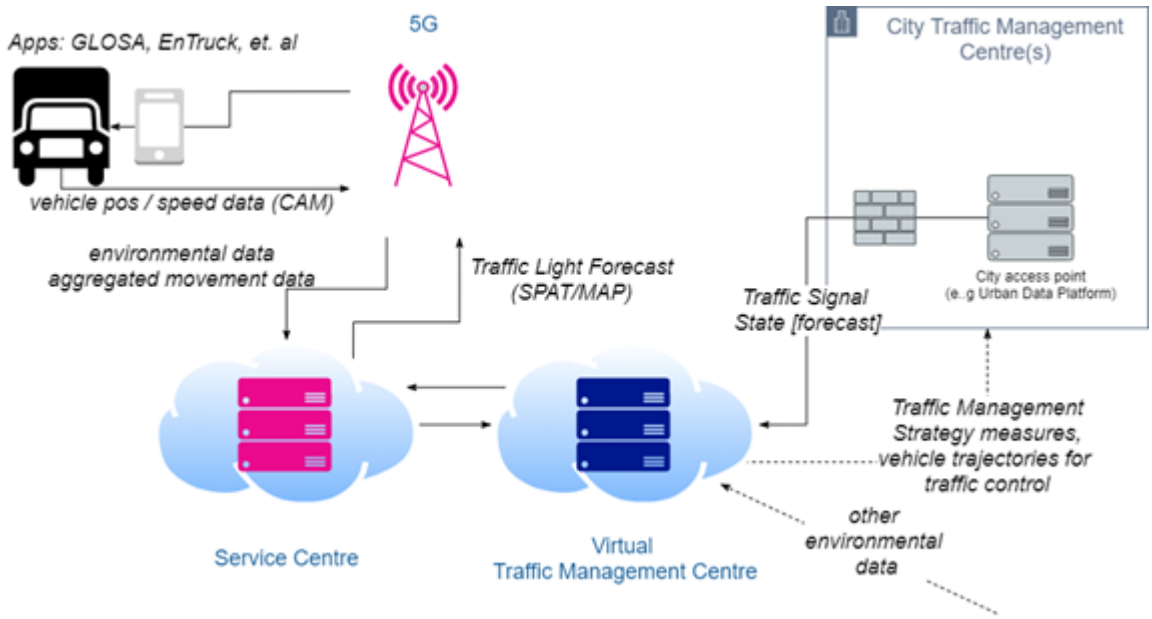

Figure 1. Service Architecture as planned for Living Lab Hamburg

Use case 10 has the objective to implement 5G-enabled truck platoons, including the lead platoon vehicle and the following vehicles. In order to keep the platoon safe and distance stable, the speed range of the lead vehicle has to be transferred to the platoon followers. For this purpose, vehicle-to-

vehicle communication (V2V) with low latency run times (<50 ms), a feature of the 5G mobile network, is foreseen and helps to guarantee the operation of the truck platoon, especially in urban traffic conditions where platooning is challenging. For this, the traffic signal forecast is sent the to the vehicle and drivers can adopt their speed to optimum according to road and traffic conditions.

SMEs and Start-Ups are welcome to design convincing business cases with the technical requirements for business implementation to attract fleet and traffic managers. Solutions should take features of telematics, IoT and 5G into their consideration and convince the Living Lab partners about their innovative go-to-market strategy.

3.3 Living Lab 3 - Koper

Mobile network – 5G NSA Release 15

- Supported User Equipment types:
  - eMBB.
  - NB-IoT.
- If required USIM with required data and QoS profile will be provided.
- Connectivity between User Equipment and Virtual Machines in the LL Cloud will be assured.

Cloud capabilities

- Standard Virtual Machines (e.g. VMware) can be deployed in Koper LL cloud environment. Required compute and storage capabilities needs to be agreed.
- Secure remote access will be available (e.g. VPN).

Services and applications

- Live video streams in standard formats (e.g. H264) from the deployed stationary UHD cameras and drones can be provided to the applicants, but they will be available only inside the Koper LL in the controlled cloud environment.
- Telemetry information data collected from the vehicles can be provided to the applicants, but they will be available only inside the Koper LL in controlled cloud environment.
- A general insight to know-how and the existing security-related drone capabilities in the port can be provided to applicants.

Physical access to the facility

- Physical access to the Koper LL will be also available for the deployment of applicant HW equipment (e.g. drone charging stations) and testing purposes, under the following conditions:
  - Physical access to the Koper LL facility is subject to security conditions set in the document named Rules on Internal Order at Luka Koper (Port of Koper), effective as of 15 April 2011, and is part of the tender documentation [3]. Applicants awarded on the Open Call should meet the provisions from the given document to be able to physically access LL Koper, for the duration of the 5G-LOGINNOV activities in LL Koper.
  - Before accessing the LL Koper facility (for the meeting purposes), the awarded applicant should announce its visit by using the Online Visitor Announcement Tool. User instructions for arranging access permits (e.g. data entry, confirmation process) is part of the tender documentation [4].
  - Before accessing the LL Koper facility (for the service work purposes, e.g. carry out on-site activities), the awarded applicant should fill-in the Application for Access Permit Form, which is part of the tender documentation. Instructions on how to fill and submit the access permit form are provided on the form itself.

Collaboration in Koper LL is subject to provisions set in the document named Regulations on Trade Secrets Protection, effective as of 15 October 2019, deriving from the Trade Secrets Act (Official Gazette of the Republic of Slovenia, No. 22/19), and implementing Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business

information (trade secrets) against their unlawful acquisition, use and disclosure (Text with EEA relevance), and is part of the tender documentation [6]. To gain access to information concerning LL Koper activities, applicants awarded on the Open Call should meet the provisions from the Regulation document and the corresponding legislation.

- Before accessing the LL Koper information, the awarded applicant should sign a statement on the protection of trade secrets of Luka Koper d.d., which is part of the tender documentation [7].
- The Trade Secrets regulation applies to LL Koper awarded applicant and is not limited to the duration of the 5G-LOGINNOV activities. Regulation on Trade Secrets Protection takes effect to applicants for and beyond the duration of the 5G-LOGINNOV action, according to the Trade Secrets Act provisions.

The above stated documents are part of the tender documentation and are available on the 5G-LOGINNOV Open Call page and at https://luka-kp.si/eng/port-security. Upon request, the documents can be transferred to applicants through email service.

4 HOW TO APPLY

This section outlines the procedures for the submission of applications to the 5G-LOGINNOV Open Call.

4.1 Application Form

The applicants shall describe their ICT solution through an **Application Form** published on the Open Call launch date, and then follow the procedure outlined in chapter 4.2; it is strongly recommended that applicants use the Microsoft Word template that will be made available for download at the link *https://5g-loginnov.eu/open-call/*, providing all requested information and respecting page limit constraints where indicated.

Compiled Application Forms must be converted to PDF format, electronically signed and sent to the application mailbox *openCall_applications@outlook.com* between 26-April-2021 and 30-Jun-2021 (see chapter 4.2 for more details).

The compiled Application Form shall not exceed 20 A4 pages, font Arial 11, line spacing 1.

The Application Form consists of the following sections:

1. **General information** about the applicant: organization type, legal address, contacts, etc.
2. **Identification of target Living Lab(s)**, including general objectives (related to Living Lab layout) and specific areas of interest that are targeted by proposed solution (if any).
3. **Ambitions and development plans**. The applicant shall describe the exploitation paths foreseen for the proposed solution, preferably through a draft structured business plan.
4. **Technical description**. The applicant shall provide an exhaustive description of its ICT solution, including:
   - Aims and operating principles (preferably through sequence diagrams, flow charts or similar).
   - Distinctive features, advances over the state-of-the-art.
   - High-level functional architecture.
   - Interfaces/connectors with other ICT systems/platforms.
   - Deployment architecture (how the solution will be integrated with existing ICT/operational infrastructure of the Living Labs: hardware, software, libraries, field devices, etc.)
   - Preliminary layout of the Human-Machine Interface (HMI), if any (preferably including pictures, screenshots, sketches, etc.).
5. **Operating description**. The applicant shall provide a brief description of:
   - Expected benefits and measurable Key Performance Indicators.
   - Possible data sharing policies.
   - Planned support activities (remote and on-site).
   - Other on-site activities (e.g. installation, test, etc.) and needs (e.g. access to Living Lab area, involvement of Living Lab personnel, etc.).
6. **Project structure**. The applicant shall provide the Work Breakdown Structure (WBS) of the project describing Work Packages and Tasks (preferably including graphical representations such as Gantt charts, PERT charts, etc.) and related Deliverables and Milestones (including types, contents, due dates). The overall timing of the project must comply with the execution of 5G-LOGINNOV Living Labs, i.e. the ICT solution must be deployed, tested and fully validated on selected Living Lab(s) by 30-Apr-2023.
7. **Resource/budget allocation**. The applicant shall indicate the estimated allocation of resources (person-months) and costs per Work Package, specifying a budgetary breakdown per cost item (staff, purchase of equipment, travel and subsistence). The total costs allocated for the application must be below the ceiling of € 50.000, VAT included; the cost reduction towards the ceiling of € 50.000 will not be considered as a preferential criterion for the evaluation of the application.
8. **The tenderer shall fill in the section** that states:
   - The acceptance by the tenderer of all conditions laid down in this invitation to tender.

- His/her confirmation that there has been no collusion from his/her answer to tender with the other tenderers and the 5G-LOGINNOV beneficiaries.
- That all the documents submitted by the tenderer become the property of the consortium and are deemed confidential.

4.2 Submission of Applications

The compiled Application Form shall be **converted to PDF format** and **electronically signed by the legal representative of the SME**, using any format having legal value (e.g. **CAdES, PAdES**). The signed document (P7M or PDF format, respectively) must be **attached to an e-mail** sent to the application mailbox *openCall_applications@outlook.com* **between 26-April-2021 and 30-Jun-2021 (05:00:00 PM CEST)**.

The application mailbox will be deactivated on 30-Jun-2021 at 05:00:00 PM CEST, and thus all applications received after this time will be automatically discarded; **applicants are strongly recommended to submit their applications with a reasonable advance over the deadline**, in order to ensure they are successfully delivered in time, even in case of technical or connectivity problems.

5G-LOGINNOV will send a confirmation receipt to the e-mail address submitting the application, notifying that it has been taken in charge by the system; such confirmation does not certify that the application is complete and suitable for evaluation, but simply that the e-mail was received in time.

4.3 Further Information for the Applicants

Applicants are invited to **visit the 5G-LOGINNOV Open Call page regularly** (*https://5g-loginnov.eu/open-call/*), in order to get latest news and to consult Frequently Asked Questions (FAQs) about the call.

In case of specific queries on the call, **applicants may write an e-mail** to *openCall_helpdesk@outlook.com* with subject "support" **to get help from the 5G-LOGINNOV Applicant Helpdesk team**; the helpdesk will remain active from the beginning (26-April-2021) to 10 days before the closure (20-Jun-2021) of the submission period.

4.4 From Application to Contracting

After closing the application phase (30-Jun-2021), all applications will **undergo a technical/business evaluation process**, aiming to determine their ranking and to select the 5 that will be granted with a service contract for each provider.

The evaluation process will indicatively take 2.5 months from the closure of the submission phase; at the end of the evaluation process (planned date: 17-Sep-2021) the final ranking will be notified via e-mail to all applicants, and the 5 winning applications will start the contracting phase, which will end with the official kick-off of activities (planned date: 01-Oct-2021).

The awarded applicants will be informed by the contracting party (ICOOR) and they will be put in contact with the involved Living Lab leaders. **The stakeholders responsible for the ICT infrastructure or port operation (e.g. related to safety, liability, etc.) of selected Living Labs, where the Open Call solutions will be deployed, may add specific clauses to the contract**. Please understand that access to the port and its resources is a delicate process that needs careful planning and must comply with their internal processes and procedures. Granted applicants may be also asked to sign the appropriate NDAs with the involved and relevant project partners

The following table provides a summary of the general timing of the 5G-LOGINNOV Open Call.

Table 1. Open Call general timing

Planned Date	Phase/Event
26-Apr-2021	Launch of the Open Call (submission of applications opened)
30-Jun-2021	Closure of the Open Call
01-Jul 2021 - 16-Sep 2021	Evaluation of received applications
17-Sep-2021	Final ranking drawn up, information to applicants
20-Sep-2021 - 30-Sep-2021	Contracting of selected applications
01-Oct-2021	Contracts signed, kick off of activities

The dates above are merely indicative and may change depending on external factors, including the number of received applications; applicants are invited to visit the 5G-LOGINNOV Open Call page regularly (*https://5g-loginnov.eu/open-call/*), in order to get latest updates about the status and timing of the evaluation process.

4.5 Promotional Events

The 5 selected applications will also be presented in a **live panel session** organized by the project in the context of **ITS World Congress in Hamburg**, 11 to 15 October 2021, together with other Living Labs activities.

Furthermore, all the eligible applicants (not only the selected ones) will be included in the "**ERTICO Start-Ups Initiative**" and engaged about innovation and opportunities linked to 5G-LOGINNOV developments.

5 SELECTION

5.1 Evaluation Process

The evaluation of eligible applications will be carried out by the **5G-LOGINNOV Project Management Team**, including appointed representatives from:

- ERTICO (Project Coordinator and Technical Coordinator, Quality Manager, Leader of WP2, WP6 and WP7).
- VICOMTECH (Innovation Manager, Leader of WP1).
- AKKA (Data Manager).
- CIRCLE (Communication Manager, Leader of WP5).
- T-SYSTEMS (Leader of WP3 and Hamburg Living Lab).
- ICCS (Leader of Athens Living Lab).
- ININ (Leader of Koper Living Lab).
- ICOOR/UNIMORE (Leader of WP4).

Potentially, additional Living Lab partners and experts from the 5G-LOGINNOV project can be involved as additional contributors to the evaluation process, depending on the nature of the submissions.

The evaluation process will be carried out in respect of principles of fairness and transparency, according to the criteria described in chapter 5.2. The process will aim to assess the applications under two distinct yet complementary perspectives:

- **Technical aspects**, mainly related to sections 2, 4, 5 and 6 of the Application Form: relevance to selected Living Lab(s), degree of innovation, overall architecture, expected impacts and benefits, data sharing, project structure, etc.
- **Business and market aspects**, mainly related to sections 3 and 7 of the Application Form: ambitions, time-to-market, costs structure, business plan, etc.

Please note that the Project Management Team could ask for integrations and additional information at any time of the evaluation process, to reach a fully informed and fair judgement.

Also note that the cost structure will only be evaluated in terms of profitability and “value for money” of the proposed solution, in a market exploitation perspective; however, a possible cost reduction towards the ceiling of € 50.000 **will not be considered as a preferential criterion** for the evaluation of the application.

The decision by the project management is final and the tenderer will withhold any legal action against the decision taken.

The following chapter thoroughly describe the assessment criteria followed in the evaluation process.

5.2 Assessment Criteria

All received applications will be first filtered according to their **eligibility status**, basing on criteria described at chapter 1.2.3; for all non-eligible applications, no further evaluation will take place.

Remaining eligible applications will be evaluated according to the criteria described in following chapters.

5.2.1 Eligibility status

All received applications will be first filtered according to their eligibility status, basing on criteria described at chapters 1.2.3 to 1.2.8 included, and according to the indications provided by chapters 4.1, 4.2 and 4.3. For all non-eligible applications, no further evaluation will take place.

Remaining eligible applications will be evaluated according to the criteria described in following chapters.

5.2.2 Technical aspects

The following aspects will be considered and evaluated.

1. **Relevance to selected Living Lab(s)**. Compliance with selected Living Lab(s) objectives and use cases; technical feasibility (related to Living Lab layout); compliance with specific areas of interest (see chapter 2.5).

2. **Innovation**. Distinctive features; degree of innovation of adopted technologies/operating principles; advances over the state-of-the-art for comparable solutions.

3. **Architecture**. Technical relevance of identified functionalities; flexibility and scalability; interoperability with legacy systems (if any); integration with existing ICT/operational infrastructure of the Living Lab(s); usability of proposed HMI (if any); security and privacy issues.

4. **Impacts**. Expected benefits; measurable Key Performance Indicators (KPIs); socio-economic impacts (sustainability, resilience); data sharing policies.

5. **Project structure**. Overall quality of the Work Breakdown Structure (WBS); methodology used; suitability of allocated resources; relevance of Deliverables and Milestones.

Each of the above criteria will accord scores as per the table below.

Table 2. Technical evaluation scoring

Evaluation	Description	Score
Fail	The proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.	**0**
Poor	The criterion is inadequately addressed, or there are serious inherent weaknesses.	**1**
Fair	The proposal broadly addresses the criterion, but there are significant weaknesses.	**2**
Good	The proposal addresses the criterion well, but a number of shortcomings are present.	**3**
Very Good	The proposal addresses the criterion very well, but a small number of shortcomings are present.	**4**
Excellent	The proposal successfully addresses all relevant aspects of the criterion. Any shortcomings are minor.	**5**

Once all technical criteria are scored, applications will be filtered to ensure they are **above a minimum acceptability threshold** defined by the following rule:

- Each criterion reaches the minimum score of 3
  and
- The application totalizes an overall technical score of 18.

5.2.3 Business and market aspects

The following aspects will be considered and evaluated.

1. **Business value**. Impact of the innovation in terms of value created for the specific Living Lab.

2. **Market aspects and exploitation outside the Living Lab**. Possibility to apply the innovation in other Living Labs and contexts and to determine a sustainable business by itself.

Each of the above criteria will accord scores as per the table below.

Table 3. Business and market evaluation scoring

Evaluation	Description	Score
Fail	The proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.	**0**
Poor	The criterion is inadequately addressed, or there are serious inherent weaknesses.	**1**
Fair	The proposal broadly addresses the criterion, but there are significant weaknesses.	**2**
Good	The proposal addresses the criterion well, but a number of shortcomings are present.	**3**
Very Good	The proposal addresses the criterion very well, but a small number of shortcomings are present.	**4**
Excellent	The proposal successfully addresses all relevant aspects of the criterion. Any shortcomings are minor.	**5**

The following **minimum acceptability threshold** is defined:

- Each criterion reaches the minimum score of 3.

Once all technical and business and marked aspects are scored, a final ranking of the proposals will be defined and the 5 winners will be selected accordingly.