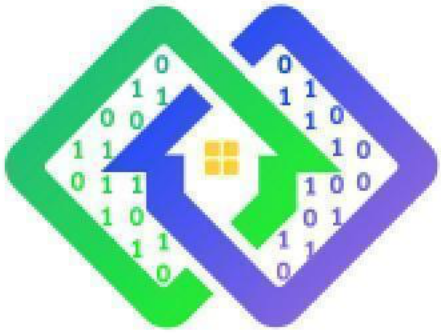
Grant Agreement N° 872592



PLATOON

Digital platform and analytic tools for energy

Guide for Applicants, 1st Open Call

Submission starts on Monday, 4th of January 2021 at 09.00 (CET, Brussels Local TIme)

Deadline is on the 4th of March 2021 at 17:00 (CET, Brussels Local TIme)

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Terms and abbreviations

EC	European Commission
FSTP	Financial Support to Third Parties
GA	Grant Agreement
GFA	Guide for Applicants
HLUC	High Level Use Case
LLUC	Low Level Use Case
MVP	Minimum Viable Product
PLATOON	Digital PLAtform and analytic TOOls for eNergy
PoC	Proof of Concept
SC	Steering Committee
SGA	The Sub-Grant Agreement is the contract signed between the beneficiary and FBA on behalf of the consortium.
SME	A business with a headcount in Annual Work Unit (AWU) less than 250 and an annual turnover less or equal to €50 million OR annual balance sheet total less or equal to €43 million
SW/HW	Software/Hardware
TRL	As per European Commission definition (Annex G, General Annexes to Work Programme 2018-2020 of the Horizon 2020 Programme), there are 9 possible levels of technology readiness. ● TRL 1 – basic principles observed, ● TRL 2 – technology concept formulated, ● TRL 3 – experimental proof of concept, ● TRL 4 – technology validated in a lab, ● TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies), ● TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies), ● TRL 7 – the system prototype demonstration in operational environment, ● TRL 8 – system complete and qualified, and ● TRL 9 – actual system proven in an operational environment (competitive manufacturing in the case of key enabling technologies; or in space).
TTP1	Technology Transfer Programme 1
TTP2	Technology Transfer Programme 2

1. Introduction

PLATOON (https://platoon-project.eu/) is a project funded by the European Commission that **aims to digitalise the energy sector,** enabling thus higher levels of operational excellence with the adoption of disrupting technologies.

In order to facilitate technology transfer into the market, PLATOON will distribute up to **2M€ among 13 disruptive Bottom-up Projects** that will be selected through **2 Open Calls:**

- 1st Open Call targeting 6 SMEs to develop different components of the PLATOON reference architecture including data analytics tool for the toolbox (prototypes);
- 2nd Open Call targeting 7 SMEs to develop new services on existing technologies (MVPs).

Additionally, the selected Bottom-up Projects will become part of the **PLATOON Support Programme** that consists of two types: Technology Transfer Programme 1 (TTP1, 1st Open Call) and Technology Transfer Programme 2 (TTP2, 2nd Open Call). The financial support for both programmes per Bottom-up Project is depicted below.

Table 1 Financial support of the programmes

Technology Transfer Programme 1	Technology Transfer Programme 2
Stage 1: Inception €30,000	Stage 1: Inception €30,000
Stage 2: Development €120,000	Stage 2: Development €120,000

In both cases, the selected projects will receive technical mentoring services provided by the core partners, which is one of the added values of the project.

This Guide for Applicants contains relevant information to understand how to successfully take part in the 1st Open Call.

2. Open Call summary

The 1st PLATOON Open Call will distribute €900,000 among **6 bottom-up projects** to develop core functional and\or technical building blocks and new data analytics tools for PLATOON's large-scale pilots.

The selected 6 SMEs will contribute towards the impact of PLATOON: that is to increase renewable energy consumption, smart grids management, increased energy efficiency and optimised energy asset management.

The selected SMEs will benefit from their participation in the PLATOON TTP1 in a number of ways, namely by:

1. securing a position within PLATOON's marketplace as a market driver (see Annex D);
2. deploying across numerous end-users that are already compliant to the PLATOON ecosystem and
3. fast-tracking and validating their solution through extensive technical and business networks in the energy domain provided by the PLATOON project.

The maximum amount per bottom-up project is **up to €150,000 equity-free funding**. The selected proposals will be invited to join the Technology Transfer Programme 1 (TTP1). For further details see Chapter 6 in this Guide of Applicants.

The 1st Open Call will **launch on the 4th of January 2021** at 09.00 (CET, Brussels Local Time) and will have a deadline for the **4th of March 2021** at 17:00 (CET, Brussels Local Time). Applications must be submitted online at: https:/platoon-open-call.fundingbox.com/

3. Eligibility criteria

All applicants will have to abide by all general requirements described in sections from 3.1 to 3.9 of this Guide for Applicants in order to be considered eligible to take part in the Technology Transfer Programme 1 (TTP1), benefit from its services and receive funding.

3.1. Types of beneficiaries

Applicants must be SMEs that are already legally established at the time of application. 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 applicants participating in the Open Call can **NOT** include any PLATOON partners (or their affiliates or employees).

3.2. Eligible countries

Only applicants legally established in any of the following countries (i.e. "Eligible Countries") will be eligible for the PLATOON Support Programme:

- The Member States of the European Union[1];
- Associated Countries to H2020[2].

3.3. Type of activity

Participants are expected to address **the scope of the Open Call, that is to develop and/or extend different components of the PLATOON reference architecture** (interoperability layer, data governance and security framework, data analytics tools etc.) to be implemented and validated in PLATOON's large-scale pilots, focused on increased renewable energy consumption, smart grids management, increased energy efficiency and optimised energy asset management. More details on components of the PLATOON reference architecture and pilots can be found in Annex C.

On the technical aspect, **PLATOON project is focused on 3 main pillars within Big Data and intelligent applications in energy: 1) Interoperability, 2) Data governance, security, privacy and sovereignty** and **3) Data Analytics Toolbox and Edge Computing Applications.** Therefore, there will be a **Minimum Quality Criteria Check** as part of the overall Eligibility Check whereby applicants will need to demonstrate **experience in at least 1 of the following 4 experimentation areas** to be eligible to participate in the TTP1 (See Annex A for more information on each of the 4 experimentation areas):

- Digital Interoperability (APIs and Data models);

[1] In case of applicants from the United Kingdom, the actual possibility of choosing under Open Call will depend on the conclusion of an appropriate agreement with the EU regarding further cooperation within projects financed from Horizon 2020. If you apply, despite the lack of the said agreement, you must take into account the risk of rejection of your application due to the non-fulfillment of the eligibility criteria.

[2] Updated information at:
https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

- Data governance, security, privacy and sovereignty;
- Data Analytics applications in energy (such as Energy usage optimization, Predictive maintenance, Demand forecast, etc.);
- Edge computing (S/H).

In order to ensure that the developed solutions can be implemented into the specific platforms for different pilots the proposed solutions must be developed in accordance with the specifications defined in the project for the following aspects:

- PLATOON reference architecture;
- PLATOON common APIs and 'Semantic' & Classical' Data models;
- Data governance, security, privacy and sovereignty framework based on IDS reference architecture;
- Data analytics tools container based on Docker technology.

More details about these aspects can be found in Annex C of the GfA.

Furthermore, it is encouraged that participants exploit/develop open standards and data models. It is also encouraged that open-source licenses are given priority during the development of the applicant's solutions, ensuring compliance with the PLATOON architecture.

Regarding the specific challenges for the open calls, there are two alternatives:

1. **Ready-Made Challenge**: participants can pick one of the following 'ready-made' challenges pre-defined by us, ready to solve:
   - **Open source IDS Connector on Edge;**
   - **Tool for automatic deployment of containerized applications in a Cloud or on premise environment;**
   - **Secure Multi party computation;**
   - **PLATOON compliant data management and interoperability solution;**
   - **PLATOON Photovoltaic Production forecasters;**
   - **Tool for scanning maintenance logs.**

See more details for each readymade challenge in Annex B of the GfA.

2. **Free-Choice Challenge**: Participants are free to propose their own challenge and solve it based on the project information provided in the applicant guide regarding project objectives, reference architecture, components already under development and the available pilots. In this sense, transversal solutions applicable to more than one pilot will be prioritised.

It must be highlighted that there is no preference over any of these two alternatives (ready-made or free-choice). Also, it must be clear that there won't necessarily be a proposal funded for each of the ready-made challenges. Equally, it could happen that two proposals for the same ready-made challenge could be funded if it makes sense. In a nutshell, the best 6 proposals out of all of them will be selected regardless if they are ready-made or free-choice.

3.4.Submission language

Proposals must be written in **English** in all their mandatory parts in order to be eligible. If the mandatory parts of the proposal are in any other language, the entire proposal will be rejected. If only non-mandatory parts of a proposal are submitted

in a language different from English, those parts will not be evaluated but the proposal is still eligible.

English is also the only official language during the whole length of the PLATOON TTP1 and, accordingly, any requested deliverables will be admitted only if submitted in English.

3.5.Multiple Submission (not allowed)

Each applicants can submit only one proposal to PLATOON in this open call. If more than one proposal is identified, only **the last proposal** which has been submitted in order of time will be evaluated.

3.6.Deadline

The deadline for the submission of applications for this call is on **the 4th of March 2021, at 17:00** (CET, Brussels Local Time).

The applicant will be able to modify the form until the deadline. Kindly verify the completeness of the form, as it won't be possible to add any further information after the deadline. Only proposals submitted until the deadline will be accepted.

3.7. Online Submission

Proposals must be submitted online through the PLATOON microsite for this open call at FundingBox Platform: https://platoon-open-call.fundingbox.com/ before the deadline.

Applications submitted by any other means **will not be considered for funding**.

3.8.Absence of conflict of interest

While assessing proposals, we will take into consideration the **existence of potential conflict of interes**t, meaning that impartiality in selection and overall performance assessment of the programme should be guaranteed. Consortium partners, their affiliated entities, employees and permanent collaborators cannot take part in the PLATOON TTP1. All cases of potential conflict of interest will be assessed on **a case-by-case basis.**

3.9.Other requirements

Each applicant must confirm:

- It is not under liquidation or is not an enterprise under difficulty according to the Commission Regulation No 651/2014, art. 2.18.
- Its project is based on the original works and going forward any foreseen developments are free from third party rights, or they are clearly stated.
- It is not excluded from the possibility of obtaining EU funding under the provisions of both national and EU law, or by a decision of both national or EU authority.
- All statements embodied in the Declaration of honour have been understood and accepted.

4. Summary of the evaluation process

Evaluation of proposals will be done following the phases reflected in the figure below:

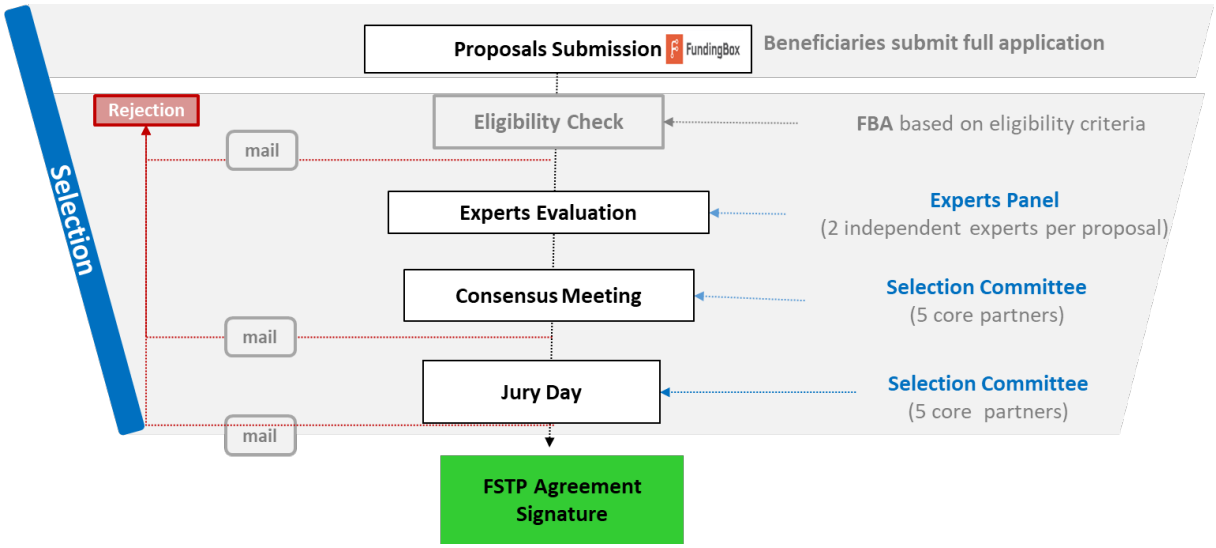

Figure 1 Evaluation process

4.1.Eligibility check

All applications received before the deadline (March 4 at 17:00 CET Brussels time) will be checked according to the "eligibility criteria" (section 3 of this Guide for Applicants).

Proposals that do not comply with the required criteria will be excluded. This includes the Minimum Quality Criteria Check where applications need to demonstrate experience in at least 1 out of 4 of the experimentation areas (see Section 4.3).

The applications will be checked internally by the three members of the selection committee (**FBA, ENGIE & TECN**).

The applicants will be notified by email whether they have passed the eligibility stage or not.

A shortlist of "Eligible Applicants" will be produced as a result of this phase.

5. External evaluation

Proposals in the list of "Eligible Applicants" will be evaluated by two independent and confidential evaluators.

Proposals will be evaluated on the following criteria:

(1) EXCELLENCE:

- **Project scope of the PLATOON 1st Open call.** Applicants need to demonstrate how they are in scope of the Open Call. The scope is to develop/extend different components of the PLATOON reference architecture (interoperability layer, data governance and security

framework, etc.) and data analytics tools to be implemented and validated by PLATOON's 7 large scale pilots.

- **Problem\Need being solved.** Applicants should describe their capabilities in addressing the challenges around the digitisation of the energy domain. Applicants should include relevant experience in other projects on Interoperability, Data Governance, Big data architectures, Data analytics and Edge Computing.
- **Ambition:** applicants should describe the innovative approach behind the building blocks and analytics tools proposed and about the degree of differentiation that this project will bring regarding the current status quo. Solutions should be aligned with the PLATOON Reference Architecture (see Annex C).
- **Technical approach:** Applicants should provide concrete performance and technology standardization targets in one or several of the PLATOON experimentation areas described in the Open Call. Moreover, the proposal should state how such performance targets will be achieved. Applicants' proposed projects must be at least at TRL 3 and reach at least TRL 5-TRL6[3].

(2) IMPACT:

- **Market opportunity**: The applicants have to demonstrate a clear idea of what they want to do and whether the proposed concept has market potential, e.g. "Candidates' project" will solve a problem for a specific target customer. Candidates' projects or solutions proposed must be compliant with the PLATOON Ecosystem.
- **Commercial Strategy and Scalability**: The applicants have to demonstrate the level of scalability of the proposed solution, meaning that it not only solves a specific problem for a specific customer but is able to be commercialised to solve a structural problem in a specific sector/process/etc. If possible, a potential Business plan linked to these solutions should be provided.

(3) IMPLEMENTATION:

- **Team:** The Bottom-up Projects have to demonstrate their technical competencies in at least one of the four experimentation areas listed in Section 3.3, their ability to take a concept from ideas to market, their capacity to carry through their ideas and understand the dynamics of the market they are trying to tap into. The team should be a balanced and cross-functional team, with a strong background and skill set.
- **Resources**. Demonstrate the quality and effectiveness of the resources assigned in order to get the objectives/deliverables proposed. The SME will need to demonstrate their capacity to deliver the core work.

Each criterion will be scored out of 5. The threshold for individual criteria will be 3. The overall threshold, applying to the sum of the three individual scores, will be 10 out of 15.

[3] As per definition is Annex G of the General Annexes of the Work Programme of Horizon 2020: https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf

The final score will be calculated as an average of the individual assessments provided by the Evaluators, following a check for evaluators' bias (a significant divergence in scoring). In case the score of the evaluators differ, the bias will be solved by a third evaluator.

Ties will be solved using the following criteria, in order:

- Impact score,
- Implementation score,
- Excellence score,
- Date: the proposal submitted first.

A **'Ranking List'** will be elaborated and passed to the next phase. All proposals obtaining a score above the threshold, will be passed to the next phase.

Additional material, which has not been included and specifically requested in the online application form, will not be considered for the evaluation of the proposals and data not included in the proposal will not be taken into account regardless of the reason for not being included. The applicants are solely responsible for verification of the completeness of the form.

The PLATOON consortium makes its best effort to keep all provided data confidential; however, for the avoidance of doubt, the applicant is solely responsible to indicate its confidential information as such.

The applicants are strongly recommended **not to wait until the last minute to submit the proposal.** Failure of the proposal to arrive in time for any reason, including extenuating circumstances, will result in rejection of the proposal.

5.1. Consensus meeting

The "Selection Committee" will check the best proposals scored in the "Ranking List" produced in the previous phase.

The Selection Committee will decide, by consensus or ⅔ majority votes), the "List of finalists" to be invited to the next stage. The discussion will be based on the ranking obtained as a result of the External Evaluation.

Whilst normally the highest ranked proposals will be selected for funding, the Selection Committee might have fair reasons for objecting to a specific third party, like the alignment with PLATOON goals and scope, the ability to achieve the highest impact possible, commercial competition, as well as the existence of significant ethical concerns or a potential conflict of interest. In this case, the choice may pass to the next-ranked proposal. The exact number of proposals approved will be decided based on the overall quality of the proposals.

The Selection Committee consists of following partners: **ENGIE, TECN, FBA, PUPIN** and **TIB.**

5.2.Jury Day

The selected projects will be invited to a Jury Day, where selected applicants will have the opportunity to pitch their project in front of the PLATOON Jury. The event may be physical or online (depending on the restrictions caused by COVID-19). Should the event be physical, a €1000 travel and subsistence allowance will be

provided to the finalists invited to the Jury Day (upon signature of the micro-grant agreement).

After the Jury Day, the PLATOON Selection Committee' will undertake the final evaluation taking into account the following 'Awarding criteria':

- The level of innovation of the proposed solution
- Technical scalability of the proposed solution
- Effective integration of relevant digital technologies
- Demonstration of new scalable data-driven business models
- Competencies and experience of the Team to successfully execute the Programme and beyond
- Solid plan for next steps to reach commercial readiness, after the end of the
- Development Programme

The 'Selection Committee' will decide by consensus or majority vote (⅔ of all members) the 'List of Finalists, and 'Reserve List'.

The exact number of proposals approved will be decided based on the overall quality of the proposals.

After the Jury Day, the results will be communicated to the applicants.

5.3.Sub-Grant Agreement setup process

After the consensus meeting, but prior to the Welcome Event, proposals included in the "List of finalists" will be required to go through a "Formal check".

For the "Formal check", applicants included in the "List of finalists" will have to provide all documentation required (e.g. registration document of the Applicant, bank identification form etc.) to prove their compliance with the Eligibility Criteria and fulfilment of the formal requirements.

In case the requested information is not provided in time without a clear and reasonable justification, this will directly end the "Sub-Grant Agreement" setup process and projects inside the "Reserve List" will substitute the failing applicants in order of ranking.

Once all these formalities are covered, Fundingbox Accelerator (on behalf of the consortium) will sign the "Sub-grant Agreement" with the final beneficiaries of FSTP.

6. PLATOON Technology Transfer Programme 1

The selected applicants, after signing the "Sub-grant Agreement" with FBA on behalf of the PLATOON consortium, will participate in the PLATOON TTP1, which will last up to 9-months and will help with the execution of bottom-up projects. The programme consists of 2 stages:

- **Stage 1 - Inception.** The first step of the programme is to engage the talent and build up the best mentoring set-up. Selected teams will meet during a Welcome Event where they will be matched with a technical mentor. After that, the teams will work intensively over a 4 weeks period to define their Individual Mentoring Plan (IMP). This document establishes the KPIs and Deliverables that will be taken into account when the Mentoring Committee

evaluates the bottom-up projects' performance during the Interim Review (see Chapter 6.1). As a result of this stage, a Proof of Concept (PoC) will be defined together with the mentors, including the roadmap to successfully execute the project (by the end of M2 of the programme).

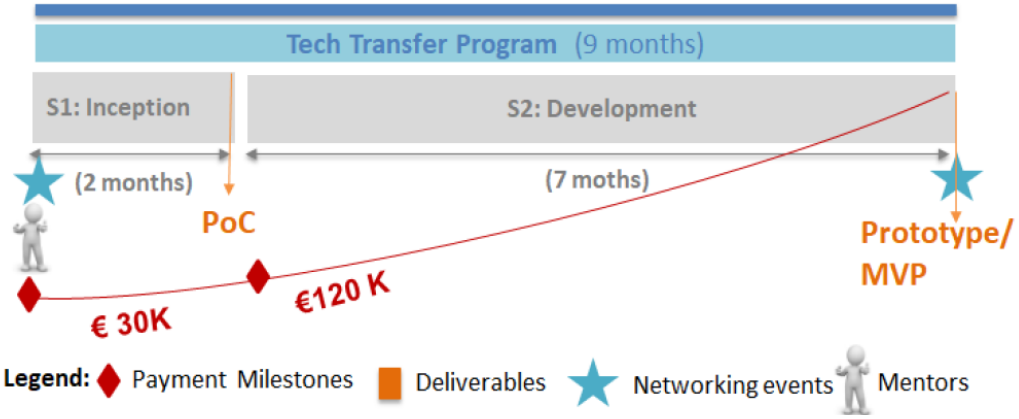

Figure 2 Stages of the Technology Transfer Programme I

- **Stage 2 - Development.** The programme will focus on developing building blocks for large scale pilots and new analytical tools for the toolbox. The outcome of the programme will be fully functional prototypes (TRL 5-TRL6).

6.1.Interim review

An exhaustive review process will be implemented in order to deliver payments linked to the achievement of the KPIs/Deliverables established. The review process consists of thhe following evaluation criteria (see also figure below):

- Deliverables quality.
- Technical performance indicators.
- Deadline Compliance.

Each criterion will be scored by Technical Mentors from 0 to 10 and the weight of each one of these criteria, in the final score, will be as follow:

- Deliverable quality (45%).
- Technical performance indicators (45%).
- Deadline Compliance (10%).

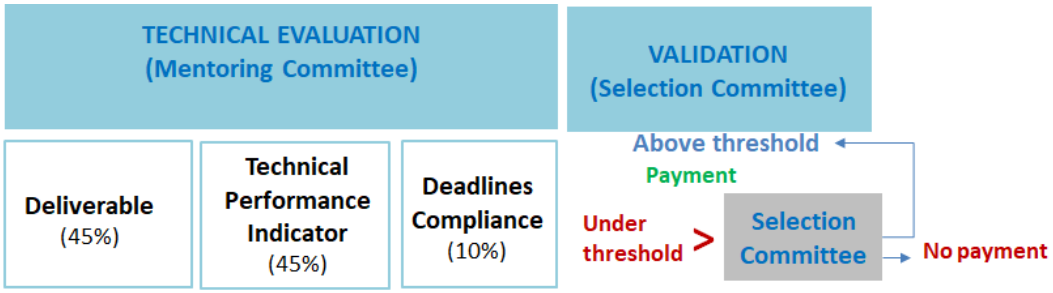

Figure 3 Weight of each evaluation criteria

6.2.Payment plan

The grant is in the form of a lump sum. Financial support will be paid once the KPIs/Deliverables are approved by the Mentoring Committee. The final beneficiaries will receive the funding as follows:

Stage 1 (Duration: 2 months):

- €20,000 at M1 upon validation of the Individual Mentoring Plan – considered as deliverable for this phase.
- €10,000 will be paid at M2 after successful conclusion and validation of the Deliverable for this stage (identification of **Proof of Concept [PoC]**)

Stage 2 (Duration: 7 months):

- €50,000 at M3, upon the reception of the Deliverable stabilised for mid-term ('**Prototype Mock-up**").
- €70,000 will be paid at M9 after successful conclusion and validation of the Deliverable stabilised for this stage (**'Prototype'**).

Those not reaching the performance requested, will be invited to leave the program without receiving the corresponding payments.

7. Communication with applicants

7.1.General communication procedure

7.1.1 Communication during the open call

During the course of the Open Call, applicants can contact us via platoonhelpdesk@fundingbox.com.

7.1.2 Appeal procedure

If the applicant considers, at any stage of the evaluation process, that a mistake has been made a complaint can be drawn up in English and submitted by email to platoonhelpdesk@fundingbox.com.

Any complaint made should include:

- contact details (including postal and e-mail address),
- the subject of the complaint, and
- information and evidence regarding the alleged breach.

Anonymous complaints will not be reviewed as well as complaints with incomplete information.

Please take into account that the evaluation is run by experts in the energy domain without interference from the PLATOON team, therefore complaints related to the results of the evaluation will not be considered, other than related to the mistakes in the evaluation of the eligibility criteria.

Complaints should also be made within 5 (calendar) days since the evaluation results are presented to the Applicants. As a general rule, the PLATOON team will investigate the complaints with a view to arriving at a decision to issue a formal notice or to close the case within no more than 7 days from the date of reception

of the complaint, provided that all required information has been submitted by the complainer.

7.1.3 Communication during the execution of the project

All beneficiaries will receive regular communication during the execution of the project and the project milestone validation, indicating if they can move to the next phase or need to make corrections to their deliverables. In case of corrections not being implemented by beneficiaries, contracts can be terminated, and this communication will include the reasons for the termination.

8. Obligations of FSTP beneficiaries

Take into account that the funds awarded under the Sub-Grant Agreement are provided directly from the funds of the European Project PLATOON and are therefore funds owned by the European Commission.

The "Sub-Grant Agreement" will include the set of obligations that the Beneficiaries of FSTP have towards the European Commission. It is the task of the Beneficiaries of FSTP to satisfy these obligations and of the PLATOON consortium partners to inform the Beneficiaries of FSTP about them.

8.1. Originality of the sub-granted projects

The applicants base their proposals on original works or the rights of third parties are identified and, going forward, any foreseen developments should be free from third party rights, or they are clearly stated.

The PLATOON consortium is not obliged to verify the authenticity of the ownership of the future products and services and any issues arising from third party claims regarding ownership are the sole responsibility of the sub-granted parties.

8.2. IPR ownership

The ownership of all IPR created by the FSTP beneficiaries, via the PLATOON funding, will remain with them as far as results are owned by the Party that generates them.

The Sub-Grant Agreement will introduce provisions concerning joint ownership of the results of the sub-granted projects, if applicable. This will be assessed and negotiated case by case.

8.3. Communication obligations

There are no IPR obligations toward the European Commission (EC). However, any communication or publication of the FSTP beneficiaries shall clearly indicate that the project has received funding from the European Union and the PLATOON programme, therefore displaying the EU and logo on all printed and digital material, including websites and press releases.

Moreover, FSTP beneficiaries will agree that certain information (e.g. name of the company, country, title of the project) regarding the projects selected for funding can be used by the PLATOON consortium for communication purposes.

9. Support for applicants

For more information about the PLATOON Open Call, please check the Frequently Asked Questions (FAQs) document at https:/platoon-open-call.fundingbox.com/

You can also post your questions at the Helpdesk space of PLATOON at: https://spaces.fundingbox.com/spaces/platoon-questions-and-answers or send us a message to our helpdesk mail: platoonhelpdesk@fundingbox.com.

In case of any technical issues or problems with the Application Form, please include the following information in your message:

- your username, telephone number and your email address;
- details of the specific problem (error messages you encountered, bugs descriptions, i.e. if a dropdown list isn't working, etc.); and
- screenshots of the problem.

There will also be a number of online webinars on this open call which will be announced at the PLATOON Support Community Space, as well as any other events related such as info days.

10. Open Call schedule

The table below presents the indicative dates during which each phase of the open call, evaluation and the PLATOON Support Programme will take place:

Table 2 Open call schedule

Milestone description	Indicative date
Call launch	January 4, 2021
Open Call deadline	March 4, 2021 at 17:00 (CET, Brussels Local Time).
Evaluation period	During approximately 3 months from the deadline.
Signature of sub-grant agreement	Within 1 month after the end of the evaluation period.

11. Applicable law

Any matters not covered by this Guide will be governed by Polish law, in particular the provisions of the Polish Civil Code and the law of the European Union.

Annex A: Areas of experimentation & Building Blocks

The purpose of this technology annex is to provide guidance to applicants of the PLATOON Open Call regarding the areas of experimentation.

The PLATOON project is focusing on the following experimentation areas within Big Data and intelligent applications in energy, including New business models and services.

- Data governance, security, privacy and sovereignty;
- Digital Interoperability;
- Data Analytics applications in energy (such as Energy usage optimization, Predictive maintenance, Demand forecast, etc.);
- Edge computing (SW/HW).

Data governance, security, privacy and sovereignty: IDS (International Data Spaces) divides data into spaces facilitating specialisation and creating a distributed data network (further information can be found in internationaldataspaces.org). Solutions must be developed to enable data governance, security, privacy and sovereignty. Data integrity, encryption and security of communications are challenges to be solved. In addition, current data protection legislation (GDPR) must be complied with, delegating data rights to the owner in a proactive manner.

Digital Interoperability: The interoperability of a growing number of highly specialised and decentralised systems requires the development of simple, agile and flexible integration solutions. To achieve this, the semantic approach, structuring the information into semantic data models – ontologies – (formal representation of linked concepts), has proved to be very successful in IoT. Likewise, the development of APIs and the use of open technologies have set a de facto standard supported by development communities.

Data Analytics applications in energy: including physics based, data-driven or hybrid models based on Machine Learning applied to the following Energy Use Cases:

> **Predictive maintenance:** Development of analytical solutions that allow to anticipate the behaviour of a system. It can include launching alerts of potential critical situations in sufficient time to be able to solve them before they occur; optimizing the use of resources in situations where savings can be generated; developing maintenance models for energy elements. To achieve this, it is expected that predictive algorithms will be developed and trained in PLATOON's pilots.
>
> **Demand forecast and Energy usage optimization:** Development of energy demand models for forecasting and optimization of the use of resources. The transfer of models from other domains can also be considered. Methods to verify their validity should be included. Big Data solutions and AI approaches are particularly expected.

Edge computing (SW/HW): Development of solutions, both software and hardware, that allow processing in the devices connected to the system. These devices may consist of sensors, intelligent gateways, etc. which must be provided by the applicant unless they are already available for testing in one of the PLATOON pilots. In this case, please check availability in the open calls support letterbox.

Annex B: Ready-Made Challenges

Participants can pick one of the following 'ready-made' challenges pre-defined by the PLATOON team, ready to solve:

1. **Open-source IDS Connector on Edge:**

IDS connector to be implemented on an edge computer to be able to send data directly from the edge but ensuring data privacy, security and sovereignty as per defined in IDS standard. The developed solution will be published as open source similar to the other IDS components developed in the project. The proposed solution should meet the following requirements:

- Real time capabilities to be able to exchange data at high frequency in (the order of KHz) following IDS standard specifically optimised for edge implementation. In terms of IDS standard, this connector should include data usage capabilities to enforce data usage policies defined in the project. Also, it should be able to communicate with the rest of IDS components developed in the PLATOON project (on-premise/cloud open-source connector, vocabulary provider, broker, app store and clearing house).
- Real time capabilities to be able to store data at high frequency (in the order of KHz) specifically optimised for edge implementation to allow for the use of the edge computer as a data buffer. In this sense It should be mostly focused for time series data and therefore must use/develop open-source tools such as a lite version of InfluxDb or similar optimised to be implemented on edge computing devices.
- Real time capabilities to be able to process data at high frequency (in the order of KHz) specifically optimised for edge implementation. The developed solution must use/develop open-source tools real time tools such as Kafka or similar but specifically optimised for edge implementation.
- The developed solution must be implemented and validated in at least one of the pilots in PLATOON.

2. **Tool for automatic deployment of containerized applications in a Cloud or on-premise environment:**

Most of the components developed in PLATOON will be containerized. These containerized tools will then be implemented in the different pilots to be validated in WP6. Similarly, in line with the project exploitation plan, these containerized tools will be offered through the PLATOON marketplace so that external organisations can find the available tools, reach an agreement with the tool provider and implement these tools. These containers then can be implemented in different environments such as local, cloud or on premise.

At the moment the implementation of these containers is a very manual procedure. Therefore, the proposed solution must develop a tool or a set of tools that allows to implement containers in an automatic or semiautomatic way in a cloud and on-premise environment. The proposed solution should meet the following requirements:

- Must work with Docker technology. Specifically, must work with the Docker containers developed in the project for IDS components and Data Analytics tools.

- Must work with the procedure developed in the project for ensuring container security, privacy and sovereignty.
- Must work for the main cloud providers (Azure, AWS and Google cloud and should also be compatible with GAIA-X.
- The developed solution must be implemented and validated in at least one of the pilots in PLATOON implementing a complete environment including storage, processing and visualisation.

3. Secure multi-party computation:

Artificial Intelligence application is experiencing a huge growth in recent times in many sectors. This incredible adoption of AI solutions is driving companies to research new and innovative alternatives to the traditional cloud-based AI architectural approach which involves the exchange of big data amounts with a third party. Market is requesting AI solutions that do not involve potential privacy and confidentiality risks over the processed data. Because of that, it is necessary to develop a secure on-premises execution environment solutions for AI solutions based on cryptographic techniques. The proposed solution should include some of the following aspects:

- Integration of Secure cryptographic HW (HSM, TPM, etc).
- Advanced encryption algorithms.
- Trusted Execution Environments.
- Roots of trust.
- Secure Execution of digitally encrypted containers.

The developed solution and obtained conclusions must be shared to the consortium partners the same as the procedures to ensure security, privacy and sovereignty of data analytics tools. Finally, the developed solution must be implemented and validated in at least one of the pilots in PLATOON.

4. PLATOON compliant data management and interoperability solution:

This topic is about the design and implementation of a solution related to the "southbound" layer of the PLATOON architecture, covering the functionalities of data collection, management and interoperability in compliance with the PLATOON logical specification and API (Deliverable D2.1 and D2.2). In particular the topic is focused on the provisioning of a solution that covers ALL the following components:

- IoT and/or data connectors for energy related legacy systems/platforms/middleware supporting specific API and protocols of the Energy domain.
- Interoperability components (middleware/adapters) to adapt energy related (raw) data standards/formats/data models/interfaces to the ones defined in PLATOON specification.

It is necessary to demonstrate that the developed solution is able to allow the communication between a legacy energy system and other key PLATOON components, in particular the toolbox and the security infrastructure (including and IDS connector). In this sense the developed solution must be implemented and validated in at least one of the pilots in PLATOON.

5. **PLATOON Photovoltaic Production forecasters**

The penetration of variable renewable energy sources (RES) in the electricity sector is expected to increase significantly over the next two decades. RES integration affects existing electricity grid infrastructure, operations and the functioning of the electricity market itself and therefore it is important to have accurate prediction of electricity generation. Forecasting methods also depend on the tools and information available to forecasters, such as data from weather stations and satellites.

PLATOON consortium is looking for PV Forecasting toolbox (TRL4-TRL5) to be integrated in the PLATOON Data Analytics toolbox and that meet the following requirements:

- Must work with Docker technology.
- Must showcase different types of forecasts taking into consideration the two main challenges: variability (PV output exhibits variability at all timescales) and uncertainty
- Must apply to different PV systems, or refer to the aggregation of large numbers of systems spread over an extended geographic area
- Forecasts may focus on the output power of systems or on its rate of change (also known as the ramp rate)
- Should be possible to export forecasts with predefined timescales (e.g. month) for a predefined list of buildings represented by GPS coordinates in terms of output power expected / sqm of photovoltaic systems or in terms of equivalent hours of production
- The toolbox must integrate an configurator for different settings
- The toolbox must include statistical tools for forecast evaluation.
- The developed solution must be implemented and validated in at least one of the pilots in PLATOON.

6. **Tool for scanning maintenance logs**

Tool for scanning maintenance logs for specific keywords (e.g. failure modes).

It should be possible to search within large text files that are exported from CMMS databases.

The text linked to predefined keywords should be extracted automatically and the correlation with the rest of the text should be clear:

- The start and end of the relevant text linked to that specific maintenance key word should be identified.
- This text block should be extracted.
- The most important words within the identified text block should be identified and extracted and made available using API.

Based on identified key words and the identified links between them it should be possible to find similar episodes in maintenance data.
The tool should use open-source tools and the tool itself should become open-source. It should be compatible (allow import of data) with the main CMMS systems used in industry. The developed solution must be implemented and validated in at least one of the pilots in PLATOON.

Annex C: PLATOON Reference Architecture and Pilots

PLATOON reference architecture

The PLATOON reference architecture identifies the different modules existing in PLATOON. It helps to know from a technical point of view, the different capacities of the platform and the integration points. Through the open calls it is expected to be able to use or expand this architecture. If the beneficiary chooses to use any of the existing modules, the PLATOON consortium will facilitate it and give instructions for its use. If the beneficiary chooses to expand it, the communication interfaces will be provided. It is not feasible to provide all the technical details in this document, but if there is any doubt about it in order to submit a proposal, the applicant can contact the open calls support mailbox.

The figure below shows a graphical representation of the PLATOON reference architecture:

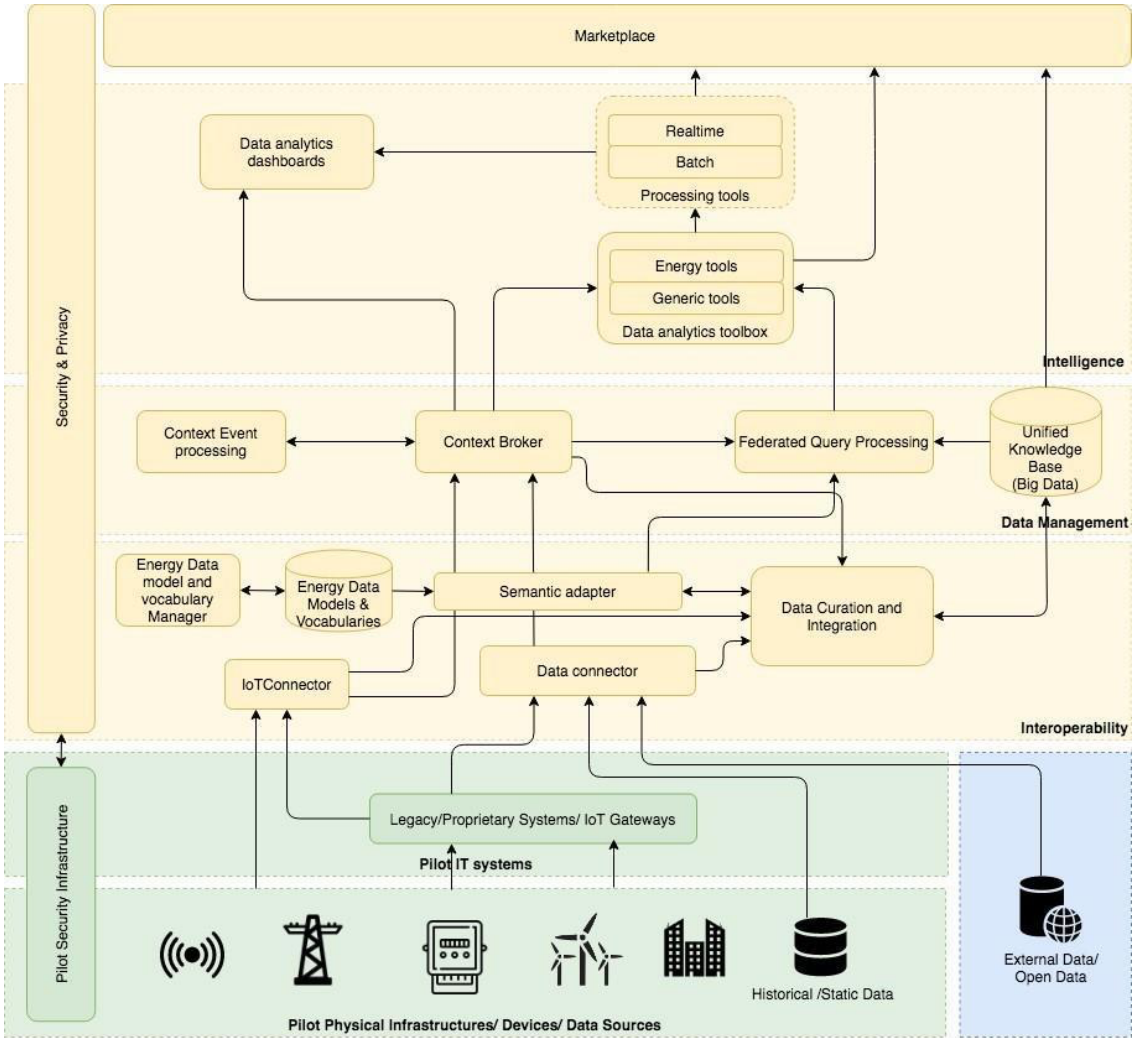

Figure 4 The PLATOON reference architecture

As shown in the picture above, the PLATOON reference architecture comprises the following main logical layers:

- **Physical infrastructure and data sources:** This layer includes all the data sources that are provided in the physical sites of each pilot or in his organizational context. For example, a renewable energy production plant, a building or a complex of buildings, or single devices such as energy meters. In this layer it is also included data that an organization may have collected in the past and that is available for running his business. They can be both historical series of various types such as periodic measurements from sensor or performance indicators made over the years or static data that describes the objects features relevant for the organization (e.g. description of the characteristics of a building or plant, configuration parameters of a device, etc).

- **External Data Sources /Open Data:** It represents all the data sources external to the organizational context (i.e. out of the PLATOON ecosystem) useful for integrating the knowledge base. For example, they can be various types of data such as weather historical series or weather forecasts or, in general, public domain Open Data.

- **Pilot IT Systems:** they are all the possible the proprietary/legacy IT systems that manage the operational and historical databases within the organization. They can manage different type of information such as data collected form IoT devices and any type of Energy related infrastructure: these systems can include IoT gateways that are in charge of translating and adapting IoT (proprietary) protocols or other typology of platforms (e.g. SCADA compliant) providing data to dedicate legacy protocols In the most of cases, for technical reasons or due to company policies, these systems represent the only possible interface for communication among devices and higher-level components in the PLATOON architecture.

- **Interoperability layer:** The interoperability layer is responsible for transforming the data that is collected by data sources into structures that can be managed by systems to be exploited. In particular the capabilities of this layer can be summarised in the following processes:
  - Data collection: the interoperability layer must have the ability to capture and manage heterogenous type of data through IoT Connectors to connect with physical devices such as sensors and embedded systems, and Data connectors in charge of collecting data from legacy/proprietary systems.
  - Semantic Adaptation/Mapping: this will process will include the adoption common semantic models and the concrete adaptation is made through a component that implements the semantic modelization.
  - Data Curation Integration: this defines the logical rules that allow to validate the quality of the data, filtering those that are not optimal for processing and data ingestion and harmonization in a common language/format.

- **Data Management:** This layer is in charge of managing data (historical and real-time) providing it through standard API to the upper layers. The scope of the components of this layer is to provide a unified knowledge base in which the data collected and harmonised in the interoperability layer can be accessed through (semantic) federated queries. This layer will provide the specific big data technologies needed to manage the large amount of data produced by pilots. Moreover, through the mean of a Context Broker the data management layer will manage real-time and context data using a publish-subscribe approach.

- **Intelligence:** intelligence layer represents a key part of the PLATOON architecture: this layer is the one designated for processing information from the lower levels in order to provide value-added services. It includes all types of big data analysis and artificial intelligence, both real time and batch processing. The Intelligence toolbox will be formed of all the data analytics tools that will be developed in the project by the different partners for the different use cases defined in the deliverable. These tools will allow the extraction of value from heterogeneous data sources.

- **Marketplace:** This component will be in charge of publishing and search different type of assets (including datasets, service and applications (e.g. analytic tools) providing also functionalities to describe them through metadata that includes the properties of the assets and the way to access them. The marketplace will be the way in which pilots can share, with the rest of the ecosystem, data and applications that will be accessible through standard metadata description and API. The marketplace, depending on the specific case, can also enable additional functionalities related, for instance to the asset monetisation and transaction monitoring.

- **Security and Privacy:** This is a transversal layer covering all the aspects related to security and privacy. Specifically, these include authentication and authorisation capabilities, functionalities to ensure confidentiality and integrity of the communications, data usage control and personal data management. This layer is also logically connected with the specific security frameworks of pilots' infrastructure providing functionalities to the rest of the architectural components that have to run in a secure a reliable environment.

The developed PLATOON reference architecture is open source and all the details of all the components can be found in deliverable D2.1 PLATOON Reference Architecture which is a public deliverable of the project.

PLATOON Large-scale Pilots:

In total, seven pilots' activities will be carried out in five different European countries, namely France, Spain, Italy, Belgium and Serbia.

The pilots cover (described in Figure 5) a whole range of potential energy services along the energy value chain:

1. Predictive maintenance in renewables (Wind Farm) – Green.
2. Distribution grids efficient operation and assets life extension - Blue colour.
3. Efficient End Use of Energy, peak avoidance and demand side response (Smart Building) - Orange colour.
4. Optimum Energy Management in a Microgrid, which moreover is linked to the previous services of the other pilots - Grey colour.

The different pilots can be grouped according to the specific application field and the specific analytical tools that will be developed in each of them as summarized in the next figure.

APPLICATION FIELD	PILOT Nb.	PILOT TITLE	COUNTRY	ANALYTICAL TOOLBOX - FUNCTION
Renewable Generation	#1a	Predictive Maintenance of Wind Farms	Belgium	Wind Power Drivetrain Operational Optimiser, Digital Twin
Smart Grids	#2a	Electricity Balance and Predictive Maintenance	Serbia	Generation Forecaster, Load Forecaster, Power Dispatch Optimiser, Assets Health Diagnosis (RTP)
	#2b	Electricity grid stability, connectivity and Life Extension	Spain	Pattern Recognition, Assets Health Diagnosis (RTP)
End Use of Energy	#3a	Office building: Operation performance thanks to physical models and IA algorithms	France	HVAC Optimiser
	#3b	Advanced Energy Management System and Spatial (multi-scale) Predictive Models in the Smart City	Italy	Peak Power characterisation, Load Forecaster, Pattern Recognition
	#3c	Energy Efficiency and Predictive Maintenance in the Smart Tertiary Building Hubgrade	Spain	HVAC Optimiser, Predictive Maintenance(RTP)
Generation, Distribution and End Use of Energy	#4a	Energy Management of Microgrids	Italy	Generation Forecaster, Load Forecaster, Power Dispatch Optimiser, Assets Health Diagnosis (RTP)

In each pilot, different Data models, Analytical tools and Energy services will be created, tested and deployed for flexible and optimized management of energy systems in real time.

a. Annex C.1: High level use cases overview

This section presents a brief overview of the HLUC defined in PLATOON.

- PILOT #1A - Predictive Maintenance of Wind Farms
- PILOT #2A - Electricity Balance and Predictive Maintenance
- PILOT #2B - Electricity grid stability, connectivity and Life Extension
- PILOT #3A - Office building - Operation performance thanks to physical models and IA algorithm
- PILOT#3B-Advanced Energy Management System and Spatial (multi-scale) Predictive Models in the Smart City
- PILOT #3C - Energy Efficiency and Predictive Maintenance in the Smart Tertiary Building Hubgrade
- PILOT #4A - Energy Management of Microgrids

Figure 5 List of pilots

High Level Use Cases describe business functions, i.e., the business layer of the SGAM framework. For each HLUC, a short description of the scope, objectives and LLUC generated from each HLLUC are identified.

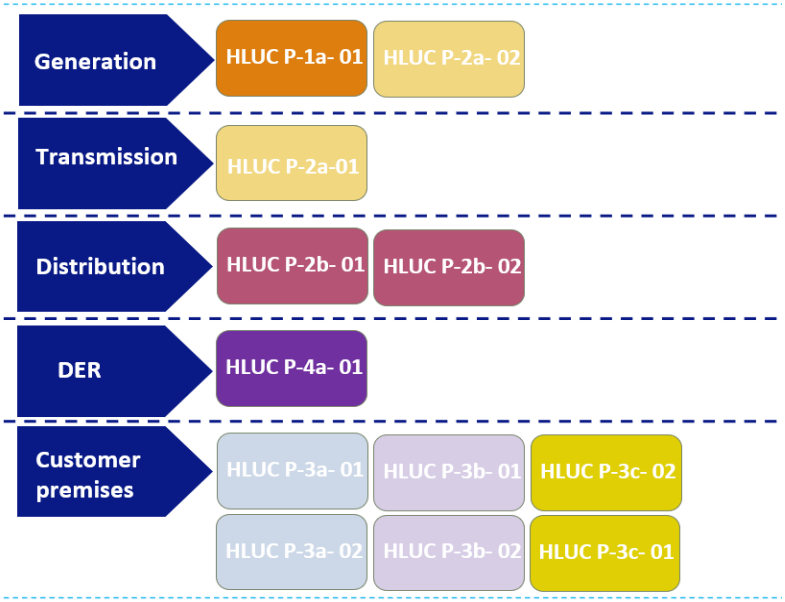

Figure 6 Overview of HLUC

b. Annex C.1.1 PILOT #1A - Predictive Maintenance of Wind Farms

HLUC-P-1a- 01: Predictive Maintenance for Wind Farms

The main goal of this pilot is to reduce operations and maintenance costs linked to unexpected downtimes for a fleet of wind turbines.

Scope

Reduce operation and maintenance costs linked to the unexpected downtimes for a fleet of wind turbines is being considered in this HLUC. The scope is the following:

- Optimize wind turbine availability.
- Optimize wind turbine condition during production.
- Optimize Data Quality.
- Monitoring Data Quality.

Objectives

The main objective of this use case is to optimize the turbine availability.

Short description

This HLUC is related to the development of an integrated monitoring strategy for predictive maintenance of electrical drivetrain components, more specifically the generator and the power converter of wind turbines. Focus is on the combination of data-driven models with physical models of the generator and potentially of the power converter into an integrated digital twin strategy. High frequency (kHz range) detailed measurements will be used in a first step. In a later stage the focus of the analysis will shift towards fleet-wide analytics. At this stage lower frequency SCADA data (10-min) and status logs are used. In addition to the anomaly detection for problem identification also load history of the electrical components is identified. The potential for edge computations of the models is explored. More specifically, the optimization of the computational load for anomaly detection is investigated.

This HLUC comprises the following general steps:

- Short List Failure Modes scoped out.
- Developing detailed understanding of how the failure mode works.
- Define modeling strategy to capture failure mode influence factors.
- Validate model with known failure cases -> Confusion Matrix.
- Test on a larger dataset.
- Increase robustness software code.

LLUC generated from this Use case

- LLUC P-1a- 01: Enhanced diagnostics of failure in electrical drivetrain components in wind turbines using a digital twin approach.

c. Annex C.1.2 PILOT #2A - Electricity Balance and Predictive Maintenance

HLUC P-2a- 01: Electricity Balance

Scope

Improve demand response and production forecast at regional and national level is being considered in this HLUC. The scope is the following:

- Short term load forecasting.
- Forecast about the power production from renewable energy sources (wind power plant).
- State estimation and balancing strategy.

Objectives

The objectives of this HLUC are:

- To balance market operators.
- To improve state Estimation.
- To plan power generation.
- To improve flexibility from existing sources of generation and demand.
- To optimize dispatching schedules and power grid operations.

Short description

Electricity must be 'consumed' as soon as it is produced, because it cannot be stored easily. Balance management is a power system operation service vital for ensuring security of supply through the continuous, real-time balancing of power demand and supply. At each point in time, total production must be equal to total consumption in order to stabilize system frequency; it is therefore also called frequency control. Historically, balancing the system has been maintained mostly by directing thermal power plants to increase or reduce output in line with changes in demand. Storage and interconnectors have also played a part, but a much smaller one.

As the volume of intermittent generation on the system grows, the system is balanced by utilizing both supply and demand resources. However, the existing electric power systems were not initially designed to incorporate different kinds of generation technology in the scale that is required today. With significant penetration of distributed generation, the distribution network has become an

active system with power flows and voltages determined by the generation as well as by the loads. Therefore, it is difficult to predict the impact of distributed generation (e.g. from wind offshore farms) on the future energy mix. As a response to this, smart grids are expected to enhance grid flexibility & robustness and enable existing grids to accept power injections from distributed energy resources without contravening critical operational limits (such as voltage control, switching equipment capability and power flow capacity). In this use case, PLATOON services will be developed that will upgrade the IMP SCADA system with electricity balancing functionalities needed in case of power injections from wind farms. With the increased penetration of distributed generation (e.g. wind power), the risk of temporary imbalances also increases caused by wind power uncertainties due to its dependence on the volatility of the wind. So, advanced demand/response optimization services are needed to prevent power outages or blackouts (complete interruption of power in a given service area). The role of the SCADA / EMS on the production side is monitoring, control of generation and data exchange.

This HLUC comprises the following general steps:

- Define the balancing challenges for the system operator due to increasing amounts of renewable energy sources embedded within the distribution networks (e.g. solar photovoltaic (PV), wind power plants).
- Define supply and demand variables.
- Analysing integration of the state estimation (SE) applications with the IMP proprietary SCADA system.
- Build ML models based on historical data.
- Integrate with the state estimation applications.
- Testing and validation.

LLUC generated from this Use case

- LLUC P-2a-01 Balancing on regional level.
- LLUC P-2a-02 Balancing on country level.
- LLUC P-2a-03 Demand forecast on transmission level.
- LLUC P-2a-04 RES (Wind generation) forecasters.
- LLUC P-2a-05 Effects of Renewable Energy Sources on the Power System (distribution level).
- LLUC P-2a-06 Research Data Management.

HLUC P-2a- 02: Predictive Maintenance in power plants

Scope

Developing a predictive layer on top of existing SCADA in power plants is being considered in this HLUC. The scope is the following:

- Health state estimation.
- Alert generation in case of expected problems with the assets.

Objectives

The objectives of this HLUC are:

- To develop timely and accurate insights for predictive maintenance.
- To decrease in outage costs.
- To improve the system reliability.

Short description

This HLUC comprises the following general steps:

- Defining the requirement and KPIs.
- Defining the measuring variables, and the current functionalities of the Maintenance Management System - MMS, Outage Management System and Asset Management System.
- Defining the integration of SCADA with PLATOON tools.
- Defining the pre-processing approach.
- Development of ML models based on historical data given the system's parameters, draw strategies to deal with similar events in the future.
- Deployment of ML model for real-time monitoring of advanced sensors and monitoring equipment.
- Define the communication with emergency services.
- Testing and validation of the service.

LLUC generated from this Use case

- LLUC P-2a- 07 Predictive maintenance in RES power plants

d. Annex C.1.3 PILOT #2B - Electricity grid stability, connectivity and Life Extension

HLUC P-2b- 01: Predictive Maintenance in Transformers

Scope

The scope of this HLUC is the following:

- Health Monitoring.
- Remaining Useful Life (RUL) estimation.
- Maintenance Planning.
- New scenario cost evaluation.

Objectives

The objectives of this HLUC are:

- To develop a predictive maintenance tool for LV/MV transformers using available data from Sampol's smart grid in ParcBit, Majorca (Spain).
- To determine remaining useful life and calculate health index of the transformers
- To optimize maintenance plan in order to reduce O&M costs

Short description

This HLUC focuses on transformer predictive maintenance, estimating transformer components health and its maintenance costs, planning maintenance actions, monitoring transformer alarms and studying different grid scenarios in case of replacing old transformers or adding complementary transformers.

This HLUC comprises the following general steps:

- Gather available transformer information and measurements, and maintenance logs, and create a database.
- Define the transformer components and the failure modes that will be analysed.
- Define required measurements and install new sensors.
- Specify the requirements for the asset health management platform, including all its functionalities.
- Exploratory data analysis, including data cleaning and pre-processing, and labelling of the dataset: Identification of faulty periods and check the maintenance logs.
- Develop virtual sensor models to estimate the state of the transformer, avoiding the over monitoring of the transformer.
- Develop a model to calculate the RUL of the critical components of the transformer, for different failure modes, due to aging in working conditions.
- Develop a model to calculate the health index of the transformer.
- Develop an economic calculation method for defining the optimal maintenance plan of the transformer.
- Develop a model to simulate the effect of different operational actions in the grid O&M cost sheet.
- Implement and validate the asset health management platform.

LLUC generated from this Use case

- LLUC P-2b- 01 Predictive Maintenance for MV/LV Transformers

HLUC P-2b- 02: Non-technical loss detection

Scope

The scope of this HLUC is the following:

- Quantification of losses in the distribution grid.
- Characterization of prosumers' energy profile.
- Detection and identification of non-technical losses (NTL).

Objectives

The main objective of this HLUC is to develop a tool for the quantification of losses in the distribution grid of a DSO and the detection of non-technical losses (NTL), using the available smart meter data from Sampol´s smart grid in ParcBit, Majorca (Spain).

Short description

This HLUC considers different techniques to calculate the losses, detect NTL appearance and identify NTL authors (prosumers and non-customers) using data from the smart meters of prosumers and measurements at the substations and transformation centers.

This HLUC comprises the following general steps:

- Gather electricity grid topology and parameters.
- Gather historical load data, at the MV substation level, and for the smart meter of each of the prosumers connected to the distribution grid.
- Historical load data cleaning and preprocessing.

- Labelling of prosumer load dataset: Identify historic known NTL, if any, based on evidence of fraud.
- Exploratory assessment of energy losses, based on energy balances, to determine thresholds of reasonable level of technical losses.
- Prosumer segmentation based on clustering techniques applied to their load profiles.
- Development of an NTL detection algorithm to detect PTUs in which NTL would have occurred, based on losses higher than reasonable technical losses, which accuracy can be improved taking into account grid topology.
- Development of an NTL identification algorithm for identification of NTL authors, based on the detection of abnormal behaviours of prosumers.
- Development of a software platform which integrates load data acquisition with use case logic (prosumer segmentation, NTL detection and identification algorithms), with a friendly user interface.
- Validation of NTL detection and identification algorithms.

e. Annex C.1.4 PILOT #3A - Office building - Operation performance thanks to physical models and IA algorithm

HLUC-P-3a- 01: Save X% on the GHG emissions

Scope

The scope of this HLUC is the following:

- Optimize energy production regulation.
- Optimize use of energy storage for optimizing generation efficiency.
- Optimize energy distribution regulation (return water temperature…).
- Optimize window opening and blinds.

Objectives

The objectives of this HLUC are:

- To follow and guarantee energy savings.
- To follow and guarantee GHG emission savings.

Short description

This HLUC concerns the reduction of energy consumption and greenhouse gases emissions for the building. It can be realized through optimization of HVAC operation and control in the building, as well as the use of local renewable energy sources (PV) that could be installed on the building. The different possibilities and strategies to reduce the energy consumption, using the data available on the building and the different equipment, will be evaluated and tested.

This HLUC comprises the following general steps:

- Check the level of data available for the building.
- Follow the building for a full year, appoint a team for being sure that the data are clean.
- Build an algorithm for comparing the various years (occupancy, climate, energy efficiency of appliances …).
- Develop a digital twin of the building compatible with energy management constraints.

- Define the management strategies, test them on the digital twin.
- Install new appliances in Stains building.
- Conclude with the comparison algorithm brick, compare the various years.

LLUC generated from this Use case

- LLUC P-3a 01 Optimization of HVAC operation regarding building occupancy

HLUC-P-3a- 02: Power Management and flexibility

Scope

The scope of this HLUC is the following:

- Storage capability of the buildings.
- Thermal storage.
- Battery storage (including those in laptops).
- H2 storage.
- Comfort level and acceptability of lowering comfort.
- Flexibility mechanism.

Objectives

The objectives of this HLUC are:

- To reduce the load peak.
- To respond to flexibility demands.

Short description

This HLUC concerns the electrical load management with flexibility services that could be offered to the grid. It can be realized through specific controls of the electrical loads in the building: heating and cooling loads, using the building inertia and other type of electrical load that could be shifted. Switching to other energy sources or using storage equipment (batteries, H2) could also be part of the scope. An analysis of the flexibility available in the building, and the use of digital twin can enable us to evaluate the potential and predict the available flexibility on the building.

This HLUC comprises the following general steps:

- Assess the building against existing flexibility framework.
- Define the priority actions (focus on PC batteries? focus on reduced comfort? Add thermal storage?).
- Simulate on digital twin. Essential to define what specific service is most beneficial, and thus what is the complexity needed for the digital twin.
- Install on Stains, run on 1 year.
- Comparison with the test year.

LLUC generated from this Use case

- LLUC P-3a 02 Provide Demand Response services through building inertia and HVAC controls

f. Annex C.1.5 PILOT#3B-Advanced Energy Management System and Spatial (multi-scale) Predictive Models in the Smart City

HLUC P-3b- 01: Building Energy Management System

Scope

The scope of this HLUC is the following:

- Energy consumption analysis and forecast.
- Daily and hour energy consumption forecast.
- Lighting optimization.
- Predictive maintenance.
- Energy efficiency plans (heating, cooling).

Objectives

The objectives of this HLUC are:

- To improve efficiency and flexibility of energetic systems and distribution on selected buildings.
- To ensure energy saving on selected buildings.
- To improve energy efficiency plans.

Short description

Poste Italiane manages around 220 buildings in the area of Rome Municipality. In the context of this HLUC, 16 of the 220 buildings are selected as 'test set' grouped according to the end use and characteristics: Data center, Logistic Centers, Retail, Office Space. These buildings will be used for modelling, benchmarking, and evaluating PLATOON components, algorithms and optimization actions in the following areas: Cooling and Heating Plants Consumptions Forecasting; Cooling and Heating Plants Predictive Maintenance and Lighting Consumption Estimation.

This HLUC comprises the following general steps:

- Identify a set of significant buildings.
- Identify the data set to be collected.
- Define frequency and check the data volumes to be produced.
- Define data flows and exchange requirements.
- Define criteria and outputs for data analysis.
- Install the new devices in the PI buildings.
- Activate and test the new devices.
- Activate the data flow toward PLATOON Platform.
- Validate pilot hypothesis.

LLUC generated from this Use case

- LLUC P-3b 01 Buildings Heating & Cooling consumption Analysis and Forecast.
- LLUC P-3b 02 Predictive maintenance of cooling & heating plants.
- LLUC P-3b 03 Lighting Consumption Estimation & Benchmarking.

HLUC P-3b- 02: Building Asset Energy Management System

Scope

The scope of this HLUC is the following:

- Energy consumption analysis and forecast.
- Power peak consumption.
- Predictive maintenance.
- Energy Auditing improvement and validation.
- RES and Storage self-consumptions potentiality.

Objectives

The objectives of this HLUC are:

- To improve forecast capability and to update Energy Efficiency scenarios (EMS and Audits).
- To detect critical issues for plant and building envelope systems (Peak Power, Anomalies, …).
- To improve energy management by using analysis tools and algorithms.
- To integrate predictive maintenance toolset in EMS and DSS.
- To perform energy audits data exploitation/integration for the municipal asset EM.
- To perform spatial analysis and visualization of energy Big Data.
- To maximize self-consumption for each building through RES and storage potentiality.

Short description

This HLUC includes about 1600 buildings owned by ROME with different uses and different plants and devices, including 165 photovoltaics, located in Rome. The data collected from the meters (power and gas) and from the available Energy Audits will be sent to the PLATOON platform for energy consumption analysis and forecast, for anomalies detection, for automated validation/updating of energy efficiency scenarios, for data integration and new EMS tools implementation.

This HLUC comprises the following general steps:

- Identify the datasets to be collected (energy meters, energy audits).
- Define extent of ROME buildings (number/typologies) and check the data volumes to be produced.
- Define data flow and exchange requirements for energy meters.
- Define criteria and outputs for data analysis (Use Case and Business Case final definition).
- Test data treatment and outputs for a control set of buildings.
- Activate the data flow toward PLATOON Platform.
- Proceed to Big Data analytics and to the outputs progressive assessment.
- Co-work to define the tools and user interfaces matching the EM needs (Usability Check).
- Validate pilot hypothesis and expectations.

LLUC generated from this Use case

- LLUC P-3b 04 Monitor and analysis system for the Data flow coming from 8950 power and gas energy meters of ROME Municipality buildings asset

g. Annex C.1.6 PILOT #3C - Energy Efficiency and Predictive Maintenance in the Smart Tertiary Building Hubgrade

HLUC P-3C- 01: Advanced EMS in Smart Tertiary Building

Scope

This HLUC focuses on the Advanced EMS to be implemented in PLATOON. This EMS will optimize the local renewable energy resources (RES) and HVAC operation following a multi-objective pattern which targets to reduce the overall energy bill and maximize the usage of RES.

The scope of this HLUC is the following:

- Develop an optimization algorithm for the HVAC system of the building to reduce the energy cost taking into account PV panels energy production and energy cost while ensuring comfort requirements (temperature, humidity and air flows).

Objectives

The objectives of this HLUC are:

- To reduce energy costs.
- To reduce GHG emissions.

Short description

This HLUC addresses the main functionalities and requirements related to the advanced EMS to be implemented within PLATOON. The aforesaid EMS will optimize the local renewable energy resources (RES) and HVAC operation as a function of building and RES characteristics, building comfort constraints, ambient conditions and energy market price following a multi-objective pattern which targets to reduce the overall energy bill and maximize the usage of RES.

This HLUC comprises the following general steps:

- Extract the data.
- If necessary, look for external data sources (weather, electricity market …) to extract remaining parameters.
- Data Cleaning: analyse the quality of the data and correct inconsistencies/errors (missing values, outliers, inconsistent values…)
- Exploratory data analysis: analyse the data using visual and statistical methods (unipara metric analysis, multiparametric analysis, correlation analysis…).
- If necessary, apply signal processing/smoothing methods to reduce the noise.
- Pattern recognition and benchmarking.
- Create a data driven or hybrid model of the building which simulates the thermal behaviour of the building using historical off-line data.
- Build, train and validate the HVAC optimisation algorithm using historical off-line data.
- Validate the developed algorithm with online data and modify the algorithm as necessary to get an acceptable performance.
- Implement the developed algorithm in the production system.

LLUC generated from this Use case

- LLUC P-3c 01 Advanced EMS for Tertiary Buildings.

HLUC- P-3C- 02: Predictive Maintenance in Smart Tertiary Building

Scope

The scope of this HLUC is predictive maintenance of:

- Air handling units.
- Water pumps.
- Chillers
- Heat pumps.

As for the previous HLUC, this HLUC will at first be focused on a single tertiary building (Donostia's CIC Nanogune), then, the outcomes will be extended to more than 10 buildings.

Objectives

The objectives of this HLUC are:

- To increase the availability of the assets.
- To increase the useful life of the assets.
- To reduce maintenance costs.

Short description

This use case describes the process of the development and the implementation of predictive maintenance tools for the thermal control assets of smart tertiary buildings (Boilers, Chillers, Air Handling Units (AHU), Split Systems, Fan coils, Extractors and Pumps). as Additional targets are improving the maintenance policy increasing the availability and useful life of these assets and reducing the general maintenance costs.

This HLUC comprises the following general steps:

- Extract the data.
- Data Cleaning: analyse the quality of the data and correct inconsistencies/errors (missing values, outliers, inconsistent values…)
- Exploratory data analysis: analyse the data using visual and statistical methods (unipara metric analysis, multiparametric analysis, correlation analysis…).
- If necessary, apply signal processing/smoothing methods to reduce the noise.
- Label the dataset: Identify faulty periods and check the maintenance logs.
- Develop a data driven or hybrid model to simulate normality using the data records for healthy condition.
- Analyse deviations from faulty points compared to the normal simulated by the developed normality model.
- Feature creation to quantify deviations from faulty points compared to normal condition modelled by the developed model.
- Train and validate algorithms using the newly created features and other features to detect failures. Use historical off-line data.

- Validate the developed algorithms with online data and modify the algorithm as necessary to get an acceptable performance.
- Implement the developed algorithm in the production system.

LLUC generated from this Use case

LLUC P-3c 02 Predictive Maintenance in Smart Tertiary Building Assets.

h. Annex C.1.7 PILOT #4A - Energy Management of Microgrids

HLUC-P-4A- 01: Energy Management of Microgrids

Scope

The scope of this HLUC is the following:

- EMS with real-time processing and optimization for small-scale/renewable electricity generation.
- Generation and load forecast.
- Smart storage/generation.
- V2G.

Objectives

The objectives of this HLUC are:

- To improve the availability of big data and big data management,
- To provide an analysis facility for real-life scale research, simulation and test purposes, thus allowing to study new data-driven paradigms for energy management able to deal with increased complexity of the energy systems
- To assess the advantages of innovative strategies.

Short description

This HLUC applies to a microgrid test-bench, to provide an analysis facility for real-life scale research, simulation and test purposes.

The aforementioned microgrid test-bench is dedicated to improve the availability of big data and big data management, providing an analysis facility for real-life scale research, simulation and test purposes, thus allowing to study new data-driven paradigms for energy management able to deal with increased complexity of the energy systems and to assess the advantages of innovative strategies.

This HLUC comprises the following general steps:

- Install all needed meters.
- Gather data from different sources internal/external (weather condition/forecast).
- Create an integrated, clean and consolidated DB.
- Create a data driven model of the grid using historical off-line data.
- Build and train a forecasting algorithm.
- Develop a robust optimization model for optimal power flow.
- Validate the model and the predictive algorithms.
- Implement the production system with edge computing capability.
- Develop an interface and data monitoring software.

LLUC generated from this Use case

- LLUC P-4A 01 Energy Management of Microgrids

Annex D: PLATOON Marketplace

Data is a valuable resource in any digital, data-driven business and it is necessary to enable participants to leverage the potential of their data and tools within a secure and trusted business ecosystem.

The PLATOON federated platform will enable the exploitation of digital services (both data and data analytics tools) amongst different stakeholders through the PLATOON Marketplace.
The PLATOON Marketplace will be a one-stop shop that integrates some of the datasets used in the project and the tools developed as a result of the project. Equally, all the services developed as part of the open calls will be available through the marketplace. Moreover, additional services from previous projects can also be made available in the PLATOON Marketplace.
The marketplace will mainly offer two types of services:

1. Data services: exchange and monetisation of raw and processed data. This includes contract for 'bulk' ad hoc transfers or unlimited pay-per-use.

2. App services: Data analytics tools that can be implemented in two ways:
   a. The tools (code) are downloaded and implemented directly in the app consumer´s platform.
   b. The tools are implemented as a microservice. In this case the tool is implemented in the app provider infrastructure and the code is not shared. Instead, there is an exchange of raw and processed data between the app provider and app consumer.

Regarding the monetisation of the different datasets and tools used and developed in the project, a “freemium” approach will be followed. In fact, there will be a basic free account that allows access to free datasets and tools. On top of that basic free account, there will be additional premium datasets and tools that are proprietary, and that the user will have to pay to have access to them. At this stage of the project two types of potential business models have been considered: pay per license and pay per use.

Annex E: Processing of personal data

CONTROLLER'S IDENTITY AND CONTACT DETAILS

The data controller is FundingBox Accelerator sp. z o.o. (Al. Jerozolimskie 136, 02-305 Warsaw, Poland).

In all matters regarding personal data, you can contact us using the following email address: **privacy@fundingbox.com**.

PURPOSES, LEGAL BASIS AND PROCESSING PERIOD

The purpose of processing	Legal basis for processing	Period
To run an Open Call and collect data necessary to evaluate applications submitted in the Open Call	The legal basis for processing is the indispensability to implement the legally justified interest of the data controller, consisting in fulfilling the obligations laid down in the Grant Agreement (Article 6 paragraph 1 point f) GDPR in this respect.	6 years from the end of the year in which the PLATOON Project ended
To realize the Project goals described in the Grant Agreement (communication, reporting, collaborating with other project partners)	The legal basis for processing is indispensability to implement the legally justified interest of the data controller, consisting in effectively participating in the project and fulfilling the obligations laid down in the Grant Agreement (Article 6 paragraph 1 point f) GDPR in this respect.	6 years from the end of the year in which the PLATOON Project ended
In order to consider potential complaints	The legal basis for processing is indispensability to implement the legally justified interest of the data controller fulfilling the obligations laid down in the Grant Agreement (Article 6 paragraph 1 point f) GDPR in this respect.	6 years from the end of the year in which the PLATOON Project ended
In order to possibly establish and enforce claims or defend against them	The legal basis of the processing is the legitimate interest of the data controller consisting in the protection of its rights (Article 6 paragraph 1 point f) GDPR in this respect.	6 years from the end of the year in which the PLATOON Project ended

DATA RECEIVERS

Data controller will transfer personal data only to trusted recipients such as entities belonging to the FundingBox's capital group, evaluators, IT service providers, accountants, law firms, postal and courier companies (who process personal data on the controller's behalf).

To realize the PLATOON Project Data can be transferred also to Project Partners (complete list of the project partners is available at the email address: privacy@fundingbox.com), European Commission and other affiliated entities.

RIGHTS OF DATA SUBJECT

Due to the fact that we process your personal data, you have the right to:

1) request access to your personal data,

2) demand the rectification of their personal data,

3) request to remove or limit the processing of your personal data,

4) complain with the supervisory authority (The President of the Personal Data Protection Office, Warsaw, Poland).

You also have a right to object to the processing of your personal data (according to Article 21 of GDPR).

INFORMATION ABOUT VOLUNTARY OR OBLIGATORY DATA PROVISION

Providing data is voluntary, although it is necessary to participate in the PLATOON 1st Open Call. Without providing your data, it is not possible to contact you and evaluate the application