Technology Application Roadmap (TAR)

and Individual Mentoring Plan (IMP)

SAKURA-APM

**Asset Performance Management System for grain processing industry SAKURA-APM,
PaaS SAKURA-IIoT based**

| **Organisation name** | **Type** |
| --- | --- |
| Centre 4.0 KPI DIH | DIH |
| INNOVINNPROM LTD | SME |

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Abstract

Our goal is to launch an Asset Performance Management (APM) system in the grain elevator segment based on the IIoT platform. To do this, we need to refine the existing solution (TRL7) using Digital Twin, AI & ML. SaaS SAKURA-APM is a new, unique product for the grain processing industry, which has no analogues in Eastern Europe.

APM will allow our customers to:

* optimise production and reduce quality losses;
* reduce elevator energy consumption;
* reduce production losses of elevators;
* reduce emissions.

Our strategy is to better adapt existing modern IoT-based solutions. It takes into account the latest innovations in the IIoT segment and offers a new business model that will improve economic performance and provide a new level of customer experience management.

The solution is adapted to the sectoral and local conditions of Eastern Europe and takes into account the following principles and their advantages:

* Democratisation - from multilevel structure ERP/MES/SCADA to IIoT based APM.
* Accessibility - use of more affordable IoT devices (power meters, sensors, counters, etc.), application of Open Source & Cloud Technologies.
* Better experience management - available & supported own PaaS with new services and built-in Digital Twin, AI & ML technologies.
* Better efficiency - own model of accounting for quantitative and qualitative indicators of raw materials and products, own algorithms for assessing efficiency.
* Green transition - emission reduction, environmental product certification.

Problem Description

Currently, most elevators in Ukraine have SKADA, which are disconnected from production management and resource control systems. As a rule, automated transfer of tasks and control of their execution are absent. The SKADA operator, guided by its own experience, chooses a technological route from dozens of possible alternatives. Adjustment of technological timings depending on the quality and quantity of raw materials is not applied.

This leads to suboptimal use of mostly powerful equipment and to significant overconsumption of electricity and natural gas.

Tests of a pilot project on an elevator with a capacity of 100,000 tons of grain showed that about 17% of the time elevator equipment works with an efficiency below 40%.

At current electricity prices, financial losses due to irrational use of electricity alone amount to about €4,500 per month.

Problem Solving

Deployment of SAKURA-APM:

Application of IIoT technologies for data collection on energy consumption by each equipment:

* Installation of additional sensors, smart meters, IoT gateways;
* Reading of additional data from PLC and SKADA;
* Deployment of cloud services based on the PaaS SAKURA-IIoT.

Application of Digital Twin technologies for product quality control at all stages of production:

* Adjustment of technological lines depending on product quality;
* Product life cycle control.

Application of AI & ML technologies to increase energy efficiency of technological processes:

* Optimization of technological delays;
* Forecasting the cost of energy resources;
* Correction of staff errors.
1. **Implementation**
	1. **Work Breakdown structure**

| **Task number**  | **1** |
| --- | --- |
| **Task title** | Project planning |
| **Task duration** | M1 |
| **Lead partner** | INNOVINNPROM LTD |
| **Objective of the task** |
| The objective of the task is to define the requirements specifications and the KPIs of the application experiment. The requirements shall describe in detail all hardware and software specifications.[[1]](#footnote-0)  |
| **Description of work** |
| The company is going to launch an APM system in the elevator segment based on the IIoT platform. To reach this goal it is necessary to refine the existing solution using Digital Twin, AI & ML. SaaS SAKURA-APM is a new, unique product for the grain processing industry, which has no analogs in Eastern Europe.The TTE consists of such main stages:1. Planning of the TTE, including requirement specification2. Addition & testing of functions on the current SAKURA-T test project: - calculation of product weight according to equipment load;- analysis of energy efficiency of technological operations;- Digital Twin, AI & ML.3. Work on customer facilities: - manufacturing and installation of energy efficiency control equipment, - installation of IoT gateways, - implementing PaaS SAKURA-IIoT, - updating SCADA software, - implementing SAKURA-APM. 4. Implementation and testing of Digital Twin, AI & ML services for calculation, forecasting and adjustment of the overall efficiency of technological processes. - calculation of product weight according to equipment load;- analysis of energy efficiency of technological operations;- Digital Twin, AI & ML.3. Work on customer facilities: - manufacturing and installation of energy efficiency control equipment, - installation of IoT gateways, - implementing PaaS SAKURA-IIoT, - updating SCADA software, - implementing SAKURA-APM. 4. Implementation and testing of Digital Twin, AI & ML services for calculation, forecasting and adjustment of the overall efficiency of technological processes. Tasks belong to each stage is presented in Gant chart in that part of this document**The components, interfaces, services, and/or software components that will be available at start and are necessary*** **Development of new SAKURA-APM functions:**

Java 11.0.15 NodeJS 16.15.1React 16.13.1 Bootstrap 4.6 Grafana 7.1.15 Guacamole 1.1.0 or MeshCentral 0.9.61PostgreSQL 14.4 with TimescaleDB 2.7 Spring boot 2.6 interfaces Rest API, json* **Development of a new version of SСADA:**

CAD Route INNOVINNPROM 2.0.17 Industrial interfaces Modbus RTU, Profinet, Profibus* **Development and connection of neural networks:**

Python 3 Google Collab PyTorch 1.11.0 KPI would be the targets for progress in project for each evaluation and are described in the table  |

| **Deliverable** |
| --- |
| **#** | **Title** | **Type** | **Dissemination level** | **Lead partner** | **Due date** |
| D1.1 | Technology Application Roadmap | Report | CO | INNOVINNPROM LTD | M1  |
| D1.2 | Ethical deliverable | Report | CO | INNOVINNPROM LTD | M1  |
| D1.3 | Requirements specifications | Report | CO | INNOVINNPROM LTD | M1  |
| **Description of the deliverable** |
| The deliverable will be an updated set of slides. |

| **Support provided from BOWI consortium** |
| --- |
| **Code** | **Description** | **Name of TiR** | **TiR Organization** |
| TS.1.1 | Support in planning and KPI description | Oleksandr Bondarenko | Centre 4.0 KPI DIH |
| TS. 1.2 | Support in planning and KPI description | Tomasz Kołcon | PIAP |

| **KPIs**  |
| --- |
| **#** | **Description** | **Current value** | **Expected value** | **Delivery date** |
| 1 | Increasing the number of SAKURA-APM system functions. | 4 | 7 | M5 |
| 2 | Reducing the percentage of inefficient use of grain elevator equipmentKPI is a reduction in the percentage of inefficient use of elevator equipment | 17% | 10% | M10 |
| 3 | Reduction of energy consumption of technological equipment of grain elevatorKPI is the percentage of reduction in energy consumption | 17% | 10% | M10 |
| 4 | Reduction of technological delays and downtime of grain elevator equipmentKPI is a percentage Reduction of technological delays and equipment downtime | 5% | 3% | M10 |

| **Task number**  | **2** |
| --- | --- |
| **Task title** | Mid term evaluation targets |
| **Task duration** | M1-M5 |
| **Lead partner** | INNOVINNPROM LTD |
| **Objective of the task** |

| Development of information technology to optimize the operation of the grain elevator using neural network models and training methods with reinforcementDevelopment of updated software SCADA, PLC, firmware energy meters. Manufacture of modernized energy meters. |
| --- |

| **Description of work** |
| --- |
| 1. Analysis of analogues for the optimization of the technological process using intelligent information technology
2. Design of architectural neural networks of typical nodal devices of elevator routes.
3. Planning of experiments necessary for training of neural network models of nodal devices and system as a whole.
4. Improving the user interface, namely adding a new theme and supporting multilingualism
5. Development of updated versions of SCADA system and PLC software in order to ensure completeness of data to create a digital twin of the grain elevator control system
6. Necessary support from DIH-HUB and mentors:
7. Technical consulting
8. Testing of modernized energy meters – 3 pcs
9. Providing marketing support
 |

| **Deliverable** |
| --- |
| **#** | **Title** | **Type** | **Dissemination level** | **Lead partner** | **Due date** |
| D2.1 | Mid term status report | Report | CO | INNOVINNPROM LTD | M5 |
| **Description of the deliverable** |
| Report of progress. |

| **Support provided from BOWI consortium** |
| --- |
| **Code** | **Description** | **Name of TiR** | **TiR Organization** |
| TS.2.1 | Technical mentoring. Networking | Oleksandr Bondarenko | Centre 4.0 KPI DIH |
| TS.2.2 | Testing of modernized energy meters. Technical mentoring | Tomasz Kołcon | PIAP |

| **KPIs** |
| --- |
| **#** | **Description of where KPI can be found** | **Current value** | **Expected value** |
| 1 | Increasing the number of SAKURA-APM system functions. | 4 | 7 |

| **Task number**  | **3** |
| --- | --- |
| **Task title** | Final evaluation and demonstration |
| **Task duration** | M6-M10 |
| **Lead partner** | INNOVINNPROM LTD |
| **Objective of the task** |
| Practical implementation of previous developments performed in the framework of task 2, implementation of algorithms, installation, and testing of system software, SСADA, PLC. Installation and testing of modernized energy meters. Application of information technology to optimize the operation of the elevator using neural network models and training methods with reinforcement on real data |
| **Description of work** |
| 1. Development of requirements and recommendations for intelligent simulator to simulate the technological cycle of the grain elevator in search of the optimal route.
2. Development of a method for detecting devices that work abnormally, by deviations of the predicted values ​​from the real ones.
3. Development of information technology to optimize the operation of the grain elevator using neural network models and training methods with reinforcement.
4. Formation of datasets for training neural network models taking into account the laws of real data.
5. Training of neural networks for node devices of elevator routes taking into account real data (item 1).
6. Simulation of algorithms for optimization of grain elevator routes taking into account new data using machine learning technologies with reinforcement.
7. Development of an intelligent simulator for simulation and visualization of the elevator technological cycle and optimization of its routes and equipment parameters.
8. Development of the interface with formation of reports with results of work of the intelligent simulator
9. Creating the optimal scenario for the route in general and for each device in particular.
10. Evaluation of the accuracy of forecasts, analysis of deviations and visualization of the results of detection of node devices due to which deviations occurred, i.e., that work abnormally, which will mean the need for repair, calibration, downtime, etc.
11. Installation and testing of modernized energy meters, firmware updates.
12. Upgrading the version of SСADA on the grain elevator.
13. Update the PLC firmware on the grain elevator.
 |

| **Deliverable** |
| --- |
| **#** | **Title** | **Type** | **Dissemination level** | **Lead partner** | **Due date** |
| D3.1 | Report on work done and results. | Report | CO | INNOVINNPROM LTD | M10 |
| **Description of the deliverable** |
| The deliverable will be realised as the presentation slides with pictures and videos of the Experimental setup. |

| **Support provided from BOWI consortium** |
| --- |
| **Code** | **Description** | **Name of TiR** | **TiR Organization** |
| TS.3.1 | Technical mentoring. Networking. Support with report preparation | Oleksandr Bondarenko | Centre 4.0 KPI DIH |
| TS.3.2 | Technical mentoring. Support with report review | Tomasz Kołcon | PIAP |

| **KPIs** |
| --- |
| **#** | **Description** | **Current value** | **Expected value** | **Delivery date** |
| 1 | Reducing the percentage of inefficient use of grain elevator equipmentKPI is a reduction in the percentage of inefficient use of elevator equipment | 17% | 10% | M10 |
| 2 | Reduction of energy consumption of technological equipment of grain elevatorKPI is the percentage of reduction in energy consumption | 17% | 10% | M10 |
| 3 | Reduction of technological delays and downtime of grain elevator equipmentKPI is a percentage Reduction of technological delays and equipment downtime | 5% | 3% | M10 |

| **Task number**  | **4** |
| --- | --- |
| **Task title** | Demonstration of system |
| **Task duration** | M10 |
| **Lead partner** | INNOVINNPROM LTD |
| **Objective of the task** |
| The objective of this task is to describe how results will be demonstrated, test arrangements and customer /end user feedback collection.  |
| **Description of work** |
| Demonstration of the SAKURA-APM system is conducted online. Provides access to view the progress of technological processes in the grain elevator, which operates in normal mode. Power meters and IoT gateways operate in automatic mode. Demonstration of system operation is performed by displaying screen forms, tables and graphs with system operation data.The main indicators of the quality of the system are the achievement of the projected values ​​of reducing technological delays and operating time of equipment, improving energy efficiency of grain elevator equipment and reducing energy consumption (in this case electricity).Since certain technological processes in the grain elevator can take several days, the analysis of the quality of the system is performed based on a comparison of statistical data for the last month and a month before the introduction of the system in the same period of the year. |

| **Deliverable** |
| --- |
| **#** | **Title** | **Type** | **Dissemination level** | **Lead partner** | **Due date** |
| D4.1 | Final Report | Rep | CO | INNOVINNPROM LTD | M10 |
| D4.2 | Video of TTE results | Pub | Pub | INNOVINNPROM LTD | M10 |
| **Description of the deliverable** |
| The deliverable will consist of a slide set with pictures and video of demonstration. |

| **Support provided from BOWI consortium** |
| --- |
| **Code** | **Description** | **Name of TiR** | **TiR Organization** |
| TS.4.1 | Support with report preparation | Oleksandr Bondarenko | Centre 4.0 KPI DIH |
| TS.4.2 | Support with report review | Tomasz Kołcon | PIAP |

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| **Task number**  | **5** |
| --- | --- |
| **Task title** | Business development |
| **Task duration** | M1-M10 |
| **Lead Partner** | INNOVINNPROM LTD |
| **Objective of the task** |
| The objective of the task is to analyse the impact of the experiment. The scope could include:* Analysis of the system as compared to the existing situation in the target environment.
* IPR analysis.
* Validation and end-user feedback.
* Formation of recommendations for algorithmization of business processes in the grain elevator.
* Business plan.
* Individual Fundraising Plan to seek public and/or private investment for commercial implementation of the results of the experiment.
 |
| **Description of work** |
| Involvement of business analysts and high state of project implementation (TRL7) provide the opportunity to analyze the progress of the project in real-time, collect data for their analysis and make appropriate technical and administrative decisions.In this way, business analysts will be able to assess the financial KPI of each stage of the project, plan and conduct technical experiments to optimize energy and production costs. In this case, these experiments can be carried out by the staff of the enterprise without the involvement of a team of developers.This allows business analysts to plan project scaling options for all grain elevators of their agrarian holdings and develop detailed business plans for the implementation of the SAKURA-APM system for all holding companies.End-user feedback will be gathered on customers’ sites..The Individual Fundraising Plan will be developed. |

| **Deliverable** |
| --- |
| **#** | **Title** | **Type** | **Dissemination level** | **Lead partner** | **Due date** |
| D5.1 | Implementation Plan | R | CO | INNOVINNPROM LTD | M10 |
| **Description of the deliverable** |
| The deliverable will be a report including KPIs and milestones. |

| **Support provided from BOWI consortium** |
| --- |
| **Code** | **Description** | **Name of EiR** | **EiR Organization** |
| BS.1 | Business and Project management mentoring, Networking | Olena Savytska | Centre 4.0 KPI DIH |
| BS.2 | Networking, project management consulting | Grzegorz Kowalski | PIAP |

| **KPIs** |
| --- |
| **#** | **Description** | **Current value** | **Expected value** | **Delivery date** |
| 1 | Negotiations with potential customers | 0 | 2 | M4 |
| 2 | Participation in public events (conferences, forums, exhibitions, fairs etc.) | 0 | 2 | M10 |
| 3 | Publications in media and social networks | 0 | 3 | M10 |

**Summary of all KPI:s and Deliverables**

| **KPIs** |
| --- |
| **#** | **Description of the KPIs (include as well the results expected)** | **Current value** | **Expected value (values expected per %, item, etc)** | **Delivery date** | **Deliverable/means of verification** |
| 1 | Increasing the number of SAKURA-APM system functions. | 4 | 7 | M5 | Report |
| 2 | Reducing the percentage of inefficient use of grain elevator equipmentKPI is a reduction in the percentage of inefficient use of elevator equipment | 17% | 10% | M10 | Report |
| 3 | Reduction of energy consumption of technological equipment of grain elevatorKPI is the percentage of reduction in energy consumption | 17% | 10% | M10 | Report |
| 4 | Reduction of technological delays and downtime of grain elevator equipmentKPI is a percentage Reduction of technological delays and equipment downtime | 5% | 3% | M10 | Report |
| 5 | Negotiations with potential customers | 0 | 2 | M4 | Report |
| 6 | Participation in public events (conferences, forums, exhibitions, fairs etc.) | 0 | 2 | M10 | Report |
| 7 | Publications in media and social networks | 0 | 3 | M10 | Publications |

| **Deliverable** |
| --- |
| **#** | **Title** | **Type** | **Dissemination level** | **Lead partner** | **Due date** |
| D1.1 | Technology Application Roadmap | Report | CO | INNOVINNPROM LTD | M1  |
| D1.2 | Ethical deliverable | Report | CO | INNOVINNPROM LTD | M1  |
| D1.3 | Requirements specifications | Report | CO | INNOVINNPROM LTD | M1  |
| D2.1 | Mid term status report | Report | CO | INNOVINNPROM LTD | M5 |
| D3.1 | Report on work done and results. | Report | CO | INNOVINNPROM LTD | M10 |
| D4.1 | Final Report | Report | CO | INNOVINNPROM LTD | M10 |
| D4.2 | Video of TTE results | Pub | Pub | INNOVINNPROM LTD | M10 |
| D5.1 | Implementation Plan | Report | CO | INNOVINNPROM LTD | M10 |

1. **TRL increase**

Please state the project’s current TRL and provide an estimate of the target final TRL. Describe how the TRL increase will be achieved through the duration of the project.

| **Initial TRL**  | **7** | **Planned final TRL**  | **8** |
| --- | --- | --- | --- |
| **The overall TRL of this project will be increased by:** We need to get a product ready for scaling and sale for agro-industrial holdings 0and enterprises - the SAKURA-APM system |

The following information is for guidance only:

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 – system prototype demonstration in operational environment

<https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf>

1. **Schedule**
	1. **Project Gantt chart**

Please add here the Gantt chart of the TTE. The chart shall indicate the tasks, deliverables and milestones.

| **Task name** | **M1** | **M2** | **M3** | **M4** | **M5** | **M6** | **M7** | **M8** | **M9** | **M10** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 06 | 07 | 08 | 09 | 10 | 11 | 12 | 01 | 02 | 03 |
| **Task 1: Project planning** |
| Development of a technical task for the development team |   |   |   |   |  |   |   |   |   |   |
| Development of terms of reference for the subcontractor |   |   |   |   |  |   |   |   |   |   |
| Development BOWI budget template TAR |   |   |   |   |  |   |   |   |   |   |
| Preparation of an updated presentation |   |   |   |   |  |   |   |   |   |   |
| **Task 2:** **Mid term evaluation targets** |
| Development of comparative table of analogues for the implementation of process optimization using intelligent information technology. |   |   |   |   |  |   |   |   |   |   |
| Development of Architecture neural networks of typical nodes of grain elevator route devices |   |   |   |   |  |   |   |   |   |   |
| Development of Scheme of experiments for training typical neural networks of grain elevator TP devices |   |   |   |   |  |   |   |   |   |   |
| Add support of application localization.Currently supported only Ukrainian locale. Add English locale |  |  |  |  |  |  |  |  |  |  |
| Add dark theme to web interface of the system. Currently supported only light theme |  |  |  |  |  |  |  |  |  |  |
| Add support for SCADA for export data for creating Digital Twin |  |  |  |  |  |  |  |  |  |  |
| Manufacturing & testing of modernized energy meters |  |  |  |  |  |  |  |  |  |  |
| Optimize the technology stack used to store time series data |  |  |  |  |  |  |  |  |  |  |
| Optimize the technology stack used to transfer data from energy meters to the System |  |  |  |  |  |  |  |  |  |  |
| Development of a new version of SKADA software |  |  |  |  |  |  |  |  |  |  |
| Development of a new version of the PLC firmware |  |  |  |  |  |  |  |  |  |  |
| Firmware development for a new version of energy meters |  |  |  |  |  |  |  |  |  |  |
| Purchase and configure a new IoT gateway |  |  |  |  |  |  |  |  |  |  |
| Installation of a test bench for checking and adjusting energy meters |  |  |  |  |  |  |  |  |  |  |
| **Task 3: Final evaluation and demonstration** |
| Development of set of requirements for intelligent simulator and its interface |  |  |  |  |  |  |  |  |  |  |
| Choice of information technology for optimization of production at the grain elevator using neural network models and methods of training with reinforcement |  |  |  |  |  |  |  |  |  |  |
| Comparison of examples of results of optimization of scenarios for choosing the optimal route of the grain elevator using intelligent technologies |  |  |  |  |  |  |  |  |  |  |
| Development of complexes of training, validation and test datasets suitable for training neural networks of nodal devices, taking into account real data from the grain elevator |  |  |  |  |  |  |  |  |  |  |
| Creating trained neural networks for grain elevator route nodes based on real data |  |  |  |  |  |  |  |  |  |  |
| Construction of algorithms for optimizing grain elevator routes based on new data using machine learning technologies with reinforcement |  |  |  |  |  |  |  |  |  |  |
| Construction of intelligent stimulator for simulation and visualization of the grain elevator technological cycle and optimization of its routes and equipment parameters |  |  |  |  |  |  |  |  |  |  |
| Selection of the optimal routes using intelligent stimulator |  |  |  |  |  |  |  |  |  |  |
| Building reports of an intellectual stimulator |  |  |  |  |  |  |  |  |  |  |
| Implementation of algorithms for automatic detection of devices that may require repair, calibration, downtime, etc. |  |  |  |  |  |  |  |  |  |  |
| Installation of modernized energy meters on the grain elevator |  |  |  |  |  |  |  |  |  |  |
| SKADA grain elevator software update |  |  |  |  |  |  |  |  |  |  |
| Grain elevator PLC firmware update |  |  |  |  |  |  |  |  |  |  |
| **Task 4: Demonstration of system** |
|  Demonstration of system |   |   |   |   |  |   |   |   |   |   |
| **Task 5: Business development** |
| Custom analysis of the project status at the stage of implementation of Task 1 and formation of proposals for improvement |  |  |  |  |  |  |  |  |  |  |
| Custom analysis of the project status based on the results of the implementation of Task 2 and the formation of proposals for improvement |  |  |  |  |  |  |  |  |  |  |
| Development of the Implementation Plan of the SAKURA\_APM system |  |  |  |  |  |  |  |  |  |  |
| Business plan for the implementation of the SAKURA-APM system in the elevators of the ASTARTA-KYIV LLC |  |  |  |  |  |  |  |  |  |  |
| Business plan for the implementation of the SAKURA-APM system in the elevators of the ZAHID-BUG PE |  |  |  |  |  |  |  |  |  |  |
| Holding a final meeting with partners, experts and potential clients at the DIH partner site on the SAKURA-APM presentation |  |  |  |  |  |  |  |  |  |  |

| - Split the project into smaller independent tasks and give each of them a timeline within a 10 months project period. Tasks will contribute to achieve a result, KPI or a deliverable. Add rows if necessary. |
| --- |

* 1. **Meeting schedule with TiR/EiR**

Give a detailed meeting schedule with TiR and/or EiR from BOWI

| **N°** | **Date** | **Time** | **Location** |
| --- | --- | --- | --- |
| 1 | M1 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 2 | M1 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 3 | M2 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 4 | M2 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 5 | M3 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 6 | M3 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 7 | M4 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 8 | M4 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 9 | M5 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 10 | M5 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 11 | M6 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 12 | M6 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 13 | M7 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 14 | M7 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 15 | M8 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 16 | M8 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 17 | M9 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 18 | M9 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 19 | M10 W2 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |
| 20 | M10 W4 Tuesday | **16-00** | <https://meet.google.com/dtz-bxur-qbt> |

1. **Evaluation Procedure**

There will be a Mentoring Committee meeting to review the experiments´ performance. This will be reviewed against this document “Technological Application Roadmap” (TAR), developed at the beginning of the support programme. The TAR establishes the KPIs and Deliverables that will be considered for evaluation.

The ‘Mentoring Committee’ will be in charge of monitoring and validating the experiment's performance in the interim and final reviews in Mentoring Committee meetings. It will be coordinated by VTT and composed by the Technical Mentor and Business Mentor from partners providing the services to sub-Grantees.

The evaluation of the Experiments performance will be done in accordance with the following criteria. Each criterion will be scored from 0 to 10 and the weight of each one of these criteria, in the final score, will be as follows:

* + Deliverables quality (30%).
	+ Technical KPIs (30%)
	+ Business KPIs (30%).
	+ Deadline Compliance (10%)

According to this final score and the final validation of the Selection Committee::

* + Sub-grantees with a minimum threshold (7 points) will successfully receive the next payment and be candidate to continue in the program.
	+ Sub-grantees under threshold. Those sub-grantees which haven't reached the threshold will be reviewed by the Selection Committee who will take the final decision taking into account all possible objective reasons for underperformance (i.e. external factors which might have influenced the performance of sub-grantees). Those not passing the examination will be requested to review their progress and provide evidence of improvements. In case of experiments failing to show improvements and capacity to reach the established KPIs will be analysed by the Selection Committee and can be dropped from the program without the corresponding payments.

Mentoring and Selection Committee members will meet every three months to monitor, validate and suggest measures for improvement of the experiments.

| **EVENT** | **DATE** | **DESCRIPTION OF THE TASK** |
| --- | --- | --- |
| **WELCOME EVENT** | * MAY 2022
 |  |
| **MENTORING COMMITTEE**  | * JUNE 2022
 | * 1st Interim evaluation

Assessment on the performance and ethical status and Technology Application Roadmap of the experiments. |
| **MENTORING COMMITTEE** | * OCTOBER 2022
 | * Interim evaluation

Assessment on the performance and ethical status of the experiments against KPIs and deliverables. |
| **FINAL EVALUATION** | * MARCH 2023
 | * Final evaluation

Assessment on the performance and ethical status of the experiments against KPIs and deliverables. |

1. **Experiment’s budget**
	1. **Eligible costs**

The maximum **grant amount** is 60,000 EUR (sixty thousand), paid as a lump sum[[2]](#footnote-1) following the conditions set out in this Agreement and its Annexes.

Payment of the individual tranches of the grant to the Beneficiary depends on the proper implementation of the Project, completion of the agreed milestones/KPIs and delivery of the agreed documents in the TAR.

Eligible costs are direct and indirect costs that correspond to the Project budget validated by the Mentoring Committee and they are eligible as long as corresponding tasks or parts of the Project have been properly implemented (including personnel costs, purchase of goods and services, travel costs, licence fees etc). Costs have to be directly linked to the performance and duration of the experiment and which can therefore be directly booked to it.

Under BOWI 3rd Open Call for Experiment grant amount may be spent only for the following costs:

* 1. Personnel costs (employees, natural persons working under a direct contract and for personnel, costs for SME owners not receiving a salary, other personnel costs)
	2. Other costs, such as consumables
	3. Travel costs, for the execution of the experiment
	4. Subcontracting
	5. Overheads (25% of the total costs excluding subcontracting).

| **COSTS** |  |
| --- | --- |
| **PERSONNEL COSTS** | **63,570 €** |
| **TRAVEL COSTS** | **3,101 €** |
| **OTHER COSTS** | **300 €** |
| **OVERHEADS** | **16,743 €** |
| **SUBCONTRACTING** | **2,000 €** |
| **TOTAL** | **85,714 €** |

**Detailed budget of the experiment**

| *Taks* | *Identification of Costs* | *Description* | *Value in €* | *Total in €* |
| --- | --- | --- | --- | --- |
| **Name of the task** | **Personnel Costs** | **Number of Person Months** | **Monthly Cost** | **Costs in euros** |
| Project planning |  | 6 persons, 1 month | 1,770,00 € | 2,585 € |
| Midterm evaluation targets |  | 6 persons, 5 month | 3,660,00 € | 27,775 € |
| Final evaluation and demonstration |  | 7 persons, 5 month | 5,665,00 € | 24,850 € |
| Demonstration of system |  | 5 persons, 1 month | 3,705,00 € | 3,960 € |
| Business development |  | 4 persons, 10 month | 470,00 € | 4,400 € |
|  | ***Personnel Costs TOTAL*** | ***63,570 €*** |
|  | **Travel Costs** | **Description and justification of the trips** | **Costs in euros** |
| Installation of modernized energy meters, updating of SKADA software and firmware of grain elevator PLC, testing. |  5 persons, 5 days, car, car driver, hotel accommodation  | 1,671 € |
| Demonstration of the system |  5 persons, 3 days, car, car driver, hotel accommodation | 1,040 € |
| Presentation at the Center 4.0 KPI DIH | 5 persons, 1 day, car, car driver | 390 € |
|  | ***Travel costs TOTAL*** | ***3,101 €*** |
|  | **Other costs (purchase of goods or services)** |  | **Costs in euros** |
| Purchase equipment |  Gateway Teltonika RUT956 | 300 € |
|  | ***Other costs TOTAL*** | ***300 €*** |
|  | ***Overheads (25%)*** |  | ***16,743 €*** |
|  | **Subcontracting Cost** | **Description of the subcontracting service and justification** | **Costs in euros** |
| Vinnytsia National Technical University  |  | Formation of recommendations and construction of algorithms for the use of AI and ML technologies | Subcontracting will use the experience and competencies of scientists to improve the quality of development and experiments | 2000 |
|  | ***Subcontracting Total*** | ***2,000 €*** |
|  | **Subtotal budget of the experiment** |  | **85,714 €** |
|  | **Voucher** | **Description of the use of the voucher mechanism** | **Costs in euros** |
| Production of modernized energy meters - 3 pieces | At this time, the time synchronization of the data received from the energy meters is carried out in the IoT gateway, which in the loss of communication can lead to desynchronization and data loss.The meaning of modernizing energy meters is to hardware add a built-in real-time clock and write the appropriate version of the firmware of energy meters.Therefore, the experiment involves the manufacture, installation and testing on the production site of a grain elevator in the actual operation of upgraded energy meters -  | ***15,000 €*** |
| Testing of modernized energy meters | Testing is necessary to verify the compliance of energy meters with the declared parameters and safety parameters in accordance with European legislation |
| Carrying out marketing activities on the territory of the DIH partner outside Ukraine | Necessary marketing support for the promotion of the SAKURA-APM system in the Eastern European market outside Ukraine |
|  |
|  | **TOTAL budget of the experiment** |  | **100, 714 €** |
|  | **TOTAL Financial Support from BOWI** | **75, 000 €** |

1. Requirements specifications prepared during the proposal preparation shall be taken as the starting point for this. [↑](#footnote-ref-0)
2. The lump sum is a simplified method of settling expenses in projects financed from Horizon 2020 funds. Under this method, the Beneficiary is not required to present strictly defined accounting documents to prove the cost incurred (e.g. invoices), but is obliged to demonstrate the implementation of the project in line with the milestones set for the Project. The lump sum does not release the Beneficiary from the obligation to collect documentation to confirm the costs under fiscal regulation. [↑](#footnote-ref-1)