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IntellioT

Deliverable D 6.11: Open Call Coordination & Results (second call)

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Author	Maren Lesche (Startup Colors)
Editor	Maren Lesche (Startup Colors)
Reviewer	Arne Bröring (Siemens AG) Martijn Rooker (TTC)
Approved by	PTC Members: (Vivek Kulkarni, Konstantinos Fysarakis, Sumudu Samarakoon, Beatriz Soret, Arne Bröring, Maren Lesche) PCC Members: (Vivek Kulkarni, Jérôme Härri, Beatriz Soret, Mehdi Bennis, Martijn Rooker, Sotiris Ioannidis, Anca Bucur, Georgios Spanoudakis, Simon Mayer, Carina Pamminger, Holger Burkhardt, Maren Lesche, Georgios Kochiadakis)
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EXECUTIVE SUMMARY

IntelloT's mission is to enable the execution of semi-autonomous IoT applications for AI-enabled systems. With its partners in three main sectors – agriculture, healthcare, and manufacturing – IntelloT is building an ecosystem united by a shared vision that is committed to privacy, security and trust, in which the intelligence of humans and devices can seamlessly intertwine. The consortium's aim is to overcome limitations of traditional cloud-centric IoT solutions, such as unreliable connectivity, privacy concerns, or high round-trip times. By initiating Open Calls, IntelloT invited SMEs and startups to join the consortium in developing next generation IoT solutions.

This report (Deliverable D6.11) gives details on the coordination and the results of the second and third Open Call of the IntelloT project. It is the result of the task T6.2 "Open Call coordination" from the work package 6 (WP6), which oversaw the overall preparation and execution of the Open Calls that IntelloT was conducting during the overall project duration.

In total, T6.2 executed **three Open Calls** targeting SMEs. At the beginning of the IntelloT project, only two Open Calls for SMEs were planned. However, due to the high number of Micro-SMEs that showed interest in Open Call #1 and #2 but did not meet the requirements and therefore were not selected, a third Open Call focusing on the future trend of Industrial Metaverse and specifically aiming for Micro-SMEs was proposed and eventually executed from M35 - M39 (August - December 2023). Four more SMEs could benefit from the IntelloT resources adding up to **14 SMEs in total** that integrated selected IntelloT components and provided important feedback on its applicability and exploitation potential. During its overall project duration **in total 304 SMEs** across Europe and its associated countries applied in the three Open Calls conducted within WP6.

The **Open Call #2** was conducted from M24 to M29 (October 2022 to March 2023). In this second project phase of IntelloT, our consortium was looking for SMEs to support the existing partners in addressing challenges in three new domains to explore the applicability of the IntelloT framework and its components better. The domains selected for Open Call #2 were: Energy, Construction and Smart Cities. In this Open Call **170 SMEs** could be activated of whom **42 were eligible** for the assessment by external evaluators. In M28 (February 2023), **six SMEs were selected** to join IntelloT. In M29 (March 2023), preparation workshops were conducted, contracts issued and the pilot projects started.

The newly initiated **Open Call #3** was conducted from M35 to M39 and became possible due to the extension of the project duration. To frame concrete applicable areas of the call overall theme "Industrial Metaverse", IntelloT defined four specific challenges that Micro-SMEs were able to address: 1.) Secure & Transparent Billing on the Blockchain; 2.) Virtual Industrial Revolution using XR Solutions; 3.) AI-Driven Autonomy for Industrial Vehicles and 4.) Remote Robot Control using Multi-Agent-Systems and Web of Things. Open Call #3 did not apply the Open Call concepts of Open Call #1 and #2 but was specifically designed to meet the needs of young Micro-SMEs. Within an Open Call **30 Micro-SMEs applied** to enter a special Hackathon. Within the Hackathon Week of five days, 15 eligible SMEs that fulfilled the requirements of Micro-SMEs worked closely with IntelloT experts to explore the applicability of the IntelloT framework in 11 projects. In a special public presentation - an online pitch - **8 projects from 7 countries** were presented and evaluated by external experts. Four of these applicants were selected to join the IntelloT consortium for one month.

The call for evaluators was considered a supportive activity and was therefore described briefly as an enabling element in D6.5: Open Call Coordination & Results. For Open Call #2 und #3 evaluators identified in the call for evaluators were reactivated since the selected evaluators were familiar with the IntelloT project and could build on their existing expertise.

By using the term "Open Call", this report in general refers to the Open Call for SMEs.

1 OPEN CALL: OBJECTIVES

Both Open Calls had the strategic objectives to maximise the exploitation and to generate societal, economic and scientific impact of the IntelloT results by disseminating project results among the scientific, business and startup community in Europe and globally, as well as among decision makers, relevant stakeholders and the interested public. They also had the objective to strengthen the research and knowledge base of all relevant stakeholders through presentation of the IntelloT work and results. Open Calls are established instruments to support open innovation and open-source activities. Within the IntelloT project, the Open Calls were used to co-create selected features, to gain feedback from SMEs on the developed framework and IntelloT components as well as to explore different novel business models applied by the Open Call winners. The learnings from Open Call #1 (OC1) were considered for the evolution of the framework in its 2nd technical release. The Open Call #2 (OC2) results fed into the demonstration of the final IntelloT framework and aim to build a sustainable ecosystem beyond the project. The Open Call #3 (OC3) explored the new trend of Industrial Metaverse and focused on challenges not in-depth covered in the previous Open Calls.

In the original project outline, it was only planned to engage with up to eight SMEs through the two planned Open Calls. However, due to the strong interest and the successful execution of OC1 the operational objectives were slightly adjusted: Within the Open Call #2, IntelloT aimed to identify six SMEs that were able to join with pilot projects of 6 months to build applications, services and extensions on the IntelloT framework and its components. The SMEs became consortium members and received up to 60,000 Euro to execute the pilot projects alongside the 13 consortium partners to apply the IntelloT technology, improve their products and services, and create new businesses. In Open Call #3, the operational target was four Micro-SMEs which received 7,000 Euro to execute short 1-month pilot projects.

Although the overall objectives of both Open Calls are similar, they were executed in a different way. In the following sections the preparation, execution and results of Open Call #2 and Open Call #3 are therefore explained separately.

2 OPEN CALL 2: PREPARATION

2.1 Open Call 2: Scope: The IntellioT Framework & its Components

The overarching objective of IntellioT is to develop a reference architecture and framework to enable IoT environments for (semi-)autonomous IoT applications endowed with intelligence that evolves with the human-in-the-loop based on an efficient and reliable IoT/edge- (computation) and network- (communication) framework that dynamically adapts to changes in the environment and with built-in and assured security, privacy and trust. These aspects result in three pillars also called component areas, which are depicted in Figure 1, and are shortly described below.

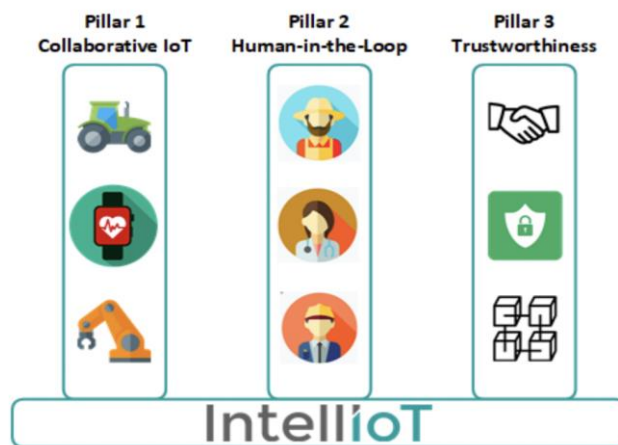


Figure 1: The three Pillars of IntellioT

1) Collaborative IoT: Various semi-autonomous entities (e.g., tractors, robots, healthcare devices, etc.) will need to cooperate in order to execute multiple IoT applications. These entities will have to be self-aware, and will all have a different amount of knowledge of the task at hand and their environment where they are located. Unfortunately, it is not always possible to provide all the necessary knowledge to the entities, especially in changing environments. To keep the knowledge of the entities up to date, they need to extend it by applying learning technologies based on Artificial Intelligence and Machine Learning. New knowledge can either be acquired by interacting with the environment (via sensors) or by interacting with the other entities in the environment. By exchanging information via a reliable and secure communication network, the entities in the environment will need to collaborate with each other to update their own knowledge to fulfill their assigned task.

2) Human-in-the-Loop: The human within the system will keep on playing a crucial role in the whole process. The aim is to not remove the human from the system but use his/her/their experience and knowledge to overcome unknown situations. This applies when the system does not have the knowledge (yet) to handle the situation and the collaboration with the other entities in the field also does not provide the required information. The interaction with the human (be it either the machine operator, the farmer, the physician or any other person) will enable the intelligent system to expand its knowledge about the environment or the application through machine learning technologies and use the experience from the human operator to

learn new features or information about the overall process. Therefore, humans will remain a vital element of the system and will interact with the IoT elements in the system to overcome the current limitations of the system.

3) Trustworthiness: Security, privacy and, ultimately, trust are considered as indispensable preconditions for reliability and the wider acceptability of distributed, collaborative IoT systems and applications. Trust of the human (e.g., a patient or farmer) in the system is key, as the system's (autonomous) decisions need to be trusted, and the end-users' data need to be handled with utmost care, by providing appropriate levels of security and privacy safeguards. In this context, and in addition to well-understood security and privacy best practices, IntelloT will adopt advanced security intelligence to protect unsupervised device-to-device interactions, based on self-adaptable, security-related operations. Furthermore, the overall trust will be fortified by continuous monitoring, real-time assurance assessment, and primitives enabling transparency of performed actions. Distributed ledger technologies (DLT) and smart contracts will be made accessible by IoT devices and other actors in the use cases to show transparency of performed actions, create trustworthy supply chains and build trust between parties. Figure 2 provides a high level, simplified view of the IntelloT framework and its building blocks.

Within the Open Call #2 a fourth component area was added to provide full accessibility: 4) Infrastructure. A dynamically managed and compute infrastructure provided the baseline for the three pillars/component areas. IntelloT features computation resource management and edge management & orchestration capabilities, along with network choreography and management as well as xApp management and control features.

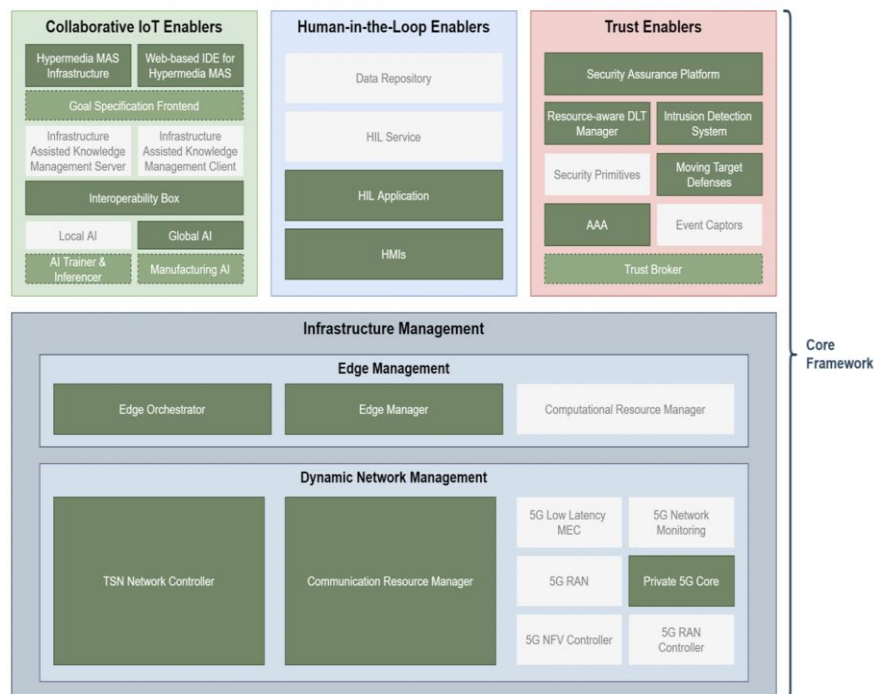


Figure 2: The IntelloT framework - simplified view

In regard to the Components, each component area (pillar) included a set of architectural components available for integration. Figure 2 shows the 4 overall areas within which the components are based. It is important to mention, that at the time of OC2, only the components colored in green in Figure 2 were available, while the gray-colored ones were still being developed. More details concerning the framework’s components available for integration were presented via specific one-pagers for each component from each component area. The following figure 3 lists each component which were made publicly available – and still are available on the IntellioT website – and downloadable directly as PDFs as **One pager**:

<p>Collaborative IoT</p> <ul style="list-style-type: none"> ● Web-based EUP IDE for Hypermedia MAS ● Hypermedia MAS Infrastructure ● Global AI ● End User Goal Specification Front End ● Manufacturing AI ● Interoperability Box ● Resource-Aware Training and Inference 	<p>Human-in-the-Loop</p> <ul style="list-style-type: none"> ● HMIs ● HIL Application
<p>Trustworthiness</p> <ul style="list-style-type: none"> ● Security Assurance Platform (SAP) ● Trust Broker ● Authentication, Authorisation, and Accounting (AAA) ● Intrusion Detection System ● Moving Target Defenses ● DLT 	<p>Infrastructure Management</p> <ul style="list-style-type: none"> ● Edge Infrastructure ● TSN Network Controller ● Communication Resource Manager ● Private 5G Core

Figure 3: The IntellioT component areas

In addition to the component one-pagers and the related publicly-available IntellioT deliverables (e.g., D2.6, providing the final IntellioT architecture), the consortium was readily available throughout the OC2 application stage to provide information regarding the different technologies, licensing schemes and any other details that the applicants requested. In total three Webinars were offered: on October 18, November 8, December 14, 2022. In addition, a central email address – intelliot@startupcolors.com – was used to bundle requests.

2.2 Open Call 2: Scope: Example Contributions

Open Call #2 focused on ecosystem building activities and highlighting the impact and sustainability of the developed solution, the IntelloT framework (see Figure 2). Hence, the consortium was aiming to attract candidates that can offer a validation of the wider applicability of the IntelloT framework and its components into the new application domains. As such, three new domains were identified for IntelloT's validation through Open Call #2, covering areas such as: Energy (e.g., smart grid, sustainable energy generation & distribution), Construction (e.g., green building, safety monitoring, tracking of resources & supply chains) and Smart Cities & related domains (e.g., logistics, smart homes, smart mobility).

These domains and their possible applications provided guidance for possible contribution. In fact, additional ideas were encouraged and welcomed since IntelloT aimed to widen the range of new and innovative IoT applications and devices within the framework and specific IoT environments of the domains. However, to assure a consistent development of sustainable solutions throughout the three new domains and to further enhance the capabilities of the platform, but to also showcase the suitability of the core IntelloT framework as a basis for an ecosystem that can be built on top of it beyond the project, IntelloT was seeking additional technological building blocks that can further expand the capabilities of the core framework with clear integration points towards the IntelloT framework.

While the proposed new applications did not have to include and integrate with the full set of IntelloT components, the proposed domains needed to at least address 4 components in total from at least 2 out of 4 component areas as shown below:

- Collaborative IoT (key pillar 1)
- Human-in-the-Loop (key pillar 2)
- Trustworthiness (key pillar 3)
- Infrastructure management

2.3 Open Call 2: Benefits

Applicants were able to request a maximum of €60,000 equity-free public funding. However, the financial gains were certainly not the only advantages for interested SMEs & startups. OC2 winners also joined the IntelloT project to actively work on 6-months technical pilot projects in collaboration with the 13 consortium partners. Moreover, this also meant having access to a broader pan-European innovation network via the coordinating CSA NGIoT and the other RIAs under that umbrella. In turn this could lead to novel exploitation opportunities of the winning applicants' solutions.

Applicants were not allowed to submit multiple applications. In case that more than one application from the same applicant was submitted, only the one submitted first was considered and any other was rejected.

2.4 Open Call 2: Timeline

The active application phase ran from October 1st 2022 until January 9th 2023. However, the preparation of the OC2 started much earlier - in June 2022 - by setting up a specific timeline and by aligning supportive activities such as communications but especially the definition of touch points with the existing framework

activities as shown in the following graph. The initial timeline was regularly updated and adjusted according to:

1. Constant alignment with communication activities as part of task T6.1
2. Connecting with the activities of the CSA Next Generation Internet of Things (NGIoT)
3. Learnings from already executed activities

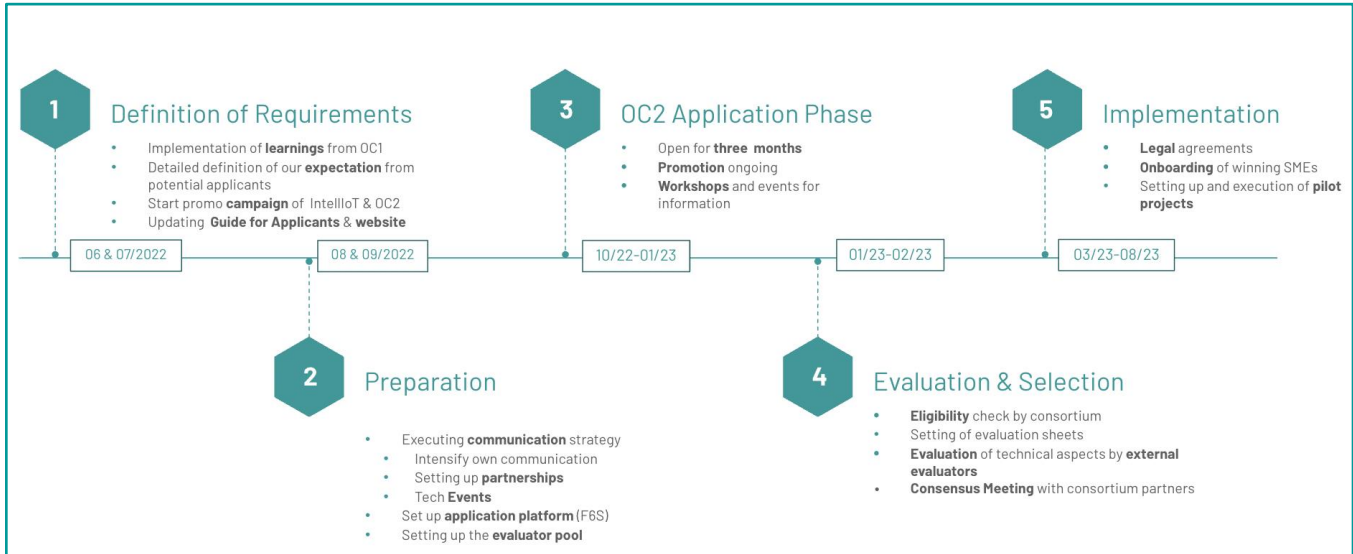


Figure 4: Overall timeline of the OC2

2.5 Open Call 2: Responsibilities

In preparation of the application phase, the consortium partners from WP6, WP2, as well as the responsible persons of the framework and its technical components worked collaboratively to establish a common understanding of the expectations of the consortium with respect to possible technical exploitation provided by the SMEs joining via the OC2. Two work packages were specifically involved in setting up the OC2. The technical scope of OC2, such as the definition of the Open Calls' contents and the expectations towards applicants, were defined in WP2 and task T2.1 (see [Deliverable D2.4](#)), whereas WP6 focused on the execution of OC2 specifically by:

- reviewing the impact of the 1st Open Call and adjusting the 2nd Open Call scoping to these learnings
- reshaping the material based on the technical iterations resulting from the 1st Open Call implementations
- supporting the scoping of the Open Call and defining the criteria for the evaluation process
- coordinating the creation of component one-pagers
- preparing informative material of the Open Call for dissemination/promotion
- reaching out to communities to specifically attract startups and SMEs to apply
- coordinating webinars for potential applicants
- coordinating promotion of Open Call in conjunction with dissemination activities (T6.1)

- preparing templates for applicant proposals and for evaluation by external experts
- managing the evaluation process with external experts
- organizing and moderating phone conferences for consensus building with external experts
- announcing the winners of the Open Call

Task 6.2 was coordinated by the WP6 lead Startup Colors and supported by all consortium partners.

3 OPEN CALL 2: EXECUTION

The second stage of the OC2 coordination was the execution, dealing with the actual operational day-to-day activities during the duration of the active application phase (October 1, 2022 until January, 9th, 2023) of the OC2.

3.1 Open Call 2: Guide for Applicants

Like for OC1, for the start of the OC2 in October 2022, an updated version of the Guide for Applicants was published. This document summarized the complete OC2 process and contained a detailed outline of the evaluation process. Its first version was published on October 1, 2022. On November 9, 2022, after the submission deadline was extended, an updated version 2.0 was published. Application and selection criteria's as well as the scope of OC2 remained. The Guide for Applicants was available for download on the IntellioT Website and was also integrated in the application form on the F6S platform. Before submitting the application, each applicant actively confirmed that they had access to the Guide for Applicants and read it. The Guide for Applicants is still available online under the following Link:

https://intelliot.eu/wp-content/uploads/2022/11/IntellioT_Open_Call_2_GfA_Updated_Nov9.pdf

3.2 Open Call 2: Application Tool: F6S

For application management the platform [F6S](#) was selected once more. F6S is an application platform that has been developed to host and process open calls. The following reasons lead to the selection of F6S:

- The existing F6S community is overlapping with the target group of the IntellioT OC2
- F6S provides a front end that allows applications to fill in information step by step
- F6S ensures that all necessary GDPR is ensured
- F6S also offers a backend that allows external evaluators to review and score applications.
- Export and import features allow documentation.
- Messaging Options allow an active, bilateral communication between IntellioT and applicants

For OC1 we initiated a partnership with F6S and set up an overall organisation profile for IntellioT, which then became the anchor for the actual application form. This formed the basis for hosting OC2. Again, in collaboration with the F6S organisation, the forms were updated and optimized.

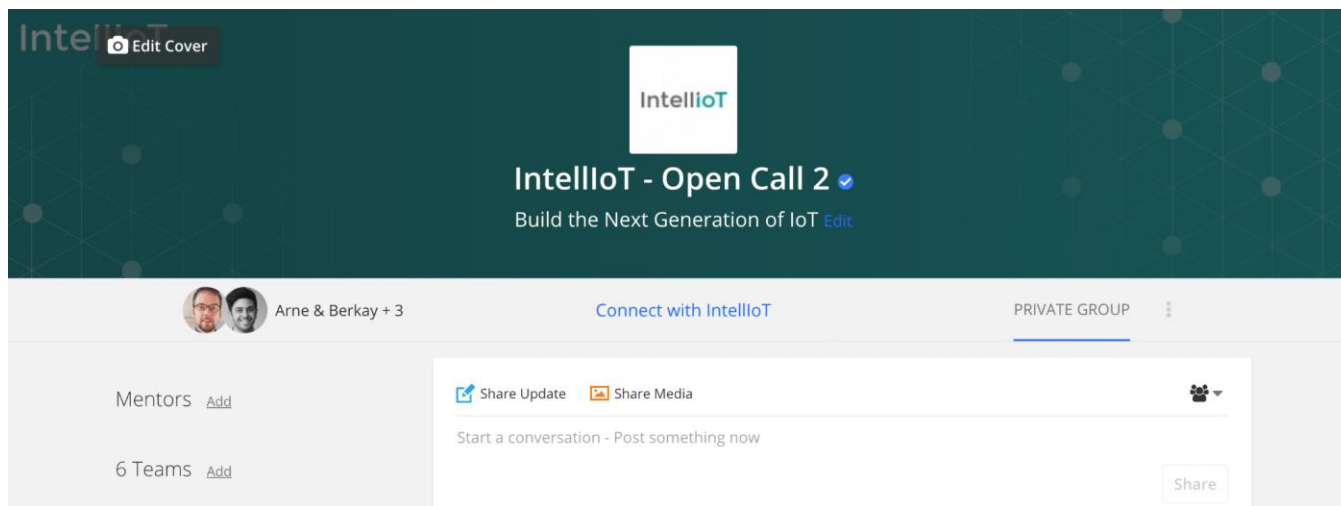


Figure 5: Screenshot of the IntelloT organisation page on the platform F6S

3.3 Open Call 2: Application Questionnaire

All applicants had to supply information, such as general company and founder team information, detailed technical explanations of their potential solutions as well as how they planned to integrate with IntelloT's components, a clear work plan including goals, milestones and a financial breakdown of their requested grant. The following questions had to be answered:

Company information

- Year of incorporation
- Number of employees (FTEs)
- Annual turnover (2021)
- Company Registration Number (CRN)
- PIC number (if available)

Solution description

- Brief description of the solution (product/service) the SME offers
- Technology USP / differentiator in relation to competitors
- Patents / IPR (owned or applied for)
- Supporting documents

Integration with IntelloT

- Definition on which Components the SME plans to use and integrate
- Reason for the chosen components (How will they enrich your existing solution?)
- Need for further support from the IntelloT consortium

Industrial relevance and impact

- Business goals
- Exploitation plans of the results of the pilot project

Team & Workplan

- Team composition
- Milestone plan for the implementation of the IntelloT components

Usage of resources and costs

- Explanation and justification of requested funding

At the end of the questionnaire, legal topics were addressed. All applicants had to consent to the following statements:

- I have read and understood the information about the project, as provided in the Guide for Applicants (<https://intelliot.eu/open-call-2022>)
- I have been given the opportunity to ask questions about the project and my participation via the contact address: [intelliot\(at\)startupcolors.com](mailto:intelliot@startupcolors.com)
- I voluntarily agree to participate in the IntelloT Open Call 2
- I understand I can withdraw at any time without giving reasons and that I will not be penalised for withdrawing nor will I be questioned on why I have withdrawn.

3.4 Open Call 2: Communication, Dissemination & Ecosystem Building

For Open Call 2 many of the learnings from Open Call 1 could be applied. Moreover, some applicants from OC1 were active in the new domains and applied again. In many ways we could build on an existing ecosystem in terms of technology expertise but were specifically adapting communications and dissemination activities to identify the best candidates with the most excellent domain knowledge.

3.5 Open Call 2: Communications Campaign Strategy

Since OC2 could benefit from the strong outreach of OC1 and the high number of potentially eligible applicants from OC1, first efforts focused on activating existing contacts. Moreover, communications activities were reviewed to ensure a more quality driven approach. In OC1, the unexpected high number of applications, resulted in a much larger evaluation process than expected and delayed decision making. In OC2 communication activities that would provide less but still high-quality applications were conducted. In October 2022, the overarching open call communication & dissemination was launched via a multitude of ways: Regular newsletter, social media, selected, media partnerships, targeted mailings, online workshops & meetups amongst others. On October 1st, 2022 the Open Call 2 was also officially opened on the platform F6S so applicants could submit their proposals immediately. The application phase ended on January 9, 2023 – after being open for more than 3 months in total. On January 9, 2023, the Application Form on F6S was officially disabled via a timer.

3.6 Open Call 2: Communications Highlights

Between M24 and M27, all communications activities from T6.1 were aligned with the Open Call activities in T6.2. An overview of all T6.1 activities can be found in Deliverable D6.9. Highlights from the Open Call campaign for OC2 communications activities included:

- **Open Call Subpage on Website:** A special subpage of the Website provided all necessary information for potential applicants. It was public from October 1, 2022 and is still available. It contained information such as access to the Guide for Applicants (for download), an overview of the most relevant FAQs, descriptions of scope of the desired contributions, an overview about deadlines and other relevant activities: <https://intelliot.eu/open-call-2022>
- **Project video & additional audio-visual content:** The animated [project video](#) created in M04 detailing the IntelloT project was also used for social media communications. Moreover, all online events during the Open Call campaign were recorded and published. The recording of the webinars provided specific guidance for applicants. It has been viewed more than 100 times.
- **Social networks:** The systematic use of social media was another cornerstone of the promotional campaign. Continuous announcements of OC related news and updates via the social networks [Twitter](#) and [LinkedIn](#) have been made. Overall, three events / meetups have been promoted via LinkedIn with more than 50 LinkedIn users registering their participation.
- **Newsletters & Special Mailings:** Already in M03, a regular quarterly email newsletter¹ was set up containing information on the progress of the project, recent events as well as information on the Open Calls. Furthermore, another group of more than 400 subscribers have signed up to a dedicated mailing list specifically set up for potential OC applicants. For OC2, three special mailings were sent out, e.g. a [Special Newsletter](#) on the Open Call 2 only.
- **Media Partnerships:** Through one tailored media partnership with the international online platform DataConomy Media, the OC2 was promoted and relevant potential applicants such as developers, IoT decision makers and SME / startup founders were targeted. Attached to its conference Data Natives and the engagement of Intelllot during the conference especially deeptech startups were reached.
- **Ecosystem Building:** Community partners were activated to connect and further grow the IntelloT ecosystem. Partnerships with communities such as Meetup.AI - a community of around 4,000 AI experts, Applied Data Incubator - a startup incubator with a network of 250 stakeholders from the data science domain, DataConomy / Data Natives - a community with approximately 55,000 followers on all its social media channels and more than 20 meetup groups bringing together up to 50,000 developers and data scientists as well as F6S - a platform hosting the application process for the OC1 and a special mailing granted access to up to 4 million company founders and their companies, were contacted.
- **Special Events:** 3 online events (1 kick-off webinar, 2 office hours with 100 attendees) were organized by WP6 partners with more than 150 SMEs sign-ups via Eventbrite and LinkedIn. Around 20 relevant SMEs were scouted and ultimately contacted directly.

¹Link to IntelloT newsletter overview: <https://us17.campaign-archive.com/home/?u=878f8ea2539b45d61093d5cf7&id=e9c1137c6e>

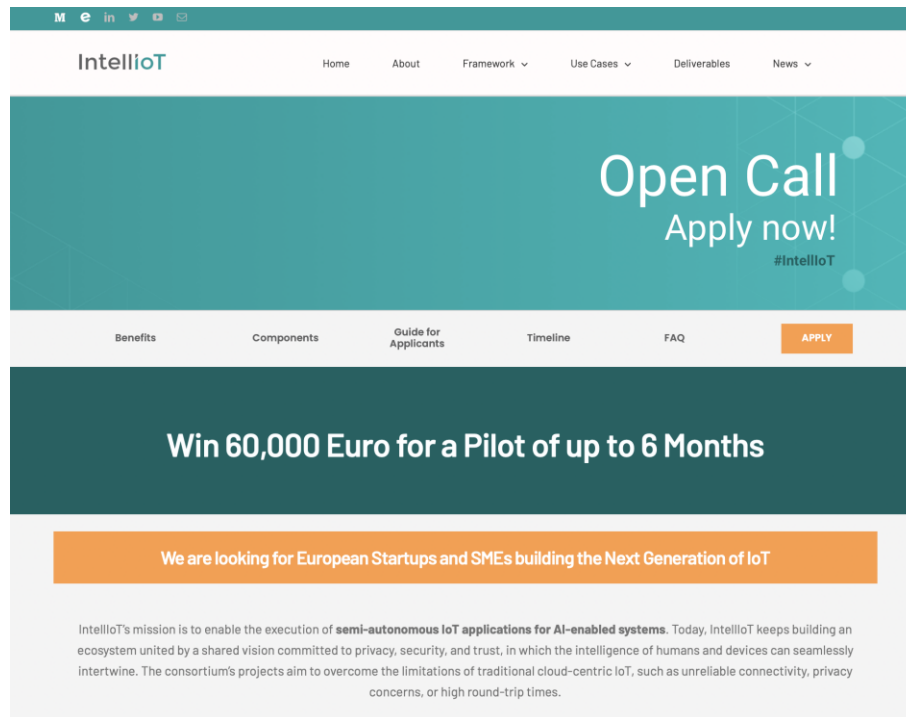


Figure 6: Screenshot of OC2 subpage on IntellioT website

3.7 Open Call 2: Direct Outreach to Applicants

Besides the passive outreach activities, direct contact to relevant applicants were initiated via the following activities:

- All applicants that had started an application in F6S were contacted regularly to offer support in finalizing the application and to provide additional material.
- These contacts were also encouraged to attend the "Ask-Me-Anything" Sessions that were held throughout the application period and to which more than 150 SMEs signed up. These online sessions proved to be very effective tools to engage potential applicants, as the following numbers show:
 - **OC2 Info Event:** October 18, 2022: 40 attendees
 - **AMA Session #1:** November 8, 2022: 20 attendees
 - **AMA Session #2:** December 14, 2022: 20 attendees

Recording of these events were made and selected parts were uploaded to YouTube². Relevant questions from the office hours were integrated in the FAQ section of the website.

²https://www.youtube.com/@intelliot_eu5464

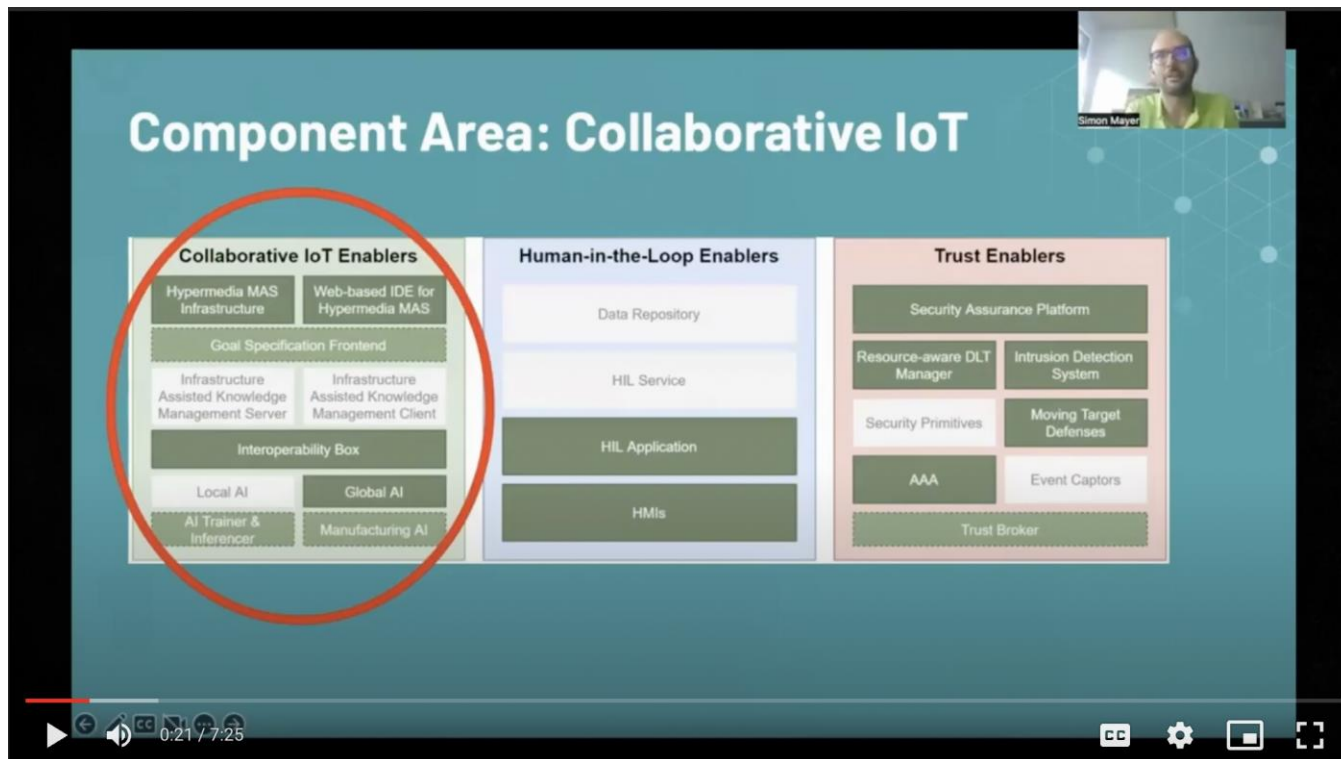


Figure 7: Screenshot of an online event

Further efforts were made by actively supporting and participating in existing events by organisations such as the CSA NGIoT - among it the NGIoT Thematic Workshop on "Funding opportunities from NGIoT" on September 15, 2022. <https://www.ngiot.eu/event/funding-opportunities-from-ngiot/>. Maren Lesche, Startup Colors, presented IntelliIoT and OC2 (80 attendees)



Figure 8: Screenshot of an online event by NGIoT on Open Calls where IntelloIoT introduced OC2

Beyond the promotion of the OC2 and the scouting of potential applicants, a big part of the OC2 execution was the active applicant management. Specifically, already started, but not quite finalised applications on the platform F6S were constantly monitored via an applicant pipeline to recognize patterns and identify potential gaps or issues. There was an active exchange between applicants, technical component leads and OC2 coordinators from IntelloIoT's side via F6S such as weekly targeted direct mailings based on category and identified problems. In addition, the OC2 coordinators reactively answered all questions shared by potential applicants via F6S, YouTube, LinkedIn as well as Email. During the last days the number of questions from applicants increased significantly.

The intensive pro- as well as re-active management of applicants has proven to be very effective. Just like during OC1, the actual number of applications of OC2 turned out to be much higher (170 applications) than the number of applicants targeted (goal: 40 applications).

4 OPEN CALL 2: STATISTICS

On January 9, 2023, the active application phase ended. Overall, OC2 counted 170 SMEs that registered for the Open Call on F6S and provided information during the application time frame. The original goal of 40 applications for OC2 was exceeded. Out of these 170 total applications, 128 applications were not eligible. Altogether 42 eligible proposals were evaluated by external experts.

4.1 Open Call 2: Domains

Since OC2 introduced new topical domains as opposed to the use cases from OC1 and focused on the integration with IntellioT's framework components, a more detailed look into the distribution into the domains as well as technical components follows.

Distribution by domain (170 total):

- Energy: **16%**
- Construction: **9%**
- Smart Cities: **42%**
- Other: **34%**

The breakdown clearly shows the vast majority of applications in the domain of Smart Cities, which was to be expected as it was the broadest domain. Important to note is also that a considerable number of applicants have either indicated the domain as "other" or have not given any indication at all.

4.2 Open Call 2: Components

Altogether 19 IntellioT components were made available. In OC2, out of the 4 different component areas, 399 components were selected in total by all applicants collectively - some applicants even showed interest in integrating more than the minimum of 4 components from at least 2 different component areas. The distribution by corresponding component area however differed as the following numbers showcase:

Distribution by component area (399 total):

- Collaborative IoT: **46%**
- Human-in-the-Loop: **7%**
- Trustworthiness: **27%**
- Infrastructure Management: **20%**

The components from the Collaborative IoT domain were selected the most, while the ones from Human-in-the-Loop were selected the least. From a sheer quantitative perspective, this too was to be expected as those two domains had the most (7) and the least (2) number of components made available for OC2. The Top 5 most selected components were:

- Global AI (Collaborative IoT): **43**

- Authentication, Authorisation and Accounting (Trustworthiness): **38**
- End User Goal Specification Front End (Collaborative IoT): **36**
- Edge Infrastructure (Infrastructure Management): **31**
- Interoperability Box (Trustworthiness): **28**

4.3 Open Call 2: Profiles of applicants / SMEs

Within OC2, we also took a closer look at both the maturity as well as their number of employees of the applying SMEs to identify further patterns and summarize even more learnings for future Open Calls. In OC2 most SMEs out of the 170 applicants were between 2 and 5 years old (43%), followed by a company age range between 5 and 10 years (24%). Unexpected was the comparatively high number of SMEs that were more than 20 years old (7%). The overall distribution shows the majority of applicants have a certain level of maturity in contrast to rather early-stage startups. With respect to the number of employees per SME, most applicants had teams of 5 or fewer members (40%) closely followed by teams between 5 and 10 employees (34%). The majority of the OC2 applicants therefore are considered Micro-SME. However, during the evaluation process many of these Micro-SMEs could not convince the evaluators. Out of the six winners of OC2 only one SME is considered a Micro-SME.

Moreover, a special emphasis was placed in the gender balance amongst the applicants' teams. Across all applications, 67% of all proposed team members were male and 31 % of the outlined team members were female. In general, a clear guideline on how to be even more inclusive was missing and is currently not provided by the CSA. Breaking gender down into male and female is a vast oversimplification of a highly nuanced topic. Therefore, other gender forms could not be tracked.

IntellioT received applications from more than 20 eligible countries in total. Applications from ineligible countries were disqualified. The results show a fairly even distribution amongst the top countries of origin, the 5 countries with the highest number of applications were:

- **Italy:** 25 applications
- **Germany:** 15 applications
- **Spain:** 14 applications
- **Poland:** 10 applications
- **Netherlands:** 9 applications

However, not all of these countries are represented among the OC2 winners. The 6 winning SMEs of OC2 originated from the following six different countries: Portugal, Spain, Italy, Germany, Estonia and Greece.

5 OPEN CALL 2: EVALUATION

The evaluation phase started in parallel to the launch of the Open Call and was intensified immediately after the deadline of OC2 on January 9, 2023.

The evaluation phase had the following stages:

- Eligibility Check by the OC2 Coordinators of Startup Colors
- External Evaluation by experts that were identified via an Open Call for Evaluators
- Cumulation of all Data into a Ranking suitable for decision making in a consensus meeting
- Announcement of winners and rejection of remaining applicants

5.1 Open Call 2: Eligibility Check

Every application underwent an eligibility check based on the OC2 eligibility criteria, which are in line with the requirements from Horizon 2020:

Open Call 2 – Eligibility criteria

- Country of registration**
You need to be incorporated in the EU or one of the Horizon2020 associated countries:
 - Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Iceland, Israel, North Macedonia, Moldova, Montenegro, Norway, Serbia, Switzerland, Tunisia, Turkey, UK and Ukraine
- Company size**
Your organisation needs to be an SME according to the definition of the European Commission:
 - Staff headcount: <250
 - Turnover: <50m Euro or balance sheet total: <43m Euro
- Company affiliation**
Your organisation cannot be a subsidiary or affiliated party of one of the consortium members.
- No consortia**
Only individual applicants – consortia cannot apply.

Figure 9: The official eligibility criteria for IntellioT's OC2

This process was done based on the information supplied by the applicants. All provided information was validated by accessing databases such as transparency databases, business registries and the EU tender portal in case a PIC was provided. In case of doubt, the applicant was contacted to provide additional information. After having fully confirmed a breach of the eligibility criteria an applicant was disqualified.

5.2 Open Call 2: External Review by Experts

The remaining 42 eligible applicants were evaluated by external reviewers outside of the IntelloT consortium. To identify suitable experts all applicants of the Open Call for Evaluators conducted during OC1 were reviewed. During OC2, further suitable potential evaluators had reached out to IntelloT and expressed their interest in evaluating. Since OC2 focused on three new domains, certain sector experts, e.g., for healthcare and agriculture were not contacted for the evaluation process of OC2. Again, the platform F6S was used since all evaluators were familiar with F6S and could review the applicants in the backend of F6S.

The external review was based on the concept that each application is scored by a minimum of two experts – one expert able to assess the technical expertise specifically and one expert with a stronger application domain expertise. Five external evaluators were selected based on their experience in evaluating, their expertise, their availability in the relevant time frame as well as based on a lack of conflict of interest. Two out of the five were female, which supports the overall effort for gender balance. Each evaluator scored between around 15 applications based on the evaluators' availability.

In order to brief the external evaluators adequately, an introductory webinar was held just after the application deadline on January 11, 2023. This webinar was also attended by IntelloT's technical component leads, who onboarded the external reviewers based on the specific challenges and needs of their components. In addition to that, the official OC2 evaluation criteria were introduced and explained. The overall goal of the onboarding was to brief the external reviewers in the best possible way, to allow them to evaluate the applications in the most informed and qualified way.

After the Evaluator briefing, each evaluator signed a contract outlining the expectations and deadlines. It also included an NDA.

5.3 Open Call: Evaluation Criteria

Applications were scored based on the following pre-defined and in the Guide for Applicants explained evaluation criteria:

- **Integration with IntelloT:** This score should reflect how well the plan for integration of the proposed components (applications, services, etc.) with the IntelloT framework and its components (Figure 3) is described. The integration plan should include references to APIs and other interfaces offered by the IntelloT components.
- **Impact and sustainability:** Demonstrate impact through examples showing specific future exploitation potential. Contributions should showcase ways to create added value to an existing IoT solution and enable next-generation IoT technologies across Europe. Further, there should be a guarantee of availability of the resources offered by the proposal after its open call pilot finishes and for how long.
- **Technical excellence:** Soundness of concept, quality of objectives and innovative elements of the proposal.
- **Quality of implementation:** Feasibility of the workplan, quality and effectiveness of the technical methodology, integration with the IntelloT framework components to achieve objectives of the project.
- **Quality of the team:** Quality and relevant experience of the individual participants, quality of the team as a whole, including complementarity, balance and diversity.

- **Economic fairness:** The requested budget should be adequate with the proposed workplan and show appropriateness of the allocation and justification of the resources to be committed (staff, equipment...).

Each criterion was judged on a scale of 1 to 6 points. A threshold of 4 points was predefined to ensure the overall quality of the application. In case that the scores of the evaluators differed by (or more than) 3 points in at least one of the criteria, the potential bias was solved by involving a third external evaluator in the process.

1 (Fail):	2 (Poor):	3 (Fair):	4 (Good):	5 (Very Good):	6 (Excellent):
<i>Proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.</i>	<i>The criterion is addressed in an inadequate manner, or there are serious inherent weaknesses</i>	<i>While the proposal broadly addresses the criterion, there are significant weaknesses</i>	<i>The proposal addresses the criterion well, although improvements would be necessary</i>	<i>The proposal addresses the criterion very well, although certain improvements are still possible</i>	<i>The proposal successfully addresses all relevant aspects of the criterion in question.</i>

Figure 10: Overview of Scale for IntelloT’s OC2

5.4 Open Call 2: Evaluation Process

After the briefing call and the signature of the evaluator contract the external review was conducted in a timeframe of 2 weeks the following way:

1. **Assignment by IntelloT OC Coordinator:** Each external evaluator was assigned the number of applications they committed to. Based on their fields of expertise, a tech evaluator and a domain expert were paired to ensure that each eligible submitted application was evaluated by a minimum of two independent external experts with a broad expertise.
2. **Access to Scoring Matrix:** The OC Coordinators developed a scoring matrix based on the six predefined evaluation criteria. Each criterion had up to 4 sub-criteria representing the possible parameter values. The matrix also included the option to comment and leave explanations. One matrix per applicant was developed and provided online. This way evaluators could only access their own scores and work independently on the scoring.
3. **Access to Applications:** All external evaluators received full access to the applicant’s information and proposals via the F6S platform in order to get the best possible picture of each applicant. F6S offers the option to score applicants on their platform, however we decided against this option to ensure an unbiased scoring since on F6S all scores from all evaluators will be visible to all other evaluators.
4. **Confirmation of Correctness:** After the OC Coordinator processed all data and checked for soundness, all evaluators confirmed the correctness by signing each scoring matrix via DocuSign. They also again declared their absence of any conflict of interest that might have occurred during the evaluation. With this final step, the job of the evaluators ended officially.

After all evaluators had provided their scores the OC Coordinators processed the material by calculating the average score of all sub-criteria and by summarizing all scores to a final score per evaluator, which was then combined with the score of the other evaluator. In this phase the threshold as well as potential bias were checked again. In case of inconsistencies, e.g., low score but positive comments, high score but critical comments or a significant gap between the scoring of the two evaluators the OC Coordinators reached out to the respective evaluator to ensure the correctness of the scoring. A final ranking of the top 10 candidates was made available for further review in the form of a consensus meeting.

5.5 Open Call 2: Consensus Meeting

A first consensus meeting with representatives of all consortium members took place on February 1, 2023.

During the consensus meeting, all consortium members had the chance to discuss and challenge the shortlist of top-ranked applicants. As stated in the Guide for Applicants, if substantial and objective reasons that would speak against this proposal joining the IntelloT pilot projects could be identified, such as the misalignment with IntelloT's 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, the choice could have been passed on to the next-ranked applicant.

One of the shortcomings of a written application process via the F6S platform is the lack of showcasing real-life demonstrators or providing source code and technical data. Since certain technical aspects and the Integration with IntelloT were crucial factors for the right ranked team - criteria that are challenging to assess by external evaluators - the consortium initiated a series of interviews and show cases with the top ranked SMEs. A list of questions specific to each applicants' potential contribution was created and shared beforehand with the applicants. During the online-video conversation, the top-ranked SMEs presented their proposal and confirmed technical details. This way the relevance to as well as the fit with IntelloT could be judged appropriately in order to make the final decision. Consequently, the consortium partners confidently confirmed the six SMEs that received the highest score by the external experts.



6 OPEN CALL 2: WINNERS & APPLICANT COMMUNICATIONS

The six winning SMEs reached the highest scores ranging from 24 to 26 out of a possible 30 points. The following companies were offered to join the IntellioT consortium and received 3rd Party Financial Support of €60,000.

	<p>ALLBESMART LDA is a Portuguese SME established in 2015 that provides R&D services in regard to ICT for several industries. They are specialized in communication networks, IoT solutions and AR applications. The SME is a spin-off company of the Instituto Politécnico de Castelo Branco, a public Technical University from Portugal. The team has ten years' experience in participating and management of innovation projects at international scale, including FP7 and H2020 programmes with a strong network of research partners and scientific background. Their C-ITS (Cooperative Intelligent Transport Systems) platform allows road operators to easily create and broadcast warning messages through a powerful back office system. The messages are then visualised by an onboard application, or through the car infotainment system with the goal of reducing road fatalities. Road safety is a major concern in urban areas. In most EU countries, governments consider C-ITS technology as a critical factor in reducing road fatalities. Having up-to-date data about how users interact with the road has traditionally been challenging. City traffic planners are looking for automatic perception systems of transportation-related data to help decision-making. In this context, Allbesmart has developed an AI algorithm that analyses 3D data provided by sensors to accurately detect and track vehicles, bicycles, and pedestrians at road intersections. The main goal of the IntellioT pilot project was to incorporate edge computing and trust components from IntellioT in its C-ITS Platform. The pilot provided Allbesmart with a unique opportunity to test and optimize LiDAR based applications for pedestrian detection over an edge infrastructure in a real-world environment.</p>
	<p>Arsoft (Spain) has developed the EyeFlow platform that has become a reference in the Industrial sector for those companies seeking to implement Augmented Reality and Virtual Reality (XR) technologies in their organizations, in a scalable and sustainable way. EyeFlow includes an authoring platform, EyeFlow Author, which allows the creation of advanced XR</p>

	<p>content for the industry: creation of Virtual Reality simulators for training, augmented manuals for technical documentation of machinery, multi-user virtual meetings for design reviews, assistance remote for incident resolution. Arsoft has been working on a completely new module for more than two years that allows users to create advanced IoT visualizers and Virtual Twins with 3D representations of industrial assets that monitor physical assets in real time to display a representation faithful to its state with Augmented Reality and Virtual Reality. The system also allows to enter IoT data graphs in real time, historical data, generate alerts to connect with the workers responsible for the machinery. The objective of this EyeFlow module is to place the worker at the center of the Digital Twin, so that they can access information of interest provided by an IoT platform and AI algorithms. Within the pilot project Arsoft integrated selected IntelliIoT components into the ARSOFT platform to facilitate the integration with other IoT systems. The use case consisted of a sensorised hydraulic plant in an offshore station. Thanks to an easy integration of the companies' IoT platforms with EyeFlow, the station provider is able to monitor the machine with virtual reality and augmented reality technologies.</p>
	<p>DotSoft S.A. is a Greek SME, offering IT services to the public and private sector. Customers include government institutions, multinational corporations, public administrations and multinational companies, research and academic institutes. Their INTEL ANN system aims at predicting parking places within a city, so that drivers can receive navigation towards reaching the areas that are most likely to be free. The system is based on the deployment of federated machine learning algorithms upon a big data space created from inground IoT sensors established at individual parking spaces in the city of Kalamaria, in Thessaloniki, Greece. The IoT sensors relay occupancy status at a gateway which in turn sends live information about free parking places at mobile devices. Information at the moment is stored at "data silos" and navigates drivers that seek parking places to free (at the moment) places. However, only a few in-ground occupancy sensors are established in comparison with the full range of possible parking places in the city. Rolling out within the full city range for in-ground sensors is very expensive, although the need for intelligent fast search of parking remains a challenge.</p>

	<p>In this direction, the proposed solution INTEL ANN aims to provide predictive information about the possible areas where it is more likely for one to find a parking place. To do so, the system will exploit one full year's big data related with occupancy of a parking place and analyze parameters such as timestamp and duration along with other semantic information (ex. shop /home street, central or quiet road, etc.), which in combination with climate and seasonal / traffic information will feed the AI predictive algorithm. The system will store both past / historical and "new" live (real time) parking and semantically annotated data in federated cloud hubs based on the street name of the city and will use these to derive intelligent predictive information of whether it is more or less likely for one to find a parking place in the city in a specific time. This information will be delivered to the "end user", the driver, through a mobile application.</p>
	<p>Lifely is an Italian SME founded in 2015, that is developing a Smart Home system to reduce heating and cooling energy consumption. The concept proposed is a step forward with respect to the current Smart Home systems able to produce an effective and direct impact on the measurement collected carrying out an action locally. Lifely is integrating existing IoT devices developed by the company into a useful AI-IoT collaborative system called Agrumino. Supported by Wi-Fi communication technology, Agrumino devices could be integrated with actuators and other smart home devices to interact locally and offer an automated and occupant-fitted solution to improve indoor comfort and reduce heating and cooling energy consumption. Agrumino represents the master device: it will receive and compute the data coming from all the devices and from itself, and then it will deal with controlling the actuators in the local network. The users, in a HIL (Human In the Loop) paradigm, are interacting with the application to increase the efficacy of the system: controls' thresholds could be tuned, specific time rules could be set to avoid undesirable behaviors and specific configurations could be set when the user returns home (thanks to smartphone interaction).</p>

	<p>The SME Pumacy Technologies AG (Pumacy) was founded in 2000 and is based in Bremen, Germany. From 2019 to 2022, Pumacy was building up a demonstrator for an autonomous assistance system for Human-Robot-Collaboration (HRC). The central idea was the development of an autonomous assistance system for HRC, which is characterized in particular by system neutrality. The solution consists of two coupled technologies: A sensor-based hardware, ready to be integrated in different kinds of working clothes to operate body-near and a specially adapted Search-Based Application (SBA) framework with a coupled Machine Learning (ML) library which takes over the activity recognition and process mining in the cloud. The idea of an HRC solution based on motion detection using sensors on which the project is based was granted a German national patent, and an additional European patent was applied. With AI-based process mining, it is possible to recognise activities and work processes so that the collaboration between robots and workers can be controlled. The potential of this new type of assistance system in terms of flexibility, cognitive relief, ergonomics and safety was demonstrated in the assembly of transformers (TRL 4-5). Lately, the solution has been further developed into a wearable sensor system integrated into a work jacket. The prototype was named "iVest". Currently, there are two use cases implemented. In addition to transformer assembly, there is also a solution to support arc welding. While collaborating with the IntellioT experts, PUMACY enabled the semi-autonomous execution of IoT applications for AI-enabled systems in construction environments. This was done by setting up an activity motion tracking solution for a construction use case.</p>
	<p>The startup WasteLocker was founded in 2022 in Tallinn, Estonia and is developing a waste and contamination level feedbacking system in compliance with ESG and GRI standard framework. WasteLocker does not only think about what is wrong today but showcases how to improve it. They aim to increase the reuse of materials by increasing the quality of sorted waste containers. Their studies have shown that there is a lack of precise data, analysis and measures about waste generation that support responsible behavior and resulting actions - both policy and otherwise. Leading public policy without trustworthy information is virtually impossible. To help individuals and companies justify their green claims</p>

	<p>without verifiable and certified data is even more meaningless. Waste management value chain optimization and value increase has been a long dream for everyone, but it has been really hard. Therefore, WasteLocker is developing a universal automated solution that can be customized to resolve all these issues. From experimenting with multiple waste flow monitoring solutions (such as a stand-alone camera module), they have reached a low-cost and easily scalable solution which makes everyone a contributor to the circular economy. The IntelloT components provided WasteLocker with future-proof security and trustworthiness. The components in combination with all the industry standard best practices that WasteLocker already employs, gave its customers the certainty that their data is guarded to the level of one of the highest possible standards.</p>
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Figure 11: Overview of Open Call 2 Winners

While the applicants that have not reached the shortlist were informed in early March about the rejection, the candidates on the shortlist were only informed after the six winning SME signed the final agreements and legally finalized the onboarding into the IntelloT consortium.

After the winners were informed the operational and administrative integration of the six winning applicants into the IntelloT pilot Program as well as the overall consortium as a whole were started. In March 2023, the collaboration agreements were signed by all involved parties. The agreement ensured a successful start into the pilot programs that ended in M35.

7 OPEN CALL 3: PREPARATION

7.1 Open Call 3: Scope: Industrial Metaverse

While OC1 and OC2 covered the most relevant technological challenges related to the IntellioT framework, selected and very specific challenges remained. Moreover, during the project duration the novel space of "Industrial Metaverse" was identified as another potential application area. OC3 therefore was initiated to attract SMEs that could develop technological approaches that apply the IntellioT framework specifically to solve the four following specific challenges related to the manufacturing domain and industrial IoT:

- Secure & Transparent Billing on the Blockchain
- Virtual Industrial Revolution using XR Solutions
- AI-Driven Autonomy for Industrial Vehicles
- Remote Robot Control using Multi-Agent-Systems and Web of Things

Applicants were invited to join the special innovation format – an online HackWeek – to explore the IntellioT's framework and to redefine a technology and business proposition highlighting how they may be able to integrate the IntellioT framework.

This final and much less complex Open Call was specifically designed to also allow Micro-SMEs and very early-stage startups to get involved in rather complex Research and Innovation Actions and to gain even further feedback on the applicability of the IntellioT framework. Moreover, the new concept of a multi-stage selection process as well as a co-creation format in form of a Hackathon provided all consortia members a closer contact to potential framework users.

Applicants were expected to showcase MVPs and Concepts that showcase solution pathways focusing on the four identified Industrial Metaverse challenges. Besides a project description provided on the hackathon website, all eligible Hackathon teams presented their approaches in special 10 min presentations to selected evaluators. This concept also provided immediate feedback to all applicants allowing them to build on these learnings and apply the expert recommendations to any future Open Call applications.

7.2 Open Call 3 Scope: Example Contributions

For each OC3 challenge concrete ideas were provided by the challenge owners – dedicated experts from the IntellioT consortium – to provide guidance for the early-stage SMEs that considered an application. The following scopes were communicated on the IntellioT OC3 website (<https://intelliot.eu/open-call-2023/>).

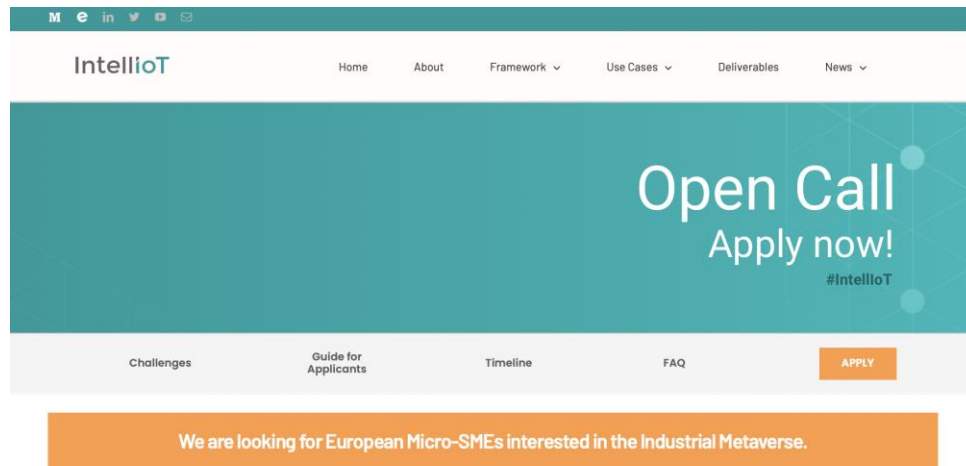


Figure 12: Screenshot of [OC Subpage](#) of Website

Challenge 1: Billing solution utilizing Blockchain: The objective of this challenge was to develop an innovative billing solution utilizing Blockchain/DLT technology. The solution should provide secure, transparent, and tamper-resistant methods for generating and managing billing records, enabling efficient and trust-based billing processes for businesses and individuals. Key Ideas were:

- **Billing Smart Contracts:** Design and implement smart contracts on a Blockchain/DLT platform to automate the billing process. These smart contracts should handle the generation, storage, and management of billing records, including invoicing, payment tracking, and transaction verification.
- **Immutable Billing Records:** Ensure that billing records stored on the Blockchain/DLT platform are immutable and tamper-resistant, providing an auditable history of all billing-related activities.
- **Transparency and Trust:** Enable all relevant parties (e.g., service providers, customers) to access and verify billing records in a transparent manner, ensuring trust and eliminating disputes.
- **Security & Privacy:** Implement robust encryption and privacy mechanisms to protect sensitive billing information while maintaining the necessary transparency and traceability provided by the Blockchain/DLT technology. Implement multi-layer monitoring using ELK stack technologies following online documentation & training material.
- **Integration and Interoperability:** Develop the solution in a way that allows seamless integration with existing Blockchain/DLT solution in IntelloT and ensure compatibility with different stakeholders and platforms.

- Scalability and Performance: Create an efficient architecture that can handle a large number of billing transactions without compromising the performance and scalability of the system.
- User-Friendly Interface: Develop a user-friendly interface that simplifies the billing process for both service providers and customers, providing a seamless experience.
- Energy Efficiency: Implement energy-efficient consensus mechanisms and optimize resource utilization to reduce the environmental impact of the Blockchain/DLT solution.
- Regulatory Compliance: Incorporate features that comply with relevant regulatory frameworks and standards, such as tax regulations or data protection laws.

Challenge 2: Virtual Industrial Revolution using XR: The goal of this challenge was to develop an innovative AR/VR solution for the industrial metaverse. The XR solution should simulate real-world industrial environments and provide users with hands-on experiences, interactive learning, or practical skills development. Key Ideas were:

- Industrial Simulation: Create a virtual environment that accurately represents a specific industrial setting (e.g., factory, construction site, oil rig) and includes realistic equipment, machinery, and hazards.
- Object Interaction: Develop the visualization of collision points of two 3D intersecting objects. For example, when a machine engine is inserted into a machine that is too small, points in the back or on the side would collide. These collision points should be highlighted.
- Collaboration: Enable remote participants to collaborate, communicate, and share experiences in real-time within the virtual environment.
- User-Friendly Interface: Create an intuitive user interface that is easy to navigate and interact with, ensuring that trainees can quickly adapt to the AR/VR environment and focus on learning.
- Gamification: Integrate game elements, challenges, and rewards to engage users, increase motivation, and make the experience more enjoyable.
- Data Analytics: Incorporate data collection of meeting points and degree of overlap.
- Hands-on experience: Create modular inverse kinematic capabilities for realistic handling of factory equipment, i.e., allow the definition of joints on robots and set movement constraints.
- Realistic visualization of flexible parts: Create a modular system to define fix points and elastic sections of cables, whilst restricting the stretchability. Allow the definition of rigidity.

Challenge 3: AI-Driven Autonomy for Industrial Vehicles: The challenge aimed to further develop the innovative AI-based solution for Autonomous Guided Vehicles (AGVs) of IntellioT. The solution should leverage advanced machine learning and computer vision techniques to enable AGVs, such as tractors or forklifts, to navigate, perform tasks, and interact safely within a dynamic environment. Key Ideas were:

- One of the main bottlenecks at this point is the lack of labeled training data for control of IntellioT's tractor. The main challenge here is to have video feeds associated with the remote-control commands, which require a human operator to manually collect them by driving the tractor around obstacles. Here, the aim is to develop a generative model (video-GAN) that could be used to augment such data streams labeled with accurate control commands to avoid the need for human effort. The augmentation could consider the adoption of different obstacles as well as different climate conditions.

- Reinforcement Learning environment: To depart from data collection and labeling process, it is necessary to move towards an RL setting where the learning algorithms require access to agents that interact with the environment. In this view, to develop RL-based control policy for the e-Tractor, an accurate simulation environment that cooperate perception, dynamics, and reward mechanisms is needed. Hence, this task is to develop a simulation environment and learn a control policy using RL.
- Fleet Management: Create a solution that enables centralized management and coordination of multiple AGVs, optimizing task allocation, resource utilization, and workflow efficiency.
- Human-Machine Interaction: Design intuitive interfaces or voice commands that allow workers to interact and collaborate with AGVs easily, enhancing productivity and usability.
- Energy Efficiency: Optimize the AI algorithms and AGV operations to minimize energy consumption and increase the overall sustainability of the autonomous systems.
- Object Recognition and Manipulation: Further develop the computer vision techniques that allow AGVs to detect, recognize, and interact with objects, such as pallets or crates, and perform tasks like picking, placing, or stacking.
- Human-Awareness and Safety: Incorporate AI capabilities that ensure AGVs operate safely in the presence of humans, with features like pedestrian detection, collision avoidance, and dynamic environment adaptation.
- Fault Tolerance and Resilience: Implement mechanisms that enable AGVs to handle unexpected situations, recover from errors, and maintain operation under varying conditions.

Challenge 4: Remote Robot Control using Multi-Agent-Systems and Web of Things: The Interactions group (<https://ics.unisg.ch/chair-interactions-mayer/>) at the University of St. Gallen studies the concept of Multi-Agent Systems, systems constituted by autonomous entities called agents, able to communicate and cooperate with each other. The group studies how to apply this concept to the Web and the Web of Things to create autonomous systems constituted by software agents, autonomous robots and humans. The experts challenged SMEs to develop autonomous software for robot control that leverages Web-based multi-agent systems and the W3C Web of Things standards to create a robot integration system that is globally scalable and interoperable. Key Ideas were:

- Multi-Agent System for Autonomous Robots: Implement a multi-agent system (using the available resources) that enables effective communication and coordination between multiple robots. Each agent should represent a robot and possess autonomous decision-making capabilities.
- Web Integration for Global Scalability: Now, you have your Web-based multi-agent system! But the ultimate test of your system lies in its ability to operate on a Web scale. As the system grows, agents can use more and more devices and services to perform more tasks in parallel and achieve more efficiently manufacturing goals, but the process of discovering and interpreting the right or useful signifiers may become more time- and resource consuming. Show that your system manages to operate even on a very large scale, e.g., in the presence of many thousands of robots and agents in a simulation. Think of ways in which your recommendation system (or additional components that you developed) can be used to optimize time and resource consumption. Take advantage of the distributed architecture of your system to distribute the workload of signifier recommendation as the number of signifiers and agents fluctuates.

- **Web Personalization for Artificial Agents:** Especially as more and more devices and services become available, can you find a way to create a recommendation system that assists agents in finding artifact profiles and signifiers. That is, the system should suggest to an autonomous agent what it believes might be a beneficial device or service for it to use! Agents should be able to publish in their profiles information (e.g., about their manufacturing goals or current context) that may be used by the recommendation system for evaluating which signifiers are relevant to them. Additionally, the recommendation system may observe the context of artifacts whose profiles are published in the hypermedia environment (e.g., by polling their state), to enable the more contextualized exposure of signifiers. Evaluate how resource consumption is allocated among agents and the recommendation system. This personalization should also be able to happen on a large scale.
- **Interoperability through the Semantic Web:** Ideally, your agents would be able to discover and interpret Web API documentation of artifacts (e.g., of services and devices). Write and publish signifiers in artifact profiles (e.g., for different of your real or simulated robots) that describe the functionality of individual devices and services on the Semantic Web. Such profiles could be considered as machine-readable Web APIs, where a signifier describes a single interaction with the API (e.g., to close the gripper of a robotic arm). In designing these signifiers, incorporate semantic metadata that you deem valuable for agents to effectively discover and interpret useful interactions, such as the semantic types of advertised actions, the state in which an action is possible, quality-of-service (QoS) information, etc. The information provided by these signifiers can also be used to enable Web Personalization for Artificial Agents
- **Artificial Intelligence Integration:** Artificial Intelligence techniques such as machine learning and computer vision can be used by robotic agents in order to learn from their environment, improve their perception abilities, and make better decisions. Such Artificial Intelligence modules could be made available through REST APIs for Web-based agents. In that case, study how Interoperability through the Semantic Web can contribute to solve this integration. Artificial Intelligence could also be used in order to improve the Web Personalization for Artificial Agents
- **Collaboration and Resource Sharing:** Design and evaluate a scenario in which different robots need to cooperate in real-time, and potentially use shared resources, to solve a problem. Evaluate whether this collaboration can happen on a large scale and whether Web Personalization for Artificial Agents can make collaboration and resource sharing easier.
- **Real-time Visualization:** Implement visualization techniques to provide real-time feedback and visual representations of the robots' actions, environment, and sensor data. If we consider that the humans controlling the system are another category of agents, this idea can be related to Web Personalization for Artificial Agents by extending it to humans so that a human may discover, for example, which robots they need to monitor if they want to study whether a given objective can be fulfilled.
- **Remote Control Interface:** Develop a user-friendly web-based interface that allows remote users to monitor and control robots in real-time. The solution should enable efficient and intuitive control of robots from a remote location, facilitating seamless interaction, coordination, and collaboration between humans and robots. This idea also extends Web Personalization for Artificial Agents to humans.

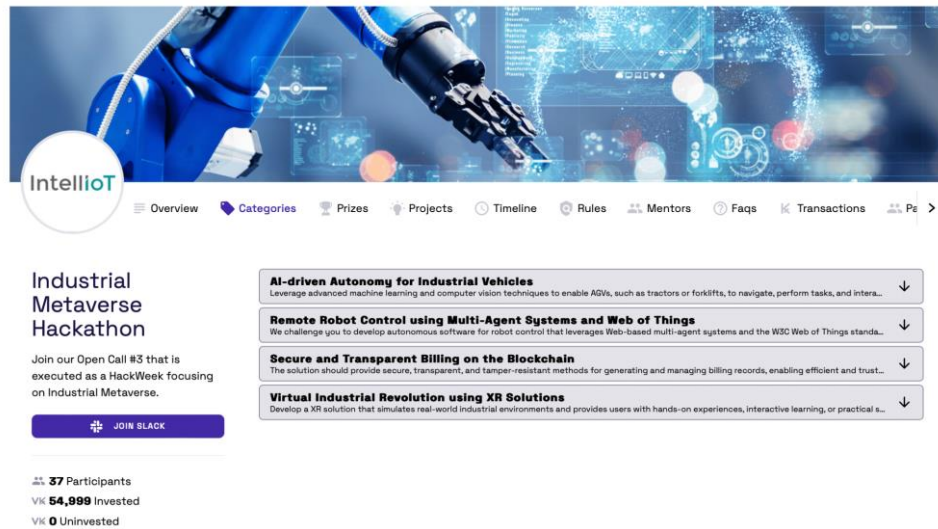


Figure 13: Screenshot of OC 3 Website at Taikai.network

7.3 Open Call 3: Benefits

Within OC3 up to 4 Micro-SMEs should be selected to work with the IntellioT partners on the framework within a 1-month pilot. The selected SMEs received up to 7,000 euros for their efforts in accordance with the selection criterion on economic fairness and as necessary to achieve the objectives of the action. As in OC1 and OC2, applicants were not allowed to submit multiple applications.

7.4 Open Call 3: Timeline

OC3 was conducted from August 8, 2023 until December 11, 2023 and applied the following multi-stage process:

- August 8, 2023, 12:00 CET: Registration for HackWeek via Online Hackathon Platform Taikai
- October 8, 2023, 12:00 CET: End of Registration for HackWeek /Eligibility Check
- October 9, 2023, 12:00 CET: Invitation of eligible Micro-SMEs to join the HackWeek
- October 9, 2023, 17:00 CET: Kick off of 5-day-HackWeek
- October 13, 2023, 12:00 CET: Submission of MVP & Presentation developed during HackWeek
- October 13, 2023, 15:00 CET: Presentation of achievements (Demo Day) & Public Evaluation
- October 13, 2023, 18:00 CET: Announcement of Winners
- October 23, 2023: Start of HackMonth / 1-month pilot program
- December 11, 2023: Final 30 min-Presentation & Q&A of Pilot Results

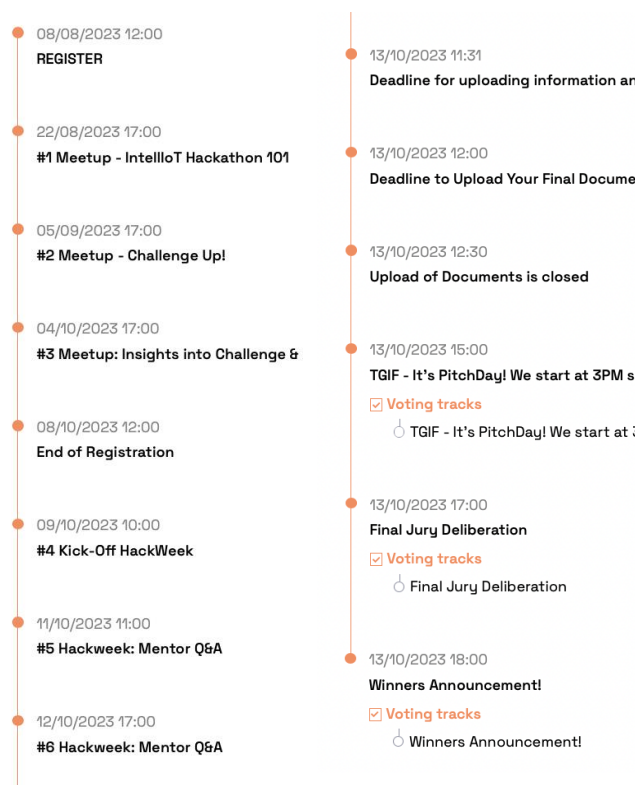


Figure 14: Timeline of OC3 Campaign

This time frame provided Micro-SMEs with ample time to become aware of this opportunity. OC3 was published altogether for 60 days on the EU portal and registration was possible via the hackathon platform from August 8 until October 8, 2023. The OC3 website was published on August 8, 2023 as well and is still accessible: (<https://intelliot.eu/open-call-2023/>)

7.5 Open Call 3: Responsibilities

OC3 was mainly coordinated by the WP6 lead Startup Colors in close collaboration with Siemens and supported by all consortium partners. Tasks included:

- reviewing the impact of the OC1 and OC2 and adjusting OC3 to these learnings
- redefining the OC concept and execution format and assessing hackathon as a tool
- setting up the complete process and defining suitable challenges related to Industrial Metaverse
- setting up of OC3 website and hackathon platform
- preparing & distributing informative material of the Open Call for dissemination / promotion
- reaching out to communities to specifically attract startups and SMEs to apply
- coordinating webinars for potential applicants
- preparing templates for applicant proposals and for evaluation by external experts
- managing the evaluation process with external experts
- announcing the winners of the Open Call

8 OPEN CALL 3: EXECUTION

OC3 was executed between May 2023 and December 2023. Submission was opened on August 8, 2023, after two months of preparation.

8.1 Open Call 3: Guide for Applicants

Like for OC1 and OC2, a Guide for Applicants was published. This document summarized the complete OC3 process and contained a detailed outline of the evaluation process. It was available for download on the IntellIoT Website and was also integrated in the application form on the hackathon platform Taikai. Before registering, each applicant actively confirmed that they had access to the Guide for Applicants and read it. The Guide for Applicants is still available online under the following Link: https://intelliot.eu/wp-content/uploads/2023/08/IntellIoT_Open_Call_3_GfA_final_04082023.pdf

8.2 Open Call 3: Application Tool: Taikai.network

For application and Hackathon management the platform Taikai was selected. The Portuguese startup Taikai has developed a platform that supports the execution of large-scale hackathons. It is also used by the EU supported Cassini project. The WP6 lead Startup Colors executed four hackathons via Taikai prior to OC3 and had done multiple tests with this service provider. Especially the scoring backend powered by DLT provided an interesting process for collecting evaluator feedback.

Taikai also provided the following advantages:

- The existing Taikai community is overlapping with the target group of the IntellIoT OC3
- Taikai provides a front end that allows applications to fill in information step by step
- Taikai also supports transparent and agile co-creation processes between applicants and the IntellIoT partners
- Taikai allows that all necessary GDPR is ensured, e.g., by providing public and private online spaces
- Taikai also offers a backend that allows external evaluators to review and score applications.
- Export and import features allow documentation.
- Messaging Options allow an active, bilateral communication between IntellIoT and applicants

On the special Taikai page of IntellIoT all information about OC3 provided on the IntellIoT website were mirrored. This also included the Guide for Applicants as well as all descriptions on the Scope of OC3 and its legal framework.

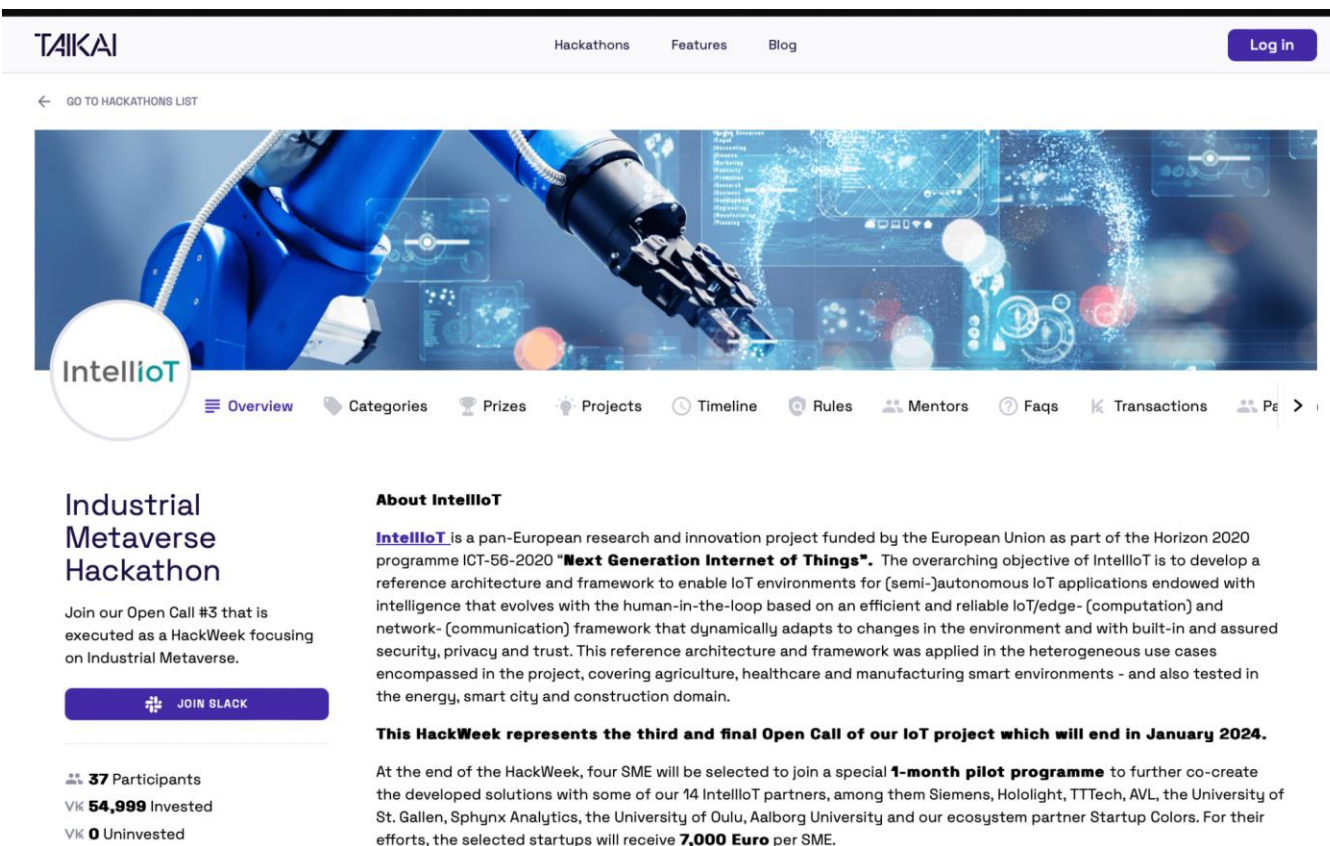


Figure 15: Screenshot of [OC Subpage](#) at Hackathon Website Taikai

Startup Colors initiated a partnership with Taikai early on and also developed a special organisation profile for IntelloT, which also provides long-term visibility in the deeptech community of hackers and Micro-SME.

8.3 Open Call 3: Application Process

In OC3 we applied a two-stage application process: Applicants could join OC3 by attending the IntelloT HackWeek from October 9 – 13, 2023. All interested Micro-SMEs needed to register via the hackathon platform Taikai first providing essential information during the registration that allowed the eligibility check done by WP6 lead Startup Colors. Eligible candidates were then invited to join the hackweek. 37 individuals registered on Taikai representing 30 teams. Out of all registered SME, 12 companies were eligible. They started to work on their projects within the Hackweek. At the end of the Hackweek, 8 Micro-SMEs decided to enter the last stage and to present their achievements and final applications to the evaluators/hackathon jurors. During the Hackweek applicants also had the chance to change challenges and qualify for another category. However, only one application per SME was considered during selection.

Within the hackathon platform, all applicants must provide information based on a predefined template, including the following sections:

Company Information*

- Legal name
- PIC
- Legal contact
- Number of employees / (full-time FTE)
- Turnover
- Website

Team Information

- Name of team members
- Position of team members
- Role of team members
- Expertise of team members
- Gender

Technology

- Description of existing technology / Product
- Touch Points with IntellioT Framework

Description of your Business

- Current business model
- Traction & Achievements

Challenge

- Which provided HackWeek challenge do you apply?
 - Which problem statement do you want to tackle?
 - Goal for the HackWeek

Solution Approach**

- Product approach
- Applied technologies & Data Sets
- Novelty of the proposed solution
- Technological achievements during the Hackathon

Exploitation / Business Opportunities**

- Long-term impact of the proposed challenge solution

Needs**

- Short work plan for the 1-month
- Resources and support needed from IntellioT

*relevant for eligibility

** to be filled out during the HackWeek

Figure 16: Overview of requested information in OC3

During the evaluation process all reviewers received access to the provided information in advance of the final review. Applicants that did not provide complete information were disqualified.

8.4 Open Call 3: Communication, Dissemination & Ecosystem Building

Due to the specific nature of Open Call 3, only selected communications campaign elements of previous Open Calls could be applied. We adapted the strategy as well as outreach activities to target Micro-SME specifically.

8.5 Open Call 3: Communications Campaign Strategy

Since OC3 aimed to activate Micro-SMEs only and focussed on very specific topics a small and very targeted communications campaign was initiated. All applicants from previous calls were screened and Micro-SMEs were identified and invited to participate. Community activities aimed to activate multipliers with a wide network of Micro-SMEs and startups. This included incubators, university transfer offices as well as coding schools and independent venture studios.

8.6 Open Call 3: Communications Highlights

Between M34 and M37 most communications activities from T6.1. were aligned with the Open Call activities in T6.2. An overview of all T6.1. activities will be found in Deliverable D6.9. Highlights from the Open Call campaign for OC3 communications activities included:

- **Open Call Subpage on Website:** A special subpage of the Website provided all necessary information for potential applicants. It was published on August 8, 2023 and is still available. It contained information such as access to the Guide for Applicants (for download), an overview of the most relevant FAQs, descriptions of scope of the desired contributions, an overview about deadlines and other relevant activities: <https://intelliot.eu/open-call-2023>
- **Project video & additional audio-visual content:** The animated project video created in M04 detailing the IntelloT project was integrated on the hackathon platform. Again, all online events during the Open Call campaign were recorded and published. The recording of the Kickoff webinar has been viewed more than 170 times.
- **Social networks:** The systematic use of social media was another cornerstone of the promotional campaign. Continuous announcements of OC related news and updates via the social networks Twitter and LinkedIn have been made. Overall, three online webinars have been promoted via LinkedIn and eventbrite with more than 140 users registering their participation.
- **Newsletters & Special Mailings:** For OC3, three special mailings were sent out, e.g., [Special Mailings](#) via eventbrite and Mailchimp to up to 1000 contacts.
- **Media Partnerships:** We also involved the existing media partner Dataconomy media again but did not initiative special events or paid advertising campaigns.
- **Ecosystem Building:** New community partners were identified, e.g., Incubator and metaverse communities in LinkedIn and on Meetup.com. Moreover, the Taikai community was also activated.

Taikai regularly promotes selected hackathons via newsletters and mailings to its 60,000 hacker strong community.

- **Special Events:** 3 online events (1 kick-off webinar, 2 Online sessions) were organized by WP6 with more than 140 SMEs sign-ups via Eventbrite and LinkedIn.




OCT 4		IntelloT Open Call Info Session Online event Wednesday, October 4, 2023 at 5:00 PM CEST	17 / 5000
SEP 5		Industrial Metaverse Hackathon: Pick your Challenge! Online event Tuesday, September 5, 2023 at 5:00 PM CEST	82 / 5000
AUG 22		AMA: Industrial Metaverse Hackathon 101 Online event Tuesday, August 22, 2023 at 5:00 PM CEST	45 / 5000

Figure 17: Overview of OC events and sign-ups from Eventbrite Backend

8.7 Open Call 3: Direct Outreach & Applicant Management

Around 30 relevant SMEs were scouted and ultimately contacted directly via Taikai - e.g., winner of past hackathons conducted via [Taikai](#) - via Incubators and Investors Websites - e.g., young portfolio companies from Bosch Startup Harbour, EIT Manufacturing or Applied Data Incubator - or suitable candidates from past OC of IntelloT that were part of the IntelloT community on F6S.

Besides these outreach activities, direct contact to relevant applicants were initiated via the following activities:

- All applicants that had started an application in Taikai were contacted regularly to offer support in finalizing the application and to provide additional material.
- These contacts were also encouraged to attend the "Ask-Me-Anything" Sessions that were held throughout the application period and to which more than 140 SMEs signed up.

Recording of these events were uploaded to YouTube. Relevant questions from the office hours were integrated in the FAQ section of the website.

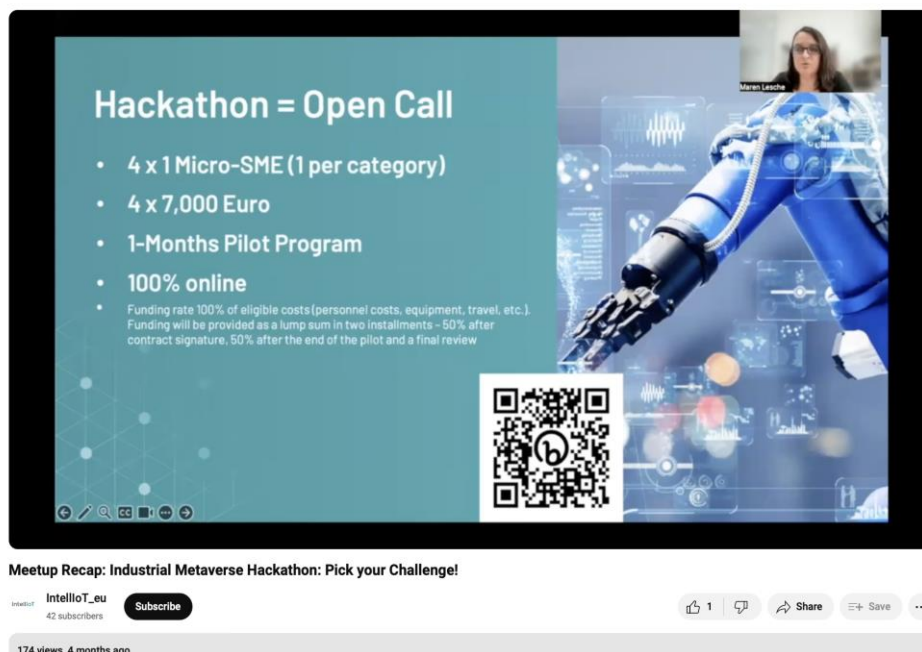


Figure 18: Screenshot of an online event

Beyond the promotion of the OC3 and the scouting of potential applicants, again a big part of the OC3 execution was the active applicant management. Specifically, already started, but not quite finalised applications on the Taikai platform were constantly monitored via an applicant pipeline to recognize patterns and identify potential gaps or issues. There was an active exchange between applicants, challenge owners, e.g., Hololight, and the OC3 coordinators from Startup Colors. In addition, the OC3 coordinators reactively answered all questions shared by potential applicants via Taikai, YouTube, LinkedIn as well as Email. During the last days the number of questions from applicants increased significantly. Especially questions related to eligibility increased since many SMEs are not familiar with the classification of SME by the EU Commission and needed guidance on the criteria of Micro-SME.

9 OPEN CALL 3: STATISTICS

On October 8th, 2023, the first phase of the application period ended. Overall, OC3 counted 37 registrations by representatives of SMEs that registered for the Open Call on [Taikai](#) and provided information during the application time frame. The original goal of 30 applications for OC2 was exceeded slightly. Out of these 37 total applications, 12 applications were fully eligible and the SMEs were fully committed to attend the hackathon. Altogether, 8 eligible proposals were eventually submitted on October 13, 2023, and evaluated by external experts. All challenge areas were represented. SMEs from 7 different countries participated in the final stage: Germany, Bulgaria, Malta, Armenia, Norway, France and Poland.

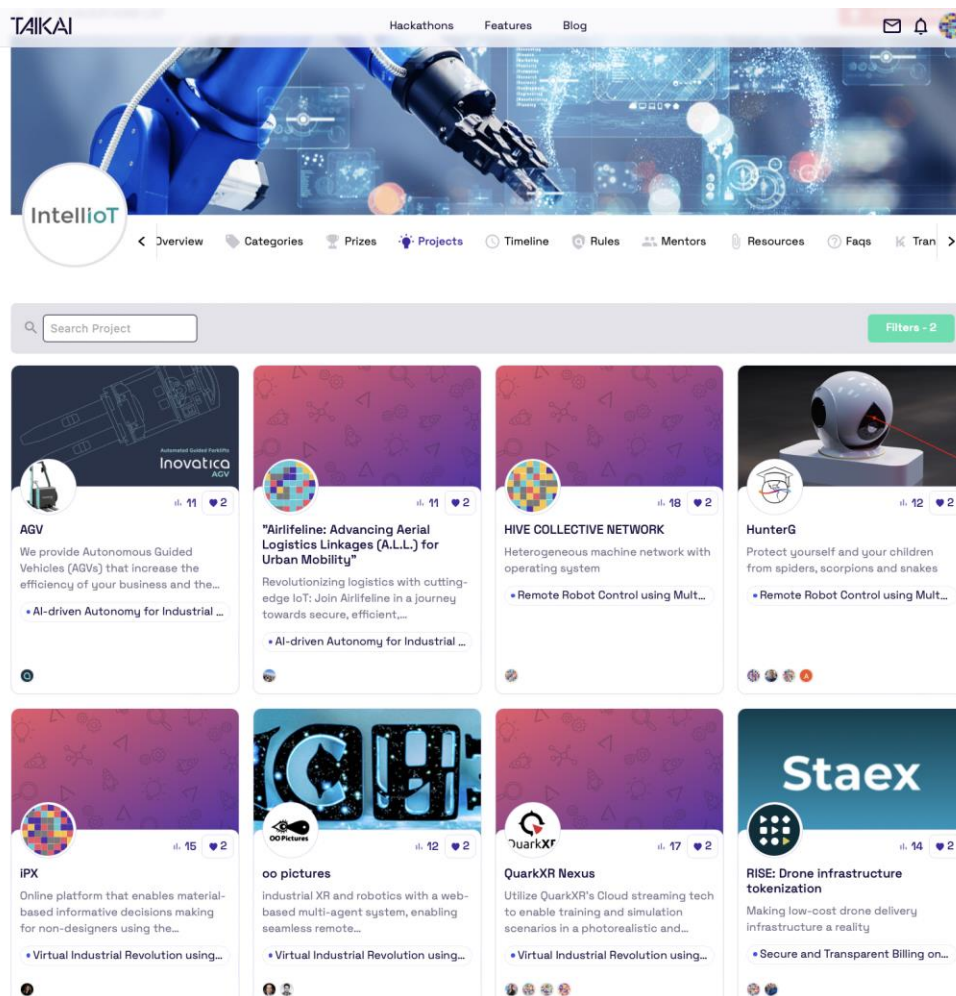


Figure 19: Overview of Open Call Shortlisted Micro-SME from [Taikai.network](#)

10 OPEN CALL 3: EVALUATION

The evaluation phase started in parallel to the launch of the Open Call and was intensified immediately after the deadline of OC3 on October 8, 2023. The evaluation phase had the following stages:

- Eligibility Check by the OC3 Coordinators of Startup Colors from August 8 until October 8, 2023
- During the Hackweek all SMEs had to contact IntelloT at least 3 times to ensure their engagement, October 10 until October 12, 2023
- External Evaluation by experts via Open Pitch on October 13, 2023
- Scoring by evaluators via Blockchain Solution of Taikai that immediately lead to a Ranking suitable for decision making in a consensus meeting on October 13, 2023
- Consensus meeting with evaluators and IntelloT decision makers on October 13, 2023
- Announcement of winners and rejection of remaining applicants on October 13, 2023

10.1 Open Call 3: Eligibility Check

The IntelloT Open Call #3 focussed on involving startups and SMEs, in particular **Micro-SME**, as per definition from the European Commission (https://ec.europa.eu/growth/smes/sme-definition_en). While checking the company's status, linked parties of the company are also taken into consideration. SME status was calculated in accordance with the rules defined in the EU recommendation 2003/361. Criteria which were used to define a Micro-SME are:

- Staff headcount in Full Time Equivalents (FTE) less than 10
- Annual turnover less or equal to €2 million OR annual balance sheet total less or equal to €2 million.

IntelloT partners and their related entities or entities in which IntelloT partners have shares or other interests were excluded from participating in the Open Call. Furthermore, the winning SMEs from IntelloT's OC1 or OC2 were also not eligible for OC3. Each proposal must have been submitted by a single applicant; consortia were not allowed.

Organizations must also have been legally incorporated in the European Union or in one of the Horizon 2020-associated countries to be eligible.

This process was done based on the information supplied by the applicants via the registration on Taikai and also via a special online research and PIC check. All provided information was validated by accessing databases such as transparency databases, business registries and the EU tender portal in case a PIC was provided. In case of doubt, the applicant was contacted to provide additional information. After having fully confirmed a breach of the eligibility criteria an applicant was disqualified.

10.2 Open Call 3: External Review by Experts

The final 8 eligible applications were evaluated by five external reviewers outside of the IntelloT consortium.

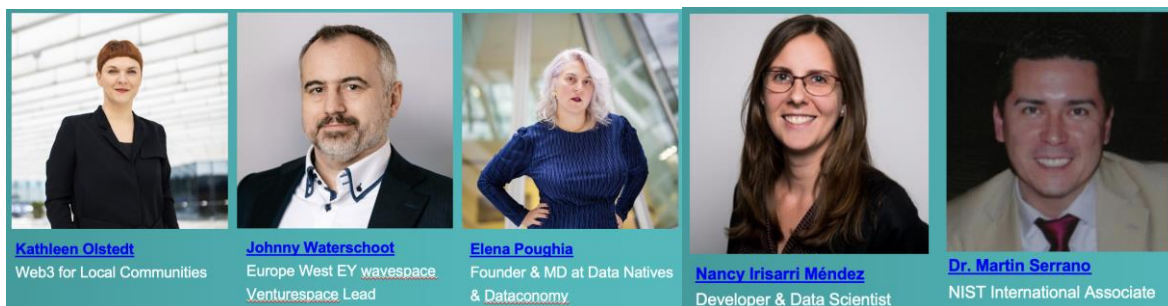


Figure 20: Overview of evaluators from OC3

Again, the external review was based on the concept that each application is scored by a minimum of two experts – in OC3 each application was scored by 5 evaluators in total. In order to brief the external evaluators adequately, an introductory webinar was held during the Hackweek on October 12, 2023. During the briefing session, the official OC3 evaluation criteria were explained and the evaluators were onboarded into the Taikai platform to allow them to access all material provided by applicants throughout the Hackweek. The overall goal of the onboarding session was to brief the external reviewers in the best possible way, in order to allow them to evaluate the applications in the most informed and qualified way.

During the Hackweek each evaluator signed a contract outlining the expectations and deadlines. It also included an NDA.

10.3 Open Call 3: Evaluation Criteria & Process

Applications were scored based on the following pre-defined and in the Guide for Applicants explained evaluation criteria:

- Problem-Solution-Fit based on the chosen challenge (desirability): Will the proposed solution solve the identified challenge?
- Level of Innovation / Technical Excellence: How innovative is the proposed technical solution? How applicable is the solution to the IntellioT framework? Which provided technologies & data sets have been applied? Assessment of soundness of concept, quality of objectives and innovative elements of the proposal.
- Feasibility of Idea & Implementation: To what extent has the application already been implemented within the HackWeek? What is the quality, functionality, and stability of the developed "hacks"? Has the team the technical ability to finalize the implementation of the solution within the HackMonth? Are there enough resources to finalize the solution within the HackMonth? What working packages are defined for the HackMonth / 1-month pilot.
- Impact and Business Approach: What is the long-term impact of the proposed challenge solution? (viability) Demonstrate impact through examples showing specific future exploitation potential. Contributions should showcase ways to create added value to an existing IoT solution and enable next-generation IoT technologies across Europe.

- **Team Set-up / Diversity:** What technical expertise does the team bring in? Assessment of the quality and relevant experience of the individual participants, quality of the team as a whole, including complementarity, balance and diversity.
- **Economic Fairness:** The provided budget of 7,000 euros should be adequate with the proposed work plan and should allow significant improvements of the first MVP during the HackWeek / 1-month pilot.
- **Presentation / Pitch:** Is the applicant able to present their achievements in an understandable and convincing way?

Each criterion was judged on a scale of 1 to 6 points which is aligned with the scale applied in OC1 and OC2.

1 (Fail):	2 (Poor):	3 (Fair):	4 (Good):	5 (Very Good):	6 (Excellent) :
<i>Proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.</i>	<i>The criterion is addressed in an inadequate manner, or there are serious inherent weaknesses</i>	<i>While the proposal broadly addresses the criterion, there are significant weaknesses</i>	<i>The proposal addresses the criterion well, although improvements would be necessary</i>	<i>The proposal addresses the criterion very well, although certain improvements are still possible</i>	<i>The proposal successfully addresses all relevant aspects of the criterion in question.</i>

Figure 21: Overview of Scale for IntelloT's OC2

This score was translated into blockchain tokens. Each evaluator had the same amount of token assigned prior to the scoring. The Taikai platform was also chosen since it represents the IntelloT approach of trustworthiness and transparency. All decisions by evaluators / jurors were transparently displayed in leadership boards and rankings. All scores were translated into token - so called KAIs - that also provide an additional prize for all participants. These tokens were linked to a special blockchain hash. All decisions - similar to blockchain transactions - can be tracked as shown in the following screenshot. Since this process also provided a special visibility for the evaluators all external experts have been made aware of this long-term aspect beforehand.

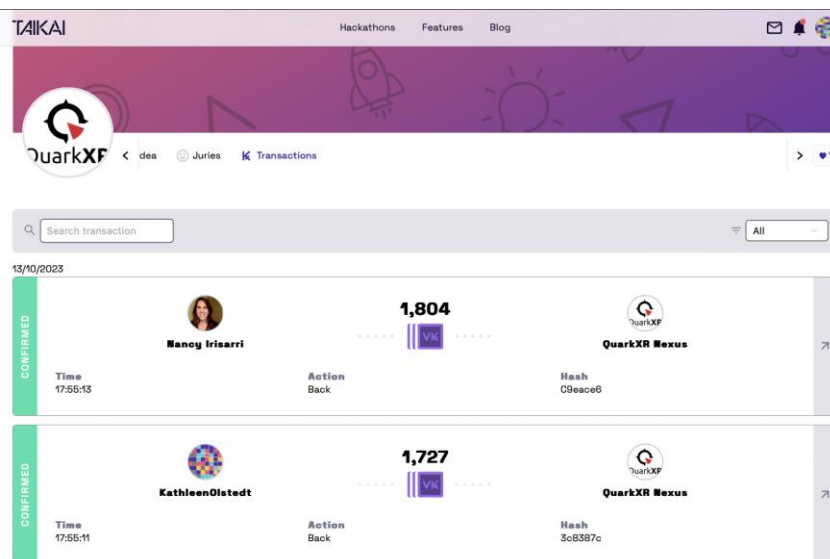


Figure 22: Overview of Scoring of OC3 on [Taikai Website](#), Example Team QuarkXR

During the consensus meeting each evaluator had some bonus token to adjust the score based on additional information provided during the consensus meeting. However, in OC3 all evaluators were aligned and supported the following ranking:

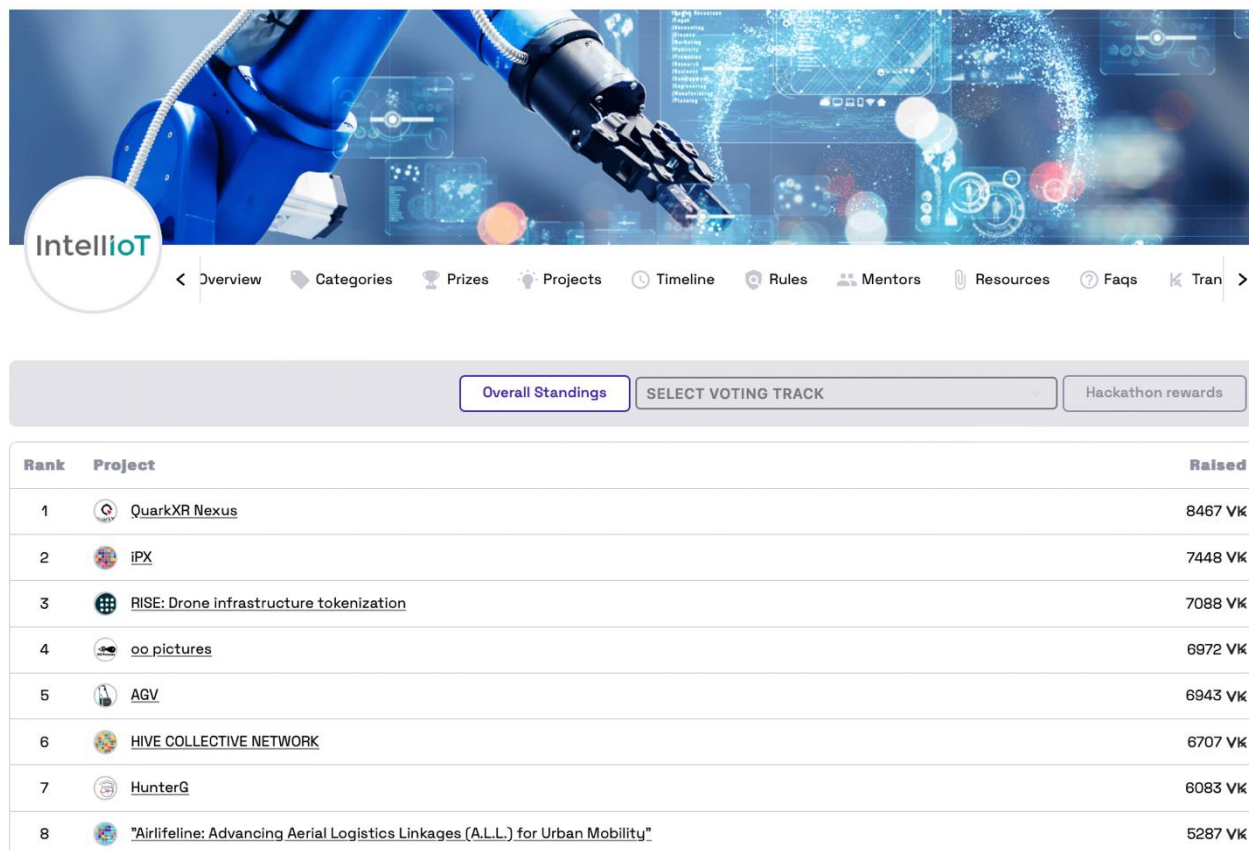


Figure 23: Overview of [final scores](#) for Shortlisted candidates for IntellioT's OC3 on Taikai Website

Per HackWeek challenge one Micro-SME with the highest score - altogether four Micro-SME in Open Call #3 - were selected and invited to join the HackMonth. In case there was no eligible applicant in one category, a 4th SME would have been selected besides the top SME per category based on the next highest score applying the overall ranking. However, this procedure did not have to be applied since all challenge areas were represented during the final pitch presentation.

10.4 Open Call 3: Consensus Meeting

A short consensus meeting with representatives of selected consortium members took place directly after the pitch and score on October 13, 2023.

During the consensus meeting, all consortium members had the chance to discuss and challenge the shortlist of top-ranked applicants. As stated in the Guide for Applicants, if substantial and objective reasons

that would speak against this proposal joining the IntelloT pilot projects could be identified, such as the misalignment with IntelloT's 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, reviewers had the chance to adjust the first initial score based on this new information.

However, in OC3 all involved parties agreed with the ranking based on the evaluator scores and consequently, the consortium partners confidently confirmed the four SMEs that received the highest score by the external experts. The winners were informed immediately as part of the public event and the final score overview was released and is still visible on the hackathon website on Taikai (<https://taikai.network/intelliot/hackathons/intelliot/result>)

11 OPEN CALL 3: WINNERS & APPLICANT COMMUNICATIONS

The four winning SMEs were offered to join the IntellioT consortium and received 3rd Party Financial Support of €7,000 as a lump-sum. The selected companies are:



	<p>QuarkXR (Bulgaria) is a deep tech company building out the XR (AR/VR) Cloud Platform for 5G and Edge Computing. We're developing the Cloud Streaming Platform that enables the next generation Immersive Computing on mobile devices. QuarkXR provides the Platform that bridges powerful Cloud computing with immersive (XR) devices on the edge. We utilize the GPU cloud to render XR applications and stream the output to mobile devices over 5G and other networks. QuarkXR removes friction, reduces price, and facilitates Mass Adoption of XR.</p>
	<p>Inovatica AGV (Poland) offers automated guided forklifts. It is an effective tool for the automation of logistics areas for small and large companies. It allows companies to safely increase the efficiency of the internal transport process, while guaranteeing the high level of safety.</p>
	<p>Staex (Germany) builds mobile-first VPN for industrial IoT. Within the framework of IntellioT project Staex developed a drone delivery payment solution on top of the blockchain. This project showcases the potential of VPNs in IoT-specific use cases and especially the fact that a VPN in IoT is not only network connectivity but also the applications that run on top. The payment solution is such an application.</p>
	<p>Nornir (Norway), a deep tech company active in IoT and AI. Their goal is to interconnect municipal services, promote data sharing among citizens while ensuring privacy, and create a seamlessly integrated urban environment. Success hinges on addressing challenges like data security and fostering collaboration with local governments and stakeholders.</p>

Figure 24: Overview of Open Call 3 Winners

In October 2023, the collaboration agreements were signed by all involved parties. The agreement ensured a successful start into the pilot programs that ended in M39.

The four selected Micro-SMEs were invited to join a 1-month pilot programme – so called HackMonth. The HackMonth took place in M38 in a virtual environment. During this 4-weeks pilot, experts from IntelloT will support the Micro-SMEs in developing the MVP from the HackWeek further, in applying additional data and open-source resources as well as existing IntelloT framework components provided by IntelloT partners. On December 11, 2023, the four SMEs will present their achievements in a final review session.

12 CONCLUSION / OUTLOOK

In total IntelloT executed **three Open Calls** targeting SMEs. At the beginning of the IntelloT project, only two Open Calls for SMEs were planned. However, due to the high number of Micro-SMEs that showed interested in Open Call #1 and #2 but did not meet the requirement and therefore were not selected, a third Open Call focusing on the future trend of Industrial Metaverse and specifically aiming for Micro-SMEs was proposed and eventually executed from M35 - M39 (August - December 2023). Four more SMEs could benefit from the IntelloT resources adding up to **14 SMEs in total** that integrated selected IntelloT components and provided important feedback on its applicability and exploitation potential. During its overall project duration **in total 304 SMEs** across Europe and its associated countries applied in the three Open Calls conducted within WP6.

IntelloT's OC2 & OC3 provided the desired outputs and exceeded the number of expected proposals. As proposed more than 860,000 Euro could be invested in the exploitation of the IntelloT framework. The framework learnings could be made accessible to 14 selected Open Call winners.

The IntelloT ecosystem could be extended via Open Calls sustainably. In close collaboration with the Coordination and Support Action (CSA) synergies between the ICT 56 RIAS could be generated, and the OC activities could be aligned the overall objectives of the goals of Next Generation IoT.