VEDLIoT

Very Efficient Deep Learning in IoT

ICT-56-2020 - Next Generation Internet of Things

Next-generation AIoT applications – VEDLIoT-Open Guide for applicants

Abstract

Project acronym: VEDLIoT

Project grant agreement number: 957197

Project full name: Very Efficient Deep Learning in IoT

Project VEDLIoT, co-funded from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No. 957197, foresees as an eligible activity the provision of financial support to third parties, as a means to achieve its own objectives.

For this Open Call, the types of activities to perform that qualify for receiving financial support are the next generation of AIoT applications in areas such as wearables, transportation, agriculture, homes, health, energy, and manufacturing.

Call identifier: VEDLIoT - Open

Call title: Next-generation AIoT applications – VEDLIoT-Open

Publication date: 01/03/2022

Deadline: 08/05/2022 at 23:59h CET.

Indicative budget for the call: 840.000 €

Expected duration of participation: 9 to 12 months

Indicative budget for each proposal: up to 120,000 € (including 25 % indirect costs, at a funding/reimbursement rate of 70 %)

Language in which proposal must be submitted: English

Official project site: https://vedliot.eu/use-cases/open-call/

For submissions: vedliot-open-submission@vedliot.eu

For support: vedliot-open-support@vedliot.eu

Tentative date for VEDLIoT-Open webinar: 25.03.2022 – 15:30 - 17:00

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1 Introduction

VEDLIoT is an EU H2020 ICT-56-2020 funded research project running for 36 months, driven by challenging use cases in key use case sectors like automotive, automation, and smart home. The VEDLIoT-Open call for cascaded funding is foreseen to explore new opportunities by extending the application of the VEDLIoT platform to a more extensive set of new and relevant use cases. It is expected that open call projects leverage VEDLIoT technologies for their own AI-related IoT use case, thereby broaden the VEDLIoT use-case basis and help making the overall concept more robust.

1.1 Objective

The ever increasing performance of computer systems in general and IoT systems, in particular, delivers the capability to solve increasingly challenging problems, pushing automation to improve the quality of our life. This triggers the need for a next-generation IoT architecture, satisfying the demand for key sectors like transportation (e.g. self-driving cars), industry (e.g. robotisation or predictive maintenance), and our homes (e.g. assisted living). Such applications require building systems of enormous complexity, so that traditional approaches start to fail. The amount of data collected and processed is huge, the computational power required is very high, and the algorithms are highly complex, making it difficult to compute the required solutions within the tight time constraints. In addition, security, privacy, or robustness for such systems becomes a critical challenge.

An enabler that aims at delivering the required keystone is VEDLIoT, a Very Efficient Deep Learning IoT platform. Instead of traditional algorithms, artificial intelligence (AI) and deep learning (DL) are used to handle the large complexity. Due to the distributed approach, VEDLIoT allows dividing the application into smaller and more efficient components and work together in large collaborative systems in the Internet of Things (IoT), enabling AI-based algorithms that are distributed over IoT devices from edge to cloud.

In terms of hardware, VEDLIoT offers a platform, the cognitive IoT platform, leveraging European technology, which can be easily configured to be placed at any level of the compute continuum starting from the sensor nodes and then edge to cloud. Driven by use cases in the key sectors of automotive, industrial, and smart home, the platform is supported by cross-cutting aspects satisfying security and robustness. Overall, VEDLIoT offers a framework for the next generation internet based on IoT devices required for collaboratively solving complex DL applications across a distributed system.
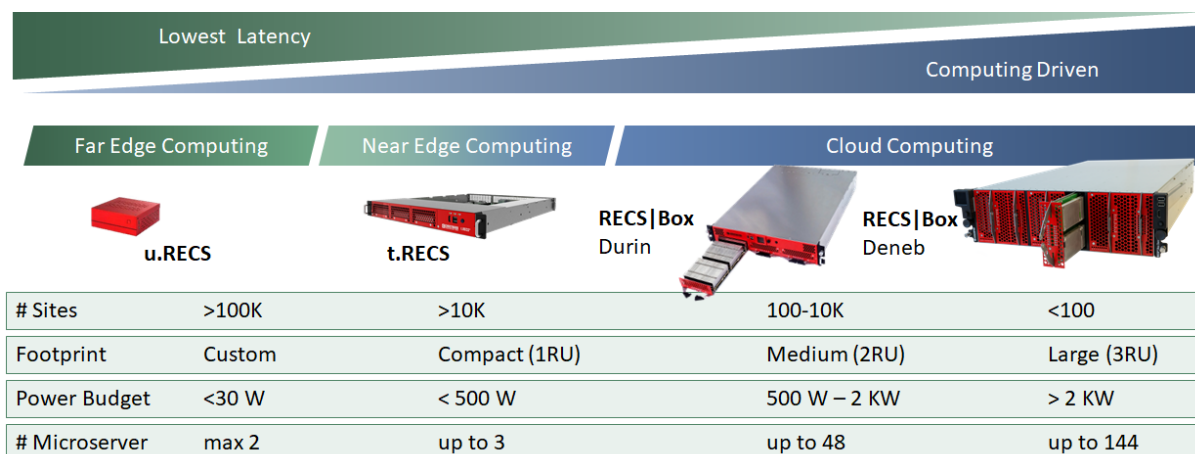
Twelve partners from four European countries – Germany, Poland, Portugal, and Sweden – as well as Switzerland, an EU association state, are working together on the project with Bielefeld University as Coordinator.
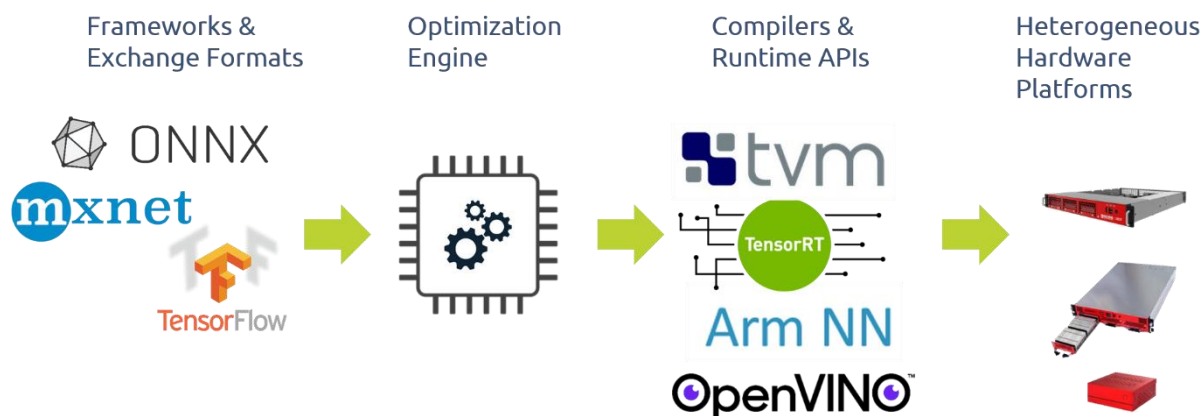
2 VEDLIoT platform and toolchain

VEDLIoT aims to provide a **modular, scalable hardware platform** for the next generation of AIoT devices (Artificial Intelligence of Things), covering the full spectrum from the cloud via near edge to far edge or embedded applications. Based on a modular approach, the platform provides a flexible and scalable architecture that supports the full spectrum of heterogeneous processing technology and supports regular CPU technology based on x86, ARM, RISC-V, and specialised accelerator ASICs.

	Far Edge Computing	Near Edge Computing	Cloud Computing	
	u.RECS	t.RECS	RECS|Box Durin	RECS|Box Deneb
# Sites	>100K	>10K	100-10K	<100
Footprint	Custom	Compact (1RU)	Medium (2RU)	Large (3RU)
Power Budget	<30 W	< 500 W	500 W – 2 KW	> 2 KW
# Microserver	max 2	up to 3	up to 48	up to 144

The **VEDLIoT toolchain** addresses the task of interfacing AI software to hardware in a comprehensive fashion leveraging and building on existing open-source components.

| Frameworks & Exchange Formats | Optimization Engine | Compilers & Runtime APIs | Heterogeneous Hardware Platforms |

Using VEDLIoT's **security mechanisms** like the Secure IoT Gateway, an easy to configure network security and VPN solution, and further CPUs built-in security features can significantly enhance applications' security trustworthiness and safety.

VEDLIoT is driven by challenging project use cases in the key automotive, industry, and smart home sectors. In addition, the projects selected in the open call will explore additional, new opportunities by extending the application of the VEDLIoT infrastructure - **VEDLIoT toolchain, security mechanisms** and the **cognitive IoT hardware platform** - to a larger set of relevant and new use cases.

Projects will be supported by technical VEDLIoT mentors, who will help to extend the application of the VEDLIoT platform to a more extensive set of new and relevant use cases.

3 Applicability and eligibility criteria

Applicants for VEDLIoT-Open can be **small consortiums** or **single participants** of any size or type (legal persons, e.g., Universities, Research Institutes, SMEs, startups, or bigger companies). The organisations shall bring use-cases that involve AIoT, Edge or related technologies, covering application areas such as wearables, transportation, agriculture, smart homes, health, energy and manufacturing.

Legal persons must have a registered office in one of the eligible countries. Financial support will be provided to legal entities with a permanent Participant Identification Code (can be a provisional one at the moment of proposal submission).

Eligible countries are:

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

Operational eligibility criteria for proposals will also be:

- Proposals must clarify how they will use the VEDLIoT hardware, toolchain and platform.

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[1] https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-a-countries-rules_en.pdf

Administrative (and other) criteria are as follows:

- Proposals must be written in English in all their parts in order to be eligible.
- The applicants must base their proposals on original work. Going forward, any foreseen developments should be free from third party rights, or they are clearly stated in a specific section (Previous IP background – see Section 7 of the Proposal Template).
- Applicants are not allowed to submit multiple applications. Only the first submitted application will be considered if that is the case. However, submitting refined versions of one application is permitted and encouraged.
- No entity with an economic interest, family or emotional ties or any other shared interest ('conflict of interest') towards VEDLIoT consortium partners will be accepted as candidates for funding.
- All cases of conflict of interest will be assessed case-by-case, based on pertinent EU stipulations.
- Incomplete proposals will not be evaluated.

More information can be found at the project website: https://vedliot.eu/

4 Funding

Applicants may consider an indicative budget of up to 120,000 € for their proposals. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. This budget includes 25 % indirect costs, at a funding/reimbursement rate of 70 %.

- Indicative budget for each proposal: up to 120,000 € (Total costs)
- Incl. 25% overhead / indirect costs for all direct costs except subcontracting
- 70% funding / reimbursement rate

In VEDLIoT-Open, eligible costs are personal expenses (staff, travel) and other direct costs (e.g. consumables, hardware costs) needed to implement the project proposal. Subcontracting can be foreseen as well. However, overhead does not apply to subcontracting. If possible, a brief explanation of the costs (e.g. payment group of staff, estimated costs for hardware and travel, etc.) should be given. Durable equipment is not foreseen to be included in the funding.

Selected parties will be funded 70% of their total cost (direct and indirect costs). They may receive a pre-financing of up to 40% of their respective total funding amount. Final payment will be made at the end of the project after successfully completing the activity and delivering the final report. A proposal may define additional payments during the project by including payment milestones coupled with additional deliverables.

The selected projects will be supported by one of the partners of the VEDLIoT consortium. The call and the selection of the third parties to be funded will follow the same principles which govern the Commission calls as described in the "Good practices and templates for organising open calls under the H2020 Financial Support to Third Parties scheme", namely:

- **Excellence.** The proposal(s) selected for funding must demonstrate a high quality in the context of the topics and criteria set out in the call;
- **Transparency.** Funding decisions must be based on clearly described rules and procedures, and all applicants should receive adequate feedback on the outcome of the evaluation of their proposals;

- **Fairness and impartiality.** All proposals submitted to a call are treated equally. They are evaluated impartially on their merits, irrespective of their origin or the identity of the applicants.
- **Confidentiality.** All proposals and related data, knowledge and documents are treated in confidence;
- **Efficiency and speed.** Evaluation of proposals and award of the financial support should be as rapid as possible, commensurate with maintaining the quality of the evaluation, and respecting the legal framework.

5 Proposal preparation and submission

5.1 Proposal template and instructions

Applicants must prepare a written proposal with a maximum of **up to 15 evaluable pages** (cover and last pages excluded) following the template available. Evaluators will be instructed to disregard any excess pages above the 15-page limit. The page limit should not be considered as an indicator for a minimum page count. Please keep the proposal concise and short, e.g., submitting a complete proposal with just 10 pages is totally ok. The minimum allowed font size is 10, and the font to be used is Arial. The format provided in the template must be respected, including same page margins (25 mm for left/right/top, 20 mm for bottom). A MS Word template is provided. Other software (Libre Office, Latex, etc.) may be used as well, as long as the template is respected. The final proposal shall be submitted in PDF format.

Proposals shall be submitted to vedliot-open-submission@vedliot.eu, you will receive an automatic mail indicating your proposal has been received. If you want to submit a refined version of the proposal, simply respond to this mail to submit the updated proposal. For any questions during proposal preparation, please use vedliot-open-support@vedliot.eu.

The content should cover (at least, but not limited to) the following information:

1. **Administrative information** (not included in page limit)
   o Details for each partner of the proposed consortium
   o Abstract of the project

2. **Idea**
   o Main idea of the proposed project and how it is related to the VEDLIoT hardware, platform, framework or use cases.
   o Innovation and excellence (how the project goes beyond already existing solutions and the state of the art)
   o The technology underlying the project and how it will work interacting with VEDLIoT.
   o Observable and tangible results (i.e. application, GUI, software, hardware, protocol, methodology).
   o Brief description of impact and sustainability, how the results are used after the project (i.e., products, services, further research, contribution to open-source projects).
   o Background of the solution (where it comes from, hardware/software/frameworks it builds atop, etc.).

3. **Relevance to VEDLIoT**

- o Describe which VEDLIoT technologies (e.g., hardware, accelerators, toolchains) are planned to be used and integrated by the proposed project.
- o Describe if and how the application will extend or enhance the VEDLIoT toolchain and cognitive IoT hardware platform
- o Describe if and how the solution will contribute to a larger set of relevant use cases.

4. **Impact and sustainability**
   - o Describe the expected short-term impact of the proposed project (i.e. during runtime of the VEDLIoT project).
   - o Describe the planned exploitation of the proposed project during and after the project runtime (i.e., products, services, further research, contribution to open-source projects).
   - o Describe the mid- and long-term indicators that could be monitored to measure the impact of your proposed project. Attempt to quantify such estimated impact.
   - o List dissemination activities that you foresee (e.g. scientific publications, attendance at conferences or exhibitions)?

5. **Implementation**
   - o Gantt chart of the project
   - o Detailed explanation of the work plan (divided into tasks)
   - o Describe the necessary means to realise the idea (data, equipment, connectivity, access to infrastructure, systems, etc.).
   - o Describe the intended/required support from VEDLIoT (e.g., hardware, accelerator, toolchains, mentoring).
   - o Indicate milestones and deliverables. The proposed project should produce at least one deliverable at the end of the project (Final project report). You can add additional milestones and deliverables as required by the proposed project. If you plan to request an interim payment (i.e. after project half-time), please indicate a payment milestone coupled with a deliverable.

6. **Team**
   - o List the relevant members of your team, their relevant skills and experience.
   - o Indicate the structure of the team and the roles and responsibilities that each member will be taking.
   - o Experience of the organisations (relevant previous projects, services, contracts, etc.).

7. **Other relevant aspects**
   - o Mention any existing IPR background.
   - o In case you apply as multiple partners, briefly mention the planned consortium agreement.
   - o Which (if any) data do you intend to gather or produce? How much of this will be openly available?
   - o Do you rely on personal data? If so, how will you store and process this data? All Open Call projects will be expected to comply with the General Data Protection Regulation 2016/679 (GDPR).

8. **Project budget** (not included in page limit)
   o Costs for implementation of the project
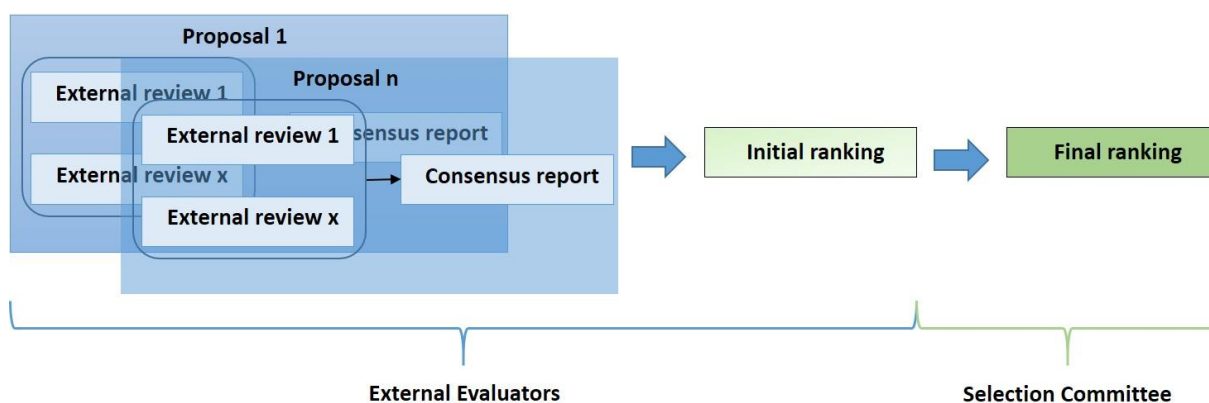   o Brief explanations regarding the different items

5.2 Evaluation process

The focus of the open call (OC) in VEDLIoT is the involvement of additional use cases in the project utilising the developed technologies, i.e., the VEDLIoT toolchain and the cognitive IoT hardware platform. Typical open call projects will leverage VEDLIoT technologies for their own AI-related IoT use case, thereby broaden the VEDLIoT use-case basis and making the overall concept more robust.

A thorough sequential filtering process is implemented to select the VEDLIoT-Open proposals, as illustrated below, ensuring that all proposals will be fairly and transparently evaluated and the call is open and competitive. It will be aligned with all formal H2020 requirements and be published (amongst others) on the H2020 Participant Portal.

The evaluation of the VEDLIoT proposals will be done by independent external experts. Two external experts from academia and industry will evaluate each submission, a third evaluator will be added in case of an unbiased outcome. The external experts appointed are independent of the organisations involved in the consortium and from any proposer.

The evaluation process will be composed of four main steps: (1) Eligibility check, (2) External Evaluation, (3) Consensus Meeting and Report, and (4) Selection Committee (SC), which is composed from the VEDLIoT Steering Committee. The final decision on the proposal to be funded will be taken by the SC, based on the result of the evaluation process.

5.3 Scoring procedure

5.3.1 Evaluation criteria

Eligible listed proposals will be evaluated by two independent and confidential evaluators on the following criteria and according to the **fitting accuracy to the VEDLIoT topics.**

Excellence:

- Adequacy and progress concerning state of the art in AI in the topic area chosen by the proposal.

- **Ambition:** The applicants have to demonstrate to what extent the proposed approach is beyond the State of the Art and describe the innovative ideas behind it.
- **Technical Approach:** The applicants should provide information about the level of innovation within their domain and about the degree of differentiation that this component will bring.

Impact:

- Expected impact of the solution during VEDLIoT project.
- The foreseen degree in which goals stated in the addressed AI challenge will be achieved.
- **Direct Impacts** (short term impacts for your organisation/consortium).
- **Indirect Impacts** (longer-term economic, social and/or environmental impacts).

Implementation:

- **Resources:** The adequacy between objectives and allocated resources (including equipment) is taken into account as well as the overall organisation of the work.
- **Team:** What is the team members expertise and motivation?

Ranking rules:

The project activities and impact will be scored by the evaluators. Each evaluator will rank the application assigning a **score from 0 to 5 for each criterion** and produce an Individual Evaluation Report. These two reports will be combined to the Consensus Report. The final score will be calculated as the average of the individual assessments provided by the evaluators. Then the applications will be finally ranked according to their overall score.

The **threshold for individual criteria will be 3**. The overall threshold, applying to the sum of the three individual scores, will be 10. All proposals above the threshold will be passed to the consensus meeting.

6 Joining the Consortium

The selected applicants will sign a combined grant and collaboration agreement with VEDLIoT's coordinator (Bielefeld University), defining all the necessary aspects of the project and its collaboration with VEDLIoT. The targeted date for grant signature is the first week of July 2022. Projects shall target June 2023 as the latest date for completion of the proposed project. After completion of the project, in addition to the final report, a final project presentation needs to be given to the VEDLIoT project.

7 FAQs

7.1 What is VEDLIoT?

VEDLIoT is an EU H2020 ICT-56-2020 funded research project running for 36 months, driven by challenging use cases in key sectors like automotive, automation, and smart home. This open call for cascaded funding is foreseen to explore new opportunities by extending the application of the VEDLIoT platform to a more extensive set of new and relevant use cases. It is expected that open call projects leverage VEDLIoT technologies for their own AI-related IoT use case, thereby broaden the VEDLIoT use-case basis and help making the overall concept more robust.

7.2 How can I apply to VEDLIoT-Open: Next-generation AIoT applications?

This call has been launched on 1st of March 2022, deadline for proposals is the 8th of May 2022 at 23:59 (CET). Applications shall be submitted via e-mail to vedliot-open-submission@vedliot.eu.

7.3 Who can apply?

Applicants for VEDLIoT-Open can be **small consortiums** or **single participants** of any size or type (legal persons, e.g., Universities, Research Institutes, SMEs, startups, or bigger companies). The organisations shall bring use-cases that involve AIoT, Edge or related technologies, covering application areas such as wearables, transportation, agriculture, smart homes, health, energy and manufacturing.

Legal persons must have a registered office in one of the eligible countries. Financial support will be provided to legal entities with a permanent Participant Identification Code (can be a provisional one at the moment of proposal submission). Eligible countries are the Member States of the European Union and associated Countries according to the H2020 rules.

7.4 How many applications can I submit?

Applicants are not allowed to submit multiple applications. If that is the case, only the first submitted application will be considered. However, submitting refined versions of one application is permitted and encouraged.

7.5 In which language must the proposals be written?

Proposals shall be written in English in all their parts in order to be eligible.

7.6 Which application domains should be addressed?

- Machine learning
- Artificial Intelligence of Things
- Hardware acceleration
- Heterogeneous computing
- Near and far edge computing
- Reconfigurable computing and run-time reconfiguration
- Energy and Resource-efficient system architectures
- Security and Privacy for IoT and Edge computing
- Federated learning

7.7 What is the budget for selected applicants?

Indicative budet for proposals is up to 120,000 € (including 25 % indirect costs, at a funding/reimbursement rate of 70 %) . E.g., if your eligible direct costs are 88,000 €, the

associated indirect costs are 22,000 €, resulting in a total project cost of 110,000 €. From this, you will receive 77,000 € as a contribution from VEDLIoT-Open.

7.8   Which costs are eligible?

In VEDLIoT-Open, eligible costs are personal expenses (staff, travel) and other direct costs (e.g. consumables, hardware costs) needed to implement the project proposal. Subcontracting can be foreseen as well. However, overhead does not apply to subcontracting. Durable equipment is not foreseen to be included in the funding.

7.9   What is the expected project duration?

The run-time of your project should be in the range of 9 to 12 months. Please plan for your project to finish in June 2023 to be aligned with the overall VEDLIoT project schedule.

7.10 How is IP shared or developed during collaboration?

Participants retain full and exclusive ownership of their prior information and intellectual property rights. Ownership of any IP developed during collaboration is shared between the participating parties.

7.11 Is there technical support for using the VEDLIoT platform?

Selected projects will be supported by technical VEDLIoT mentors, who will help to extend the application ofuse the VEDLIoT platform to awith more extensive set of new and relevant use cases.

7.12 Are there any formatting rules for the proposal?

Please submit your proposal as PDF to vedliot-open-submission@vedliot.eu, please respect a reasonable file sizre (< 10 MByte). The minimum allowed font size is 10, and the font to be used is Arial. The format provided in the template shall be respected, including the page margins (25 mm for left/right/top, 20 mm for bottom). Please keep your proposal concise and short, e.g., submitting a complete proposal with just 10 pages (or less) is totally ok, 15 pages (counting content pages only) is the upper limit.

8   VEDLIoT-Open ethics guidelines and GDPR

The VEDLIoT project is to comply with the ethical standards in its operation. The project's ethics manual guides the actions to accommodate participants and sets the requirements. The ethical issues are vital to be followed by all the participants in the project throughout its whole lifecycle– before, during, but also after the Open Call period in relation to knowledge exchange and impact activities (such as reporting and publication). A set of core ethical principles is listed below, providing general guidance that the successful applicants will need to follow:

1. The European GDPR law is a source for general personal data protection principles. The principles set in GDPR law should be respected by design and by default.
2. Integrity and transparency are characteristics that should be present in each aspect of the project.
3. The definition of responsibility and accountability should be set in clear lines.
4. The independence of projects should be maintained. Where conflicts of interest cannot be avoided, they should be made explicit.
5. Individuals and groups' rights and dignity must always be respected in each project aspect.
6. Data subjects' rights exercise to be informed, to object, to be forgotten, and to withdraw consent should be ensured.

7. Personal data processing should be conducted in a legally way.
8. Decisions that are made solely upon automated processing of data should be avoided.
9. Processing of data that may profile data subjects should be excluded.

8.1 Privacy policy

All data collected and/or processed within the VEDLIoT project will need to comply with the GDPR regulation. In this respect, the VEDLIoT Open Call will involve:

1. Collection of personal and non-personal data from the open call applicant.
2. Collection and processing of site-related data.

8.2 Collection of personal & non-personal data from the open call applicant

By inviting participants to submit an Open Call project proposal, VEDLIoT Consortium will collect the participant's personal data submitted by them and process following applicable law and data protection with particular regard to the General Data Protection Regulation 2016/679 of the European Parliament and of the Council of the 27th of April 2016 (infra "GDPR"). The principles of fairness, lawfulness, transparency, and integrity will be fundamental in processing participants' personal data, privacy, and rights.

8.3 Nature of data collected

As part of the template, a registration form has been created for participation in the open call. The participants are to submit their details by using this form. Through this submission, VEDLIoT collects personal data: family name, first name, country of residence/registration, personal e-mail address, phone number and the relevant registration number allocated to your application.

8.4 The purpose and modalities of the processing for which the data are intended

Your personal information, referring to you as a natural person, or related to the company that you represent, is collected to check the eligibility for funding of the applicants and for the purpose of the obligatory reporting by VEDLIoT to the European Commission. Your personal data may be processed both by digital and non-digital means, with full respect to the security measures provided by the GDPR.

Additionally, during the project period, the selected applicants can be asked to participate in interviews or to contribute to communication material related to their projects. Such material, including personal data, may be published on VEDLIoT social media channels and on the VEDLIoT website or communicated through relevant press releases.

Finally, the applied personal data may be used to contact the open call participants after the end of the project, inform them of similar initiatives, and invite you to participate in novel activities. For these purposes, communication via e-mail is probable to take place. We take the security of your personal data seriously, and we have followed a privacy-by-design architecture in order to ensure that your data is secure at all times.

8.5 The obligatory or voluntary nature of providing the requested data and the consequences of a potential refusal of providing such data

Providing your personal data for the purpose of registration and submission of your project proposal is not compulsory. Yet, the refusal to provide such data will preclude you from participating, as it will render you ineligible to receive the grant.

Providing your data for the promotional and marketing purposes described above is optional. In the absence of such consent, you can still participate in the project, however, the VEDLIoT Consortium cannot send you any further information about similar activities after the conclusion of the project. Your consent, once provided, can be revoked at any time for all the contact modalities (whether traditional, such as paper-based mail, or automated, such as SMS or e-mail), as well as only for one or some of them, by submitting a communication to the Data Controller, without any formality, at the following e-mail address: vedliot-open-support@vedliot.eu

8.6 Entities to whom data may be communicated

VEDLIoT is to anonymise any personal and identifying data in the initial phase. The remaining data from the open call application will be shared with the open call reviewers, who will sign a Declaration of Absence of Conflict of Interest prior to the revision. Your proposal will also be shared with the Project Steering Board made of selected members of the VEDLIoT project. Any organisation involved in the revision of the open call application will be considered as Data Processors. For the purposes of the competition, if you are selected for the grant, your company name will be published on the VEDLIoT website together with the name of the project and funding amount (in compliance with EC guidelines for Cascading funding).

8.7 Your rights of access to, and rectification, of your data

We remind that, in your capacity of a natural person, you can exercise your rights against the VEDLIoT Consortium at any time, in accordance with the relevant provisions of the GDPR, by sending an e-mail without formality to vedliot-open-support@vedliot.eu. It is crucial to underline that the open call participants will be the ultimate responsible for obliging and complying with the GDPR rules.

For this reason, we recommend the following:

- Applicants should make sure that decision-makers and key people in their organisation are aware that the law changed to the GDPR in May 2018, and they need to understand the impact this is likely to have.
- Applicants should review the current privacy notices and put a plan in place for making any necessary changes in time for GDPR implementation.
- Applicants should proceed to review the procedures to guarantee they cover all the rights individuals have, including how you would delete personal data or provide data electronically and in a commonly used format.
- The applicants should be aware that they have to follow and have in place the necessary procedures for the detection, reporting, and investigation of any personal data breach.