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Bolzano, 06.09.2023

### **Preliminary market consultation and contextual request for quote**

Dear supplier,

**NOI SpA** intends to initiate a preliminary market consultation pursuant to art. 20 of LP no. 16/2015 and art. 40 of Directive 2014/24/EC for the further consolidation and development of the AI-as-a-Service components of the Open Data Hub. More information and specifications are described in more detail in the Annex.

**NOI SpA** invites all interested economic operators to participate by filling in an expression of interest, **also in the form of a quote**, in relation to the products and requirements described in the Annex.

This preliminary market consultation is organized in the scope of the following EU project:

**Project name:** IMPACT – Impacting Innovation Through Specialization

**Project code:** EFRE1048

**Project CUP:** J57H23000640009

### **DEADLINE FOR THE DELIVERY OF THE QUOTE (22.09.2023):**

**The quote is to be sent exclusively by e-mail to r.cavaliere@noi.bz.it**

Best regards  
Roberto Cavaliere

## **ANNEX: Details of the preliminary market consultation**

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### **1. Open Data Hub**

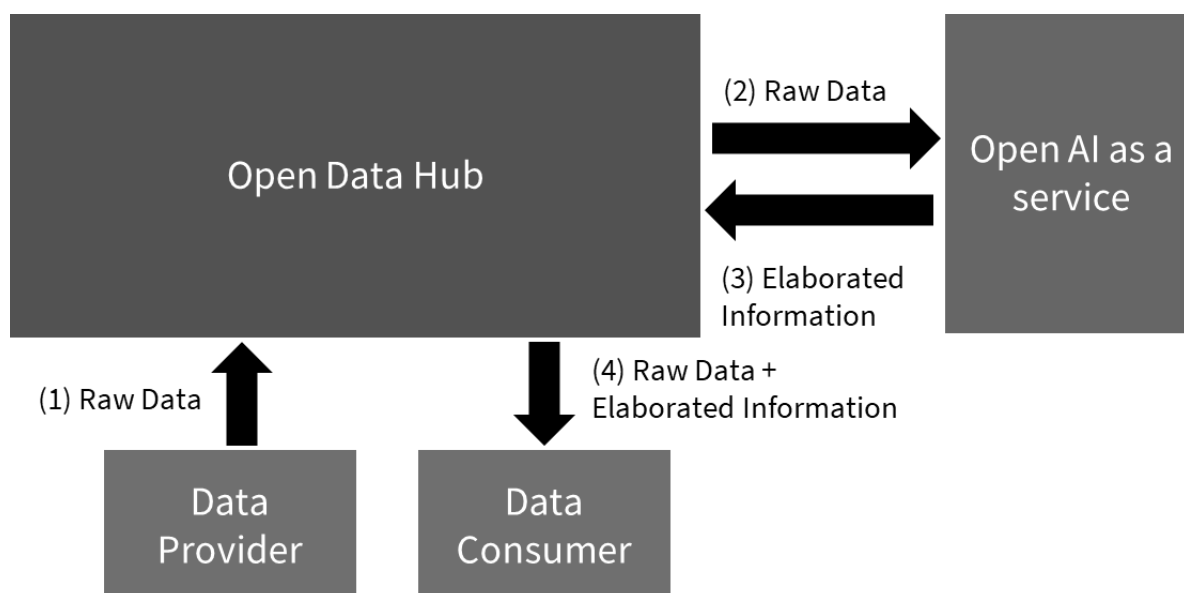
The Open Data Hub is an open-source platform developed by NOI in cooperation with a large number of local public and private stakeholder, which aims to open up and make available machine-readable data related to different sectors. The goal is to promote data-related research and development activities, so that the full potential associated to the usage of this data can be exploited and innovative products and services can be created and put on the market. For a comprehensive and up-to-date overview of the Open Data Hub, its community and the datasets available so far please refer to the official project web site: <https://opendatahub.com/>

### **2. AI-as-a-service components**

The Open Data Hub was originally meant to let raw data provided by Data Providers be available “as is” for other Data Consumers. The empirical experience seen in the last years is that in some cases the immediate usage of raw data is not so easy, and a remarkable effort is necessary on the Data Consumer side to extract from this raw data useful elaborated information to be used for their purposes.

For this reason, a new type of added value has been recently introduced: the possibility for Data Consumers to access together to raw data also elaborated information, that could be more interesting and ready-to-use in highly innovative digital

products and services. This elaborated information is computed automatically by AI-as-a-Service components, which read the raw data from the Open Data Hub API, compute their elaborations, and provide enriched information via API again to the Open Data Hub. The following draw explains this workflow



A first set of such AI-as-a-Service components has been already implemented, in particular in the mobility domain. The source code of such components is freely available in the following repository: <https://github.com/noi-techpark/bdp-elaborations>

One of the most remarkable components developed is the one that computes the emissions generated by vehicular traffic, taking as input the traffic measurements associated to the traffic stations. The reference repository and a detailed explanation on how this component has been implemented is available at the link <https://github.com/noi-techpark/bdp-elaborations/tree/main/pollution>

### 3. Specification of the requested set of activities

The present market consultation aims to explore the market in order to find a suitable partner for the further development of such AI-as-a-service components. In particular, following developments are foreseen.

#### 3.1 FURTHER IMPROVEMENT OF THE AUTOMATIC “EMISSIONS” CALCULATOR

The request is to further improve the prototype that was already implemented. In particular, the main enhancement is related to a “smarter” management of the traffic stations on top of which the calculation of the emissions should be applied. At present all this is managed through a white / black list, that is manually updated. The possibility to be explored is to automatically update this list on top of the “data quality state” of the data provided by the different traffic station. The exact logic should be designed together with NOI by taking in consideration all available possibilities.

### 3.2 DEVELOPMENT OF ROAD WEATHER ALARMS

The Open Data Hub also makes available some (on-demand) data related to the road conditions (Data Type: “RWISstation”), e.g. road temperature, and other useful parameters. The idea is on top of this raw data to compute an estimation of the safety risk index, which is something that could be e.g. communicated to end-users applications. In that regard NOI has contributed in the past, in the scope of a EU R&D project called “CLEAN-ROADS” (<https://clean-roads.eu>), to the definition of automatic alarms logics to be applied on such raw data. Such details can be requested to NOI for better understanding possible starting algorithms logics from which to start for such computation. Together with the real-time status the idea is to have also a short-term forecast, based on the temporal trends of the variables considered.

### 3.3 TRAFFIC ASSIGNMENT AND FURTHER ENVIRONMENTAL ELABORATIONS

Linked to activity 3.1, the idea is also to move from a single computation of emissions related to a single traffic measurement point, towards a “spatial distribution”. In order to get that, there is the necessity first to assign traffic measurements to a graph, i.e. to links connecting different nodes. Once the traffic data is assigned to links, emissions can be computed on top of these links. By finally combining emissions data with weather data, it could be then possible to compute real-time dispersion maps in the area just near the emission source, i.e. the road network. As starting point, this elaboration should be first applied to the A22 highway, in which the network topology is much simpler.

## 4. Deadlines

The activities requested have to be carried out according to the following time plan:

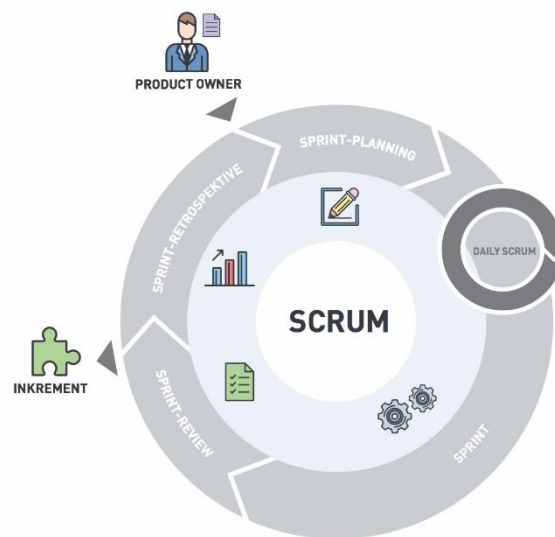
- **Further improvement of the automatic emissions calculator + development of road weather alarms:** by end 2023
- **Traffic assignment and further environmental elaborations:** by end of June 2024

## 5. Technical constraints

In this section the constraints that the service provider must follow to work with NOI on this project are listed and described.

### 5.1 WORK METHODOLOGY

The development of the activities covered by this market survey will follow the agile method (scrum). Two weeks sprint sessions are scheduled, unless otherwise agreed during the kick-off meeting with the core team of NOI S.p.A.



The software development will take place in three phases/environments:

- **development environment:** this environment is on supplier's infrastructure and is used during the development of the software components.
- **testing environment:** on infrastructure made available from NOI Techpark. This environment is used to test the new working versions of the software components. For the publication of the new versions a Continuous Integration (Jenkins) pipeline will be developed by the NOI team. For this reason, the new versions of the code will have to be "committed" to a dedicated Git Repository according to the instructions provided by the team of the NOI Techpark.
- **production environment:** on infrastructure made available from NOI Techpark. After the testing phase, as soon as the software produced is considered sufficiently stable, the software will be integrated into the production environment. Also, this process is managed automatically with Continuous Integration pipelines.

To coordinate the project NOI S.p.A. will use a Kanban Board in Github. Each functionality or issue will be described by NOI S.p.A. in Github and put on the Kanban Board. The Kanban Board will have the following columns:

- **Backlog:** contains all issues that are on hold and have to be discussed during the next sprint meeting with the supplier;
- **ToDo:** contains all issues that have to be concluded in the actual sprint;
- **In Progress:** contains all issues where the is working on;
- **To Review:** contains all issues where NOI Techpark has to make some reviews and that has to be reviewed during the sprint meeting.

All issues in the Kanban, but the one in Backlog, have to be assigned to the user that has to make the next step (e.g. the issues in ToDo will be assigned to the developer who has to develop the functionality, the issue in ToReview will be assigned to the tester, etc.). The supplier will have access to the project Kanban board and will have to check it regularly.

In order to allow the NOI S.p.A. team to properly review and test the code, for each issue in the ToDo lane the service provider has to send a pull request to the development Branch of the repository at least 5 working days before the sprint meeting.

In order to allow a better integration with the systems already in use by NOI Techpak it is required to implement all software components, where possible, using the technologies that are already in use by the Open Data Hub project. This technologies are described in the technical documentation, available at the following link:

<https://docs.opendatahub.com>

## 5.2 REPOSITORY GIT

The source code has to be uploaded to the Git repositories provided by NOI Techpark. During the upload the service provider has to take particular attention to the following aspects:

- do not commit usernames or passwords. NOI Techpark uses Github Actions to build the code which implements password ingestion based on special keywords in the source code;
- well document the code describing at least:
  - the general architecture of the system;
  - the list of the licences of all the libraries used;
  - the installation process;
  - all other useful information for people who want to fork or install and use the project.

As Open Data Hub we created some boilerplate repositories for the most common project type (es. Java project, Web Component, .Net Core project, etc.). In case you are starting a new project from scratch, before starting your project please look for the boilerplate that best fits your project and use it to initialize your repository. The repository of the Open Data Hub on github is:

<https://github.com/noi-techpark>

### 5.2.1 Documentation

While you are documenting your code, please consider that the official language of the Open Data Hub is English. So, the entire documentation, including the comments in the code, has to be in English. Moreover, you must observe the following guidelines:

- use the right boilerplate of the README.md if exists;
- use only markdown or text (no binaries, no PDF, etc.);
- should be so detailed that a third person, without any connection to the developers can setup the project, run it and develop it further;
- Java Doc and similar tools for other languages should be as complete as possible;
- add the author tags incl. emails;
- README.md should be a good description of the project and should also have a usage instruction (boilerplate does not consider that). Mainly because tools like **\*\*npm\*\*** use it as homepage for each project

In general, the documentation of the project (e.g., readme file, license file, etc.) should be done in order to allow third parties developers, who don't know anything about the project, to understand the whole project and replicate, install or modify it without the need to get in contact with NOI S.p.A. Therefore, the documentation (README.md) should include also:

- a short description that allows the user to understand the overall goal and functionalities of the project;
- longer and detailed description that includes also:
  - description of the different parts of the repository/application;

- description of different parts of the project (also other repositories, if existing, and a link to them) and how this application is part of the overall project;
- external services/code/framework/software that are used including their licence and copyright information;
- detailed development setup instructions (including testing);
- detailed deployment setup instructions.

### **5.2.2 Licensing and Reuse compliance**

In respect to the licensing and copyright information, the service provider must follow the guidelines defined by the Reuse project:

<https://reuse.software>

The service provider must provide code where the Reuse linter passes without errors and the licenses must be all compatible with each other.

### **5.2.3 Pull request (PR)**

As mentioned in the previous paragraphs the service provider, before each sprint meeting, will deliver the source code by making a Pull Request to the Development Branch of the repository Git provided by NOI S.p.A. at the beginning of the project. In general the service provider has to observe the following guidelines to make the pull requests:

- at the beginning of each sprint the service provider will open a Pull Request (PR) with a prefix [WIP];
- during the sprint the service provider has to regularly push the commits to that PR in order to allow NOI S.p.A. to monitor the status of the project (additional information are available under: <https://opendatahub.readthedocs.io/en/latest/contributors.html>);
- at the end of the sprint (at least 5 days before the sprint meeting) the service provider will close and send the Pull Request.

NOI S.p.A. will analyze the Pull Request before the meeting and eventually send feedback to the service provider. The minimal requirements for a Pull Request to get accepted are:

- the documentation must exist and be as complete as possible in respect to the status of the project;
- commits must not contain credentials or any other sensible data;
- contributions (e.g. documentation, comments, etc.) must be in English;
- merge conflicts must be resolved by the contributor;
- all Continuous Integration verifications must pass;
- Pull Request branches should possibly have a linear history, that is, they should not contain merge commits

During the development cycles the pull request comments and in general the issues and the dedicated Kanban board on Github (original repository) must be tracked by the service provider. The discussion about issues, pull requests, and other specific comments on the code development will be managed on GitHub in the project repository and NOT through email. That also involves moving user stories to the corresponding column in the Kanban and assigning them to the right user.

### **5.2.4 Commits**

These paragraphs contain some guidelines that the service provider should follow while implementing the project:

- commits should contain a single thing/feature, not be too big and specially they should not be a combination of unrelated features or bug-fixes;
- each commit must be described: present tense and active (e.g. "Add logging to commons" not "commons will get logging now" and not "Added logging").

### **5.2.5 Deployment**

For the deployment of the project NOI S.p.A. will use its CI/CD infrastructure, for this reason it is important that the service provider includes in the documentation of the project the information about how the application should be deployed or updated by a CD pipeline. Therefore, the documentation should point out the following things:

- What parameters must be configured? Which ones are secrets and which are not?
- What services must be used? (e.g.. PostgreSQL database, S3, ..)
- What steps must be made to package the application/project so that it can be copied to the server?
- What steps must be made on the server after deploying? (ex. Database migrations executing with special command)
- What must be adjusted on the server only once? (ex. cron job, shared folder).

### **5.2.6 Testing**

All projects should include unit tests and the minimal requirements for the service provider are:

- setup a test infrastructure;
- write unit tests to cover the most important features;
- the minimal test coverage should be 20%;
- tests should mainly cover own business logic (even if minimal) and not third-party API's / libraries.

Finally, a test-driven development is appreciated.

### **5.2.7 API development**

In case that within the project it is foreseen also the development or the change of APIs, the service provider should observe the following guidelines:

- all API calls must be documented in the README.md;
- Swagger UI should be used;
- in case of errors the API should return to the consumer valid and descriptive error messages;
- the API should be RESTful, if possible, but, in case of need, other formats will be considered. In case of non RESTful APIs the service provider should present to NOI S.p.A. enough documentation to allow NOI S.p.A. to decide whether to go on with the new technology or stick to RESTful;
- the API must include also:
  - Response codes,
  - HTTP methods,
  - validity errors,
  - logging: JSON format for production and plain-text for local development written to stdout.

### **5.2.8 Access Control List (ACL) management**

In case that the project foresees Access Control List management, the service provider should observe the following guidelines:

- every login to a webapp needs ACL;



- the passwords must be complex enough to be secure;
- OAuth 2.0 standard is required Session management for webapps should be present, logout after an inactivity time (the length of the inactivity time depends on the single projects and has to be agreed with NOI S.p.A.)

As an Access Management tool NOI S.p.A. uses Keycloak (<https://www.keycloak.org/>) instance. More details are available at the following links:

<https://docs.opendatahub.bz.it/en/latest/guidelines/authentication.html>

### **5.2.9 Dockerization**

NOI S.p.A. is using Docker (<https://www.docker.com/>) to automate the deployment of the application and we strongly recommend to:

- use docker for local development;
- keep local docker setup, staging and production as similar as possible (these will be provided and updated by the NOI S.p.A. team);
- use environmental variables to configure different stages (i.e., .env files).

## **6. Organizational constraints**

### **6.1 WORKING PLACE AND HOUR**

#### **6.1.1 Working Hours**

The execution of the works that involve collaboration with the staff of NOI Techpark or other entities involved in the project must be carried out within a timeframe ranging from 9.00 to 12.00 and from 15.00 to 17.00. Depending on the needs, different times may be agreed via email between the service provider and the entities involved.

#### **6.1.2 Working Place**

The meetings that will be agreed during the project will take place, according to the needs of the project team, online or in the NOI Techpark offices:

- Via Alessandro Volta, 13, Bolzano.

Any expenses that the supplier will have to incur to reach these locations will not imply an additional cost for NOI Techpark. In any case, any travel costs that the supplier will have to incur to ensure the natural performance of the project activities (e.g., extraordinary coordination meetings, interventions that require presence on site, development activities to be carried out in agreement with the one or more entities / suppliers involved in the project, etc.) can't be billed to NOI Techpark.

## **7. Contents and evaluation of proposals / quotes**

The quotes will be evaluated according to the criteria summarized in the table below.

<b>CRITERIA</b>	<b>Points</b>
<b>1. Technical evaluation</b>	<b>70</b>

1.1 Technical proposal for the implementation of the requested AI-as-a-Service components	40
1.2 References and overall experience in the requested domain (data analysis & AI modules development)	30
<b>2. Economical quote</b>	<b>30</b>

As far as **criterion 1.1** is concerned, it is expected to receive a concept on how it is proposed to implement the requested AI-as-a-Service components, clarifying the data architecture structure and the elaboration logics proposed. Technical aspects like e.g. AI toolkits that will be used should also be mentioned. The most convincing concepts and that demonstrate to use in the best effective way the available technologies will get a higher score.

As far as **criterion 1.2** is concerned, it is expected to receive a CV of the personnel staff to be involved in this activity and up to 3 project references about similar development activities in which this staff (or alternatively the company) was involved. Such project references should have taken place from 1.1.2020 onwards.

As far as the **economical quote** is concerned, it is expected to receive a cost indication for each single activity requested (paragraphs 3.1 – 3.3). The points are going to be assigned according to the following formulas:

$$C_i = \frac{O_{min}}{O_i}$$

$$PE_i = C_i * P_{max}$$

where:

- $O_i$  is the economical quote of the  $i$ -th proposal.
- $O_{min}$  is the economical quote of the best quote (i.e. with the lowest price)
- $C_i$  is the coefficient associated to the  $i$ -th proposal
- $P_{max}$  is the maximum number of points related to the economical quote (i.e. 30 points)
- $PE_i$  is the number of points associated to the  $i$ -th proposal.

The technical evaluation and economical quote shall be provided in a document that should not exceed 10 pages of documentation. Any collaboration with other companies and the presence of any subcontracts must be explicitly indicated.

NOI S.p.A reserves the right to activate a cooperation with several economic operators if it considers it functional and efficient from a technical and economic point of view. Therefore, it is possible to present a quote also for just a subset of the activities described in this document (e.g. only design or implementation activities). In this case, the comparison of the quotes will be limited to the applicable activities.

## 8. Invoicing procedures

The invoicing of the activities concluded by the supplier will be sent to NOI S.p.A via electronic invoice only after the outputs produced have been successfully tested by NOI S.p.A. Before to proceed with the testing of the outputs, the supplier must provide to NOI S.p.A.:

- the entire documentation;
- if code development is planned, the code must be uploaded to the Git repository provided by NOI S.p.A;

- in the case of multimedia contents (e.g. photos, videos, illustrations, documents), the service provider has to upload it on specific platforms (e.g. Vimeo, Flickr, etc.) and provide the source files or open versions through appropriate file hosting services indicated by NOI S.p.A.

All invoices must include that the transaction is subject to the Split Payment discipline as mentioned in the art.17-ter del DPR 633/197 and must be issued exclusively in electronic format (Unique Office code: T04ZHR3).

The invoices should include the following references:

**Project name:** IMPACT – Impacting Innovation Through Specialization

**Project code:** EFRE1048

**Project CUP:** J57H23000640009

## 9. Transfer of rights

Where the creation of material subject to proprietary rights, including copyrights, sui generis data rights, and related rights, including solely of photographs, industrial design, all rights of economic exploitation arising from achieved results are reserved to NOI S.p.A., excepting those expressly excluded when the order is placed.

Further, if the material includes a software development project, all source code from libraries or other modules used in the realisation of an assignment and belonging to a third party must be released under an Open Source license (open-source.org/ licenses) in a manner compatible with the scope of the "outbound" software license, without requirement for adaptation, addition, cancellation or requests for permission from third parties on the part of NOI S.p.A. In the absence of any expressly indicated license, the terms of the GPL v3 or AGPL v3 (depending on the project type) license shall apply. The use of material belonging to third parties must be expressly declared at the time of the quote, or be easily and immediately understandable from the description of the project. In the event that code is developed during the realisation of this assignment, NOI S.p.A. will initiate a Git repository on which the supplier must develop and publish the source code.

If the material consists of data, creative works (drawings, literary works, cinematographic works, figurative art, photographs), industrial design or other material which are subject in whole or in part to the proprietary rights of a third party, the use of such material is permitted provided it is licensed under conditions compatible with the license under which said material will be published, if indicated. If no license is indicated, the material will be subject to conditions compatible with the Creative Commons Zero (CC0) license.