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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 development of the Open Trip Planner instance connected to 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



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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 made available machine-readable data related to different sectors. The goal is to promote research and development activities based on the usage of such data, so that the full potential beyond its usage 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. Open Trip Planner

The Open Data Hub also integrates in its architecture an instance of the Open Trip Planner (OTP), i.e. the most popular open source journey planner available on the market (<u>https://www.opentripplanner.org/</u>). The source code and the details of this implementation is freely available on this repository: <u>https://github.com/noi-techpark/odh-mentor-otp</u>

Thanks to OTP, it is also possible to offer an intermodal journey planning API on top of the different mobility data integrated in the Open Data Hub. A high-level representation of this is provided in the following picture.



The OTP API end-point is: <u>https://otp.opendatahub.bz.it/otp/</u>

The GBFS end-point exposed by the OTP instance is: <u>https://gbfs.otp.opendatahub.com</u>

A demonstration of Mobility-as-a-Service (MaaS) application consuming these web-services is https://mobility.meran.eu

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 **design** and **developments** on this OTP implementation, both as far as the back-end system as well as the demo applications managed by NOI are considered. The activities foreseen are briefly presented in the following paragraphs.

3.1 END USER APPLICATION IMPROVEMENTS (UX / UI)

- Disable the functionalities "view lines" and "restart" in the header menu
- Improve the favourites management in the desktop-view of the application (at present points of interests can not be set as home / work locations)
- **Tooltips** related to **stations** belonging to one of the different map layers shall visualize the **timestamp** of the realtime information provided
- Stations belonging to one of the different map layers shall have a grey top right marker (instead of red / yellow / green) if the provided real-time information is older than one hour



- **On-street** and **off-street parking sensors** (rif. ParkingSensor and ParkingStation data types of the Open Data Hub) should be visualized differently (different map icons).
- **On-street parking sensors** should be visualized at a higher zoom level through their groups they belong to (ref. smetadata-> group field in the Open Data Hub API). The position of the marker should be put at the centre of the area covered by the associated sensors (mean of their coordinates). Expected UX:
 - Zoom-out situation: information of the group of the on-street sensor. The total availability of the parking slots should be provided when clicking on the marker (with timestamp -> ref. to the oldest timestamp of all associated sensors).
 - **Zoom-in situation**: visualization of each on-street sensor. Can be also opened from the tooltip of the group in the zoom-out situation (with a certain call to action, the map is displayed with higher zoom and centred in the area covered by this group).
- On-demand service:
 - by clicking on the demand vehicle the **reference itinerary** should be displayed (the geometry should be displayed after the click, not after the activation of the layer. The itinerary to be done should be displayed differently from the itinerary already travelled (the latter one e.g. in grey colour, and eventually trunked to the last leg).
 - by clicking on the demand vehicle, the tooltip should also provide information to the next stops served and eventually to the next journey, if already scheduled. In this latter case, a "booking" call-to-action should be foreseen so to allow the user to book a ride on that journey. The link will bring to an external application for doing this.
- **Traffic layer**: to be temporarily disabled.
- **Bike Parking layer**: to be added. User experience similar to off-street parking visualization, different map markers to be conceived. Reference Open Data Hub dataset: <u>https://mobility.api.opendatahub.com/v2/flat,node/BikePark-ing</u>
- **Car Pooling layer**: to be added. Thanks to new real-time provided to the Open Data Hub, it will be possible to see the car pooling offer shared by private users. It is imagined to view on the map the starting locations of all car pooling trips. By clicking on one of them, it is possible to get all trip information. A proper visualization should be conceived in order to let the user understand where the trips are going to be directed. A proper filter should be designed for this layer in order to let simplify the search of trips (e.g. reference start time of the trips, destination locations, etc.)
- **Other**: further improvements to the geocoding mechanism in the trip planning component

3.2 ROUTER FURTHER IMPROVEMENTS

Following improvements are to considered for the routing engine:

- Currently, the OTP version in use is 1.4.0. It is requested to install the **new OTP version (v2.x)** so to take advantage of the new functionalities provided by this new version. The exact choice of the version to be considered will be agreed with the supplier during the implementation phase.
- Based on this upgrade, all **adapters to the different mobility services** data provided by the Open Data Hub **already integrated** need to be configured again according to the features of OTPv2, so to implement the multi-/ inter-modal routing functionalities currently available.
- Finally, the OTPv2 should be capable to provide **new multi**-/ **inter-modal functionalities**. In particular, it should be possible to include as modes in the routing engine also **on-demand** services, which are currently only visualized on the map. Additional transport modes to be further included are separately presented in the next paragraphs.



3.3 INTEGRATION OF FLIGHT DATA

Recently NOI has found an agreement with SkyAlps, regional flight services operator for the sharing of planned and realtime information of the flight services arriving and departing from the airport of Bolzano. This data is provided by the Open Data Hub through the following API: <u>https://mobility.api.opendatahub.com/v2/flat,node/Flight/*/latest</u>

For the direct integration in OTP, a GTFS export has also be produced: <u>https://gtfs.api.opendatahub.com</u>

Following design and development activities are requested:

- Visualization of flight data as an additional layer on the map. Basically, here it is intended to show real-time data available, e.g. a departure monitor to be opened when a click on the airport of Bolzano is made. Please consider that for this a web-component is already available (<u>https://webcomponents.opendatahub.com/webcomponent/flightmap</u>)
- Integration of flight data as mode in the routing engine. This mode should be considered alone or for integration with other public transport services for intermodal trips.
 - <u>Reference use case</u>: tourist planning a trip to South Tyrol. Following trip combination should be obtained: flight to the airport of Bolzano + public transport / on-demand service to his destination point in South Tyrol

3.4 INTEGRATION OF CAR POOLING DATA

NOI is activating the interface with some local providers of car pooling platforms, that share information about the trips that are offered by private users to other private users. A first glance to the data that the Open Data Hub will provide through its API is available here: <u>https://mobility.api.opendatahub.testingmachine.eu/v2/flat,node/CarpoolingTrip</u>

Basically the start and destination points of the trips and the reference start time are provide. Following design and development activities are requested:

- Visualization of car pooling data data as an additional layer on the map. This functionality should be first designed and then implemented. Basically, here it is intended to show all relevant trips for the current day, that start after the current timestamp. Each trip should be visualized through its starting point, and if selected it should graphically visualize its reference destination. Through the filter it should be possible to "geographically" filter all trips that arrive in a certain area (to be implemented e.g. through the logic of bounding boxes).
- Integration of car pooling data as mode in the routing engine. This mode should be considered alone or for integration with other public transport services for intermodal trips.
 - <u>Reference use case</u>: commuter living in the mountains willing to arrive a in main centre. He / she could get the following trip combination: car pooling to train station-> train -> bike sharing + walking to his / her destination

At present, there is no converter for the availability of this data in GTFS format. If such conversion is deemed necessary for the integration in the router, the offerer should consider this implementation in his quote.

3.5 INTEGRATION OF BIKE PARKING DATA

Thanks to a cooperation with STA NOI has started the integration of a new type of dataset, i.e. real-time data of the availability of dedicated bike parking facilities. The first implementation in that regard that have been "opened" from a digital point of view are the ones recently opened in the train stations of Bressanone and Brunico (see image below).



This data is provided by the Open Data Hub through the following API: <u>https://mobility.api.opendata-hub.com/v2/flat,node/BikeParking/*/latest</u>

Following design and development activities are requested:

- Visualization of bike parking data as an additional layer on the map. To be implemented similarly to off-street parking layer.
- Integration of bike parking data as mode in the routing engine. This mode should be considered for P+R intermodal trips, to be differentiated from the existing ones in the sense that the transport mean is bike and not car.
 - <u>Reference use case</u>: private bike to bike parking facility -> train -> urban public transport + walking for destination



3.6 INTEGRATION OF ADDITIONAL PUBLIC TRANSPORT DATA

At present the current OTP back-end / front-end implementation is very limited to the South Tyrolean region. The intention is to try to extend this demonstrator also to other regions, in particular other neighbouring ones. The idea is to feed the OTP engine with additional GTFS / NeTEx feeds, so to have at least planned data of other territories.

NOI will be responsible for the collection of these additional data, while the supplier should concentrate on the integration work in the OTP. The supplier is also requested to improve and adapt the current UX, if necessary, in order to properly present these additional public transport information.

Basically the start and destination points of the trips and the reference start time are provide. Following development activities are requested:

4. Deadlines

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

- Design of integration of flight data: by October 2023
- Router further improvements: by November 2023
- Integration of integration of flight data: by December 2023
- Design of integration of bike parking data: by January 2024



- Implementation of integration of bike parking data: by February 2024
- Design of integration of car pooling data: by March 2024
- Implementation of integration of car pooling data: by June 2024

The integration of additional public transport data will be scheduled once the first datasets will be available. This activity will however not start before the beginning of 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;
 - o 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:
 - o 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: <u>https://opendatahub.readthedocs.io/en/latest/contributors.html</u>);



• 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,
 - o 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 (<u>https://www.keycloak.org/</u>) 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.

CRITERIA	Points
1. Technical evaluation	70
1.1 Technical proposal for the UX / UI improvement of the web-application	20
1.2 Technical proposal for the update of the OTP back-end and for the integration of the requested transport	30
modes	
1.3 References and overall experience in the requested UX / UI and software developments	20
2. Economical quote	30

As far as **criterion 1.1** is concerned, it is expected to receive a preliminary concept on how the demonstrative application could be improved in relation to the developments requested. The most convincing concepts will of course get a higher score.

As far as **criterion 1.2** is concerned, it is expected to receive some concrete indications about how the upgrade of the OTP back-end should take place and how the different transport modes could be efficiently integrated in the routing logics. The most convincing, efficient and time-effective proposals will get a higher score.

As far as **criterion 1.3** 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. The specific references related to OTP implementations will be specifically awarded.



As far as the **economical quote** is concerned, it is expected to receive a cost indication for each single activity requested (paragraphs 3.1 – 3.4). 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 15 pages of documentation. Any collaboration with other companies and the presence of any subcontracts must be explicitly indicated.

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.