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Market research – Open Data Hub – New outbound architecture development

This market research aims to identify a partner that can support NOI S.p.A. in activities regarding the development of the proof of concept of a new outbound architecture of the Open Data Hub.

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1. Goal of the market research

This chapter aims to explain in more detail the content included in the market research. The generic goal is the identification of one or more a partner that can support NOI S.p.A. in activities regarding the testing of the proof of concept of a new inbound architecture of the Open Data Hub.

1.1 INTRODUCTION

The Open Data Hub team has started the review and update of the actual Open Data Hub architecture. The goal of this activity is the definition of a new Open Data Architecture that:

- is able to receive data coming from other domains than mobility and tourism (e.g. agriculture);
- is able to receive data from large IoT platforms;
- stores all raw data as they are sent by the data provider in a separate database (Raw Data Table);
- is able to manage a large number of request and a large quantity of data;
- is easily scalable in case of need;
- ensures high performance in terms of number of requests (inbound and outbound);
- guarantees high reliability and resilience regarding network and application failures and traffic spikes.

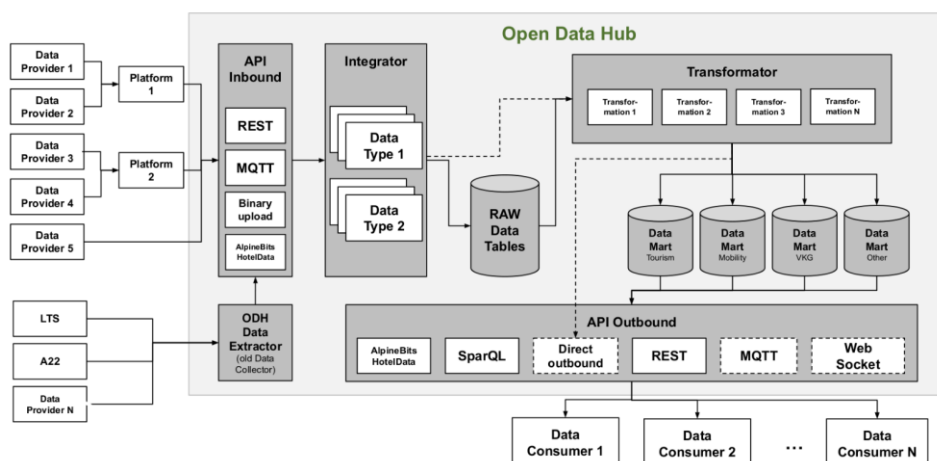


Figure 1: the new high-level architecture of the Open Data Hub.

Taking into consideration this aspects NOI S.p.A. defined a first draft of the high-level architecture that is reported in Figure 1. During the last months NOI S.p.A. defined and implemented a first Proof of Concept (PoC) of the inbound architecture, that includes all components that gets the data form the different Data Providers APIs and stores it in the Raw Data Table. The inbound architecture is described in Figure 2.

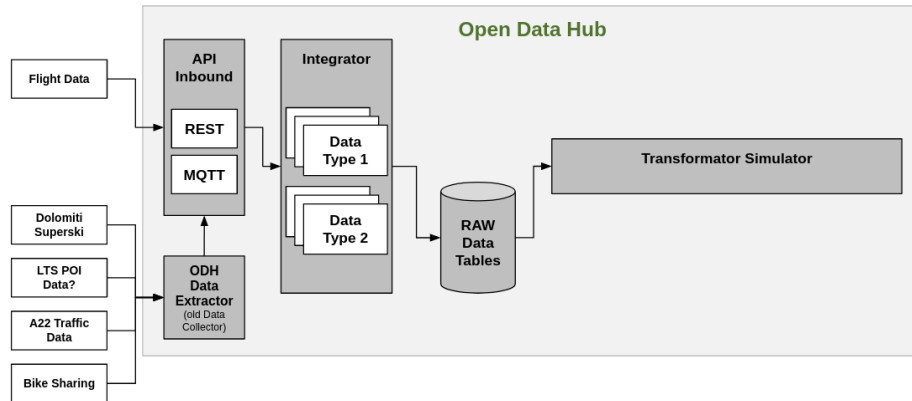


Figure 2: the new high-level architecture of the Open Data Hub.

More information about the technologies and the implementation of the new Open Data Hub Architecture Inbound Proof of Concept are available in the slides attached to the present document (ODH-InboundArchitectureDesign.pdf).

NOI S.p.A. aims to extend the Inbound PoC also to the Outbound Architecture highlighted in green in Figure 3.

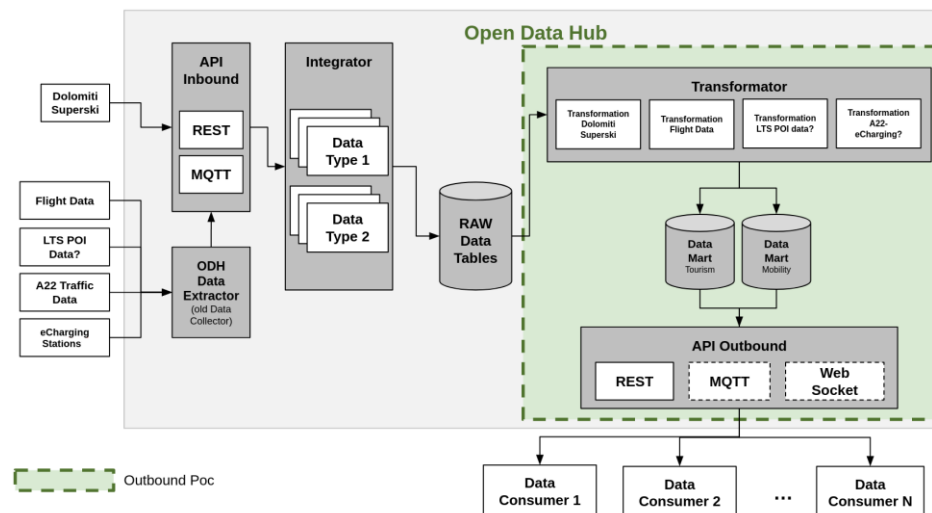


Figure 3: new Open Data Hub architecture inbound and outbound PoC .

The goals of the PoC are:

- identification of the right technologies for each component of the architecture;
- verify the architectural decision that has been taken during the first analysis by using real data;
- test the entire architecture in order to verify that all requirements of the Open Data Hub are fulfilled.

1.2 GOAL OF THE MARKET RESEARCH

This market research aims to identify one or more partner that can support NOI S.p.A.:

- in the interpretation of the result of the testing of the new Open Data Hub inbound architecture PoC;
- in the optimization of the new Open Data Hub inbound architecture PoC based on the testing's results;
- in activities regarding the development of the proof of concept of a new outbound architecture of the Open Data Hub;
- in the interpretation of the result of the testing of the new Open Data Hub architecture (inbound and outbound) PoC;
- in the optimization of the new Open Data Hub architecture (inbound and outbound) PoC based on the testing's results;
- In the planification and realization of the takeover of the new architecture PoC by the Open Data Hub Team and the migration from the old architecture to the new one;
- in the organization of trainings (e.g., Terraform, Kubernetes, MongoDB, etc.) and pair programming sessions to speed up the takeover of the new architecture PoC by the Open Data Hub Team.

2. Constraints

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

2.1 ECONOMIC EXPLOITATION

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 licence (opensource.org/licenses) in a manner compatible with the scope of the "outbound" software licence, 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 licence, the terms of the GNU GPL v3 licence shall apply. The use of material belonging to third parties must be expressly declared at the time of the offer 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 licence under which said material will be published, if indicated. If no licence is indicated, the material will be subject to conditions compatible with the Creative Commons Zero (CC0) licence.

2.2 INVOICING

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 must 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).

2.3 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.

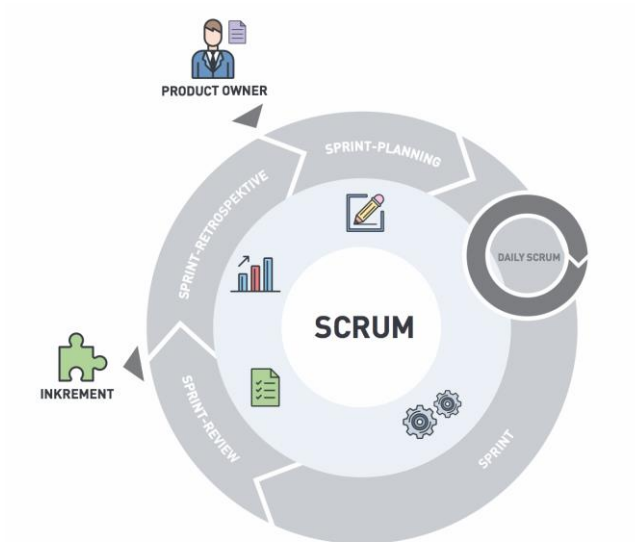


Figure 3: the SCRUM methodology.

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.bz.it/>

2.4 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 Data browser is:

<https://github.com/noi-techpark/it.bz.opendatahub.databrowser>

2.4.1 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.

2.4.2 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.

2.4.3 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.

2.4.4 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").

2.4.5 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).

2.4.6 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.

2.4.7 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.

2.4.8 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>

2.4.9 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).

2.5 WORKING PLACE AND HOUR

2.5.1 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.

2.5.2 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.

3. Request to the supplier

3.1 SERVICES AND ACTIVITIES

In the present paragraph are listed as example some activities included in this Market Research:

- support in the coordination and interpretation of the result of the testing of the inbound technologies;
- support in the optimization of the inbound architecture PoC based on the testing results;
- integration in the actual PoC also the outbound architecture for some representative data set;
- support in the coordination and interpretation of the result of the testing of the entire architecture (inbound and outbound);
- support in the optimization of the entire architecture (inbound and outbound) PoC based on the testing results;
- organization of trainings (e.g., Terraform, Kubernetes, MongoDB, etc.) and pair programming sessions to speed up the takeover of the new architecture PoC by the Open Data Hub Team.

3.2 EXPECTED OUTPUTS

The service provider must provide the following outputs:

- a new optimized version of the inbound Open Data hub architecture that fulfils the Open Data Hub needs including:
 - source code;
 - documentation;
 - a workshop for the Open Data Hub entire team (including slides in pdf format);
 - a hands on workshop for Open Data Hub software architects (including technical documentation);
- a report that includes:
 - the optimization proposed for the inbound architecture;
 - the technologies and the integration plan for the outbound part of the new architecture PoC;
- a new version of Open Data hub architecture that includes the outbound part. The service provider must provide:
 - source code;
 - documentation;
 - a workshop for the Open Data Hub entire team (including slides in pdf format);
 - a hands on workshop for Open Data Hub software architects (including technical documentation);
- a plan for the takeover by the Open Data hub team and migration in production of the final version of the architecture.

3.3 COMPETENCES

Considering the activities included in this market research, the service provider who wants to send an estimation should provide a list of references. For these types of activities:

- software architecture design and implementation;
- use of container orchestration system for automating software deployment (e.g., Kubernetes - <https://kubernetes.io>);
- use of Infrastructure as a Code software tools (e.g., Terraform - <https://www.terraform.io>).

4. Documentation

To participate in this market research, we kindly ask you to provide the following documentation:

- a short company description that includes also a list of references in similar projects;
- a short description of the team that will be assigned to the project including a short description of the competences of each team member;
- the cost of each activity described in the paragraph 3.1 of the present document;
- the hourly rate of each team member included in the project team.

5. Deadlines and contacts

The service providers who are interested in participating in this market research will have to present their estimation by the **12th of September 2022**.

In case of any question please contact:

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