

# 12

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## Repositories and Open Source

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The i3-MARKET Consortium is committed to contributing to a reference implementation (community release) of the individual building blocks as well as the overall i3-MARKET data market frameworks corresponding to their market APIs to the developer community through an open-source project.

The i3-MARKET Consortium will address the open-source community along with the dissemination events, and two hackathons are organized during the project period. The hackathons will be aligned with the releases of the i3-MARKET marketplace. Hackathons, on the one hand, allow engaging new stakeholders in i3-MARKET and, on the other hand, allow retrieving quick and contextual feedback about its usability, business potential, and attractiveness. The success of the hackathons will be key since we strongly believe that first-hour enthusiastic users are the ones that best disseminate and spread the project's results through social networks.

The open-source management project structure has been updated to reach the developers and entrepreneurs (SMEs) communities largely and facilitate their onboarding or innovation processes. i3-MARKET followed an open-source path using two of the most well-known and established open-source organizations, which provide open-source projects hosting: GitLab and GitHub. We have studied the options to have better impact and acceptance in the developers and SME's communities and adopted the procedure and roles for the users of our i3-MARKET open-source project in a way that suited best to the i3-MARKET case.

i3-MARKET project governance process defines a support and evaluation process to include software improvements as follows:

- **Request for changes or updates:** A technical board identifies any change requests prior to a *major* release, which should be integrated into this *major* release. Before a release, all changes have to be tested by using a pre-production/staging approach.

- **The evaluation of any type of technical request:** A technical board approves a software component or initiates a project in i3-MARKET OSS.
- **The communication of the results from technical experts:** A tagging release strategy as described in Section 5.3 is used in order to indicate the impact of the changes made on the i3-MARKET ecosystem.
- **Evaluation of contributions for new commits:** A technical board assesses and evaluates the contributions including documentation in i3-MARKET OSS.
- **Reports and changes report:** A technical board issues a short report, explaining the rationale of the acceptance or the rejection in exceptional cases.

The i3-MARKET team aims to facilitate and simplify development of data services based on i3-MARKET Backplane, and any developer should be capable of implementing and developing data services based on i3-MARKET backplane tools. The i3-MARKET open-source team provides the slack tool ([i3-market.slack.com](https://i3-market.slack.com)) for a direct communication and conversations with the developers team; the slack channel is used as a direct communication channel and it is open to any developer that is part of the i3-MARKET community but also for those external that want to start engaging with the project. The community can join the i3-MARKET slack channel and start reviewing the selected topics and also initiate new ones. i3-MARKET slack open-source has served as main channel for developers to interact directly with the i3-MARKET technical development team. The slack channel facilitates access to a wide range of information about the technologies developed. i3-MARKET OSS is the first project to provide the means for setting up, managing, and using open-source channels for the different developer communities and other stakeholders providing direct support.

Developers require technical information that goes beyond high-level descriptions in a website or that a normal software project documentation can provide. The i3-MARKET project has set up an open-source developers portal as an online tool to facilitate the members of the ecosystem to get access to the materials, documentation, technical information, developers know-how, and code. The online tool of the i3-MARKET project is deployed to actively facilitate reaching out not only to the open-source community but also SMEs and entrepreneurs in order to facilitate an easy adoption and building an ecosystem around the i3-MARKET project.

The i3-MARKET project has evolved from R1 to R3 completing a planned evolution process. The documentation and specifications are released using the open-source developer portal at <http://www.open-source.i3-market.eu>. Videos showing the progress and use of the developed software tools can be accessed via the i3-MARKET YouTube channel. The community of open-source developers SMEs and entrepreneurs can now easily find instructions that are available at the i3-MARKET open source portal. This is a live portal, which is a continuous update according to the latest development of the project. The main purpose of releasing this developer-centric portal is to actively enable a channel for reaching out to the open-source community and to allow SMEs and entrepreneurs to get all the latest developments and also download and use the different i3-MARKET available software updates. More specific technical documentations about the components and systems are also available in a specific “Developer Portal” at <https://i3-market.gitlab.io/code/backplane/backplane-api-gateway/backplane-api-specification/index.html>.

## 12.1 GitLab/GitHub

The i3-MARKET repository is hosted at the GitLab11 which can be found at the following link: <https://gitlab.com/i3-market/code>. The i3-MARKET repository is divided in branches. The branches are divided in two thematic categories. One is the documentation (i.e., site storage hosted at the “gh-pages”) and the other is the i3-MARKET source code branch. Under the source code category, various branches will exist; the two main categories are:

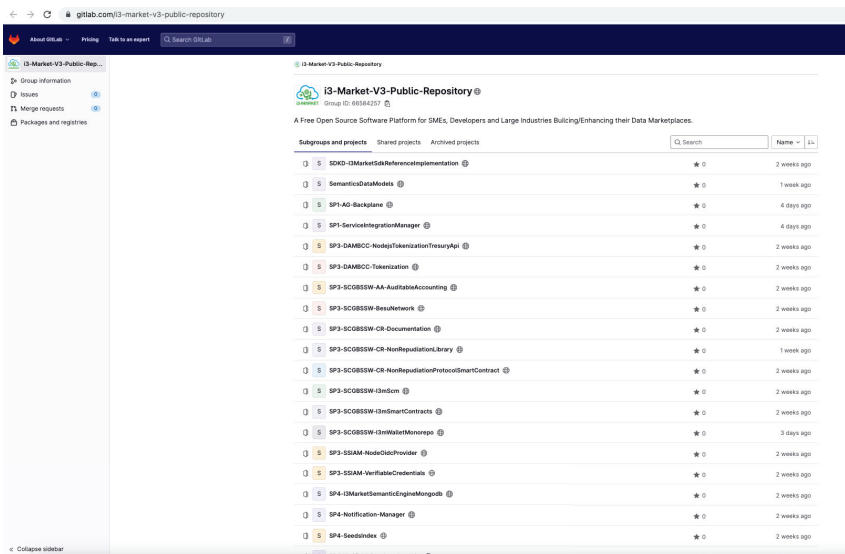
- Main branches with an infinite lifetime:
  - Master branch
  - Develop branch
- Supporting branches:
  - Feature branches
  - Release branches
  - Hotfix branches

The i3-MARKET strategic plan to enlarge the ecosystem and reach out the largest developers communities with this i3-MARKET public version has proceeded with success, and i3-MARKET backplane V2 is accessible

in <www.gitlab.com> and www.github.com. The i3-MARKET’s developers team has done an extra effort to release the V2 in these two well-known platforms as they are amongst the largest and most popular open-source communities. i3-MARKET has conducted all the necessary efforts to establish an automatic synchronization mechanism transparently and the OSS governance methodology to support members of both communities; thus, what is committed and released in one platform the other community has access to it in a matter of few minutes.

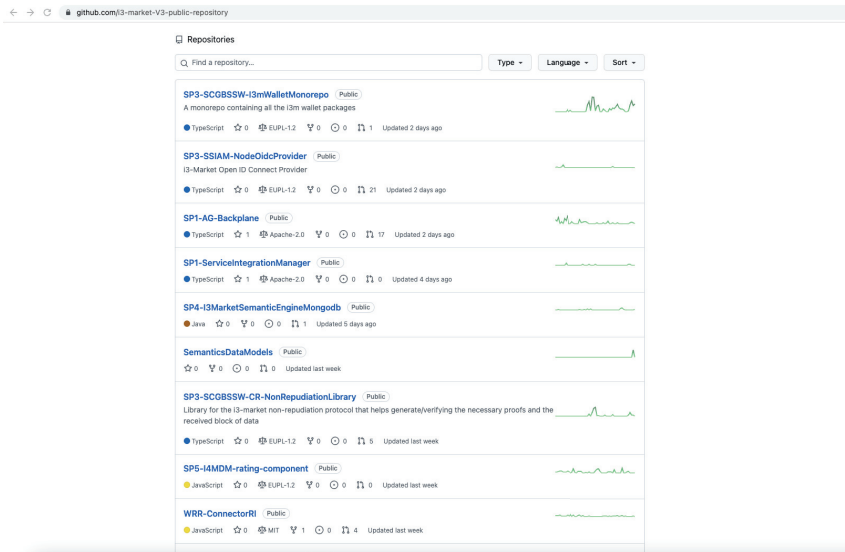
## 12.2 GitLab Repository

The code is available open-source via the establishment of the i3-MARKET spaces on GitLab (available at: <https://gitlab.com/i3-market-v3-public-repository>).



## 12.3 GitHub Repository

The code is available open-source via the establishment of the i3-MARKET spaces on GitHub (available at: <https://github.com/i3-market-V3-public-repository>).

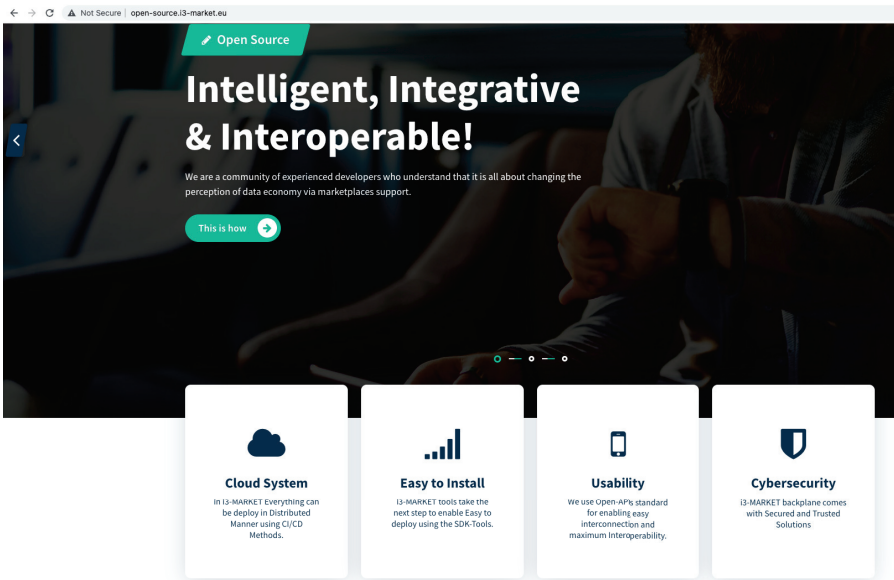


## 12.4 Developers' portal with MKDocs framework

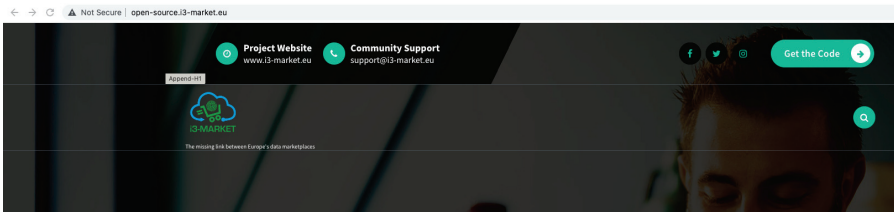
This section contains the details about the online developers support tool and documentation; sections remain the same as presented in previous version but its content has been maintained and updated continuously since its first release. The community of open-source developers SMEs and entrepreneurs can now easily find instructions that are available at the i3-MARKET open-source portal here: <http://open-source.i3-market.eu/> (see Figure 12.1).

This is a live portal, which is a continuous update according to the latest development of the project. The main purpose of releasing this developer-centric portal is to actively enable a channel for reaching out to the open-source community and to allow SMEs and entrepreneurs to get all the latest developments and also download and use the different i3-MARKET available software updates.

The binaries of the different software artefacts and reference implementation modules will be found at the downloading section “Get the Code” part – see Figure 12.2.



**Figure 12.1** Open-source developers portal with MKDocs.



**Figure 12.2** Code repository.

## 12.5 Open-Source Portal

### (open-source.i3-market.eu)

i3-MARKET open-source project has selected a proper governance scheme, which regulates the interactions between the members of the open-source community, including key roles and responsibilities for the development and expansion of the project's software code. i3-MARKET adopts an incremental, iterative, and evolutionary software development process, notably based on agile development techniques. To identify and define these roles, the i3-MARKET Consortium made the following decisions:

- A master-governed approach is the starting scheme associated with the establishment, governance, and initial evolution of the i3-MARKET open-source project. The goal of this decision is to ensure proper integration of the various parts of the project, at least in the initial phase of the project where some critical mass has to be developed. It is the phase where the project will be looking for good reputation among the IoT open-source communities.
- i3-MARKET members from Atos partner act as master(s) for the part of the project that concerns the lower-level sensor/ICO information acquisition and filtering, notably on the basis of the enhancements to be realized on top of the i3-MARKET Backplane.

Figure 12.3 depicts the i3-MARKET project governance process, which is defined as the support and evaluation process to include software improvements as follows:

- **Request for changes or updates:** Identify any development previous to a *major* release, which should be considered private and usually is on testing and pre-production/staging.
- **The evaluation of any type of technical request:** A technical board, PM, TM, TPMs, or WPLs approves participation; in particular, software component or initiate a project in i3-MARKET OSS.

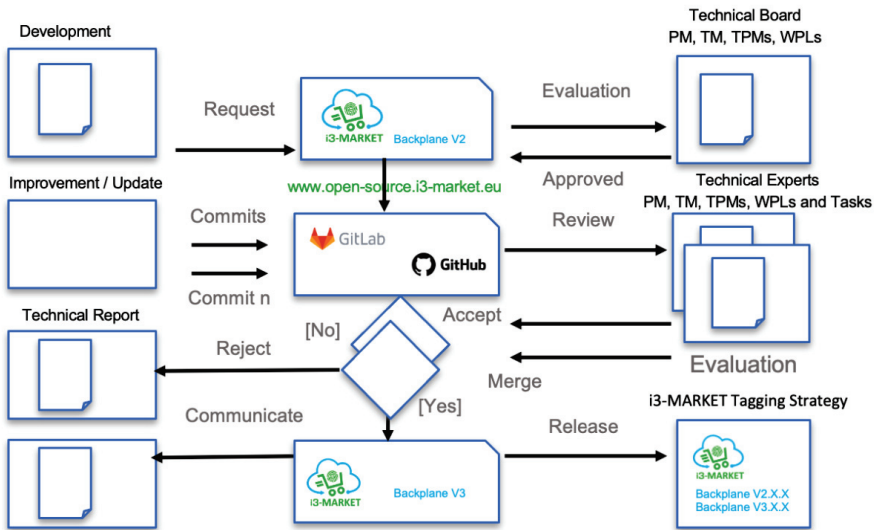


Figure 12.3 Open-source governance.

- **The communication of the results from technical experts:** A tagging version using alpha, beta, and gamma versions and then tagged as *major* is used here.
- **Evaluation of contributions for new commits:** Technical experts, PM, TM, TPMs, WPLs, and TaskLs assess and evaluate the contribution that includes documentation at the initiated project in i3-MARKET OSS.
- **Reports and changes report:** The technical board issues a short report, explaining the rationale on the rejection in exceptional cases; this step can include rejects/cancel project participation.

### 12.5.1 Developers, users, and respective roles

Developer roles and specializations are extensively discussed in [Aalto 2013]. The relevant extracts from this discussion are presented below.

The participants of an open-source community can be divided into three groups based on their level of contributions. A joiner is someone who has just recently joined the community and does not have access to the repository yet. When that person has made his first changes to the repository, he becomes a newcomer. A developer is a fully fledged contributor that actively adds new code to the repository [von Krogh 2003].

A developer often starts out by making bug fixes that are related to his work and interests. The bug fixes are not randomly scattered around the software, but they tend to focus on the same modules. Gradually, he gains acceptance and a higher status in the community through his bug fixes and participation in discussions and debates about new features. This process characterizes how a developer becomes an expert on some part of the architecture and is able to influence its development [Ducheneaut, 2005].

Many software developers and users participate in OSS development and communities because they want to learn. The system architecture can be designed in a modularized way to create independent tasks with progressive difficulties so that newcomers can participate and move on gradually to take care of harder tasks. This approach can encourage more users to become developers. Developers at the centre of OSS communities should focus on developing the system as well as having enough attention to the creation and maintenance of a dynamic and self-reproducing OSS community [Ye 2003].



### 12.5.2 Roles and activities of developers and experts in the governance model

Taking as a reference the i3-MARKET project governance model described above, Figure 12.4 shows the different developers and technical experts and their impact in the i3-MARKET project governance model implementation. The developers (mainly external to the i3-MARKET team) shall follow this process playing a dynamic role in the process to further develop functionalities and/or services.

The group of experts, on the other hand, shall evaluate, approve, and issue official technical reports indicating clearly what the consequences and conditions about the decision(s) about a requested commit are. The user of the code will be notified by an announcement clearly describing the benefits or new functionalities that are ready to be used as a result of implementing the governance model process.

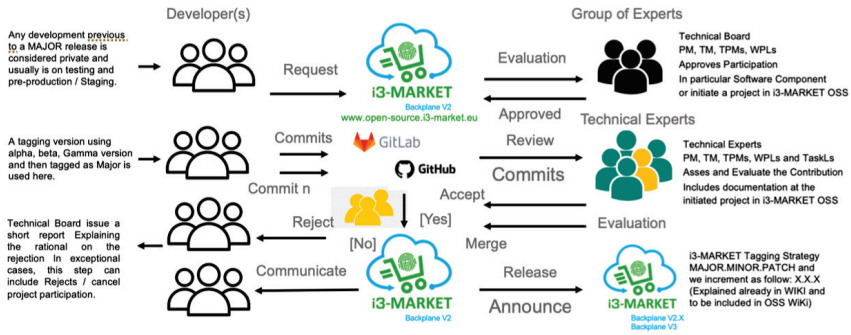


Figure 12.4 Public repository governance.

