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Deliverable D5.3
Update of the service catalogue

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Abstract: Deliverable D5.3 – Update of service catalogue based on feedback from WP6 scientific communities, resource providers, and the catalogue development team.

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References

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[2] Best practices for on-boarding and related policies, NI4OS-Europe deliverable D3.1, DOI: http://doi.org/10.5281/zenodo.3736143.

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[4] Provider landscape analysis and provider categorization, NI4OS-Europe deliverable D5.1, DOI: https://doi.org/10.5281/zenodo.3932941.

[5] First report on provider and repository integration, NI4OS-Europe deliverable D5.2, DOI: https://doi.org/10.5281/zenodo.4485708.

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[9] EOSC Portal - A gateway to information and resources in EOSC, https://eosc-portal.eu/.

[10] NI4OS-Europe on-boarding dashboard, https://catalogue.ni4os.eu/.

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List of Acronyms

AAI	Authentication and Authorization Infrastructure
API	Application Program Interface
EOSC	European Open Science Cloud
NRS	NI4OS-Europe Repository Service
UI	User Interface

Executive summary

What is the focus of this Deliverable?

The main focus of this deliverable [1] is to present updates of the service catalogue, and in this way, to reflect the current progress of the on-boarding activities. Three different stakeholder groups perform the updates, and they are presented in the same way in the document: updates based on WP6 scientific communities' feedbacks, resource providers content editing, and catalogue team development updates.

What is next in the process to deliver the NI4OS-Europe results?

We have defined the initial architecture of the NI4OS-Europe pre-production environment in the deliverable D3.1 - Best practices for on-boarding and related policies [2]. Based on this document, we have deployed a set of federated services and tools, whose detailed description is given in the deliverable D3.2 - First report on pre-production environment [3]. We examined the on-boarding aspects, requirements, categorizations, and created an initial plan for the on-boarding in the deliverable D5.1 - Provider landscape analysis and provider categorization [4]. A revised version of this document, based on experiences obtained during the initial on-boarding of resources, is given in the deliverable D5.2 - First report on provider and repository integration [5]. In this document, we present the service catalogue's current status and feedback from the WP6 scientific communities. Such a feedback includes also a scientific evaluation of available resources and directly influences further on-boarding activities, whose results will be presented in D5.4 - Second report on provider and repository integration and horizontal service delivery. The current deliverable is relevant to WP3 for further policy templates and fine-tuning of on-boarding procedures, as well as pre-production environment development. Also, it is important for the preparation of the WP6 open call, whose details will be given in the deliverable D6.5 - Open call specification.

What are the deliverable contents?

The report on the update of the service catalogue is organized as follows:

- Section 2 gives updates of the catalogue based on the WP6 scientific communities that practically tested resource access procedures, integration of the resources with the services from the pre-production environment, and resources themselves.
- Section 3 reports updates of the content of the catalogue, i.e., the information provided by resource providers. The catalogue strictly follows the EOSC profiles specification, which defines common data models for EOSC entities and related taxonomies. The catalogue content updates are presented for each entity: users, providers, and resources.
- Section 4 presents technical updates of the catalogue, focusing on the major one, the integration between the NI4OS-Europe catalogue and the central EOSC portal.

The overall status of the updates of the catalogue is described in Section 1, while Section 5 presents the deliverable conclusions.

Conclusions and recommendations

Practical testing and scientific evaluation of available resources are most important steps from the users' perspective. WP6 scientific communities performed such a validation and scientific assessment [6] of our resources, and as a result, diverse problems related to access, usage, and integration of the resources were identified, reported, and fixed. By creating relevant scientific workflows, we were able to recognize resources that could have a high scientific impact, thus prioritizing them for on-boarding. From the catalogue's content perspective, we doubled the amount of stored information within the catalogue in the first half of 2021. From a technical perspective, we achieved integration with the EOSC marketplace so that the resource/provider on-boarded to the NI4OS-Europe catalog is also automatically on-boarded to the EOSC environment.

1. Introduction

The main purpose of a resource catalogue is to collect relevant information about available resources. Based on this, the catalogue should enable potential users to recognize resources of interest and inform them of the quality of the offered resources. It isn't easy to meet such requirements by a centralized system, and typically such a system is distributed. In the distributed environment, the purpose of the catalogue is to refer to external information and serve as a hub connecting them. Therefore, the feedback we received from the resource users, WP6 scientific communities, is sometimes directly related to features and information stored within the catalogue, but frequently to information just referenced in the catalogue.

In this document, we structured updates of the service catalogue into three parts:

- Updates based on the community feedback,
- Catalogue content update,
- Technical update of the catalogue.

Feedback received from WP6 scientific communities was mainly oriented to the technical documentation of resources, user manuals, and resource policies. Such a documentation is stored outside of the catalogue, and links are provided within the catalogue. These updates are described in the Updates based on the community feedback section. In addition, the same section covers feedback on the integration of resources with the services from the pre-production environment.

Catalogue content updates are mainly provided by resource providers following AGORA forms that implement the EOSC profiles specification. As described in the Catalogue content update section, we doubled the amount of information stored within the catalogue from January to July 2021.

The AGORA developers regularly perform technical updates of the catalogue. In the previous period, we achieved integration between the NI4OS-Europe catalogue and the central EOSC one, enabling automatic publication of the on-boarded resources. Also, we have optimized AGORA APIs to improve the performance of the on-boarding dashboard. These and related updates are described in the Technical update of the catalogue section.

2. Updates based on the community feedback

In deliverable D6.4 - Service evaluation by user communities [6], we provided a detailed analysis of the testing of services performed by the four scientific communities of life sciences, climate sciences, digital cultural heritage and computational physics. In this test, 10 thematic services, 6 generic services and 1 repository service have been tested.

The use cases aimed to test the scientific readiness of the thematic services and the integration of the services with the project's pre-production environment. This includes testing whether AAI works properly, whether users can get support throughout the helpdesk adequately, and whether the guidelines can be used efficiently.

Regarding repository services, use cases tested only one repository, namely the NI4OS-Europe Repository Service (NRS), which is fully on-boarded. This has been tested by life science as well as by the climate scientific communities. Out of this testing, it was made clear that the NRS is a well-organized and useful tool for sharing and accessing data. Although similar services are already available, NRS has the advantage that it can be combined with other on-boarded NI4OS-Europe services and grow a strong research community. In addition, it is well constructed and maintained and follows the FAIR Data principles. Currently, there are only four communities available in NRS, but it is expected that in the future, it will grow bigger by including more scientific domains such as computational physics. Only one issue was raised here regarding its accessibility. A number of users could not log into the service using their academic credentials. Academic login is of great importance to our understanding, and the technical problems regarding authentication should be resolved. WP6, in cooperation with WP5, will work together to resolve this issue.

Regarding generic services, six such services have been tested. Namely, the use cases tested PARADOX-Hadoop, PARADOX-IV cluster, FINKI-cloud and AVITOHOL, which are fully on-boarded, and Isabella and the CYI cloud facility are partially on-boarded. Users have faced minor issues with the high-performance computers PARADOX-IV, AVITOHOL, and Isabella. Namely, problems regarding SSH connection as well as the lack of a number of libraries have been encountered. These have been easily addressed and resolved by using the helpdesk core service. Regarding the data analysis service, testing revealed that it is a functional, useful, and well-documented service. The only problem faced with this service was with the NI4OS-Europe Helpdesk, which was resolved immediately after communicating with the service providers. Nevertheless, WP6, in cooperation with WP5, will look closely at this issue to ensure that no one encounters similar issues again. Furthermore, some minor issues have been identified in FINKI-cloud. FINKI-cloud is fully integrated with the eduGAIN/NI4OS AAI, enabling seamless access to virtualized computing, network, and storage resources. The evaluators tested the accessibility and functionality of the service. To perform the service evaluation, the service tutorial was used to guide them in creating and testing a virtual machine instance. In order to get access to the service, the team communicated with the providers of the service using the NI4OS-Europe Helpdesk. A few problems were addressed since there are no clear steps that should be followed. The providers only replied using an automated message that directs to the manual of the service, which does not provide any further information. An authentication procedure is required to request permission to the service, which can be performed through the web-based UI using keystone credentials or a NI4OS-Europe AAI

account. After the authentication step was completed, permission to access and use the service was granted to them immediately and without any further problems. Thus, WP6 and WP5 need to ensure that clear steps should be present regarding the authentication procedure.

Regarding the thematic services, the life science community tested the services Melgene, BIOCONNECT, Chembioserver, FEPrepare, the climate science community tested the services AirPollution prediction, WRF-ARW, and DREAM, the Digital Cultural Heritage community tested the services OVRET and Clowder4DCH, and finally, the computational physics community tested the service Schrodinger.

From the thematic services, the life science community tested two are fully on-boarded (Chembioserver, FEPrepare), one is a candidate (Melgene), while Bioconnect is not on-boarded. The team that runs the use cases did not report any major issues with the access and usage of Chembioserver or FEPrepare, which are fully on-boarded services. On the other hand, as far as Melgene goes, the team reported that its database is outdated (it hasn't been updated since 2013), and a major update should be performed before it is fully on-boarded to NI4OS-Europe. Moreover, the team suggested that a user manual for the service would be very useful. Finally, Bioconnect is not on-boarded and access to the service was granted to the use cases team via temporary CYI email accounts, which were then used to connect to the CYI network, where Bioconnect is currently hosted, via a VPN connection. The team reported that the service is very useful. However, it lacks a detailed user manual, and its visualization tools are not better than the existing ones from other software. From the thematic services, the climate science community tested DREAM service, which is fully on-boarded, and WRF-ARW and AirPollution prediction as candidate services. The team reported no major issues with using the aforementioned services. For the Digital Cultural Heritage community, both OVRET and Clowder4DCH are not fully on-boarded yet. The users who tested these services reported that the services need to improve on their documentation on how to use the services, and they should engage the community via outreach activities. Finally, as far as the Schrodinger thematic service goes, the service is fully on-boarded, and the community reported that the service is very friendly to use and it can perhaps enhance its capabilities in the future by including methods to solve the Schrodinger equation for other potentials.

It appears that a successful approach for testing service, especially a thematic one, is the paradigm of the life science use case. Namely, if the service provider organizes a team of researchers and assigns them the detailed investigation of each service feature, this is a very efficient way of finding out what are the faults, what are the weaknesses and what are needs to be fine-tuned in a service. As a matter of fact, this is a good strategy of testing a service in order to ensure its scientific readiness is high enough as well as it is on-boarding mature (integration with the pre-production environment) before this is listed as a fully on-boarded service in NI4OS-Europe. This approach will be adopted for the future services before these are becoming fully on-boarded on NI4OS-Europe catalogue.

Besides these concrete suggestions, as a feedback from WP6 scientific communities, we have also received workflows of the resources that solve use-cases of interest for each scientific community. We used these workflows to recognize resources of interest, which are not on-boarded so far. Such resources are listed in Table 1, and our on-boarding plan for the upcoming period is modified to include these resources. Therefore, in the second

half of the project, WP5 will focus on implementing these workflows that will increase cross-border usage of resources and their interoperability.

Resource name	Type of resource	Country	Community
Repository in Medical Sciences	Repository	Moldova	Life sciences
FINKI-archive	Repository	N. Macedonia	Computational physics
MelGene	Thematic	Greece	Life sciences
Bio-Connect	Thematic	Greece	Life sciences
AFMM	Thematic	Greece	Life sciences
Subtract	Thematic	Greece	Life sciences
DREAM	Thematic	Serbia	Climate sciences
WRF-ARW	Thematic	Multi-country	Climate sciences
CHERE	Thematic	Multi-country	Digital cultural heritage
Clowder4DCH	Thematic	Cyprus	Digital cultural heritage
OVRET	Thematic	Multi-country	Digital cultural heritage
OMApp	Thematic	Montenegro	Digital cultural heritage
ARIS	Generic	Greece	All comunities
Isabella	Generic	Greece	All comunities
Archival service	Generic	Greece	All comunities
Simple storage service	Generic	Serbia	All comunities

Table 1: Resource from the WP6 scientific workflows to be on-boarded in the upcoming period.

3. Catalogue content update

In this section, we present an update of the content of the catalogue. This is done separately per catalogue's entry type: users, providers, and resources. We compared the current numbers with those reported in the deliverable D5.2 - First report on provider and repository integration [5], and as it is presented, the amount of information stored within the catalogue doubled from January to July 2021. As a result, the total number of registered users is 74, the total number of registered resource providers is 31, and the total number of registered resources is 73. Out of these, we on-boarded 22 resource providers, 5 repositories, 8 thematic services, and 5 generic services. In addition, all services from the pre-production environment [3] are on-boarded as well.

3.1. Registered users

Interaction with the catalogue starts with a user account registration. Since AGORA is fully integrated with the project's AAI, the user is authenticated with an institutional credential or social identity. This is a straightforward process, which is supported by the on-boarding team member from a particular country, if necessary. During the account registration, user's full name and e-mail address are collected by the catalogue. At the moment, we have 74 registered users, and at least one AGORA user account per partner country. Since AGORA accounts are primarily used for content editing purposes, i.e., for provider and resource registration and information gathering, the number of accounts per country depends on the number of providers and resources registered within the catalogue from the particular country. Typically, a single provider or resource information is gathered by a single account, although this is not the case for all items registered within the catalogue. Some accounts (18 out of 74) are in the observer mode (read-only mode). Mainly, these are created by people outside of the consortium who heard about AGORA on our dissemination events and are interested in functionalities of our catalogue.

If we compare the number of registered users reported in the deliverable D5.2 - First report on provider and repository integration, we see that the number of accounts has significantly increased, from 36 accounts in January 2021 to 74 accounts in July 2021.

3.2. Registered resource providers

In the process of provider registration within the catalogue, all EOSC profile's mandatory information is collected, which includes basic, classification, location, marketing, maturity, and contact information. At the moment, we have registered 31 resource providers. We managed to on-board at least one resource provider per project participating country. Although the process of resource on-boarding requires provider on-boarding, these two processes are independent, so the number of registered resources per country does not need to reflect the number of registered providers. All registered resource providers are academic institutions, research institutes, universities, or their departments.

Let's compare the number of registered providers with the number reported in the deliverable D5.2 - First report on provider and repository integration. We can see that the number of providers increased from 25 in January 2021 to 31 providers in July 2021. Out

of these, 22 providers are fully on-boarded, i.e., described in terms of the EOSC profiles specification, and 9 of them are marked as candidates.

3.3. Registered resources

We have collected a significant number of resource descriptions in the last six months. In the deliverable D5.2 - First report on provider and repository integration, we have reported 38 registered resources in the catalogue, while the current number is 73. Practically, we doubled the number of registered resources in the period January - July 2021. Figure 1 illustrates the distribution per type of resource. In the last couple of months, we have received 18 new repository descriptions from Serbia, which increased the share of repositories to 38 percent of all resources (28 resources in absolute numbers). Within AGORA, 26 percent of registered resources are thematic services (19 resources), 25 percent are generic services (18 resources), and 11 percent are services from the pre-production environment (8 services).
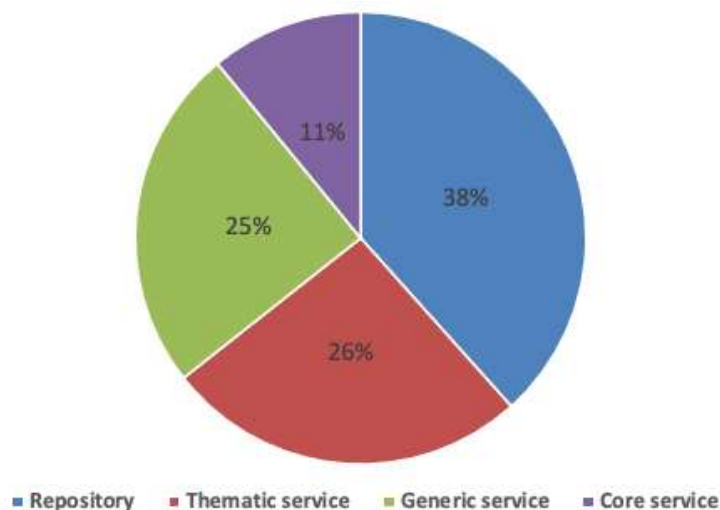
Figure 1: Distribution of resources per type of resource within the catalogue.

We have at least one resource registered within the catalogue from almost all project participating countries. Colleagues from Slovenia, Albania, and Bosnia and Herzegovina in the upcoming period will register the first resources. In Serbia, a significant number of resources are repositories, and if we focus only on services, there are 6 services registered from Serbia. Also, a significant number of resources are registered by colleagues from Greece, Cyprus, Bulgaria, Croatia, and North Macedonia.

Resource integration starts with a basic resource description using the corresponding AGORA form, which follows the EOSC profiles specification [7]. We collect basic, marketing, geographic and language availability, classification, maturity, and contact information in this process. This is followed by the user manual, terms of use, access policy, privacy policy, and acceptable use policy production, and finalized by integration

with the helpdesk and monitoring system. For more than 50 percent of resources, we collected basic descriptions, while a smaller number of resources is equipped with the corresponding policies and integrated with the services from the pre-production environment. This is reflected in the number of fully on-boarded resources. Up to now, we have on-boarded 5 repositories, 8 thematic services, and 5 generic services. In addition, 8 services from the pre-production environment are on-boarded.

4. Technical update of the catalogue

AGORA catalogue has been updated to meet the criteria set by EOSC profiles version 3.0 and to be able to integrate with EOSC API. AGORA allows Provider administrators to enter the necessary information (e.g. classification, availability, maturity, policies, management, dependencies, etc.) in order to describe their organization and easily publish it to EOSC. Similarly, resource administrators enter into AGORA the corresponding information for their services. The portfolio managers curate these descriptions according to the EOSC Rules of Participation [8] and validate the Resources to be published to the EOSC Portal.

AGORA plays an important role in the on-boarding process for EOSC as it enables the following processes:

- Resource Admins are able to describe their Resources according to Profiles 3.0 and to submit them for Validation.
- Provider Admins are able to describe their organizations according to Profiles 3.0 and to submit and curate Resource profiles for the services/resources of their organization.
- Portfolio managers are able to validate Resource and Provider Profiles and then approve them in EOSC Portal.

4.1. Integration with the EOSC marketplace

The EOSC provides a public API to allow regional and thematic catalogues to on-board providers and resources to the EOSC Portal [9]. In collaboration with the EOSC Enhance project, that is currently developing the EOSC Portal, GRNET integrated the AGORA catalogue with the EOSC Portal. As a result, it is now able to on-board to EOSC Portal multiple providers and resources/services registered in AGORA and to synchronize controlled vocabularies between the portals. The following use cases describe how the integration between the two systems works.

On-board provider profiles workflow

Figure 2 demonstrates the workflow to on-board a provider in the EOSC Portal via the EOSC API.
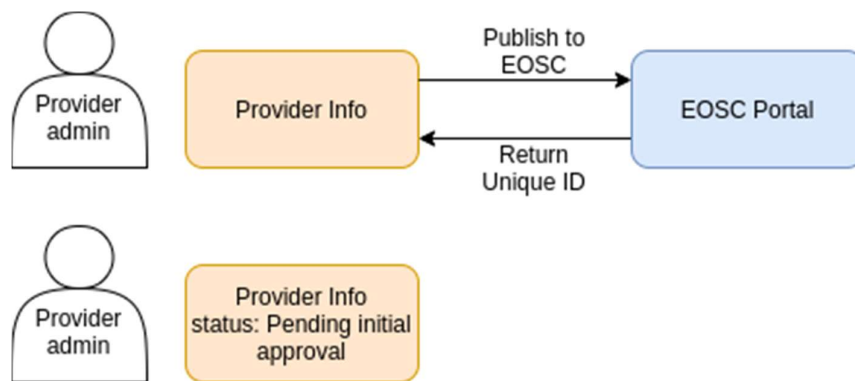
**Figure 2: Workflow of a provider registration using EOSC portal API.**

The main steps of the workflow are the following:

1. The provider admin fills the required information for the provider as stated in the Profiles 3.0. All the required fields for EOSC are properly labeled in AGORA.
2. The provider admin presses the button Publish to EOSC portal in the top right area of the screen, as illustrated in Figure 3.
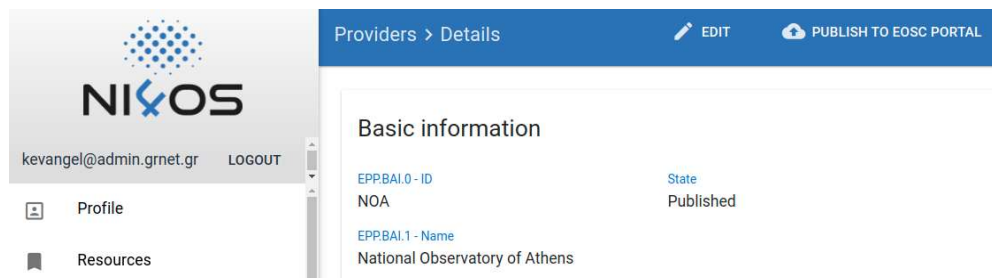

Figure 3: AGORA publish to EOSC portal feature illustration.

3. Then the EOSC portal will return a unique identifier, the EOSC_ID and it will be saved in the provider's model.
4. The status of the provider is "Pending initial approval".
5. Following the workflow illustrated in Figure 4, a provider admin can now review the provider from the AGORA UI and approve it or reject it.
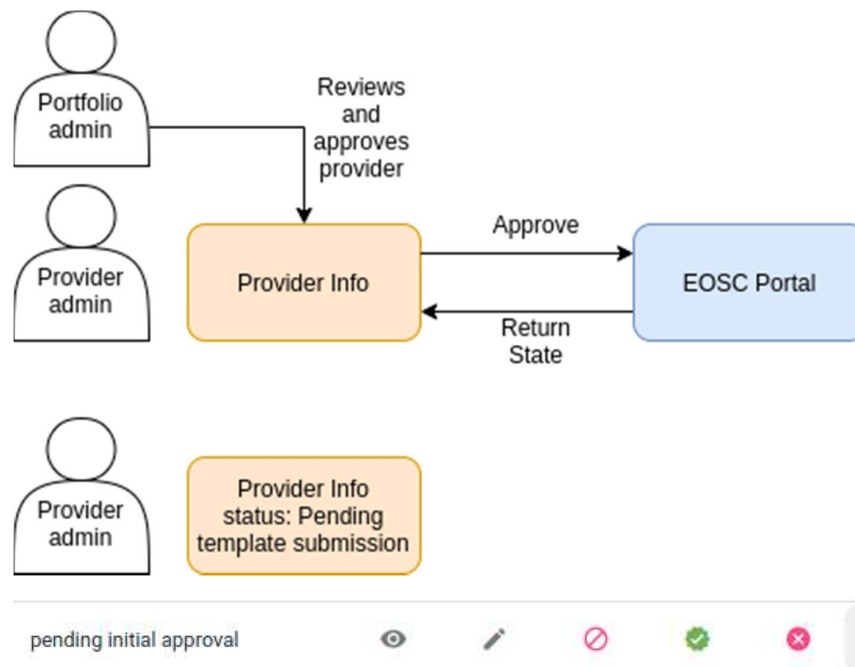
Figure 4: Workflow (top) and AGORA user interface options (bottom) of a provider approval/rejection after synchronization with the EOSC portal.

6. After the first approval the state of the provider becomes "Pending template submission", which is required by the EOSC API for a provider to publish a resource.
7. After the provider publishes a resource, following the workflow illustrated in Figure 5, the portfolio admin can finally approve the provider.
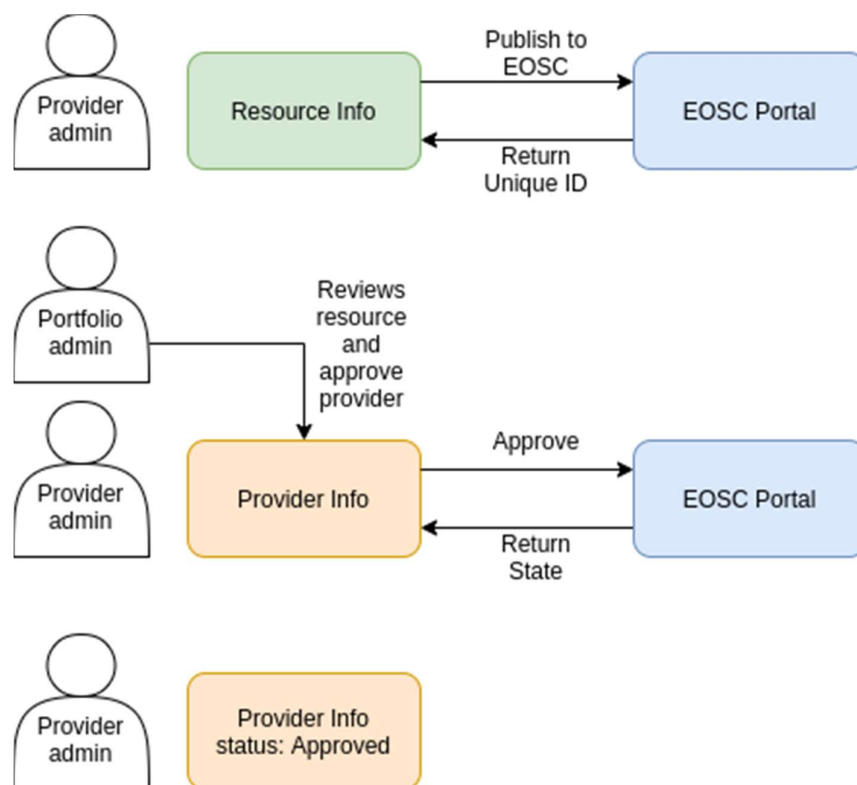
Figure 5: Workflow of a portfolio admin final approval of a resource.

The functionality described in this section is already deployed in the AGORA NI4OS-Europe instance to push information to the EOSC portal (https://beta.providers.eosc-portal.eu/). We are currently ready to publish Providers profile that do not exist in the EOSC-Portal.

Synchronization with EOSC vocabulary

Figure 6 illustrates synchronization with EOSC vocabulary, which workflow includes:

1. In order to be able to integrate with EOSC API we needed to use the same vocabulary.
2. Check if an entry in AGORA vocabulary matches a specific word from the EOSC vocabulary. For example, a standard MERIL category.
3. Once we find the matching entry from AGORA we get it's EOSC_ID from the vocabulary and append it to the entry model. As a result, we saved the EOSC_ID in the object of the vocabulary entry as follows {name: <Vocabulary entry>, eosc_id: <entry_id>}.
4. After the synchronization, we sanitized the data by removing duplicates and entries without an EOSC_ID.
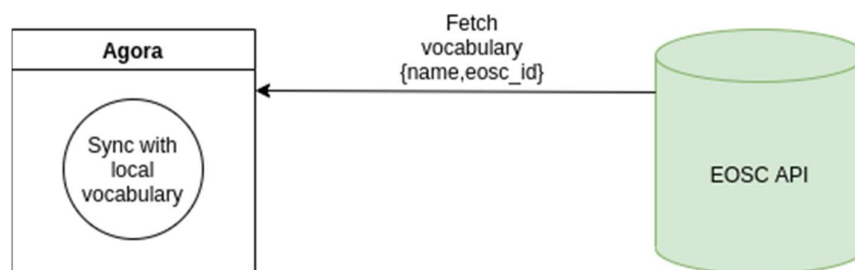
Figure 6: Synchronization of AGORA with EOSC vocabulary.

4.2. On-boarding dashboard

The NI4OS-Europe project has developed an on-boarding dashboard [10] to provide a better and user-friendly view of the resources from the service management system (AGORA catalogue). This tool helps the on-boarding team track each provider's status and resource registered within the catalogue. The dashboard offers two major views, providers, and resources illustrated in Figure 7. Each of the views provides a list of all entries or only entries that have already been on-boarded.
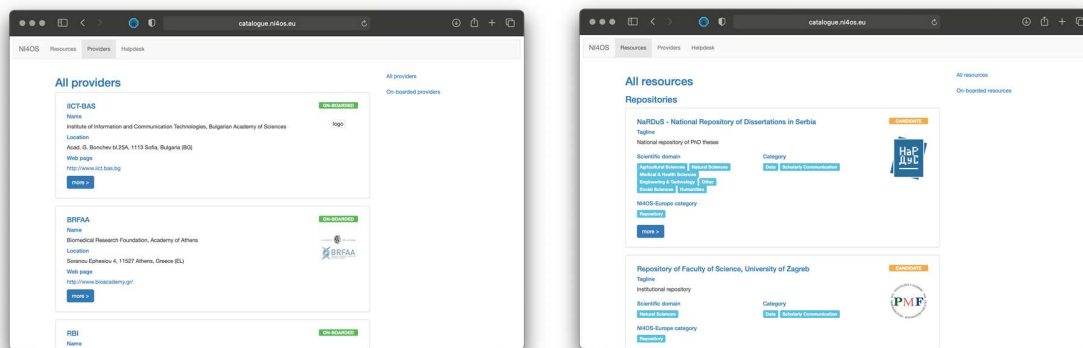
Figure 7: Providers and resources views in the dashboard.

From the providers' view, users can access the details of each of the registered providers. The on-boarding status ("on-boarded" or "candidate") is displayed for each of the providers. By selecting a provider, its detailed page is shown, containing a detailed description of the provider. Status "on-boarded" is given to all the providers who have filed in the required information in the AGORA system, while those who have not yet done so have the "candidate" status.

The resources view offers a list of on-boarded and candidate resources from the project partners. It shows the basic information in the list, with the possibility for extended resource view when More option is selected. Resources in the list are categorized into four categories: Repositories, Thematic services, Generic services, and Core services. The Core services are the elements of the NI4OS-Europe pre-production environment, described in D3.2 - First report on pre-production environment. A resource is tagged on-boarded once all the necessary data is entered in the AGORA system. The dashboard helps the NI4OS-Europe on-boarding team to spot the missing information and react in time.

The dashboard utilizes AGORA API, which has been optimized in the previous period to improve the dashboard's performance. This is done by decreasing the amount of information sent via API, so the API's endpoints return a fraction of the data available in the catalogue (only information that the dashboard needs to show).

5. Conclusions

This deliverable reports updates of the service catalogue based on the feedback received from WP6 scientific communities, resource providers, and the development team behind AGORA. These feedbacks have helped to cover and validate all aspects of the information stored within the catalogue.

WP6 scientific communities have practically tested the access to resources using the provided policies, and the resources themselves using corresponding manuals. As a result, numerous problems related to access and usage were reported and fixed. In addition, by working with provided resources, the scientific communities indirectly tested the integration of resources with the services from the pre-production environment. These problems, such as issues related to integration with the helpdesk or AAI, were also reported and corrected. Furthermore, WP6 scientific communities created concrete workflows using the provided resources and identified additional resource candidates from which such workflows can benefit. In this way, they performed a scientific evaluation of available resources, which will directly influence further on-boarding activities. In other words, all repositories, thematic and generic services that are part of the WP6 workflows will be on-boarded in the upcoming period.

We doubled the amount of the information stored within the catalogue in the first half of 2021. The resource providers performed updates the catalogue, and as a result, we now have 74 registered users, 31 resource providers, and 73 resources. Out of these, we on-boarded 22 resource providers, 5 repositories, 8 thematic services, and 5 generic services. In addition, all services (8 in total) from the pre-production environment are on-boarded as well.

The AGORA software is under permanent development, and the NI4OS-Europe instance is regularly upgraded to the latest version. Besides numerous new features, the major upgrade in the previous period is integration with the central EOSC catalogue, which is done in collaboration with the EOSC Enhance project. We would like to stress that NI4OS-Europe is the very first external catalogue integrated with the EOSC marketplace. This integration establishes a trusted channel between these two catalogues, and resources/providers marked as on-boarded within the NI4OS-Europe catalogue are automatically published into the central EOSC one. Thus, practically, the resource/provider on-boarded to the NI4OS-Europe catalogue is also on-boarded to EOSC.