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NI4OS-Europe

National Initiatives for Open Science in Europe

Deliverable D2.4
Stakeholder map, inventory, policy matrix update

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Abstract: Deliverable D2.4 - Stakeholder map, inventory, policy matrix update: Along with identifying changes in the landscape (new stakeholder clusters within NOSCIs; new inventories; new policies), the deliverable provides the details as captured in the second half of NI4OS-Europe, highlights the value of the sources of information created during the project and mechanisms to keep these sources updated.

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List of Acronyms

EOSC	European Open Science Cloud
EU	European Union
FAIR	Findable, Accessible, Interoperable, Reusable
MoU	Memorandum of understanding
NOSCI	National Open Science Cloud Initiative
OA	Open Access
ORDM	Open research data management
OS	Open Science
RoP	Rules of Participation
SEE	Southeast Europe
UoB	University of Belgrade
WG	Working group
WP	Work package

Executive summary

What is the focus of this Deliverable?

Along with identifying possible changes in the landscape, the deliverable seeks to establish whether the project has created relevant resources for future landscape analyses and mechanisms to keep these resources updated.

It seeks to answer the following questions:

- In case of a new landscape analysis, would it be possible to apply a different approach and methodology?
- To what extent the resources created during the project fill in the identified gaps?
- What can be done to optimize the outcomes of the project actions?

What are the deliverable contents?

After a brief presentation of the results of the initial landscaping activity, the deliverable focuses on the main landscaping elements covered in D2.1: stakeholder map, inventory, and policy matrix. The three sections conform to the same scheme: an outline of the main problems identified in the initial landscaping is followed by a discussion about the ways in which these have been addressed through the project activities and recommendations for further action.

Conclusions and recommendations

Conclusions drawn from the analysis suggest that in the case of a new landscape analysis it would be possible to use a different methodology than the one used in landscaping analysis in 2019. The public sources of information created through the project activities and new networks and collaborations would make it possible to conduct a comparative case study using data collection templates and targeting local experts, as well as a survey targeting representative samples of OS stakeholders. At the same time, available data sources would not allow for a reliable desk research.

The stakeholder map should be updated once the process of establishing National Open Science Cloud Initiatives (NOSCIs) is finalized. Project partners who wish to establish NOSCI portals should be encouraged to reuse the resources created during the project as much as possible (stakeholder map, service catalogue, training materials). Furthermore, NOSCIs will be empowered to collect and update relevant information after the project.

1. Introduction

This deliverable is intended as an update to the initial landscape analysis conducted by the NI4OS-Europe team in the autumn of 2019, at the beginning of the project, with the aim of mapping the existing Open Science (OS) initiatives, infrastructures, services, policies, stakeholders and topics in each of the partner countries.[1] The activity was also relevant in the context of the EOSC Landscape Activity and the NI4OS-Europe survey results were later used in a report drafted by the EOSC Secretariat, which summarized the results of the landscape activities of the regional INFRAEOSC 5b projects.[2]

The direct results of the 2019 NI4OS-Europe landscape activity include:

- Deliverable *D2.1: Stakeholder map, inventory, policy matrix* [1], which did not include a detailed analysis of the collected responses but rather offered general information about the structure of the responses, the initial mapping of infrastructures and services and a policy matrix based on the responses.
- The stakeholder map on the NI4OS-Europe website (https://ni4os.eu/os-stakeholders-map/).
- A dataset containing stakeholder information, deposited in Zenodo under an open license [3].
- The survey results, which were delivered to all partners and used as input data for various deliverables (especially as a starting point for planning further actions).
- Visualizations of select subsets of the results: EOSC and FAIR awareness in the partner countries and in various stakeholder groups, training and support, and the concept cloud showing the stakeholders' expectations from EOSC (https://ni4os.eu/survey-results/).

The main reasons why Deliverable D2.1 did not present a thorough analysis of all survey results were the large scope and the uneven quality of the collected data (some responses were assessed as insufficiently reliable) and, especially, the desire to avoid the duplication of effort, as the preparation of a number of other deliverables was in progress and most of them contained an analysis of a particular subset of the survey data. Some survey results that had not been analyzed in D2.1 were later covered in *EOSC: Landscaping analysis*.[2]

In the meantime, new entities have emerged in the Open Science landscape in Southeast Europe (SEE) – National Open Science Cloud Initiatives (NOSCIs), as stakeholder clusters that can take various forms (task forces, consortia, national projects, etc).[4] NOSCIs belong to the group of the so-called EOSC national structures in EU Member States, Associated Countries, and Switzerland established with "the goal of supporting the countries in organizing the EOSC coordination and engagement activities at local level".[5, p. 5] The process of establishing NOSCIs in the NI4OS-Europe partner countries has been coordinated and monitored under WP2, and the rationale behind the concept and the blueprint for the establishment of NOSCIs are extensively explained in Deliverable D2.2: National OSC initiatives models,[4] whereas the NI4OS-Europe website provides information about the progress made in this process (e.g. https://ni4os.eu/15-national-osc-initiatives/). In the context of this deliverable, NOSCIs will not be analyzed in terms of their model, size or structure, but rather in terms of their potential to create and maintain resources that could provide input for EOSC maturity assessment relying on the living indicators defined by the EOSC regional projects.[5, pp. 57–60], [6]

The present update has multiple purposes. Along with identifying possible changes in the landscape (new stakeholder clusters within NOSCIs; new inventories; new policies), it seeks to establish whether the project has created relevant resources for future landscape analyses and mechanisms to keep these resources updated.

While we may not be able to assess accurately to what extent project activities, and other related activities, have changed the landscape, as this is still a work in progress, it is apparent that relevant sources of information have been created and/or pooled together, especially at the national level. When conducting the initial landscape analysis, NI4OS-Europe had to struggle with the lack of reliable sources of information to a greater degree than other INFRAEOSC 5b projects. The methodology used in the landscape analysis was largely determined by this circumstance and the issue of data sources was extensively discussed in D2.1. For this reason, the main focus of this report will be on the available, and especially newly created sources of information, seeking to answer the following questions:

- If we conducted a landscape analysis now or in the near future, would it be possible to apply a different approach and methodology?
- To what extent the resources created during the project fill in the identified gaps?
- Whether, and if yes, how we can ensure that data relevant for landscape analyses on Open Science are regularly updated and that the created sources of information are maintained after the project?

2. Methodology

The present analysis uses desk research to investigate whether:

- It is possible to trace changes in the NI4OS-Europe landscape.
- The quality of the available information relevant for landscape analysis has improved.

The backbone of the initial landscape analysis was a cross-sectional survey targeting a strategic sample of respondents. It was supported by desk analysis and input provided by project partners (primarily in the process of identifying stakeholders, who were also survey respondents). Although a considerable number of responses were collected, the sample was not representative and the coverage of various countries and stakeholder groups was uneven. As a result, some subsets of data were unreliable (e.g. policies, or services). This is one of the reasons why the present update will not use the same methodology as the initial landscape analysis: is unlikely that a new survey would provide more reliable data. The other reason is that new sources of information have been created through NI4OS-Europe activities, but also through data collection activities of the EOSC Secretariat and the EOSC Landscape WG in which NI4OS-Europe partners have been involved. Furthermore, the main focuses of the present update are not absolute facts and figures because the landscape is still rapidly changing.

Along with Deliverable D2.1, the analysis relies on the following sources of information:

Documents:

- *Country sheets analysis: report from the EOSC Executive Board Working Group (WG) Landscape* [7].
- *EOSC: Landscaping Analysis, which integrates the results of the landscaping activities of the four regional INFRAEOSC 5b projects* [2].
- NI4OS-Europe deliverables (https://ni4os.eu/project-results/).
- *EOSC National Structures: an overview of the national EOSC coordination and engagement mechanisms in Europe* [5].

Registries:

- OpenDOAR (https://v2.sherpa.ac.uk/opendoar/).
- OpenAIRE (https://www.openaire.eu/).
- re3data (https://www.re3data.org/).
- NI4OS-Europe Service catalogue (https://catalogue.ni4os.eu/).
- ROARMAP (http://roarmap.eprints.org/).

Websites:

- NOSCI pages on the NI4OS-Europe website (https://ni4os.eu/15-national-osc-initiatives/).
- NI4OS-Europe website (https://ni4os.eu/).
- NOSCI portals (Albania: https://ni4os.rash.al/en/; Bosnia and Herzegovina: https://nauka.link, Bulgaria: https://bpos.bg/, Croatia: https://www.srce.unizg.hr/hr-zoo/, Hungary:www.openscience.hu, North Macedonia: https://www.nosci.mk/,Romania: https://uefiscdi.gov.ro/ro-nosci,Serbia: http://open.ac.rs/, Slovenia: http://odprtaznanost.si).

3. Landscape elements and topics

In this section, we will briefly sum up:

- The work presented in D2.1.
- The activities and results that stemmed from deliverable D2.1.
- The outcomes of other project activities relevant for landscape analysis.

Based on this information, updates and further actions will be suggested.

The analysis will focus on the elements covered in D2.1 and it will, in essence, follow the structure of Chapter 4 in D2.1, focusing on the points where the need for further elaboration was identified in the initial landscaping and the ways in which these points have been addressed through the project activities across working packages. Each subsection ends with an evaluation of the performed work and suggestions regarding the possible follow up actions.

Deliverable D2.1 did not cover the full range of areas and topics addressed in the landscaping activity. It focused on the following landscape elements and the analysis was based on the complete responses only:

- OS stakeholders – identification and structure.
- Services: generic services thematic services, publication and data repositories, and other services; the inventory was based on the survey results, but the data were checked and refined.
- Policies: Open Access (OA) to publications, policy compliance monitoring, OA to research data, preservation of scientific information, information and data security, and mandatory software sharing; the policy matrix was based on survey results, some of which were apparently unreliable.

Other topics relevant for landscaping were addressed in a number of NI4OS-Europe deliverables and the report *EOSC: Landscaping analysis*. Table 1 summarizes the coverage of landscape elements and topics in various sources.

Table 1 Coverage of landscape elements and topics in various sources

	Specific topics	D2.1 [1]	NI4OS-Europe website	Other NI4OS-Europe deliverables	*EOSC: Landscaping analysis* [2]
Stakeholders	Stakeholder structure	tables	map		
	EOSC and FAIR awareness		diagrams		
	Benefits expected from EOSC		diagram	D4.3 [8]	
	Contribution to EOSC				
	Liaison with EOSC-related initiatives and projects		list	D2.3 [9]	

	Specific topics	D2.1 [1]	NI4OS-Europe website	Other NI4OS-Europe deliverables	EOSC: Landscaping analysis [2]
Inventory	Publication repositories	list		D4.3 (aggregated results)	
	Data repositories	list		D4.3 (aggregated)	
	Other services	list		D4.3 (aggregated), WP5[1] deliverables	
	Access and authentication			D4.3	
	Identifiers			D4.3	
	User communities			D4.3, D6.1 [10], D6.2 [11]	
	Training available		diagrams	D4.1 [12], D4.2, D6.1, D6.2	
	Training needs		diagrams	D6.1, D6.2	
	EOSC integration			WP5 deliverables[2], D6.1	
Policies	OA to publications	list		D4.1	
	OA to research data	list			
	Policy compliance monitoring	list			
	Preservation	list			
	Security	list			
	Software sharing	list			
	Research evaluation			D4.1	
	ORDM and FAIR incentives			D4.1, D4.2	
Funding	Business and procurement models			D2.5	

D2.1 identifies the following problems:

- There are no curated national or regional registries where one could find stakeholder lists and contacts (this was required in the process of identifying

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[1] Survey data were not the main source of information.

[2] Survey data were not the main source of information.

survey participants, but was also relevant in the process of identifying the target audiences for NI4OS-Europe training, on-boarding and outreach activities).

- There are no standardized and curated national or regional registries of services relevant for OS; the information provided by major international registries, such as OpenDOAR, re3data, FAIRSharing, etc. is incomplete.
- The information about OS policies is incomplete, the most reliable source being the OpenAIRE country pages (but not all partner countries are involved in OpenAIRE).

The present analysis uses the following indicators of change:

- Stakeholder registries are in place.
- Service registries are in place.
- The number of repositories in re3data, OpenDOAR and OpenAIRE.
- Policy registries or reliable sources of information about policies are available.

3.1. Stakeholders

The process of identifying stakeholders included several phases, as described in D2.1.

The first step was defining stakeholder groups and the following groups were defined:

1. **Funders and policymakers – FUND** (the actors who fund research and, most commonly, shape research-related policies.;
2. **The ones who perform research – CREATE** (research performing organizations and researchers).
3. **The ones who perform research – SUPPORT** (repositories, research infrastructures, e-infrastructures, service providers, libraries).
4. **The ones who "consume" research – CONSUME** (SMEs and citizens).
5. **OS facilitators (including OS initiatives) – FACILITATE** (international nodes, coordinators).

Once the stakeholder groups were defined, the partners provided either lists of institutions classified into stakeholder groups, or merely the number of entities per each group (Armenia, Bosnia and Herzegovina, Croatia and Montenegro). The number of stakeholders identified in the initial phase is shown in grey cells in Table 2. After the survey and D2.1 had been completed, the partners were asked to update the missing information on stakeholders by providing the names of institutions, their postal addresses, and websites. The updated information was used to create the stakeholder map (https://ni4os.eu/os-stakeholders-map/) on the NI4OS-Europe website. The visualization was done in line with the plan proposed in D2.1: open-source software (Leaflet) was used and the underlying dataset was published under a free license (CC-BY 4.0) in Zenodo.[3]

Figure 1 Stakeholder map
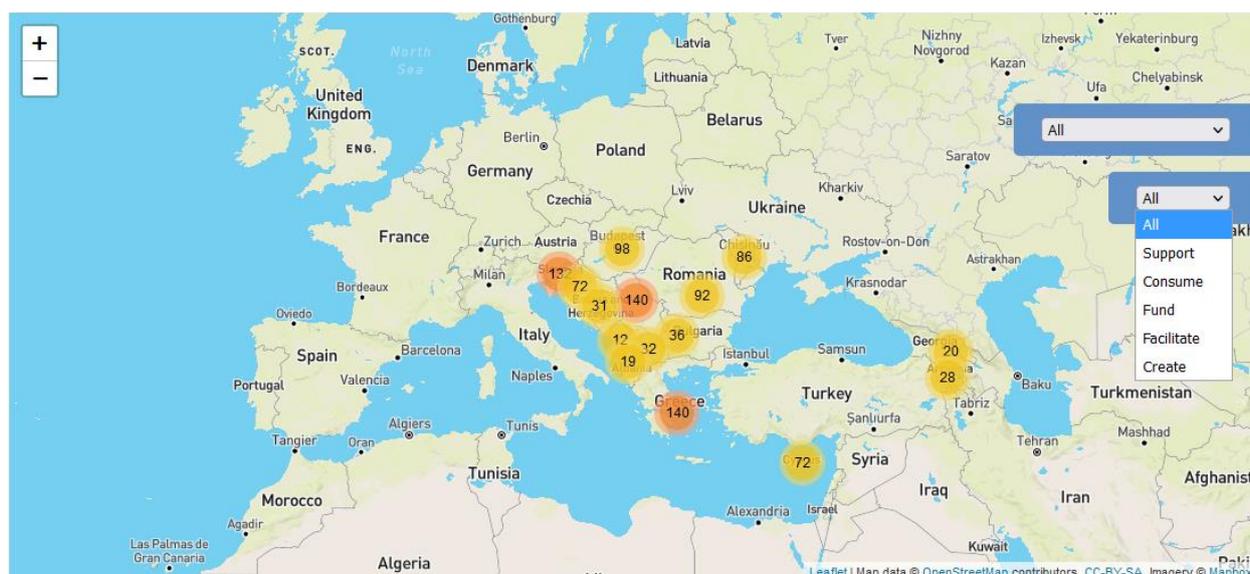
Table 2 Stakeholders in partner countries: partners' initial input *vs.* the final stakeholder map

Country	Fund 2019	Fund (map)	Create 2019	Create (map)	Support 2019	Support (map)	Consume 2019	Consume (map)	Facilitate 2019	Facilitate (map)	Total 2019	Total (map)
Albania	2	2	14	14	3	3	0	0	1	0	**20**	**19**
Armenia	3	4	14	23	5	0	3	1	2	0	**27**	**28**
Bosnia and Herzegovina	3	3	8	11	7	10	3	6	2	1	**23**	**31**
Bulgaria	3	3	17	17	8	8	5	5	3	3	**36**	**36**
Croatia	2	0	90	54	45	15	20	3	4	0	**161**	**72**
Cyprus	21	20	32+13[3]	32	22	13	7+3	7	4	0	**102**	**72**
Georgia	1	1	6	14	3	4	0	1	2	0	**12**	**20**
Greece	16	15	59	58	59	48	15	11	15	8	**164**	**140**
Hungary	6	6	52+12	52	28	28	4	4	7	8	**109**	**98**
Moldova	3	3	46	46	30	30	2	2	5	5	**86**	**86**
Montenegro	2	1	5	5	10	0	6	6	3	0	**26**	**12**
North Macedonia	4	4	18	21	4	4	9	3	0	0	**35**	**32**
Romania	6	6	27+7	27	33	33	24	24	2	2	**99**	**92**
Serbia	4	4	107+4	106	17	17	10	10	3	3	**145**	**140**
Slovenia	5	6	47+26	63	30	43	4	4	13	16	**125**	**132**
Total	**81**	**78**	**604**	**543**	**304**	**256**	**115**	**87**	**66**	**46**	**1170**	**1010**

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[3] The formula "+n" indicates individuals identified as stakeholders.

Table 3 shows the shares of the five stakeholder groups in the survey responses, in the partners' initial input, and in the final stakeholder map.

Table 3 Stakeholder representation

Stakeholder group	Survey responses		Partner's initial input		Stakeholder map	
Fund	41	7.13%	81	7.22%	78	8.98%
Create	403	70.09%	604	53.83%	543	62.49%
Support	94	16.35%	256	22.82%	115	13.23%
Consume	25	4.35%	115	10.25%	87	10.01%
Facilitate	12	2.09%	66	5.88%	46	5.29%

Tables 2 and 3 show slight differences between the partners' initial input and the data underlying the stakeholder map (updated early in 2020). Interestingly, there are significant differences in the numbers (Croatia and Cyprus) and some stakeholder groups are missing in the updated data (Armenia, Croatia, Montenegro). This may suggest that the initial input was based on the partner's rough estimation of the sizes of particular stakeholder groups.

The stakeholder map and the information about stakeholders have been a reference point in the discussions regarding NOSCIs and when organizing training and dissemination events. At the same time, the activities related to the establishment of NOSCIs, as well as the materials created in this process, suggest that the stakeholder map created in 2020 captured the situation, which is subject to change, in a particular moment. Accordingly, there should be a mechanism in place to update the map and the underlying data. At this point we aim to consider whether there can be a two-way exchange of information between the stakeholder map and the NOSCIs.

The (planned) structure of the NOSCIs, as indicated by the country pages on the NI4OS-Europe website reflects a different share of individual stakeholder groups identified in the corresponding countries. According to the data provided on the country pages on the NI4OS-Europe website (https://ni4os.eu/15-national-osc-initiatives/), based on the data available in the data collection templates used in the EOSC Secretariat landscaping activity [5], the Create and Support groups prevail in the structure of NOSCIs, which is in line with the stakeholder map. Funders are currently included in four initiatives but, it may be expected that at least national research funders will get involved in all NOSCIs by the end of the process, once all MoUs are signed. The Facilitate group is almost entirely missing in NOSCI pages. The role of OS facilitators usually overlaps with other roles – most commonly those typical of the Support group. This may be one of the reasons why they are poorly represented, or rather poorly visible, in the initial set of identified stakeholders and even more so in the survey results[4] and the stakeholder map. They may be involved in the process of establishing NOSCIs, but they are not visible as the Facilitate group, as evidenced by the fact that on NOSCI pages some countries mention NRENs, OpenAIRE NOADs or RDA nodes as being involved in the NOSCIs as members of other stakeholder groups. Another group that is not represented in NOSCIs is Consume (including mostly

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[4] Most probably, they responded to the survey as representatives of a different stakeholder groups, most commonly Support.

SMEs and citizens). This group was also underrepresented among the initially identified stakeholders and survey respondents, as well as in the stakeholder map. One of the reasons may be that in some countries this group is particularly difficult to mobilize for OS activities.

Figure 2 The page dedicated to NOSCIs in the partner countries (NI4OS-Europe website)

Table 4 Representation of stakeholder groups in NOSCIs

Country	Fund	Create	Support	Consume	Facilitate
Albania			■		
Armenia		■			
B&H		■			
Bulgaria		■	■		
Croatia	■				
Cyprus		■			
Georgia		■	■		
Greece		■	■		
Hungary		■			
Moldova		■	■		
Montenegro		■	■		
North Macedonia		■			
Romania	■	■	■		
Serbia	■	■	■		
Slovenia	■	■			

One reason for an uneven representation of various stakeholder groups lies in the fact that the majority of NOSCIs follow a Hybrid or Top-down set-up approach. This means that the NOSCI teams have focused, as a first step, on strengthening their links with funders, policy makers and the government, securing their support. According to the EOSC Secretariat landscaping activity [5], having the support of decision makers and funders is a crucial success factor for the NOSCIs and their sustainability. Accordingly, it is expected to have limited representation in some stakeholder groups in the first months of NOSCIs' operation. In the future, we expect to observe the changes reflecting a more inclusive picture.

Another reason for the absence of some stakeholder groups in the current structure of the NOSCIs lies in the fact that the data collection templates designed by the EOSC Secretariat, which are the source of information for the country pages, use a different classification of stakeholders. In the templates, these two groups are not explicitly mentioned and may be only added under "other". The *EOSC Landscaping analysis* published by the EOSC Secretariat, which integrates the results of the landscape surveys conducted by the five INFRAEOSC-5b projects, highlights that these two stakeholder groups were included in the landscape analysis only by NI4OS-Europe "in order to better reflect the situation in the countries under analysis".[2, pp. 16–17]

Interestingly, some stakeholders are not present in the stakeholder map appear as NOSCI members (e.g. in Croatia). This may suggest that new OS stakeholders have been identified in the meantime.

All this suggests that the stakeholder map should be updated and the right moment for the update is the end of the process of establishing the NOSCIs. The mechanism to update the map is simple and straightforward:

- Project partners will be invited to revise the tabular data collected when creating the present map.
- The revised data will be converted to the appropriate format and imported in Leaflet to generate a new map.
- The collected data will be exported to CSV format and uploaded to Zenodo as a new version of the existing dataset; appropriate metadata will be provided to explain the changes to the initial dataset.

3.2. Inventory

In the initial landscaping activity, it was not possible to rely on publicly available service registries when mapping repositories and other OS-related services in the region. That is why this information was collected using a survey. However, the quality of the collected data was disputable and additional refinement was required. The refined lists of publication and data repositories, as well as other services, were presented in the annexes to D2.1.[1, pp. 58–66] Repository and service policies were not analyzed because the collected information was inconsistent, some policy documents were not available and some were in local languages – accordingly, it was impossible to check it.

As the candidates for on-boarding among generic and thematic services had largely been identified during project preparation, the survey data about other services were not used for this purpose. Only the refined survey data about repositories were partly used. [13]

Project partners were advised to encourage local stakeholders to register their repositories with OpenDOAR, re3data and OpenAIRE. Table 5 reveals that three countries with zero records in OpenDOAR in 2019 have added a number of repositories to this registry, while seven countries have registered new repositories.[5] Furthermore, project activities have certainly helped improve the situation regarding repository and service policies, although the beneficial impact is difficult to measure while the work is still in progress.

Newly created sources of information include the NI4OS-Europe Service Catalogue (https://catalogue.ni4os.eu) and national Open Science portals in the partner countries (currently nine).

Table 5 Publications and data repositories in 2019 and 2021 according to various sources of information

country	Responses 2019	OpenDOAR 2019	OpenDOAR 2021	re3data 2021	OpenAIRE 2021	National portal 2021	NI4OS-Europe Service Catalogue
Albania	0	1	1	0	0	-	-
Armenia	2+1[6]	0	2	0	1	-	1
Bosnia and Herzegovina	2	2	2	1	0	-	-
Bulgaria	2+1	9	11	0	2+2	8	-
Croatia	26+1	119	148	3	64	-	2+1
Cyprus	5+1	0	6	2	5	-	1
Georgia	3	0	4	0	0		1
Greece	4+4	39	39	10	9		0+1
Hungary	9	43	44	5	12	45	1
Moldova	9	11	12	0	1	-	1
Montenegro	1	0	0	0	0	-	-
North Macedonia	2+1	5	5	1	2	-	1
Romania	0+1	5	6	1	0	-	-
Serbia	14	28	48	3	30	62	18
Slovenia	5+3	12	13	4	9	-	-

The NI4OS-Europe Service Catalogue provides information about repositories, thematic, generic and core services, as well as about service policies. Although it offers a good framework for resource description, relying on templates [14, p. 19] that are well aligned with the EOSC Rules of Participation (RoP) [15] and the EOSC Portal data model [16], and goes far beyond the initial list of candidates for on-boarding, it is not realistic to expect

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[5] In case of Croatia and Serbia, the increase is significant.

[6] Publication repositories + data repositories

that an exhaustive inventory of repositories and other services will be created in the context of WP5 and the on-boarding process, nor is this the purpose of WP5.

The responsibility for compiling and maintaining national service catalogues could be entrusted to NOSCIs. Two countries have already started building service catalogues within NOSCI portals (Croatia, Slovenia), whereas one (Albania) has integrated the NI4OS-Europe Service Catalogue into the NOSCI website. Resource description and policy templates have been designed to support the on-boarding process[7] and a set of tools have been created to automate license clearance,[8] EOSC RoP legal and ethical compliance,[9] and drafting repository and privacy policies.[10] The project has created robust guidelines and a network of experts to support the process of establishing national service catalogues.

3.3. Policy matrix

At the moment when the survey was conducted, no comprehensive sources of information about policies were available. The information available in the Registry of Open Access Repository Mandates and Policies (ROARMAP) was neither up-to-date not properly curated (misclassified policies, dead links, etc.). OpenAIRE country pages provided up-to-date information but not all partner countries are included in OpenAIRE. This was the main reason why survey was used to collect the information about policies. However, the survey data about policies have revealed a number of challenges related to policy tracking and paved the way for alternative solutions in the NI4OS-Europe project. While the information on the national level was reliable and fairly easy to verify, the data on institutional policies were highly unreliable and practically impossible to check, as institutional policies were mostly not available online and even if they were, it was difficult or impossible to analyze them because they were in local languages. Accordingly, institutions that claimed to have policies regarding OA to publications, policy compliance monitoring mechanisms, OA mandates relating to research data, policies on the preservation of scientific information, information and data security, and mandatory software sharing were listed in D2.1 [1, pp. 37–66] but the data were not analyzed.

This effort reveals the need for curated international policy registries. Although project partners were advised to update OpenAIRE country pages and register national and institutional policies in ROARMAP,[11] this action was not expected to provide a long-term solution to the problem, primarily because the ROARMAP data model is outdated and does not cover all aspects of Open Science policies.

In the context of NI4OS-Europe, the problem of missing information sources was solved with the assistance of project partners. Additional information about policies relating to ORDM and the FAIR principles was collected by the authors of D4.1 (by sending an inquiry

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[7] https://wiki.ni4os.eu/index.php/NI4OS_wiki#NI4OS-Europe_policy_documents_and_templates

[8] https://wiki.ni4os.eu/index.php/License_Clearance_Tool_-_Description_and_Documentation

[9] https://wiki.ni4os.eu/index.php/EOSC_RoP_Legal_%26_Ethics_Compliance_-_Description_and_Documentation

[10] https://wiki.ni4os.eu/index.php/RePol

[11] Seven new policies from partner countries have been registered in ROARMAP after the survey.

to project partners).[17] Also, NI4OS-Europe partner countries provided information about policies in the country sheets used by the EOSC Landscape WG.[7]

An important step towards providing public information about policies in the region has been the creation of NOSCI pages on the NI4OS-Europe website, relying on the efforts behind the deliverable D2.2. The pages provide information about national-level policy documents in the area of OS. As far as institutional policy tracking is concerned, this will be the responsibility of NOSCIs, which are well positioned to collect, analyze, and disseminate this type of information.

Along with NOSCI pages, during the project, nine partner countries have established NOSCI portals, i.e. national OS portals, which could serve as valuable sources of information for landscape analyses. Table 6 shows the types of information available on NOSCI portals. Currently, three provide information about national OS policies and only one about institutional policies.

Table 6 Information avaialble on NOSCI portals

Country	URL	Stakeholder registry	Repositories	Service catalogue	National policies	Institutional policies
Albania	https://ni4os.rash.al/en/			■		
B&H	https://nauka.link					
Bulgaria	https://bpos.bg/		■		■	
Croatia	https://www.srce.unizg.hr/hr-zoo/			■		
Hungary	www.openscience.hu		■			
North Macedonia	https://www.nosci.mk/				■	
Romania	https://uefiscdi.gov.ro/ro-nosci					
Serbia	http://open.ac.rs/		■		■	■
Slovenia	http://odprtaznanost.si			■		

4. Conclusions

The presented analysis has provided sufficient information to assess to what extent the identified indicators of change are met.

- Progress in creating stakeholder registries:

The initial landscaping action resulted in a publicly available stakeholder map visualized on the NI4OS-Europe website. With contact and location information about 968 unique entities in the 15 SEE countries, it makes it easy to identify local and regional actors for new surveys or collaborations. The way the stakeholder map was developed sets a good practice example. The map was created using open-source software and the underlying data were published under a free license. This makes the map not only reproducible, but also allows for efficient updates and enables combining data into larger datasets, as well as deriving specific data subsets and generating the maps based on them (e.g. OS stakeholder maps for individual countries presented on NOSCI portals).

The stakeholder map will be updated once the establishment of NOSCIs is completed, to include newly identified or omitted stakeholders.

- Progress in establishing service registries:

The NI4OS-Europe Service Catalogue is well-aligned with the EOSC RoP and the EOSC Portal data model and it provides a good model for national service registries. Although it does not provide exhaustive information about services in the region, this is currently the most extensive and reliable catalogue of services in Southeast Europe and project partners are free to register services regardless of whether these are planned for on-boarding or not. It also provides valuable information about service policies. The partners who decide to create their own service registries should be encouraged to follow this model.

- The number of repositories in re3data, OpenDOAR and OpenAIRE:

Although the number of registered repositories has increased, the mentioned registries still do not provide complete information about repositories in the region. Keeping in mind that integration in OpenAIRE is a crucial step in the process of EOSC on-boarding (and registration in OpenDOAR is required for integration in OpenAIRE), the UoB team will organize a webinar for project partners where requirements and procedures will be additionally clarified. re3data will also be covered.

- Progress in establishing policy registries or other reliable sources of information about policies:

The information about national-level policies is currently available on NOSCI pages for all partner countries. Tracking institutional policies goes beyond the scope of NOSCI pages. The process of defining and/or updating institutional OS policies is still in progress in all partner countries and is expected to continue after the end of the project. NOSCIs are well positioned to take responsibility for tracking institutional policies.

- Considering NOSCI portals as source of information:

Although this goes beyond the scope of the project, we hereby present some recommendations regarding NOSCI portals. Currently, none of the nine portals provide a list or a map of local stakeholders and only some of them provide information about repositories, services and policies. In all NOSCI portals, information is available in local

languages, while less than half also provide information in English (Albania, Bulgaria, Croatia, and North Macedonia). The process of establishing national OS portals is still work in progress. These portals have the potential to serve as reliable sources of publicly available information about OS stakeholders, infrastructure and policies. Therefore, NOSCIs should be advised to include this information, both in the local language and in English.

- Overall outcome and outlook:

The landscape analysis conducted in 2019 provided abundant information about the state-of-the-art in the partner countries. Despite the uneven quality of the collected information, the survey provided a useful input for project activities and deliverables. In cases where the collected information was insufficiently reliable, the project team was able to find alternative ways to obtain required information. At the same time, the survey (and especially the unreliable, inconsistent or confusing data) was instrumental in revealing knowledge gaps, the lack of awareness, and locally specific issues, as well as in identifying priority areas of action and devising tailored, yet flexible, solutions that could be efficiently applied in the partner countries.

If we were to conduct a landscape analysis now, it would certainly be possible to use a different methodology from the one used in D2.1. In case of a new survey, it would be possible to select representative samples from the stakeholder map and target a smaller number of respondents likely to provide more accurate and more complete responses. Data collection actions using templates in the form of country sheets (EOSC Landscape WG and EOSC Secretariat) clearly demonstrate that a qualitative analysis relying on data collection templates and targeting local experts within NOSCIs would also be possible. However, available data sources still do not allow for reliable desk research, nor could they provide a full range of information necessary for EOSC maturity assessment relying on the living indicators defined by the EOSC regional projects.

Along with creating new sources of information relevant for landscape analyses, by establishing a network of NOSCIs, NI4OS-Europe has empowered local actors to assume responsibility for guiding and monitoring the adoption of Open Sciences policies and practices, as well as for collecting and updating information for landscape analyses after the end of the project.