*Research Lifecycle Management technologies for
Earth Science Communities and Copernicus users in EOSC*

Deliverable D2.1
Business Plan and Exploitation strategy – Issue 1

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History of changes

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V0.3	10/12/2021	First draft shared to ESI for peer review	Elizabeth A. Nerantzis	ALPHA
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V1	04/01/2022	Final delivery	Elizabeth A. Nerantzis	ALPHA

Glossary

Acronym	Explanation
ADAM	Advanced geospatial Data Management
CEMR	Council of European Municipalities and Regions
EC	European Commission
ECO	European Consumer Organisation
EDP	European Data Portal
EFDI	European Food and Drink Industry
EGD	European Green Deal
EOSC	European Open Science Cloud
F2F	Farm to Fork
FAIR	Findable, Accessible, Interoperable and Reusable
FDE	Food Drink Europe
GEO-GSNL	Geohazard Supersites and Natural Laboratories
ICLEI	Local government associations, Local Governments for Sustainability
ICTP	The Abdus Salam International Centre for Theoretical Physics
OECD	Organisation for Economic Co-operation and Development
SMEs	Small Medium Enterprises
PA	Public Administrations
RELIANCE	Research Lifecycle Management technologies for Earth Science Communities and Copernicus users in EOSC
RO	Research Object
VIP	Validation - Identification – Preparation
UNESDA	Union of European Beverages Associations

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Ref ID	Subject
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Executive Summary

This deliverable aims to present the approach and the methodology adopted for the exploitation plan; to provide preliminary market and competitive environment assessment together with first inputs on the roadmap for exploitation. It is worth to be noted that all the presented findings are still preliminary. These will be further updated in final version of the Business plan and exploitation strategy (v.2).

The starting point of the analysis is "open data", its role and significance in the European digital agenda. Open data are a vital part of the European digital agenda as they are seen as an enabler for the economy. As an enabler, the impact of open data is wider and crosscuts multiple sectors. In Europe, the open data market size, in 2019, this was estimated at EUR€ 184 billion and is forecasted to reach between EUR€ 199.51 and EUR€ 334.21 billion in 2025. Driving the market, the wide benefits that open data can create. Indeed, when it comes to efficiency gains and cost savings due to open data, the value created by open data goes beyond solely financial benefits. Not only does open data help businesses and governments generate more revenues due to new services, or reduce costs by working more efficiently, it can also help to save lives, save time, preserve the environment, and enhance knowledge transfer through language services.

In this framework, initiated in 2015 and launched in 2020, the European Open Science Cloud (EOSC) was created by the European Commission to build infrastructures to provide seamless access to FAIR (Findability, Accessibility, Interoperability and Reusability) data and interoperable services for the scientific community. Indeed, the EOSC enables a step change across scientific communities and research infrastructures towards seamless access; FAIR management; reliable reuse of research data and all other digital objects produced along the research life cycle (e.g., methods, software and publications). In this context, RELIANCE aims to build and deliver a suite of services of innovative and interconnected services that extend EOSC's capabilities to support the management of the research lifecycle within Earth Science Communities and Copernicus Users.

The EU scientific community represents the primary target market for the RELIANCE adoption. In Europe, there are over c. 810 research entities (Research institutes, Universities and higher- education institutes and national observatories) covering multiple domains of science and humanities. The majority of research entities institutions are based in Germany, Italy, Spain, France, Belgium, Austria and Poland. In these countries stand c. 58% of overall recognised research entities.
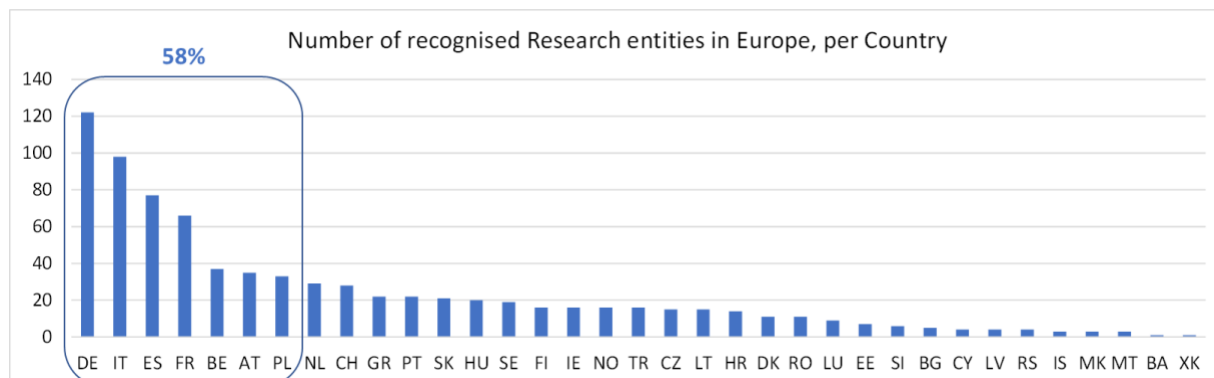

Figure 1 Number of recognised research entities in Europe, per Country, according to EUROSTAT

Working within such entities c. 72 million professionals in science, technology, humanities and social sciences. Among them, c. 15 million scientists and engineers are present. Over 52% of them work in Germany, France, Spain, Poland and Italy.
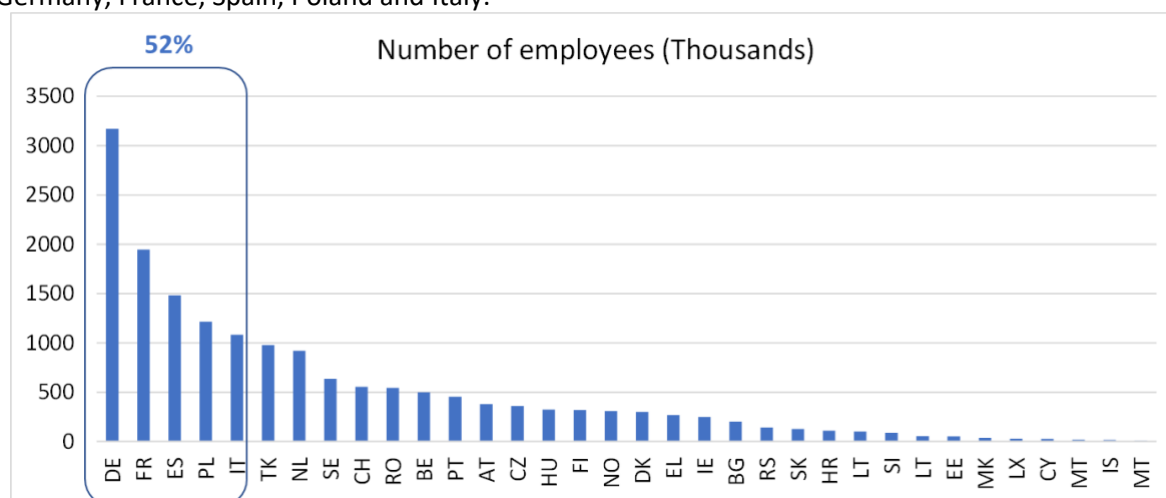

Figure 2 Distribution of scientist and engineers according to EUROSTAT, April 2021

Focusing on the number of scientists and engineers involved in R&D activities, these amount of c. 1,8 million researchers. In EOSC, more than 567,900 users, in continuous growth (reported growth rate of +90% in 2020). These are active users of research data and that have regular access to EOSC virtual environment, representing only c. 30% of the researchers involved in R&D activities.

Other relevant secondary markets have been as well identified such as the food and drink industry and public administrations as they could benefit from RELIANCE services [RD.01]. In detail:

- Food and Drink Industry (FDI) could use RELIANCE services as a "patent" to demonstrate the fairness of its production processes and chains, in line with the European Green Deal and in compliance with EU environmental and energy strategy, policies and regulations. The FDI is the largest manufacturing industry in the EU, generating a turnover of EUR € 1.2 trillion, with a R&D expenditure of EUR€ 2.9 billion. In this industry there are c. 291,000 companies (mainly SMEs) are based in Italy, France, Spain, Germany, Poland and Greece cover c. 70% of the food and drink industry. In particular, countries such as Italy (c. 56,400 companies), France (c. 54,260 companies) and Spain (c. 31,342 companies) have a leading position in terms of enterprises operating in the Food and Beverage industry, accounting for c. 48% of the overall European industry.

- Public administration (esp. cities and municipalities) could use RELIANCE in their activities and decisions in several fields, from the definition of sustainable and innovative strategies for tourism and healthy environment to intelligence and defense topics. More than 670 cities and municipalities with populations over 50,000 that could be targeted. Among these, there are c. 300 smart cities by 2020, that make use of open data on regular basis. Germany, Italy, France, Spain and Poland are the Countries which register the greatest number of cities, and that could represent key entry points for RELIANCE market roll-out.

Hence, when looking at the addressable markets, some country-markets have been identified and that could be targeted at different stages. As figure X shows, in blue, primary country markets could be addressed at a first, i.e.: Belgium, Germany, Italy, Poland, Spain and Sweden, as there are countries in which the Consortium network has a relevant reach. These markets are relevant in respect to the identified target industries; in purple, secondary county-markets, that could be targeted at a second stage in the market roll-out. They are: Austria, Bulgaria, Croatia, Czech Republic, Denmark, Greece, Ireland, Hungary, Slovakia, Slovenia, and United Kingdom. These countries are relevant when looking at their relevance across the industries identified and can be easily targeted by the RELIANCE consortium.
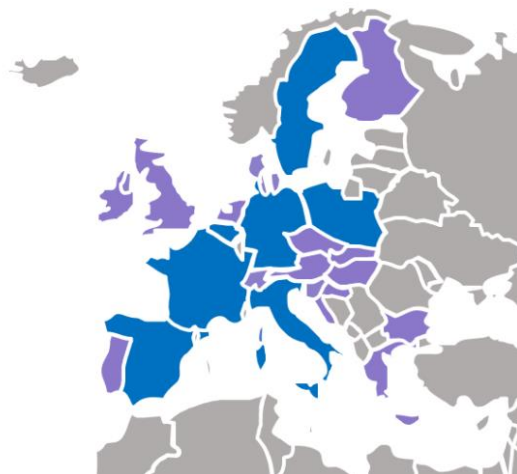
Figure 3 Potential addressable market for RELIANCE

A preliminary list of market trends has been identified. These include the push for open science, as it is a policy priority for the European Commission and the consideration of open science as the standard method of working under its research and innovation funding programmes as it improves the quality, efficiency and responsiveness of research. Indeed, the open data policy is linked with open research data policy since both address publicly funded data or their data results from public funding. Outside the research community environment, for the other identified markets (i.e., Food and Drink industry and public administrations), on top of the call for open science, there are regulatory drivers. In particular, these are derived from the European Green Deal (EGD) policy and Farm2Fork (F2F) strategy which is favored by the Common Agriculture Policy (2021-2027). Moreover, additional drivers influence the uptake of open data, such as the growing need of reliable data to improve entities' environment and sustainability impact; and increased consumer/citizen awareness, which lead to marketing strategies such as the "Ecolabel" and other initiatives driven by the sustainability imperative.

Competition is present within the target addressable markets (primary and secondary markets). Indeed, some solutions are already available on EOSC, while other solution represent main alternatives to RELIANCE services. In detail:

- ROHub competitors: Some initiatives are present such as RO-Crate[1], FAIRDOM-SEEK. These are spin-off initiatives of previous project that evolved into services build ad-hoc for the scientific community Nevertheless, these are not present on EOSC marketplace nor focus fully on Earth Observation, as RELIANCE aims to do;
- Text mining and enrichment service competitors: Ontotext text mining and enrichment service, SciBite Text Analytics and Semantic Enrichment; OpenAIRE Mining Service and DEEP[2] are already present in EOSC environment;
- Datacube competitors: Rasdaman Datacube, Open Datacube, Eurodatacube; EOXHub are some solutions already present that provide similar services to the one provided in RELIANCE.

Outside the scientific community environment, looking at the other potential markets environments for RELIANCE (i.e., the Food and Drink industry and Public administrations) the increasing demand of

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[1] It is worth to note that RELIANCE participates to RO-Crate. However, if RELIANCE Research Object can be integrated in such service, it is not possible the other way around, as the RO-Crate system does not allow it.

[2] This is a EU RIA project that ended in April 2020. However, its service is still available on EOSC marketplace. Source: https://cordis.europa.eu/project/id/777435/it

sustainable practices together with the growing awareness by consumers are impacting such industries and increasing the pressure on them and pushing them towards better practices and choices.

From a preliminary assessment, there are a few available tools and/or softwares that aim to support companies in addressing their sustainability goals. Some examples: Green Business Bureau's tools EcoAssessment™ and EcoPlanner™ enable businesses to understand, prioritize, implement and certify green initiatives and sustainable business practices; Sphera integrated Environmental, Social, and Corporate Governance (ESG) solution, a platform which aims to help companies achieve their sustainability goals. On top of these ad-hoc consultancy services are leveraged for such type of analyses and studies supporting both companies and cities/ municipalities to achieve their objectives. However, the solutions identified are not fully comparable, as they are somehow limited in the provision of certain types of information, and do not allow cross-topic analyses encompassing more than one field of research. In this context, the proposed RELIANCE solutions can also provide complementary information enabling such services to provide the "broad picture" in their analyses. Thus, RELIANCE services remain highly innovative as they allow to overpass the orthodox organizational structures of science with siloed and compartmentalized work that inhibits crosscutting and interdisciplinary cooperation to be up to the grand challenges of profound social environmental changes of our times, underpinning an intertwined relation between potential users, society and environment.

Opportunities and threats for RELIANCE uptake have been identified. Starting from the opportunities, these mainly concern the push for uptake of EOSC portal and marketplace at EC level, in the frame of the digital strategy activities. An additional asset for uptake is the involvement of trusted EOSC service providers, positioning RELIANCE in a relevant position. Looking at the threats, these concern the growing competition of similar services available on the EOSC marketplace, and populating the overall competitive landscape, and the still low level of EOSC' adoption. However, it is worth to highlight that, actions to boost EOSC' uptake have been undertaken.

An analysis of the value chain is provided, identifying the main components, actors and stakeholders that play a significant role. This preliminary assessment clearly outlines an environment of multiple stakeholders influencing the chain and calling for a shift of paradigm in the way science is done, from a closed environment to an open one, using FAIR data.

Additionally, a first risk analysis was performed (see also section 4). Up to date, the risk identified are mainly technical and industry commercial risks. In this context, mitigation actions have been proposed to address them. It is worth to highlight that, only risks related the service provisioning and solution uptake have been considered, while specific risks linked to the project are taken into consideration in a dedicated project risk assessment and in monthly progress reports in the frame of WP1 (see also [RD.01]).

Possible Business models that could be leveraged in order to commercialise RELIANCE services are described. In particular, two preliminary business models have been identified reflecting the differences among the potential user communities. In fact, RELIANCE solution and services can be provided through:

- The EOSC Catalogue and Marketplace, within the EOSC Portal, with the RELIANCE Consortium acting as service provider to accelerate data-driven research in Europe and targeting the scientific community, in compliance with all the EOSC policies and rules. It was agreed that RELIANCE services will be initially provided for free to the EOSC users;

- A Business to Business (B2B) approach, with the RELIANCE Consortium acting as content provider directly to the industry for an ad-hoc pricing strategy (including a one-off/entry price and annual fee), enhancing RELIANCE application areas and sustainability models

The Consortium can act as front-end towards EOSC and for the commercialization of the RELIANCE services outside the EOSC framework. In this context, the possibility to create a new commercial entity (the RELIANCE NewCo) that will be supported by all the involved partners is being evaluated. The main idea, here, is for the Consortium members to leverage their experience (in terms of Research Objects, Data Cubes, Text Mining), their presence across multiple continents and their contacts with different user communities.

At this stage, the RELIANCE services (i.e., Ro-Hub, DataCube, Enrichment) are already being made available on the on the EOSC marketplace on behalf of RELIANCE project Consortium, by recognised EOSC services providers, such as PSNC,MEEO and ESI. Nevertheless, the activity for the definition of the RELIANCE NewCo, to act as well as recognised EOSC provider, will be better defined and described in second Issue of the Business plan and exploitation strategy, as discussions on the topic are ongoing.

Additionally, first inputs for the exploitation strategy are provided. RELIANCE will focus first of all on EOSC potential users, trying to enlarge EOSC'user base as much as possible. Different strategies are proposed according to the addressable markets, favoring RELIANCE primary target market i.e., researchers and scientist. Some activities have been undertaken such as the involvement of national archives, the UNITWIN/UNESCO Chairs programme[3] and talks are ongoing with The Abdus Salam International Centre for Theoretical Physics (ICTP) [4]. On top of these, joint dissemination activity with the INFRAESOC 07 project stack[5] are being carried out. In this context, the raise of awareness of RELIANCE services across the different communities involved in the various project is one of the positive outcomes within the initiative, as it reaches other communities different from the ones involved in the RELIANCE project.

Overall, leveraging the consortium network will be crucial to reach potential new scientists, taking advantage of previous initiatives (e.g., EVER-EST user community) and focusing on specific geographies. As highlighted in section 3.1, Country-markets within Central-Mediterranean European countries (esp. Germany, France, Spain, Poland and Italy) as well as Scandinavian countries (esp. Sweden, Finland), could be targeted at first, expanding then the reach to other European countries. Nevertheless, in order adequately reached the identified addressable markets, it is key to undertake specific actions such as specific trainings and awareness raising campaigns to increase of adoption of both EOSC and, thus, RELIANCE services. Also, to ensure the continuity of the RELIANCE services after

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[3] The UNITWIN/UNESCO Chairs Programme, was launched in 1992, and involves over 850 institutions in 117 countries, promoting international inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work. The programme supports the establishment of UNESCO Chairs and UNITWIN Networks in key priority areas related to UNESCO's fields of competence – i.e. in education, the natural and social sciences, culture and communication. https://en.unesco.org/unitwin-unesco-chairs-programme

[4] The Abdus Salam International Centre for Theoretical Physics (ICTP) is an international research institute for physical and mathematical sciences that operates under a tripartite agreement between the Italian Government, United Nations Educational, Scientific and Cultural Organization, and International Atomic Energy Agency. More information is available here: https://www.ictp.it/

[5] The Horizon 2020 Programme's INFRAEOSC-07 task force project group includes EOSC Future, C-SCALE, EGI-ACE, OpenAIRE-Nexus, RELIANCE and DICE. The task force constitutes an important element in building up the infrastructure of the European Open Science Cloud. More information here: https://www.dice-eosc.eu/news-events/news/dice-participating-new-infraeosc-07-cross-project-collaboration-initiative

the project's end, additional funding opportunities will be exploited by the Consortium at national and supra-national/international level (e.g., Horizon Europe, ESA-ESRIN[6] open calls, …).

So far, the findings emerging from this document D2.1 seem promising. However, the findings will be further improved, and their outcome will be presented in the second issue of the present deliverable.

1   Introduction

RELIANCE, short for Research Lifecycle Management for Earth Science Communities and Copernicus users in EOSC, aims to realize the vision of FAIR research in EOSC by adopting a holistic research management approach based on three key and complementary technologies: i) Research objects (RO) as the overarching mechanism to manage scientific research activities, which relies upon ROHub platform as the reference service; ii) data cubes as the mechanisms enabling an efficient and scalable Earth Observation data access and discovery, which relies upon the Advanced geospatial Data Management (ADAM) platform as the reference service; iii) text mining and semantic enrichment services allowing to extract machine-readable metadata from RO resources, enabling researchers to discover scientific information at scale and to structure their own research, and which rely on the AI-based expert.ai platform as base system. As part of the integration in EOSC, RELIANCE services will leverage and integrate with some of the EOSC core-cross cutting and added value services, playing a complementary role to what is already available and bridging between various EOSC services. RELIANCE will pilot the services in three different Earth Science communities, fostering the use of Copernicus data and demonstrating their efficacy in real-life vertical and multi-disciplinary scenarios, and will launch an Open Call to engage other communities.

The present deliverable D2.1 "Business plan & exploitation strategy - Issue 1" is part of Work Package 2 "Outreach exploitation and capacity building", i.e., the RELIANCE Exploitation Plan, as main output of Task 2.1 "Exploitation strategy and business plan under the EOSC framework".

1.1   Purpose of the document

The objective of this "Business Plan and exploitation strategy" is to foster RELIANCE integration and adoption under the EOSC framework and demonstrating RELIANCE sustainability, presenting the business opportunities within and outside the EOSC portal.

This document presents the "Business plan and exploitation strategy - Issue 1" (D2.1). Two issues are foreseen for this document (D2.1 and D2.2) to include all the potential project updates, as foreseen by the amendment of the Description of Work (DoW)[RD.01] .

Main content by Business Plan and exploitation strategy deliverables

Issue	Content	Due date
D2.1 - Issue 1	Approach and methodology presentation. Preliminary market and competitive assessment. First inputs on environment assessment with a value chain analysis to support an effective strategy; preliminary risk analysis and first inputs on the business model(s) for RELIANCE and exploitation strategy	M12 (December 2021)
D2.2 - Issue 2	Finalised market and competitive environment assessment; final inputs on value chain and on risks analysis, related mitigation actions and possible required initiatives.	M24 (December 2022)

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[6] ESA-ESRIN is the European centre of excellence for exploitation of Earth observation missions.

	Consolidation of exploitation approach and presentation of the overall Business Plan and final exploitation strategy.	

1.2   Structure of the document

This document is organised in several chapters:
- Executive summary
- Chapter 1 is the introduction to the present document;
- Chapter 2 explains the methodology and approaches applied for the preparation of the deliverable;
- Chapter 3 outlines the market and competitive analysis, identifying the main market trends together with the main opportunities and threats for RELIANCE;
- Chapter 4 is devoted to the risk analysis mapping main economic and non-economic risks;
- Chapter 5 presents the initial business plan, presenting the current work in progress;
- Chapter 6 outlines the preliminary exploitation strategy; and
- Chapter 7 encloses the first conclusions.

2   Methodology

The methodology applied throughout the Task 2.1 is based on a Validation - Identification - Preparation (V.I.P.) approach, as summarized in the figure hereafter.
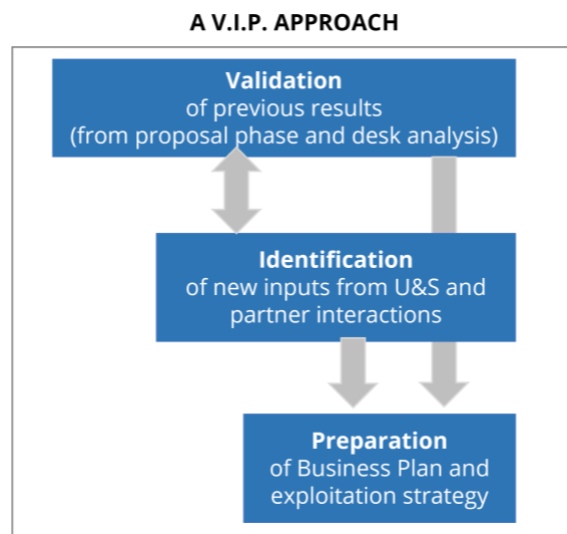
Figure 4 ALPHA's V.I.P. Approach

To reach the objectives foreseen by Task 2.1 (see Chapter 1.1) different sources have been used. The completeness of different sources allowed covering the key scope of the analysis and validating information considered as main outputs also for the other WPs.

First of all, the **interactions with potential end-users and stakeholders** of the proposed products and services will be paramount to draft a realistic analysis. A series of interviews will be carried out during the project to involve and collect feedback from key actors and stakeholders. In this sense, a list of contacts to be targeted will be prepared and an analysis of the stakeholders who provided useful feedback will document the results in the final version of the Business plan and exploitation strategy document. To this end, some iterations have been carried out at partner level for the present issue.

Nevertheless, these activities will continue and be carried out in view of the next release (Issue 2) to further validate and refine the presented information.
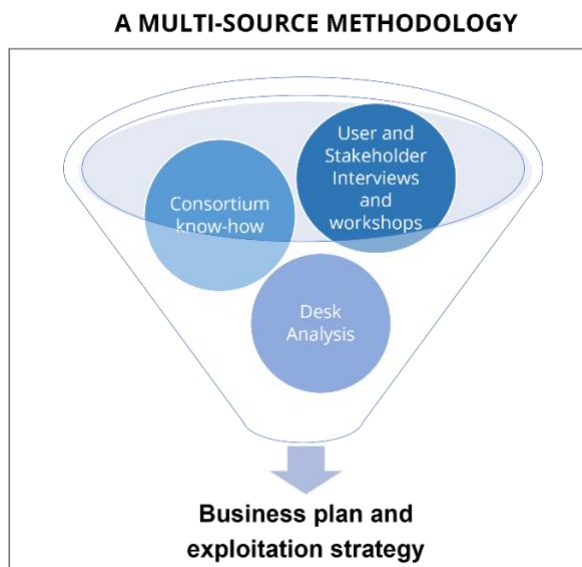
Figure 5 Source of information of the "Business plan and exploitation strategy" deliverables

To support a consistent collection of feedback, a user and stakeholder interview guideline will be prepared and handed out to project partners as reference document for interviews and/or other interactions with external contacts. The questionnaire will contribute to consolidate market and business data with inputs from experts and relevant stakeholders. These opportunities for interactions are also intended as a vector to engage stakeholders, e.g., to share the exploitation possibilities and attract interest in and obtain their endorsement of these solutions.

In parallel with the interview programme, **contributions from all consortium partners** on main economic and financial terms will be collected through the project.

Finally, a dedicated **desk analysis** is ongoing to complement inputs from primary research. Some of the key sources are:

- EC reports and resources;
- EOSC resources;
- Organisation for Economic Co-operation and Development (OECD) reports;
- European Food and Drink Association (EFDA) reports;
- Relevant magazines, journals, articles, and news resources.

Furthermore, dedicated events will be designed to collect information and validate the overall main results, including the progress meetings, official reviews and demonstrations.

All the information retrieved during the process of collection and study of these sources are presented, leveraging different models to conceptualize them as reported in Figure 6.
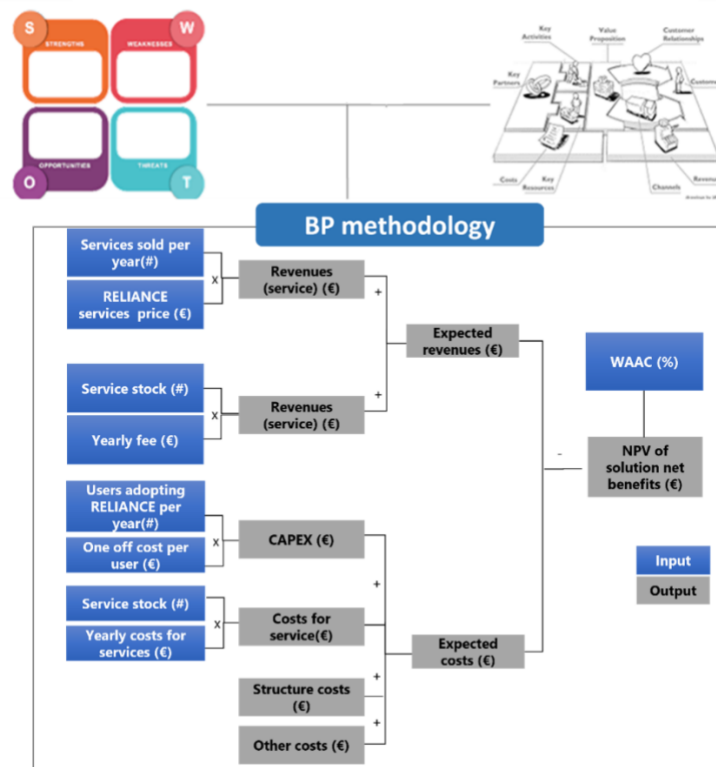
Figure 6 Main methodologies/ frameworks of analyses (illustrative)

As the example shows, we planned to adopt a mix of methodologies to make the analysis as effective as possible, such as:

- The Business Model Canvas for the business model;
- The SWOT analysis for the business venture; and
- Alpha's methodology for the Business Plan.

The identified methodologies are considered key tools to reach final results coming from the overall activities foreseen in this Task. In fact, the activities involved in the "Business Plan and exploitation strategy" have been defined during the early phases of the proposal [RD.01] and include the following:

- Analysis of the target user communities/ domain(s)/market(s) and of the competitive environment to identify segmentation, trends (both historical and expected), as well as key opportunities and threats for RELIANCE. The overall analysis will be coupled with an environment assessment and value chain analysis to support an effective strategy;
- Drafting of a risk analysis to map the main economic and non-economic risks linked to RELIANCE and identify main actions to avoid/ mitigate them;
- Preparation of an Overall Business Model and Business Plan quantifying key assumptions over a 5 to 10 years period, to obtain a long-term cash-flow prediction of the RELIANCE solution and highlight its sustainability;
- Design of an exploitation strategy aimed at defining key strategy and drivers for the exploitation; and
- Overall conclusions and recommendations.

3   Market and competition analysis

3.1   Market assessment

As of today, the use of data has become essential for every sector of activity from research to business activities. Data enables to extract relevant information leading to better research results as well as improved decision-making processes across organisations and building effective strategies to tackle possible issues. In this context, especially in science, data sharing is a usual practice because transparency and openness are considered by many to be part of the scientific method. On the other hand, it gives useful insights to face the Grand Challenges[7] and to improve business results.

Since the start of the open data movement, thousands of public datasets were opened across Europe enabling new applications and insights. Moreover, it initiated a switch of mindset about public data as "common good" to enable a fair and thriving European economy. Open data, hence, became a vital part of the European digital agenda and Member States implemented their national strategies accordingly. As a consequence, the European Data Portal (https://data.europa.eu/)[8] was created providing access to open data from international, EU, national, regional, local and geo data portals. The portal addresses the whole data value chain, from data publishing to data reuse. Going beyond collecting metadata (data about data), the strategic objective of the portal is to improve accessibility and increase the value of open data.

In this context, open data is seen as an enabler for the economy. As an enabler, the impact of open data is wider and crosscuts multiple sectors. In Europe, the open data market size, in 2019, this was estimated at EUR€ 184 billion and forecasted to reach between EUR€ 199.51 and EUR€ 334.21 billion in 2025 [RD.03]. Driving the market, the wide benefits that open data can create. Indeed, when it comes to efficiency gains and cost savings due to open data, the value created by open data goes beyond solely financial benefits. Not only does open data help businesses and governments generate more revenues due to new services, or reduce costs by working more efficiently, it can also help to save lives, save time, preserve the environment, and enhance knowledge transfer through language services.

In addition, seizing the opportunities brought by the digital revolution[9], to accelerate research and to engage the power of machine analysis at scale while ensuring transparency, reproducibility and social utility, data and other digital objects created by and used for research need to be Findable, Accessible, Interoperable and Reusable (FAIR)[10] [RD.04]**Error! Reference source not found.**.

With the mission to turn FAIR into reality, promoting the access and reuse of research data coming out of publicly funded research, the European Open Science Cloud (EOSC) aims to build infrastructures to provide seamless access to FAIR data and interoperable services for the scientific community. In brief, EOSC develops a 'Web of FAIR Data and services' for science in Europe upon which a broad spectrum of value-added services can be built. These range from visualisation and analytics to long-term information preservation or the monitoring of the uptake of open science practices [RD.05].

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[7] Grand Challenges are difficult but important problems set by various institutions or professions to encourage solutions or advocate for the application of government or philanthropic funds especially in the most highly developed economies and energize not only the scientific and engineering community, but also students, journalists, the public, and their elected representatives, to develop a sense of the possibilities, an appreciation of the risks, and an urgent commitment to accelerate progress. Source: https://en.wikipedia.org/wiki/Grand_Challenges

[8] The new portal replaces the EU Open Data Portal and the European Data Portal. Source: https://data.europa.eu/en/highlights/finding-open-data-2021-dataeuropaeu

[9] Europe Digital decade: making Europe fit for the digital age. https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en

[10] It is worth to note that FAIR data do not have to be open: restricted-access data may be FAIR, providing the metadata describing them are openly accessible.

In this context, RELIANCE aims to provides three core services to the EOSC environment service portfolio. They can be used both in stand-alone mode or can be partially of fully integrated to maximise their capacities, supporting the management of the research lifecycle within Earth Science Communities and Copernicus Users.

According to the "EOSC-hub D13.4 Periodical assessment of the services", EOSC services operated with the Virtual Access[11] have more than 567,900 users. The number of users is in continuous growth, as reported in [RD.02]. In particular, the users of EOSC services have been consistently increased (of c.90%) since the EOSC-hub began, showing a growing interest of the scientific community on them. This interest has been strengthened by the launch of the marketplace that allowed the project to reach new and diverse users, within and outside EU. In this context, RELIANCE will aim at providing research enabling and interconnected services with an added value to the whole research community, adapting them to the emerging needs of the EOSC users and the underlying technologies.

The EU scientific community represents the primary target market for RELIANCE's adoption. In Europe, there are c. 810 entities that have been recognised as research entities by EUROSTAT[12]. These are organisation feeding EUROSTAT microdata, i.e., are sets of records containing information on individuals, households or businesses. These entities are, generally, Research institutes, Universities and higher- education institutes and national observatories covering multiple domains of science and humanities.
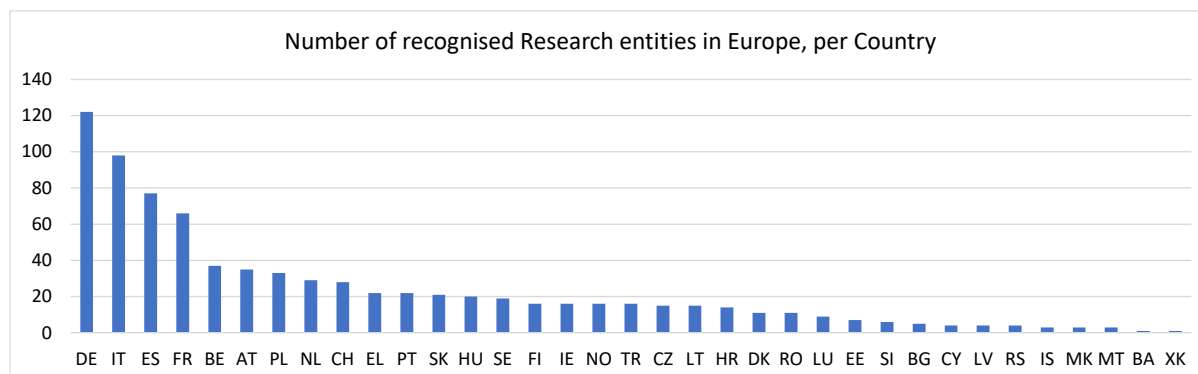
Figure 7 Number of recognised research entities in Europe, per Country, according to EUROSTAT

The majority of the research entities are based in Germany, Italy, Spain, France, Belgium, Austria and Poland. In these countries stand c. 58% of overall recognised research entities.

Working within such institutions, according to the latest EUROSTAT figures, in 2020, 72.9 million people in the EU aged from 15 to 74 were employed in science and technology [RD.06].
Within this 72.9 million, 67.7 million people were in the 25 to 64 age group. From this broad group 57.0 % were 'professionals' (of which 22.6% of 'Scientists and Engineers'(SE)) and 34.4% of 'Other professionals (other than 'SE')' and 43% were 'technicians'. Going further into detail, c. 15 million Scientist and Engineers are estimated in Europe. The majority of them live and work in Germany,

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[11] Virtual Access (VA) is a financial instrument to reimburse the access provisioning costs to access providers. This instrument is provided by the European Commission to increase the sharing of research infrastructures and services that otherwise would not be available to international user groups. In VA, the services – also called "installations" – must be made available 'free of charge at the point of use' for European or International researchers. VA access is open and free access to services through communication networks to resources needed for research, without selecting the researchers to whom access is provided.

[12] EUROSTAT Recognised research entities. These are recognised entities that contribute to EUROSTAT https://ec.europa.eu/eurostat/documents/203647/771732/Recognised-research-entities.pdf

France, Spain, Poland and Italy (c. 59% of scientist and engineers) [RD.07]. In this sense, these country-markets could represent key entry markets for initial RELIANCE market roll-out.
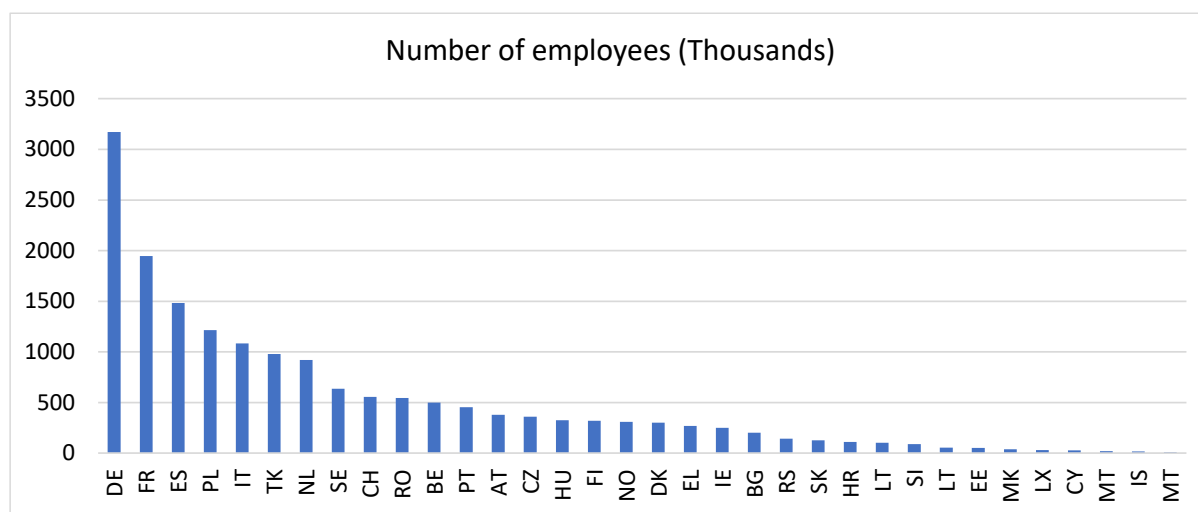

Figure 8 Distribution of scientist and engineers according to EUROSTAT, April 2021 [RD.06][RD.07]

Furthermore, focusing the scientist and engineers involved in R&D activities, these amount of c. 1,8 million researchers. These are active users of research data and that have regular access to EOSC virtual environment [RD.08]. These, together with the over 70 million professionals in science, technology, humanities and social sciences - i.e., the scientific community - represent a key target for RELIANCE services adoption, with a particular attention for sea monitoring, atmospheric and Geohazard user communities.

As per [RD.01] , on top of the scientific community - that remains the primary objective of RELIANCE-the proposed services can be further customized to impact other private and public actors, also outside the EOSC framework.

Cross-analysing the potential RELIANCE added-value and the Consortium expectations, two main segments have emerged as the most promising ones, although to a different extent, i.e.:

- *Food and drink industry:* private companies using RELIANCE services can contribute to make Europe climate-neutral and protect natural habitat, in line with the European Green deal and circular economy objectives and growth strategy.
- *Public administrations*: RELIANCE added-value services could be further tailored on the needs of these actors (e.g., allowing systematic monitoring of environmental variable of interest, correlations between scientific publications and specific regulations, policies or documents, adding ad-hoc market intelligence services or organising information in a usable way). In this way, RELIANCE could significantly support national or regional public administrations and authorities (e.g., Municipalities or Ministries) in their activities and decisions in several fields, from the definition of sustainable and innovative strategies for tourism to intelligence and defence topics.

Starting from the **Food and drink industry.** As mentioned in [RD.01] here, the RELIANCE services could be customized on the needs of different private stakeholders, in particular the food and drink industry could benefit from the proposed solution. In detail, companies can use RELIANCE service as a "license" to demonstrate the fairness of its production processes and chains: implementing studies and official research algorithms on geo-localized data into the Research Object would allow the systematic and repetitive measurement of e.g., usage of clean water, reduction in fertilizers, impact on greenhouse gas emission by using Copernicus data. In this way, RELIANCE can help food companies in becoming

leaders in clean/fair/sustainable production and technologies contributing to a greener economy, in line with the European Green Deal, the NextGenerationEU recovery plan[13], and incompliance with EU environmental and energy strategy, policies and regulations. This support will be of paramount importance considering the leading role in this industry.

In this context, the EU food and drink industry it the largest manufacturing industry in the EU, generating a turnover of EUR€ 1.2 trillion, with a R&D expenditure of EUR€ 2.9 billion [RD.10]. In half of the EU's 27 Member States, the "food and drink" industry is the biggest manufacturing employer. According to FoodDrink Europe[14], c. 291,000 companies are identified, highlighting the relevance and the fragmentation of such market [RD.10].**Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**

Food and drink industry data by Member State[1] (2018)

	Employment ranking in manufacturing	Turnover (€ billion)	Value added (€ billion)	Number of employees (1,000)	Number of companies
Austria	-	25.5	6.5	88.3	3,870
Belgium[2]	1	54.9	-	94.6	4,239
Bulgaria	1	6.2	1.2	95.3	6,185
Croatia	1	5.7	1.3	51.2	2,483
Cyprus	1	1.7	0.4	13.6	926
Czech Rep.	4	14.8	3.2	115.3	11,028
Denmark	2	23.2	4.6	54	1,649
Estonia	2	1.9	0.3	14.8	723
Finland	4	11.1	2.6	38	1,772
France	1	213.1	-	674.8	54,260
Germany	2	211.1	47.2	992.9	28,800
Greece[3]	1	15.5	3.2	120.6	16,050
Hungary	2	13	2.6	107.2	6,640
Ireland	1	27.5	9.8	57	1,800
Italy	2	141.3	29	462.1	56,400
Latvia	-	2	-	23.9	1,230
Lithuania	1	4.2	0.9	41.5	1,735
Luxembourg	1	1	0.3	5.8	154
Netherlands	1	76.2	13.5	135.6	7,038
Poland	1	54.6	12.3	393	16,912
Portugal	1	17.1	3.3	115.4	11,426
Romania	1	13.2	9.3	183.3	9,937
Slovakia	3	4.6	0.9	43.4	4,173
Slovenia[4]	4	2.2	0.5	14.1	755
Spain	1	116.9	30.8	426.3	31,342
Sweden	3	18.8	4.4	51	4,648
United Kingdom	1	119.5	32.5	433	10,715

[1] As published by FoodDrinkEurope National Federations or by Eurostat (SBS)
[2] Data for 2019
[3] Small food and drink producers and family businesses included in the number of companies
[4] Only limited liability companies, joint stock companies or similar
No data available for Malta

Table 1 Food and drink industry data by Member State, FoodDrinkEurope "Data and Trends, EU food & Drink Industry", 2020 Edition [RD.10]

As shown in Table 1, companies based in Italy, France, Spain, Germany, Poland and Greece cover c. 70% of the food and drink industry. In particular, countries such as Italy (c. 56,400 companies), France

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[13] NextGeneration EU is Europe recovery plan in response to the economic impact of COVID-19. This measure allocated 750 billion euros to projects addressing sustainability-related topics (e.g.: environment, natural resources, digital innovation…). More information here: https://ec.europa.eu/info/strategy/recovery-plan-europe_en

[14] FoodDrinkEurope represents Europe's food and drink industry, the largest manufacturing sector in the EU in terms of turnover and employment. It aims to promote the industry's interests to European and international institutions, contributing to a framework addressing, inter alia, food safety and science, nutrition and health, environmental sustainability and competitiveness. FoodDrinkEurope's membership consists of 26 national federations (including 2 observers), 27 European sector associations and 21 major food and drink companies. More info: https://www.fooddrinkeurope.eu/

(c. 54,260 companies) and Spain (c. 31,342 companies) have a leading position in terms of enterprises operating in the Food and Beverage industry, accounting for c. 48% of the overall European industry.

Despite their size, SMEs represent c. 99.2% of the total companies operating in Europe generating more than 40% of the food and drink industry turnover and value added and provide more than half of jobs.

Figure 9 Contribution of SMEs and large companies to the EU food and drink industry, FoodDrinkEurope "Data and Trends, EU food & Drink Industry", 2020 Edition [RD.10]

Moreover, it is worth to mention that COVID-19 pandemic had a great impact within the identified industry, and it is impressive that Europe's food (including beverages) supplies remained resilient, efficient and constant[RD.11]. In addition, the demand of for food labelled as healthy, sustainable and local food, which have been growing already before the pandemic, have only been accelerated by it [RD.12]. In this context, the identified Country-markets could represent an entry point for the uptake of RELIANCE customised services devoted to monitoring the environmental sustainability of Food and beverage industry, based on repetitive measures using certified data, algorithms and publications.

The other identified potential market is represented by **public administrations**, in particular cities**. In** particular, two-thirds of Europeans live in towns and cities. Their health and well-being depend on how well city authorities address several challenges (e.g., health, safety, economic, environmental, sustainability, …). In this context, they could benefit from RELIANCE services can be tailored to address their needs.

As per [RD.01], cities can rely on indicators provided through the usage of RELIANCE services to improve tourism promotion and management; and smart cities, as they typically rely on digital and telecommunication technologies, could gain from the effective data and information flow for the benefit of inhabitants and businesses.
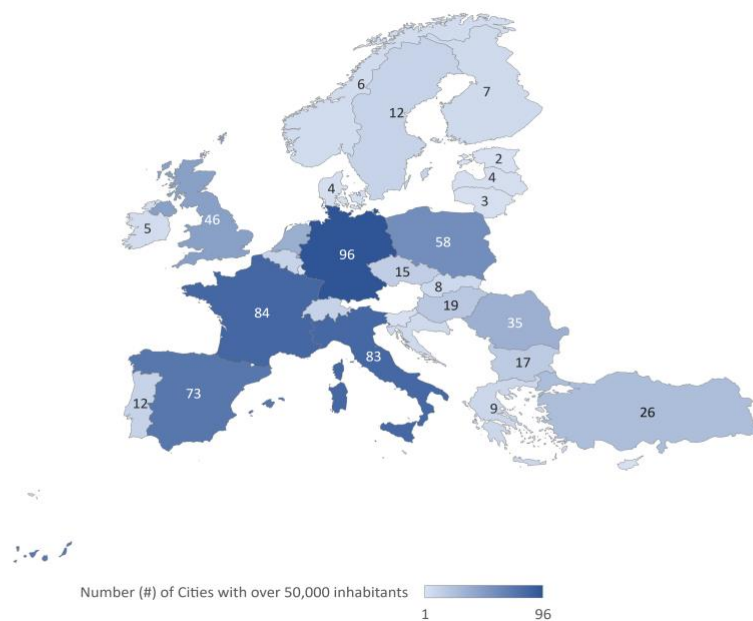
Figure 10 Number of Cities with over 50,000 inhabitants by Country, EUROSTAT Data [RD.13]

In Europe, there are c. 95,200 cities and municipalities[RD.13]. Among them, the cities with populations over 50,000, it was identified a list of more than **670 cities and municipalities that could be targeted**[15], including the most common destinations for tourists in this Region [RD.13][RD.14].

Among these, there are c. 300 smart cities by 2020[16], that make use of open data on regular basis.

In this context, Germany, Italy, France, Spain and Poland are the Countries which register the greatest number of cities with more than 50,000 inhabitants. It is worth to note that the number of cities is in direct correlation with the population of the Countries.

However, these countries represent the potential Country-markets that could be addressed

and in which RELIANCE services could be envisaged.

Not only limited to tourism-related and commercial-relevant information, RELIANCE' services could also be leveraged for environmental information as well as supporting public administration with sustainable and "*greener*" practices. In detail, public administrations (esp. cities and municipalities) are pushed by the "sustainability" imperative posed by the European Green Deal and are seen as key players - especially cities - in enabling a more sustainable, greener and healthier environment for their citizens [RD.15][RD.16][RD.17]. In the recent years, the trends highlight a strong need for more sustainable and greener cities, also in view of the fact that citizens' awareness has grown, demanding a more liveable environment [RD.17][RD.18]. In this context, as for example, RELIANCE could support cities (as well as ministries) with tailored services to provide systematic measurement from space and in situ of environmental variables of interest (e.g., air quality, algal bloom) to support the administrations on sustainable strategies.

Moreover, many initiatives have been set in place to enable and support the transition to more sustainable practices such as the World Banks' "*Sustainable Cities Initiative*"(SCI)[17], a multi-year program designed to support cities and governmental programs at the national level in pursuing an agenda that enhances the sustainability of cities across Europe and Central Asia (ECA); the "*New*

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[15] EUROSTAT Data on "Population on 1 January by age groups and sex - functional urban areas". Elaboration of data source: https://ec.europa.eu/eurostat/databrowser/view/URB_LPOP1/default/table

[16] There are 300 smart cities in Europe by 2020, in the frame of the "European Innovation Partnership for Smart Cities and Communities", an initiative supported by the European Commission combining Information and Communication Technologies (ICT), energy management and transport management to come up with innovative solutions to the major environmental, societal and health challenges facing European cities today. More information available here: https://energypost.eu/europe-aims-to-have-300-smart-cities-next-year/;and
https://e3p.jrc.ec.europa.eu/articles/european-innovation-partnership-smart-cities-and-communities

[17] World Bank Sustainable Cities Initiative: https://www.worldbank.org/en/region/eca/brief/sustainable-cities-initiative

European Bauhaus"[18], a multi-level from global to local, participatory and transdisciplinary initiative, aiming to facilitate and steer the transformation of our societies along three inseparable values i.e. sustainability, aesthetics and inclusion; the *"European Sustainable Cities Platform"*[19], focused on the uptake of The Basque Declaration[20], which is the main outcome of the 8th European Conference on Sustainable Cities and Towns; *"Intelligence Cities Challenge"*[21], the European Commission's initiative bringing together 136 cities to achieve intelligent, socially responsible and sustainable growth through advanced technologies.

Overall, even if mainly conceived for the scientific community, RELIANCE could be promoted at Consortium level also towards other public and private sectors. This possibility will contribute to guarantee the overall sustainability of the proposed services, especially after the project end.

Finally, when looking at the preliminary **addressable markets for RELIANCE services**, some country-markets have been identified and that could be targeted at different stages.

As Figure 11 shows, in blue, primary country markets could be addressed at a first, i.e.: Belgium, Germany, Italy, Poland, Spain and Sweden, as there are countries in which the Consortium network has a relevant reach. These markets are relevant in respect to the identified target industries.
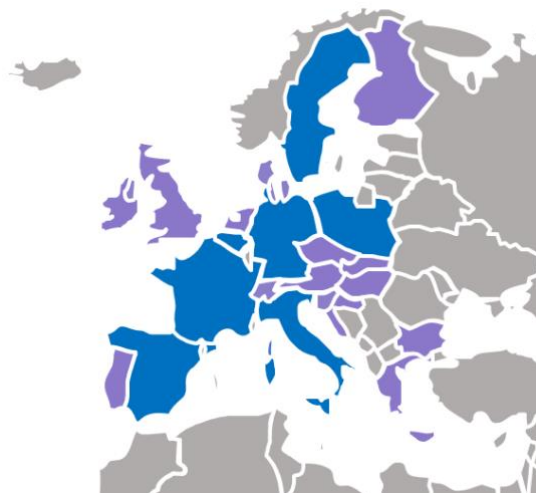
In purple, secondary county-markets, that could be targeted at a second stage in the market roll-out. These are: Austria, Bulgaria, Croatia, Czech Republic, Denmark, Greece, Ireland, Hungary,

Figure 11 Potential addressable market for RELIANCE

Slovakia, Slovenia, and United Kingdom. These countries are relevant when looking at their relevance across the industries identified and can be easily targeted by the RELIANCE consortium.

Nevertheless, these are preliminary findings that will be further improved in view of the final issue of the present deliverable.

3.2   Competitive environment assessment

RELIANCE aims to provide three core services to the EOSC environment service portfolio[22] i.e.:
- ROHub, based on research object technology and its repository. It is a holistic solution for the storage, lifecycle management and preservation of scientific investigations, campaigns and

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[18] The New European Bauhaus initiative was launched by President Von der Leyen in her Speech on the State of the Union in 2020. It is a creative and interdisciplinary initiative, convening a space of encounter to design future ways of living, situated at the crossroads between art, culture, social inclusion, science and technology. The New European Bauhaus translates the European Green Deal into tangible change on the ground that improves our daily life, in buildings, in public spaces, but also in fashion or furniture. More information available here: https://europa.eu/new-european-bauhaus/index_en

[19] Sustainable cities platform. https://sustainablecities.eu/sustainable-cities-platform/

[20] The Basque Declaration outlines new pathways for European Cities and Towns to create productive, sustainable and resilient cities for a liveable and inclusive Europe. The document aims to support and accelerate socio-cultural, socio-economic and technological transformation. https://sustainablecities.eu/fileadmin/repository/Basque_Declaration/Basque-Declaration-ENGLISH-WWW.pdf

[21] EU Intelligent Cities Challenge: https://www.intelligentcitieschallenge.eu/about-intelligent-cities-challenge

[22] More information upon the each of the three RELIANCE services are enclosed respectively in and D5.2, D3.2 and D4.2 .

operational processes via research objects. It makes these resources available to others, allows to publish and release them through a Digital Object Identifier (DOI), and allows to discover and reuse pre-existing scientific knowledge;

- Text mining and enrichment services, an artificial intelligence-based service that extracts information and metadata from bibliographic sources and other text documents (e.g., technical reports, field notes, presentations); and

- Data Cube, which enables efficient access to extensive collection of multi-temporal and multi-dimensional earth observation imagery, allowing interoperability among the different information layers. It is a vital asset for those researchers who's computer main memories could neither store nor manage big data produced by EO missions.

These services can be used both in stand-alone mode or can be partially of fully integrated to maximise their capacities.

RELIANCE services will be deployed in the EOSC environment. Currently, the EOSC Portal and Marketplace, is running 8 Competence Centres with more than 270 services including 30 thematic services published, from over 130 providers.

Looking at the competitive environment of the RELIANCE proposed services, some similar solutions have been identified, in particular:

- ROHub competitors: Some initiatives are present such as RO-Crate[23], FAIRDOM-SEEK. These are spin-off initiatives of previous projects that evolved into services build ad-hoc for the scientific community. Nevertheless, these are not present on EOSC marketplace nor focus fully on Earth Observation, as RELIANCE aims to do;

- Text mining and enrichment service competitors: Ontotext text mining and enrichment service, SciBite Text Analytics and Semantic Enrichment; OpenAIRE Mining Service and DEEP[24] are already present in EOSC environment;

- Datacube competitors: Rasdaman Datacube, Open Datacube, Eurodatacube; EOXHub are some solutions already present that provide similar services to the one provided in RELIANCE.

It must be highlighted that the identified solutions operate mainly as stand-alone services and cannot be integrated to a full extent with other services. In this context, it is worth to note that RELIANCE services allow the integration with some of the EOSC environment identified existent solutions. Moreover, it is relevant to mention that RELIANCE services are complementary to other similar or key initiatives devoted to the scientific community previously mentioned, such as SEEK, ROCrate, DEEP, Zenodo/OpenAire, promoting a modular, scalable and interoperable research lifecycle management service ecosystem enabling cross-sector research.

Looking outside the scientific community environment, the increasing demand of sustainable practices together with the growing awareness by consumers are impacting the food and drink industry [RD.19].

In this sense, many companies are seeking ways to become more "sustainable" with the implementation of different tools that enable them to assess their impact on the environment, in order to improve their practices, enhancing their overall level of sustainability. From a preliminary assessment, there are a few available tools and/or softwares that aim to support companies in addressing their sustainability goals. Some examples, are Green Business Bureau's tools

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[23] It is worth to note that RELIANCE participates to RO-Crate. However, if RELIANCE Research Object can be integrated in such service, it is not possible the other way around, as the RO-Crate system does not allow it.

[24] This is a EU RIA project that ended in April 2020. Source: https://cordis.europa.eu/project/id/777435/it However its service is still available on EOSC marketplace.

EcoAssessment™ and EcoPlanner™ which enable businesses to understand, prioritize, implement and certify green initiatives and sustainable business practices; Sphera integrated Environmental, Social, and Corporate Governance (ESG) solution, a platform which aims to help companies achieve their sustainability goals. The scalable platform and personalized configuration pave the way for compliance, reporting and performance improvement; and Ecovadis Enterprise is a package of solutions developed by Ecovadis, a provider of business sustainability ratings, intelligence and collaborative performance improvement tools for global supply chains.

However, such types of solutions are not fully comparable, as they are somehow limited in the provision of certain types of information, not allowing cross-topic analyses encompassing more than one field of research. In this sense, the proposed RELIANCE solutions can provide complementary information enabling such services to provide the "broad picture" in their analyses.

Furthermore, big companies (e.g., Danone[25]) generally have a devoted department (and/or unit) for sustainability assessment and monitoring implementing, often, inhouse solutions to support them to be compliant with current regulations and help them identify areas where actions to improve sustainability may be needed. Nevertheless, it is worth noting that such companies do - as well - rely on specialized consultancy services. Indeed, in this context, many consultancy companies have developed ad-hoc services, such as sustainability assessment services (e.g., EcoVadis, McKinsey, Bain & Company, Deloitte, …).

As for the public administrations (e.g., municipalities), often "sustainability and environment" have their own department (and/or office) in the overall organigramme. Nevertheless, for what concerns sustainability assessments and reporting these are generally outsourced, upon need, to consulting companies' services and or external collaborators[26]. As mentioned above, these consultancies have developed ad-hoc services in order to satisfy client needs also in view of the existent regulatory frameworks.

Overall, as an outcome of this preliminary competitive assessment, RELIANCE proposed solution can be defined as unique is able to provide integrated services in order to address a wider range of needs. Nevertheless, this assessment will be further revised in view of the second Issue of the present document.

3.3 Market trends

Open science is a policy priority for the European Commission and the standard method of working under its research and innovation funding programmes as it improves the quality, efficiency and responsiveness of research[RD20]. In light of this, since the start of the open data movement, thousands of public datasets were opened across Europe enabling new applications and insights. Moreover, it started a switch of mindset about public data as a common good - similar to infrastructure - to enable a fair and thriving European economy. As a consequence, open data became a vital part of the European digital agenda and Member States implemented their national strategies accordingly[RD.03].

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[25] Danone is France' leading Food Group and it is the world's n. 1 in fresh dairy foods, with a strong collection of healthy and innovative yogurt-based products. This is now the group's single biggest business, accounting for well over half of total revenues. https://www.danone.com/about-danone/at-a-glance/danone-data.html

[26] As an example, the Municipality of Milan (Italy) has its own database with the list of Consultancy services and collaborators: https://www.comune.milano.it/comune/amministrazione-trasparente/consulenti-e-collaboratori/titolari-di-incarichi-di-collaborazione-o-consulenza

Also, open data policy is linked with open research data policy since both address publicly funded data or their data results from public funding. Therefore, this data should be openly accessible and reusable[RD20].

Open data movement is driving the **market**, due to the **wide benefits that it can create**. Indeed, when it comes to efficiency gains and cost savings due to open data, the value created by open data goes beyond solely financial benefits. Not only does open data help businesses and governments generate more revenues due to new services, or reduce costs by working more efficiently, it can also help to save lives, save time, preserve the environment, and enhance knowledge transfer through language services.

In this context, European Open Science Cloud (EOSC) will enable researchers across disciplines and countries to store, curate and share data. In particular, EOSC is a portal providing European researchers, innovators, companies and citizens with a federated and open multi-disciplinary environment where they can publish, find and re-use data, tools and services for research, innovation and educational purposes. This also represents the main framework and marketplace where RELIANCE services will be made available.

Outside the research community environment, there are a set of additional factors driving the uptake of open data and pushing for eco-compatible and sustainable choices lead other entities (e.g., companies) to take responsibility, optimizing their resources and reducing their impact on the environment: these are the **regulatory drivers**.

Among the main policies pushing for sustainability, the European Green Deal (EGD)[RD21], EU's new growth strategy, which aims to transform the EU into a fairer and more prosperous society, with a modern, resource-efficient and competitive economy, with no net emissions of greenhouse gases by mid-century[27]. The EGD is a transversal measure that cross-cut all sector of economic production and society, as it aims to transform the EU into a modern, resource-efficient and competitive economy.

In this context, with reference to the food and drink industry, at the heart of the Green Deal there is the Farm to Fork (F2F) strategy which aims to make food systems fair, healthy and environmentally-friendly. The aim of the new European food policy is to implement concrete measures and targets for each stage of the food value chain to increase the stability of European food systems. The mission of this strategy is to ensure sustainable food production and processing, as well as food safety, by promoting sustainable food consumption and diets, reducing food waste, and addressing food fraud[RD22].

Favoring the implementation of the F2F strategy, the new Common Agriculture Policy (2023-27)[28]. The policy focuses on nine specific objectives, linked to common EU goals for social, environmental, and economic sustainability in agriculture and rural areas. With the new CAP, Member countries will have to allocate part of the European funding to environmental and climate measures. Also, it is worth to highlight that among the objectives, three of them are focused on the environment impact namely "climate change action"; "environmental care"; and "to preserve landscapes and biodiversity". Also, the new CAP legislation lays down a common set of indicators as part of a new performance, monitoring and evaluation framework. The indicators will be monitored through annual performance reports and a biannual review of the performance of CAP strategic plans to assess the progress of EU countries in reaching their targets and the objectives of the CAP.

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[27] The EU Green Deal is enforced into law by the EU Climate Law: https://ec.europa.eu/clima/eu-action/european-green-deal/european-climate-law_en#ecl-inpage-663

[28] The New CAP was approved on the 23rd of November 2021, effective from January 2023.

On top of these regulatory measures, several regulations are being proposed (e.g., Proposal for a regulation on deforestation-free products[29], in which that Agri-food companies shall demonstrate that their products (esp. those producing soy, beef, wood, etc.) do not fuel deforestation). Moreover, as a supporting tool for environment impact assessment, the EU Eco-Management and Audit Scheme (EMAS) was developed[RD23]. This tool is a premium management instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance. EMAS is open to every type of organisation eager to improve its environmental performance. It spans all economic and service sectors and is applicable worldwide.

Other drivers influence the food and drink industry, such as the **increased consumer awareness** on the environment and sustainability topics that led to the creation and adoption of sustainability standards and certifications. These are voluntary guidelines used by producers, manufacturers, traders, retailers, and service providers to demonstrate their commitment to good environmental, social, ethical, and food safety practices. There are over 400 such standards across the world. The trend started in the late 1980s and 90s with the introduction of Ecolabels and standards for Organic food and other products. Most standards refer to the triple bottom line of environmental quality, social equity, and economic prosperity[RD24].

As a consequence, of these processes, the **growing need of reliable data to improve entities' environment and sustainability impact**. The utilization of the EOSC gateway to data, is not limited to researchers but also it enables businesses to benefit from the available knowledge and tools to perform their own assessments and/or researches. Sustainability certification for business is more than just a stamp of approval and can do more than just provide a new talking point for business owners. This focus on going green can save money, increase customers and provide a new way to go up against competition. In fact, research has shown that 84% of consumers seek positive environmental commitment with the companies they do business with and 80% of consumers consider a company's environmental and social commitment before making a purchase[RD25][RD26].

The **increasing demand for sustainable practices**, from a regulatory perspective, together with the growing awareness by consumers are impacting the food and beverage industry. In this sense, many companies are seeking ways to become more "sustainable" with the implementation of different tools that enable them to assess their impact on the environment, in order to improve their practices, enhancing their "level" of sustainability[RD.19][RD26]. Indeed, the big multinational groups (e.g., Unilever[30], The Coca-Cola Company[31]) have are started doing so and are leading within this trend already providing their "sustainability information". Together with the individual showcase of sustainability practices, there are as well in place relevant initiatives such as the International Food and Beverage Alliance (IFBA)[32] and The Consumer Goods Forum[33] that are committed – among the

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[29] Proposal for a "Regulation to minimize EU-driven deforestation and forest degradation". More information is available here: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_5919

[30] An example of what big companies are doing in order to increase their attractiveness to the consumer, and in response to greener and sustainable policies: https://www.unilever.com/planet-and-society/sustainability-reporting-centre/sustainability-performance-data/

[31] Example for The CocaCola Company sustainable practices: https://www.coca-colacompany.com/sustainable-business

[32] The international food & beverage alliance (IFBA) is an alliance of twelve multinational food and non-alcoholic beverage companies - The Coca-Cola Company, Danone, Ferrero, General Mills, Grupo Bimbo, Kellogg's, Mars, McDonald's, Mondelēz International, Nestlé, PepsiCo and Unilever – who share a common goal of helping people around the world achieve balanced diets and healthy lifestyles. IFBA is a non-commercial, non-profit-making organization in special consultative status with the UN's Economic and Social Committee (ECOSOC). More information here: https://ifballiance.org/

[33] The Consumer Goods Forum (CGF) is a global, parity-based industry network, driven by its members as private sector multistakeholder governance. It brings together the CEOs and senior management of over 400 retailers, manufacturers,

innovation processes – to empower consumers to make informed choices, collaborating with all stakeholders to find bold, smart, diverse and sustainable solutions to global health challenges, and inspiring others in our industry to step-up and take action.

On top of this, the development of **"Eco-labels"** are considered as an exceptional marketing and advertising tool that informs contemporary consumers about the green traits of a product. They provide information that motivates consumers to exhibit a positive attitude and actual behavior towards a green product purchase[RD27]. Some examples can be found in the EU EcoLabel, a label of environmental excellence that is awarded to products and services meeting high environmental standards throughout their life-cycle: from raw material extraction, to production, distribution and disposal.

Not only limited to food, drinks and consumer products, the concept of EcoLabel was also extended to other commercial activities that have direct impact on cities' economies, such as the Tourist Accommodation Catalogue , and orienting cities council decision toward new sustainable procurements[34]. Also, it is worth to mention that "sustainable tourism" practices are having a growing impact, as consumer (in this case tourist) awareness is canalizing the tourism streams to more sustainable and greener cities[35]. In this direction, several initiatives have been set in place, such as the Europe Sustainable tourism to enhance Europe's touristic offer[36].

In this context, eco-labelling is today an increasingly diffused instrument of environmental policy, has followed quite a similar path to that of the EU labelling for product safety[37]. Like the latter, in fact, ecolabelling was inspired by the success that product labelling had achieved in the field of quality, for which such labels were originally conceived. Its success in the environmental area has been achieved at exceptional speed, moving from a marketing instrument to a public policy instrument [RD28]. To this end, tools such as EMAS [RD23] were developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance.

3.4   Opportunities and threats for RELIANCE

Open science proposes a fundamental systemic change in the way research is conducted, shared and evaluated. Through increasing the availability and accessibility of research results and involving societal actors in the research process, the open science movement aims to make the research process more efficient, transparent and responsive to global societal challenges.

Open data is advocated because it is generally believed to contribute to the efficiency, replicability, and transparency of science. In some fields open data can also enable novel discoveries that would

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service providers and other stakeholders across 70 countries and reflects the diversity of the industry in geography, size, product category and format.

[34] In October 2017, the citizens' representation in Copenhagen adopted a new sustainable procurement policy for the City of Copenhagen. The procurement policy, which was implemented in 2018, states that the municipality must choose products and services certified by The Nordic Swan Ecolabel or The EU Ecolabel within 26 selected categories. More information available here: https://www.globalecolabelling.net/assets/Documents/The-City-of-Copenhagen-Making-the-Most-of-Ecolabels-in-Public-Procurement.pdf?utm_source=202012GENews&utm_medium=email&utm_campaign=202012GENews

[35] Sustainable tourism a concept that covers the complete tourism experience, including concern for economic, social and environmental issues as well as attention to improving tourists' experiences and addressing the needs of host communities. Tourism can be related to travel for leisure, business and visiting friends and relatives and can also include means of transportation related to tourism. This might be transportation to the general location as well as local transportation to and from accommodations, entertainment, recreation, nourishment and shopping. There is now broad consensus that tourism should be sustainable. More information: https://www.cstt.nl/publications/The-eco-efficiency-of-tourism/45

[36] Europe' Sustainable tourism initiatives: https://ec.europa.eu/growth/sectors/tourism/offer/sustainable_en

[37] More information is available here: https://ec.europa.eu/info/business-economy-euro/product-safety-and-requirements/eu-product-requirements_en

have been impossible without sharing research data. Also, open data can make new revenue streams and other opportunities available for businesses. Vast ranges of data - mainly from government and public sector sources - are freely accessible. This generates valuable opportunities for businesses to launch new products or services and/or grow and improve their existing ones.

In Europe, two central pieces of infrastructure have been developed, i.e., the Open Research Europe (for publications) and the European Open Science Cloud (for research data). In this context, the R&D Framework programmes have long fostered collaboration between research, business and government sectors and have (more recently) promoted citizen science.

As mentioned, the EOSC initiative[38] reinforces Open Science, Open Innovation and Open to the world policies. The vision is to facilitate cross-country and cross-domain collaborations among researchers, the public sector, and private companies. EOSC is deemed to:

- foster best practices of global data findability and accessibility;
- help researchers get their data skills recognized and rewarded;
- help address issues of access and copyright and data subject privacy;
- allow easier replicability of results and limit data wastage;
- contribute to clarification of the funding model for data generation and preservation, reducing rent-seeking and priming the market for innovative research services.

These concepts promote the idea of opening up European research and innovation systems to move towards a reality where knowledge is created through global collaborations.

Within this framework, **opportunities** have been identified such as the push for uptake of EOSC portal and marketplace at EU level. Leveraging the involved user communities (such as CNR, INGV and UiO), RELIANCE can attract multiple user communities as the overall EOSC portal becomes more "popular" among the various research institutions and universities. In this context, these user communities could widely benefit from RELIANCE services as it enables easy access to cross-domain research materials, datasets allowing to further enrich the landscape of research results; save time and effort in searching information contained in a multitude of bibliographic sources and other text documents (e.g., technical reports, field notes, presentations); access to extensive collection of multi-temporal and multi-dimensional earth observation imagery, allowing interoperability among the different information layers, which is a vital asset for those researchers who's computer main memories could neither store nor manage big data produced by EO missions.

Also, the fact that there are already recognised, reliable and trustable providers within the EOSC environment such as PSNC and MEEO, certainly poses RELIANCE to have a privileged position, in comparison to newcomer-providers and their products.

RELIANCE has a high market potential not only limited to the scientific and research communities. As seen in Section 3.2, the services proposed in RELIANCE, fill some gaps facilitating the cross-domain research and access to data as they allow the integration with some of the EOSC environment identified existent solutions and are complementary to other similar or key initiatives - currently devoted to the scientific community - promoting a modular, scalable and interoperable research lifecycle management service ecosystem.

However, some **threats** need to be considered. These concern the growing competition of similar services available on the EOSC marketplace (see also Section 3.2), low attitude of users to change the way of work on their day-to-day activity, unless the new tools/services provides them groundbreaking benefits. In this context, RELIANCE aims to overpass the orthodox organizational structures of science

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[38] More information is available here: https://digital-strategy.ec.europa.eu/en/policies/open-science-cloud

with siloed and compartmentalized work that inhibits crosscutting and interdisciplinary cooperation to be up to the grand challenges of profound social environmental changes of our times, underpinning an intertwined relation between potential users, society and environment.

Moreover, there are also other indirect threats that need to be, somehow, considered. These are connected to the overall EOSC adoption by the user communities. Currently, the level of uptake of EOSC is slowly growing and efforts are being made in order to assure engagement with wider sets of communities, not only limited to the scientific ones [RD29][RD30].
Nevertheless, to further push the popularity of such Cloud, thanks to the involvement of big research entities and universities within the RELIANCE Consortium, together with the engagement of the INFRAEOSC-07 project-stack initiative[39], regarding the coordinated infra-project joint dissemination channel initiative, a wider range of user communities can be reached (e.g., Environmental sciences community, Geohazard Supersites and Natural Laboratories community (GEO-GSNL) community,…).

Outside the scientific communities environment, as RELIANCE services can enable other actors, such as businesses populating the food and drink industry as well as cities and municipalities, to benefit from the access to great amount of data and research information to serve their needs for compliance and sustainability goals (e.g., sustainability certifications, environmental impact assessment, etc.), specific actions such as specific trainings and awareness raising campaigns will be crucial in order to increase of adoption of both EOSC and, thus, RELIANCE services.

3.5   The value chain analysis

The Open Data value chain is quite articulated and involves different players with diverse roles as depicted in the figure below.
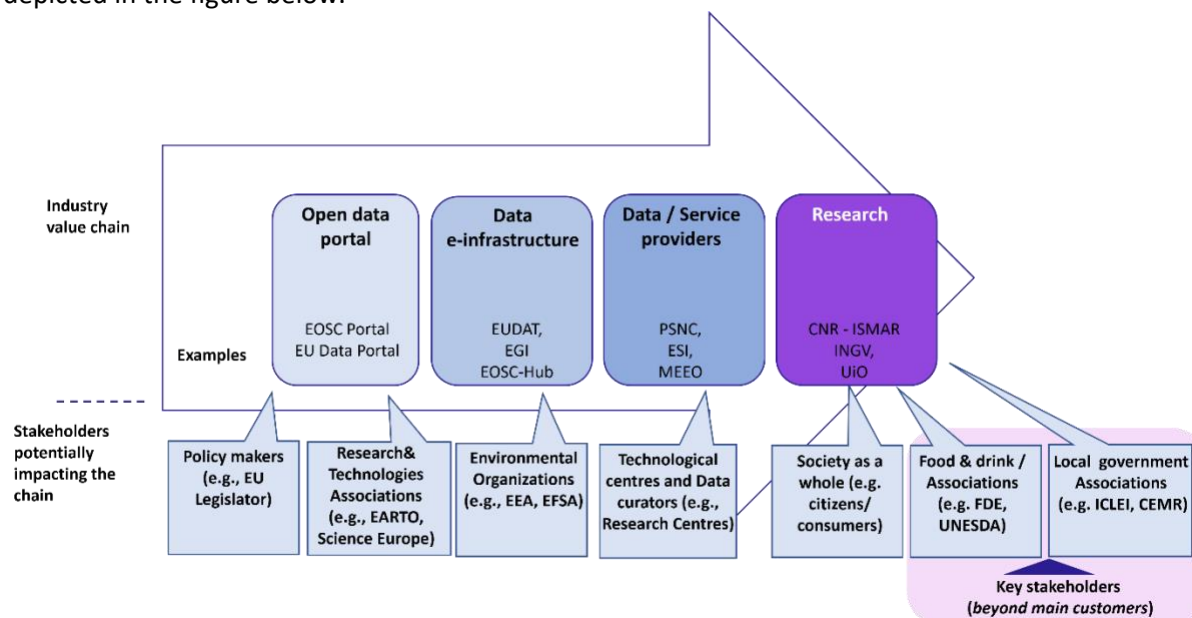
Figure 12 Open data industry value chain

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[39] The Horizon 2020 Programme's INFRAEOSC-07 task force project group includes EOSC Future, C-SCALE, EGI-ACE, OpenAIRE-Nexus, RELIANCE and DICE. The task force constitutes an important element in building up the infrastructure of the European Open Science Cloud. More information here: https://www.dice-eosc.eu/news-events/news/dice-participating-new-infraeosc-07-cross-project-collaboration-initiative

Supporting the EU's policy of open science, the EOSC aims to give the EU a global lead in research data management and ensure that European scientists enjoy the full benefits of data-driven science. In this context, several actors and items and actors drive and compose the open science industry value chain, i.e.:

- Data portals, which enable access to datasets and information. In this context, the EOSC Portal is the universal access channel to EOSC services and resources. Through the portal, researchers and professionals can access open and seamless services, data, and other resources from a wide range of national, regional and institutional public research infrastructures across Europe.

- e-infrastructures, a combination of digital technology, computational resources, and communications to support collaborative work and research. Here, e-infrastructures have been operating largely in silos, each focusing on a specific part of the e-Infrastructure stack (network, computing, data, and storage), with limited interoperability and cross-infrastructure collaboration (with the notable exception of specific technical topics, such as security). It is worth noting that EOSC is pushing for more collaboration between e-Infrastructures.

- Data and service providers, make their services available throughout the [EOSC Marketplace](), the Integrated platform that allows easy access to lots of resources for various research domains along with integrated data analytics tools. Currently, there are more than 270 services including 30 thematic services published, from over 130 providers.

- Research, which includes various research communities that utilize available EOSC services and datasets. It is the main audience addressed (but not limited to) of open science. It included researchers encompassing different fields of science i.e.: Medical and health sciences, Engineering and technology; Natural sciences; Humanities; Agricultural sciences; social sciences; and other sciences.

Complementing the value chain, there are several stakeholders and enablers such as:

- EU Legislator. Open science is a policy priority for the European Commission and the standard method of working under its research and innovation funding programmes as it improves the quality, efficiency and responsiveness of research. When researchers share knowledge and data as early as possible in the research process with all relevant actors it helps diffuse the latest knowledge. EOSC, enable researchers across disciplines and countries to store, curate and share data.

- Research and Technologies Associations, such as Science Europe[40], and European Association of Research and Technology Organisations (EARTO)[41]. These associations act as the "voice" of the research and science entities across Europe, with the ultimate goal of pushing the frontiers of how scientific research is produced and delivers benefits to society. They surely have an influential role in the uptake of Open data and more specifically for EOSC uptake;

- Environment Organizations. When it comes to sustainability and environment impact related research, but also to other domains (i.e., food and drink industry and public administrations), EU organisations such as European Environment Agency (EEA) and European Food Security Agency play a relevant role. Indeed, these entities dictate the general guidelines as well as main gateway for the collecting and sharing relevant data useful for further research investigations.

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[40] ScienceEurope is the association representing major public organisations that fund or perform excellent, ground-breaking scientific research in Europe. More information here: https://www.scienceeurope.org/

[41] EARTO promotes RTOs and represents their interest in Europe. EARTO network counts over 350 RTOs in more than 20 countries. EARTO members represents 150.000 of highly-skilled researchers and engineers managing a wide range of technology infrastructures. More information here: https://www.earto.eu/

- Data curators and technological research institutions. Here it is highlighted their role in the data curation, i.e., the organization and integration of data collected from various sources (including annotation, publication and presentation of the data such that the value of the data is maintained over time, and the data remains available for reuse and preservation) as well as the support and cross-check of data FAIRness.
- Other key stakeholders that have a relevant role, especially in the uptake of Open data by non-research communities:
  - Food and Beverage Industry associations, such as the Food and Drink Europe (FDE) and Union of European Beverages Associations (UNESDA), they are the main representatives of the industries.
  - Local government associations, Local Governments for Sustainability (ICLEI) and Council of European Municipalities and Regions (CEMR). These organisations bring together a network of local and regional governments committed to sustainable urban development; as well as promoting good practices, citizenship and exchange between elected representatives.
  - Citizens/Consumers associations, such the European Consumer Organisation (ECO) as they play a relevant role when it comes to push for awareness, for example the Green Consumption Pledge[42]

In this context, RELIANCE aims to be a key enabler in the access to data for a plethora of research user communities (not only limited to these). Also, the positioning of the consortium partners, across the main elements of value chain, represent a clear advantage for the uptake of the developed RELIANCE services.

Nevertheless, these findings are still preliminary and will be further improved in the second Issue of the Business plan and exploitation strategy – Issue 2.

4   Risk analysis

This chapter presents the risk analysis, focused on RELIANCE target markets (in order of importance, i.e., the European research industry, food and drink industry and public administrations), mapping the main economic and non-economic risks linked to RELIANCE and identify main actions to avoid/ mitigate them.

The main risks for RELIANCE services development and exploitation can be classified in three main categories: technical, commercial and other risks. These identified risks are enclosed in the tables in the sections below, respectively in section 4.1, section 4.2, and section 4.3). In particular, for each risk its potentiality in terms of occurrence and severity related to potential impacts are assessed, together with specific mitigation actions. Nevertheless, it is worth to note that the presented findings are still preliminary and will be further improved in view of the second Issue of the Business plan and exploitation strategy deliverable.

It is worth to highlight that, here, only risks related the service provisioning and solution uptake have been considered, while specific risks linked to the project are taken into consideration in a dedicated project risk assessment and in monthly progress reports in the frame of WP1 (see also [RD.01]).

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[42] The Green Consumption Pledge is a voluntary cooperation with businesses to increase the sustainability of production and consumption, thereby complementing other regulatory actions. More information available here: https://ec.europa.eu/info/policies/consumers/consumer-protection-policy/green-consumption-pledge-initiative_en

4.1 Technical risks

Risk description	Probability	Severity	Mitigation actions/ initiatives
Lack of interoperability for data exchange	Medium	Medium	The consortium will make sure that the services will be developed to ensure interoperability across services and as well with softwares commonly utilized
Poor performance of the services	Low	High	The consortium will ensure satisfactory performance levels of the RELIANCE services.
Data management and data quality issues	Low	Medium	The consortium will make sure that the data provided will be delivered respecting high-quality standards in order to avoid criticalities that may arise.
Data handling issues	Low	Medium	The consortium will make sure that the necessary industry standards will be observed. Also, the involvement of EOSC service providers (e.g., PSNC, MEEO) with extended experience is key as these types of issues will be overcomed by developing services that are not easy to compromise.
Lack of simplicity and usability of the services	Low	Low	The services will be user-friendly, since they have been developed - and further refined - together with the involved user-communities, to be subsequently tested.
Deficits/Bugs in the services application	Low	Low	The service application will be designed in order to avoid any possible arising issues due to software bugs and/or deficits.

Table 2 Main technical risks

4.2 Market risks

Risk description	Probability	Severity	Mitigation actions/ initiatives
Slow adoption of new services and technologies	Medium	Medium	The presence in the Consortium of key players, such as research centres and universities, is and will be a key lever for market uptake.
Difficulties in reaching the final "customer"	Medium	Medium	On one hand, among the Consortium partners, the presence of user communities "facilitators"(CNR, INGV and UiO) will ease the uptake by being key success stories. On the other hand, to reach other end-users, the Consortium will study an appropriate marketing strategy by foreseeing different actions during the further project phases such as communication, dissemination campaign of the services to reach the users. Also, after the project's conclusion marketing actions are foreseen.
Lack of a track of success stories	High	Medium	RELIANCE consortium will leverage on a stepwise approach towards other industries of interest (Companies in Food and Drink industries and public administrations) aimed at providing limited and really specific services at the beginning (leveraging on its distinctive features) for then expand to others.
Low level of innovation	Low	Medium	The ambition of RELIANCE is to provide a suite of innovative and interconnected services integrated into EOSC and used by (but not limited to) the EOSC

Risk description	Probability	Severity	Mitigation actions/ initiatives
			scientific communities to support thematic and multidisciplinary research in Earth Science.
Competitors will start providing services similar to RELIANCE so that it loses its competitive edge	High	Low	The consortium will keep monitoring the competition and will undertake the market entry actions in a timely manner.

Table 3 Main market risks

4.3   Other risks

Risk description	Probability	Severity	Mitigation actions/ initiatives
Many 'competing' projects and initiatives	Medium	High	The Consortium in carrying out the project's activities will leverage the knowledge of users and stakeholders that might be involved in similar projects.

Table 4 Other risks

5   Business Plan

5.1   Business model (work in progress)

The work on RELIANCE business model started since the very beginning of the project, considering the complexity of the topic and the number of partners within the Consortium involved in this work.

The starting point was the selection (together with all the Consortium members) of the best approach to reach the market. To this end, two preliminary business models have been identified reflecting the differences among the potential user communities. In fact, RELIANCE solution and services can be provided through:

- The EOSC Catalogue and Marketplace, within the EOSC Portal, with the RELIANCE Consortium acting as service provider to accelerate data-driven research in Europe and targeting the scientific community, in compliance with all the EOSC policies and rules. It was agreed that RELIANCE services will be initially provided for free to the EOSC users;
- A Business to Business (B2B) approach, with the RELIANCE Consortium acting as content provider directly to the industry for an ad-hoc pricing strategy (including a one-off/entry price and annual fee), enhancing RELIANCE application areas and sustainability models. In detail, this B2B approach, by leveraging the modular design of RELIANCE, allows the possibility to offer different, separate and customisable services directly to the end-users. In this context, two customisation of RELIANCE services are envisaged:
  - RELIANCE for Food (primary): Providing services to monitor the environmental sustainability of Food industry, based on repetitive measures using certified data, algorithms and publications; and
  - RELIANCE for Public Administrations (PA) (secondary): Provide systematic measurement from space ed in-situ of environmental variables of interest (e.g., air quality, algal bloom) to support the administrations on sustainable strategies.

Both these models (through the EOSC portal or a B2B approach), based on the modular and flexible design of RELIANCE, allow to integrate the proposed services with the EOSC ones, but also to offer different, separate and customizable services directly to the targeted user communities.

The Consortium can act as front-end towards EOSC and for the commercialization of the RELIANCE services outside the EOSC framework. In this context, the possibility to create a new commercial entity (the RELIANCE NewCo) that will be supported by all the involved partners is being evaluated. The main idea, here, is for the Consortium members to leverage their experience (in terms of Research Objects, Data Cubes, Text Mining), their presence across multiple continents and their contacts with different user communities.

They will continue to work together to guarantee the availability and reliability of the services or to support the potential NewCo in the exploitation, marketing and communication strategy, as highlighted in the figure below:
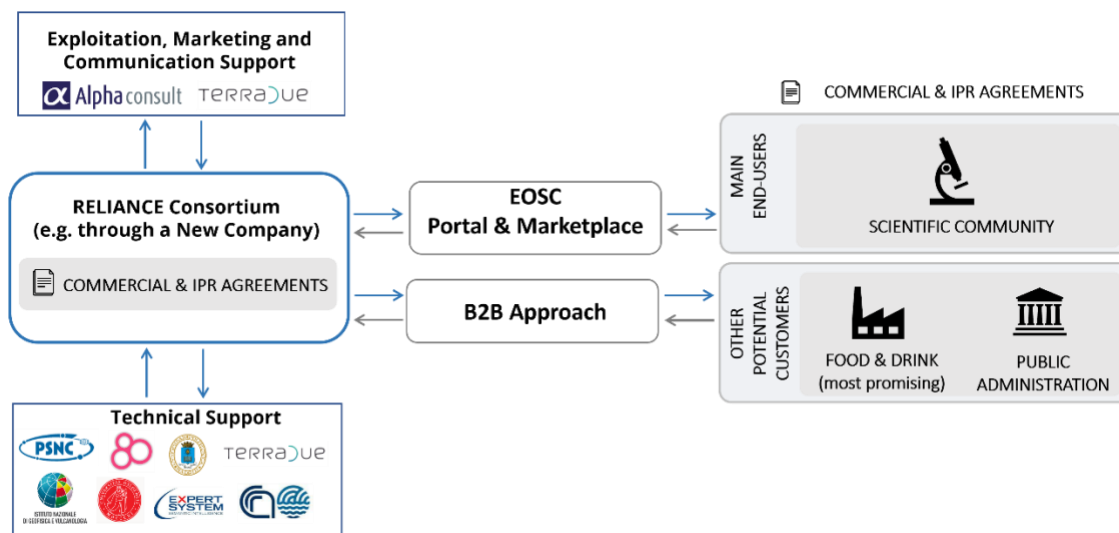

Figure 13 RELIANCE provisioning chain

At this stage, it is worth to note that, the RELIANCE services (i.e., Ro-Hub, DataCube, Enrichment) are already being made available on the EOSC marketplace[43] on behalf of RELIANCE project Consortium by recognised EOSC services providers such as PSNC, MEEO and ESI.

Nevertheless, the activity for the definition of the RELIANCE NewCo, to act as a recognised EOSC provider, will be better defined and described in second Issue of the Business plan and exploitation strategy, as discussions on the topic are ongoing.

5.2 *The final Business Model*

The overall inputs on the business model will be summarised in the Business Model Canvas that will be presented in final version of the Business Plan.

5.3 *Financial projection and sources*

The financial projections will be presented in the final version of the Business Plan and exploitation strategy (see also Chapter 1).

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[43] Currently, ESI' Text mining services – in particular, the Enrichment service, the Search service, and Recommendation service - have completed the onboarding procedures on EOSC. Yet, they are pending final confirmation from EOSC, that will make them available on the EOSC marketplace hopefully by the end of December 2021.

6   Exploitation strategy

Looking now at the exploitation strategy, RELIANCE will focus first of all on EOSC potential users, trying to enlarge EOSC user base as much as possible, following a specific approach.

The European researchers and professionals in science, technology, the humanities and social sciences are the main target for RELIANCE (i.e., this is the primary addressable market) To make the awareness enhancement and engagement campaigns efforts effective, the Consortium has started to involve the sea monitoring, atmospheric and geo-hazard communities. In this context, the consortium' network will be of paramount importance to reach potential new scientists, leveraging previous initiatives (e.g., EVER-EST user community) and focusing on specific geographies. As highlighted in section 3.1, Country-markets within Central-Mediterranean European countries (esp. Germany, France, Spain, Poland and Italy) as well as Scandinavian countries (esp. Sweden, Finland), could be targeted at first, expanding then the reach to other European countries.

Currently, in this direction, talks with some States' national archives (e.g., the Swedish National Archive) as well with the institutions and organisations that are part of the UNITWIN/UNESCO Chairs programme[44] are ongoing[45]. Strengthening the connections and involvement of such institutions, this will certainly pave the way for the uptake of RELIANCE services, reaching not only the already knowledgeable research centres, already aware of EOSC and its services, but will allow to reach a plethora of higher-education institutions, in several science and humanities domains.
Adding to this, first engagements and talks are ongoing with The Abdus Salam International Centre for Theoretical Physics (ICTP) [46], an international research institute for physical and mathematical sciences that operates under a tripartite agreement between the Italian Government, United Nations Educational, Scientific and Cultural Organization, and International Atomic Energy Agency.

Moreover, synergies with other selected projects are being exploited. In this context, RELIANCE has been involved in several Task Forces (TF) (e.g., Bilateral TF with other INFRAEOSC-07 projects (DICE, OPEN-AIRE), INFRAEOSC-07 (DICE, EGI-ACE, OPEN-AIRE, C-SCALE, RELIANCE); EOSC Future – INFRAEOSC-07, EOSC Future – RELIANCE). The involvement in such task forces concerns mainly collaboration on technical and interoperability items; joint dissemination (open calls) and training activities. In this context, the raise of awareness of RELIANCE services across the different communities involved in the various project is one of the positive outcomes within these initiatives, as it reaches other communities different from the ones involved in the RELIANCE project.

To ensure continuity of the RELIANCE services after the project's end, additional funding opportunities will be exploited by the Consortium at national and supranational/international level. For example,

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[44] The UNITWIN/UNESCO Chairs Programme, was launched in 1992, and involves over 850 institutions in 117 countries, promoting international inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work. The programme supports the establishment of UNESCO Chairs and UNITWIN Networks in key priority areas related to UNESCO's fields of competence – i.e. in education, the natural and social sciences, culture and communication. https://en.unesco.org/unitwin-unesco-chairs-programme

[45] This activity is being carried out also in view of RELIANCE Open Call T8.4)

[46] The Abdus Salam International Centre for Theoretical Physics (ICTP) aims to foster the growth of advanced studies and research in physical and mathematical sciences, especially in support of excellence in developing countries; develop high-level scientific programmes keeping in mind the needs of developing countries, and provide an international forum of scientific contact for scientists from all countries; and conduct research at the highest international standards and maintain a conducive environment of scientific inquiry for the entire ICTP community. More information is available here: https://www.ictp.it/

the participation to Horizon Europe calls for proposals or to other EU funding programmes[47]; and/ or participating to ESA-ESRIN[48] calls for proposals and related initiatives.

Additionally, the overall sustainability of the RELIANCE services in the long-term will be not only based on funding schemes and programs. It will also rely on the RELIANCE capability to attract other types of users willing to pay for the proposed services, outside the EOSC framework, i.e.:

- The food and drink industry, as the most promising and relevant market. To maximize the results, a clear strategy should be prepared. In line with that, some preliminary steps for the RELIANCE market roll-out are presented:
  - o The Consortium will focus first of all on EU food and drink industry, addressing medium-large companies as main target, at least at an initial stage of the RELIANCE adoption;
  - o The strategy will be designed following an effective geographical roll-out, e.g., starting from some specific countries (especially Italy, Spain, Poland and Scandinavian countries), as a result of two main drivers: the Consortium network and the countries with the highest number of food and drink companies;
- Public administrations as a secondary domain. Also, in this case:
  - o EU cities (especially with populations over 50,000) will be the main target at least at a first stage of the solution roll-out. Among them, Europe aims to have 300 smart cities that could represent the entry point for the RELIANCE adoption.

It is worth noticing that, on top of these stakeholders, other domains and markets could be positively impacted by RELIANCE customised services (e.g., pharmaceutical or insurance industry), although to a smaller extent, and with a lower link with earth science. Nevertheless, even if less relevant, these business opportunities are mentioned to highlight the commercial potential of RELIANCE also *outside* the EOSC framework.

Nevertheless, these findings will be further improved and updated in view of the second issue of the present deliverable.

7 Conclusions

At this stage, some preliminary conclusions can be presented. Nevertheless, they do not represent the final ones as these will be provided in the final version (v.2) of the Business plan and exploitation strategy.

Open data are a vital part of the European digital agenda as they are seen as an enabler for the economy. As an enabler, the impact of open data is wider and crosscuts multiple sectors. seizing the opportunities brought by the digital revolution, to accelerate research and to engage the power of machine analysis at scale while ensuring transparency, reproducibility and social utility, data and other digital objects created by and used for research need to be FAIR. With the mission to turn FAIR into reality, promoting the access and reuse of research data coming out of publicly funded research, the

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[47] A list of EU Funding programmes and open calls is available here: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls_en

[48] ESA-ESRIN is the European centre of excellence for exploitation of Earth observation missions. Among others, ESRIN's role is to increase the wider take-up of satellite data by supporting development of innovative Earth Observation-derived information products and services. ESRIN does this through a series of programmes that foster partnerships between research institutions, service companies and user organisations. Source: https://www.esa.int/About_Us/ESRIN/Exploiting_Earth_Observation_data

EOSC aims to build infrastructures to provide seamless access to FAIR data and interoperable services for the scientific community.

The EU scientific community represents the primary target market for the RELIANCE adoption (as highlighted in section 3.1). Other relevant secondary markets have been as well identified such as the food and drink industry and public administrations. For each sector, a preliminary list of country-markets that can represent the key entry points for RELIANCE have been identified.

As seen in 3.2, competition is present within the target addressable markets (primary and secondary markets). Indeed, some solutions are already available on EOSC, while other solution represent main alternatives to RELIANCE services. However, the solutions identified are not fully comparable, as they are somehow limited in the provision of certain types of information, and do not allow cross-topic analyses encompassing more than one field of research. In this context, the proposed RELIANCE solutions can also provide complementary information enabling such services to provide the "broad picture" in their analyses. Hence, RELIANCE services remain highly innovative as they allow to overpass the orthodox organizational structures of science with siloed and compartmentalized work that inhibits crosscutting and interdisciplinary cooperation to be up to the grand challenges of profound social environmental changes of our times, underpinning an intertwined relation between potential users, society and environment.

In this context, there have been identified opportunities and threats for RELIANCE uptake. Starting from the opportunities, these mainly concern the push for uptake of EOSC portal and marketplace at EC level, in the frame of the digital strategy activities. An additional asset for uptake is the involvement of trusted EOSC service providers, positioning RELIANCE in a relevant position. Looking at the threats, these concern the growing competition of similar services available on the EOSC marketplace, and populating the overall competitive landscape, and the still low level of EOSC' adoption. However, it is worth to highlight that, actions to boost EOSC uptake have been undertaken [RD30].

Also, a preliminary risk analysis was performed (see also section 4). Up to date, the risk identified are mainly technical and industry commercial risks. In this context, mitigation actions have been proposed to address them.

Furthermore, first inputs for the exploitation strategy are provided in section 6, as RELIANCE will focus first of all on EOSC potential users, trying to enlarge EOSC user base as much as possible. Different strategies are proposed according to the addressable markets, favouring RELIANCE primary target market i.e., researchers and scientist. Here, the consortium network is crucial to reach potential new scientists, leveraging previous initiatives (e.g., EVER-EST user community) and focusing on specific geographies. In this direction, some activities have been undertaken such as the involvement of national archives, the UNITWIN/UNESCO Chairs programme[49] and talks are ongoing with The Abdus Salam International Centre for Theoretical Physics (ICTP) [50] .

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[49] The UNITWIN/UNESCO Chairs Programme, was launched in 1992, and involves over 850 institutions in 117 countries, promoting international inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work. The programme supports the establishment of UNESCO Chairs and UNITWIN Networks in key priority areas related to UNESCO's fields of competence – i.e. in education, the natural and social sciences, culture and communication. https://en.unesco.org/unitwin-unesco-chairs-programme

[50] The Abdus Salam International Centre for Theoretical Physics (ICTP) is an international research institute for physical and mathematical sciences that operates under a tripartite agreement between the Italian Government, United Nations Educational, Scientific and Cultural Organization, and International Atomic Energy Agency. More information is available here: https://www.ictp.it/

As highlighted in section 3.1, Country-markets within Central-Mediterranean European countries (esp. Germany, France, Spain, Poland and Italy) as well as Scandinavian countries (esp. Sweden, Finland), could be targeted at first, expanding then the reach to other European countries.

Nevertheless, in order adequately reached the identified addressable markets, it is key to undertake specific actions such as specific trainings and awareness raising campaigns to increase of adoption of both EOSC and, thus, RELIANCE services.

Moreover, to ensure continuity of the RELIANCE services after the project's end, additional funding opportunities will be exploited by the Consortium at national and supra-national/international level. For example, the participation to Horizon Europe calls for proposals or to other EU funding programmes[51]; and/ or participating to ESA-ESRIN[52] calls for proposals and related initiatives.

So far, the findings emerging from this document D2.1 seem promising. However, the final conclusions will be presented in the second issue of the present deliverable.

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[51] A list of EU Funding programmes and open calls is available here: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls_en

[52] ESA-ESRIN is the European centre of excellence for exploitation of Earth observation missions. Among others, ESRIN's role is to increase the wider take-up of satellite data by supporting development of innovative Earth Observation-derived information products and services. ESRIN does this through a series of programmes that foster partnerships between research institutions, service companies and user organisations. Source: https://www.esa.int/About_Us/ESRIN/Exploiting_Earth_Observation_data