

## The Business Aspects of NEANIAS

NEANIAS (Novel EOSC Services for Emerging Atmosphere, Underwater & Space Challenges) is delivering innovative services including cross-cutting thematic and interdisciplinary core ones in three major sectors: Underwater research, Atmospheric research and Space research. However, NEANIAS is not only aiming to address the needs of the specific sectors but also to enable cross-sectoral collaboration as well as the engagement of both the scientific and professional communities unlocking a number of opportunities in the new EOSC (European Open Science Cloud) era. Thus, NEANIAS will address the fragmentation of current eScience as well as research technologies and infrastructures ecosystem by enabling access to EOSC hub ecosystem including numerous useful resources, collaboration instruments and interdisciplinary research means.

The services of NEANIAS started at a Technology Readiness Level (TRL) of 6 and are expected to reach TRL8 where the system is complete and qualified. Hence, NEANIAS is being prepared for the successful exploitation of the developed services. The main goal of this effort is to understand the main drivers that will affect their market adoption and evolution. For this purpose, a market analysis was initially performed by analyzing the market dynamics, key players and trends in an effort to place the diverse NEANIAS services to the appropriate markets in business terms. Based on the characteristics of the developed services, cloud computing, earth observation, SaaS and green sustainability markets were considered more relevant.

One major trend that is observed is the gradual migration of technical operations to the cloud, which can prove a positive influence towards scientific and industrial services. Considerably alleviating the difficulties that follow the need to setup advanced infrastructural components, services now should be available over the cloud in order to compete. Ease of access and use are very important to the end user, especially when the biggest cloud providers already provide resources very cost effectively. This trend is also aligned with the effort of the European Commission to promote cooperative cloud-oriented projects that aim to bring stakeholders closer together, innovating and disseminating, producing value that benefits the entirety of the European population. This trend is confirmed by the constantly increasing use of cloud computing globally and in Europe in particular. The European cloud computing market is expected to show significant progress following the rapid expansion of cloud services in the region along with the increasing prevalence of cloud computing platforms.

The optimism that surrounds the European cloud computing market is also accompanied by a rapid growth in the Software-as-a-Service (SaaS) market. This growth acceleration is expected due to the adoption of SaaS services by an array of verticals such as retail, hospitality, financial, technology, telecommunications and more. It is interesting to note that the COVID-19 crisis accelerates, even further, the SaaS market growth.

Apart from the growth of cloud computing and XaaS and other technical aspects, the thematic foci of NEANIAS are also part of increasingly discussed topics that relate to environmental, sustainability, health, and other subjects that are projected to grow in years to come. For example, Copernicus, Europe's Earth Observation (EO) programme, reports great results as its data and services are being increasingly utilised by EO companies across Europe. This growth does not only relate to research purposes as marine observation activities interest the private sector as well. As observed by the

European Marine Observation and Data Network (EMODnet), its marine data can be utilised by the private sector in various ways (e.g. improvement of offshore operators’ efficiency and costs in gathering and processing data, enrichment of company data etc.).

All the above-mentioned markets are closely related to several NEANIAS services, and it is considered that their characteristics can mirror at least a part of the most outstanding services offered by the project.

After the completion of the market analysis, the roles in NEANIAS were identified. A reference model consisting of the players, their relationships and potential revenue streams was developed. The involved players are shown in **Error! Reference source not found..**

Players	Description – Product/service details
<b>End Users (EU)</b>	Universities, Scientists, Researchers, Research Community, Research Organisations, Innovators, Archeologists, Biologists, Geologist, Robotics community, SMEs (interested in services related to data processing, mapping, classification), marine industry, environmental agencies, Tourism agencies and Municipalities etc. Even research Infrastructures and Service providers can be customers of core services.
<b>EOSC</b>	It provides to customers/EU the means to discover and access services and technologies
<b>Service Providers</b>	Third parties that provide products to end users (EUs). This can be thematic sector’s related products or bundle of products or core services.
<b>Infrastructure Providers</b>	This category includes all types of providers like cloud providers, data centers that owns physical resources that can be used by interested parties. They can also be in the as-a-Service form.
<b>Data providers</b>	Provides data or data sets for services testing, validation and/or research and business purposes
<b>Integrators</b>	An entity that specializes in bringing together components into a whole and ensuring that those components function together
<b>Software Developers</b>	They are developing several types of software programs and necessary services

*Table 1 Players definitions*

The reference model is illustrated in Figure 1. The direction of the arrows in the model represents the direction of service flow. Revenue flow is considered to be in the opposite direction. In the case of revenue sharing between two players, the arrow is bidirectional. The ellipse represents a player while rectangular boxes within the ellipse represent the roles that a player may undertake.

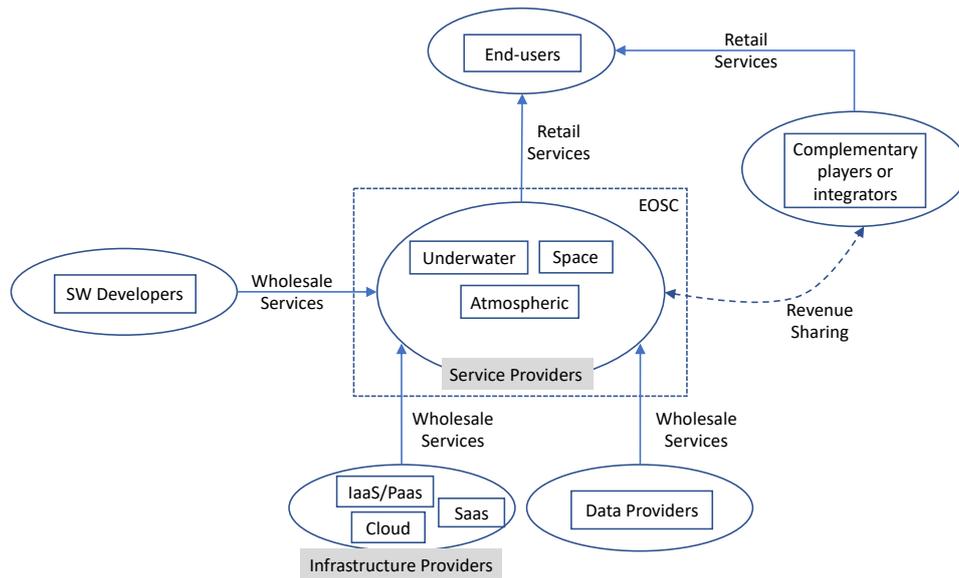


Figure 1: NEANIAS Reference Model

NEANIAS services and sources will be “advertised” through the EOSC catalogue. End-users can “purchase” services either directly by third-parties (e.g. integrators) or by service providers having first selected them through the catalogue. It should be noted that in the latter case, EOSC is not involved in the transactions. In the case of third-parties’ sales, revenue sharing is taking place between the service provider and the third-party. Apart from the retail services, a number of wholesale services is provided by the players participating in the NEANIAS ecosystem. For example, Infrastructure Providers can provide to service providers wholesale access to their infrastructure in order the latter to offer their services to end-users.

Finally, NEANIAS business model portfolio was provided by analysing twenty-one services (thematic and core). Towards this direction, the TRL along with the intellectual property rights (IPRs) and the form of exploitation of each service were identified. It was deduced that none of the examined services is covered by any patent. So overall, no IPR barriers to entry are foreseen. Background, foreground and postground IPs were also described. It was also concluded that the use of some services (mainly core) is mandatory for the smooth operation of some services. Regarding the exploitation of the services, several forms are analysed depending on the type of the service provider. The most frequent form for companies was the direct industrial use through commercial licenses or exploitation through license agreements, while for academic and research institutions exploitation through scientific publications or through an open-source license (for research purposes) was used.

A business model canvas was also drafted for each service. External topics outside of the “company” control, but with impact in the Business Model proposal, such the market or the environment were identified. What is needed internally in the new “company” or product in order to implement the value proposition was also defined. The competitive advantages (value proposition) along with the revenue streams of each service were the main building blocks of the provided business models. Free, freemium, pay-per-use, subscription-based and other charging schemes were described based on the type of service and provider. National and EU projects were highlighted by all the providers as an alternative funding source ensuring service sustainability.

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