



## Bottom-up capacity building for data providers in RITMARE

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RITMARE is a Flagship Project by the Italian Ministry of Research, coordinated by the National Research Council (CNR). It aims at the interdisciplinary integration of Italian marine research. Sub-project 7 shall create an interoperable infrastructure for the project, capable of interconnecting the whole community of researchers involved. It will allow coordinating and sharing of data, processes, and information produced by the other sub-projects [1].

Spatial Data Infrastructures (SDIs) allow for interoperable sharing among heterogeneous, distributed spatial content providers. The INSPIRE Directive [2] regulates the development of a pan-european SDI despite the great variety of national approaches in managing spatial data. However, six years after its adoption, its growth is still hampered by technological, cultural, and methodological gaps. In particular, in the research sector, actors may not be prone to comply with INSPIRE (or feel not compelled to) because they are too concentrated on domain-specific activities or hindered by technological issues.

Indeed, the available technologies and tools for enabling standard-based discovery and access services are far from being user-friendly and requires time-consuming activities, such as metadata creation. Moreover, the INSPIRE implementation guidelines do not accommodate an essential component in environmental research, that is, in situ observations.

In order to overcome most of the aforementioned issues and to enable researchers to actively give their contribution in the creation of the project infrastructure, a bottom-up approach has been adopted: a software suite has been developed, called Starter Kit, which is offered to research data production units, so that they can become autonomous, independent nodes of data provision.

The Starter Kit enables the provision of geospatial resources, either geodata (e.g., maps and layers) or observations pulled from sensors, which are made accessible according to the OGC standards defined for the specific category of data (WMS, WFS, WCS, and SOS). Resources are annotated by fine-grained metadata that is compliant with standards (e.g., INSPIRE, SensorML) and also semantically enriched by leveraging controlled vocabularies and RDF-based data structures (e.g., the FOAF description of the project's organisation). The Starter Kit is packaged as an off-the-shelf virtual machine and is made available under an open license (GPL v.3) and with extensive support tools.

Among the most innovative features of the architecture is the user-friendly, extensible approach to metadata creation. On the one hand, the number of metadata items that need to be provided by the user is reduced to the minimum by recourse to controlled vocabularies and context information. The semantic underpinning of these data structures enables advanced discovery functionalities. On the other hand, the templating mechanism adopted in metadata editing allows to easily plug-in further schemata.

The Starter Kit provides a consistent framework for capacity building that brings the heterogeneous actors in the project under the same umbrella, while preserving the individual practices, formats, and workflows. At the same time, users are empowered with standard-compliant web services that can be discovered and accessed both locally and remotely, such as the RITMARE infrastructure itself.

[1] Carrara, P., Sarretta, A., Giorgetti, A., Ribera D'Alcalà, M., Oggioni, A., & Partescano, E. (2013). An interoperable infrastructure for the Italian Marine Research. IMDIS 2013

[2] European Commission, "Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)" Directive 2007/2/EC, Official J. European Union, vol. 50, no. L 108, 2007, pp. 1–14.