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D2.1 Report on scope and methodology of the state-of-the-art study

ENERGIC OD
European NEtwork for Redistributing Geospatial Information to user Communities - Open Data

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[1] R = Report, P = Prototype, D = Demonstrator, O = Other

[2] PU = Public, PP = Restricted to other programme participants (including the Commission Services), RE = Restricted to a group specified by the consortium (including the Commission Services), CO = Confidential, only for members of the consortium (including the Commission Services).

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Abbreviations and acronyms

Term	Explanation
API	Application programming interface
BMPN	Business Process Model and Notation
CIP	Competitiveness and Innovation Framework Programme
CORDIS	Community Research and Development Information Service
EC	European Commission
ENERGIC OD	European NEtwork for Redistributing Geospatial Information to user Communities - Open Data
ETL	Extract, Transform and Load, data warehousing process
EU	European Union
FP7	Seventh Framework Programme
GEOSS	Global Earth Observation System of Systems
GI	Geographic Information
GMES	Global Monitoring for Environment and Security, currently known as Copernicus
GNSS	Global Navigation Satellite System
ICT	FP7 Information and Communication Technologies Programme
INSPIRE	Infrastructure for Spatial Information in the European Community
ISO	International Organization for Standardization
LDIF	LDAP Data Interchange Format, Lightweight Directory Access Protocol Data Interchange Format
OD	Open Data
OGC	Open Geospatial Consortium
OMG	Object Management Group

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PSP	ICT Policy Support Programme
R&D	Research and development
RDF	Resource Description Framework
SDI	Spatial Data Infrastructure
SoS	System of Systems
SWOT	Strengths, Weaknesses, Opportunities and Threats Analysis
URL	Uniform Resource Locator
WCS	OGC Web Coverage Service Interface Standard
WFS	OGC Web Feature Service Interface Standard
WMS	OGC Web Map Service Interface Standard
WP2	Work Package 2. State of the art in R&D, projects & technologies
WP3	Work Package 3. Open Data Survey
WP4	Work Package 4. Requirements and specifications: SDI, data harmonisation and applications
WP5	Work Package 5. Virtual Hubs: architecture and implementation
WP6	Work Package 6. Development of new innovative applications
WP7	Work Package 7. Dissemination of the project results
WP8	Work Package 8. Proof of concept, exploitation, business plans and networking
WPS	OGC Web Processing Service Interface Standard

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Table of Contents

Index of figures

Index of tables

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Revision history

Version	Date	Modified by	Comments
0.1	17/11/2014	Miguel Ángel Latre	Introduction, Overview, Domains of Interest, Sources, Annex I
0.3	28/11/2014	Miguel Ángel Latre / Javier Lopez-Pellicer /Paolo Mazzetti	Executive summary, Introduction, Overview, Domains of Interest, Sources, Technologies, SWOT, References
0.5	12/12/2014	Miguel Ángel Latre / WP2 workshop attendants	5.1 (Definition of the domains of interest); 5.2.1 (European Commission funded projects); 5.3 (Compilation of project technologies); 5.4.1 (Methodology); 5.4.2 (Application guide example)
0.6	24/12/2014	Miguel Ángel Latre / Maria Liberti	Minor corrections, change of template

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1 EXECUTIVE SUMMARY

There currently exist many open data and geographic information related initiatives that have produced various results and new technologies. An inventory of these results is essential for the efficient implementation of the ENERGIC OD project, which addresses the problem of the high heterogeneity in the world of geographic information by adopting a broker architectural approach. The main objective of WP2 of ENERGIC OD is to provide a state-of-the-art study in R&D in the domains tackled by the rest of work packages, emphasizing the technological aspects. In order to do so, an inventory of R&D projects (in particular European projects in progress or already completed) in the domains relevant to ENERGIC OD is going to be performed, and their strengths, lacks and convergences will be evaluated.

This deliverable defines the methodology to perform the aforementioned study and inventory, whose objective is to find current, mature technologies together with state-of-the-art technologies relevant to the ENERGIC OD project. The relation among the different deliverables produced by this methodology and their use by other work packages is explained and the different steps that compose the methodology are described.

The fist step consists in the definition of the scope of the state-of-the-art report by determining the list of domains to be considered and to decide on how extensively the study will be performed, by analysing the ENERGIC OD DoW document and by setting a temporal extent for the study from 2007 until the present.

The next step is the review of relevant sources of information regarding technologies related to the domains identified in the previous step. The main source of information will be projects funded by the European Commission, together with GI initiatives such as INSPIRE, GMES/Copernicus and GEOSS; input from partners regarding national or local SDIs and national or local INSPIRE, open data, GNSS and GMES initiatives or platforms and academic literature.

The following step consists in the compilation of project technologies relevant to the ENERGIC OD which will be compiled, taken into account partners' inputs regarding the technologies they will use or expect to use in the implementations of the pilot applications of ENERGIC OD and the R&D projects identified in the previous step. An evaluation of the technologies will be given, according to the most relevant criteria for each kind of technology, which is presented.

The final step is a comparative SWOT analysis. The main objective of the analysis is to detect strengths, lacks and convergences of inventoried projects using ENERGIC OD as baseline. The analysis involves the identification of the internal and external factors of each project that motivates these strengths, lacks and convergences among them. Next, characteristics (strengths and weaknesses) and elements of the environment (opportunities and threads) from all analysed projects will be examined for identifying convergences among projects.

2 INTRODUCTION

The world of geographic information (GI) is, at present, extremely heterogeneous. User and system requirements, too varied to be satisfied by a single system or technology, have led to an utter lack of agreement on interoperability standards, creating a barrier to realizing the full exploitation potential of GI. ENERGIC OD addresses these problems by adopting a broker architectural approach, designed, developed and implemented in recent research activities.

There currently exist many open data and geographic information related initiatives that have produced various results and new technologies. An inventory of these results is essential for the efficient implementation of the ENERGIC OD project. The main objective of WP2 is to provide a state-of-the-art

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study in R&D in the domains tackled by the rest of work packages, emphasizing the technological aspects. In order to do so, an inventory of R&D projects (in particular European projects in progress or already completed) in the domains relevant to ENERGIC OD is going to be performed, and their strengths, lacks and convergences will be evaluated.

This deliverable defines the methodology to perform the aforementioned study and inventory. Next section presents an overview of the methodology, and the different steps involved are presented in section 4. One of the results of the application of the methodology is the inventory of R&D projects (deliverable D2.2), which will serve as a source to identify the technologies that will be assessed in the state-of-the-art report (deliverable D2.3). Regarding D2.1, the internal WP2 Workshop (deliverable D2.4) will serve as a means to validate the methodology by all the involved partners and to provide a clear, common understanding of it.

Deliverable D2.2 (Inventory of R&D projects) will serve as an early input for WP3 and its deliverable D3.3 (Exhaustive catalogue of existing operational and planned GI platforms and initiatives). WP3 will focus afterwards on assessing them, while WP2 will use them as a source for identifying technologies.

Additionally, the application of the methodology described by this document will serve also as input to WP4 and WP5. WP4 has to define technical and scientific requirements in order to facilitate the use of open GI from different data sources for the creation of innovative applications and services. WP4 also has to give specifications in order to overcome gaps, barriers and bottlenecks found in WP2 and WP3. Additionally, task T5.2 (Virtual Hubs implementation), based on the logical architecture of the Virtual Hubs defined in task T5.1, will deliver one or more technical implementations that will be based on technologies identified in WP2 through deliverable D2.3 (R&D state-of-the-art report, obtained by applying the methodology defined in D2.1).

3 OVERVIEW OF THE METHODOLOGY

The following diagram presents an overview of the methodology for the development of the state-of-the-art study, where the different steps, intermediate results and relation with WP2 deliverables are outlined. The notation is based on BMPN [OMG, 2011], although it has not being strictly applied.

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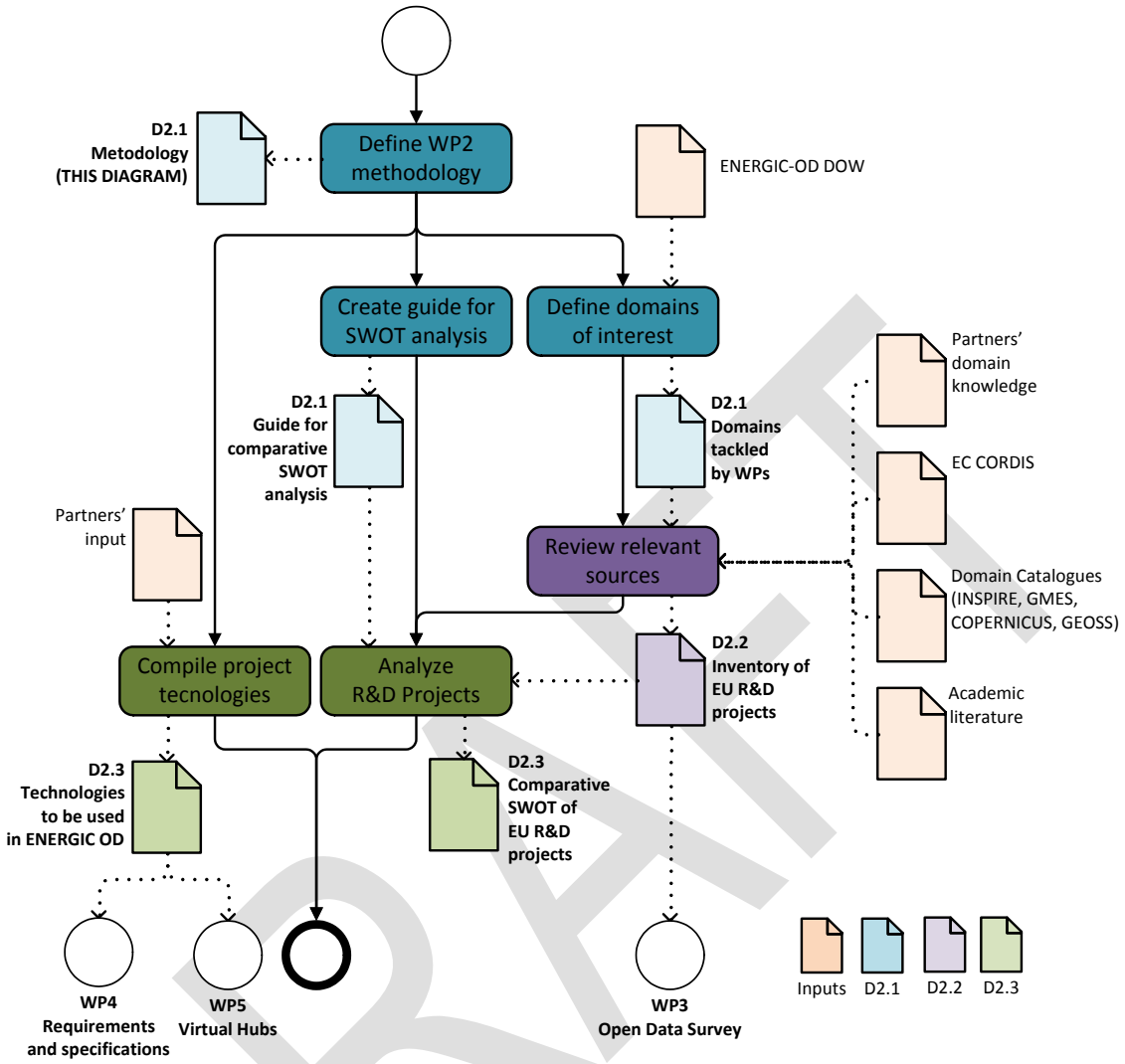

Figure 1. Methodology overview.

This document defines the complete methodology. The steps necessary to deliver D2.2 ("Inventory of R&D projects"), that is, "Definition of domains of interest" and "Review of relevant sources" (in what identification of EU funded projects is respected) have been performed by the time of delivering this methodology (D2.1) and the inventory of projects (D2.2). The rest of steps are already defined, but will be implemented as part of D2.3 ("R&D State-of-the-art report").

In the following sections, each of the steps is explained.

4 METHODOLOGY STEPS

4.1 Definition of the methodology

The objective of this *metastep* is the definition of the methodology and the main matter of this document. Details on the definition of the methodology are provided in the rest of the document. It is included in the diagram as a step in order to provide a global vision of the different results of each step and the deliverables of WP2 where they belong.

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4.2 Definition of the domains of interest

The first step in the methodology consists in the definition of the scope of the state-of-the-art report by determining the list of domains to be considered and to decide on how extensively the study will be performed, bearing in mind that the final objective is to find current, mature technologies together with state-of-the-art technologies relevant to the ENERGIC OD project.

In order to do that, the ENERGIC OD "Description of Work" (DoW) document [ENERGIC OD, 2014] has been analysed in order to determine the topics being tackled by the project, and their relevance to the different tasks defined in the DoW. The result, a matrix of domains and DoW tasks that mention them, is presented in Annex I. The number of tasks in which a domain appears provides an indicator for the importance of the domain to the project, and can serve to set how extensively the domain must be studied in the state-of-the-art report. The summarised results are presented below:

Domain	**# of tasks**
User groups & needs	17
Virtual hubs & brokered architectures	11
GI applications & services	9
Open data	7
Geospatial information	6
Technical requirements and specifications	6
Redistribution, access and reuse of GI	5
Data interoperability, harmonization & integration	4
INSPIRE	4
Standardisation	4
System of systems	4
Licences, constraints, legal affaires	4
Metadata	4
GMES/Copernicus	3
Economics and business models	3
Volunteered GI & crowdsourcing	2
GNSS	2
GEOSS	2
Semantic data & ontologies	2
Spatial Data Infrastructure	1
OGC services	1
Galileo	1
Governance	1

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Domain	# of tasks
Data models	1
Land cover	1
Policy making	1

Table 1. Main ENERGIC OD domains and number of tasks that mention them in the DoW.

This means that there are 19 domains common to more than one task and 13 domains common to more than 4 tasks. The search of projects and technologies to be performed in the following steps should be mainly focused on these 13 highly cross-task topics (*User groups & needs*; *Virtual hubs & brokered architectures*; *GI applications & services*; *Open data*; *Geospatial information*; *Technical requirements and specifications*; *Redistribution, access and reuse of GI*; *Data interoperability, harmonization & integration*; *INSPIRE; Standardisation*; *System of systems*; *Licences, constraints and legal affairs*; *Metadata*).

The same analysis has been made taking also into account the work packages objectives section, getting a similar rank.

Since the final objective is to find current, mature technologies together with state-of-the-art technologies, and since EU funded projects is going to be one of the sources to be used, it is reasonable and pragmatic to set a temporal extent for the study from 2007 until the present moment, coincident with the 7th Framework Programme and Horizon 2020 temporal extents.

In the WP2 workshop held in Berlin on December 4, it was agreed that there are domains more important than others for the project as a whole, and also for each WP. An additional selection of big domains (so-called 'framework keywords'), more generic and more adapted to the ENERGIC OD requirements, to be later used in the assessment of the relevance of the projects and to focus the study-of-the-art. These framework keywords are presented in Table 2.

WP	Framework keywords
WP3	Open data; standards
WP4	Brokering; geospatial information; Technology: software / tools / applications; data models, architectures; mobile apps
WP7	Users; user communities
WP8	Costs/profits; business models
	Security and trusted services and applications

Table 2. Framework keywords for ENERGIC OD as proposed in the WP2 workshop

4.3 Review of relevant sources

This step aims at the identification of sources of information regarding technologies related to the domains identified in the previous step. The call for proposal funding the ENERGIC OD project, CIP-ICT-PSP-2013-7, [EC, 2013] states that "*Based on the work already accomplished across the EU, the role of GI as a motor for growth and jobs through the creation of innovative information products and services can be further enhanced.*" According to this, we consider our main source of information to be based on work already done or in progress, particularly projects funded by the European Commission.

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In addition to this, well known initiatives in the area of geographic information, particularly in the European arena, such as INSPIRE, GMES/Copernicus, and even GEOSS related initiatives, will also be considered.

Input from partners regarding national or local SDIs and national or local INSPIRE, open data, GNSS and GMES initiatives or platforms will also be asked and taken into account.

Academic literature will also be used as complementary source of information when the study of the main sources (projects, initiatives and platforms) does not provide enough information on the technologies used within the domains in scope.

In this section, a list of types of sources of information has been presented. The implementation of this step will identify concrete projects, initiatives, platforms and articles. The projects identified are included in the projects inventory that defines deliverable D2.2. The point is not in the exhaustiveness of the project inventory, but in its capacity to identify successful technologies applied to the domains in the scope of ENERGIC OD. The projects, together with the other initiatives and platforms will be passed as input to WP3.

4.3.1 European Commission funded projects

European Commission funded projects will be searched initially through the CORDIS platform, using the main domains tacked by ENERGIC OD project, as identified in the "Definition of scope" step. CORDIS is the European Commission's primary public repository and portal to disseminate information on all EU-funded research projects and their results in the broadest sense[3]. Therefore CORDIS will be our main source of information about R&D European projects.

Since CORDIS lists more than 25,000 FP7 projects, the list will be refined in order to get a manageable amount of relevant projects. In order to do that, each domain, according to the keywords in Table 3 will be searched within the "objectives" text of the FP7 projects. A matrix of presence of each domain in each project will be filled, and a score based on that for each project will be calculated.

Domain	Keywords to search for	Remarks
User groups & needs	'user groups', 'user communities', 'user needs', 'use cases'	
Virtual Hubs & Brokered Architectures	'virtual hub', 'broker', 'brokered architectures'	
Geospatial Information	'geospatial', 'geographic information'	
Open Data	'open data'	
GI applications & services	'application', 'service'	*
Technical requirements and specifications	'requirement', 'specification'	*
Redistribution, access and reuse of GI	'redistribution', 'access', 'reuse',	*
Data interoperability, harmonization & integration	'interoperability', 'harmonization', 'integration'	*
INSPIRE	'INSPIRE'	
Standardisation	'standard', 'standardization', 'ISO'	*

[3] http://cordis.europa.eu/home_en.html

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Domain	Keywords to search for	Remarks
System of systems	'system of systems', 'SoS'	
Licences, constraints, legal affaires	'licences', 'legal constraints', 'rights'	*
Metadata	'metadata', 'catalogue', 'metainformation'	
GMES/Copernicus	'GMES', 'Copernicus'	
Economics and business models	'business model', 'financial sustainability'	*
Volunteered GI & crowdsourcing	'VGI', 'volunteered', 'crowdsourcing'	*
GNSS	'GNSS'	
GEOSS	'GEOSS'	
Semantic data, ontologies	'semantic data', 'ontology', 'thesaurus'	*
Spatial Data Infrastructure	'spatial data infrastructure', 'spatial infrastructure', 'SDI'	
OGC services	'OGC', 'WMS', 'WFS', 'WCS', 'WPS'	
Galileo	'Galileo'	
Governance	'Governance'	*
Data models	'data model', 'data models', 'model'	
Policy making	'policy making', 'decision'	*
Geoportal	'geoportal'	
georeferencing	'georeferencing', 'georeference'	
Real time GI	'real time'	*
in-situ data	'in situ'	*

* Only in projects already marked as related to GI or OD

Table 3. Keywords used for search projects related to ENERGIC OD domains.

However, searching through the projects objectives does not assure the relevance of the project with respect to ENERGIC OD, since the abstracts do not involve actual project results. Taking this into account, the list with calculated scores will be used as the basis for a manual revision of the most scored projects according to the partners' knowledge. The objective of this revision will be to assess the relevance of each project to ENERGIC OD. This can be done based on the partners' prior knowledge of the projects, taking into account the framework keywords presented in Table 2 and taking mainly into account the actual results of the projects.

Additionally, partners will be invited to suggest other projects relevant to ENERGIC OD that might not been present in the top list with calculated scores due to a low score or that did not belong to the initially selected FP7 temporal extent.

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4.3.2 Other projects, initiatives and platforms

Additional INSPIRE, GMES/Copernicus, GEOSS related initiatives would be searched through the catalogues these initiatives may have. The direct involvement of ENERGIC OD partners in these initiatives will help the analysis.

In particular, for the case of INSPIRE, the web page "Funded Projects" from the INSPIRE Forum[4] lists a subset of INSPIRE related projects that have been funded by EC Programmes and national programmes. It will be used as a means to calculate the precision and recall of the projects retrieved from CORDIS.

ENERGIC OD partners have also knowledge regarding the domains in the scope of ENERGIC OD in their respective countries, so they will provide also information national and local SDIs, INSPIRE related initiatives, open data initiatives, GNSS, GMES, etc. Increasing the range of partners' contributions from projects to include platforms and initiatives will make the inventory more useful to WP3.

4.3.3 Information to be provided regarding identified projects, initiatives and platforms

A minimum set of information regarding each project, initiative or platforms should be collected in order to identify them to be further analysed when developing the state-of-the-art report. This minimum set of information will be the **title** and **URL of the project**, initiative or platform (or any other access point to get further information on the project). However, providing more information on the project, when possible, according to the Dublin Core standard[5] would ease the posterior analysis of the projects:

- **Title:** Title of the project, initiative or platform.
- **Creator:** Name of the main responsible organisation of the project, initiative or platform, if applicable.
- **Subject:** Keywords describing the project, initiative or platform. If possible, they should belong to the set of domains in the scope of ENERGIC OD.
- **Description:** Brief, textual description of the project, initiative or platform, as provided by their responsible part.
- **Publisher:** if applicable
- **Contributor:** Names of other parties involved in the project, initiative or platform.
- **Date:** start date and, if applicable, end date of the project, initiative or platform.
- **Type:** One of project, initiative or platform. One of European, national, local.
- **Identifier:** Main URL or access point of the project, initiative or platform.
- **Language:** Language or languages of the project, initiative or platform.
- **Coverage:** geographical area covered by the project, initiative or platform.
- **Rights:** Any restriction regarding the inclusion of information regarding the project, initiative or platform or its technologies used in the state-of-the-art report.
- **Relevance:** Information on the reasons why the project is relevant for ENERGIC OD.

This is the information that will be included in deliverable D.2.2 ("R&D projects inventory").

4.4 Compilation of project technologies

A list of project technologies relevant to the ENERGIC OD will be compiled. From a pragmatic point of view, the main source for this compilation should be the partners input regarding the technologies they will use or expect to use in the implementations of the pilot applications over the Virtual Hubs

[4] http://inspire-forum.jrc.ec.europa.eu/pg/pages/view/1668/funded-projects
[5] http://dublincore.org/

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architecture. Such a list is already present in the DoW document of the project, and it will be used as a starting point.

Since the design of these pilot applications is tacked in task T6.2 of WP6, in the months from M13 to M15, a complete list of technologies cannot be expected from partners input. Lacks and gaps in the list will be filled in when analysing the R&D projects identified in the previous step. The fill of lacks and gaps will take into account specially other technologies besides partners pilots in order to ease the insertion of new applications into the virtual hubs

Due to the aforementioned fact that the design of the pilot applications starts after the finalisation of the study-of-the-art report, and to the fact that the technologies compiled have to be relevant to the ENERGIC OD project, this list will be hosted in the project website and will be a living document that will be updated through the life of the project. Its contents would be as described in section 4.4.1.

For deliverable D2.3, an evaluation of the technologies will be given, according to the most relevant criteria for each kind of technology. Section 4.4.2 provides a list of possible criteria. It is not expected to exhaustively use all the criteria to evaluate each technology, the list of criteria is provided as a guide to use the most relevant when evaluating the technologies.

4.4.1 Information to be provided regarding identified technologies

For each technology planned or expected to be used in ENERGIC OD or just relevant to the project, this information should be provided:

- The **name** of the technology.
- A short **description** of the technology.
- A set of **keywords** that categorizes the technology, including its **type** (technology, standard, software component, software application, model, …).
- A **link to documentation** pages.
- The **requirements** for using or installing the technology.
- The **provider** organization(s) or person(s).
- The **owner** organization(s) or person(s).
- The level of **maturity** of the technology.
- **Date** describing the current use of the technology (date of latest release, …)
- The type of **license** needed to use it.
- The name and **contact** address of a person who could help with the use; a mailing list is also appropriate if the person is unknown.
- A **link to some representative publication** about the technology.
- A **link to** information about **events** related to the technology.

A spreadsheet template will be created and circulated to collect this information. When appropriate, the different pieces of information will be mapped to Dublin Core elements:

- **Title:** Name.
- **Creator:** Author or owner.
- **Subject:** Keywords
- **Type:** Type.
- **Description:** Description and link to documentation.
- **Date:** Date.
- **Rights:** License.

4.4.2 Assessment criteria for technology

- Maturity of the technologies

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- Degree of adoption / Operational settings where it has been adopted
- Scalability

- Domains where it is used/applied. Requirements it addresses
- Open or proprietary
- If the technology is a piece of software:
  - Type of software: system/infrastructure, portal, application, service, API/library, catalogue, mediator/broker
  - Purpose of the software: discovery, portrayal, access, processing
  - Accepted formats/interfaces
  - Standards compliant
  - Graphic user interface, usability (if applicable)
  - Interoperability interfaces (if applicable)
  - Measurements of performance
- If the technology is a data format/data model:
  - Standard or not
  - Access rights, fees
  - Metadata: embedded, standard (INSPIRE, ISO, Dublin Core) compliant
  - Measurements of performance
- If the technology is an architecture:
  - Type: system of systems, federated system, brokering layered architecture
- If the technology is a standard/specification:
  - Type: standard, reference system, …
  - Purpose
  - Encodings
  - Rights, fees
- If the technology is semantic related:
  - Type: knowledge base, thesaurus, gazetteer, ontology, …
  - Purpose
  - Encoding
- If the technology is at the level of an operating system or protocol: web, desktop, mobile

4.5 Comparative SWOT Analysis methodology

A comparative SWOT analysis is the core of the deliverable D2.3 State-of the-art-study of WP2. A SWOT analysis [Armstrong, 1996] is a strategic planning method that ENERGIC OD will use to evaluate the strengths, weaknesses, opportunities, and threats involved in inventoried European R&D projects.

In ENERGIC OD, the main objective of the SWOT analysis is to detect strengths, lacks and convergences of inventoried projects using ENERGIC OD as baseline. The goal is to provide hints related to the following questions:

- Which European projects should ENERGIC OD use as reference regarding reuse of open data and geographic information, technologies, cases and data sources?
- Which European projects should ENERGIC OD use as reference regarding European policies (H2020), impact on stakeholders, availability of results and long-term viability?
- Which caveats should be considered?

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The analysis involves the identification of the internal and external factors of each project that motivates these strengths, lacks and convergences among them. Next we describe how it will be performed and we present an example of application.

4.5.1 Methodology

The SWOT Analysis will be performed according to the overall methodology defined in the deliverable D2.1 (this document) on a selection of the European R&D projects inventoried in the deliverable D2.2. The selection will be done based on the relevance to the objectives of ENERGIC OD of each project, assessed by the partners based on their knowledge of them, taking into account framework keywords presented in Table 2 and taking mainly into account the actual results of the projects.

For each project, the SWOT analysis will identify:

- Strengths, characteristics of the project that gave or could give the project an advantage to achieving objectives related to ENERGIC OD objectives.
- Weaknesses, characteristics of the attributes that placed or could place the project at disadvantage to achieve objectives related to ENERGIC OD objectives.
- Opportunities in the environment of the evaluated project that were helpful for it that can be also opportunities in the context of the ENERGIC OD project.
- Threats in the environment that caused or could cause trouble for the evaluated project that could become risks also for the completion of ENERGIC OD.

The strengths and weaknesses that will be analysed will concern:

- Project focus on geographic information and the reuse of open data
- Technologies and standards used in the project
- Adopted approach: enforced or mediated/brokered
- Cost-benefit analysis performed

The opportunities and threats that will be analysed will concern:

- Attitude of users and stakeholders regarding to the project
- Creation of user communities
- Capacity of the dissemination strategy to create and effective impact
- Definition of business models for the long term viability of the results after the project

Next, characteristics (strengths and weaknesses) and elements of the environment (opportunities and threads) from all analysed projects will be examined for identifying convergences among projects. This analysis will be used to provide a level of relevance to the strengths, weakness, opportunities and threats identified.

The SWOT should start with a brief description of the project. Next, in order to identify the SWOT of each project, a set of questions addressing the relevant strengths, weaknesses, opportunities and threads should be answered. The answers will be used to identify the SWOT that will be summarized in a table.

The next two sections present an example of an application guide to perform the comparative SWOT analysis, followed by an example of the guide application to a particular project. In deliverable D2.3, an extended application guide will be provided, taking into account the results of the WP2 workshop.

4.5.2 Application guide example

- **Strengths**
  - **S1. Reuse**: Do they properly reuse of open data and geographic information?
  - **S2. Technologies**: What technologies make this project relevant? Do they use a brokered approach to data? Do they provide a single point of access to data?

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- **S3. Cases**: Do they focus in cases related to the reuse of open data and geographic information?
- **S4. Data sources**: Do they use relevant data sources?

- **Weakness**
  - **W1. Reuse**: What they could improve in the reuse of open data and geographic information?
  - **W2. Technologies**: What technologies used in this project can be considered weaknesses?
  - **W3. Cases**: What they could improve in the cases related to the reuse of open data and geographic information?
  - **W4. Data sources**: Do they not produce reusable data?
- **Opportunities**
  - **O1. H2020**: Are there H2020 funds related to the project topics?
  - **O2. Impact**: Do stakeholders praise the project?
  - **O3. Availability**: Are the results of the project accessible?
  - **O4. Viability**: Can some framework that ensures the long-term viability of the results be identified after the end of the project?
- **Threats**
  - **T1. H2020**: Could it not be a viable H2020 proposal?
  - **T2. Impact**: Are stakeholders aware of the outcomes of the project?
  - **T3. Availability**: Are the results of the project inaccessible?
  - **T4. Viability**: Have the project results not be transferred yet to the industry?

4.5.3 Example of comparative SWOT analysis to a project

This example is the application of the methodology for producing the comparative SWOT of the EU FP7 project PlanetData[6] (Ref. FP7 257641). This project was a FP7 Network of Excellence in the area of Intelligent Information Management Network (ICT-209.4.3) with a total cost of EUR 7.32M (EU contribution EUR 3.02M). The project was executed from 2010-10-01 to 2014-09-30. PlanetData aimed to establish a sustainable European community of researchers that supports organizations in exposing their data in new and useful ways. The project is based upon three objectives: research on large-scale data management, develop software to support data provisioning and management, and improve the education level related to large-scale data management in both academia and industry.

An analyst will examine the information available of PlanetData (website, deliverables, relevant papers, external reviews…) in order to answer the questions identified as useful for identifying strengths, weakness, opportunities and threats restricted to topics relevant to ENERGIC OD.

[6] http://www.planet-data.eu/

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Table 4 contains these answers. Next, the analyst summarizes answers identifying the underlying internal and external characteristics that can be helpful or harmful for ENERGIC OD if partners decide to use the project as reference for decision taking. This summary is the comparative SWOT.

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Table 4. Example of SWOT: capturing details from a FP7 project.

presents the comparative SWOT.

Question	Answer
S1. Reuse	The tools developed within the project can be used for publishing RDF data and consuming different sources of data, in particular geographic.
S2. Technologies	The project maintains a catalogue of tools developed by PlanetData partners that support large-scale data management, with particular attention to Linked Data and Sensor Data[7]. Some of the published tools are brokers that can work as a single point to access data. Subprojects have an intensive use of geographic information.
S3. Cases	The project considers, as an application case, the access to diverse sets of open (and closed) public and private data related to city infrastructures and territory, demography, public transport facilities and commercial activities across the city, specifically, focusing on the area of geomarketing[8]. The technical solution is the exposition of dynamic data sources as virtual streaming RDF sources and the transformation of static data sources in RDF sources using ETL processes.
S4. Data sources	The project (and its subprojects such as LinkedMap[9]) considers the use of open (and closed) public and private georeferenced data related to infrastructures and territory, demography, public transport facilities, commercial activities, etc.
W1. Reuse	Many of the tools developed within the project only are focused on publishing data in RDF formats. The support of ENERGIC OD data output requirements is very limited.
W2. Technologies	Stream data, linked data and non-structured data are the inputs of many of the tools developed in this project. The overlap with ENERGIC OD data inputs is little (exception geometry2rdf and LDIF).
W3. Cases	No weakness can be detected from the cases.
W4. Data sources	The project (and subprojects) seldom works with data related to the ENERGIC OD project but the crawl of the Linked Data Web that shows the current relevance of geoinformation in the available Linked Open Data.

[7] http://www.planet-data.eu/planetdata-tool-catalogue

[8] http://planet-data.eu/sites/default/files/PD_WhitePaper_SmartCity.pdf

[9] http://linkedmap.unizar.es/

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Question	Answer
O1. H2020	The focus of the project on large-data management relates it with H2020 ICT calls related to Big Data.
O2. Impact	The impact in academia related with RDF streams and Linked Data is evident (e.g. paper on SRBench[10] 29 cites, updated LOD cloud diagram[11])
O3. Availability	The results of the project are accessible with public licenses.
O4. Viability	The existence of a Linked Data community and the growing relevance of RDF data in European open data portals may support long-term viability of results.
T1. H2020	No threat can be detected unless a restrictive interpretation of the term Big Data is applied.
T2. Impact	It is difficult to identify an impact outside of the academia because the project has just finished.
T3. Availability	No threats can be detected from the availability.
T4. Viability	It is difficult to identify technology transfer because the project has just finished

[10] http://www.planet-data.eu/publications/srbench-streaming-rdfsparql-benchmark
[11] http://data.dws.informatik.uni-mannheim.de/lodcloud/2014/

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Table 4. Example of SWOT: capturing details from a FP7 project.

	Helpful for ENERGIC OD	Harmful for ENERGIC OD
Internal	**STRENGTHS** ▪ Geographic information ▪ Experience in developing data brokers ▪ Experience in reusing geographic information	**WEAKNESS** ▪ Focused on publishing RDF data ▪ Limited support of geographic information formats
External	**OPPORTUNITIES** ▪ Linked Data support enables dissemination in same academic forums ▪ Linked Data community and public data portals support long term viability	**THREATS** ▪ Difficult to predict impact outside of academia

Table 5. Example of SWOT: final SWOT.

5 REFERENCES

References	
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[ENERGIC OD, 2014]	ENERGIC OD Consortium. *European NEtwork for Redistributing Geospatial Information to user Communities - Open Data. Grant Agreement. Annex I - "Description of Work"*. **28 April 2014.**
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6 ANNEX I. DOMAINS TACKLED BY TASK ACCORDING TO THE ENERGIC OD DOW

Domain	#	T2.1	T3.1	T3.2	T3.3	T4.1	T4.2	T4.3	T4.4	T5.1	T5.2	T5.3	T5.4	T6.1	T6.2	T6.3	T6.4	T6.5	T7.1	T7.2	T7.3	T7.4	T8.1	T8.2	T8.3	T8.4
User groups & needs	**17**		X			X		X	X	X				X	X		X	X	X	X	X	X	X	X	X	X
Virtual Hubs & Brokered Architectures	**11**	X				X				X	X	X	X			X	X						X	X	X	
GI applications & services	**9**	X	X					X	X	X				X			X						X		X	
Open Data	**7**	X	X	X		X		X	X							X										
Geospatial Information	**6**	X				X	X	X	X							X										
Technical requirements and specifications	**6**					X			X	X	X			X	X											
Redistribution, access and reuse of GI	**5**	X	X			X	X									X										
Data interoperability, harmonization & integration	**4**		X			X	X			X																
INSPIRE	**4**	X				X	X		X																	
Standardisation	**4**					X			X					X		X										
System of systems	**4**									X	X	X	X													
Licences, constraints, legal affaires	**4**		X			X										X									X	
Metadata	**4**		X		X	X				X																

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Domain	#	T2.1	T3.1	T3.2	T3.3	T4.1	T4.2	T4.3	T4.4	T5.1	T5.2	T5.3	T5.4	T6.1	T6.2	T6.3	T6.4	T6.5	T7.1	T7.2	T7.3	T7.4	T8.1	T8.2	T8.3	T8.4
GMES/Copernicus	**3**	X				X	X																			
Economics and business models	**3**							X														X			X	
Volunteered GI & crowdsourcing	**2**						X	X																		
GNSS	**2**	X					X																			
GEOSS	**2**					X				X																
Semantic data, ontologies	**2**					X	X																			
Spatial Data Infrastructure	**1**	X																								
OGC services	**1**					X																				
Galileo	**1**						X																			
Governance	**1**		X																							
Data models	**1**									X																
Land cover	**1**		X																							
Policy making	**1**			X																						