METHODS AND PROCEDURES PROPOSAL FOR LOCAL SPATIAL DATA INFRASTRUCTURES MONITORING

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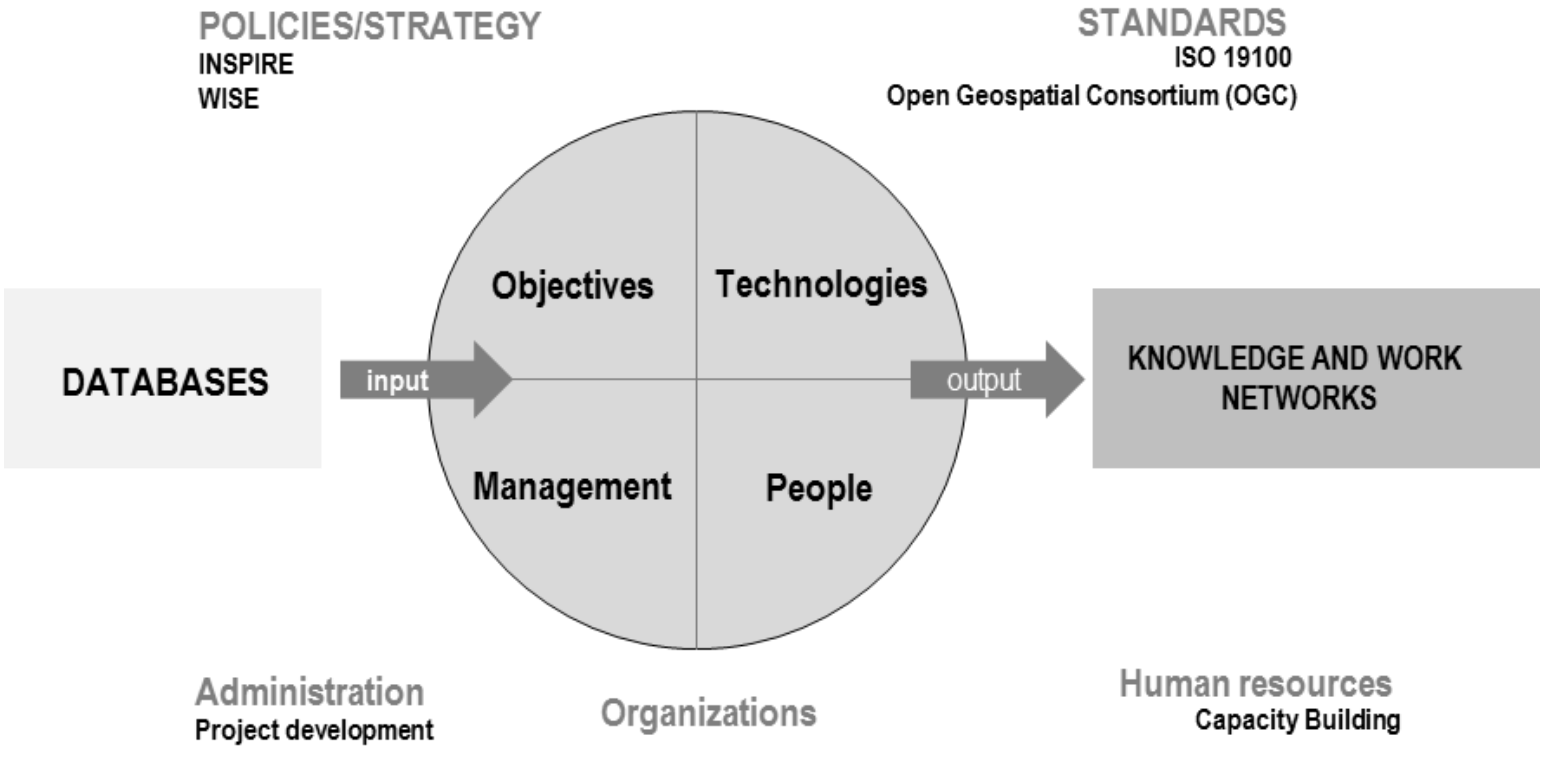
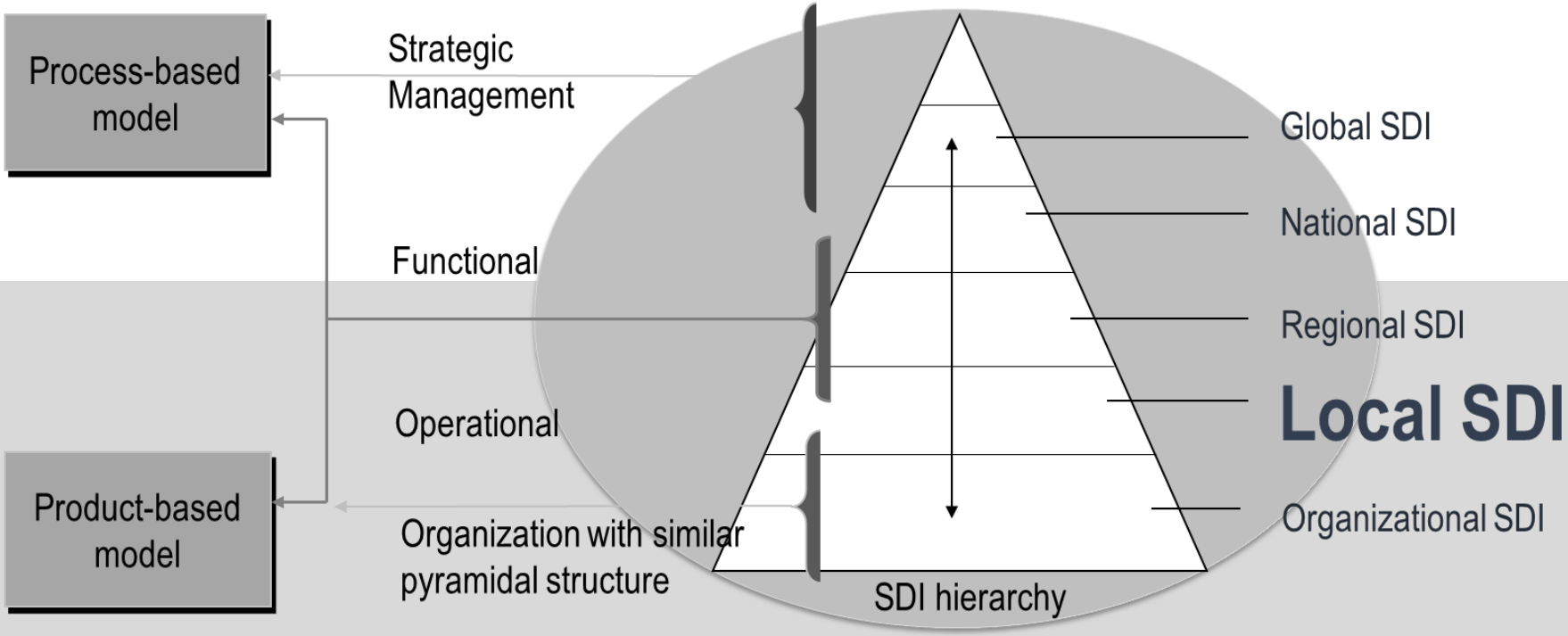
Components and contexts of SDI development



Local Spatial Data Infrastructures



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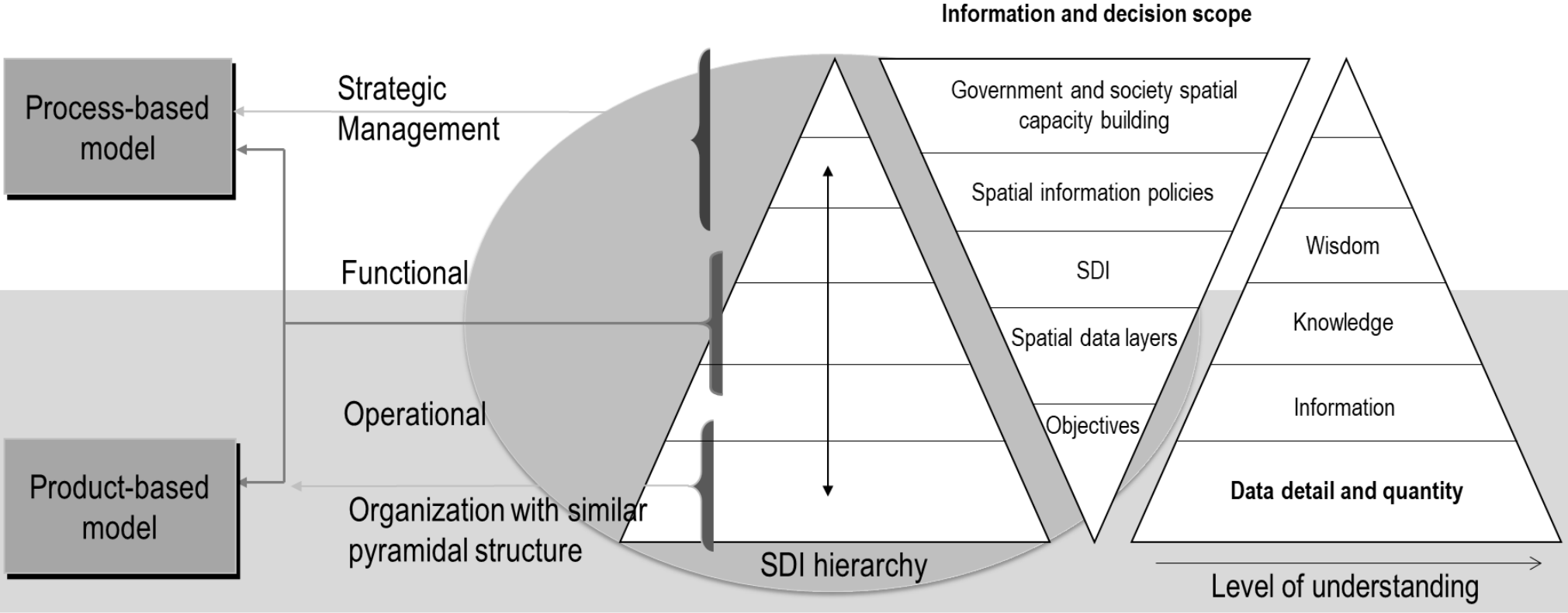


The costs, challenges and potential **impacts indicate the importance and the liability to develop SDI approaches and evaluation models,**

Awareness… ,

Readiness…,

Maturity… ,

Performance….

and satisfaction….

SDI effectiveness/functioning from the user perspective/usability assessment models.

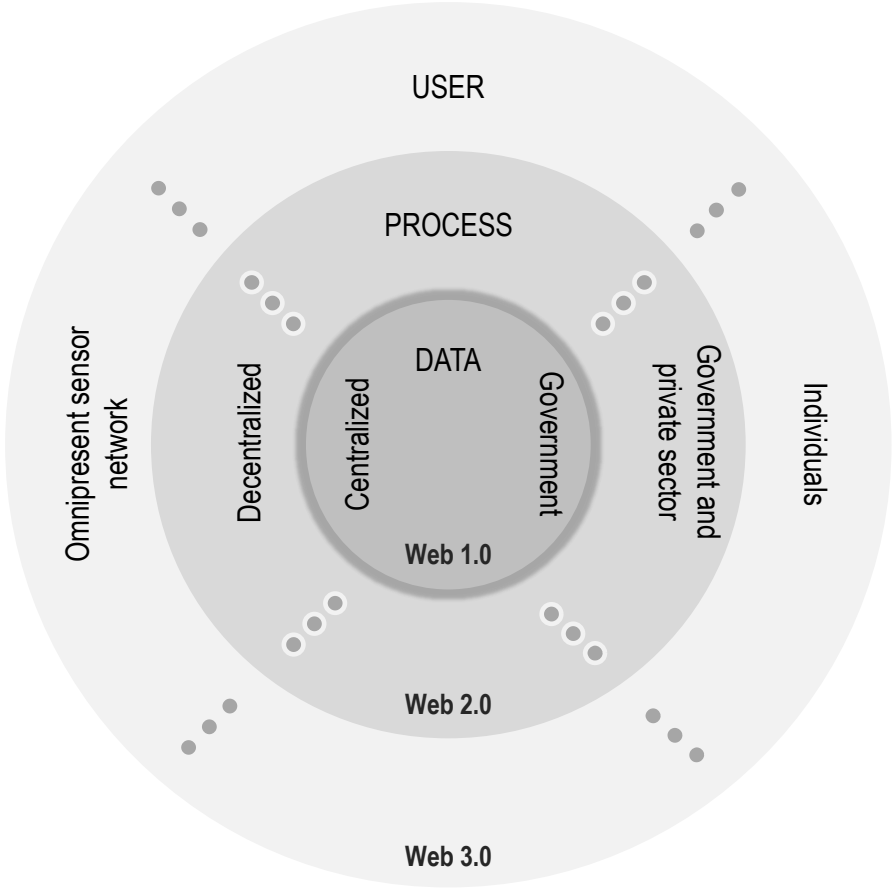
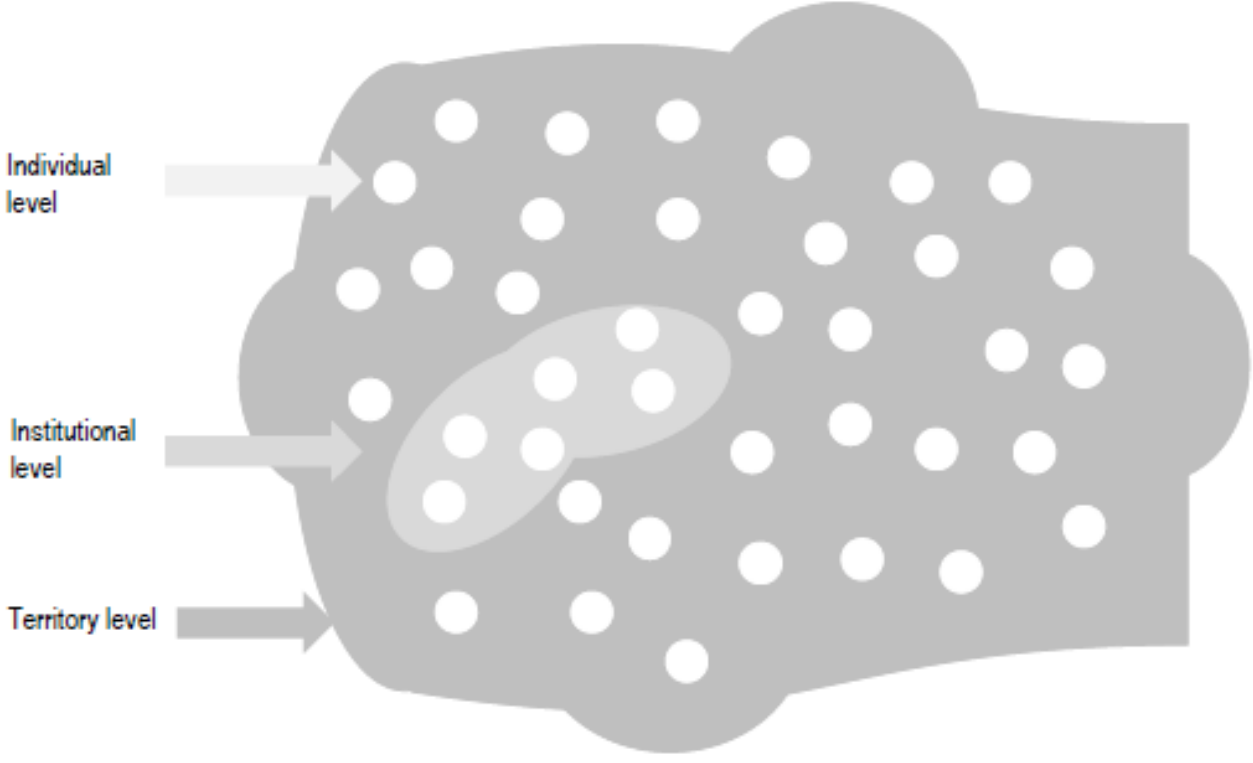


Fig. 2.17 – Representation of the evolution of concepts and elements present in different SDI generations (adap. de Sadeghi-Niaraki et al., 2010).



Objective

Establish, develop and propose (support) an operational local SDI capacity building assessment and monitoring model namely at conceptual, content and instrumental level to be tested in municipal/local authorities.

(1)Explore assessment approaches/concepts

The development of the assessment model is based on the literature, applied over the past 20 years, that is sufficiently comprehensive and abstract to be applied in different realities / moments

(2) Define and implement assessment indicators of local capacity building

The indicators and methodologies considered are according to the interests, importance, preferences, and criteria of the users.

The indicators are divided on the components of the system and the capacities define the ability of the system to evolve from local administration GIS to local SDI.

Methodology

(3) **Establish data collection procedures**.

Collection of data from different sources (available reports, interviews, surveys; dataservers; geoportal; (meta)data. Inquire local agents;

(4) Development of the SDI assessment model

Simple and agile integrated with other assessment and management procedures

(5) Implementation of a collaborative assessment platform

To support the defined indicators, with (semi)automatic capture, user's profiles definition, results analysis and communication.

Methodology

> This model aims to be integrative, dynamic, participatory with a collaborative approach;

> Systematic, dynamic and continuo to support the monitoring of the system

> It is a quantitative and qualitative assessment

> It aims to quantify, restore, adjust, hold and improve local SDI.

Selected indicators to evaluate the capacity building

POLICIES componente		Definition
p1	**Vision**	The collective vision documented for the model, the object and the proposed, discussed and approved objective
p2	**Mission and governance model**	Mission of the proposed documented governance model
p3	**Leadership**	Establishment and dinamization of the activities as well as clarification of leadership responsibilities and authority
p4	**Model and development plan**	Definition of a model and approval of a medium-term development plan (for a period over 5 years)
p5	**Financial and sustainability plan**	Definition of a model and approval of a financing and sustainability plan (for a period over 5 years) that identifies and quantifies costs, sources of revenue, investment indicators and outcome metrics.
p6	**Research plan and practice**	Definition of a model, plan and establishment of achievement, access and participation in Communication and Geographic Information Technologies research activities
p7	**Innovation plan and practices**	Definition of a model, plan and establishment of achievement, access and participation in Communication and Geographic Information Technologies innovation activities, involving aspects related with technology transfer, property management and introduction of innovation.
p8	**Policies and INSPIRE directives**	Policies and policies implicit to the introduction of overall policies and INSPIRE Directive, regarding (publication, sharing and data access)
p9	**National legal framework and standards**	Policies and directives implicit to the introduction of the national legal and regulatory framework (publication, sharing and data access and National SDI participation)
p10	**Data policies**	Data policies (price, sharing, access and reuse policy)
p11	**Partnerships and network policies and practices**	Partnerships formulation and management for knowledge, experience, resources and products sharing
p12	**Public and private partnerships**	Partnerships formulation and management for knowledge, experience, resources and products sharing between private and public entities
p13	**Authority and legitimacy**	Acknowledgment, analysis, introduction, adaptation and assessment of aspects related with authority and legitimacy regarding the mission and activities within the statutory responsibilities framework or SDI partnership agreement
p14	**Entrepreneurship and economy**	Acknowledgment, analysis, introduction, adaptation, assessment and dissemination of experiences and initiatives to promote entrepreneurship and new economies as a result of the SDI partnership implementation

Selected indicators to evaluate the capacity building

STANDARDS componente		Definition
s1	**ISO 19100 Standard**	Introduction experience and initiatives of the ISO TC211 / ISO19100 series
s2	**OGC Standards**	Introduction experience and initiatives of the OGC Standards series
s3	**Intellectual property**	Standards concerning the registration and management of intellectual property and copyright (data registration and licensing)
s4	**Privacy and confidentiality**	Standards related with data record, privacy management and confidentiality
s5	**Security**	Data security and technology standards, including data integrity
s6	**Data and services price**	Standards concerning the definition and conditions for the application of data prices and data services
s7	**Licensing**	Standards concerning data and technologias licensing according to the users typology of and/or use
s8	**Data custody and stewardship**	Standards and agreements on data custody between SDI partners and users
s9	**INSPIRE Directive application**	Standards and agreements regarding the application of INSPIRE standards (Annexes I, II and III data modeling, filling metadata into profiles according to the INSPIRE Metadata Profile)
s10	**Internal regulation of data modeling**	Standards and agreements on the application of modeling and data standards and metadata profiles
s11	**Internal procedures (accountability)**	Standards regarding the development of internal processes and procedures associated with a framework of accountability
s12	**External precedures (integration)**	Standards regarding the development of external processes and procedures associated with a framework of accountability and interaction of technologies and systems
s13	**Information Management System**	Standards regarding the development of internal processes and procedures at the level of an information management system (COBIT.)
s14	**Management and quality assurance mechanism**	Standards regarding the development of internal processes and procedures at the level of management and quality assurance

Selected indicators to evaluate the capacity building

USERS componente		Definition
u1	**Hiring**	Permanent or temporary recruitment of qualified human resources to perform functions and activities in the areas of C&GIT
u2	**Professional stability**	Stability and professional progression of human resources qualified to perform functions and activities in the areas of C&GIT
u3	**Evaluation**	Procedures for the evaluation of human resources to carry out functions and activities in the areas of C&GIT
u4	**Collaboration**	Procedures and processes for collaboration among human resources, groups, departments or communities to share common capabilities, resources and projects
u5	**Coordination**	Procedures and processes for coordinating human resources, groups, departments or communities in order to articulate common capacities, resources and projects for capacities
u6	**Training**	Project and actions of education and vocational training in order to train human resources, groups, department or community in knowledge, skills and attitudes around the subjects of C&GIT
u7	**Research**	Procedures and processes to promote, stimulate and participate in research projects, programs or networks
u8	**Innovation**	Procedures and processes to foster, stimulate and participate in innovation projects, programs or networks
u9	**Accreditation and competences recognition**	Procedures and processes to foster, stimulate and participate in projects, programs or networks for the recognition of competences for C&GIT users
u10	**Mobility**	Procedures and processes to foster, stimulate and participate in initiatives, programs or mobility networks of techniques with activity and functions in C&GIT applied in GIS and SDI

Selected indicators to evaluate the capacity building

DATA AND METADATA componente		Definition
d1	**Collection of Reference data**	Procedures for capturing and modeling bases or spatial data sets according to INSPIRE Annex I Standards
d2	**Collection of Thematic Data**	Procedures for capturing and modeling bases or spatial data sets according to INSPIRE Annex II Standards
d3	**Collection of Thematic Data**	Procedures for capturing and modeling bases or spatial data sets according to INSPIRE Annex III Standards
d4	**Data storage**	Procedures for storing databases or spatial data sets in conditions of security and integrity
d5	**Editing and data transformation**	Processing procedures (spatial, formats) and editing of alphanumeric databases in databases or spatial data sets
d6	**Data publication**	Procedures for analogue and digital publication of databases or spatial data sets
d7	**Data access**	Procedures for managing access to databases, spatial data sets or data services by defining user profiles and application
d8	**Database Management**	Procedures for managing databases or spatial data sets or data services
d9	**Database integration**	Procedures for integrating spatial data sets or data services by developing standardization implementation or process implementation and interoperability tools
d10	**Analysis and spatial modeling**	Development and application of procedures and techniques for spatial data analysis and spatial modeling
d11	**Internal quality**	Development and application of procedures and techniques for evaluation and internal quality management of geographic databases (ISO 19113, 19114, 19138, 19157 and 19158)
d12	**External quality**	Development and application of procedures and techniques for evaluation and management of external quality of geographic databases (ISO 19113, 19114, 19138, 19157 and 19158)
d13	**Quality assurance procedures**	Development and application of management procedures and internal quality assurance of geographic databases (ISO 19157 and 19158)
d14	**Metadata production**	Development and application of metadata production procedures (ISO 19115 and 19139, MIG 3.0)
d15	**Metadata publication**	Development and application of metadata publishing procedures (ISO 19115 and 19139, MIG 3.0) in metadata manager and catalog

Selected indicators to evaluate the capacity building

TECHNOLOGIES componente		Definition
t1	**Spatial data capture (location and georeferencing)**	Development, installation and operation of procedures of geographic data technologies (telemetry / LIDAR, positioning system, dynamic segmentation, geocoding)
t2	**Capture and image processing**	Development, installation and operation of geographic data technologies (satellite image, high and low resolution aerial images)
t3	**spatial analysis and decision support systems applications**	Development, installation and operation of spatial transformation technologies, format and integration of geographic databases
t4	**Storage technologies**	Development, installation and operation of database storage technologies
t5	**Security technologies**	Development, installation and operation of database security technologies
t6	**Communication and data mobility**	Development, installation and operation of communication and mobility technologies (fiber, network expansion, cloud installation .....)
t7	**Technology integration and interoperability**	Development, installation and operation of technologies for the integration and interoperability of technologies
T8	**Metadata management and catalog**	Development, installation and operation of manager and metadata catalog technologies (geo-network)
T9	**Mobile interface and technologies**	Development, installation and operation of mobile interfaces and technologies (SIGWEB platforms, smartphone ....)
t10	**Access (Geoportal)**	Development, installation and operation of geoportal (consultation, space operations, user management, implementation of geo-web-services)

Results

- Definition of the indicators organised by the components of the system
  - Information to be collected from each indicator
    - Data source
    - Collection type
    - Collection form
    - Data type
    - Format
    - Normalization/standard level

	Indicador	Description	Data Source (Who has the authority/legitimacy to respond to this?)	Collection type	forma de recolha	Data type	Format	Stakeholders	Notes
				Direct/indirect		(qualitative/quantitative)			
1	Vision	The collective vision documented for the model, the object and the proposed, discussed and approved objective	Decision makers/SDI promoters	Indirect	Secondary	Qualitative	text		
2	Mission and governance model	Mission of the proposed documented governance model	Decision makers/SDI promoters	Indirect	Secondary	Qualitative	text		
3	Leadership	Establishment and dinamization of the activities as well as clarification of leadership responsibilities and authority	Decision makers/SDI promoters	Indirect	Secondary	Qualitative	text		
4	Model and development plan	Definition of a model and approval of a medium-term development plan (for a period over 5 years)	Decision makers/SDI promoters	Indirect	Secondary	Qualitative	text		

- Variables standardization/normalization

— Indicators for institutional and territorial assessment capacity

Value	Definition
0	Does not have a direct relationship between project outcomes on the component impact;
1	Not aware or entities do not intend to use;
2	Aware and have interest in knowing and applying the procedures or results developed in the projects.
3	Theoretical knowledge and development of individual (in territorial assessment) or institutional (in territorial assessment) competences;
4	Practical application by a limited set of individual users (in the territorial assessment) or institutional users (in the territorial assessment);
5	Internal publishing and dissemination by a significant set of users and significant influence on the functioning of the institutional or territorial context;
6	Internalization and institutionalization or maturity of the elements with the regular application or continuous improvement of the procedures or results;
7	Divulgação e disseminação externa mesmo com a ajuda ao nível da documentação e apoio à experimentação External publication and dissemination even with support at the level of documentation and experimentation.

Results

- Definition of capacities (capacity building as a process…)
  - Political impulse
  - Technical ability to gather and mobilize data
  - Ability to generate cost savings
  - Data responsiveness
  - Data service responsiveness
  - Service responsiveness
  - Users capacity building and users capacity involvement responsibility
  - Accountability

Final considerations

Assess and manage of the SDI complex and evolutive nature;

Assess the **capacity building evolution associated to each implemented project, component, level, status, at different evolutive levels, interaction, or cumulative impact.**

The **definition, simplification, and implementation of the exploratory model in different case studies allows the identification of the key points and moments (temporal frequency) for assessment data collection** related to the increasing the capacity building and SDI recognition.

Assess SDI components/indicators

Assess SDI development results and contributes from each project impacts

Assess SFI capacity to support strategic or operational decision making, communication…;

Assess knowledge networks

Assess capacity to SDI expansion/improvement.

The integration of the exploratory evaluation model in a research and innovation program benefits the simplification, dissemination and monitoring of practices associated with the implementation of management systems, quality assurance, and certification of SDI evaluation processes.

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