

# Organisational aspects of spatial information infrastructure in Poland

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**Abstract.** One of the more important elements of spatial information infrastructure is the organisational structure defining the obligations and dependencies between stakeholders that are responsible for the infrastructure. Many SDI practitioners and theoreticians emphasise that its influence on the success or failure of activities undertaken is significantly greater than that of technical aspects. Being aware of the role of the organisational structure in the creating, operating and maintenance of spatial information infrastructure (SII), Polish legislators placed appropriate regulations in the Spatial Information Infrastructure Act, being the transposition of the INSPIRE Directive into Polish Law.

The principal spatial information infrastructure stakeholders are discussed in the article and also the scope of cooperation between them. The tasks and relationships between stakeholders are illustrated in UML, in both the use case and the class diagram. Mentioned also are the main problems and obstructions resulting from imprecise legal regulations.

**Keywords:** SDI, SII, INSPIRE, organisational structure

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## 1. Introduction

Spatial data / information infrastructure (SDI/SII) facilitates the collection, maintenance, distribution and the use of spatial information. By reducing duplication, facilitating integration and developing new and innovative applications, and also respecting user needs, SDI can produce significant human and resource savings and

returns (Chan et al., 2001). The creation of reliably functioning spatial information infrastructure requires the undertaking of a range of legal, organisational, technical and also standardisation activities. In the literature the most frequently discussed problems concern technical and standardisation issues, though in recent years many publications have appeared discussing the significance of organisational aspects in the construction and use of SDI/SII.

Borrero (1998) emphasises one of the issues of primary significance, stating that problems connected with the creation of SDI are principally organisational rather than technical. A similar opinion is held by Nebert (2001). Masser (2007) characterises the implementation of SDIs as something that is not only of a technical, but also of an institutional nature. Rajabifard et al. (2003) consider that the development of a successful SDI is a socio-technical exercise rather than a purely technical matter. Rajabifard and Williamson (2001) mention six key factors for accelerating SDI development, three of which are related to organisation. They are as follows: awareness of the application of spatial information, the involvement of politicians, and collaboration between different stakeholders. Based on findings of Kok and Van Loenen (2005), Van Loenen (2006) identifies six critical organisational aspects of SDI development: leadership, vision, communication channels, the strength of the GI-Community to organise itself, awareness, and sustainable resources.

In Poland the organisational structure of the spatial information infrastructure was established statutorily by the Spatial Information Infrastructure Act of the 4th of March 2010 (SII Act), which is the transposition of the INSPIRE directive (2007/2/EC) into Polish Law. The organisational structure is adapted both to the central and local government. The Act specifies the basic principles of the creation and operation of SII in Poland and also the introduction of a range of legal mechanisms, which enable interoperability of spatial data, metadata, network services, and coordination of establishment, development and use of the infrastructure. Within the infrastructure, initiatives may be implemented creating regional, local and thematic infrastructure on the condition of ensuring that they are inter-operational and in compliance with the Polish and INSPIRE implementing rules. Thus the spatial information infrastructure in Poland has an interdisciplinary, inter-resort and multi-subjective and also multi thematic character (Gaździcki, 2009; 2010).

## **2. Organisational structure of spatial information infrastructure in Poland**

### ***2.1. The hierarchical character***

The coordinator of all activities is the minister responsible for public administration, who entrusts the performance of the specified tasks to the Surveyor General (SG). Alongside the minister operates the Spatial Information Infrastructure Council which is an advisory and consultative body. At the second level of SII coordination, for each of the 34 spatial data themes, is a leading authority, which may be a minister or central

body of government administration. The task of the leading authority is coordination of the work and assurance of the implementation of the regulations of the Act for the specified theme. At the third level of coordination of SII is established, maintained, and developed by the public authorities that operate the data sets, corresponding to one or more of the themes listed in the Annexes I-III.

## ***2.2. SII stakeholders in Poland***

The leading authority, public authorities, the coordinator are the principal SII stakeholders. Their participation in the development of SII, specified in the SII Act, is of a coordinating, technical, monitoring-reporting and promotional character.

### *2.2.1. Leadership – General Surveyor*

The Surveyor General (SG), on the behalf of the minister responsible for public administration, is liable for all activities associated with the establishing and operating of the spatial information infrastructure in Poland as well as cooperation with the European Commission. In particular the tasks of the SG include planning, initiating and co-creating (in agreement with interested parties) all organisational, legislative and technical activity intended to create and develop SII. In particular the SG establishes and operates the geoportal, and conducts publicly available registration of spatial data sets and services within the infrastructure.

Alongside the SG operates the Spatial Information Infrastructure Council. It is a consultative and advisory body, which may present initiatives concerning organisational and technical development of the infrastructure and also broadening its thematic range.

### *2.2.2. Leading authorities*

The leading authority is the central government level administrative body responsible for organisation, coordination and monitoring activities connected with the development of the infrastructure elements for the specified, theme assigned to it. The tasks of the leading body include:

- initiation and co-creation of legal and technical arrangements intended to achieve inter-operational capability in the extent of the specified INSPIRE theme;
- making available to public authorities or third parties the information essential to ensure interoperability of spatial data sets and services;
- drawing up the data sets and services harmonisation schedule and (optionally) drawing up the data integration plan;
- cooperation with other administrative bodies;

- monitoring of the SII implementation and use (with reference to the assigned spatial data theme).

The Act designates 11 leading authorities, including 5 ministers and 6 presidents of central authorities. The Surveyor General bears the most obligations, being responsible for the 15 themes, belonging to all three Annexes of INSPIRE (Table 1). For one of the themes – *Protected Areas* – two leading authorities are responsible: the Minister of Culture and National Heritage for the protection of historic monuments and archaeological sites and the Minister of Environment with reference to NATURE2000. Furthermore the Minister of Environment is responsible for the 4 themes listed in the Annex III.

Table 1. Leading authorities and the number of themes assigned

Leading Authority	Number of themes		
	Annex I	Annex II	Annex III
Minister of Infrastructure			3
Minister of Culture and National Heritage	1		
Minister of Agriculture and Rural Development			1
Minister of Environment	1		4
Minister of Health			1
Surveyor General	7	3	5
Geologist General		1	2
State Environmental Protection Inspector			1
Nature Conservator General			2
President of the Central Statistical Office			2
President of the National Water Authority	1		

### 2.2.3. Public authority

Government administrative bodies and bodies of local government participate jointly in the establishment of SII insofar as they maintain data sets corresponding to at least one spatial data theme listed in the Annexes to the INSPIRE directive. These sets constitute the infrastructure resources, and should be notified for register of spatial data sets and services. Furthermore, the obligations of the public authority also include the introduction of technical arrangements ensuring interoperability of spatial data sets and services and the harmonisation of these sets (the SII Act article 7).

With regard to the high cost of IT technology, public authorities may, in agreement with leading bodies, create and maintain joint infrastructure elements, intended to minimise the costs of implementation and maintenance of this infrastructure, optimise access to spatial data and services, and improve quality of these data and services.

The tasks of public authority and their relationships with the leading authority are presented as a use case diagram in Figure 1.

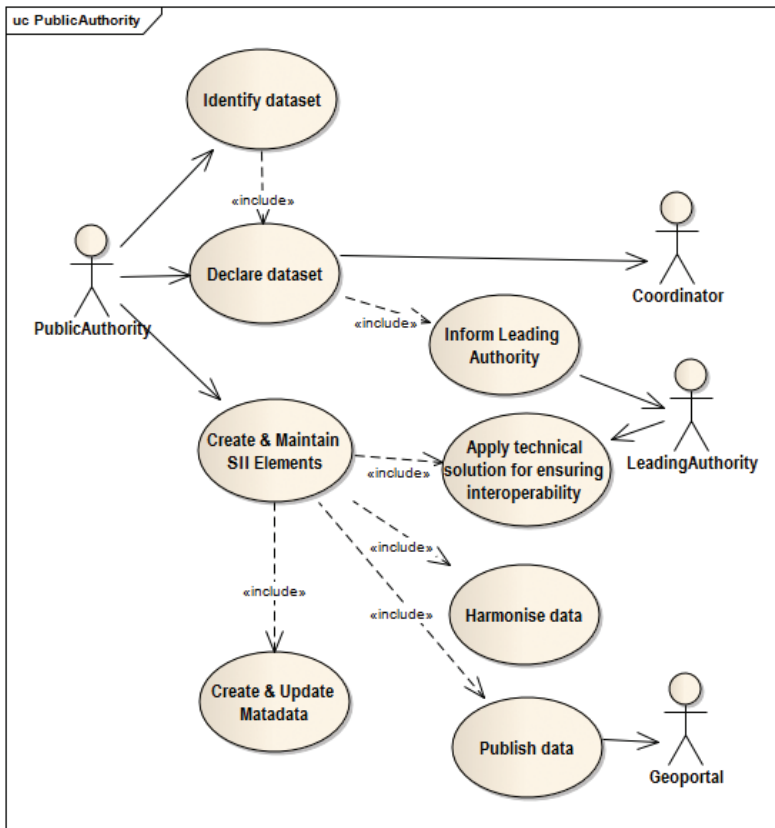


Fig. 1. Tasks of public authorities in the establishing and maintenance of SII

### 2.3. Relations between SII stakeholders

Mutual relations between SII stakeholders, and remaining infrastructure elements, referred to as resources (data, metadata and services) are presented in the class diagram (Figure 2). The SII Coordinator is responsible for the implementation, maintenance and development of the infrastructure; the SII Coordinator cooperates with the European Commission and leading authorities and other public authorities. The Coordinator acting on behalf of the Minister of Internal and Administrative Affairs advises the SII Council. The leading authority is responsible for the indicated spatial information themes (one or many see Table 1) and also for the resources (one or more source data), which are assigned to the given theme. Each INSPIRE theme is covered by one or many resources (e.g. *Protected Area*) and each resource belongs to one or

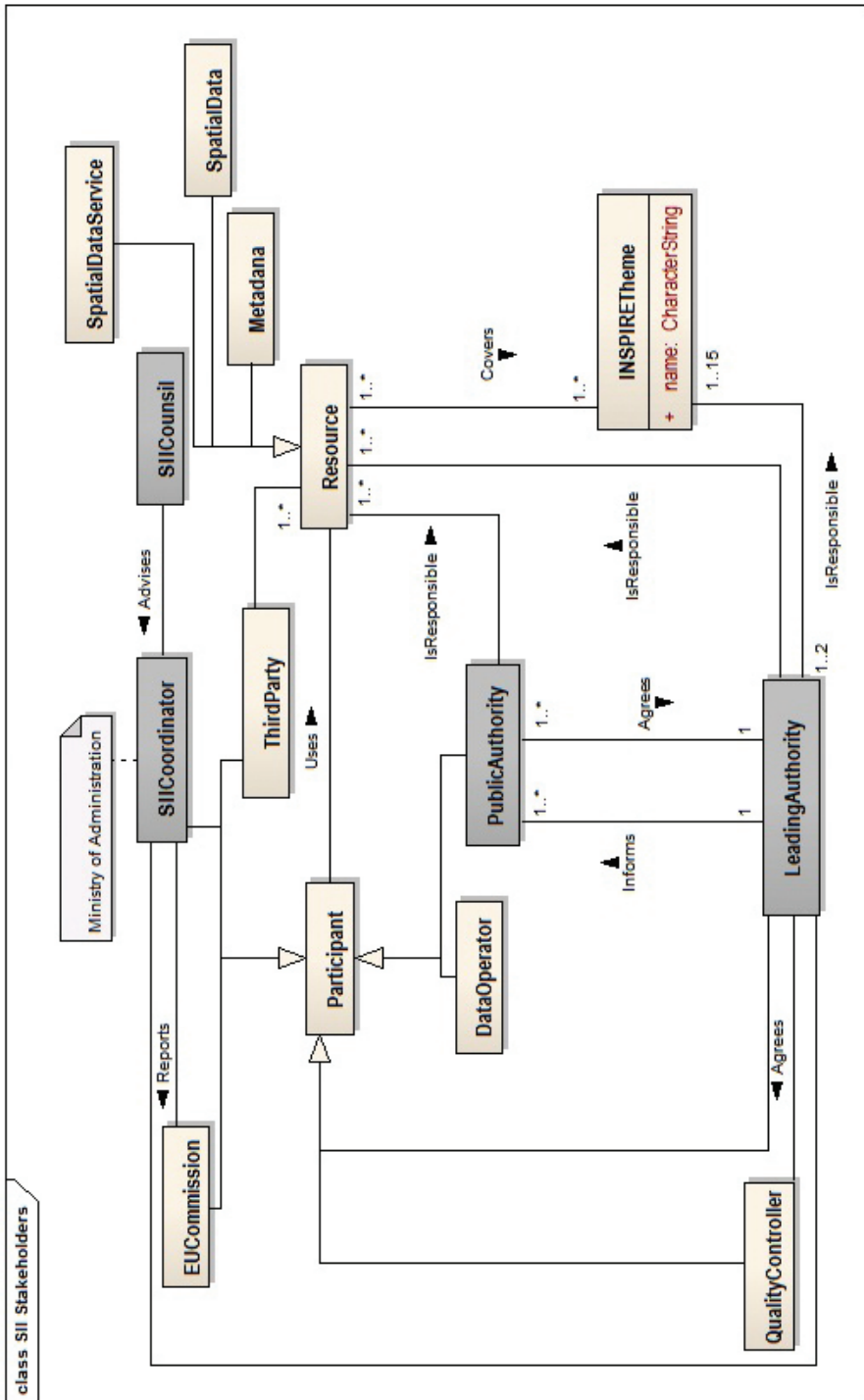


Fig. 2. Relationships between SII elements

many INSPIRE themes (e.g. Topographic Database should be the source data set for creating data for *Transport networks*, *Buildings* and *Land Use*). The public authority on the basis of information obtained from leading authority, concerning the principles of ensuring interoperability and harmonisation of resources, prepares metadata and establish services for the spatial data, for which it is responsible. The public authority is responsible for one or many resources (e.g. National Heritage Board of Poland is responsible for the only one theme – *Protected Area* – and Polish Geological Institute is responsible for 3 themes). Public authorities in agreement with leading authority may, through mutual agreement, jointly create and maintain infrastructure elements (relation 1..\*). Furthermore, the leading body makes agreements in the extent of the infrastructure implementation, including quality inspection, with the SII Coordinator. Leading authorities, public authorities and the coordinator are infrastructure participants (users).

The data operator and the quality controller fulfill significant roles in the construction and functioning of SII. They are the stakeholders, to whom are ascribed exclusively technical tasks. The data operator is a unit (of state budget economy, budget, administrative unit) managing data, on behalf of the administrative body. The quality controller is the organisational unit, to which the leading authority and/or SII Coordinator entrust the task of quality control of harmonisation. The extent and mode of assessment of the quality of resources, which have been connected to the infrastructure, are subject to agreement with the SII Coordinator, leading or public authority.

### 3. Cooperation within the scope of SII

The principal objective of SII is joint use of information resources made available due to the achievement of inter-operational capability. This objective may only be achieved due to the cooperation of interested parties. Without close cooperation as emphasised by Masner (2005, 2007), Kok and Van Loenen (2005) and Craglia and Campagna (2009) between public administration units, it is difficult to imagine the efficient operation of the spatial information infrastructures. This aspect was emphasised in the articles 18 and 19 of the INSPIRE directive. The article 18 obliged Member States to create, at particular levels of administration, appropriate structures and mechanisms coordinating the construction and use of SII and also the monitoring of its conformity with the implementing rules of the directive. Whereas the article 19 states that the European Commission (EC) is responsible for the coordination of INSPIRE at the community level, assisted by the European Environment Agency. Contact between the EC and the Member State takes place through the mediation of the contact point.

Furthermore the directive in its first article emphasises that “INSPIRE is supported by the infrastructures for spatial information established and operated by the Member States”, thus in a significant manner the shape, effectiveness and information content depends upon the arrangements accepted in each of the states. The Polish Spatial Information Infrastructure Act, being the transposition of the INSPIRE directive

to Polish legislation, details the mode and extent of cooperation between different bodies creating the spatial information infrastructure. The details of cooperation are enumerated in section 5 “Joint use of spatial information” and also section 6 “Joint action and coordination in the extent of spatial information”.

Analyzing the INSPIRE Directive and implementing rules as well as the SII Act cooperation between stakeholders establishing and maintaining the Spatial Information Infrastructure in Poland concerns legislative, methodological, standardisation and technical activities, and primarily encompasses the creation of:

- legal frameworks for the exchange, making available and use of spatial data and information;
- organisational structures ensuring reliable and effective introduction of INSPIRE implementing rules and the coordination of activities;
- methodological and technical ensuring inter-operational capability;
- data and services;
- technical resources for making available SII resources;
- requirements for spatial data and services;
- training and promotional activities.

#### **4. Problems and hazards**

Interoperability and inter-resort functionality of the Polish SII requires the interest and involvement of many administrative bodies at various levels, starting with central authorities and extending to local government administration. As emerges from the questionnaire (Fiedziukiewicz et al., 2009), the awareness of the necessity of the implementation of new, advanced technological tasks amongst the bodies jointly creating SII is very variable and cooperation based on agreement is not always effective.

The SII Act determines that spatial data sets and services included in the infrastructure shall be notified for registration by public authorities. Notification shall take place on the principles established in the Regulation of the Ministry of Internal Affairs and Administration (MSWiA, 2010), according to which the public authority defines the theme classification of the data set, that is ascribes the data set to the appropriate theme (§3 item 1 point 8 of the Regulation). Neither the leading body responsible for the given theme, nor the coordinator – Surveyor General – have any influence on the manner of ascribing data sets to the particular INSPIRE theme. This situation may lead to erroneous assignment of data sets, especially with regard to discrepancy in the names of themes in the Polish texts of the INSPIRE directive and the SII Act.

The obligations of public authority also include the harmonisation of data sets and the introduction of technical arrangements ensuring interoperability (SII Act article 7). This obligation may lead to a situation, in which administrative bodies will independently define the harmonization rules, in effect causing lack of internal cohesion



of data made available by various public authorities. The scope of harmonisation and the way how to transform source data in accordance with the required application schema, as well as the quality measures of the harmonized and interoperable data, should be established at the level of leading authority.

The next problem requiring a systemic solution concerns spatial data themes, for which data essential for harmonisation may originate from two or more sources of data maintained by different administrative bodies. The SII Act does not provide instruments for effective harmonisation of such data sets, in particular for maintaining rules for harmonisation and the quality of data set published in the extent of the infrastructure. In order to ensure conformity with the INSPIRE theme data specification the necessity of correcting source data sets may arise e.g. elimination of incoherence of data, building topology, matching for adjoining spatial objects etc. If corrections are treated as one of the phase of the harmonisation process, i.e. should be performed only on data set resulting from harmonisation, the question arises who should correct data and on what basis. Correction of source data should be performed by the public authority on the basis of data quality criteria established, by the leading body or coordinator.

## **5. Conclusion**

The organisational structure and cooperation within the framework of SII in Poland is adapted to the purposes and tasks set by public administration bodies involved in the establishment and development of the spatial information infrastructure.

The measures stimulating and regulating this cooperation are the Spatial Information Infrastructure Council and also the annual compulsory monitoring and the tri-annually established reporting concerning the state of usage and implementation of the spatial information infrastructure. Cooperation is formalised and clarify the agreements between parties concerned.

Legal provisions assure governmental bodies the tools for monitoring the process of creation and development of the infrastructure. Moreover, the public institutions responsible for the implementation become engaged in operational management and planning of the process.

The strong aspect of SII in Poland is the position of the Surveyor General as the SII Coordinator and also as the leading authority in the extent of the 15 themes. The weak aspect is the undoubtedly too weak influence of leading bodies on public authorities, which have at their disposal data sets connected with the INSPIRE themes. The weak aspects also include lack of procedures concerning integration, harmonisation and quality control.

Transposition of the INSPIRE Directive in Poland gives an opportunity for comprehensive revision of the national data resources, technical standards, data exchange and update procedures.

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## Aspekty organizacyjne infrastruktury informacji przestrzennej w Polsce

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### Streszczenie

Jednym z istotniejszych komponentów infrastruktury informacji przestrzennej (IIP) jest struktura organizacyjna określająca m.in. zależności pomiędzy organizacjami tworzącymi infrastrukturę. Wielu praktyków i teoretyków SDI podkreśla, że wpływ aspektów organizacyjnych na sukces lub porażkę SDI jest dużo większy niż elementów technicznych. Mając świadomość znaczącej roli struktury organizacyjnej w tworzeniu, funkcjonowaniu i zarządzaniu infrastrukturą przestrzenną w Polsce, legislatorzy umieścili odpowiednie zapisy w ustawie z dnia 4 marca 2010 r. o infrastrukturze informacji przestrzennej, będącej transpozycją dyrektywy INSPIRE do prawa polskiego.

W artykule omówiono strukturę organizacyjną IIP w Polsce, podając (m.in. w postaci diagramów UML) obowiązki poszczególnych organów administracji zaangażowanych w jej budowę i rozwój, a także omówiono zależności i zakres współpracy pomiędzy poszczególnymi jednostkami. Wspomniano także o problemach jakie wynikają z niezbyt precyzyjnych zapisów ustawy o IIP.