

Geospatial Reference Architecture – a tool to manage utilisation of geospatial information in Statistics Finland

The reference architecture work defined the vision for the target state and its actors for the processing of geospatial information utilised and produced in Statistics Finland's statistics production. Measures were documented in the reference architecture to attain the target state according to the vision. The key perspective is to improve interoperability within Statistics Finland and outside the agency in the operating environment of the integration of statistics and geospatial information.

Description of the problem

The processing of geospatial information utilised and produced in statistics production is implemented with overlapping statistics-specific solutions that may have led to mutually non-uniform results and overlapping work. There has been no comprehensive view of the geospatial information linkages of the entire statistics production and this has made it difficult to utilise fully geospatial information of statistics and especially administer them.

The integration of statistics and geospatial information is placed nationally within the activity of several authorities. There is no clear view of the division of work between different authorities from the perspective of the integration of statistics and geospatial information.

Solution

The first version of the geospatial reference architecture was made in 2018 and it was updated in 2019. It is a tool for the controlled utilisation and production of geospatial information. The reference architecture shows how the activity related to geospatial information should be arranged so that

- Statistics Finland attains a centralised operating model for the production of geospatial information
- Geospatial information is stored in the geospatial data repository
- Geospatial information is used uniformly
- Geospatial information is used with a customer-oriented approach
- Statistics Finland cooperates with other producers of geospatial information.

The framework for the architecture work is the national public administration recommendation JHS 179 Planning and development of business architecture, which is largely based on TOGAF (The Open Group Architecture Framework). The architecture is also based on the reference architecture of the public administration's geospatial information, which is a target state description and development plan, advancing national interoperability and the joint use of geospatial information.

Results

Strategy map

The strategy map of Statistics Finland's geospatial reference architecture summarises the vision of geospatial information, the drivers behind the change, the strategic goals and the detailed objectives.

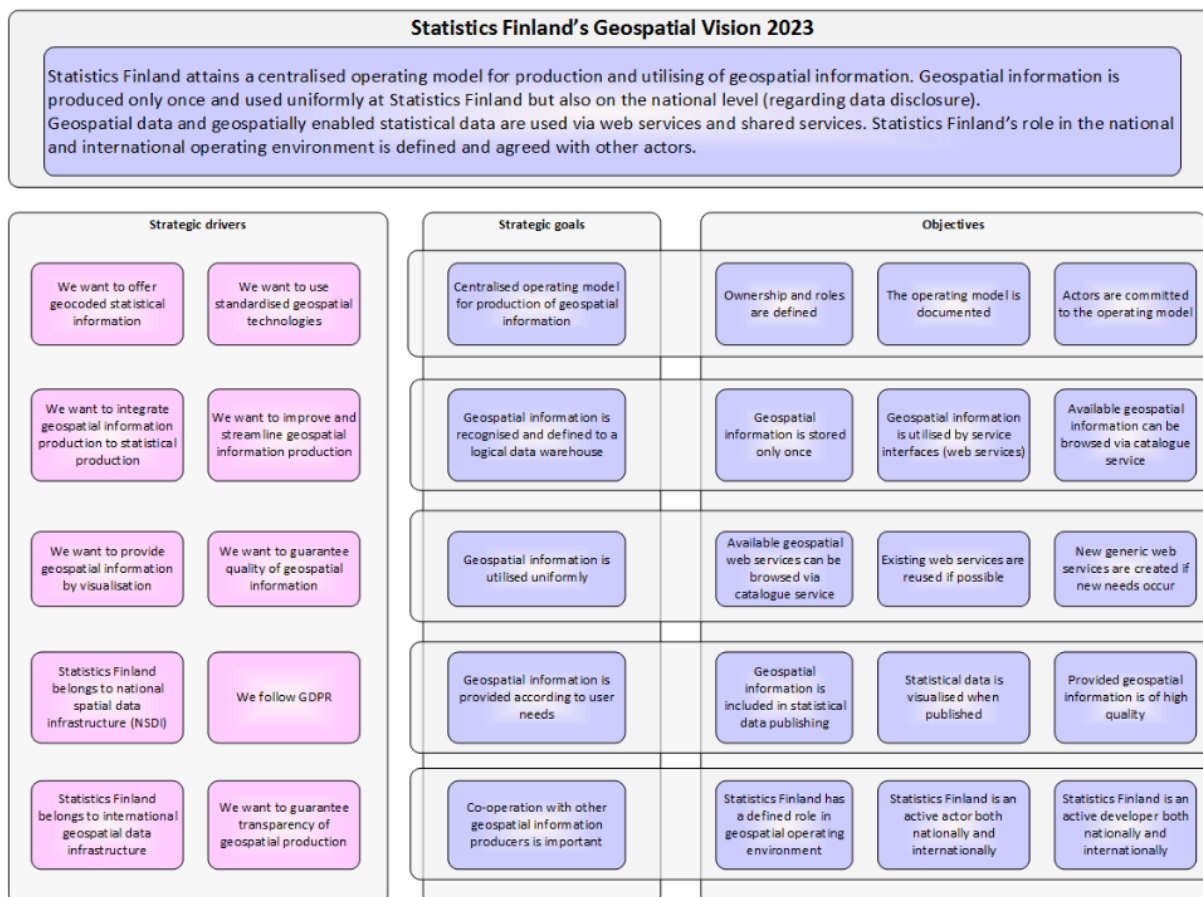


Figure 1. Geospatial Strategy Map of the Geospatial Reference Architecture of Statistics Finland

Strategic goal	Description
Centralised operating model for production of geospatial information	Ownerships, roles and actors of geospatial information are defined. The activities related to geospatial information are centralised, and the operating model is documented so that it is transparently available to all involved in the production and distribution of geospatial information. Geospatial information actors must be committed to the centralised operating model.
Geospatial information is stored in the logical geospatial data repository	Geospatial information and location information are stored in the centralised geospatial data repository. The structure and processing of geospatial information is based on the joint concept model. The repository's data are used through APIs.
Geospatial information is utilised uniformly	Geospatial information is used at Statistics Finland, and as far as possible at the national level, uniformly through generic geospatial information services. New generic services are produced for the new needs of statistical production. The target state services of geospatial information are presented in the service map. Statistics Finland also utilises general use services produced by other geospatial information actors. Correspondingly, Statistics Finland produces such services so that they are also available to other actors.

Geospatial information is provided according to user needs	The aim is to provide high-quality geospatial information as part of the distribution of statistical data whenever the linking of location is possible. The data are provided through the services, and they are available to customers in visual form through map interfaces, for example. Customers can combine various statistical data on the basis of location information.
Cooperation with other geospatial information producers	Statistics Finland defines its role in the operating environment of geospatial information. Statistics Finland can utilise more outputs of other actors and focus on the development of the outputs according to its role. These outputs are correspondingly available to other geospatial information actors as generic services or more high-quality data, for example. Statistics Finland is active nationally and internationally. It promotes initiatives related to the integration of statistics and geospatial information.

Geospatial information stakeholders

Stakeholder	Description
International	<ul style="list-style-type: none"> • EU Eurostat, WG Integration of Statistical and Geospatial information • UN ECE High-Level Group for Modernisation of Official Statistics HLG-MOS • United Nations Committee of Experts on Global Geospatial Information Management UN GGIM • United Nations Expert Group on the Integration of Statistical and Geospatial Information UN EG ISGI • European Forum for Geography and Statistics EFGS • GEOSTAT consortiums
National	At the national level, around 20 key actors were identified. The most significant of these is the National Land Survey of Finland for cooperation and as the producer of data. National collaboration to advance the integration of statistics and geospatial information must be strengthened. A shared national Finnish view in the above-mentioned international connections requires a support structure for national cooperation. We suggest the establishment of such a group.
Statistics Finland's internal stakeholder	More than 40 different statistical systems, products, or activities were identified at Statistics Finland, where the processing of geospatial information is part of statistics production.

Logical data repositories

The geospatial data repository is one of Statistics Finland's six logical data repositories in the processing stage, and it is linked to other logical data repositories concerning the location information of statistical objects.

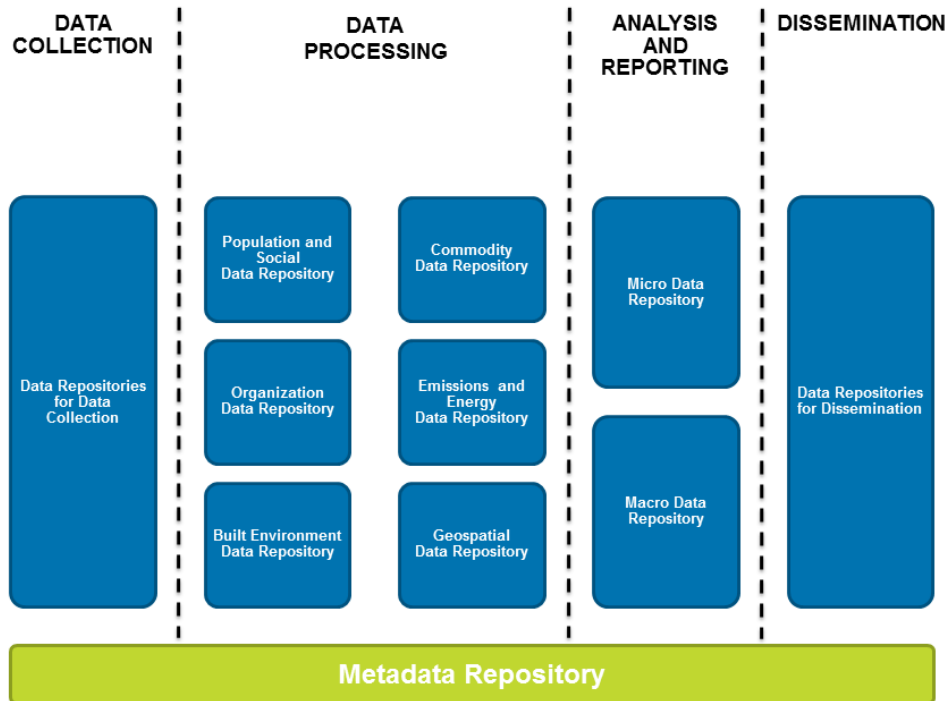


Figure 2. Statistics Finland's logical data repositories

Conceptual model

A less detailed level conceptual model for geospatial information was made in connection with the reference architecture work. Statistics Finland's geospatial information solutions must comply with the data model described below to attain the interoperability of the service and the integrability of data.

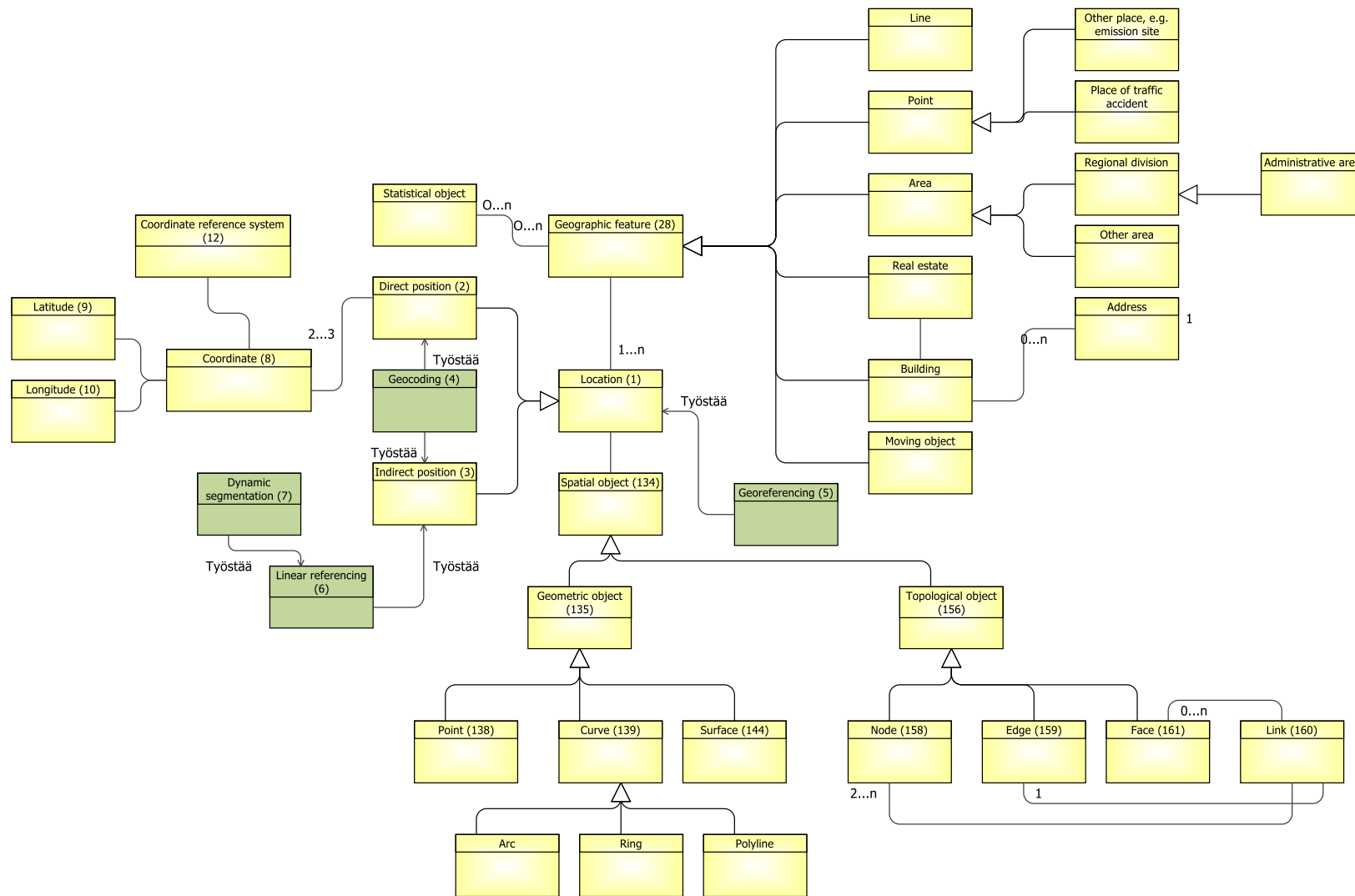


Figure 3. Conceptual model for spatial information (to be developed; this model was also the basis for conceptual modelling work in the GEOSTAT 4 project. Comments will probably change the national model later)

The conceptual model comprises statistics production concepts and the geospatial information concepts that specify them. The geospatial concepts are taken from the national Vocabulary of Geoinformatics. The *geographic feature* is at the centre of the conceptual model. It is a *statistical object* that has a *location*. The definition of location, or *georeferencing*, can result in either a *direct* or *indirect position* e.g. a street address. Geocoding in this model means the conversion of an indirect position into a direct position.

The conceptual model is specified in connection with the implementation of the geospatial data repository. It is built so that it can be integrated with the data repositories and services of other geospatial information actors.

Actors

At Statistics Finland, geospatial information actors are classified into three groups:

1. **Steering:** Statistics Finland’s Management Group is responsible for the strategic objectives, and the development steering group for the final selection of development activities. The ownership of geospatial information must be named.
2. **Development, administration, and maintenance:** The management group for geospatial information is a multi-professional and cross-organisational team that removes silos within the organisation and enables the development of geospatial information over unit boundaries. It is responsible for all sub-areas of the architecture (business architecture, data architecture, information system architecture and technology architecture). Understanding the theoretical competence of geospatial information is included in all the group’s roles.

A cross-organisational team called the Geospatial Information Contact Point acts as a service desk for both internal and external users of geospatial information. It is closely related to the management group and conducts concrete maintenance and development of geospatial data repository, services and miscellaneous geospatial systems.

3. **Statistics production:** Data collection, statistics production and data dissemination use geospatial information from the geospatial data repository. The data are used and distributed through geospatial information services maintained by the management group.

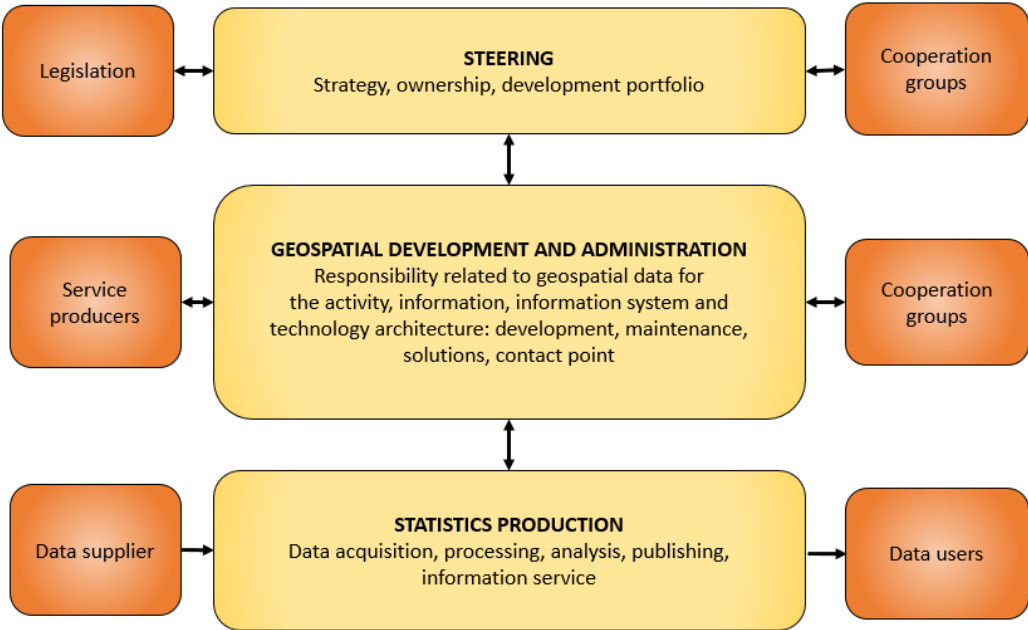


Figure 4. An illustration of geospatial information actors (at a rough level)

Service map

The geospatial information services required by statistics production are listed in the service maps and classified according to the Generic Statistical Business Process Model (GSBPM) phases. The first service map lists the current services and the second lists the additional services planned. The services are basically application services, in most cases APIs, but can also be seen as business services. They are generic, but can be extended as required by statistics production or customers. The aim is to utilise services produced by other organisations in the implementation. New services are developed whenever necessary. Statistics Finland can produce part of the services so that they can also be utilised by external actors.

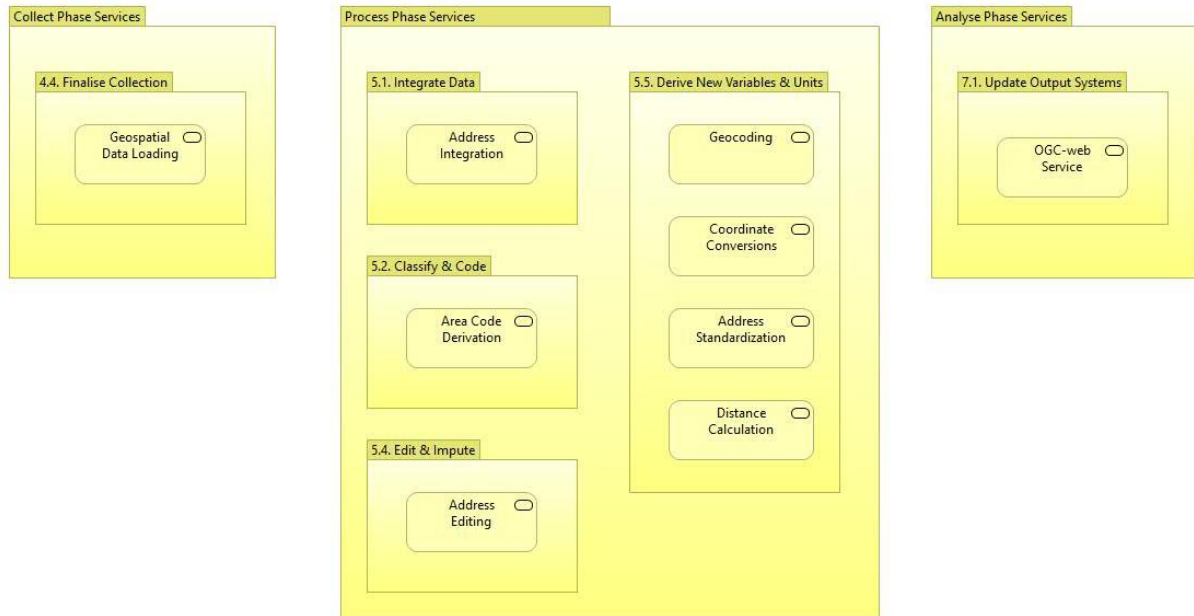


Figure 5. Current state service map according to GSBPM phases

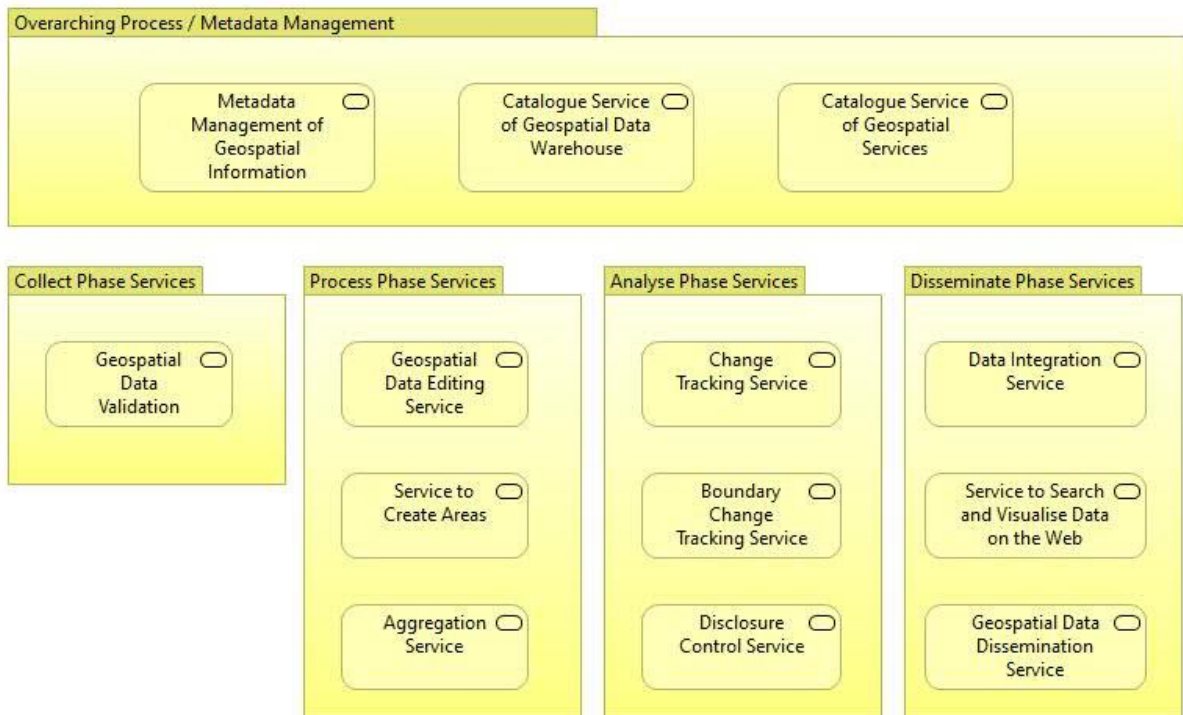


Figure 6. Target state service map according to GSBPM phases

Road Map

In the geospatial reference architecture, more detailed measures are listed for attaining the change sought by the architecture. The measures are compiled into development packages in the development road map. First, the geospatial management team lists suggested packages, which are then assessed according to the development process of Statistics Finland. Examples of past development packages include:

- Definition of geospatial information actors
- Temporary maintenance of geospatial data reference architecture and creation of the control model
- Implementation of the logical geospatial data warehouse and the first services
- Further development of the logical geospatial data warehouse and services
- Development of metadata for geospatial information
- Implementation of the map service

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