


Metadata on geographic problems: possibility of a consistent system

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Describing geographical analysis process with metadata

Find, share, design solutions.

Declaration of method. Use uniform description method to share knowledge worldwide

Directly reuse algorithm. Reusing in the same platform, to get the same results for geographic data of different regions.

Teaching - specific methods.

Teaching - usage of tools (software)

Data explanation. Explaining meaning of data by explaining method how this data is made.

Metadata 1

Metadata about geographical data

Widely used in spatial data infrastructures to describe spatial data sets.

In Lithuania there is used national metadata profile:

meets ISO 19115:2003, ISO 19119:2005, ISO 19139:2007 standards

62 metadata elements

24 core elements (Lithuanian and English)

Metaduomenų santrauka:	
Aprašas	
Pavadinimas:	Lietuvos Respublikos teritorijos M 1:10 000 georeferencinio
Sukūrimo data:	2003-02-26
Duomenų rinkinio kūrėjas	
Organizacijos pavadinimas:	Nacionalinė žemės tarnyba prie Žemės ūkio
Vaidmuo:	Autorius
Tinklalapis:	www.nzt.lt
Santrauka	
Santrauka:	Lietuvos Respublikos teritorijos M 1:10 000 georeferencinio p...
Tema:	Vaizdiniai / pagrindiniai žemėlapiai ir (arba) žemės danga
Erđvinė rezoliucija:	10000
Duomenų rinkinio kalba:	lit
Raktažodžiai:	geodezinio pagrindo punktai, kelių tinklas, valstybės siena,
Geografinis padengimas	
Vakarų ribojanti koordinatė:	21.0485
Rytų ribojanti koordinatė:	26.8325
Šiaurės ribojanti koordinatė:	56.4499

Metadata about analysis process

Chemistry - standardized **system** for displaying elements, compounds, reactions

Internet services - describing **capabilities** of service (example WMS: GetCapabilities request, INSPIRE invoke service)

Data **lineage** - writing all data processing steps into log file

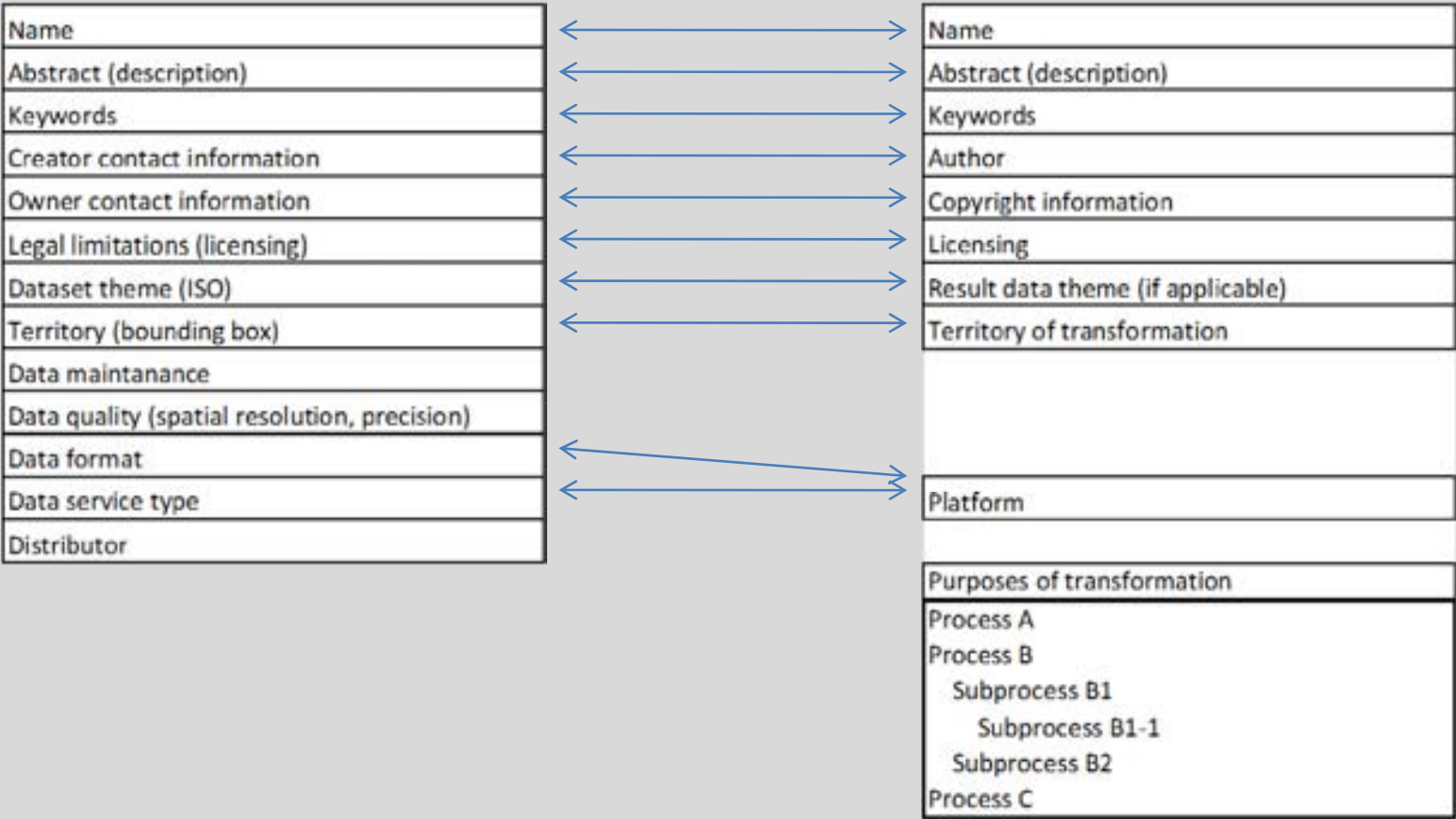
Visual data processing flow **models** in GIS software

Programming **languages**, macro commands

Metadata 2

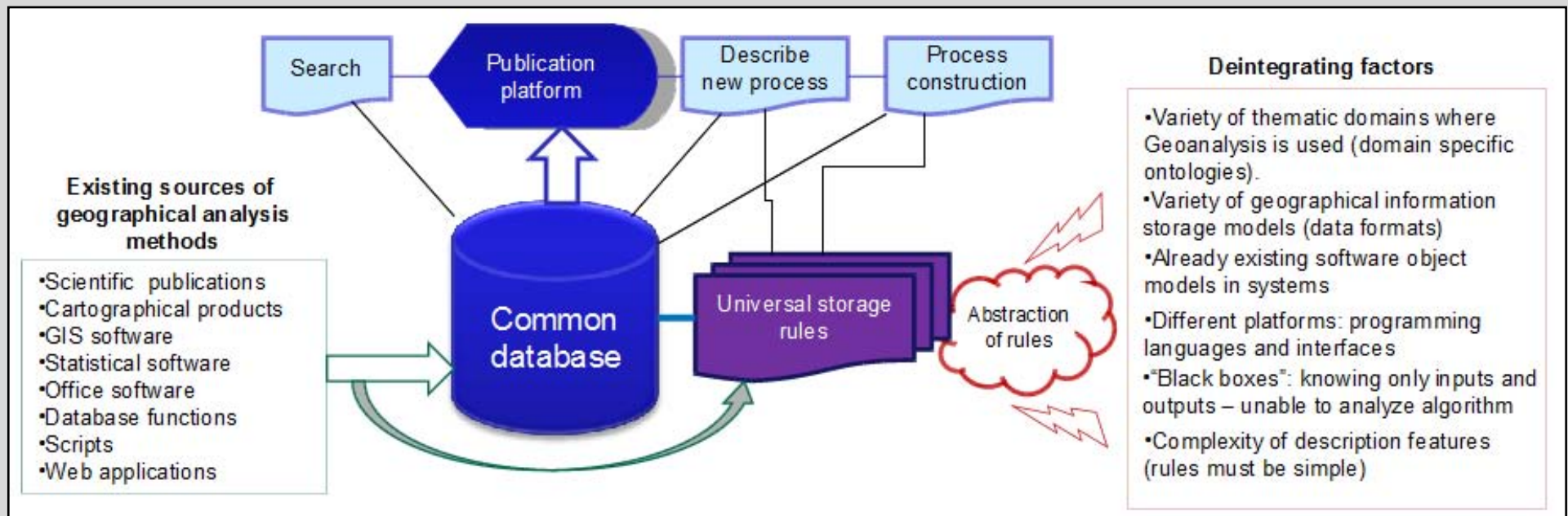
Metadata about geographical data. National metadata profile elements

Metadata about geographical analysis process



Geographical analysis process description: the idea

- How to build universal schema and principles of geographic analysis description?
- How to store all explorations in one place with capability to compare similar methods ?
- How to find intuitively required method and construct (develop) analysis process?
- How to publish methods in easy readable manner for different expert groups?



Difficulties

Meaning of analysis.

Variety of descriptive aspects.

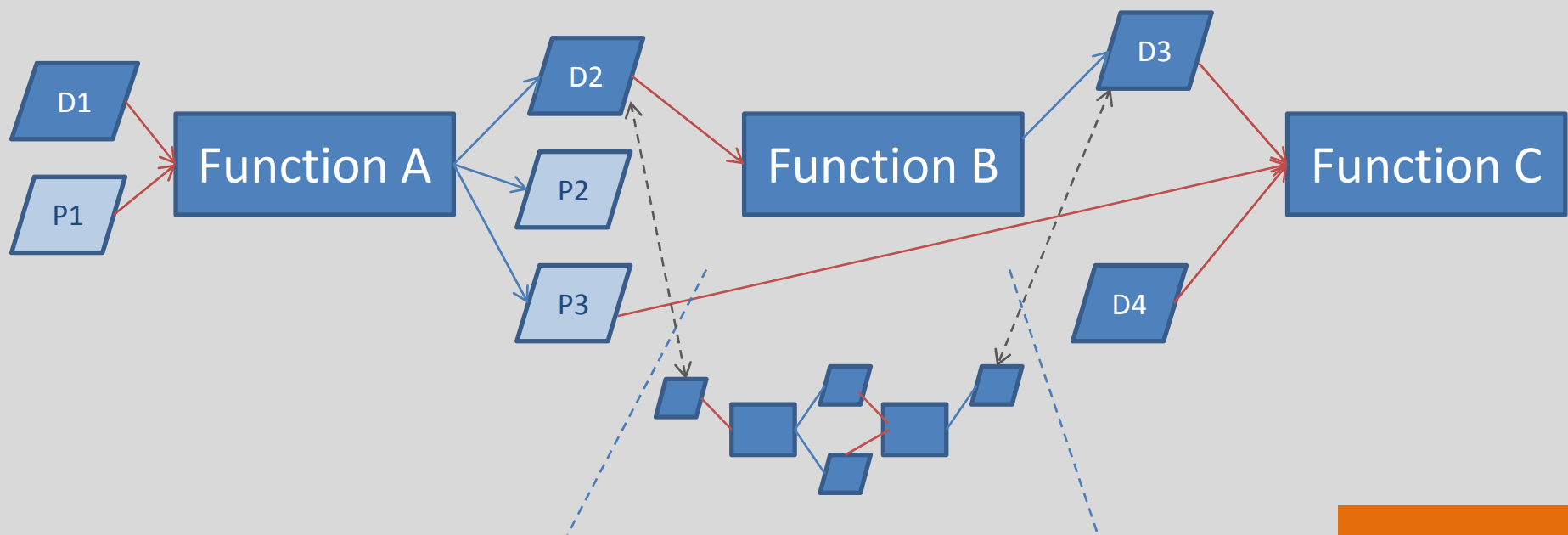
Unified design of analysis flow

Different requirements for user groups, differences in competences

Usability of description model

Process explanation and components

- The smallest unit in geographical analysis here is called **function**. Function uses **input** data and parameters and produces **output** data. Every analysis process can also be called function, because is using inputs and producing outputs.
- By describing analysis process is important to characterize 3 entities:
 - **Data** - Inputs and outputs
 - **Function** - geographic and attribute transformations, techniques, meaning and goal of the function
 - **Process flow** - relations between functions building process flow sequence



User group needs and level of detail

Society	Where new road will be built?	Using map
Manager	Where is correct place of the road? Is this economically efficient? Possible influence to health of society?	Making decision
Analyst	How to calculate cost of terrain preparation for the road ? How to find parcel owners? How to model air pollution flow? How to model noise? Which data sets are needed for analysis? How to analyze and compare complex indicators?	Creating methodology
Technologist	Build profile of a road line Build buffer of a road line Overlay buffer data with parcels Perform noise and air pollution analysis Perform distance analysis to find influenced inhabitants Repeat analysis with different parameters	Using technology Creating algorithms Programming

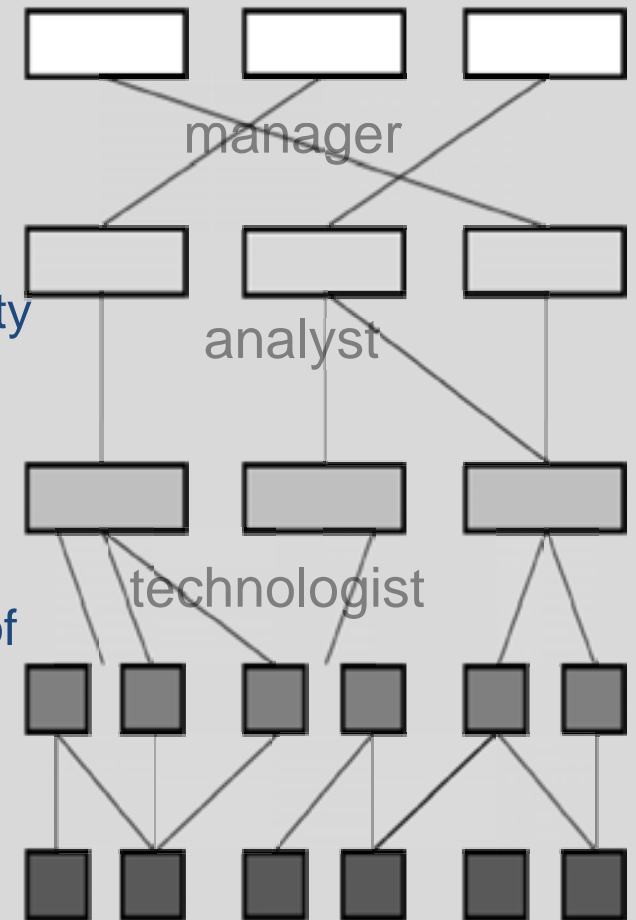
decision making

building the geographic model of reality

synthesis of methods

construction of algorithms

data collection and output



Design of uniform method storage system

Base elements:

Name, description, copyright, keywords

Classified elements:

Change in time, spatial domain, **target user group**...

Input geodata sets:

Geometry type, used attributes and types. Described in GML
Theme, explanation of meaning

Input parameters:

Text, number, date, record list. Type and explanation

Output data

Geometry type, used attributes and types. Described in GML
Theme, explanation of meaning

Output parameters

Geometry type, used attributes and types. Described in GML
Theme, explanation of meaning

Process flow information

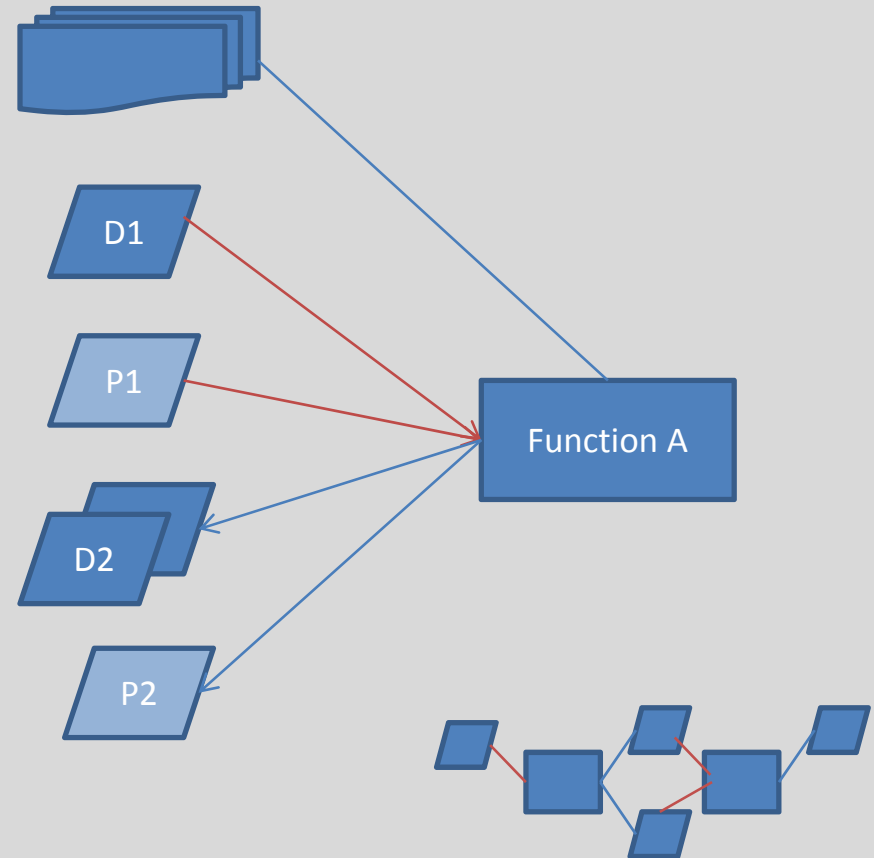
Detailed process construction in sequence input data – output data

Platform-specific elements

data flow models, software code

Information for publication

charts, maps, tables, pictures



Solution registration sequence

Entering used **data**

Entering **methods**, which at this time must not be constructed from other methods (base)

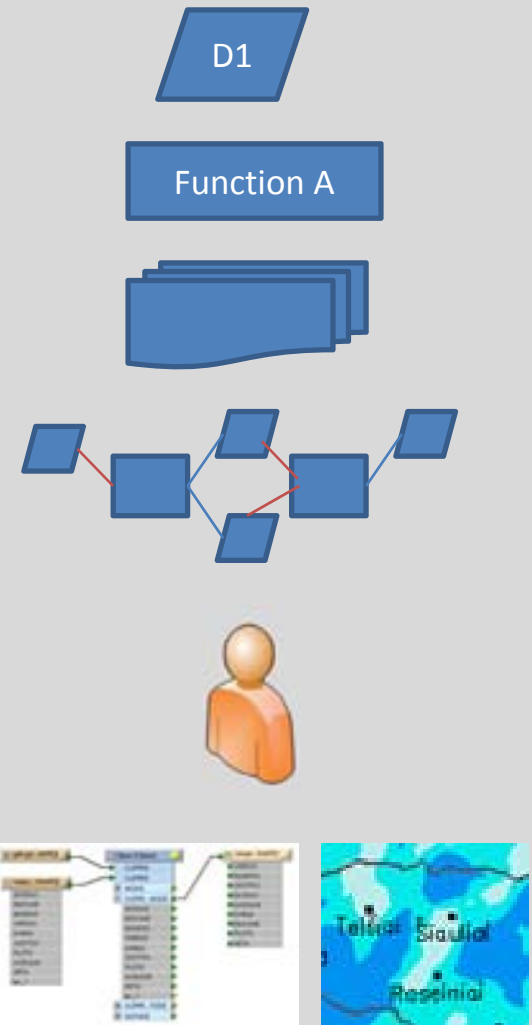
Defining common **characteristics** describing metadata record

Constructing analysis process **flow**

Reusing already registered methods

Decomposition of method, and assigning each decomposition level to appropriate **user group**

Relating added method to other methods in database: defining level of similarity, possible aggregating and decomposing methods



Conclusions

Complexity of description of geographical analysis process is influenced by different platforms, different results interpretation (and naming), different levels of detail

More effective way to describe geographical analysis process is not to form new formal language, but trying to relate similar methods

Prepared system needs a lot of users input and can be effective only at inter-institutional or international cooperation level

Thank you!

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