

GI Norden standardisation workshop

Conceptual modelling



SWEDISH
STANDARDS
INSTITUTE

Anders Skog

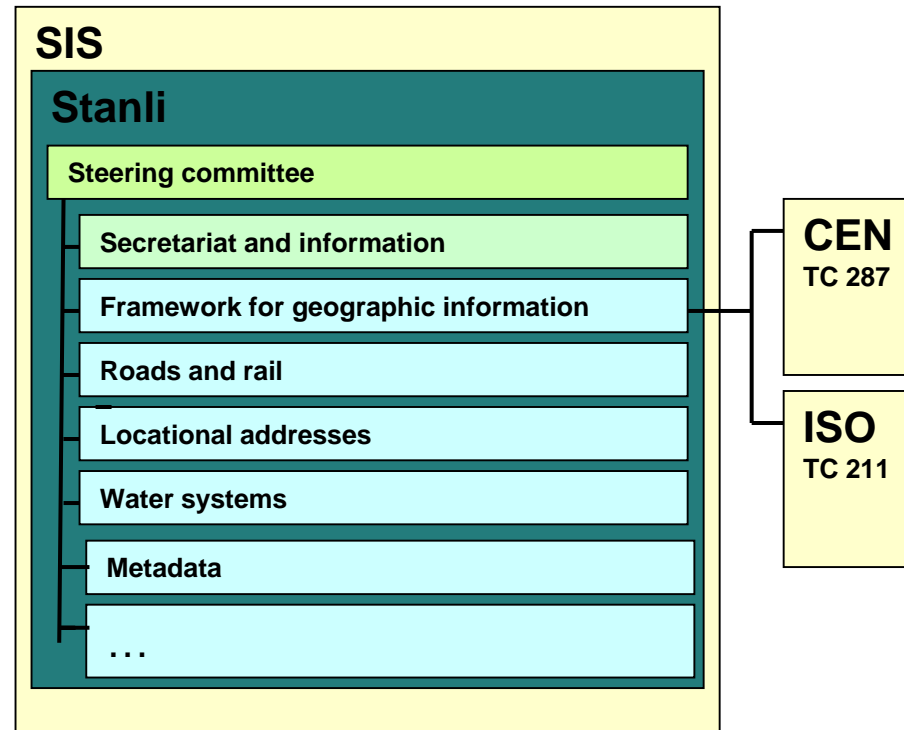
Information management standards

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Stanli – Swedish Standards Institute projects for standards for geographic information

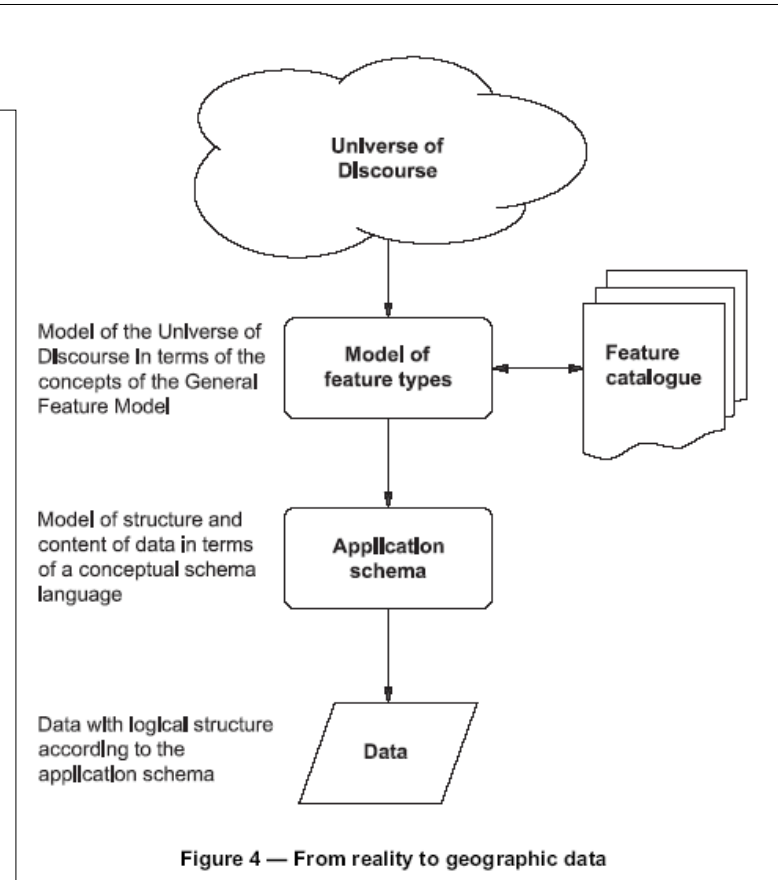
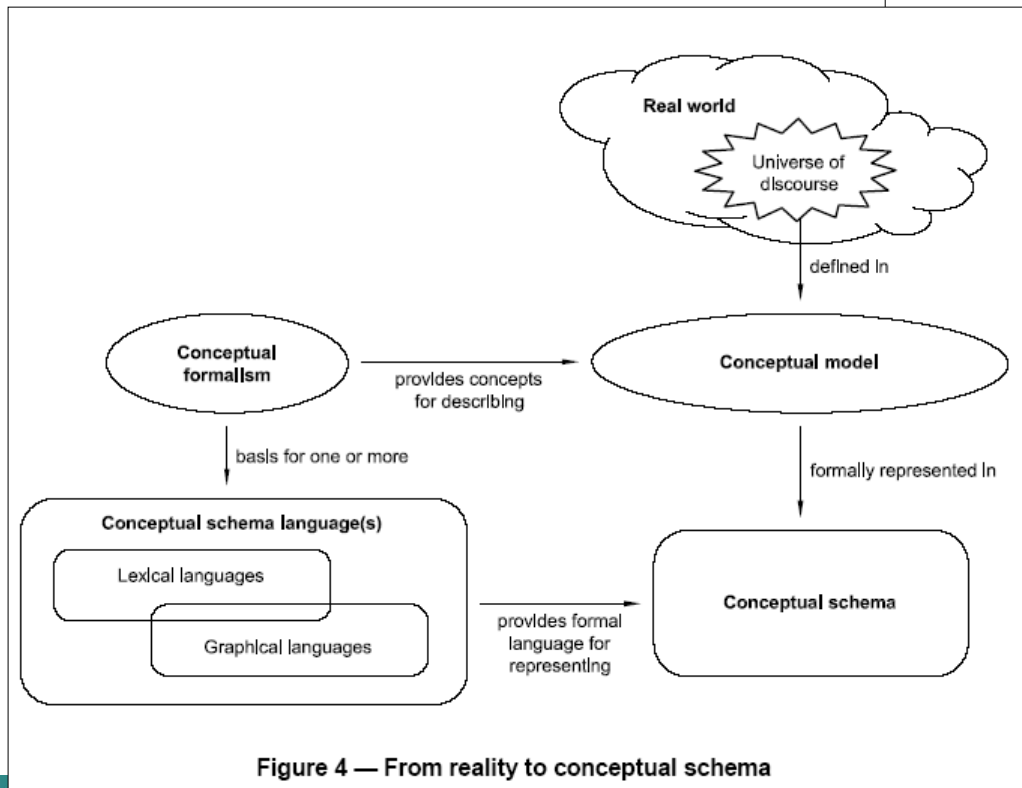
- Basic standards for geometry, topology, time, etc. (ISO+CEN)
- Application standards = interface specifications for certain application areas + rules + more
- Methodology
- User support
- Information & outreach
- Electronic News Letter
- Courses



Conceptual modelling

ISO 19109 – Rules for application schema

ISO 19101 – Reference model



Contents

- Interface specifications
- Concepts and information
- Catalogues for harmonisation
- Catalogues for documentation
- Developing interfaces
- The GiMoDig case



Standardised interface specifications enable...

- Integration
 - program-to-program data interchange
- Compatibility
 - component replacement
- Migration
 - replace your system but keep the information
- Collaboration
 - between external partners
 - adopting new business models

Different data encoding or structure

- ...will make information exchange impossible
- ...will easily be detected
- ...makes it necessary to technically translate data

Different semantics

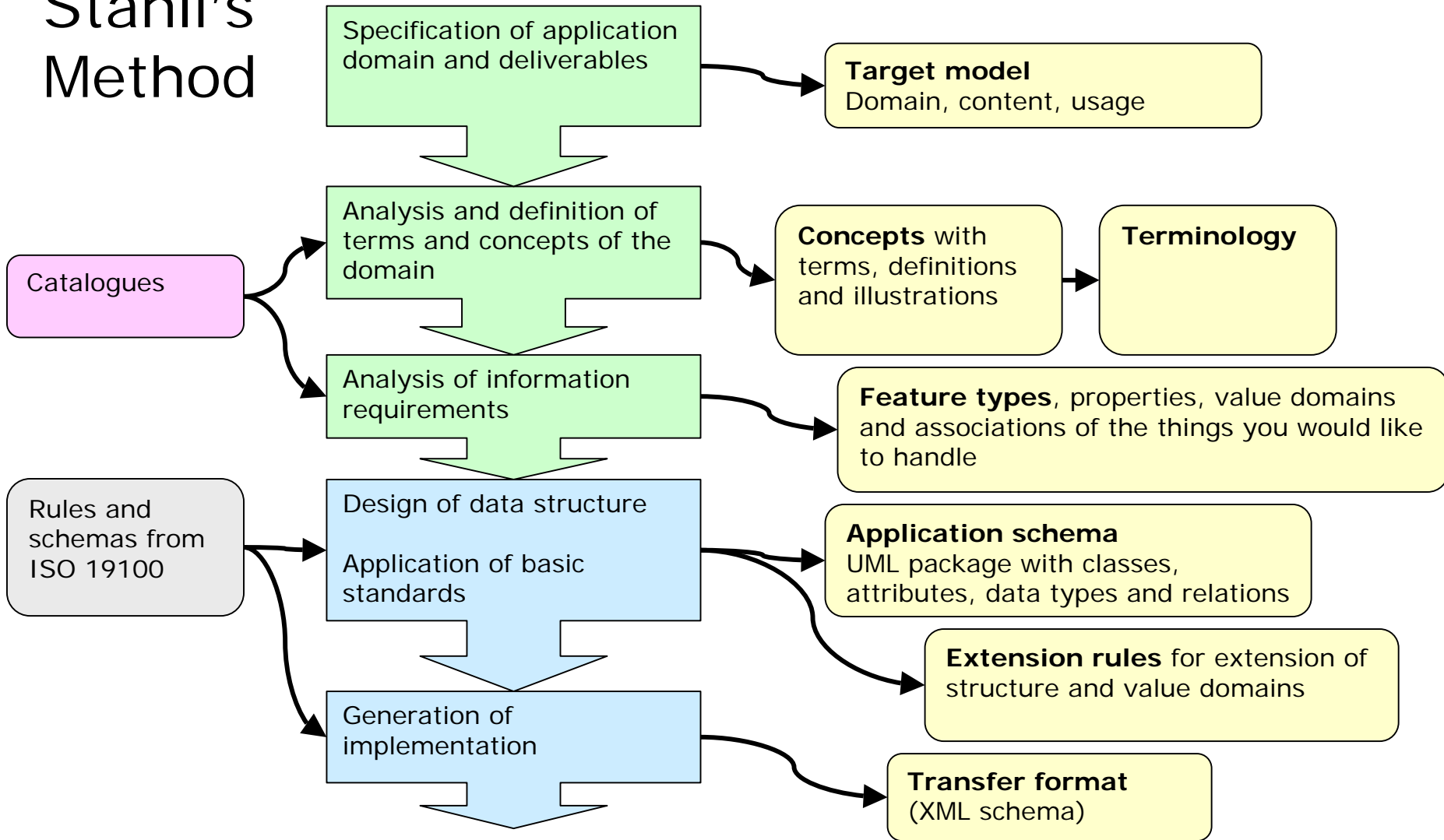
- ...might lead to poor information quality
- ...might not be possible to overcome by translation
- ...will not always be detected

- Important – but also difficult

Stanli's Method

Activities

Results



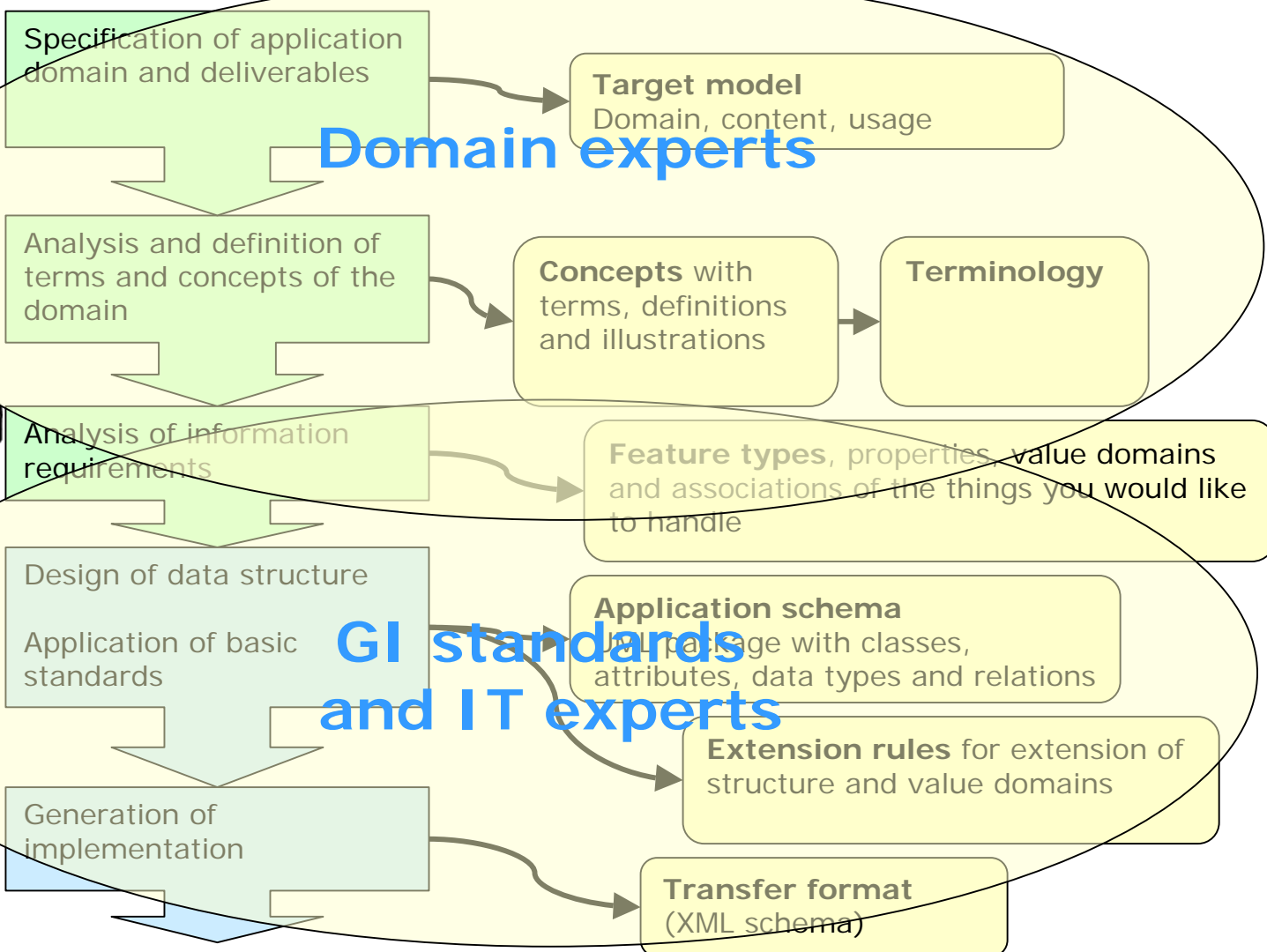
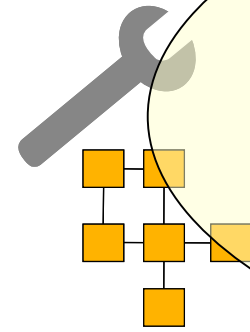
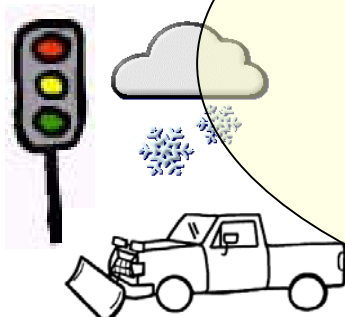
Skills

Activities

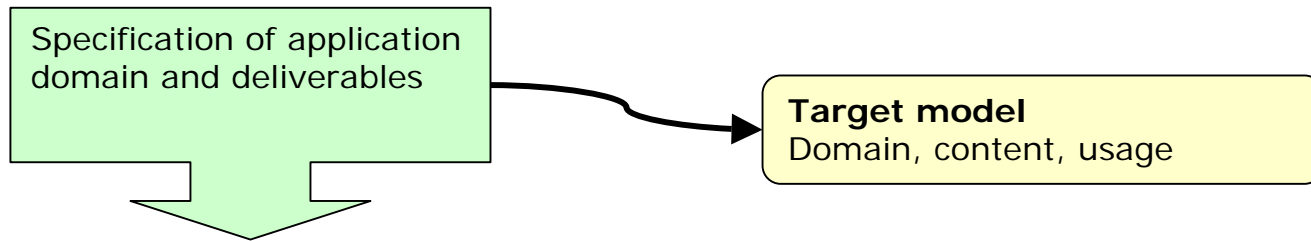
Results

Domain experts

GI standards and IT experts



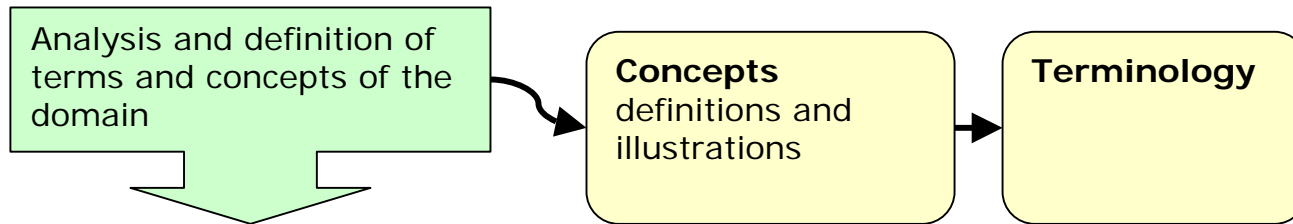
Domain and contents of the specification



- Application domain
- Use cases for the interface
- Use cases for the specification
- Contents of the specification

Conceptual model [ISO 19101]
model that defines concepts of a **universe of discourse**

Semantics – identify the phenomena and define the concepts



- To provide a common language in the team
- To identify feature types (Conceptual modelling)
- To provide a terminology for information description
- May give a common terminology for a domain

Conceptual model [ISO 19101]
model that **defines concepts** of a universe of discourse

What is a concept?

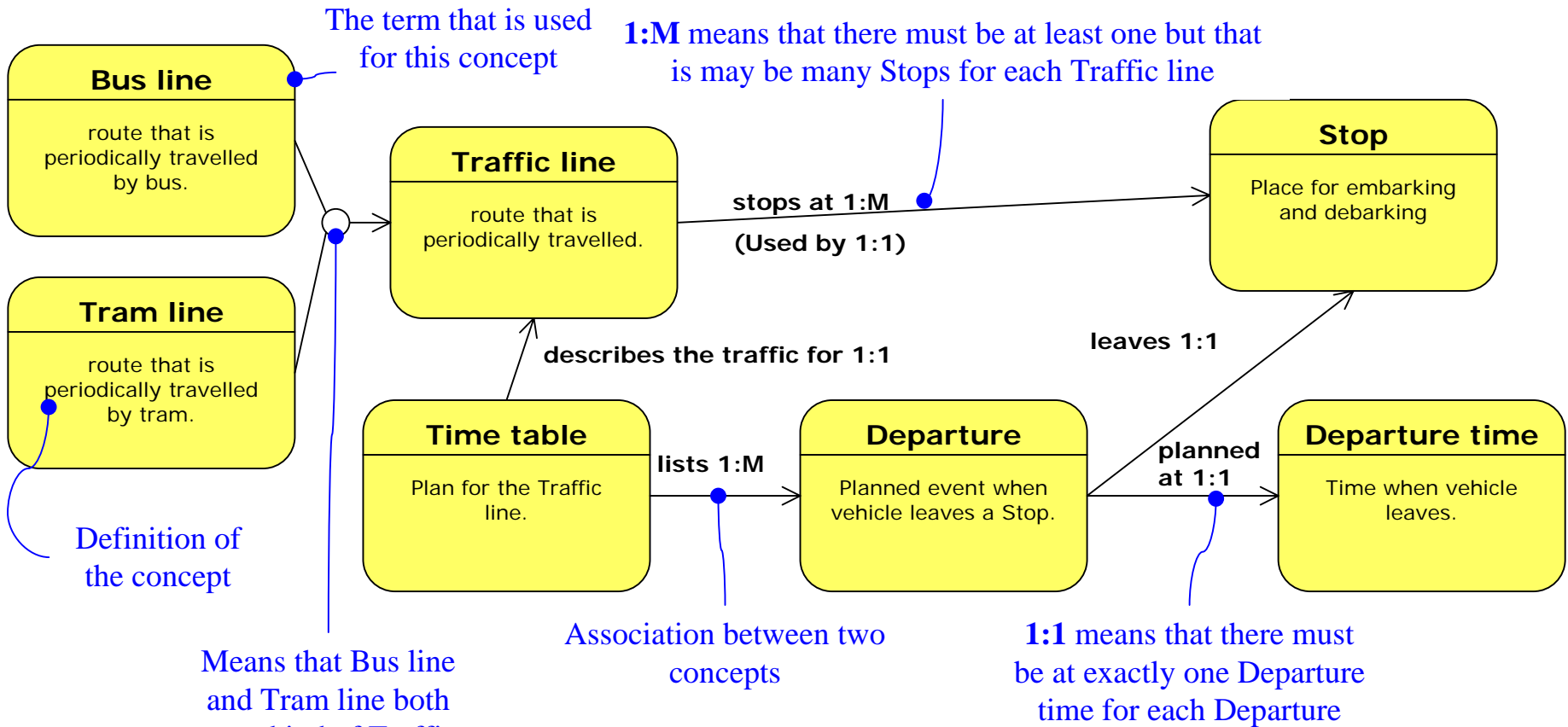
- abstraction of a group of phenomena with similar characteristics
- There must be a termological **definition**
- There may be one or several **terms**

bridge

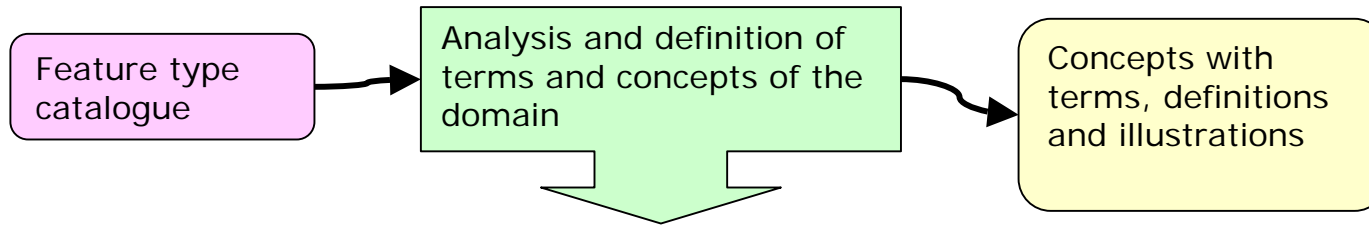
a man-made structure spanning and providing passage over a body of water, depression, or other obstacles

Describe concepts in a table or in a graphical schema.

Concept schema "Stanli's graphical notation"

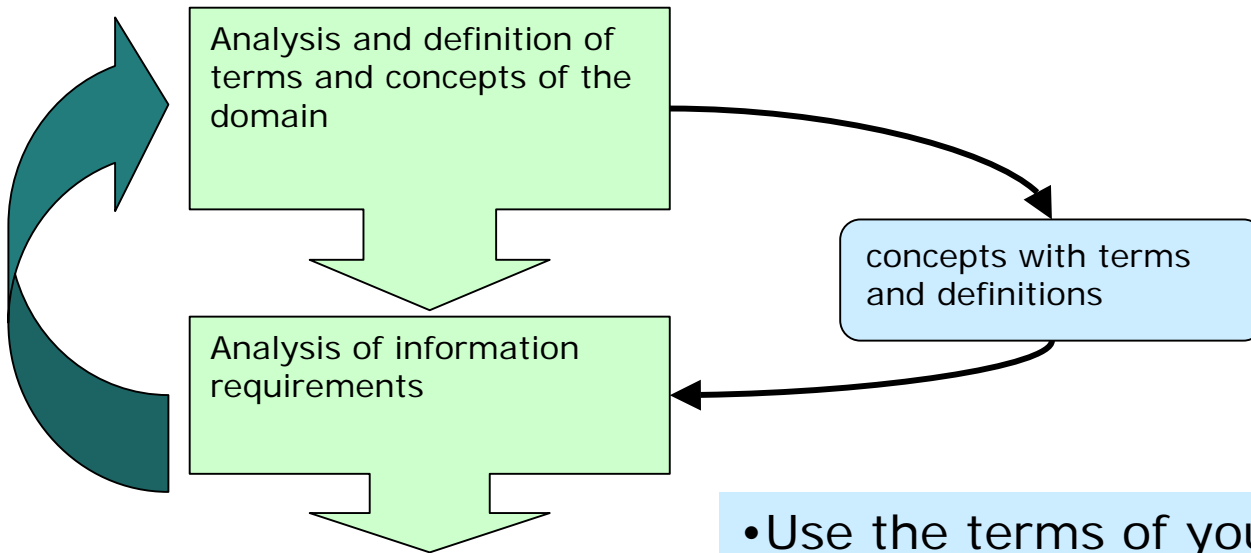


Concept harmonisation – use catalogues



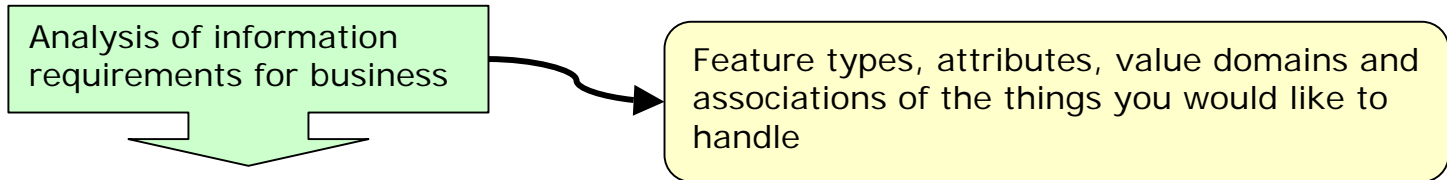
- The catalogue lists standardized feature type definitions
- Using the same catalogue in different projects enables future interoperability
- Using a catalogue decreases the terminology work

Concepts, information, new concepts



- Use the terms of your **concepts** when describing information.
- When required, define new concepts..

Information requirements



Concept vs. information

Bridge - what do you mean?

A man-made structure spanning and providing passage over a body of water, depression, or other obstacles.

Bridge - what do you want to know?

- + height
- + spanning width
- + material (concrete, stone, iron, wood)
- + year of construction



Be descriptive

Bridge – poor description

- + height
- + spanning width
- + material (concrete, stone, iron, wood)
- + year of construction

Information about a bridge for traffic over a river

- + the maximum height over river reference surface
- + the width of the bridge measured from ...
- + the main construction material (concrete, stone, iron or steel, wood or bamboo)
- + the year when the bridge was opened for public traffic

- Use the terms of your **concepts** when describing information.
- Object type names are less important than definitions.
- Express selection criteria.
- When required, define new concepts.
- When required, draw a schema to visualize associations.

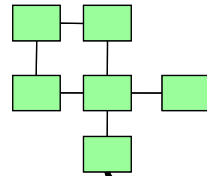
Utopian approach

1. Specify the feature types we need for the map.
2. Select and use a feature type catalogue.
3. Specify the interface.
4. Make applications that translates national data.
5. Make applications that draw maps.

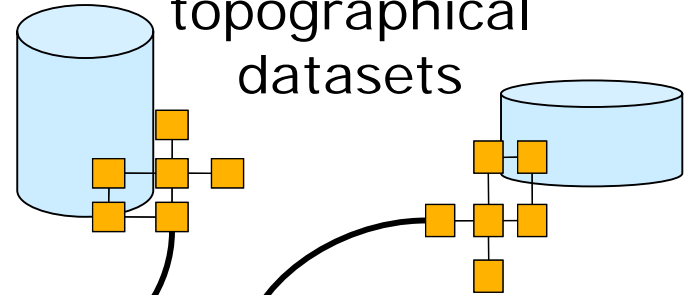


Input

schemas that we want to be compliant with



information that we have in our national topographical datasets



Definitions from Feature Attribute Coding Catalogue (FACC)

real-time processing requirements



phenomena that we want the map to show



Selecting a catalogue

“In the very beginning of the GiMoDig project it was decided to adapt the classification schema and semantic model of the **FACC**. This should ensure the compliance with the EuroGlobalMap and the EuroRegionalMap because both datasets are structured according to the FACC.”

FACC from DGIWG

Feature Attribute Coding Catalogue Data Dictionary

a comprehensive coding scheme for
features, feature attributes, and attribute values

Inventory

- Inventory on the national topographic datasets in four countries
 - use catalogue for definition of each feature type
 - identify equivalent national feature types
 - specify the geometry type that is used
 - specify national collection criteria
 - specify national attributes (and value domains)



Selection process

- 470 feature types in FACC
- 180 feature types in some of the 4 national datasets
- <20 feature types are in all of the national datasets
- 21 feature types are in at least 3 of 4 national datasets
- 17 feature types remain after removing odd ones



Selected feature types

- Administrative boundary
- Water (except inland)
- Watercourse
- Lake
- Marsh
- Park
- Building
- Contour line
- Cropland
- Named location
- Built-up area
- Railway
- Road
- Trail
- Airport
- Forest
- Grassland



Specify attributes

- Select attributes (including geometry type) supported by at least 3 of 4 national datasets
- Use FACC attributes and definitions
- Make value domains as FACC subsets

Collection criteria

Example: feature type 'Park'

Germany: size of area $> 10\ 000\ \text{m}^2$

Denmark: size of area $> 2\ 500\ \text{m}^2$

Finland: size of area $> 5\ 000\ \text{m}^2$

Sweden: size of area $> 900\ \text{m}^2$

Common: size of area $> 10\ 000\ \text{m}^2$



Examples: Lake, Park, Building

FACC ID & Name	Collection criteria	Geometry type	FACC Attributes
BH080 Lake	> 0,1 ha	Area	--
AK120 Park	> 1 ha	Area	--
AL015 Building	> 25 m ²	Area	BFC Function 1 Fabrication Structures 2 Government Building 16 House 50 Church



Example: Road

FACC ID & Name	Collection criteria	Geometry type	FACC Attributes
AP030 Road	In use length > 50 m	Line Motorway: centre line of individual lanes	LOC Location Category 0 unknown 8 On ground surface 25 Suspended or elevated above ground or water surface (bridge) 40 Underground NAM Road/Street name RTN Route Number RTT Route Intended Use ... WD1 Minimum Travelled Way Width



FEATURE TYPE

Name: Building
 Definition: A relatively permanent structure, roofed and usually walled and designed for some particular use.
 Code: AL015
 Aliases:
 Feature Attribute Names: Building Function Category
 Feature Association Names:

Feature Attribute

Name: Building Function Category
 Definition: Type or purpose of the building.
 Code: BFC
 Value Data Type: Integer
 Value Measurement Unit:
 Value Domain Type: 1
 Value Domain:
 Feature Attribute Value:

Label	Code	Definition
Fabrication Structures	1	
Government Building	2	
House	16	
Church	50	

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