

# Metadata of spatial data

Brno, June 3rd 2010



Dipl.- Umweltwiss. Thorsten Bockmühl

University of the Bundeswehr Munich  
thorsten.bockmuehl@unibw.de  
[www.agis.unibw.de](http://www.agis.unibw.de)

# Overview

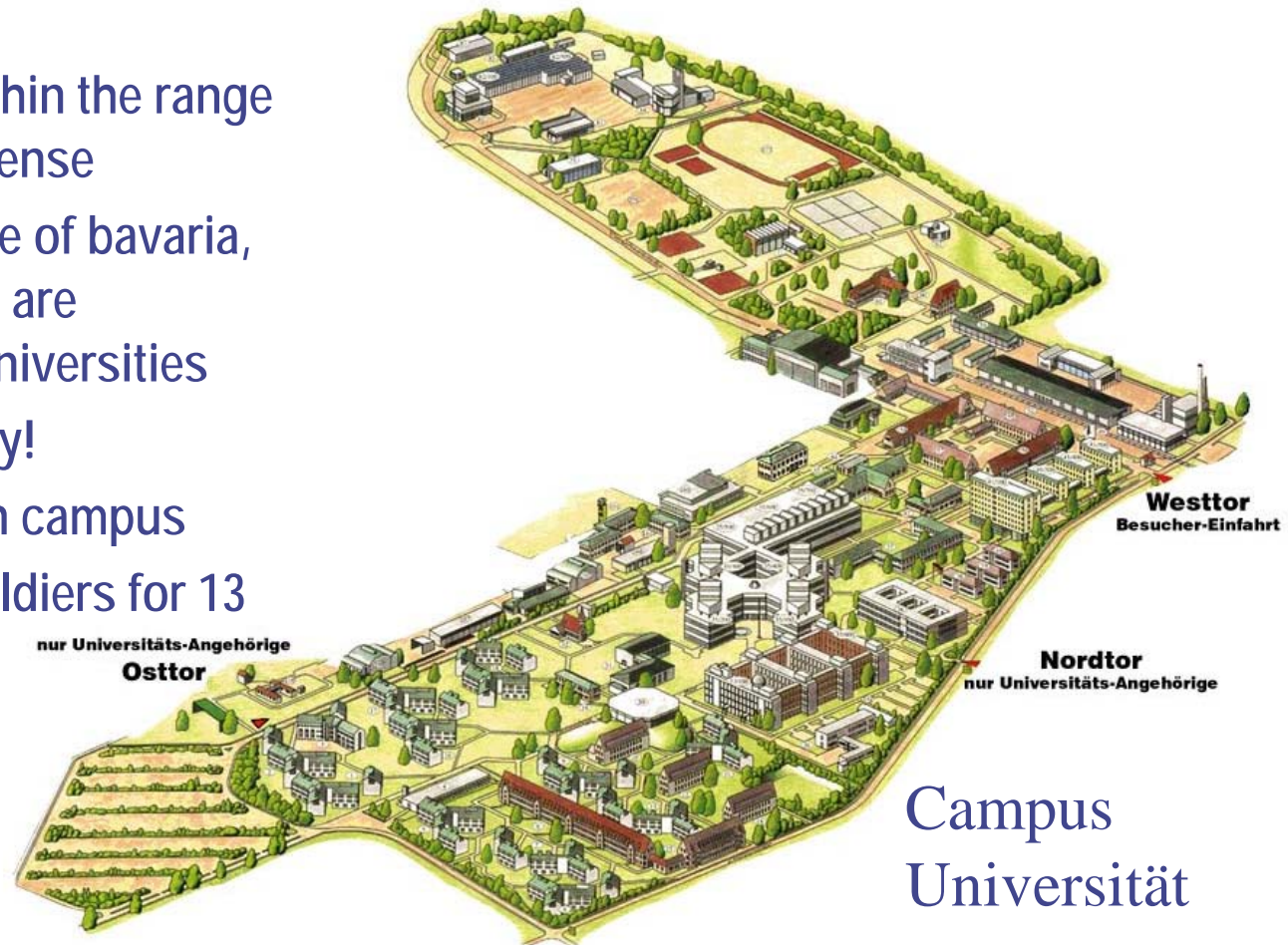
- Introduction of AGIS and University of the Bundeswehr Munich
- Military standardization in DGIWG
- Metadata
  - General questions about metadata
  - Typical user requests
  - Difficulties between produced metadata and user requirements
- Data Product Specification ISO 19131
  - Background ISO and DGIWG Profile
  - Use for an automatic generation of metadata

# UniBw München

## UniBw München

Around 3500 Students

- Private university within the range of the ministry of defense
- Approved by the state of bavaria, courses and degrees are equivalent to other universities
- Officers have to study!
- Most students live on campus
- Most students are soldiers for 13 years
- Staff is civil
- Trimester system!



Campus  
Universität

AGIS: GI-Lab at UniBw M, Chair of Geoinformatics

- Around 10 scientists, mostly financed from 3. Party funds



InGeoForum



RUNDER TISCH GIS e.V.

# MILITARY STANDARDIZATION IN DGIWG



# Defence Geospatial Information Working Group



- DGIWG is the multi-national body responsible for geospatial standardization for the defence organizations of member nations.
- Aim is to create required standards and procedures to enable the provision, exchange and use of standardized geospatial information
- 18 Member + 5 Observer nations

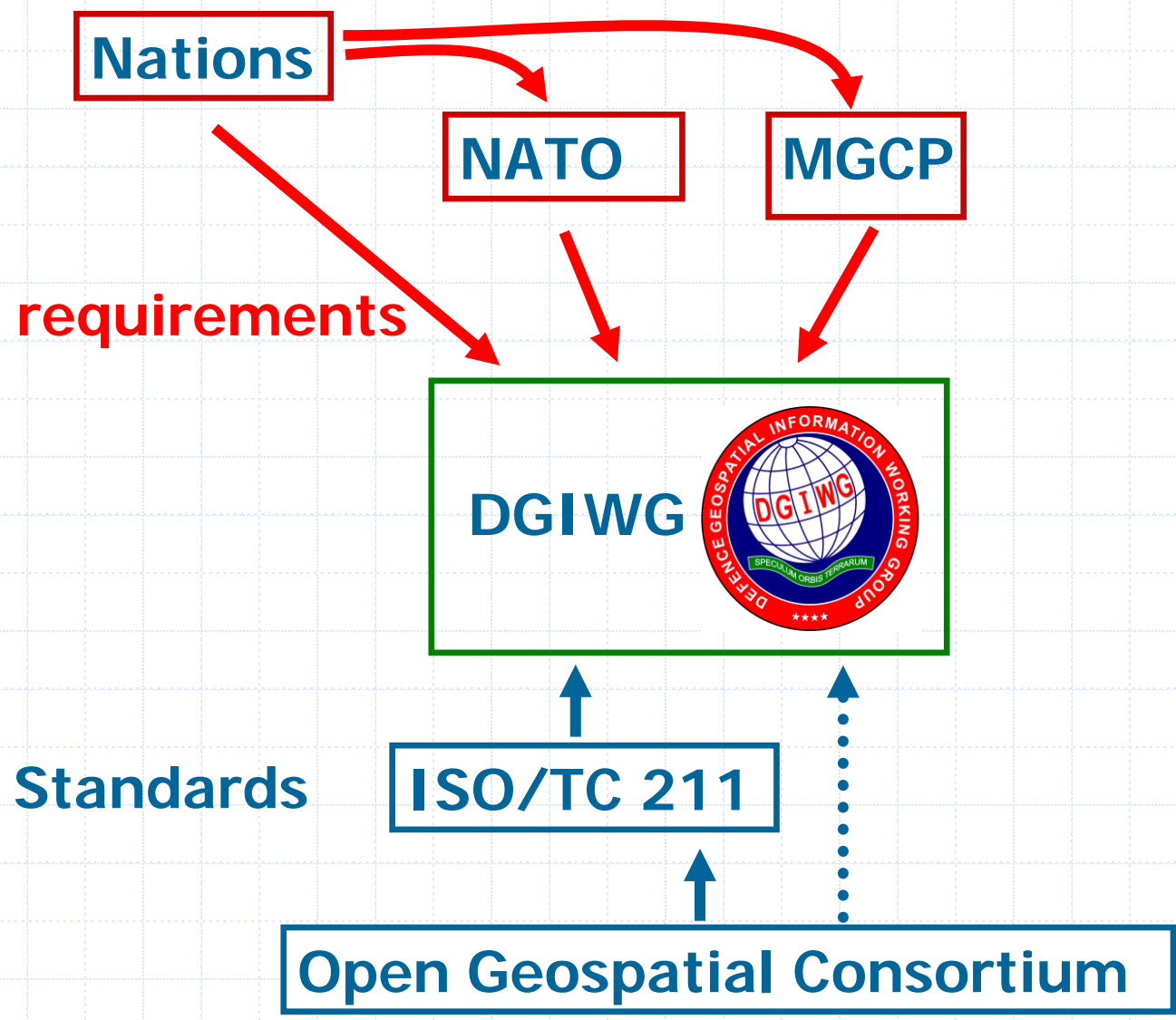
## Participating Members

- Australia
- Belgium
- Canada
- Czech Republic
- Denmark
- France
- Germany
- Greece
- Italy
- The Netherlands
- New Zealand
- Norway
- Portugal
- Spain
- Sweden
- Turkey
- United Kingdom
- United States

## Observers

- Estonia
- Latvia
- Romania
- South Africa
- Switzerland





# METADATA



# Metadata overview



## ISO/TC 211 N 1377

Geo

ISO reference number

Title:

Source:

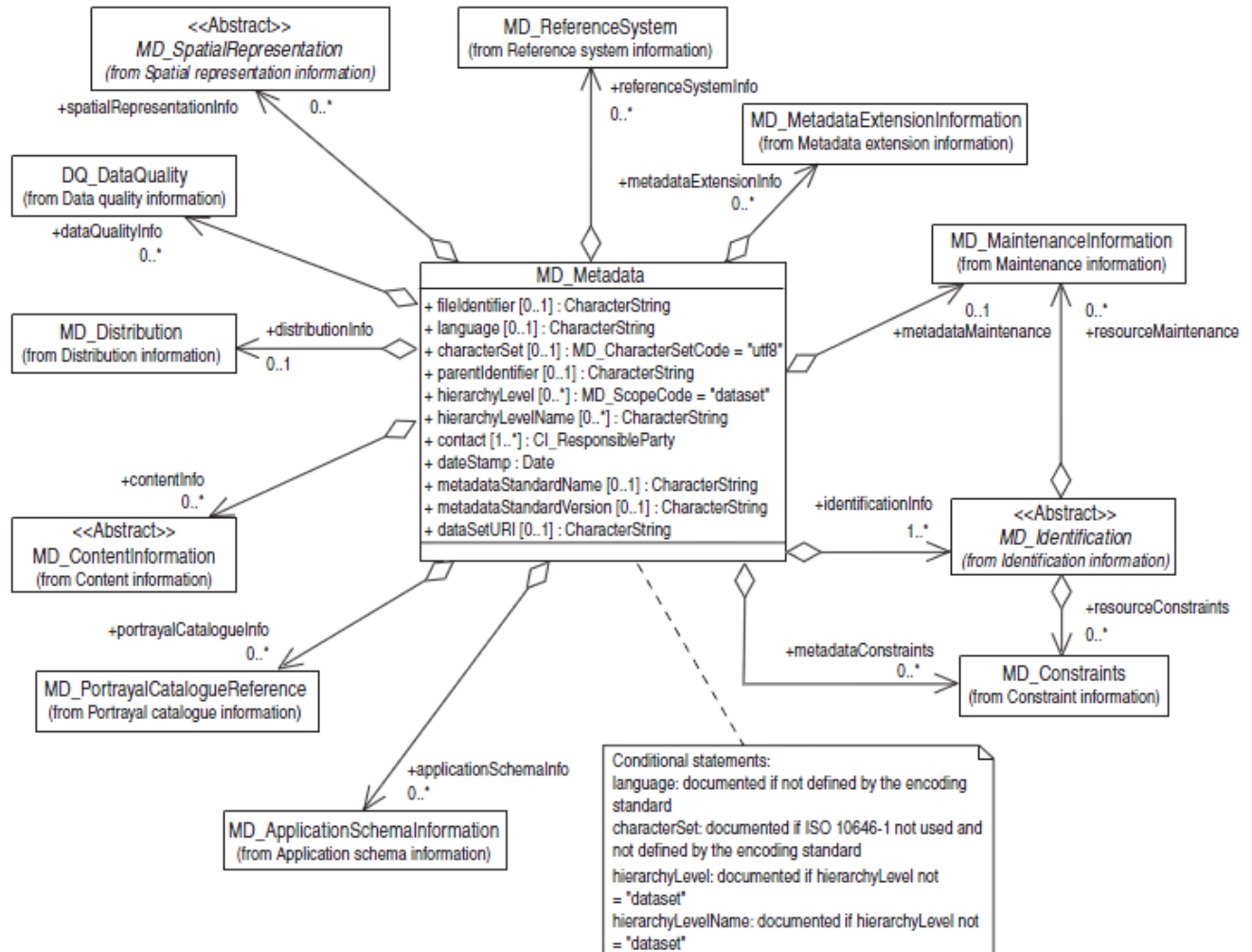
Expected action:

Type of document:

Note:

Hyperlink:

Reference:



# Metadata overview

Exit   
 Save   
 Validation (OFF)   
 User Guide   
 About

**Metadata** | **Identification** | Classification | Keyword | Geographic | Temporal | Quality&Validity | Conformity

Search    **Advanced Search**    Browse    About

for Spatial Information

<b>Title</b>	<b>Resource title</b>	Image2000 Product 1 (uk7) Panchromatic
<b>Uniq Code Nam</b>	<b>Resource abstract</b>	IMAGE2000 product 1 individual orthorectified scenes. IMAGE2000 was produced from ETM+ Landsat 7 satellite data and provides a consistent European coverage of individual orthorectified scenes in national map projection systems. The year 2000 was targeted as reference year, but a deviation of maximum 1-year was allowed to obtain a full coverage of Europe, which involves approximately 450 Landsat TM Frames. Where Landsat 7 data were not available, Landsat 5 data have been used instead. The spatial resolution is 25 metres for multispectral and 12.5 metres for panchromatic imagery.
	<b>Resource type</b>	dataset
	<b>Resource locator</b>	
	<b>Unique resource identifier</b>	Code space: null Code: image2000pr1uk7panc
	<b>Topic category</b>	boundaries economy
	<b>Couple Resource</b>	Not applicable to dataset

Order by [v]

Image2000 Product 1 (uk7) [magnifying glass]

Record 1 - 1 of 1

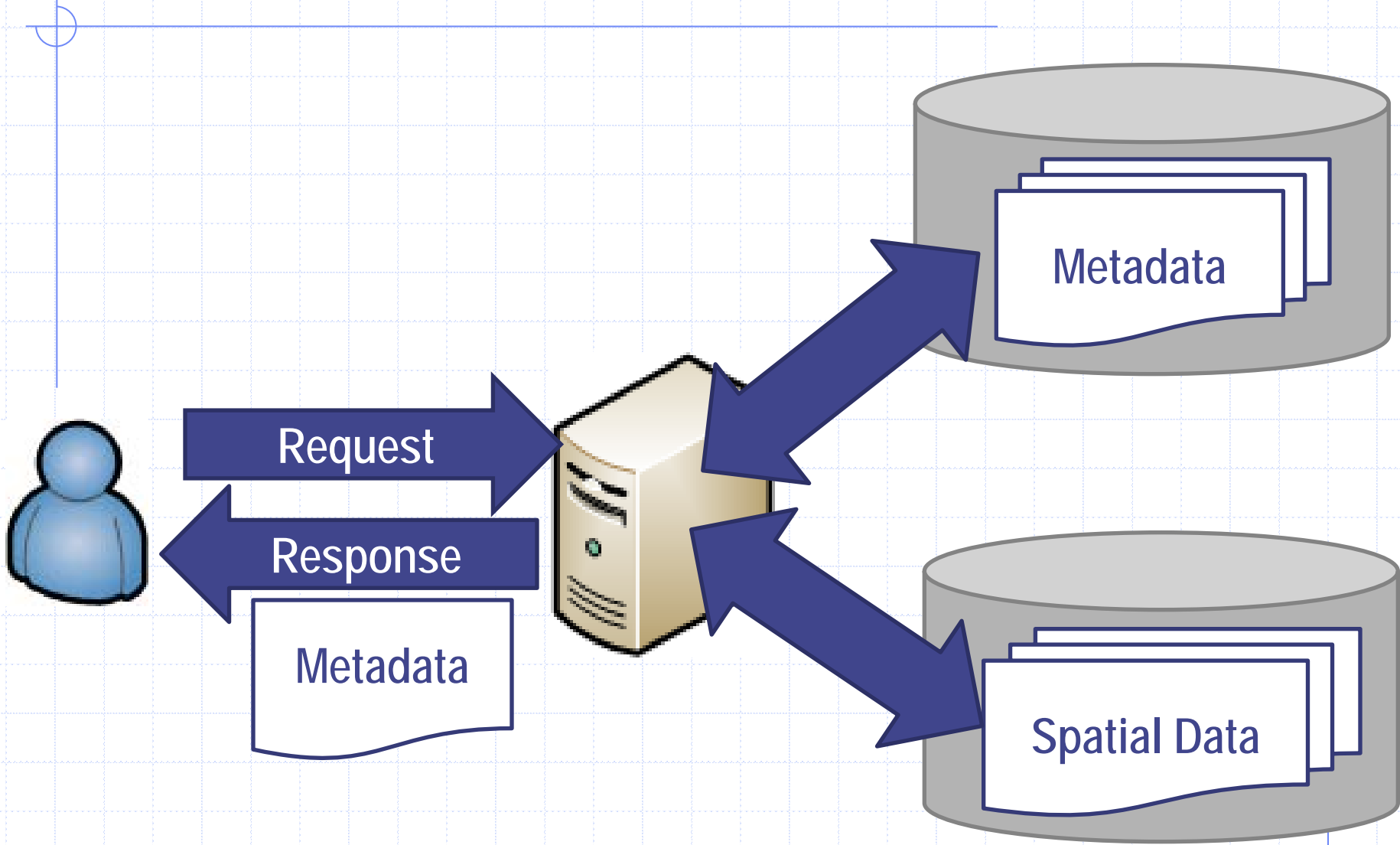
ic	1
	1
ic	1

Marseille    Sarajevo    Sofia    [economy](#)

Remove Selected

# What is Metadata?

- Definitions in standards of ISO TC211
  - data about data
  - information about data
- INSPIRE Directive
  - information describing spatial data sets and spatial data services and making it possible to discover, inventory and use them
- Extended definition
  - **all needed information** to describe spatial data sets and services **without a direct access** to them.



# How is metadata generated?

## 1. Manual collecting in a Metadata Entry Tool

- The common way to collect metadata
- Great effort and additional work
- The huge amount of metadata enable a wide description of a resource

## 2. Automatic generation by accessing spatial data

- The quantity of metadata depends on the data format

## 3. Automated generation by monitoring the production process of spatial data

- A controlled environment is needed

# Which Metadata should be generated?

- The purpose of metadata is to inform a user
  - metadata is user oriented
- Nobody knows during the production of spatial data and metadata, which metadata users need
  - all metadata should be generated
- To decrease "all" in a practical quantity
  - all metadata of ISO standards should be generated

**But the standardized metadata are only an approach to fulfill the user requirements**



# Typical user request

## Background

- An ongoing process is the development of a NATO metadata profile
- The first draft version of the profile was created as a subset of ISO 19115
- Typical user request (freetext) were defined by NATO
- There was an analysis if the typical user request can be answer with the metadata elements of the first draft of NATO metadata profile

# Additional information to answer a request

Typical user request:

I need datasets which describe main supply routes of ISAF RC East.

To answer this request with common metadata some additional information is needed.

Questions:

- Which features contain main supply routes (e.g. roads, bridges, tunnels)?
- Is an attribute named supply classification needed?
- Which area contains ISAF RC East?

Missing information:

- The semantic relation between "main supply routes" and the feature types or keywords must be defined
- The area of ISAF RC East must be identified

# Transformation to answer a request

Typical user request:

I need all obstacles higher than 30 m in the surrounding of 10 km from Kandahar air field.

The request has to be transformed in a "metadata" request

e.g.: Give me all datasets with:

- Features = rocks, trees and buildings
- Attribute = height
- Attribute accuracy of height = 5 m
- Geographical extend of Kandahar air field + Buffer of 10 km

# Typical user request (examples)

In what area is no data on rivers available? (different to the question in which area are no rivers)

I need a 3D urban model of Kabul with textures of all buildings.

- There is no element in ISO 19115 for textures of buildings

# Typical user request (examples of analysis)

- If the system tells me that snipers cannot see me, can I trust that information?
  - Is the route really the shortest route?
  - I need to transport oversized equipment. Can I rely on the results of the routing analysis?
- Open question: How can I describe the reliability of an analysis, because it depends not only on the spatial data?

# Results

- Metadata should be user oriented but often collected in a production view
- There is a discrepancy between the production view and the user requirements
- Users are different in:
  - Knowledge (expert – non expert)
  - Domain (civilian – military)
  - Tasks (customer – producer)

It is an ongoing research to solve the problem to create user oriented metadata.



# AN APPROACH FOR AUTOMATIC GENERATION OF METADATA BASED ON DATA PRODUCT SPECIFICATIONS

Thorsten Bockmühl, Stephan Mäs, Wolfgang Reinhardt

Paper is published on INSPIRE conference 2010 Krakau

# Background

The creation of metadata content is mostly manual work, which is:

- boring,
- tedious and also
- error-prone.

It is vital to capture automatically as much metadata as possible.

# Overview of data product specification (DPS)

Not so well known as Metadata standard ISO 19115

- Google Hits: "ISO 19131" (7.840) vs "ISO 19115" (298.000)

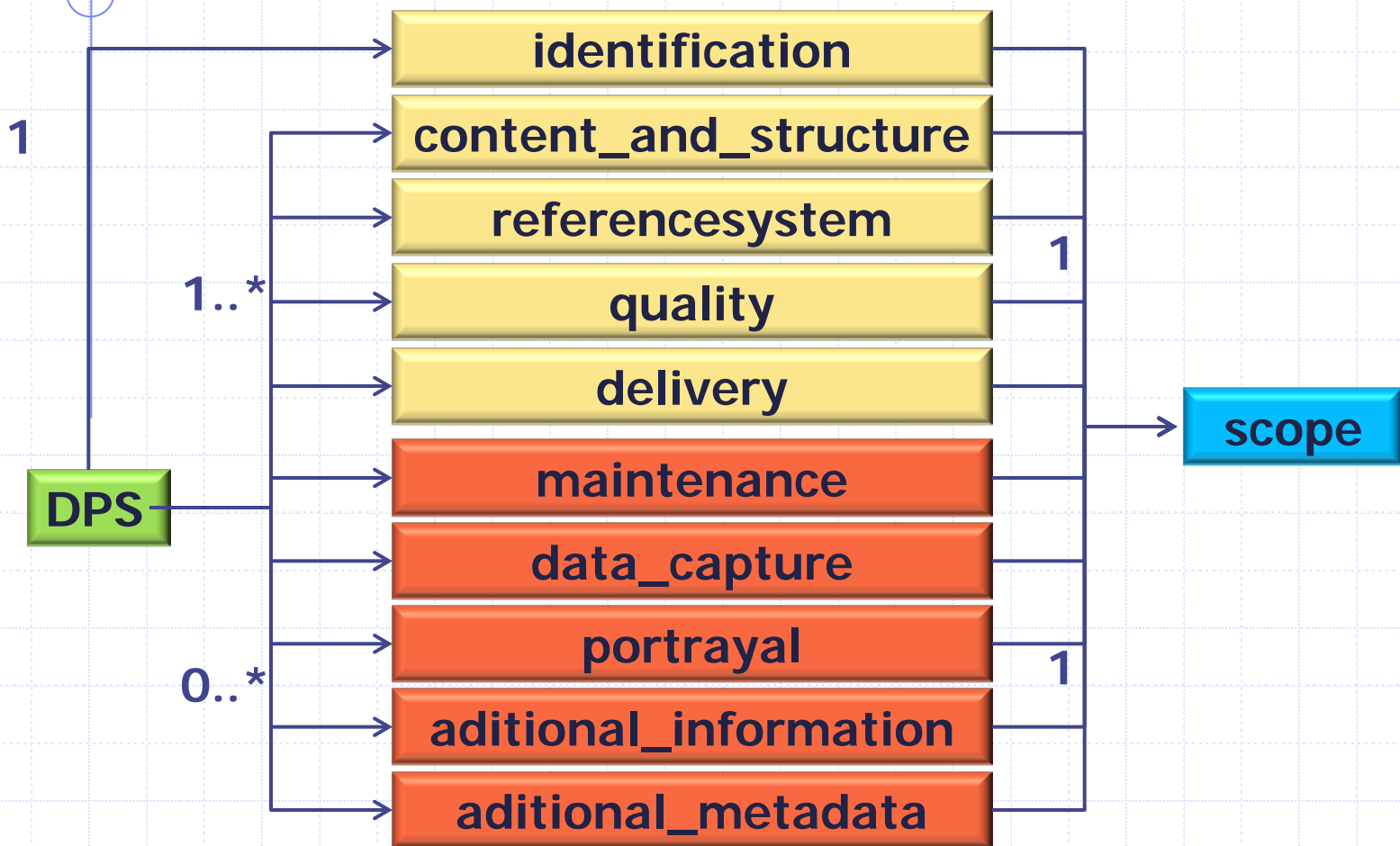
Data product specification (DPS) is defined in ISO 19131

Metadata about a product and the production process

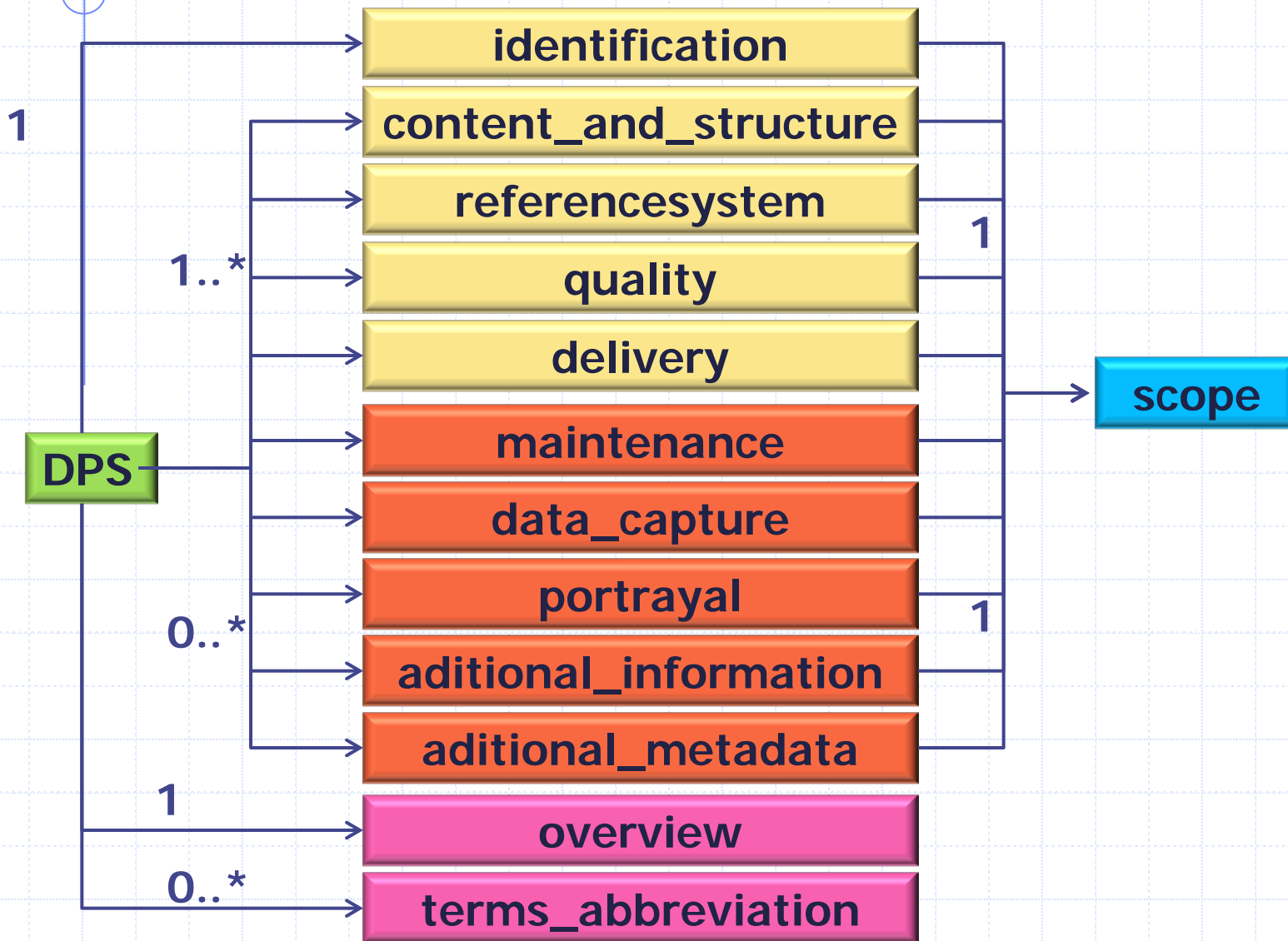
A product is a **dataset** or **dataset series**

Refers to the elements of the ISO metadata standard (ISO 19115)

# Content of ISO 19131 data product specification



# Additional Content in DGIWG Profile



# Application of DPS

## Assumption for common production processes of spatial data

- Data content is defined and described (e.g. in a Feature Catalog or Application Schema).
- The information is stored according to ISO 19131 DPS

## A DPS is applicable for:

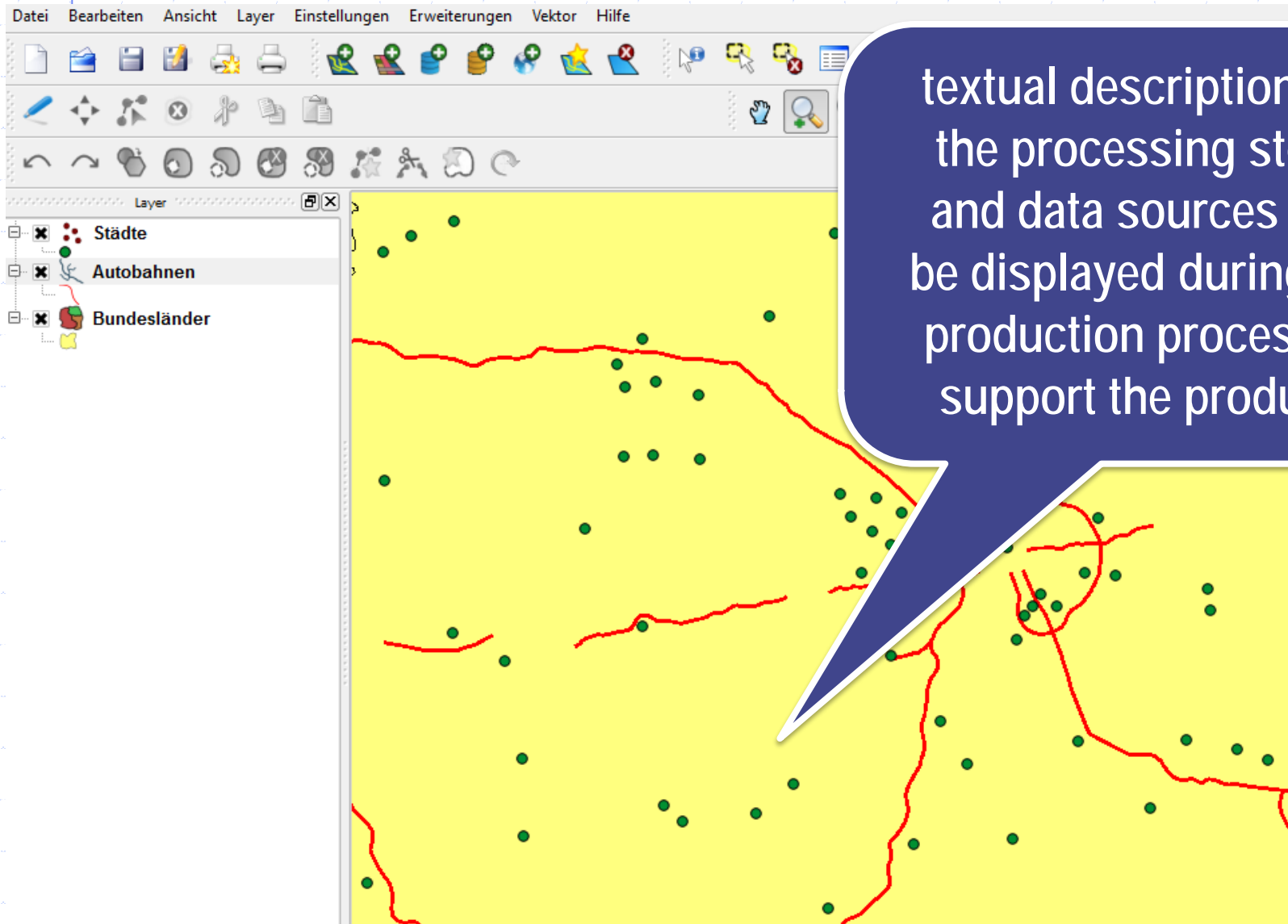
- Direct mapping of DPS contents to the metadata of the produced data
- User guidance and workflow support during the production process
- Support of the manual input of quality metadata



# Direct mapping of DPS

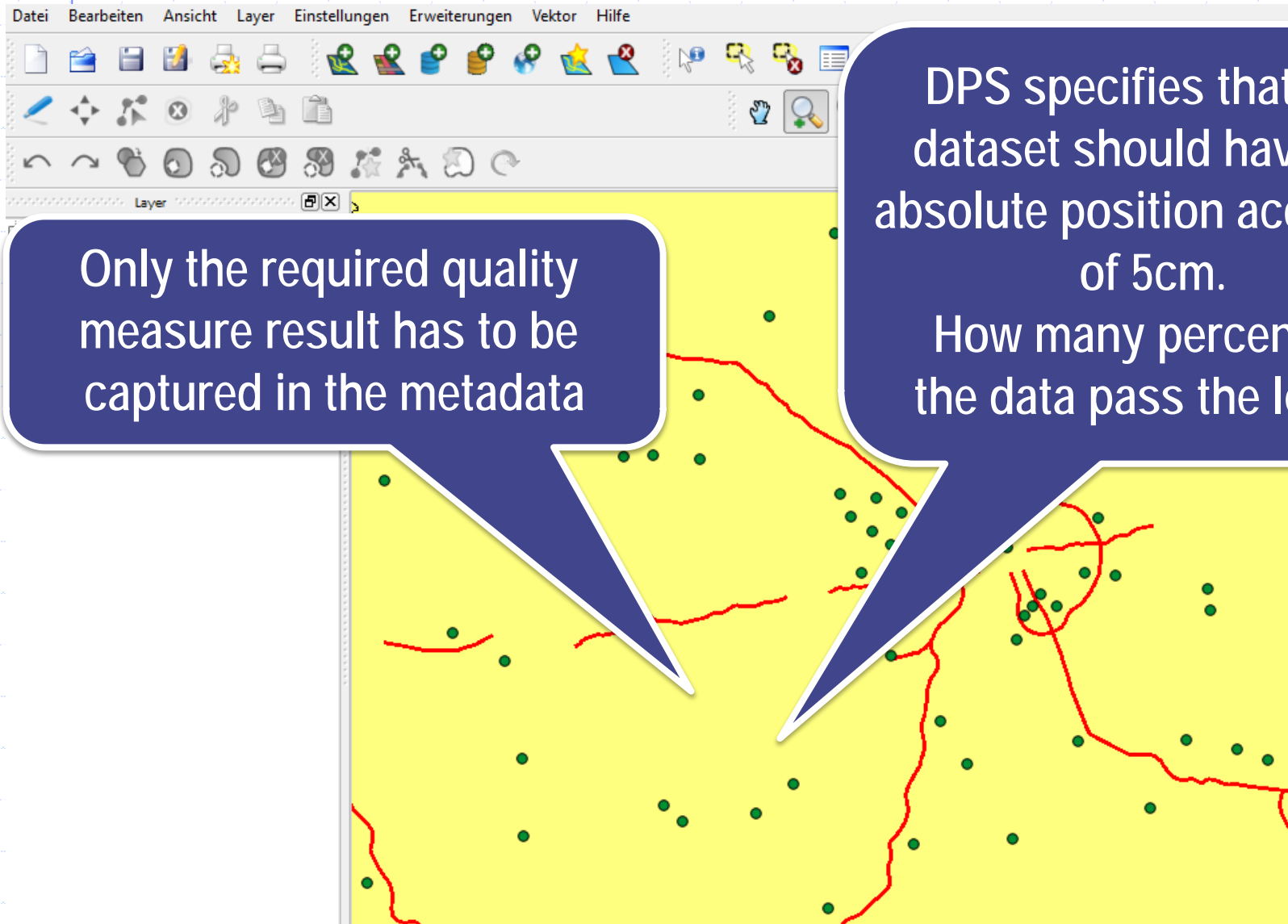
<b>Data Production Specification</b>	<b>Metadata/MD_Identification</b>
identification/title [1..1]: CharacterString	citation/title [1..1]: CharacterString + individual text
identification/abstract [1..1]: CharacterString	abstract [1..1]: CharacterString
identification/purpose [1..1]: CharacterString	purpose [1..1]: CharacterString
maintenance/ maintenaceAndUpdateFrequency [1..1]: MD_MaintenanceFrequencyCode	resourceMaintenance/ maintenaceAndUpdateFrequency [1..1]: MD_MaintenanceFrequencyCode

# User guidance and workflow support during the production process



textual descriptions of the processing steps and data sources can be displayed during the production process to support the producer

# Support of the manual input of quality metadata



# Conclusion

- Metadata should be user oriented but often collected in a production view
- There is a discrepancy between the production view and the user requirements
  
- Different Approaches are needed for an automatic generation of metadata
- The ISO 19131 data product specification can be used as a source for an automatic generation of metadata

Thank you for your  
attention