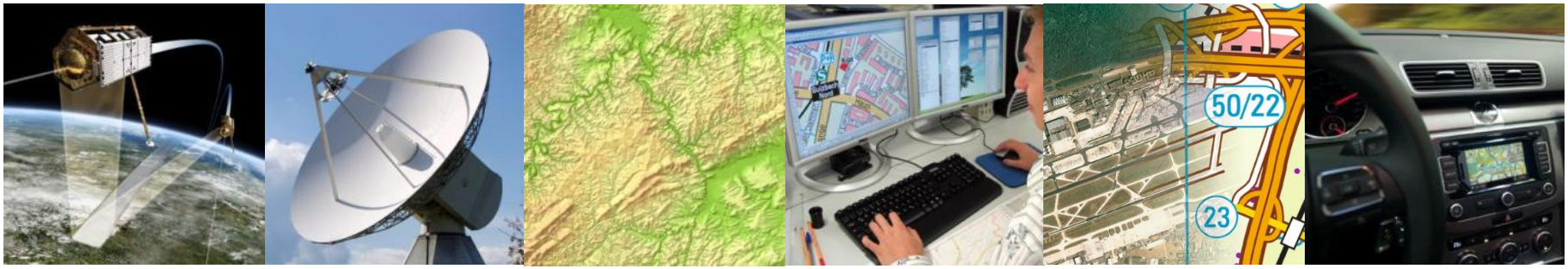
Federal Agency for
Cartography and Geodesy

Quality standards ISO vs INSPIRE

What's the future of metadata?

Eszter Kiss

Federal Agency for Cartography and Geodesy



Content

- Qualitymanagement Operations at the BKG
  - The Control Loop of Quality Management (QM) - Documenting and Reporting of Quality Information
- Normative References / de facto Standards – Which Standards have to be followed?
  - Two Generations of ISO Standards
  - Other Standards and Regulations and their Reference to ISO Standards
- Summary and outlook: Discussion

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- Qualitymanagement Operations at the BKG
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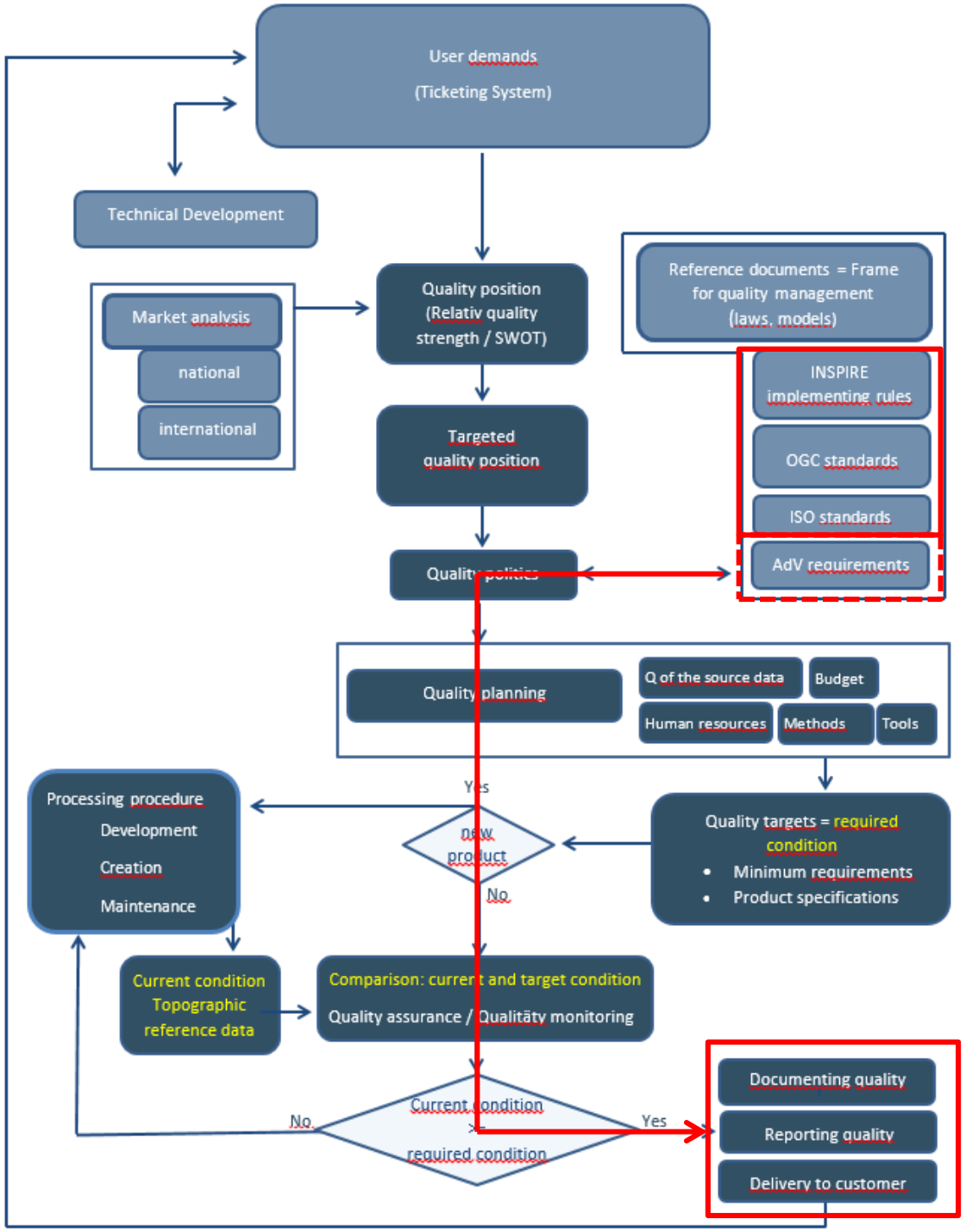
Control Loop of Quality Management



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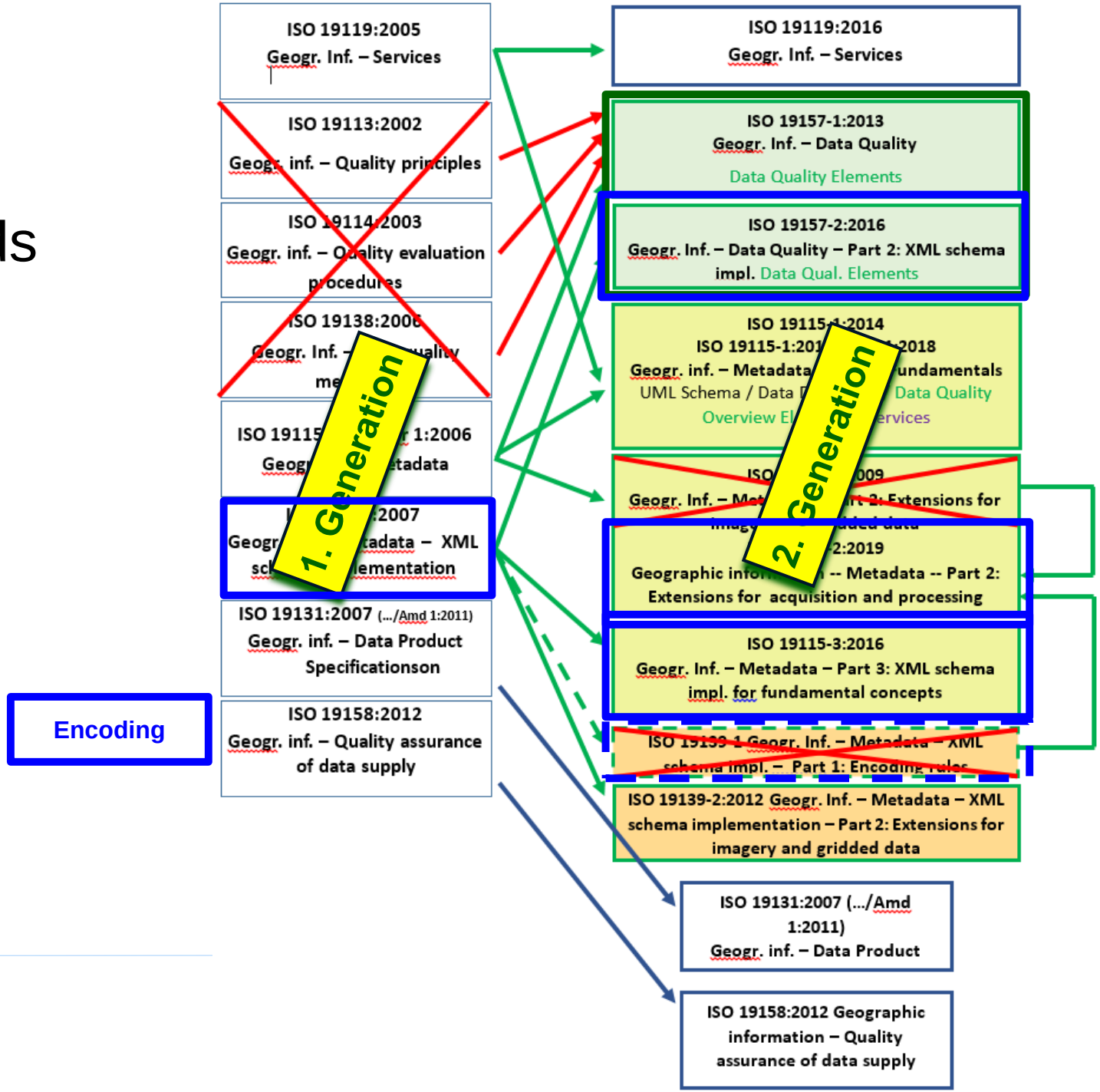
Normative References / de facto Standards – Which Standards have to be followed?

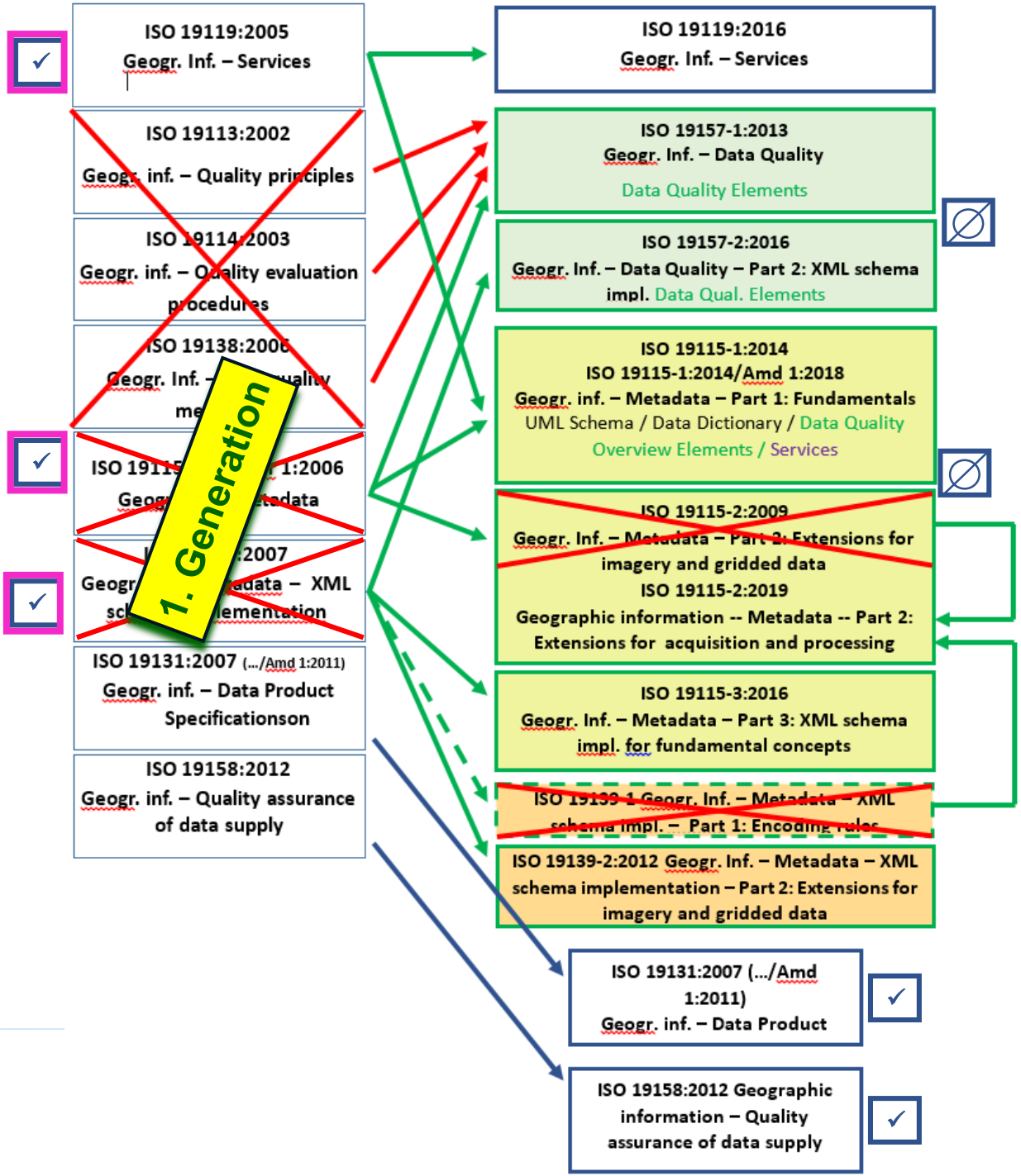
Interoperability / Researchability
(SDI / user-friendly publishing of geodata)

- ISO
  - 1. Generation / 2. Generation of Q-Standards …Comparison
  - ISO 19165
- INSPIRE
  - Metadata Implementing Rules
  - Metadata Technical Guidelines
- OGC
  - CSW 2.0.2 + CSW 2.0.2 ISO AP, CSW 3.0 – no ISO AP
  - WFS 3.0
- Others
  - DCAT / DCAT-AP – GeoDCAT / GeoDCAT AP

ISO - Quality standards



ISO - Quality standards



Comparison of the two Generations of ISO Standards

Non-quantitative, **non-measurable** quality:
Overview elements:

- purpose → Identification information package
- usage → Identification information package
- lineage → Lineage information package

Quantitative, **measurable** quality:
Quality categories + Quality elements

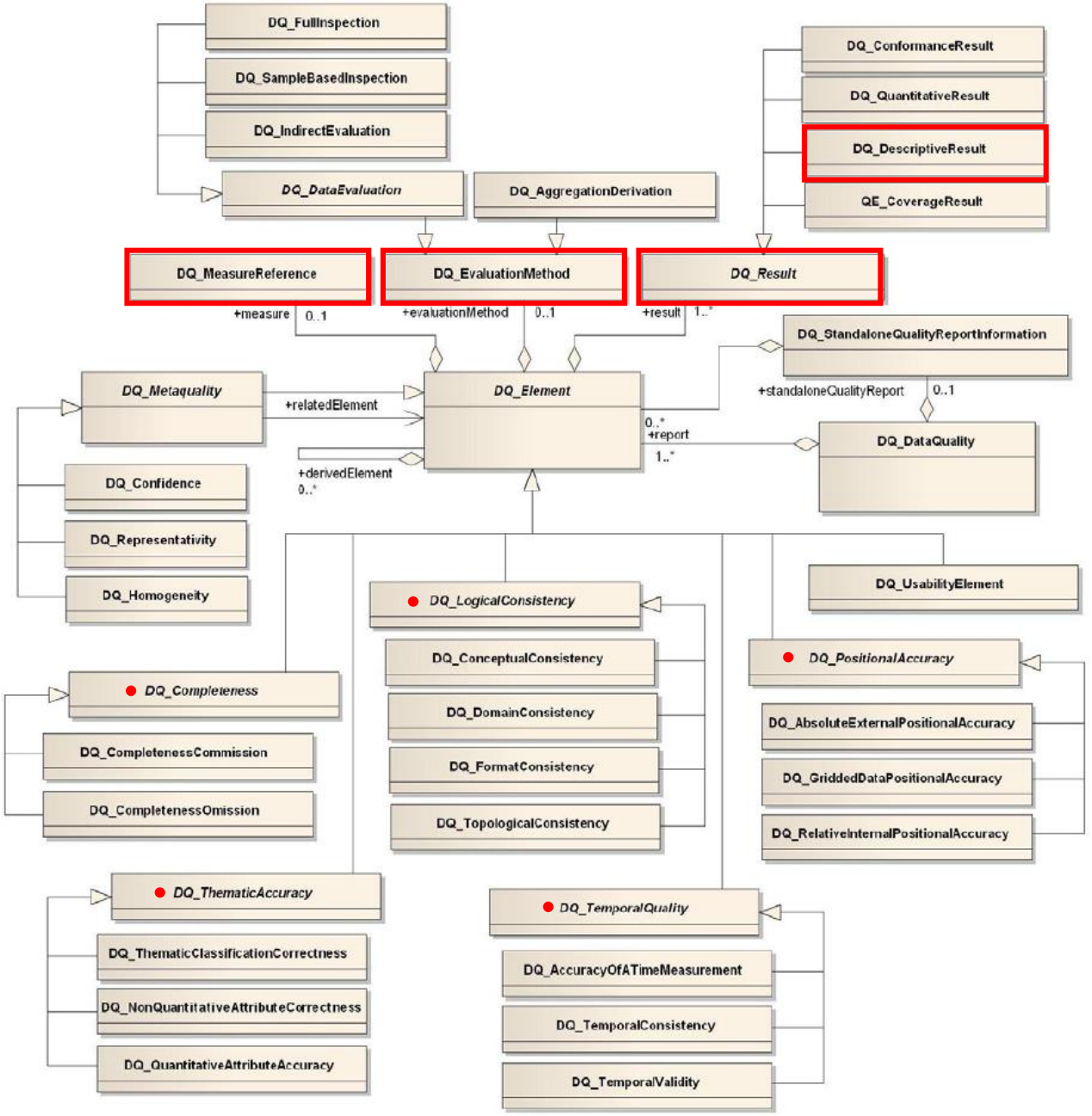
- Positional accuracy
- Temporal accuracy
- Completeness
- Logical consistency
- Thematical accuracy

Fitness for Use Elements:

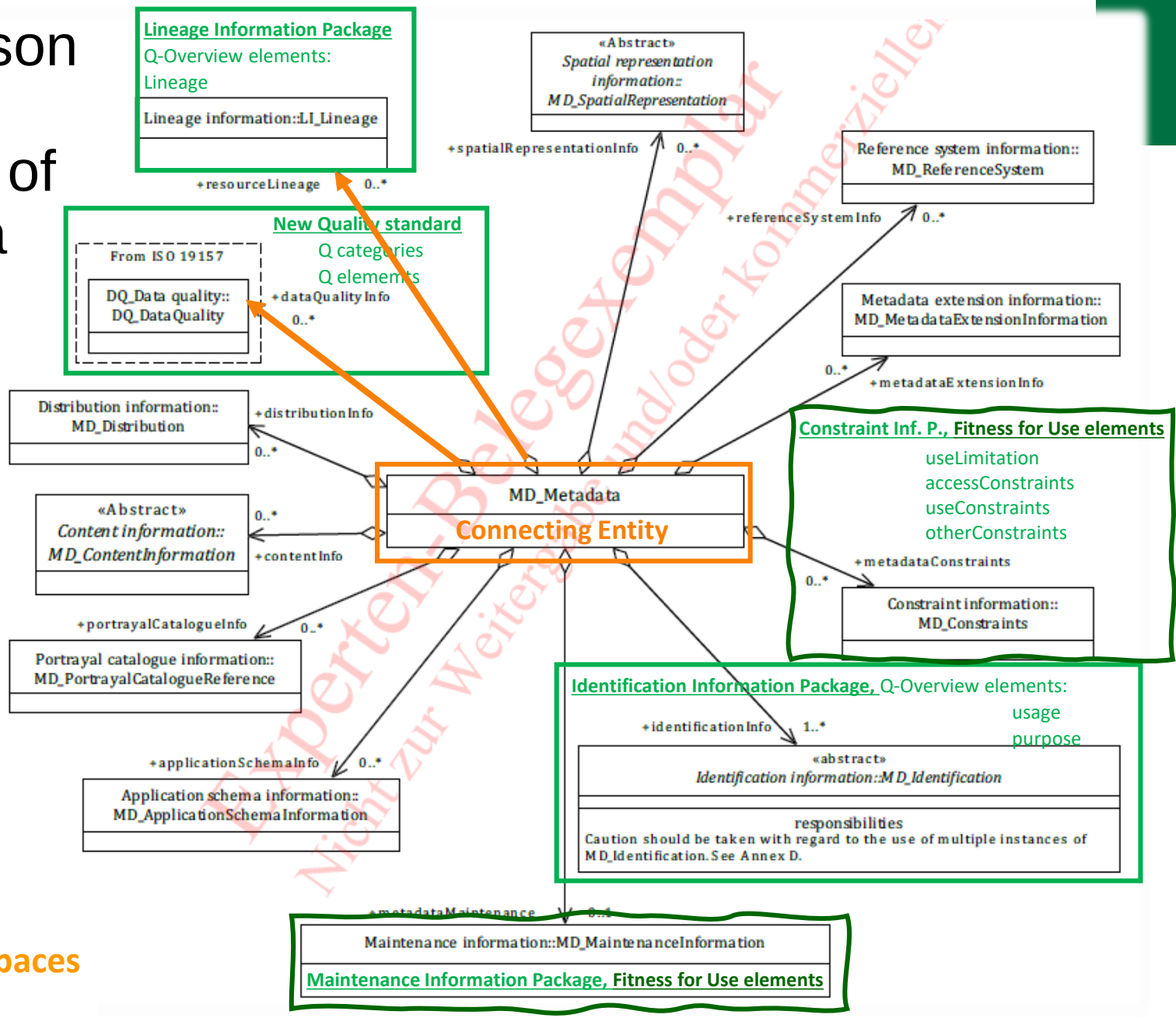
- Maintenance information
- Legal Constraints
  - accessConstraints
  - useConstraints
  - otherConstraints

- Usability
- Metaquality
  - homogenity
  - representativeness
  - trustworthiness

Comparison of the two Generations of ISO Standards



Comparison of the structure of metadata



+ more namespaces

Comparison of the two Generations of ISO Standards - Scope of validity

MD_ScopeCode :

Description: class of information to which the referencing entity applies
CodeSpace: http://standards.iso.org/iso/19115/-3/mcc/1.0
Number of items: 26

Entry	Definition
attribute	information applies to the attribute value
attributeType	information applies to the characteristic of a feature
collectionHardware	information applies to the collection hardware class
collectionSession	information applies to the collection session
dataset	information applies to the dataset
series	information applies to the series
nonGeographicDataset	information applies to non-geographic data
dimensionGroup	information applies to a dimension group
feature	information applies to a feature
featureType	information applies to a feature type
propertyType	information applies to a property type
fieldSession	information applies to a field session
software	information applies to a computer program or routine
service	information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour, such as a use case
model	information applies to a copy or imitation of an existing or hypothetical object
tile	information applies to a tile, a spatial subset of geographic data
metadata	information applies to metadata
initiative	information applies to an initiative
sample	information applies to a sample
document	information applies to a document
repository	information applies to a repository
aggregate	information applies to an aggregate resource
product	metadata describing an ISO 19131 data product specification
collection	information applies to an unstructured set
coverage	information applies to a coverage
application	information resource hosted on a specific set of hardware and accessible over a network

Comparison of the two Generations of ISO Standards - Reference documents

POSSIBILITIES OF LINKAGE

ISO first Generation (OLD)	ISO second Generation (NEW)
Only in a few cases	More possibilities
✓ Contact information	
✓ Metadata extension information	
✓ Distribution information	
∅ Specification	✓ Specification
∅ Product description	✓ Product description
∅ Lineage → standalone quality report	✓ Lineage
	✓ Standalone Quality Report

Comparison of the two Generations of ISO Standards – Reporting Quality

OLD: ISO 19115:2003/Cor 1:2006

	Name / Role Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
78.	DQ_DataQuality	DataQual	quality information for the data specified by a data quality scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Lines 79-81
79.	scope	dqScope	the specific data to which the data quality information applies	M	1	Class	DQ_Scope <<DataType>> (B.2.4.5)
80.	*Role name:* report	dqReport	quantitative quality information for the data specified by the scope	C / lineage not provided?	N	Association	DQ_Element <<Abstract>> (B.2.4.3)
81.	*Role name:* lineage	dataLineage	non-quantitative quality information about the lineage of the data specified by the scope	C / report not provided?	1	Association	LI_Lineage (B.2.4.2)

NEW: ISO 19157-1:2013

	Name / Role Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
1.	DQ_DataQuality	quality information for the data specified by a data quality scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Lines 2-4
2.	scope	the specific data to which the data quality information applies	M	1	Class	DQ_Scope <<DataType>> (C.2.1.6)
3.	*Role name:* report	quantitative quality information for the data specified by the scope	M	N	Association	DQ_Element <<Abstract>> (C.2.1.2)
4.	*Role name:* standaloneQualityReport	reference to external standalone quality report	O	1	Association	DQ_StandaloneQualityReportInformation (C.2.1.7)

Normative References / de facto Standards – Which Standards have to be followed?

Interoperability / Researchability

(SDI / user-friendly publishing of geodata)

- ISO
  - 1. Generation / 2. Generation of Q-Standards …Comparison
  - ISO 19165

- ISO 19165-1:2018
  Geographic information — Preservation of digital data and metadata — Part 1: Fundamentals

2. Generation

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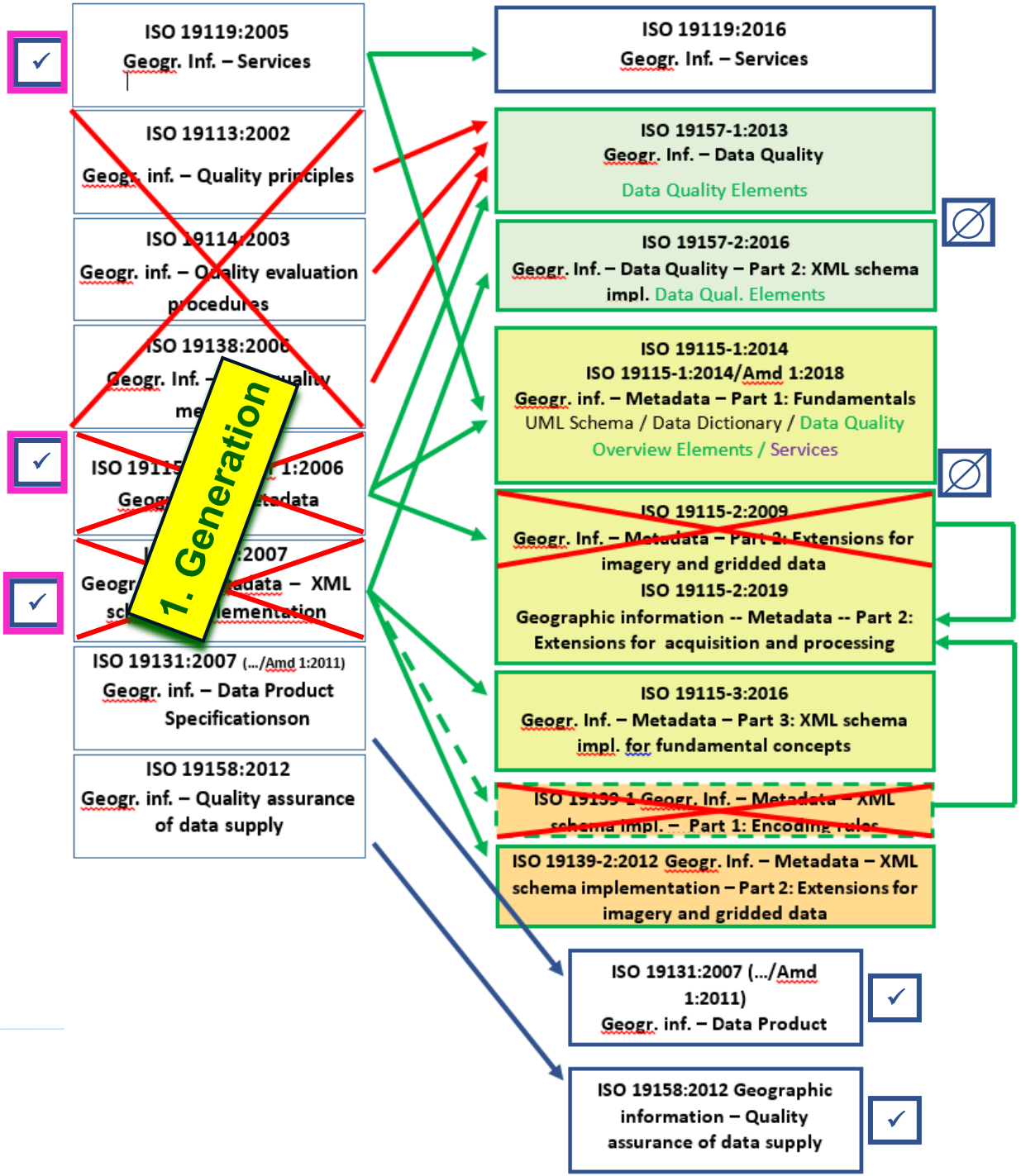
ISO - Quality standards



Normative References / de facto Standards: INSPIRE

TG for the implementation of INSPIRE dataset and service metadata

based on ISO/TS 19139:2007

1. Generation

“It was decided in the MIWP-8 sub-group that new versions of the ISO 19115 standard were out of scope for this version of this specification. The future versions of these Technical Guidelines may be revised taking into account the new ISO 19115 family standards.”

…

“[ISO 19157] ISO 19157:2013, Geographic information -- Data quality.

NOTE: This document is not listed under normative references because it is only referred to as an inspiration for the encoding of the INSPIRE metadata elements Topological consistency and Data quality into ISO 19139. The ISO 19157:2013 standard should be used together with a newer version of ISO metadata standard for geographic information, [ISO 19115-1].”

Normative References / de facto Standards:

INSPIRE - **TG for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007**

Data Quality

Domain	DQ_Element is an abstract complex type and has to be expressed by a corresponding DQ_xxx subelement concerning the particular data quality issue e.g. DQ_ConceptualConsistency. See B.2.4.3 in ISO 19115:2003 for further information. The following ISO 19115 elements are the corresponding ones to express quantitative results of the data quality evaluation as given in INSPIRE Data specifications sections 8.3.2 which in fact focus on ISO 19157: - 100. nameOfMeasure [0..*]: name of the test applied to the data / domain value: free text - 103. evaluationMethodType [0..1]: type of method used to evaluate quality of the dataset/ domain value: DQ_EvaluationMethod TypeCode - 104. evaluationMethodDescription [0..1]: description of the evaluation method / domain value: free text - 106. dateTime [0..*]: date or range of dates on which a data quality measure was applied / domain value: DateTime (ISO 19103) - 107. result [1..2]: value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level / domain value: DQ_Result (abstract) - 133. DQ_QuantitativeResult, consisting of - 137. value [1..*]: quantitative value or values, content determined by the evaluation procedure used / domain value: Record (ISO 19103) Due to making use of DQ_QuantitativeResult subset there is a mandatory element in ISO 19115 to be considerer too: - 135. valueUnit [1]
Example	
Comments	ISO 19115 lists several elements which build DQ_Element. For the purpose of theme-specific metadata according to the INSPIRE Data specifications the elements won by mapping from ISO 19157 are sufficient.

Normative References / de facto Standards:

INSPIRE - **TG for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007 Topological consistency**

3.2.4 Data quality info section …

3.2.4.1 Topological consistency …

Providing descriptive results

“ The descriptive topological consistency measure is properly described in [ISO 19157], but unfortunately there is no obvious element for encoding it in the [ISO 19139] XML Schemas. To make it possible to encode the descriptive results without extending the [ISO 19139] XML Schema, the gmd:DQ_TopologicalConsistency element is used with a specific type of gmd:DQ_ConformanceResult element referring to the INSPIRE Generic Network Model. The actual textual description of the consistency result is reported using the gmd:explanation property. “

Domain	DQ_TopologicalConsistency is a forming of the abstract complex type DQ_Element. See B.2.4.3 in ISO 19115:2003 for further information. The following ISO 19115 elements are the corresponding ones to express quantitative results of the data quality evaluation as given in INSPIRE Data specifications sections 8.3.2 which in fact focus on ISO 19157: - 100. nameOfMeasure [0..*]: name of the test applied to the data / domain value: free text - 103. evaluationMethodType [0..1]: type of method used to evaluate quality of the dataset/ domain value: DQ_EvaluationMethod TypeCode - 104. evaluationMethodDescription [0..1]: description of the evaluation method / domain value: free text - 106. dateTime [0..*]: date or range of dates on which a data quality measure was applied / domain value: DateTime (ISO 19103) - 107. result [1..2]: value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level / domain value: DQ_Result (abstract) - 133. DQ_QuantitativeResult, consisting of - 137. value [1..*]: quantitative value or values, content determined by the evaluation procedure used / domain value: Record (ISO 19103) Due to making use of DQ_QuantitativeResult subset there is a mandatory element in ISO 19115 to be considerer too: - 135. valueUnit [1]
Example	
Comments	ISO 19115 lists several elements which build DQ_Element. For the purpose of theme-specific metadata according to the INSPIRE Data specifications the elements won by mapping from ISO 19157 are sufficient. This element is mandatory only if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network.

Normative References / de facto Standards: INSPIRE

TG for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007

Overview table of theme specific INSPIRE metadata elements concerning Data quality

INSPIRE theme specific metadata element for Data quality		Which annex theme is involved?																														
		GN	AU	AD	CP	TN	HY	PS	EL	LC	OI	GE	SU	BU	SO	LU	HH	US	EF	PF	AF	PD	AM	NZ	AC	MF	OF	SR				
Completeness	Commission		x	x		x	x	x	x	x			x	x		x																
	Omission	x	x	x	x	x	x	x	x	x	x		x	x	x	x		x		x	x	---					x					
Logical Consistency	Conceptual Consistency	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	---	x	x	x	x	x	x	x	x	x	x
	Domain Consistency	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	---	x	x	x	x	x	x	x	x	x	x
	Format Consistency					x			x	x								x				---										
Positional Accuracy	Absolute or external accuracy	x	x	x	x	x	x	x	x	x			x	x		x	x					---					x	x				
	Gridded data position accuracy								x		x											---										
	Relative or Internal Accuracy						x			x												---										
Temporal Accuracy	Temporal Consistency									x												---										
	Temporal Validity									x			x				x			x	x	---										
Thematic Accuracy	Thematic Classification Correctness					x				x			x			x				x	x	---										
	Non-quantitative attribute correctness			x		x	x			x						x						---										
	Quantitative attribute correctness						x			x							x					---										
Usability	Usability	---												x													x	x				

Building

Oceanographic geographical features

Sea regions

Usability

Normative References / de facto Standards – Which Standards have to be followed?

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(SDI / user-friendly publishing of geodata)

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  - WFS 3.0

- Others
  - DCAT / DCAT-AP – GeoDCAT / GeoDCAT AP

OGC®
Making location count.

Current version since 2016

INSPIRE

Version	Document Title (click to download)	Document #	Type
3.0	OGC® Catalogue Services 3.0 - General Model	12-168r6	IS
	OGC® Catalogue Services 3.0 Specification - HTTP Protocol Binding	12-176r7	IS
	OGC® Catalogue Services 3.0 Specification - HTTP Protocol Binding - Abstract Test Suite	14-014r3	ATS
2.0.2	OpenGIS Catalogue Service Implementation Specification	07-006r1	IS
	Revision Notes for Corrigendum for OpenGIS 07-006: Catalogue Services, Version 2.0.2 (1.0)	07-010	ISC
	OGC I15 (ISO19115 Metadata) Extension Package of CS-W ebRIM Profile 1.0	13-084r2	ISx
	CSW-ebRIM Registry Service - Part 1: ebRIM profile of CSW (1.0.1)	07-110r4	IS
	CSW-ebRIM Registry Service - Part 2: Basic extension package (1.0.1)	07-144r4	IS
	CSW-ebRIM Registry Service - Part 3: Abstract Test Suite (1.0.1)	08-103r2	TS
	OGC Catalogue Services Specification 2.0.2 - ISO Metadata Application Profile (1.0.1)	07-045r1	SAP
	~~OGC Catalogue Services Specification 2.0.2 - ISO Metadata Application Profile (1.0.0)~~	07-045	D-SAP
	FGDC CSDGM Application Profile for CSW 2.0 (0.0.12)	06-129r4	RP
1.0.0	OGC® Catalogue Services Standard 2.0 Extension Package for ebRIM Application Profile: Earth Observation Products	06-131r	
	GML 3.1.1 Application Schema for EO products (1.0.0)	06-080r	

AP ISO is missing

1. Generation

AP ISO

ISO 19115:2003/Cor 1:2006
Geogr. Inf. – Metadata

Normative References / de facto Standards – Which Standards have to be followed? WFS 3.0 = OGC API - Features

Geodata – geoportals ←→ General-purpose search engines

New develelopment:

- technical changes
- conceptual changes

- Purposes a modernized service architecture for sharing spatial data
- Follows current Web and API practices

→ WFS 3.0 = OGC API Feature = Open API 3.0

Paradigm shift

Normative References / de facto Standards – Which Standards have to be followed?

Interoperability / Researchability
(SDI / user-friendly publishing of geodata)

…

- Others
  - DCAT / DCAT-AP – GeoDCAT / GeoDCAT AP
    - de-facto EU standard metadata interchange format
    - an extension of DCAT-AP for describing geospatial datasets

1. Generation

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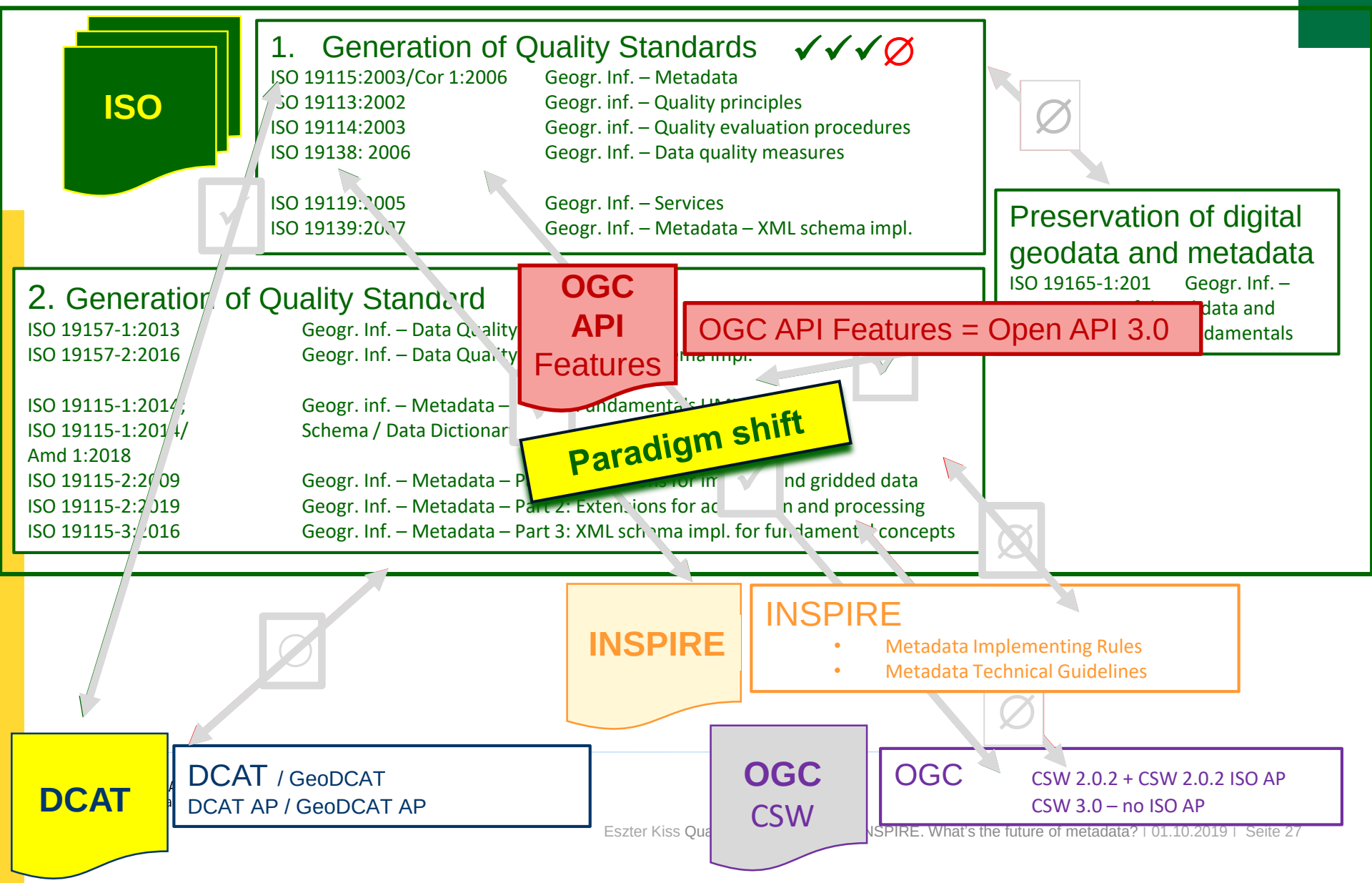

Summary and Outlook: Discussion

ISO

1. Generation of Quality Standards

ISO 19115:2003/Cor 1:2006	Geogr. Inf. – Metadata

2. Generation of Quality Standard

ISO 19157-1:2013	Geogr. Inf. – Data Quality
ISO 19157-2:2016	Geogr. Inf. – Data Quality – Part 2: XML schema impl.
ISO 19115-1:2014; ISO 19115-1:2014/ Amd 1:2018	Geogr. inf. – Metadata – Part 1: Fundamentals UML Schema / Data Dictionary
ISO 19115-2:2009	Geogr. Inf. – Metadata – Part 2: Extensions for imagery and gridded data
ISO 19115-2:2019	Geogr. Inf. – Metadata – Part 2: Extensions for acquisition and processing
ISO 19115-3:2016	Geogr. Inf. – Metadata – Part 3: XML schema impl. for fundamental concepts

OGC CSW

OGC CSW 2.0.2 + CSW 2.0.2 ISO AP
CSW 3.0 – no ISO AP

DCAT

DCAT / GeoDCAT
DCAT AP / GeoDCAT AP

Which standards have to be followed
What is the future of metadata

?

OGC API Features

OGC API Features = Open API 3.0

Paradigm shift

Thank you for your kind attention!

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