Interoperability Maturity Matrix

CEOS
Committee on
Earth Observation Satellites

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Interoperability Framework - Scope

❖ Help data providers to enhance the interoperability of their data and services with those of other organizations, agencies, and countries, avoiding duplication of efforts, reduce costs, and improve the interoperability of EO data and services.

❖ Facilitate the integration of global EO data with other data sources, including geo-statistics, model data, and forecasts.

❖ Assist in creating a common understanding among users with different backgrounds, interests, and needs and the data sharing.

❖ Foster collaboration and innovation by enabling the development of new applications, tools, and services that leverage EO data.

https://github.com/ceos-org/interoperability-handbook
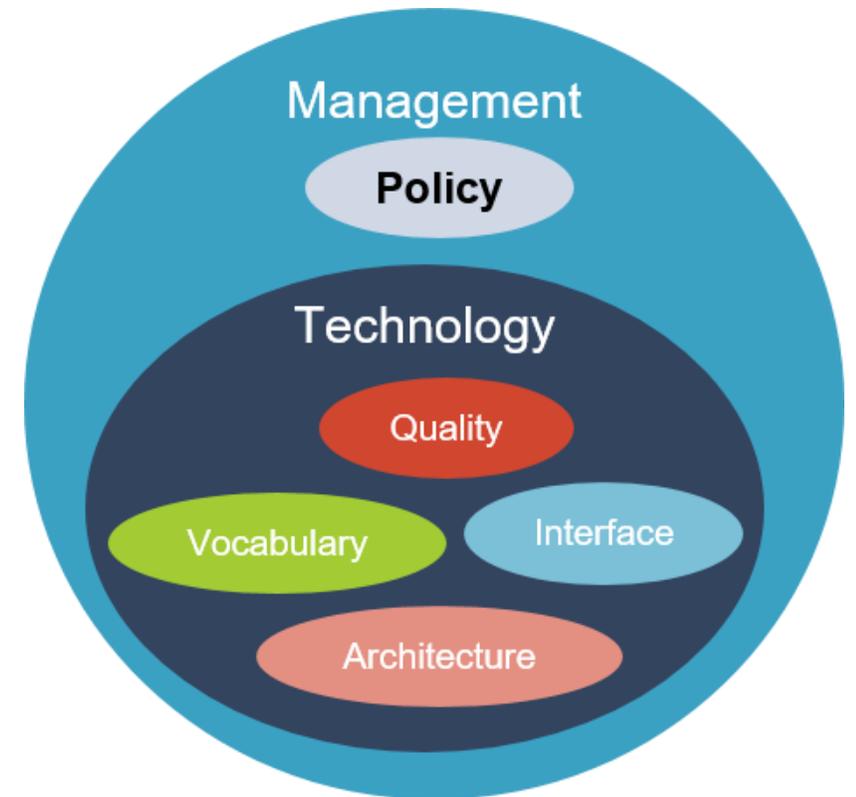
Interoperability Framework – Factors and Principles

Factors	Description	Principles
Vocabulary (Semantics)	The (narrow) semantic aspect refers to the naming and defining terms and expression. It includes developing, harmonizing, and maintaining vocabularies, concepts, and schemata supporting provision, exchange, and analysis of data, information, and knowledge regarding Earth observation. It ensures that words and language are understood in the same way by all communicating parties	• Semantic • Thesaurus
Architecture	Architecture describes the organizational structure of concepts, processes, and assets, including data. It comprises of the structural aspects of models and standards that govern the collection, storage, archiving, documentation and publication of data	• Preservation Architecture • Data and Metadata Architecture • Publishing Architecture
Interface (Accessibility)	Data exchange protocols and application interfaces, from a consumption or user perspective. These provide the means necessary to search for collections, find and access data and information contained in those collections	• Data Discovery • Data Access • Authentication and Authorization
Quality	Indicators (parameters, metrics, etc.) for informing users of the trustworthiness (accuracy, uncertainty, consistency, etc.) of the data provided (measurands, measurements, observations, etc.)	• Calibration and Validation
Policy	Legal frameworks, policies, rules, and strategies regulating the relation between the different stakeholders	• Policy

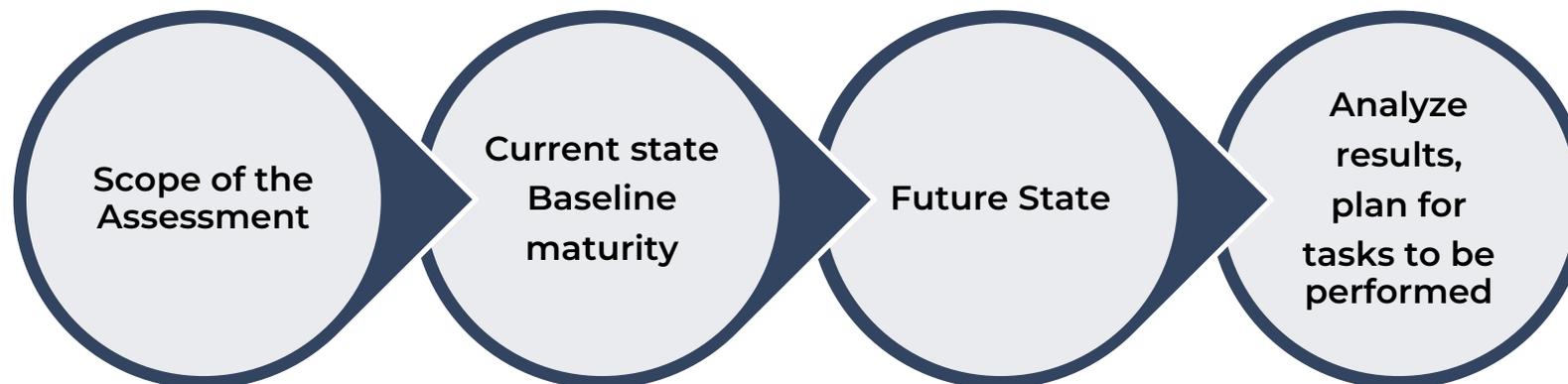# Interoperability Framework – Recommendations
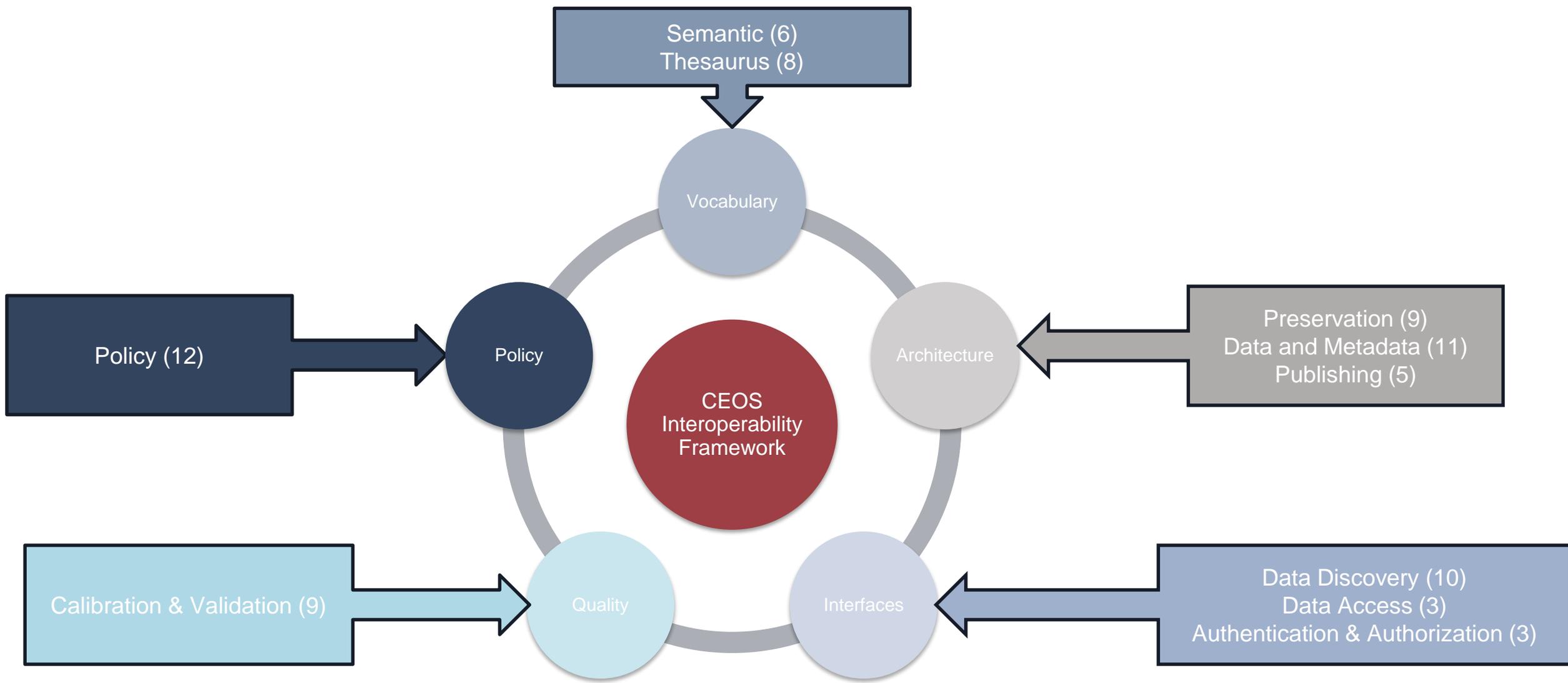
Interoperability Maturity Matrix

❖ The Interoperability Maturity Matrix (IMM) will help users to measure the maturity of Interoperability of data and services in their organizations and will also allow them to monitor the interoperability implementation with time.

❖ The IMM can be used by people at every level of their organisation, from information management professionals working in data governance or analytics to senior leadership teams setting agency targets and strategies.

❖ The IMM can be applied to all data and services made available by CEOS agencies that have the potential to be integrated, exchanged or shared.

The IMM can be used for a self-assessment to:

❖ self-evaluate current level of interoperability maturity

❖ identify gaps in data and services interoperability maturity

❖ plan improvements to reach the targeted level of maturity

0	INITIAL	Processes are ad-hoc, chaotic, and success depends on individual effort
1	REPEATABLE	Basic management processes are established, and successes can be repeated
2	DEFINED	The organization develops a standard process that is documented, standardized, and integrated into all processes
3	MANAGED	The organization monitors and controls its processes through data collection and analysis
4	OPTIMIZED	Processes are constantly improved through feedback and by introducing new ideas and technologies.

Scope of the Assessment → **Current state Baseline maturity** → **Future State** → **Analyze results, plan for tasks to be performed**

Interoperability Maturity Matrix

FACTORS	PRINCIPLES		DESCRIPTION	LEVEL OF MATURITY					NOTES
				INITIAL	REPEATABLE	DEFINED	MANAGED	OPTIMIZED	
VOCABULARY	SEMANTIC	SEM#1	Terms and definitions should be collected into the CEOS Earth observation glossary on GitHub.	–	–	–	–	–	
		SEM#2	Capability should be provided to enable public comment and discussion on existing and new terms and definitions.	–	–	–	–	–	
		SEM#3	Enable version control and change management at the individual term level and link to historical and alternative definitions.	–	–	–	–	–	
		SEM#4	Use of project or document specific vocabularies should be discouraged e.g., in the form of 'terms and definitions' chapters. Source (via url), maintain, and develop all terms that serve or might serve in more than one context in the online, shared repository.	–	–	–	–	–	
		SEM#5	Community members should promote the common thesaurus, including through ISO/TC 211, OGC, WMO, GEO and other stakeholders in Earth System Sciences, to strive for domain wide adoption.	–	–	–	–	–	
		SEM#6	Common online repositories for abbreviations and acronyms should be used. Agreed metadata fields with unified and binding lists of options should be included. Keywords from controlled vocabularies that allow lookup of keyword information via Linked Data principles, e.g., HTTP URI de-referencing or SPARQL interfaces are preferred. The use of GCMD controlled keywords is encouraged.	–	–	–	–	–	
	THESAURUS	THES#1	The terms used in the thesaurus should be consistent and divided into classes such as Base, Core, Controversial and High Impact. The 'Base Terms' should have cross community agreement and should not have circular or ambiguous definitions. The 'Core Term' should be using the 'Base Term' consistently and can be allowed to have minor tweaks with approval from the identified committee. The 'Controversial Term' should have qualifiers attached to them with links to discussions, which led to the association of the qualifier. The 'High Impact Term' should be approved by a specialist committee and should be linked to a document providing details of the term.	–	–	–	–	–	
		THES#2	The definition of a term may not contain the term itself nor other circular definitions (e.g., where term A is defined using term B and term B is defined using term A). A clear set of base terms should be used.	–	–	–	–	–	
		THES#3	The terms used in the thesaurus should have clear and mappable relationships with other terms (parent, sibling, child). Overlaps between terms that are supposed to delineate more generic concepts (siblings) should be avoided or minimized.	–	–	–	–	–	
		THES#4	Definitions have to be kept unambiguous and short, and written in a form such that they can replace the term in a sentence.	–	–	–	–	–	
		THES#5	Explanations should be given in a separate 'Notes' sections, and Examples in a separate 'Examples' section. Both complement the definition, and should not be included as part of the main definition.	–	–	–	–	–	
		THES#6	Every definition should have an accompanying 'Sources' section, where all source documents are listed or link to register maintained by source is provided, wherever possible as urls.	–	–	–	–	–	
		THES#7	Thesaurus terms should be version controlled at the individual term level.	–	–	–	–	–	
		THES#8	Where a term is deemed 'controversial' then contradictory definitions can be provided, but only with clear links to alternative definitions and explanations as to what context a term is used in.	–	–	–	–	–	

|	
X	IMPLEMENTED
/	PARTIAL IMPLEMENTED
–	NOT IMPLEMENTED

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Maturity Level of Each Factor and visualization from WGISS#58 meeting

❖ Maturity Levels have weights from 0 to 4 (Initial to Optimized)

❖ Each Factor have multiple recommendations and the user may have different maturity levels for each of the recommendation

❖ Maturity Level for each Factor is calculated as average/weighted average of all recommendations

❖ Finally each Factor will have Maturity Level from 0 to 4 (Initial to Optimized)

❖ Maturity Levels can be visualized in the form of Radar chart

Interoperability Maturity

WAY FORWARD
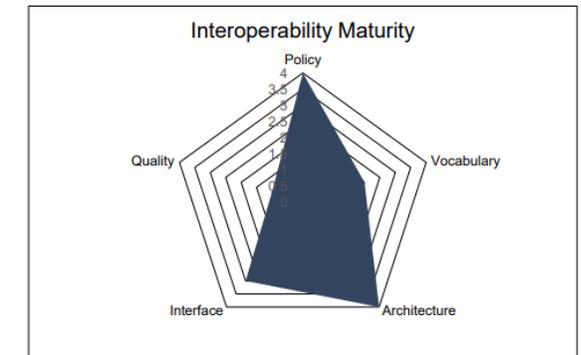
- Inclusion of any comment/feedback by end of March

- Score methodology definition by end of April

- Score methodology implementation by mid of June

- Final and formal confirmation of the Interoperability Maturity Matrix by end of September