



**DL.org**

Digital Library Interoperability,  
Best Practices and Modelling Foundations



# Quality interoperability within DLs

## The **DL.org** perspective

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## Research and project motivations

- *Urgent need to solve the problems hindering true interoperability on national and international scales* [Paepcke et al., 1998]
- Cross-domain perspective (DELOS) → **Quality**
- Mobilising the DL community
- Identifying best practices and solutions

# Interoperability

## Standard definitions

- **IEEE (1991):** *the ability of two or more systems or components to exchange **information** and to use the information that has been exchanged*
- **ISO/IEC 2382-2001:** *the capability to communicate, execute programs, or transfer data among various functional units in a manner that requires minimal knowledge of the unique characteristics of those units → **contextualisation?***
- **EIF 2.0 (2008):** *the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed **common goals**, involving the **sharing of information and knowledge between the organizations via the business processes** they support, by means of the exchange of data between their respective information and communication technology (ICT) systems*



## Interoperability Framework 2.0 EC 2008

An **Interoperability Framework** describes the way in which organisations have agreed, or should agree, to interact with each other, and how standards should be used. In other words, it provides **policies** and **guidelines** that form the basis for **selection of standards**

# European Interoperability Framework 2.0. EC, 2008

Cooperating partners having compatible visions, and focusing on the same things.

**Political Context**

The appropriate synchronization of the legislation in the cooperating MS so that electronic data originating in any given MS is accorded to proper legal weight and recognition wherever it needs to be used in other MS.

**Legal Interoperability**

**Legislative Alignment**

The processes by which different organisations such as different public administrations collaborate to achieve their mutually beneficial, mutually agreed eGovernment service-related goals.

**Organisational Interoperability**

**Organisation and Process Alignment**

Ensuring that the precise meaning of exchanged information (concept, organisation, services, etc) is preserved and well-understood

**Semantic Interoperability**

**Semantic Alignment**

The technical issues involved in linking computer systems and services (open interfaces, interconnection services, data integration, middleware, data presentation and exchange, accessibility and security services, ...)

**Technical Interoperability**

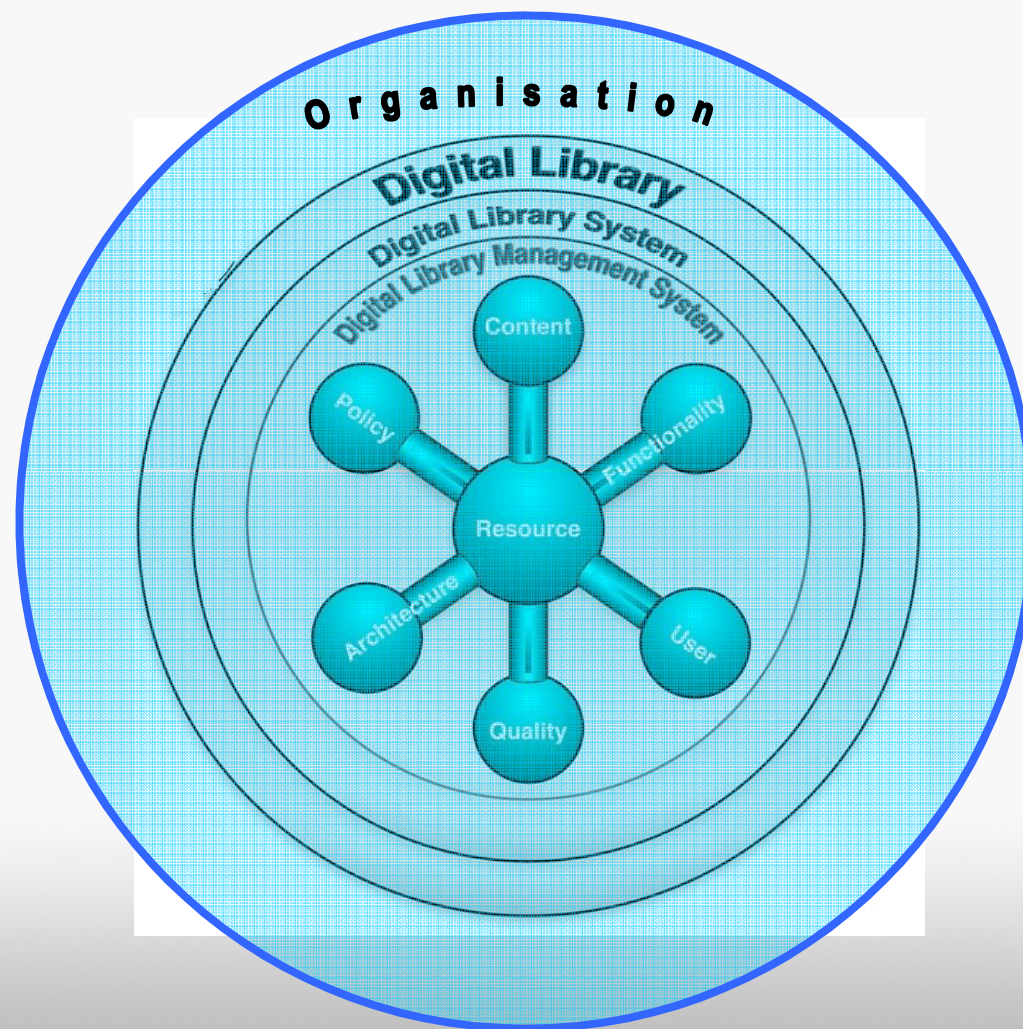
**Syntax, Interaction & Transport**



## Shared Quality/Policy WGs organisational issues

A DL may operate within an **organisation** which defines over-arching **policies** (not necessarily specific to Digital Libraries) which affect interoperability *e.g.*:

- Subject community
- University



## Quality

**ISO 8402-1994** *the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs*

**ISO 9000-2005** *The degree to which a set of inherent characteristics fulfils requirements (needs or expectations stated/implied/obligatory)*

**DELOS 2008** *parameters that can be used to characterise and evaluate the content and behaviour of a DL. Quality can be associated not only with each class of content or functionality but also with specific information objects or services*

- the degree that the DL conforms to the specified policy that expresses what the goal of a DL is. The policy can cover from very general guidelines to very technical issues
- applicable to either overall or single aspects of any products, services and processes, usually defined in relation to a set of guidelines and criteria. Often implicit...

# Quality comprehensive models

Gonçalves et al., 2006

*What is a good digital library? A quality model for digital libraries*

Table 1  
DL high-level concepts and corresponding DL dimensions of quality with respective metrics

DL concept	Dimension of quality	Factors/variables involved in measuring
Digital object	Accessibility	Collection, # of structured streams, rights management metadata, communities
	Pertinence	Context, information, information need
	Preservability	Fidelity (lossiness), migration cost, digital object complexity, stream formats
	Relevance	Query (representation), digital object (representation), external judgment
	Similarity	Same as in relevance, citation/link patterns
	Significance	Citation/link patterns
	Timeliness	Age, time of latest citation, collection freshness
Metadata specification	Accuracy	Accurate attributes, # of attributes in the record
	Completeness	Missing attributes, schema size
	Conformance	Conformant attributes, schema size
Collection	Completeness	Collection size, size of the 'ideal collection'
Catalog	Completeness	# of digital objects without a set of metadata specifications, size of the described collection
	Consistency	# of sets of metadata specifications per digital object
Repository	Completeness	# of collections
	Consistency	# of collections in repository, catalog/collection pair-wise consistency
Services	Composability	Extensibility, reusability
	Efficiency	Response time
	Effectiveness	Precision/recall (search), F1 measure (classification)
	Extensibility	# of extended services, # of services in the DL, # of lines of code per service manager
	Reusability	# of reused services, # of services in the DL, # of lines of code per service manager
	Reliability	# of service failures, # of accesses



# Quality comprehensive models

Zhang, 2010

*Holistic DL  
evaluation  
model*

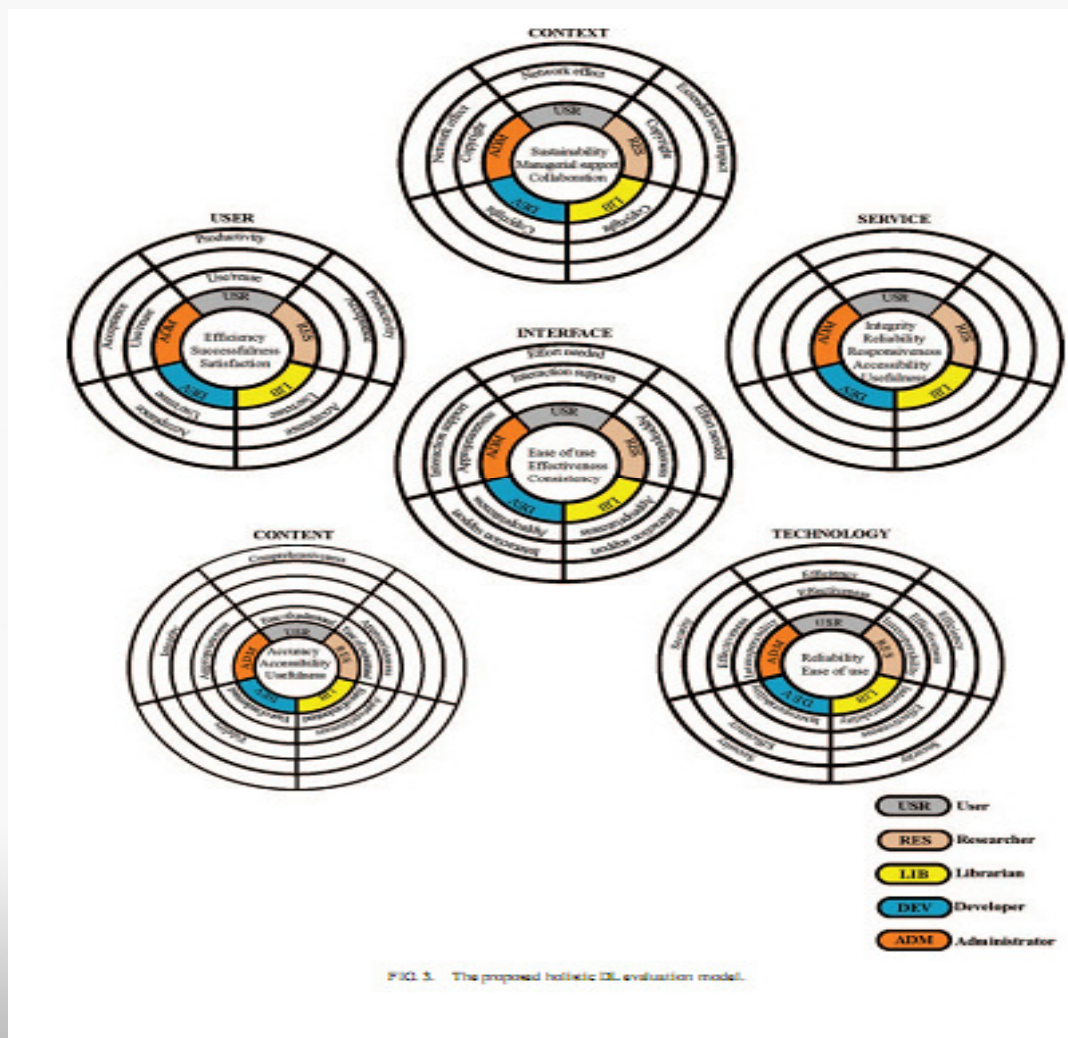
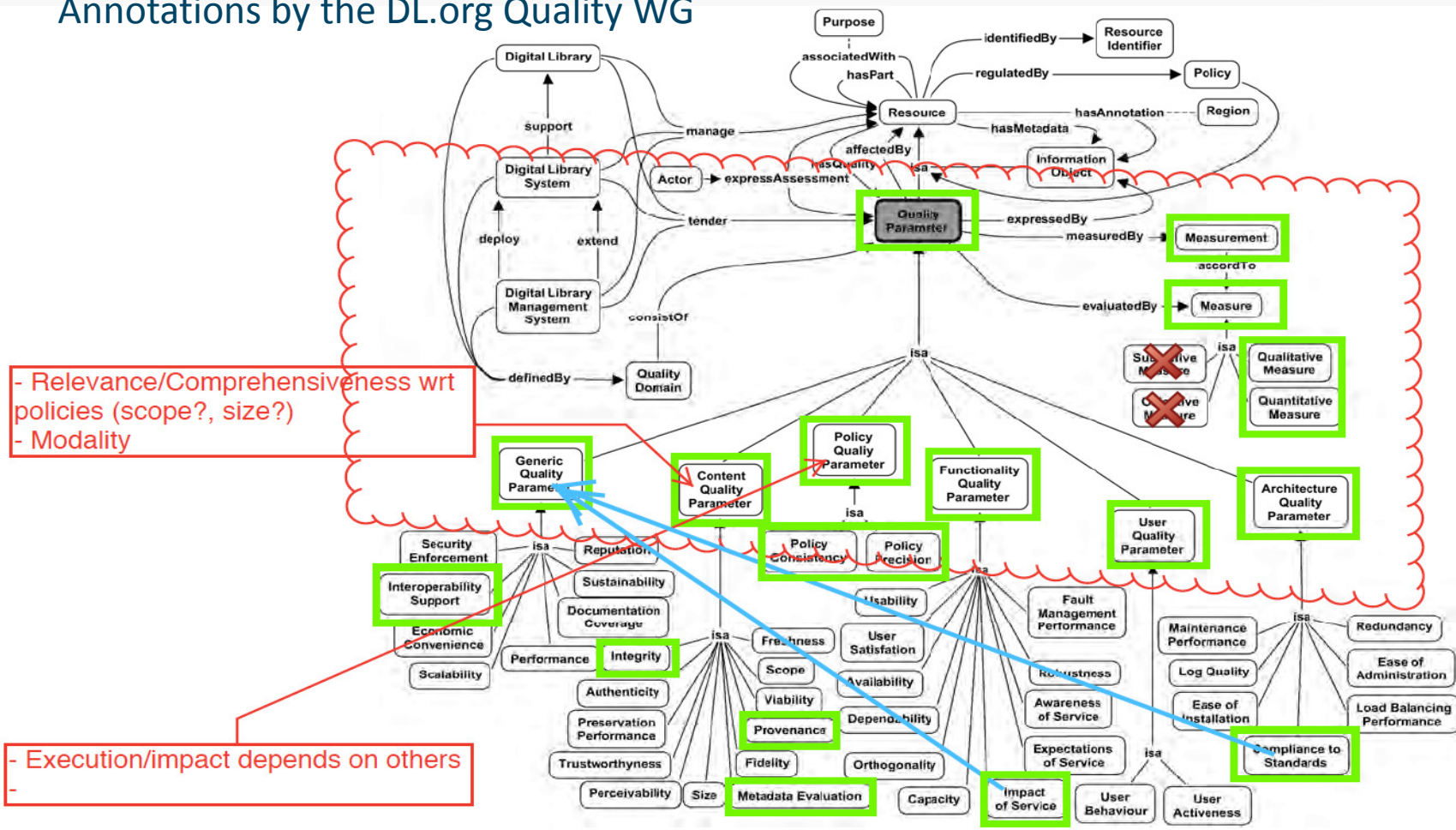


FIG. 3. The proposed holistic DL evaluation model.

# Quality comprehensive models

Candela et al., 2008. *The DELOS RM Quality concept map*

Annotations by the DL.org Quality WG



# Quality interoperability

- Establishment, adoption and measurement of quality requirements and performance indicators... **How these requirements/ indicators can interoperate?**
- Interrelations → low quality services can affect the degree of interoperability among different components, preventing the successful cooperation among different systems
- **The possibility for DLs to share a common quality framework**
- Decentralised paradigm on how to link heterogeneous and dispersed resources keeping reliability of services, data precision, homogeneous experience for the end user

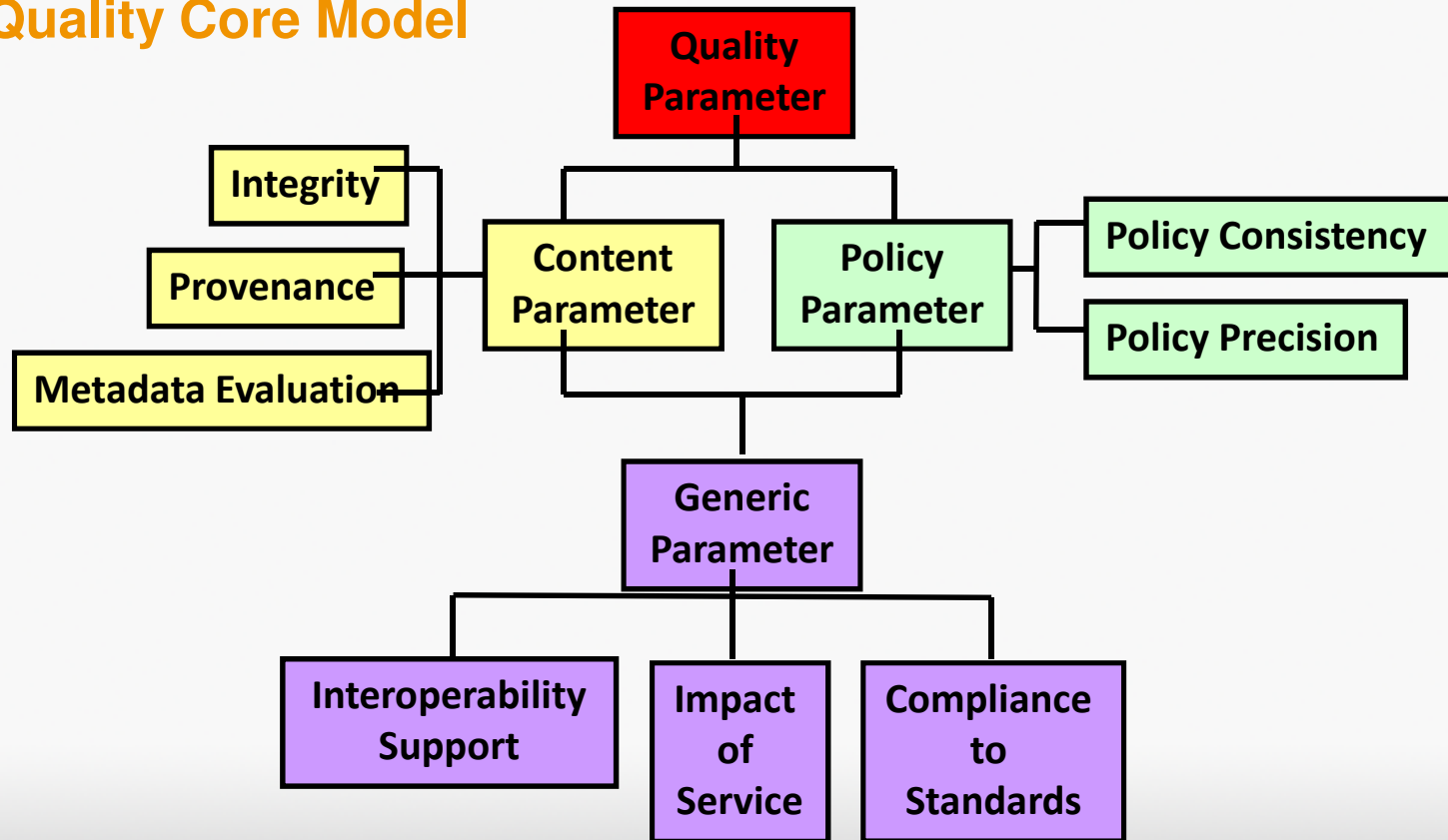
## Quality WG motivating scenario

**Our motivating scenario:** consider that representatives of two (or more) DLs have a round table to negotiate a service level agreement (SLA) defining their interoperability requirements and for this establish a quality threshold that each individual DL has to meet or exceed; “Quality” would provide transparent qualitative or quantitative parameters for defining the threshold



# The DL.org Quality Core Model

## The Quality Core Model



The Quality Core Model wikipedia: [https://workinggroups.wiki.dlorg.eu/index.php/The Quality Core Model](https://workinggroups.wiki.dlorg.eu/index.php/The_Quality_Core_Model)

# The DL.org Quality Core Model

**Compliance to standards** the degree to which standards have been adopted in developing, managing and delivering a digital library service

**Impact of service** the influence that a digital library service has on the users' knowledge and behaviour

**Interoperability support** the capability of a digital library to interoperate with other digital libraries as well as the ability to integrate with legacy systems and solutions

**Integrity** the quality of being whole and unaltered through loss, tampering, or corruption

**Metadata evaluation** the measurements of metadata schemas and their individual fields to support the collection, management, discovery and preservation of digital library content

**Provenance** information regarding the origins, custody, and ownership of an item or collection (the resource story, how to establish quality)

**Policy consistency** the extent to which a policy or a set of policies are free of contradictions

**Policy precision** the extent to which a set of policies have defined impacts and do not have unintended consequences

# Quality Interoperability Survey

- Quality Interoperability Survey, Use scenarios
- Survey Pilot
- Disambiguation (Glossary) & Collection strategy
- Data analysis and interpretation
- Best practices & checklist with practical recommendations

# Quality Interoperability Survey

## I Covered areas

- Formats
- Format compliance checking tools (and results)
- Metadata standards
- Metadata compliance checking tools (and results)
- Communication protocols
- Communication protocol compliance checking tools (and results)
- Web guidelines / standards in the areas of accessibility, usability, multilingualism
- Legal obligations e.g. for web standards





# Quality Interoperability Survey

## II Monitoring, interoperability, more general info

- Multi-level guidelines and certifications
- User satisfaction monitoring
- Interoperation of policies
- Quality interoperability and the RM



## Our contribution to the DL.org Cookbook

The results of the Survey will be included as best practices from / recommendations to the professional community. We are aware that quality is subjective, that we are dealing also with two “primitive” interoperability challenges

1. researchers vs professionals
2. different disciplines involved

But we want to know from DLs people!

## Some preliminary evidences

- **Metadata-centric** world
- Role of **guidelines** and **validators**
- Different meanings of **Quality** and **Interoperability**
- Lack of formalised and well-analysed **policies**
- Need to be **supported**

# Quality Interoperability Survey

## A “good quality” DL

### What do you consider to be a “good quality” Digital Library (DL)?

- *A high organisational level of interoperability between objects and people concerning interoperability aspects of embedded devices and process management*
- *I would tend to say that a "good quality" digital library cannot be measured only through the metadata quality or interoperability level. In my eyes Quality is a combination of Content, User satisfaction, Functionality, Policy, Quality, and Architecture of the system. A good level for each of these can lead to a good quality Digital library*
- *Containing consistent and complete metadata; valid identifiers to full-text and other material*
- *A DL that includes consistent, authoritative data within a user-centred website.*
- *Usefulness for the end user, all the functions working, understandable (language and functions), user finds what he/she was looking for (if it can be found), user do not have to print anything*
- *A good quality DL has a strategy and clear target to be compliant to the technical standards mostly accepted in the network, to be easy for its patrons/users, to be oriented to improve something every year*



## Work in progress

- Complete the **survey** and analyse/interpret data
- Identification and selection of **best practices** and **recommendations**
- Enhancing the **Quality domain** in the RM
- Elaborating more our starting **definition** and the QCM **functionality aspects**
- Your **feedbacks** 😊

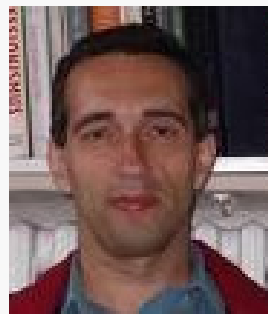
# Thank you!



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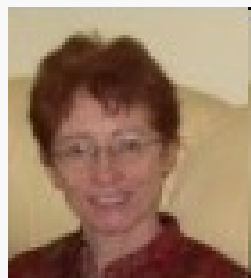
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**Quality WG public webpage:**

[https://workinggroups.wiki.dlorg.eu/index.php/Quality\\_Working\\_Group](https://workinggroups.wiki.dlorg.eu/index.php/Quality_Working_Group)