



Engaging Content
Engaging People

A World
Leading SFI
Research
Centre



Mapping Data Governance Requirements Between the European Union's AI Act and ISO/IEC 5259: A Semantic Analysis

Kuruvilla George Aiyankovil
Julio Hernandez
Dave Lewis

ADAPT Centre @ Trinity College Dublin



HOST INSTITUTION



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

HOST INSTITUTION



PARTNER INSTITUTIONS



University College Dublin
An Coláiste Oílscoile, Baile Átha Cliath
Ireland's Global University



MTU
Oibscoll Teicneolaíochta na Mumhan
Munster Technological University



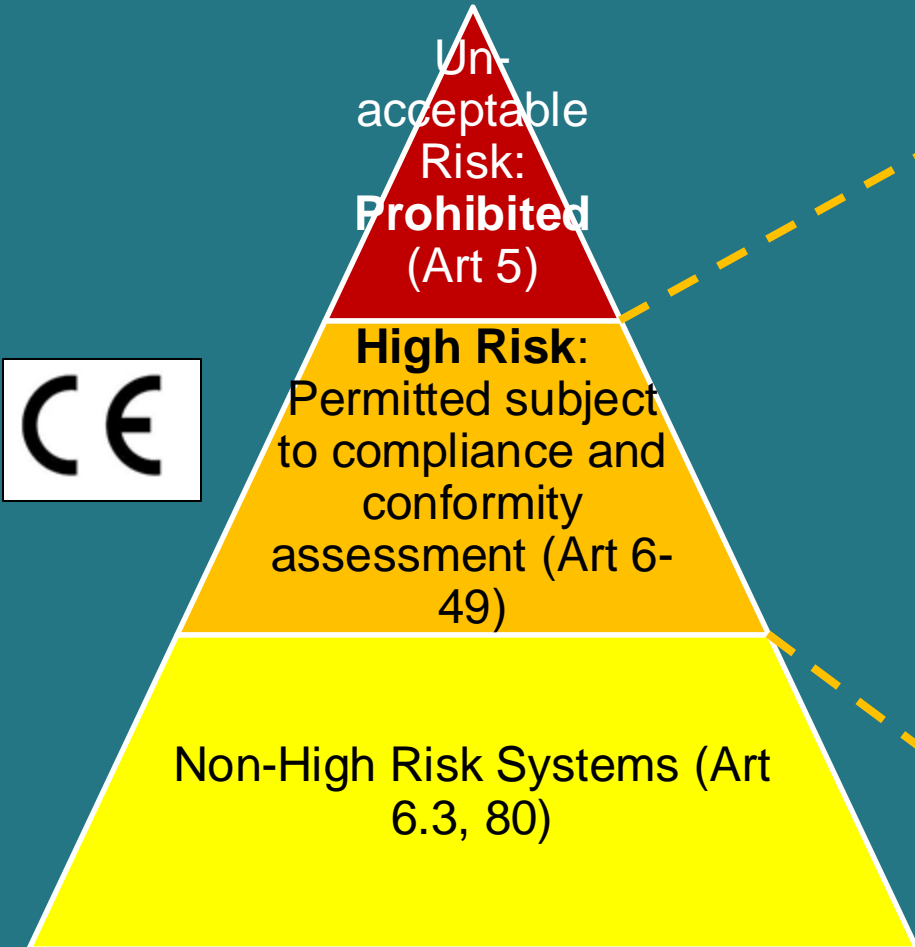
TUS



Maynooth University
National University of Ireland Maynooth



OILSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY



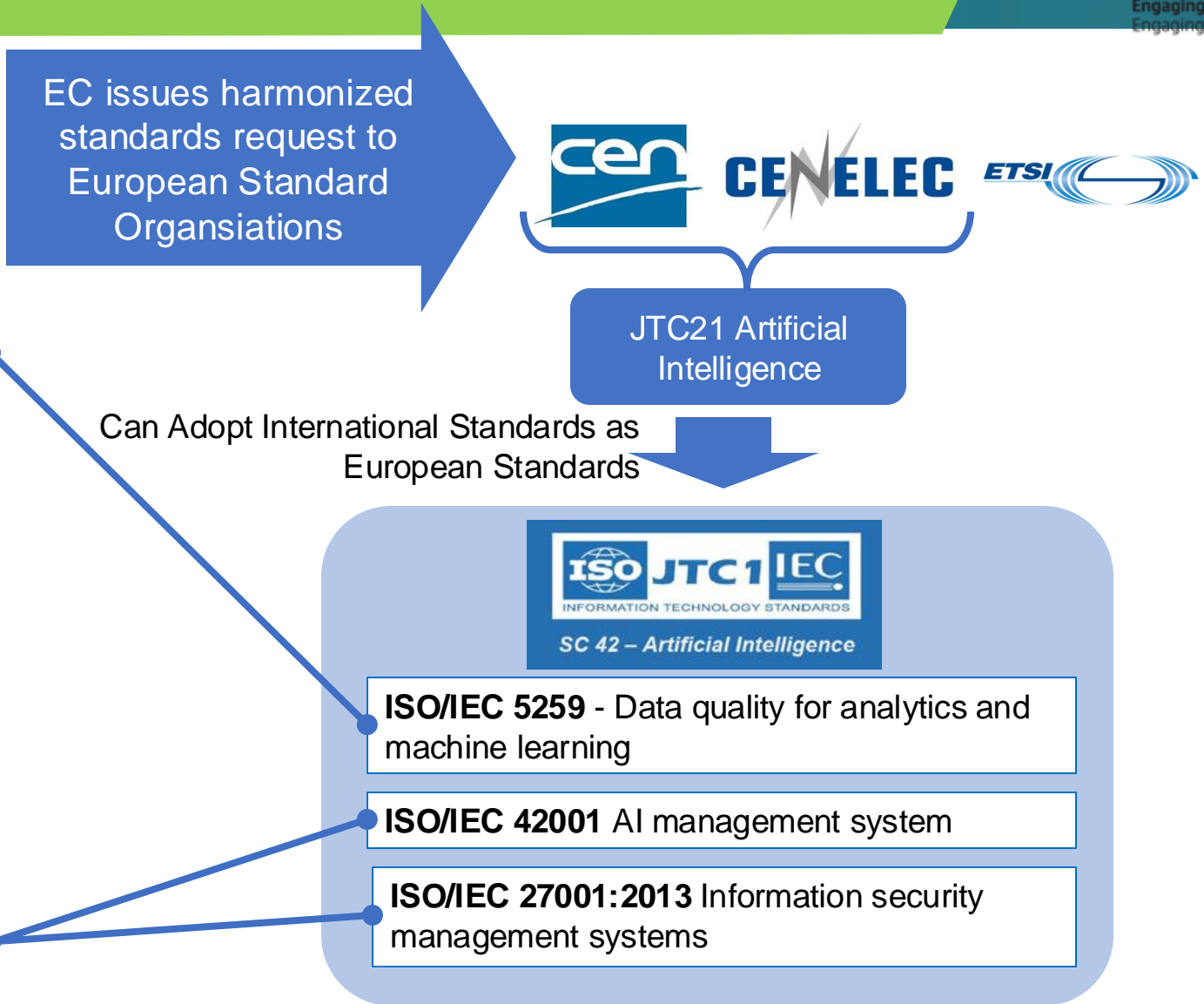
Article 10: Data and Data Governance

- Applies to data-driven AI systems
 - Addresses Data Governance & Management of training, testing and validation data
 - Addresses data quality, bias in data and personal data protection
- Data governance measures to be recorded as part of technical documentation

Data Governance Standards for the AI Act



Requirement for European Standard
https://ec.europa.eu/growth/tools-databases/enorm/mandate/593_en
Risk Management Systems for AI systems
Governance and quality of datasets used to build AI systems
Record keeping through logging capabilities by AI systems
Transparency and information provisions for users of AI systems
Human oversight of AI systems
Accuracy specifications for AI systems
Robustness specifications for AI systems
Cybersecurity specifications for AI systems
Quality management systems for providers of AI systems, including post-market monitoring processes
Conformity assessment for AI systems



Challenges in mapping AI Act requirement to technical standards



- Under the EU AI Act, a Provider of AI system must demonstrate the conformance of their product and its quality management process to the Act's technical requirement
- Demonstrating compliance to harmonised standards confers a 'presumption of conformity' on product, but does not override Provider's obligation to satisfy Act's requirements
- **Challenges:**
 - Do the requested harmonized standards fully address the Act's requirements?
 - Do alternative proprietary standards, EC Common Specification or AI compliance standards from other jurisdictions (e.g. US NIST) fully address the Act's requirements
- Concerned here only with Data Governance requirements (Art 10)



Benefits

- Standards request reflects international consensus in areas of interest
- ISO management system standards well aligned with existing EU product certification processes
- Standards embody industry technical consensus

Problems

- International standards cannot directly address specific jurisdictional rules
- Terminology and concepts differ between regulation and standards
- Regulation define legal compliance (more 'shalls'/'musts') vs standards often focus on process norms ('should'/'may')
- Different author communities: legislators vs. technical experts
- Different revision processes
- Profiling of international standards as European standards for regulations involves simple binary mapping of law article to standards clauses
- Alternative EC-specific Common Specification may diverge from international norms

Previous Work: Mapping AI Act Requirements to AI Management System Requirements Drafts

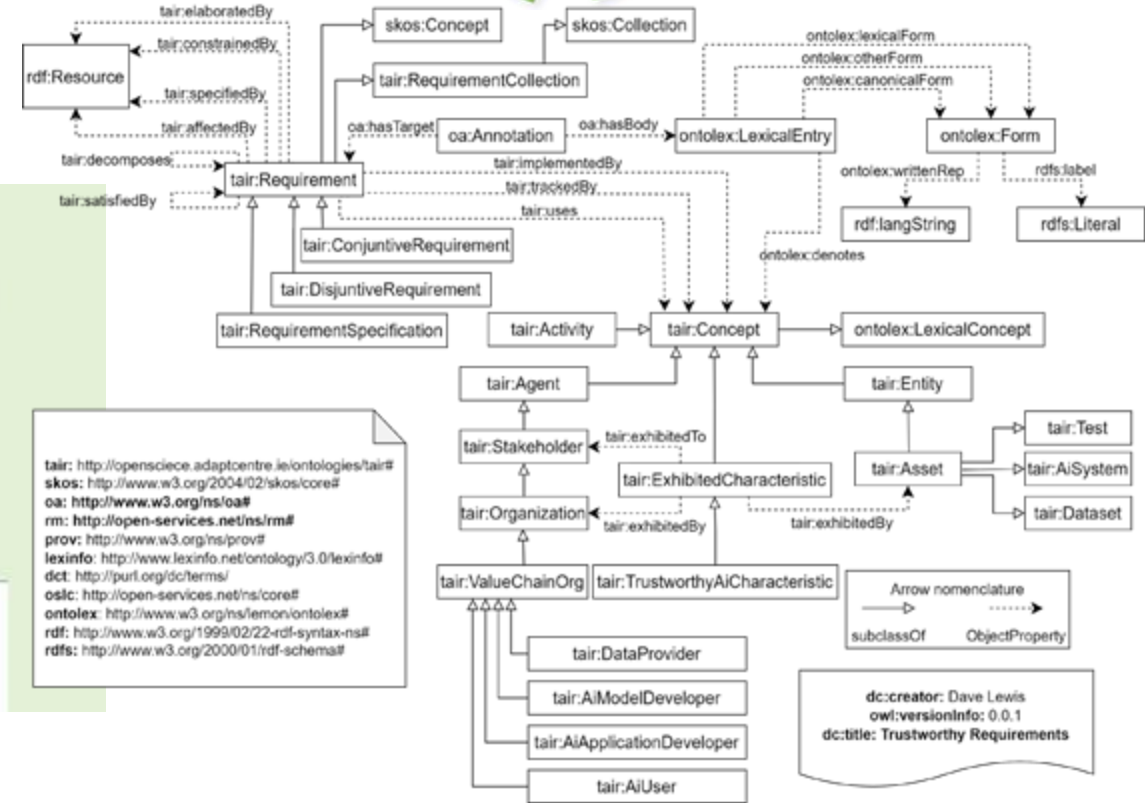


- TAIR demo: The demo explores the Title III of the Draft AI Act mapped to High-Risk AI System requirements (ISO 42001)



TAIR
The Trustworthy AI Requirements Ontology

Title name: Title III - High-Risk AI Systems	Chapter Chapter 3	Article Article 18	Article name: Obligation to draw up technical documentation
Requirement Article 18.1_R1	Related Concept(s) High Risk Ai Sy...	Related AI MSS requirement Documented inf...	
Requirement definition Providers of high-risk AI systems shall draw the technical documentation referred to in Article 11 in accordance with Annex IV.	Concept definition Lexical entry - High Risk Ai System	Requirement definition AI management system (AIMS) requirement collection - 7.5.1 - Documented information general	



<https://tair.adaptcentre.ie>



Extract defined terms from Act as SKOS Concept Scheme (Art 3)

Separate atomic requirement statements from Act Provisions (Art 10.1 to 10.6) and add Requirement concept for each to a requirement collection

Extract and link concepts deemed relevant to satisfying each requirement into further SKOS concept scheme

Article3-29	training data
Article3-30	validation data
Article3-31	validation data set
Article3-32	testing data
Article3-33	input data
Article3-34	biometric data
Article3-35	biometric identification
Article3-37	special categories of personal data
Article3-38	sensitive operational data
Article3-50	personal data
Article3-51	non-personal; data

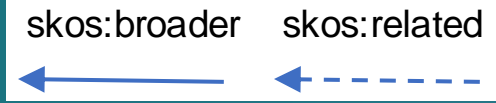
10.2. Training, validation and testing data sets shall be subject to data governance and management practices appropriate for the intended purpose of the high-risk AI system. Those practices shall concern in particular:

- (a) the relevant design choices;
- (b) data collection processes and the origin of data, and in the case of personal data, the original purpose of the data collection;
-
- (h)....

Article10-2-r1	Training, validation and testing data sets shall be subject to <u>data governance and management practices</u> appropriate for the intended purpose of the high-risk AI system.
Article10-2-a-r1	[<u>Data governance and management practices</u> shall concern in particular] the relevant <u>design choices</u>
Article10-2-b-r1	[<u>Data governance and management practices</u> shall concern in particular] <u>data collection processes and the origin of data</u> , and in the case of <u>personal data</u> , the original purpose of the data collection



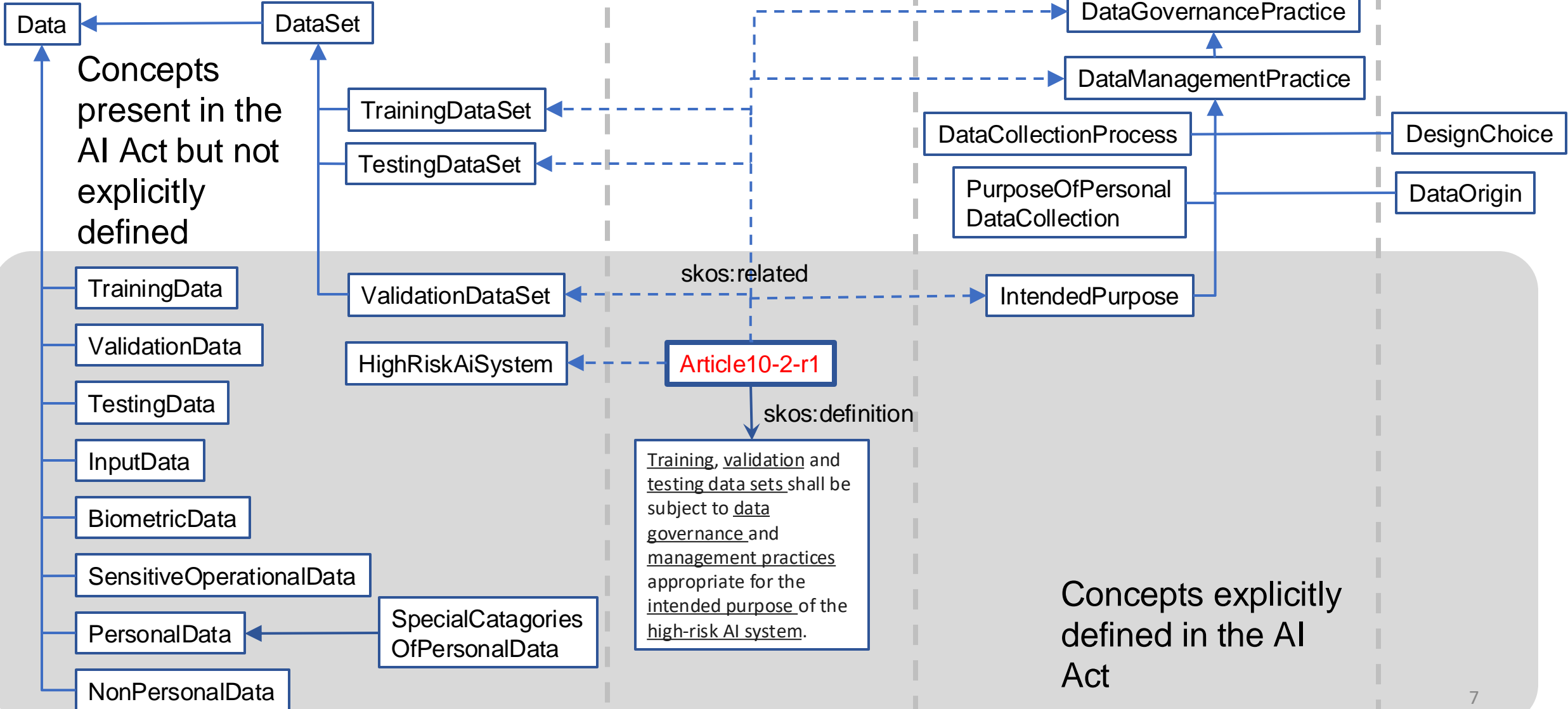
AI Act Requirement Example

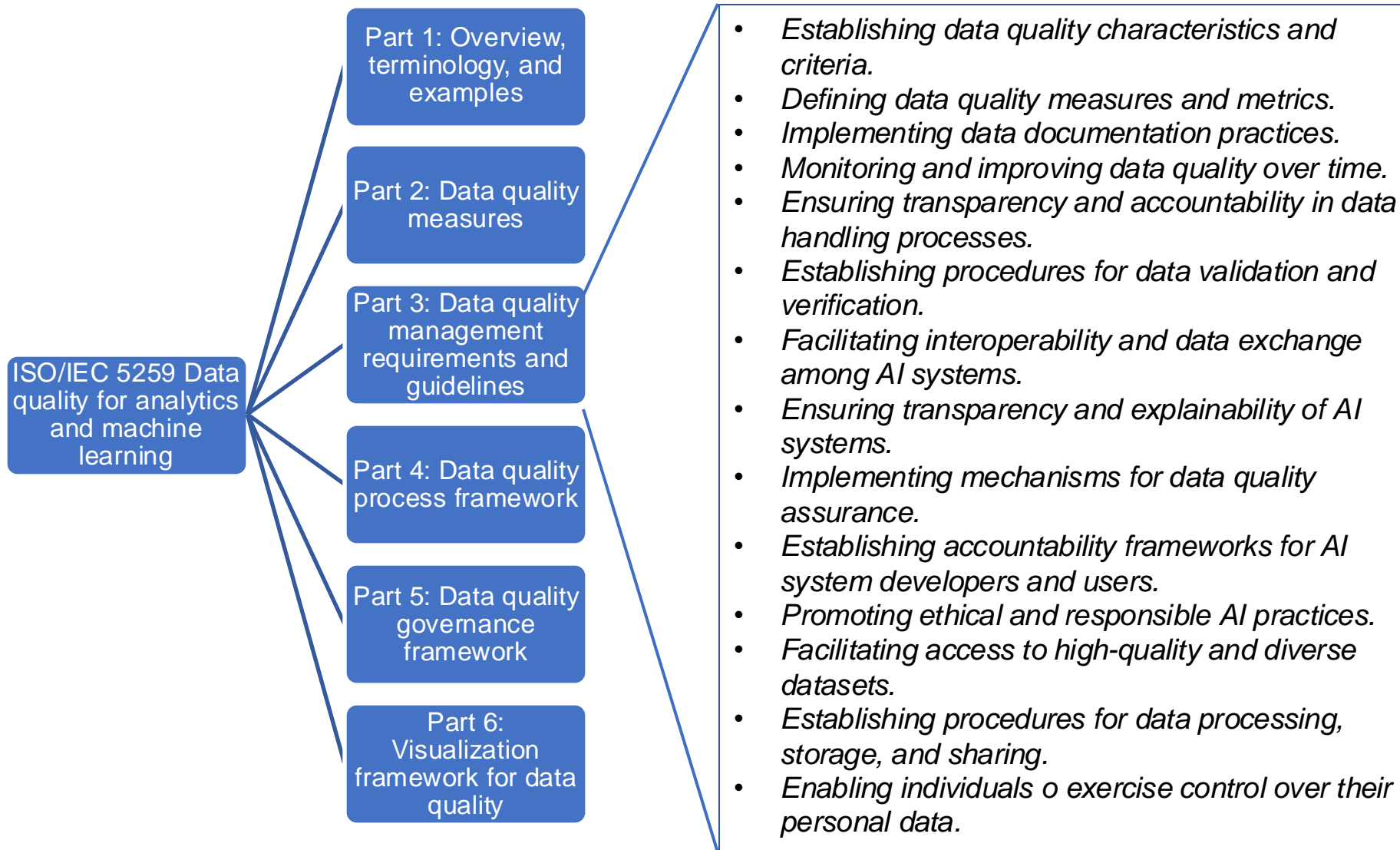


prov:Entity

tair:Requirement

prov:Activity





- Part 1 - 22 defined concepts – none coincide with the AI Act definitions
- Part 3 offers 135+ normative statements, many with list components

Challenges Comparing Requirements



- Comparing AI Act data governance requirements to ISO/IEC 5259 requirements
- Disjoint sets of defined terms
 - Article 10 requirements involve 74 undefined terms – majority were classed as activities (44)
- Different granularity in requirements:
 - AI Act 22 atomic requirements
 - 5259 part 2: at least 135 requirements
- Binary mapping used in European Standards not sufficient
- Proposed classification for partial requirements alignment

Mapping Type	Description
Direct Alignment	Requirements fully match between AI Act and ISO/IEC 5259.
Partial Alignment	Requirements partially align, with some differences.
Normative Difference	Difference in normative language used (e.g., "shall" vs. "should").
Definition Disparity	Different definitions for the same concept in each framework.



- Data Governance Concepts in AI Act are relatively under-defined, especially for processes
- Comparing AI Act Data Governance requirements to those of ISO/IEC 5259 is complex due to lack of definitions and differing granularity of statements
- Initial classification of degree of satisfaction 0 requirements proposed
- Initial findings:
 - No direct alignment, or even direct normative differences to AI Act requirements
 - Highlight some areas of conceptual similarity



- Integrate Art 10 – ISO/IEC 5259 requirements into v2 of Trustworthy AI Requirements open resource:
<https://tair.adaptcentre.ie>
- Develop mapping ontology that allow propose requirement similarity mappings to be published in machine readable form to allow m:n traceability
- Use mapping to identify 5259 concepts and process descriptions that could be used to propose definitions of required entities/activities in Art 10
- Explore sectoral case study from a high risk AI type to further evaluate the mapping against more concrete requirements