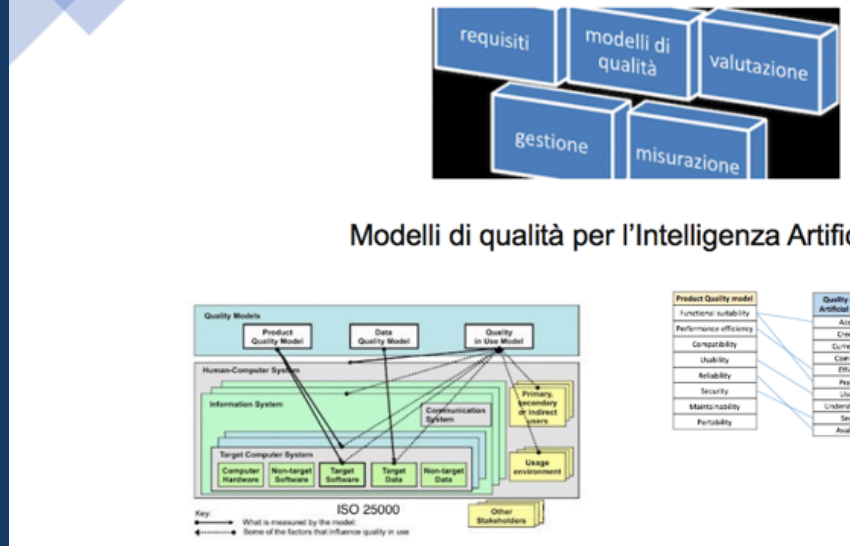
GUIDELINES ON THE QUALITY MODEL OF ARTIFICIAL INTELLIGENCE

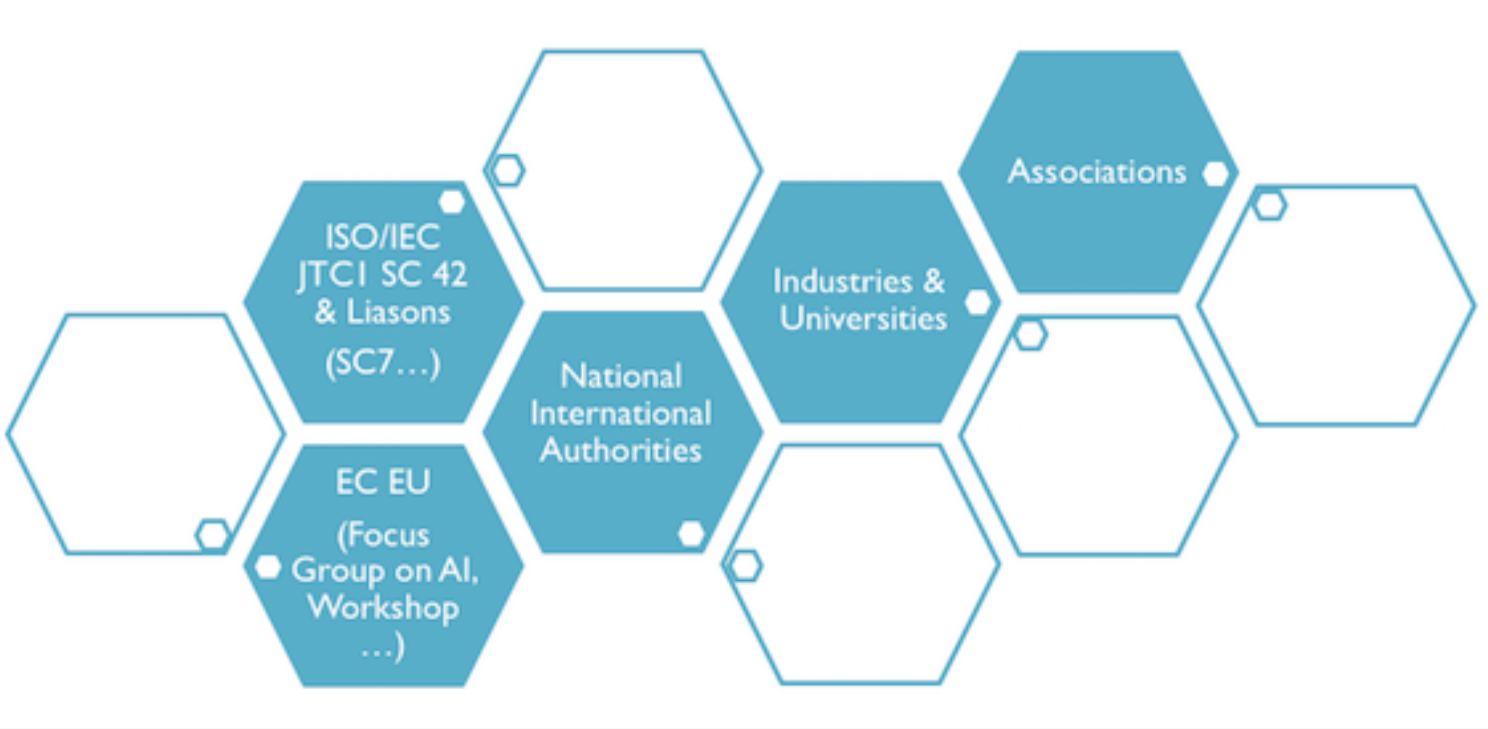
Domenico Natale

IA NO STOP

UPS, 25-26 september 2020



International and national organizations active on AI



In the world

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

Within ISO/IEC JTC1 for IT

- . SC 42 Artificial Intelligence & Big data
- . SC 41 IoT
- . SC 40 IT Governance
- . SC 38 Cloud Computing
- . SC7 Software & System Engineering
    - . Software product quality models (SQuaRE)
    - . Study Group on Future directions

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS)

Global Initiative on Ethics of Autonomous and Intelligent Systems

. IEEE 7010: A New Standard for Assessing the Well-being Implications of Artifical Intelligence 2020

In Europe

European Commissione

. Ethical guidelines for reliable AI 2019

. White Paper on Artificial Intelligence 2020

. CEN-CENELEC contributions on Focus Group AI and Europe-Japan Workshop

ETSI - European Telecommunications Standards Institute

. Artificial Intelligence and future directions 2020

In Italy

AgID – Agency for Digital Italy

. AgID - Agency for Digital Italy

. White Paper on Artificial Intelligence at the service of citizens - 2018

MISE – Ministry of Economic Development

. Naziotional strategy for Artificial Intelligence - 2020

Software quality

Qualità del SOFTWARE

Data quality

Qualità dei dati

IT service quality

Qualità dei servizi IT

QUALITY in use of AI perceived by customers and users with trust and satisfaction

Governance, management, processes: activities implemented by clients and developers

THE GUIDELINES IS FORMULATED, FOLLOWING THE SQUARE MODEL, IN ORDER TO ARRIVE AT A STRUCTURED FRAMEWORK OF QUALITY ASPECTS

THE MODEL used relates to the PRODUCT and not to the associated development PROCESS

(for the use of the terms, please refer to official sources)

A MODEL is a set of properties or empirical characteristics of a product or system that is to be developed or evaluated.

(ISO / IEC 25000 SQuaRE series)

A product quality model should concern for example the following 4 characteristics (out of the 36 provided in SQuaRE):

. software: "usability"

. data: "credibility"

. IT services: "timeliness"

. in use: "satisfaction»

The PROCESS is the set of activities that transform INPUT into OUTPUT, satisfying the quality defined by the model.

(ISO / IEC DIS 24774)

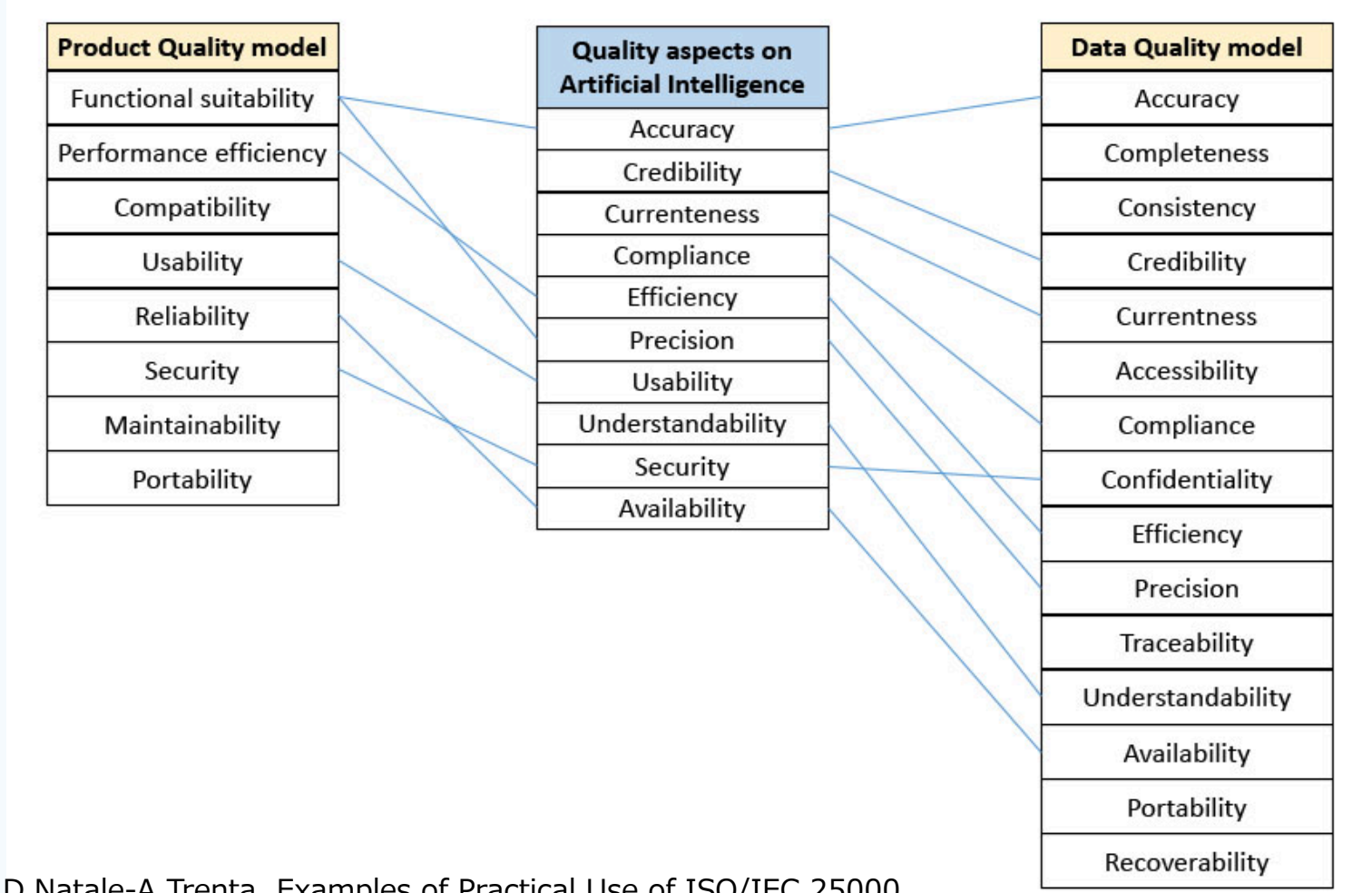
Compliance with the SQuaRE model

Quality characteristics do not have a priority in the model: priorities depend on the context of use

Compliance is respected even if not all characteristics are applied giving reasons for exclusions

It is possible to add new features deemed relevant in the context

Example of relationships of qualitative aspects for AI



D.Natale-A.Trenta, Examples of Practical Use of ISO/IEC 25000, Asia Pacific Software Engineering Conference, Malaysia 2019

IEEE 7010: STANDARD ON SOCIAL IMPLICATIONS AND QUALITY CHARACTERISTICS

Software product
- sustainability
- equity
- responsibility
- transparency

Data
- analyzability

Governance, management, processes
- evaluation of the impact of algorithms
- law and regulations
- software engineering processes

White Paper of the European Commission

Software product
- reliability
- technical robustness
- safety

Data
- accessibility
- confidentiality

Quality in use
- confidence creativity

Governance, management, processes
- human vigilance
- data governance

Ethical guidelines CEN-CENELEC

Software product
- robustness
- safety
- transparency

Quality in use
- social and environmental well-being

Governance, management, processes
- legality
- ethics
- non-discrimination and fairness
- responsibility

Other elements under discussion

Software product

- compliance
- testing

Data

- data strategy

Governance, management, processes

- human and machine roles
- decision making
- digital sovereignty

ETSI

Software product
- sescurity
- privacy
- testing

Data
- acquisibility
- provenance

IT services and infrastructures
- AI speed with 5G, IoT
- network optimizability

Quality in use
- health and society

Governance, management, processes
- governability
- manageriality

AgID

Software product
- technology

Data
- role of data

Quality in use
- Measurement of impact

Governance, management, processes
- competence
- legal context
- transformation
- prevent inequalities
- human being

MISE

Governance, management, processes

- increase in investments
- research and innovation
- adoption of digital technologies
- educational offer
- data economy
- regulatory and ethical framework
- awareness and trust
- relaunch of the public administration
- international European cooperation

Software product quality

Software product

- sustainability
- equity
- responsibility
- transparency
- reliability
- safety
- robustness
- safety
- compliance
- testing
- technology

Data quality

Data

- analyzability
- accessibility
- confidentiality
- data strategy
- role of data
- acquisibility
- origin

IT service quality

IT services and infrastructures

AI speed with 5G, IoT

network optimizability

Quality in use

confidence creativity

social and environmental well-being

health and society

Governance

Governance, management, processes

- evaluation of the impact of algorithms
- law and regulations
- software engineering processes
- human vigilance
- data governance
- legality
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- non-discrimination and fairness
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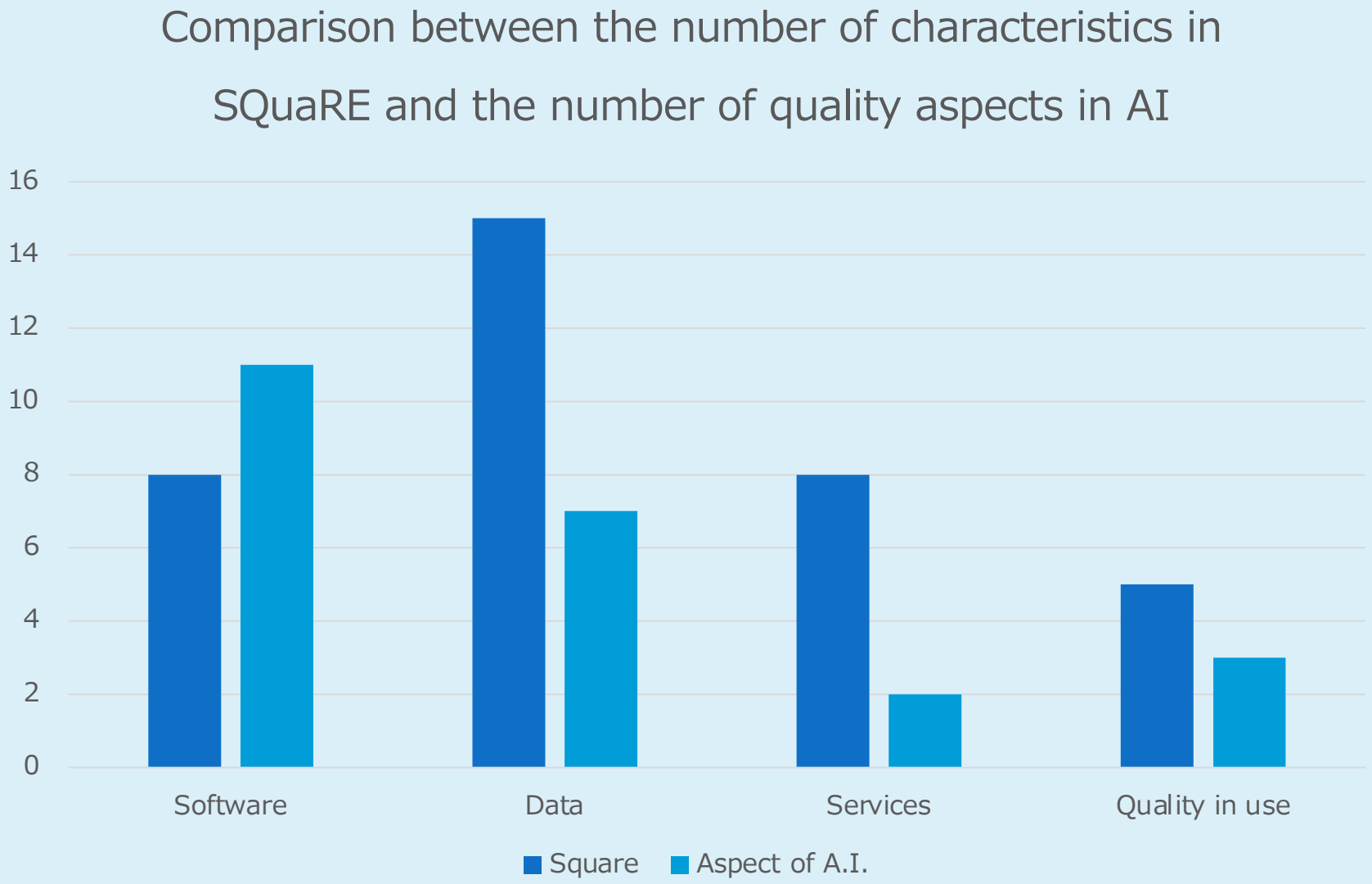

Comparison between the number of characteristics in SQuaRE and the number of quality aspects in AI
16
14
12
10
8
6
4
2
0
Software
Data
Services
Quality in use
Square
Aspect of A.I.

Utility of the model

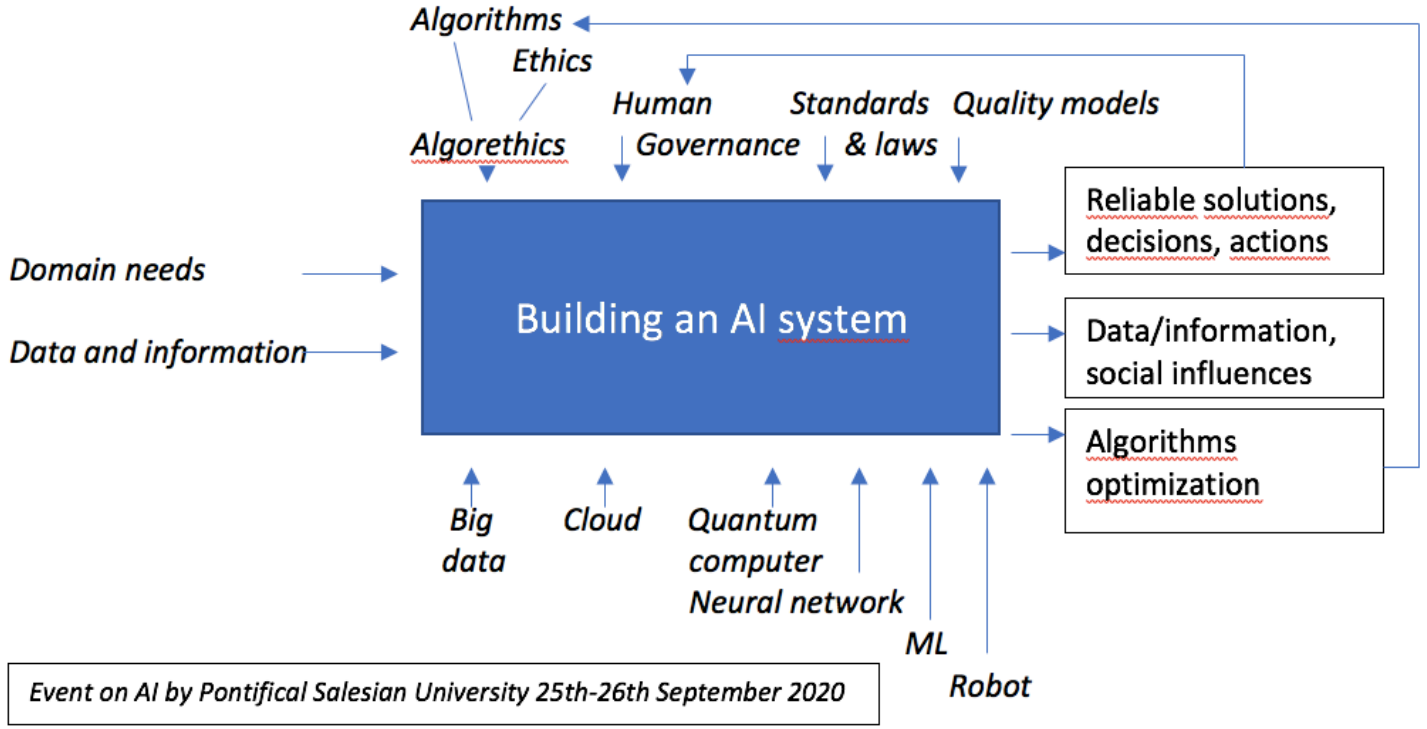
The comparison between the characteristics of the SQuaRe model and the quality aspects emerged in the Guidelines provides indications on a trend of greater attention to software quality, rather than to data and IT services.

In specific cases, numerous new aspects of quality appear in the Guidelines that will guide the adaptation of SQuaRE to the context of Artificial Intelligence.

To create an AI system, we intend to produce reliable solutions (indicated in the output), according to the domain needs (in input), based on the Governance constraints (top) and the use of available technological tools (bottom)

It almost looks like an ontology (see https://intelligenzartificiale.unisal.it/ontologia/)

Overall framework of AI



SADT scheme (*Structured Analysis and Design Technique*) by Domenico Natale [14.5]

THANKS FOR THE ATTENTION!

Domenico Natale

Editor ISO/IEC 25012 “Data quality modeli”

Editor ISO/IEC 25024 “Measurement of data quality

ISO-CEN-UNI-UNINFO Expert

www.iso25000.it