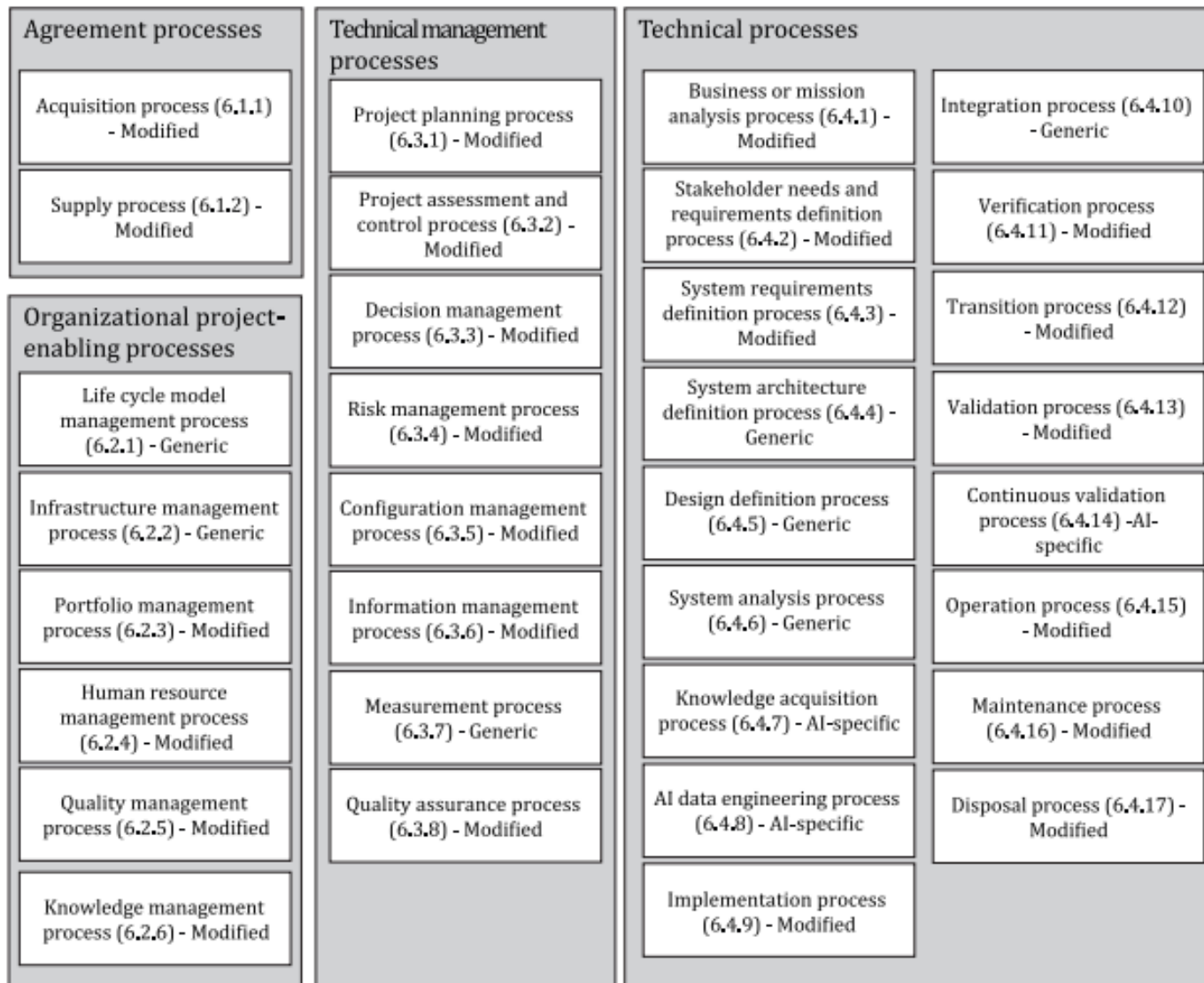# Interrelated standards

Interrelated standards

- All standards cite other standards since the aim is to keep the standard focused.

- ISO 42001 is focused on the management of AI so it avoids many areas of concern in the use of AI.

- ISO 42001 refers out to many standards. How relevant they are, depends on the application.

- The next slides consider some of these standards, for example:
  - ISO/IEC 23894, *Information technology — Artificial intelligence — Guidance on risk management*
  - ISO/IEC TR 24027, *Information technology — Artificial intelligence (AI) — Bias in AI systems and AI aided decision making*
  - ISO/IEC TR 24029-1, *Artificial Intelligence (AI) — Assessment of the robustness of neural networks — Part 1: Overview*

Generic Standards

- For most domains of interest there are some generic standards that should be considered.

- In the case of ISO 42001 there are two standards that are clearly relevant:

- ISO/IEC 23053, *Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML) - This provides the overall framework for the use of AI.*

- ISO/IEC 23894, *Information technology — Artificial intelligence — Guidance on risk management – This provides the risk management framework that should be employed from the initiation of any project involving AI through to end of life.*

Generic Standards: Lifecycle

- ISO/IEC 5338: 2023, *Information technology — Artificial intelligence — AI system life cycle process*
  - This provides the overall lifecycle for systems involving – this goes beyond the software to include all aspects of the system.
  - This is a comprehensive standard and covers all aspects of the lifecycle without over specifying

Agreement processes

Acquisition process (6.1.1) - Modified

Supply process (6.1.2) - Modified

Organizational project-enabling processes

Life cycle model management process (6.2.1) - Generic

Infrastructure management process (6.2.2) - Generic

Portfolio management process (6.2.3) - Modified

Human resource management process (6.2.4) - Modified

Quality management process (6.2.5) - Modified

Knowledge management process (6.2.6) - Modified

Technical management processes

Project planning process (6.3.1) - Modified

Project assessment and control process (6.3.2) - Modified

Decision management process (6.3.3) - Modified

Risk management process (6.3.4) - Modified

Configuration management process (6.3.5) - Modified

Information management process (6.3.6) - Modified

Measurement process (6.3.7) - Generic

Quality assurance process (6.3.8) - Modified

Technical processes

Business or mission analysis process (6.4.1) - Modified

Stakeholder needs and requirements definition process (6.4.2) - Modified

System requirements definition process (6.4.3) - Modified

System architecture definition process (6.4.4) - Generic

Design definition process (6.4.5) - Generic

System analysis process (6.4.6) - Generic

Knowledge acquisition process (6.4.7) - AI-specific

AI data engineering process (6.4.8) - AI-specific

Implementation process (6.4.9) - Modified

Integration process (6.4.10) - Generic

Verification process (6.4.11) - Modified

Transition process (6.4.12) - Modified

Validation process (6.4.13) - Modified

Continuous validation process (6.4.14) -AI-specific

Operation process (6.4.15) - Modified

Maintenance process (6.4.16) - Modified

Disposal process (6.4.17) - Modified

Figure 1 — AI system life cycle processes relative to ISO/IEC/IEEE 15288:2023, Figure 4

Generic Standards: Quality

- Any lifecycle will specify quality systems to ensure the processes produce product of adequate quality.
- ISO 9001, *Quality management systems — Requirements*
  - This is the basis of all ISO quality management standards
- ISO 13485, *Medical devices — Quality management systems — Requirements for regulatory purposes*
  - Relates to meeting the requirements of the Medical Device Regulation
- ISO/IEC 25059, *Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality model for AI systems*
  - Software Quality Model

Generic Standards: Data Quality

- ISO 8000-2, *Data quality — Part 2: Vocabulary*
- ISO/IEC 5259 (all parts), *Data quality for analytics and machine learning (ML)*
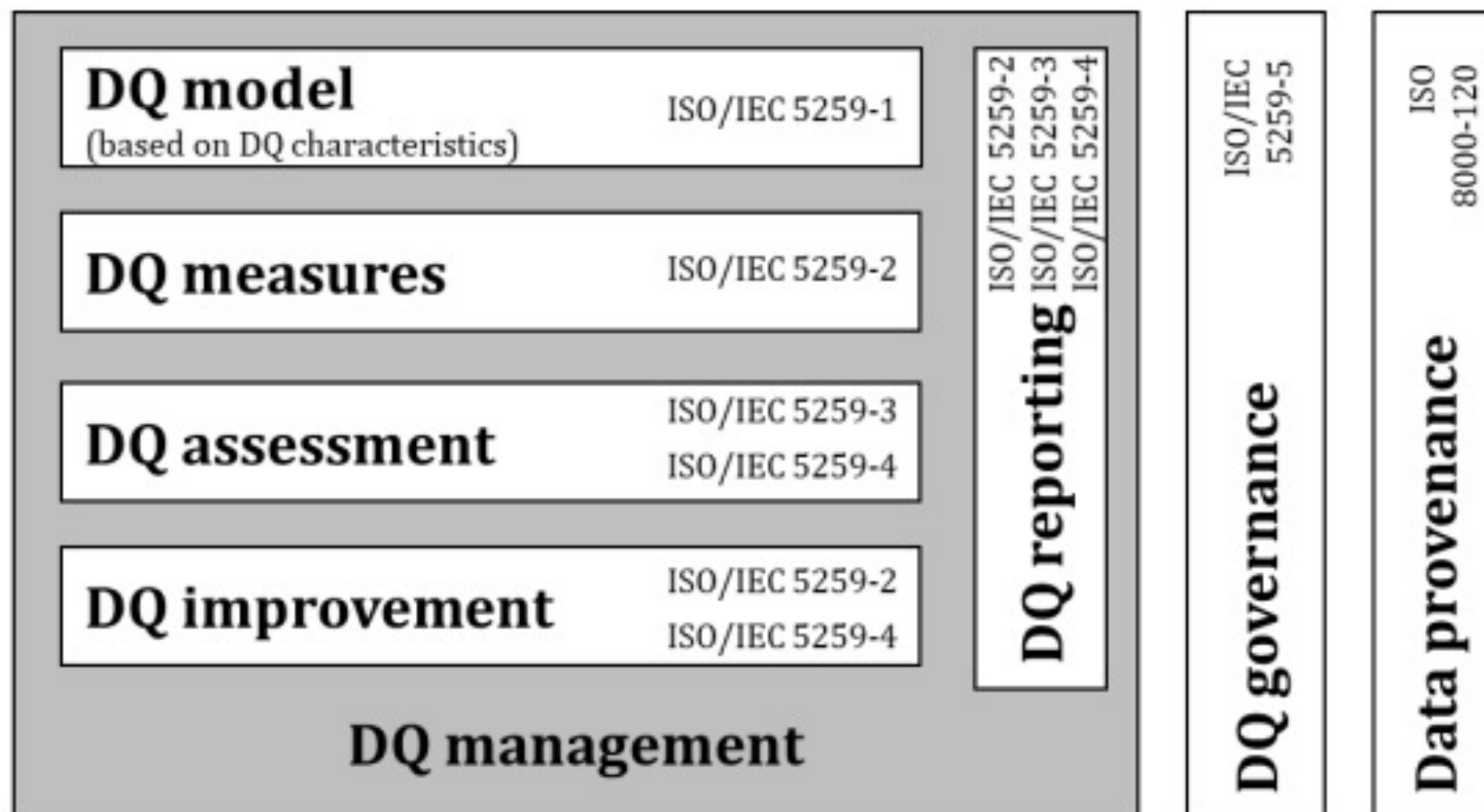
NOTE   ISO/IEC 5259 series are under development.

Figure 1 — DQ concept framework for analytics and ML

<A data quality model for analytics and ML>
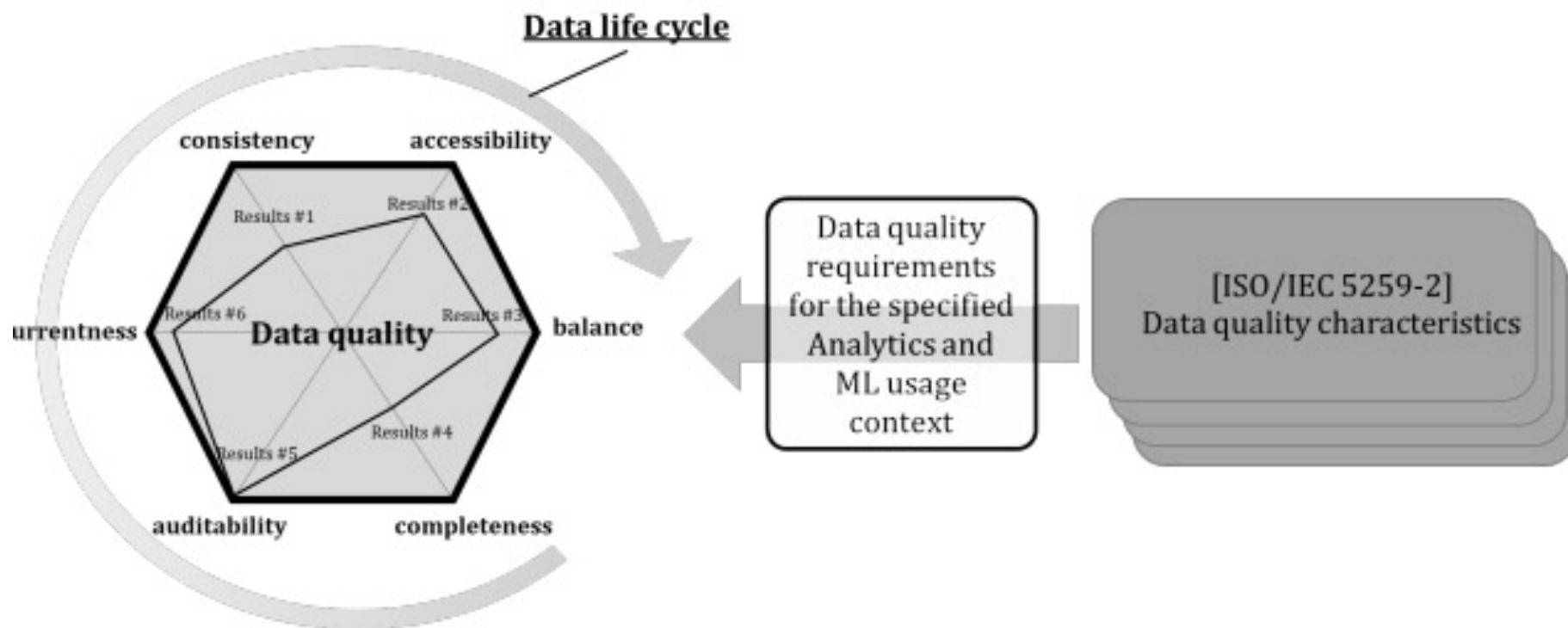
Key

Data life cycle for analytics and ML (see 5.3)

Figure 2 — Example of applying characteristics from 5259-2

Generic Standards: Security

- ISO/IEC 27000:2018, *Information technology — Security techniques — Information security management systems — Overview and vocabulary*

- ISO/IEC 27701, *Security techniques — Extension to ISO/IEC 27001 and ISO/IEC 27002 for privacy information management — Requirements and guidelines*

- ISO/IEC 27001, *Information security, cybersecurity and privacy protection — Information security management systems — Requirements*

- ISO/IEC 29100, *Information technology — Security techniques — Privacy framework*

Specific areas of interest

- Some standards are highly relevant in some context and not in others.
- So, in considering what standards to comply with there is a need to take the context into consideration.
- ISO/IEC TR 24027, *Information technology — Artificial intelligence (AI) — Bias in AI systems and AI aided decision making*
  - *This standard is specifically oriented to looking at decision taking and bias in decision taking*
  - *This standard is likely to be important if you are working with data you suspect may have bias or the data is being used to train systems that will have significant impact on the users.*
  - *It advises on how to detect and mitigate bias in ML*

Some standards deal with specific technologies

- As a particular technology becomes more widespread, then standards emerge that deal with the characteristics of the technology

- ISO/IEC TR 24029-1, *Artificial Intelligence (AI) — Assessment of the robustness of neural networks — Part 1: Overview*
  - *This standard is in place to help users of neural networks deal with the robustness of neural networks.*
  - *It is known the these can be susceptible to small changes in configuration and the environment of use.*
  - *This standard is highly relevant for systems using neural nets in situations where robustness is a key property of the ML model.*

Implementation technology

- ISO/IEC 19944-1, *Cloud computing and distributed platforms – Data flow, data categories and data use — Part 1: Fundamentals*

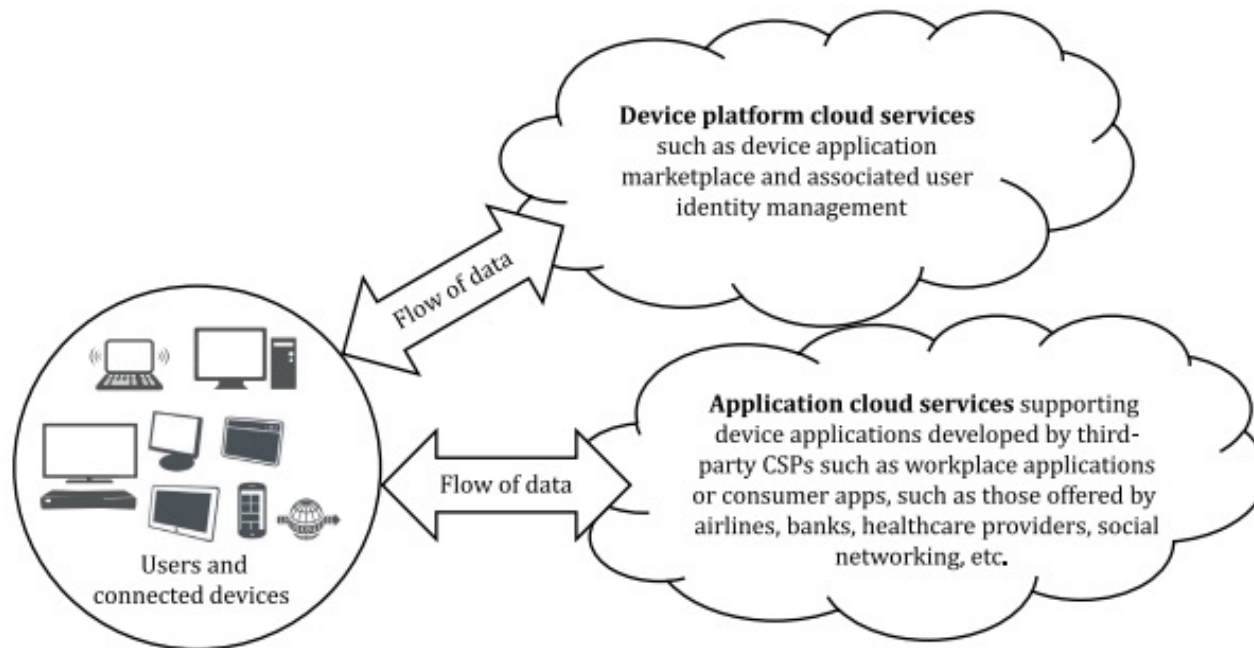# Useful introduction to a new technology

ISO/IEC 19944-1:2020(E)

Figure 1 — Devices and cloud services ecosystem
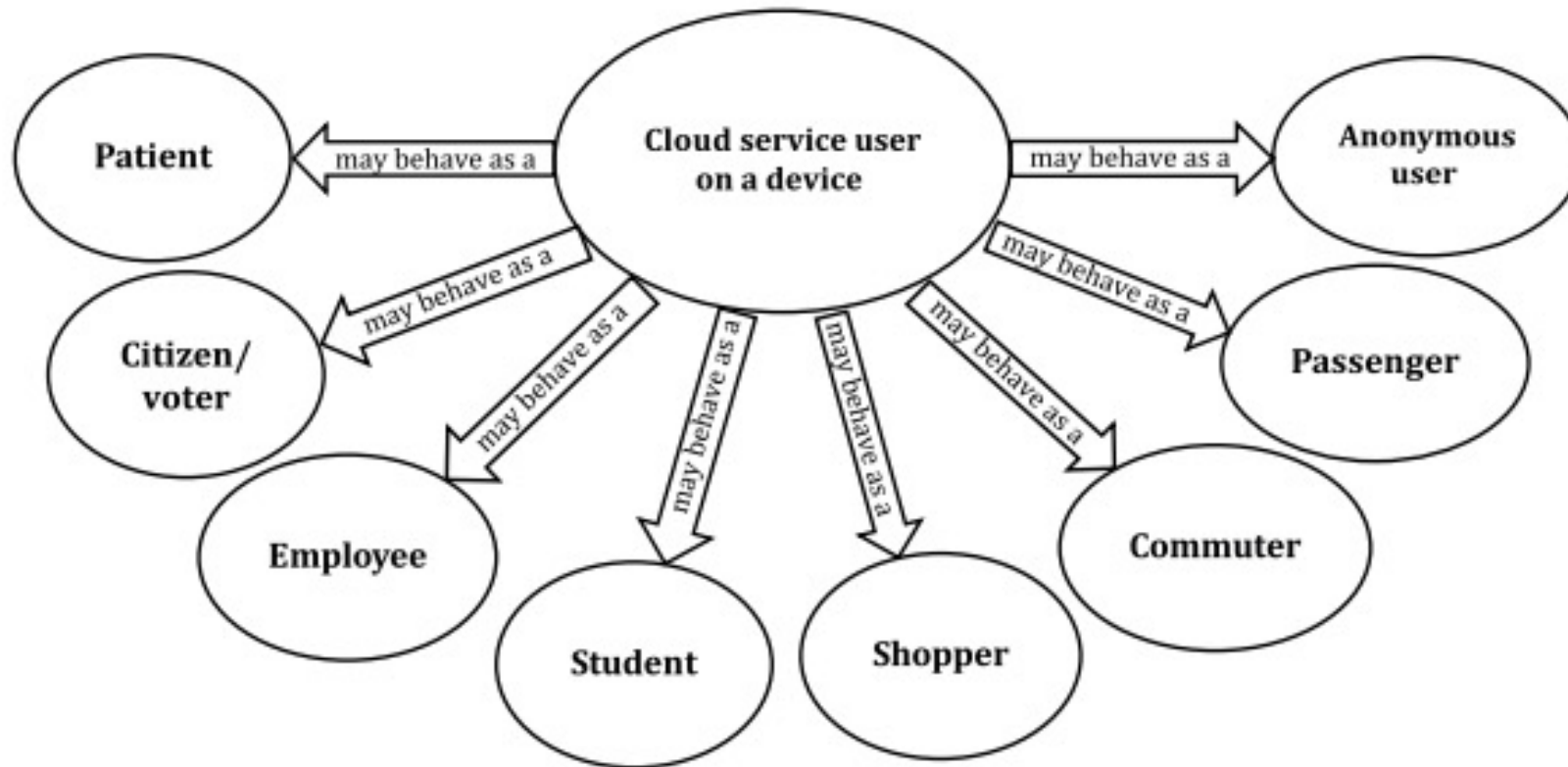
Useful in specifying different roles

Figure 2 — Example of roles a user can assume in device use scenarios

Ethics

- For many classes of system there are important ethical considerations.
- Increasingly we are encouraged to consider the ethical consequences of deployment.
- It is likely that standards such as this are a key part of our relevant standards
- ISO/IEC TR 24368, *Information technology — Artificial intelligence — Overview of ethical and societal concerns*

Usability

- ISO 9241-210, *Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems*

Requirements

- The chosen standards will contain a (possibly large) collection of requirements on the product and process for producing the product.

- For example:

  - *The organization shall define and document verification and validation measures for the AI system and specify criteria for their use.*

- Capturing the set of requirements, you need to meet in order to comply is a key part of the compliance process.

The impact of requirements

- *The organization shall define and document verification and validation measures for the AI system and specify criteria for their use.*

- This specifies methods and how they should be used.

- Imposes a requirement on the management of the process.

- The types of V and V an their use will depend on the application area
  - Standards may be very lax or stringent depending on the application.

- This requirement will impose constraints on both the process and the product.

Summary

- In developing a lifecycle approach for a particular class of products it is valuable to:
  - Choose what you know to be a highly relevant standard for your product class.
  - Look at the standards referred to in the key standard and use this as a basis to begin exploring the different aspects of your class of systems.
  - Use this to sketch out the key product requirements.
  - Also consider process aspects since there are likely to be process standards you can use.