

# The anatomy of ISO 42001

Continued – SCSD Lecture 5 Feb 2024

# Further contents

<b>7</b>	<b>Support</b> .....	<b>11</b>
7.1	Resources.....	11
7.2	Competence.....	11
7.3	Awareness.....	12
7.4	Communication.....	12
7.5	Documented information.....	12
	7.5.1 General.....	12
	7.5.2 Creating and updating documented information.....	12
	7.5.3 Control of documented information.....	13
<b>8</b>	<b>Operation</b> .....	<b>13</b>
8.1	Operational planning and control.....	13
8.2	AI risk assessment.....	13
8.3	AI risk treatment.....	14
8.4	AI system impact assessment.....	14
<b>9</b>	<b>Performance evaluation</b> .....	<b>14</b>
9.1	Monitoring, measurement, analysis and evaluation.....	14
9.2	Internal audit.....	14
	9.2.1 General.....	14
	9.2.2 Internal audit programme.....	14
9.3	Management review.....	15
	9.3.1 General.....	15
	9.3.2 Management review inputs.....	15
	9.3.3 Management review results.....	15
<b>10</b>	<b>Improvement</b> .....	<b>15</b>
10.1	Continual improvement.....	15
10.2	Nonconformity and corrective action.....	16
	<b>Annex A (normative) Reference control objectives and controls</b> .....	<b>17</b>

# Resourcing and Competence

## 7 Support

### 7.1 Resources

The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the AI management system.

NOTE Control objectives and controls for AI resources are provided in A.4 in [Table A.1](#). Implementation guidance for these controls is provided in [Clause B.4](#).

### 7.2 Competence

The organization shall:

- determine the necessary competence of person(s) doing work under its control that affects its AI performance;
- ensure that these persons are competent on the basis of appropriate education, training or experience;
- where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken.

Appropriate documented information shall be available as evidence of competence.

NOTE 1 Implementation guidance for human resources including consideration of necessary expertise is provided in [B.4.6](#).

# Resourcing

<b>A.4 Resources for AI systems</b>		
Objective: To ensure that the organization accounts for the resources (including AI system components and assets) of the AI system in order to fully understand and address risks and impacts.		
	Topic	Control
A.4.2	Resource documentation	The organization shall identify and document relevant resources required for the activities at given AI system life cycle stages and other AI-related activities relevant for the organization.
A.4.3	Data resources	As part of resource identification, the organization shall document information about the data resources utilized for the AI system.
A.4.4	Tooling resources	As part of resource identification, the organization shall document information about the tooling resources utilized for the AI svstem.
A.4.5	System and computing resources	As part of resource identification, the organization shall document information about the system and computing resources utilized for the AI system.
A.4.6	Human resources	As part of resource identification, the organization shall document information about the human resources and their competences utilized for the development, deployment, operation, change management, maintenance, transfer and decommissioning, as well as verification and integration of the AI system.

# Competence

- Roles should be defined with defined competence.
- People should be able to demonstrate a match with the competence through education, training, experience,...
- This should be documented.

# Competence defined (Annexe B: Normative)

## **B.4.6 Human resources**

### **Control**

As part of resource identification, the organization should document information about the human resources and their competences utilized for the development, deployment, operation, change management, maintenance, transfer and decommissioning, as well as verification and integration of the AI system.

### **Implementation guidance**

The organization should consider the need for diverse expertise and include the types of roles necessary for the system. For example, the organization can include specific demographic groups related to data sets used to train machine learning models, if their inclusion is a necessary component of the system design. Necessary human resources can include but are not limited to:

- data scientists;
- roles related to human oversight of AI systems;
- experts on trustworthiness topics such as safety, security and privacy;
- AI researchers and specialists, and domain experts relevant to the AI systems.

Different resources can be necessary at different stages of the AI system life cycle.

# Awareness and Communication

## **7.3 Awareness**

Persons doing work under the organization's control shall be aware of:

- the AI policy (see [5.2](#));
- their contribution to the effectiveness of the AI management system, including the benefits of improved AI performance;
- the implications of not conforming with the AI management system requirements.

## **7.4 Communication**

The organization shall determine the internal and external communications relevant to the AI management system including:

- what it will communicate;
- when to communicate;
- with whom to communicate;
- how to communicate.

# Documentation

## 7.5 Documented information

### 7.5.1 General

The organization's AI management system shall include:

- a) documented information required by this document;
- b) documented information determined by the organization as being necessary for the effectiveness of the AI management system.

NOTE The extent of documented information for an AI management system can differ from one organization to another due to:

- the size of organization and its type of activities, processes, products and services;
- the complexity of processes and their interactions;
- the competence of persons.



# Operation

## 8 Operation

### 8.1 Operational planning and control

The organization shall plan, implement and control the processes needed to meet requirements, and to implement the actions determined in [Clause 6](#), by:

- establishing criteria for the processes;
- implementing control of the processes in accordance with the criteria.

The organization shall implement the controls determined according to [6.1.3](#) that are related to the operation of the AI management system (e.g. AI system development and usage life cycle related controls).

The effectiveness of these controls shall be monitored and corrective actions shall be considered if the intended results are not achieved. [Annex A](#) lists reference controls and [Annex B](#) provides implementation guidance for them.

Documented information shall be available to the extent necessary to have confidence that the processes have been carried out as planned.

The organization shall control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.

The organization shall ensure that externally provided processes, products or services that are relevant to the AI management system are controlled.

# Operation

- The controls are points to monitor – so the appropriate controls need to be identified.
- The controls are also points of control so the means of control need to be established.
- There is the need for monitoring of the effectiveness of the monitoring and control
- Corrective action needs to be in place in the event of ineffectiveness

# Risk and Impact

## **8.2 AI risk assessment**

The organization shall perform AI risk assessments in accordance with [6.1.2](#) at planned intervals or when significant changes are proposed or occur.

The organization shall retain documented information of the results of all AI risk assessments.

## **8.3 AI risk treatment**

The organization shall implement the AI risk treatment plan according to [6.1.3](#) and verify its effectiveness.

When risk assessments identify new risks that require treatment, a risk treatment process in accordance with [6.1.3](#) shall be performed for these risks.

When risk treatment options as defined by the risk treatment plan are not effective, these treatment options shall be reviewed and revalidated following the risk treatment process according to [6.1.3](#) and the risk treatment plan shall be updated.

The organization shall retain documented information of the results of all AI risk treatments.

## **8.4 AI system impact assessment**

The organization shall perform AI system impact assessments according to [6.1.4](#) at planned intervals or when significant changes are proposed to occur.

The organization shall retain documented information of the results of all AI system impact assessments.

# Risk and Impact

- Continuous review to identify new risks
- These need to be documented and treatments identified
- Treatments need to be reviewed and monitored for effectiveness.
- AI Impact assessment should be carried out routinely and when change is planned – this potentially affects a wide range of stakeholders.

# Performance

## **9 Performance evaluation**

### **9.1 Monitoring, measurement, analysis and evaluation**

The organization shall determine:

- what needs to be monitored and measured;
- the methods for monitoring, measurement, analysis and evaluation, as applicable, to ensure valid results;
- when the monitoring and measuring shall be performed;
- when the results from monitoring and measurement shall be analysed and evaluated.

Documented information shall be available as evidence of the results.

The organization shall evaluate the performance and the effectiveness of the AI management system.

# Performance

- The organization determines the desired performance characteristics (and these need to meet the constraints of the standard).
- The organization needs to plan for the monitoring and evaluation of the system.
- There also needs to be a means to repair poor performance.

# Audit

## **9.2 Internal audit**

### **9.2.1 General**

The organization shall conduct internal audits at planned intervals to provide information on whether the AI management system:

- a) conforms to:
  - 1) the organization's own requirements for its AI management system;
  - 2) the requirements of this document;
- b) is effectively implemented and maintained.

### **9.2.2 Internal audit programme**

The organization shall plan, establish, implement and maintain (an) audit programme(s), including the frequency, methods, responsibilities, planning requirements and reporting.

# Review

## **9.3 Management review**

### **9.3.1 General**

Top management shall review the organization's AI management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness.

### **9.3.2 Management review inputs**

The management review shall include:

- a) the status of actions from previous management reviews;
- b) changes in external and internal issues that are relevant to the AI management system;
- c) changes in needs and expectations of interested parties that are relevant to the AI management system;
- d) information on the AI management system performance, including trends in:
  - 1) nonconformities and corrective actions;
  - 2) monitoring and measurement results;
  - 3) audit results;
- e) opportunities for continual improvement.



# Audit and Review

- Audit is a routine task to look at possible non-conformities
- Audit feeds into the review process.
- The review process determines actions to be taken in response to monitoring , performance and audit.

# Nonconformity

## **10.2 Nonconformity and corrective action**

When a nonconformity occurs, the organization shall:

- a) react to the nonconformity and as applicable:
  - 1) take action to control and correct it;
  - 2) deal with the consequences;
- b) evaluate the need for action to eliminate the cause(s) of the nonconformity, so that it does not recur or occur elsewhere, by:
  - 1) reviewing the nonconformity;
  - 2) determining the causes of the nonconformity;
  - 3) determining if similar nonconformities exist or can potentially occur;
- c) implement any action needed;
- d) review the effectiveness of any corrective action taken;
- e) make changes to the AI management system, if necessary.

Corrective actions shall be appropriate to the effects of the nonconformities encountered.

## A.1 General

The controls detailed in [Table A.1](#) provide the organization with a reference for meeting organizational objectives and addressing risks related to the design and operation of AI systems. Not all the control objectives and controls listed in [Table A.1](#) are required to be used, and the organization can design and implement their own controls (see [6.1.3](#)).

[Annex B](#) provides implementation guidance for all the controls listed in [Table A.1](#).

**Table A.1 — Control objectives and controls**

<b>A.2 Policies related to AI</b>		
Objective: To provide management direction and support for AI systems according to business requirements.		
	Topic	Control
A.2.2	AI policy	The organization shall document a policy for the development or use of AI systems.
A.2.3	Alignment with other organizational policies	The organization shall determine where other policies can be affected by or apply to, the organization's objectives with respect to AI systems.
A.2.4	Review of the AI policy	The AI policy shall be reviewed at planned intervals or additionally as needed to ensure its continuing suitability, adequacy and effectiveness.

# Controls

- A 2.2: This relates to the origination of policy. Here the organization needs to check a policy is in place that covers all the AI systems controlled by the organization. There is control over the policymaking process.
- A 2.3: This relates to the alignment with other policies. There is a need to monitor that this check has been carried out. Monitoring will identify possible failures of the process. There is control over the approach to checking and monitoring alignment
- A 2.4: This ensures that reviews occur regularly and that they are correctly scoped. Monitoring checks the revisions improve performance. There is control over the review process.