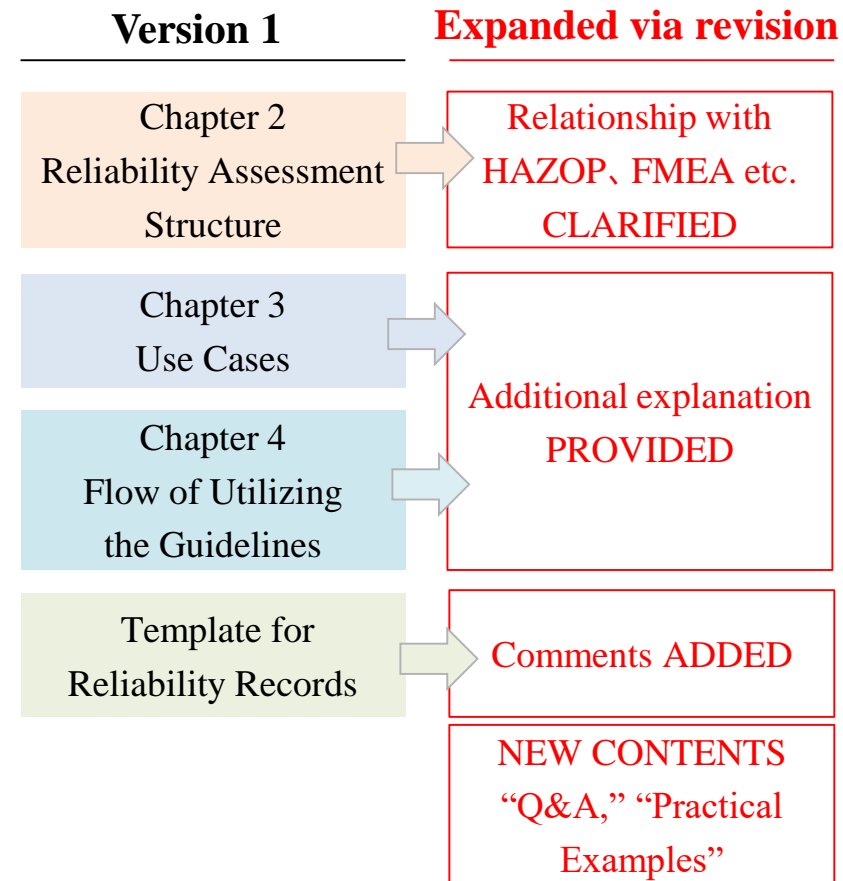# Revision of Guidelines on Assessment of AI Reliability in the Field of Plant Safety

- The Guideline provides the **methodology to fulfill AI's desired quality in terms of safety and productivity enhancement**, in order to promote the usage of AI in the field of plants where safety is considered vital.

- The Guideline has seen wider adoption since its publication in November 2020. With these adoptions in consideration, **real-life examples of guideline adoption** are hereby provided, as well as a **revision of the Guideline to promote its appropriate adoption**.

KEY POINTS OF REVISION

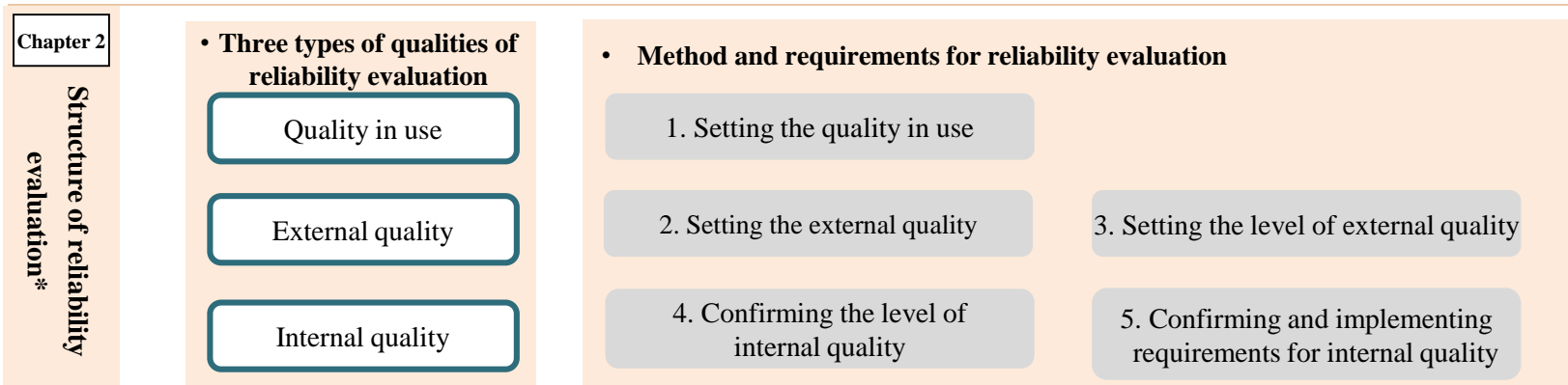1. CLARIFIED the relationship between **AI safety evaluation** and **plant safety evaluation** based on traditional risk evaluation methods **e.g. HAZOP, FMEA**※

2. ADDED **explanatory comments** to the Format for Recording Actions Taken, enhancing its usability

3. PROVIDED **Q&A comments** regarding common questions and uncertainties in adopting the Guideline

4. PROVIDED **practical examples of the Template for Reliability Records, based on actual reliability assessment pursuant to the Guideline** (Seven examples in total, **covering all five use cases**)

Version 1	Expanded via revision
Chapter 2 Reliability Assessment Structure	Relationship with HAZOP、FMEA etc. CLARIFIED
Chapter 3 Use Cases	Additional explanation PROVIDED
Chapter 4 Flow of Utilizing the Guidelines	
Template for Reliability Records	Comments ADDED
	NEW CONTENTS "Q&A," "Practical Examples"

（※）IEC 61882:2016 Hazard and operability studies (HAZOP studies) - Application guide; IEC 60812:2018 Failure modes and effects analysis (FMEA and FMECA)
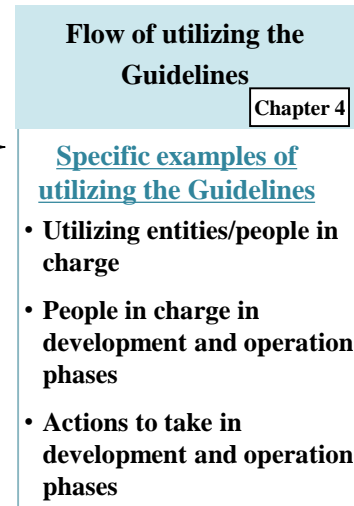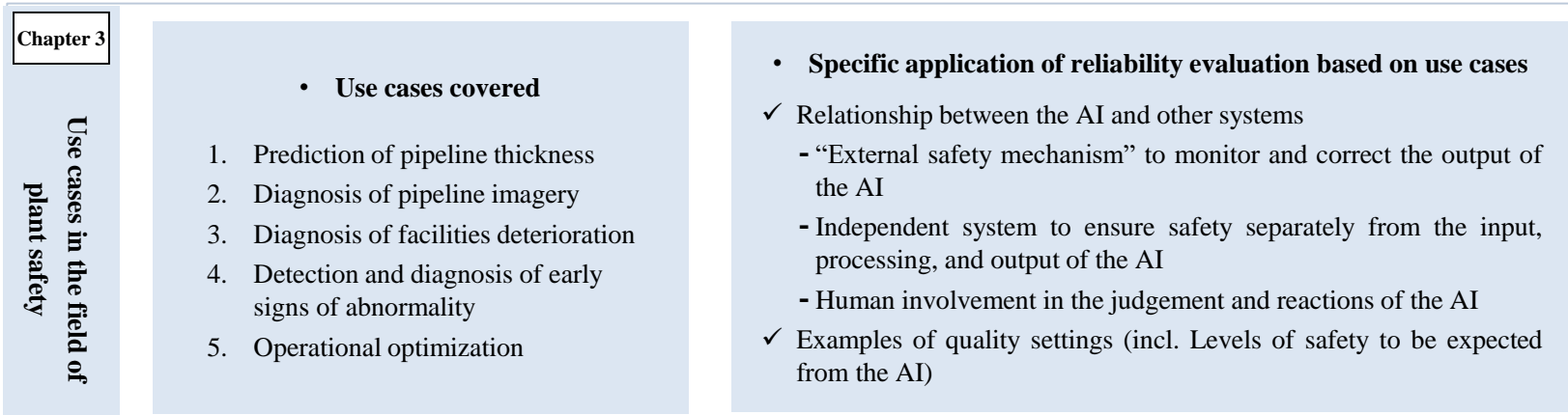
cf. Structure of the Guidelines on Assessment of AI Reliability in the Field of Plant Safety

- The Guideline provides **quality management methods using the "three types of quality" in terms of reliability evaluation**, as well as **"five uses cases" regarding plants**.
- This allows plant owners and AI vendors **to resolve the challenges regarding AI reliability evaluation**.
  - Plant owners can: explain the AI's reliability within and without the company; set adequate requirements for vendors.
  - AI vendors can: explain their AI's reliability to plant owners; share plant owners' vision regarding the requirements.

Three types of qualities, evaluation method, and requirements of reliability evaluation

Chapter 2

Structure of reliability evaluation*

- **Three types of qualities of reliability evaluation**

  - Quality in use
  - External quality
  - Internal quality

- **Method and requirements for reliability evaluation**

  1. Setting the quality in use
  2. Setting the external quality
  3. Setting the level of external quality
  4. Confirming the level of internal quality
  5. Confirming and implementing requirements for internal quality

* Based on the structure of the 1st edition of *Machine Learning Quality Management Guideline* by AIST

Chapter 3

Use cases in the field of plant safety

- **Use cases covered**

  1. Prediction of pipeline thickness
  2. Diagnosis of pipeline imagery
  3. Diagnosis of facilities deterioration
  4. Detection and diagnosis of early signs of abnormality
  5. Operational optimization

- **Specific application of reliability evaluation based on use cases**

  ✓ Relationship between the AI and other systems
    - "External safety mechanism" to monitor and correct the output of the AI
    - Independent system to ensure safety separately from the input, processing, and output of the AI
    - Human involvement in the judgement and reactions of the AI
  ✓ Examples of quality settings (incl. Levels of safety to be expected from the AI)

Flow of utilizing the Guidelines

Chapter 4

Specific examples of utilizing the Guidelines

- **Utilizing entities/people in charge**
- **People in charge in development and operation phases**
- **Actions to take in development and operation phases**

Real-world examples of utilizing AI in the field of plant safety