Strategic Implementation of CCPS Risk-Based Process Safety in Japanese Chemical Plants

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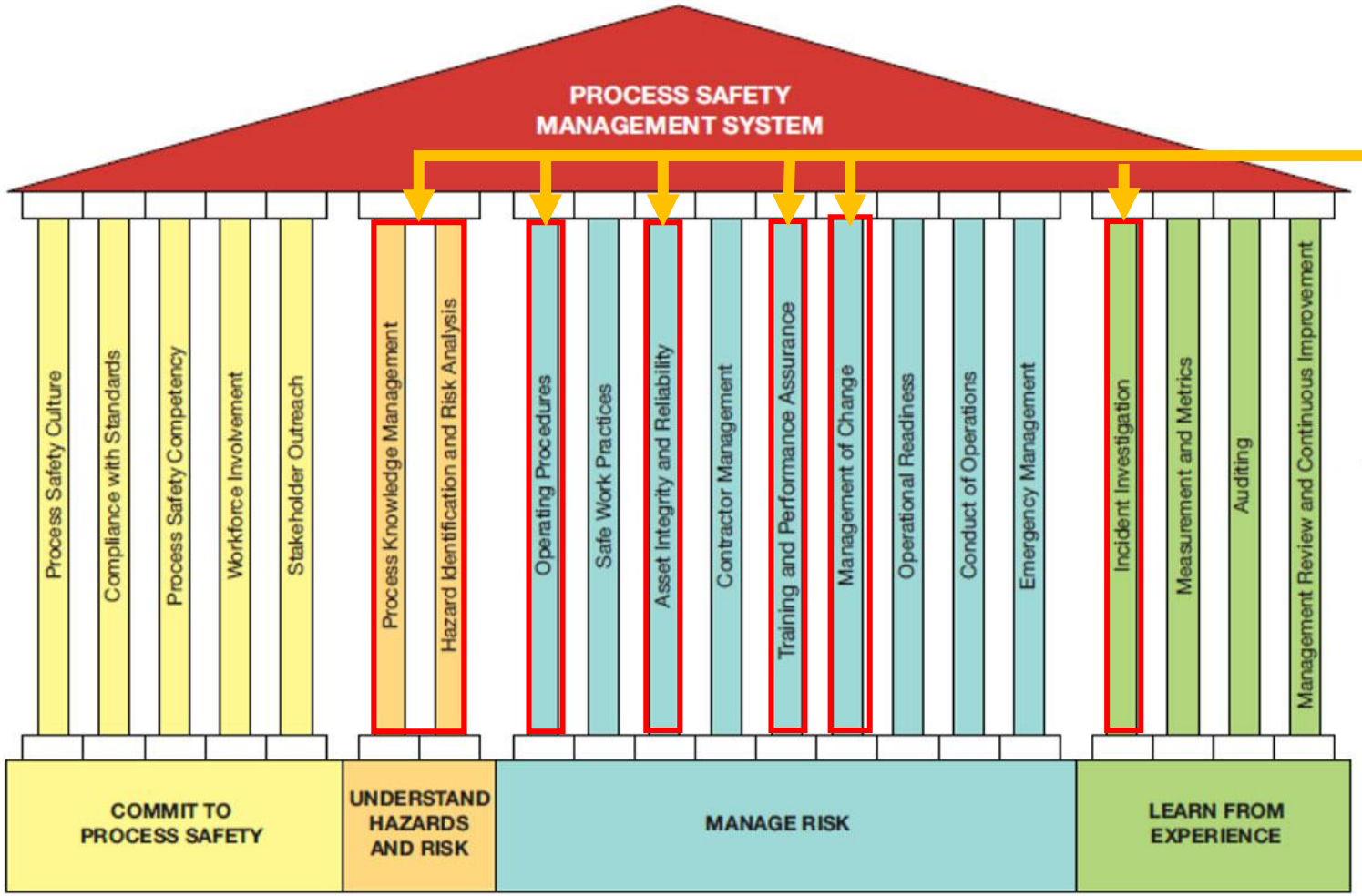
Slide Explanation

This slide presents a strategic approach to implementing **CCPS Risk-Based Process Safety (RBPS)** at Japanese chemical plants, particularly those that have not yet adopted RBPS practices common in Europe and the United States.
From the 20 RBPS elements, seven core elements are selected for focused implementation.
While Japanese plants already comply with extensive regulatory requirements — and therefore partially address several RBPS elements — certain elements are often less systematically structured compared to Western practices. This approach centers on three high-impact elements and demonstrates how the selected seven elements work together to strengthen operating discipline, prevent major process safety incidents, and enhance product quality performance.
This framework may be relevant to:

- Western companies partnering with Japanese manufacturers through procurement, toll production, or investment; and
- Japanese companies considering RBPS implementation.

Further discussion and practical implementation guidance in Japanese are available upon request.

Strengthening Process Safety Discipline Through Targeted Implementation of CCPS RBPS Core Elements



Core Seven Elements

1. Process Knowledge Management
2. Hazard Identification and Risk Analysis
3. Operating Procedures
4. Asset Integrity and Reliability
5. Training and Performance Assurance
6. Management of Change
7. Incident Investigation

Why These Seven Core Elements?

These seven core elements were selected because they:

1 Enable the Entire RBPS Framework

Act as foundational enablers of the RBPS system, supporting safe, stable, and high-quality operations through disciplined PDCA execution.

2 Address High-Impact Discipline Weaknesses

Directly strengthen areas that are often underdeveloped in Japanese chemical plants:

- **Hazard Identification & Risk Analysis** — ensuring risks are systematically analyzed and translated into effective engineering and administrative controls
- **Management of Change** — preventing unintended consequences during technical, organizational, and operational changes
- **Asset Integrity & Reliability** — ensuring equipment performance remains aligned with design intent throughout its lifecycle

3 Drive the Shift to System-Based Management

Support the transition from experience-based management to structured, system-driven decision-making.

(Note: I removed repetition of PDCA here — already covered in #1.)

4 Maximize Resource Effectiveness

Concentrate resources on the elements that deliver the greatest measurable improvement in process safety discipline.

PDCA Across the Chemical Plant Lifecycle – Plan / Do

3. Operating & Maintenance Procedures

Develop procedures to run the plant

Reflect new risks to manage in procedures

2. Hazard Identification & Risk Analysis

1. Process Knowledge Management

- Chemical Reactions & Process Control
- Unit Operations & Safer Design
- Process & Instrumented Equipment
- Hazard Identification / Risk Analysis
- Operating Practices
- Maintenance Procedures
- Engineering Standards
- Codes & Regulations

Process Control

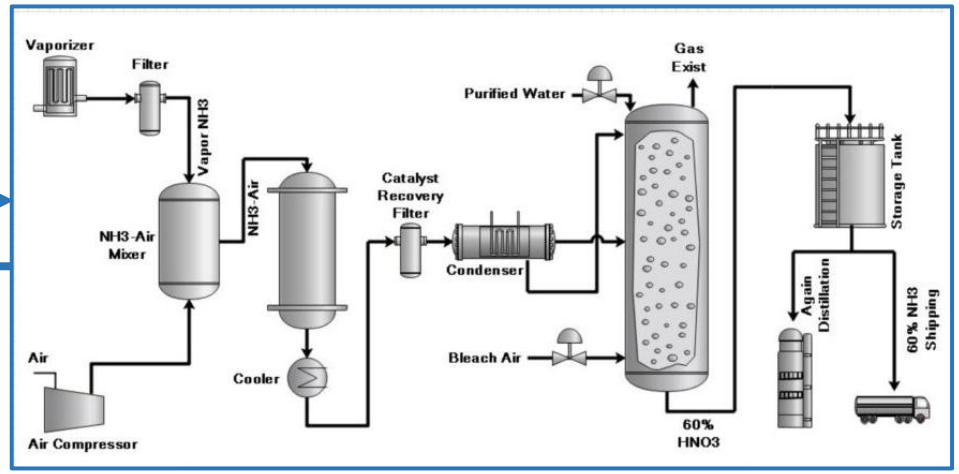
Operations

Maintenance

5. Training & Competency Assurance

- Training

Train people



Maintain facility

4. Asset Integrity & Reliability

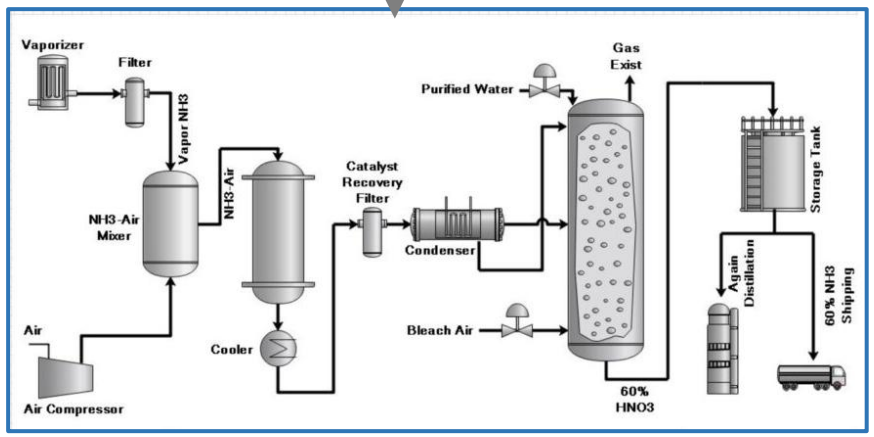
- Mechanical Integrity Program
- Instrument Reliability Program

Operational Activities

Design & Construction → **Start-up & Production** → **Maintenance & Modification** → **Shutdown & Decommissioning**

PDCA Across the Chemical Plant Lifecycle – Check / Act

Engineering Controls (Design Improvements)



6. Management of Change (MOC)

4. Asset Integrity & Reliability
- Inspection・Testing
- Preventive Maintenance
- Repair & Restoration

Deficiency

Incident/ upset

7. Incident Investigation

Correction

2. Hazard Identification & Risk Analysis **Ex. HAZOP**

New risk

New Risks

1. Process Knowledge Management
- Chemical Reactions & Process Control
- Unit Operations & Safer Design
- Process & Instrumented Equipment
- Hazard Identification / Risk Analysis
- Operating Practices
- Maintenance Procedures
- Engineering Standards
- Codes & Regulations

6. Management of Change (MOC)

3. Operating & Maintenance Procedures
- Production
- Maintenance
- Quality Management

5. Training & Competency Assurance
- Training

Administrative Controls (Procedural improvements)

Process Control

Operations

Maintenance

Process Safety and Product Quality Excellence Enabled by Seven Core RBPS Elements

No	Critical States of Being to achieve Zero Process Safety Events and Quality Problems	Relevant Elements
1	Process operations executed through optimized procedures developed from a thorough understanding of chemistry, unit operations, equipment, and engineering standards.	1.Process Knowledge Management 2. Hazard Identification and Risk Analysis 3. Operating Procedures 6. Management of Change
2	Operators and maintenance personnel deployed only after structured training and verified competency assessment.	5. Training and Performance Assurance
3	Facilities and equipment maintained to perform as originally designed throughout their lifecycle.	4. Asset Integrity and Reliability
4	Engineering standards current, controlled, and consistently applied to all new installations, modifications, and maintenance activities.	1. Process Knowledge Management 6. Management of Change
5	Process and quality risks continuously updated and controlled through corrective actions from incident investigations and hazard analyses.	1. Process Knowledge Management 2. Hazard Identification and Risk Analysis 6. Management of Change 7. Incident Investigation

PSM Elements Relevant to Causes and Effects Diagram of Process Safety and Quality Events