PSD-1: a RI-PB Design Standard

NRC Standards Forum
Virtual Presentation – January 28, 2026

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Plant Systems Design Standards Committee

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What is PSD-1?

PSD-1, ASME **P**lant **S**ystem's **D**esign

Technology neutral standard for design of plant systems for facilities with the potential of significant hazards to the worker, public safety, and the environment.

What is PSD-1 Applicability?

- fossil power generation facilities (e.g., coal, natural gas, etc.)
- nuclear power generating facilities
- oil refining
- oil and natural gas production;
- petrochemical
- chemical
- hazardous waste plants and facilities.

What is value of using PSD-1?

Provides a **workflow** for plant owners, designers, and other stakeholders to execute projects in a manner that:

- **minimizes errors and omissions** in the design process

- **produces better cost and schedule outcomes** for its users

3-Key PSD-1 Activities

1. Conduct **plant process hazard evaluations** and analysis in the early phases of design that:

   a. Provide early identification of hazards, including strategies to avoid and mitigate them

   b. Advance as the design matures

   c. Provide structure to the development of a quantitative risk assessment

3-Key PSD-1 Activities   (Continued)

2. Incorporate and i**ntegrate systems engineering design processes, practices, and tools** with traditional architect engineering design processes, practices, and tools

3. **Integrate probabilistic design processes, practices, and tools** with traditional deterministic design processes using reliability and availability targets

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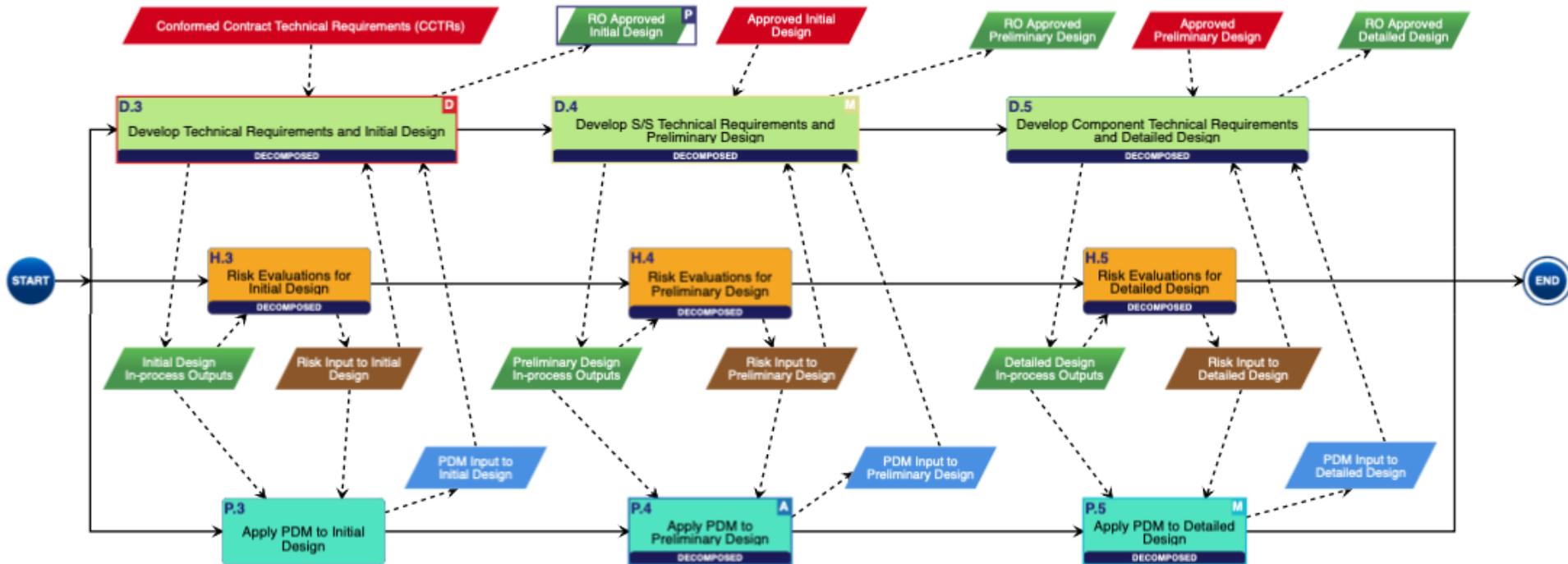SETTING THE STANDARD

PSD-1 is RI-PB

1. PSD-1 is **risk-informed (RI)**

   Combining a performance-based systems engineering process with the risk evaluations provides a risk-informed design.
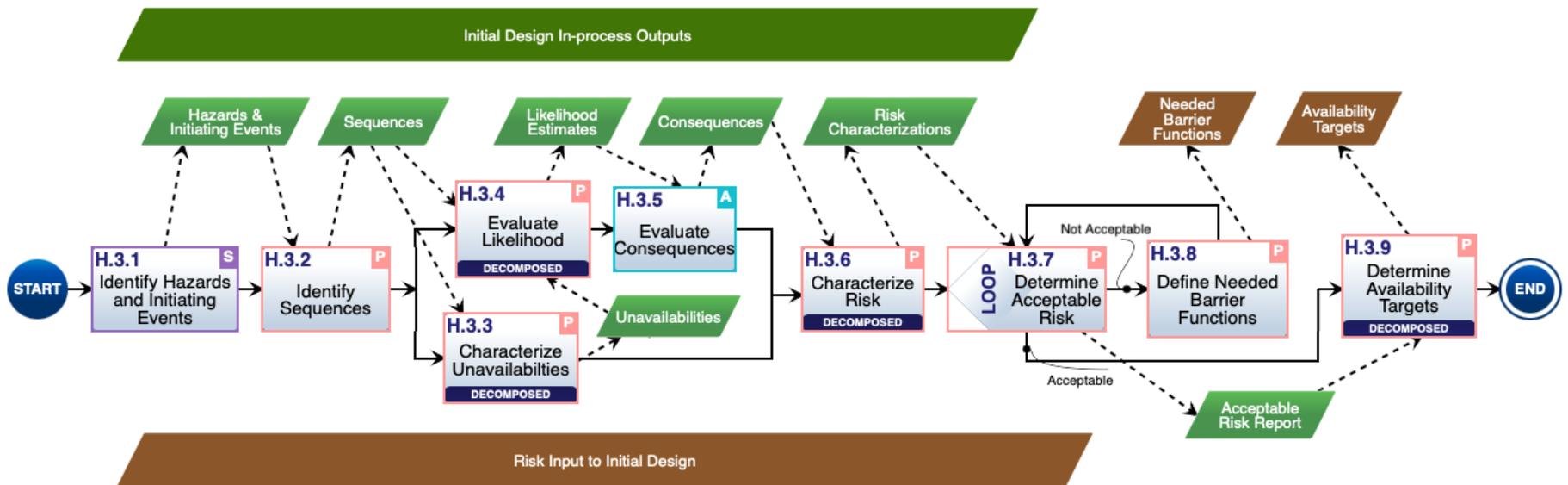
2. PSD-1 is **performance-based (PB)**

   The systems engineering design processes establish and manage functional and performance requirements making it performance-based design.
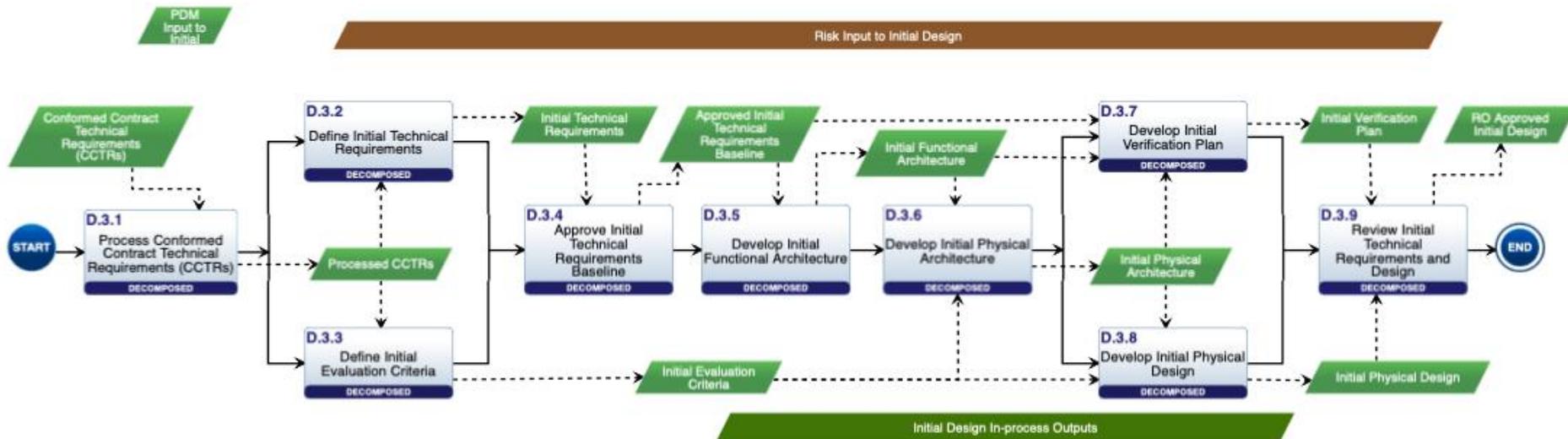
PSD-1 Top Level Structure

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Risk Evaluation Process

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Systems Engineering Process

What is different about PSD-1?

- Integrates systems engineering, risk evaluation, and probabilistic design into traditional plant engineering processes.

- Integrates risk to plant performance and availability with safety risk!

- Risk evaluation process makes it RI

- Systems engineering process makes it PB

- Combined, it is RI-PB

PSD-1 Status

- Published January 31, 2026
- Five papers on PSD-1 were presented in their own session at PVP-2025 in Montreal
- Deep Fission is piloting PSD-1

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PSD-1 Status

- A PVP 2026 paper compares PSD-1 workflow with workflow used by NuScale

- ASME training is under development

- A cloud- based application is under development

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