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Development of a Security-By-Design Handbook

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NNSA National Nuclear Security Administration

JAEA

Sandia National Laboratories

Outline

- Security-By-Design: What is it and Why?
- Project Overview
- Description of Work to Date
  - Principles and Practices
  - Generic Design Process
- Planned Work
- Summary

Security-By-Design – What is it?

- Security-by-design: the system level incorporation of the physical protection system (PPS) into a new nuclear facility resulting in intrinsic security.
  - PPS minimizes the risk of malicious acts resulting in nuclear material theft or sabotage and facility sabotage.
- For existing nuclear facilities, the PPS may be integrated into the facility;
  - Post construction integration may not achieve the efficiency and effectives of system level design.

Project Overview

- Objective
  - Develop a Security-By-Design handbook for future facilities
- Intended users
  - Current physical protection designers
  - The next generation of physical protection designers
  - Facility designers in emerging countries
- Related Goal
  - Develop a Security-By-Design information dissemination plan
- Project is sponsored by National Nuclear Security Agency (NNSA) between Sandia National Laboratories (SNL) and Japan Atomic Energy Agency (JAEA)

Security-By-Design Principles and Practices for the Facility Lifecycle

Systems Principles
- Lifecycle Perspective
- Consider All Operating Conditions

CPPNM Fundamental Principles
- Responsibilities (State, Competent Authority(CA), Licensee)
- Base Physical Protection on Threat
- Graded Protection
- Security Culture, Confidentiality
- Quality Assurance, Contingency Plans

Safety/Domestic Safeguards/Security
- Principle: Balance in design
- Principle: Balance Detection, Delay, Response functions
- Practice: Establish priorities

Security-By-Design

Systems Engineering Practices
- Concurrent Design
- Project Management
- Use of Trade-off Studies

Regulatory Best Practices
- Lessons-learned
- Adopt commonly-used guides and standards
- Maintain Close, Honest Relationship with CA

Security Design Practices
- Defense in Depth
- Measure effectiveness against threat

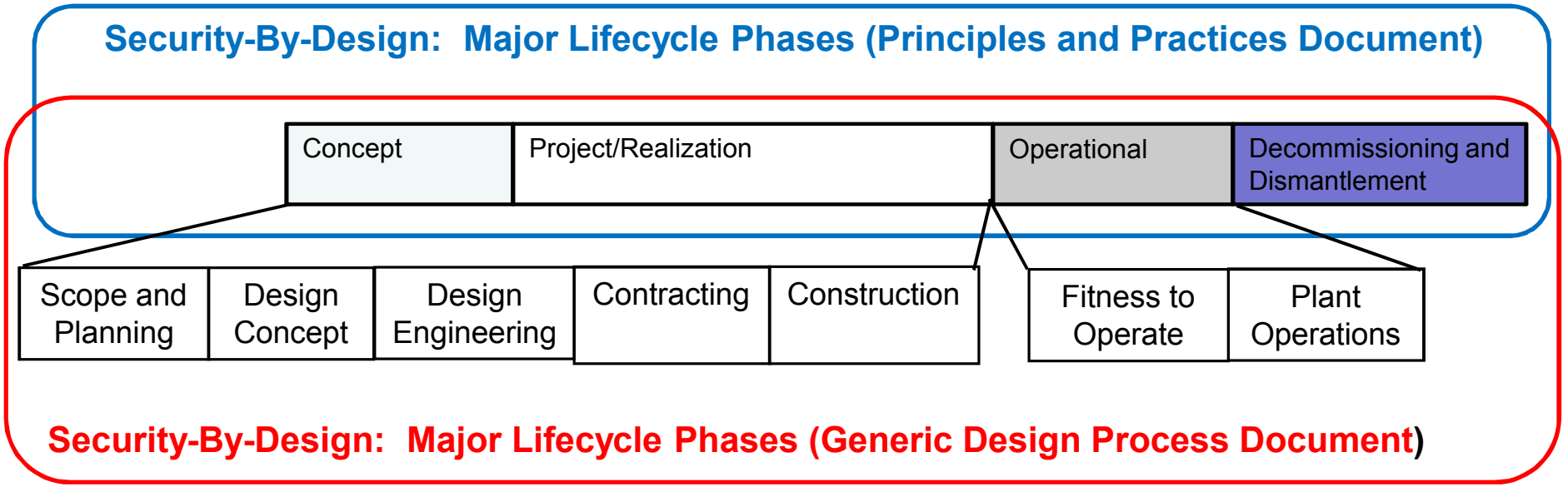
Entire Lifecycle, Realization, Operational

Collection of Insights for Security-By-Design

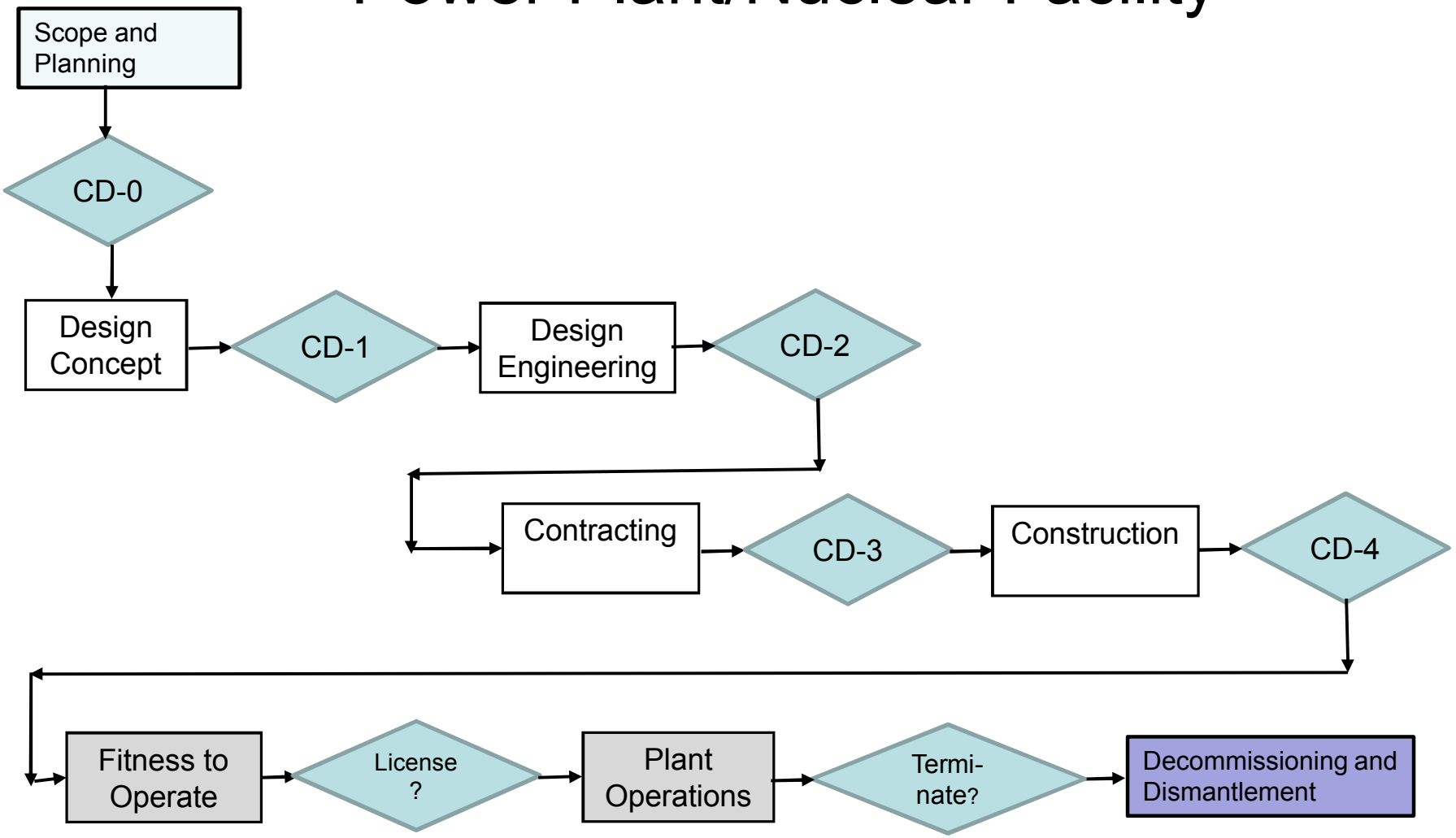
- Realization (Design/Build)
  - Principle: Treat security as a key function during design
  - Principle: CA should balance prescriptive and performance-based security requirements and have mechanisms to relax prescriptive requirements,
  - Practice: Employ Intrinsic Security design methods
- Operational
  - Ensure adequate staffing, funding and independence
  - Monitor system performance and test

Entire Lifecycle,
Realization,
Operational

Security-By-Design Lifecycle Phases for the Purposes of the Generic Design Process



Notional Lifecycle for New Nuclear Power Plant/Nuclear Facility



Iterative Use of Vulnerability Assessments During Lifecycle

Phase	Value of Assessment	Occurs
Scope	Assures principal design requirements are consistent with mission need	CD-0 Project Authorization
Concept	Choose among competing facility and PPS design approaches	CD-1 Design Selection
Design	Optimize facility and PPS design consistent with S3 priorities	CD-2 Design Approval
Construction	Continuous assurance PPS design achieves security objectives	CD-3 Construction
Acceptance	Performance validation of PPS, operators, and response force for entry into operations	CD-4 Acceptance
Operations	Verification PPS performs as designed and remains consistent with threat	Operational Inspections & Assessments
Decommission & Dismantle	Determine residual PPS requirements post operations	

Planned Work

- Document how the principles and best practices can be best integrated into the design process
- Develop a security-by-design handbook
  - What level of knowledge, examples, details
- Develop a plan for getting security-by-design information out to the intended audience
  - Intended audience
  - Best methods to transfer information

Summary

- We described
  - A variety of Security-by-Design principles and best practices
  - A generic design process that addresses the entire facility lifecycle
- Work is progressing to develop a Security-by-Design handbook