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Integration of Security, Operations, Safeguards and Safety for Exportable Reactors

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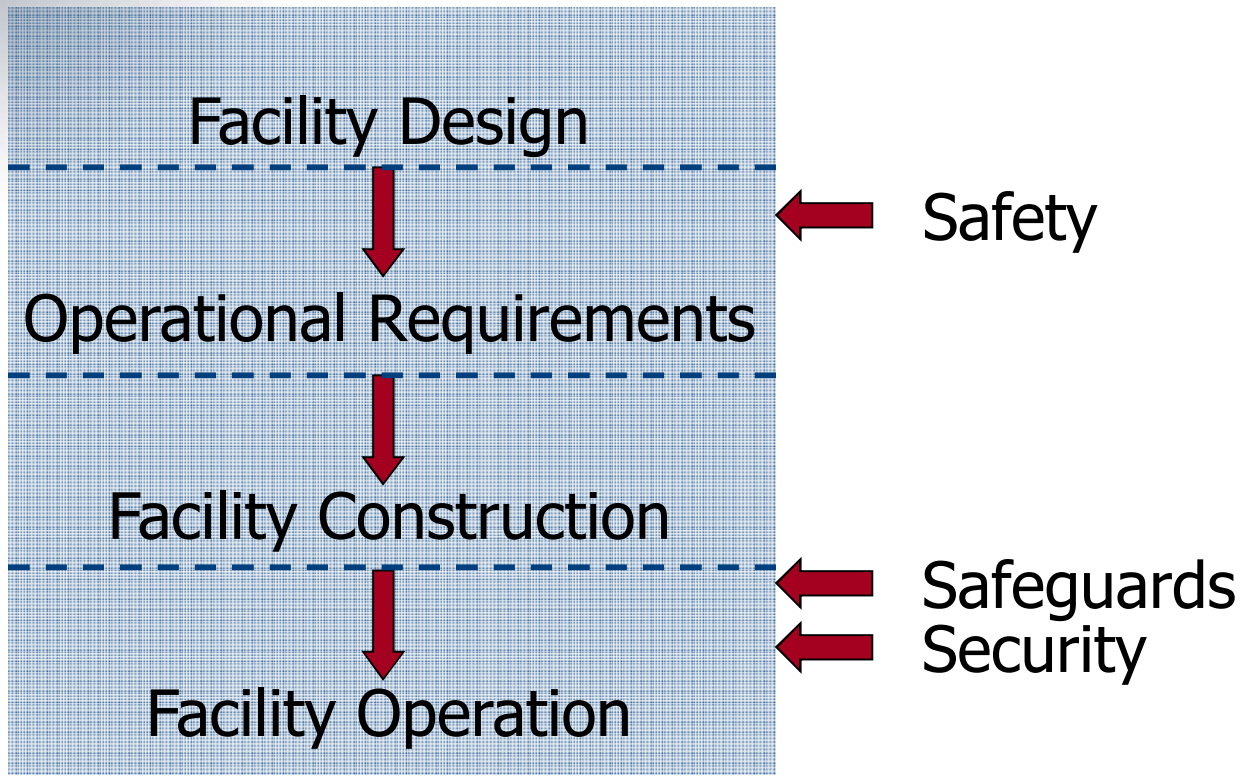
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

The Nuclear Renaissance

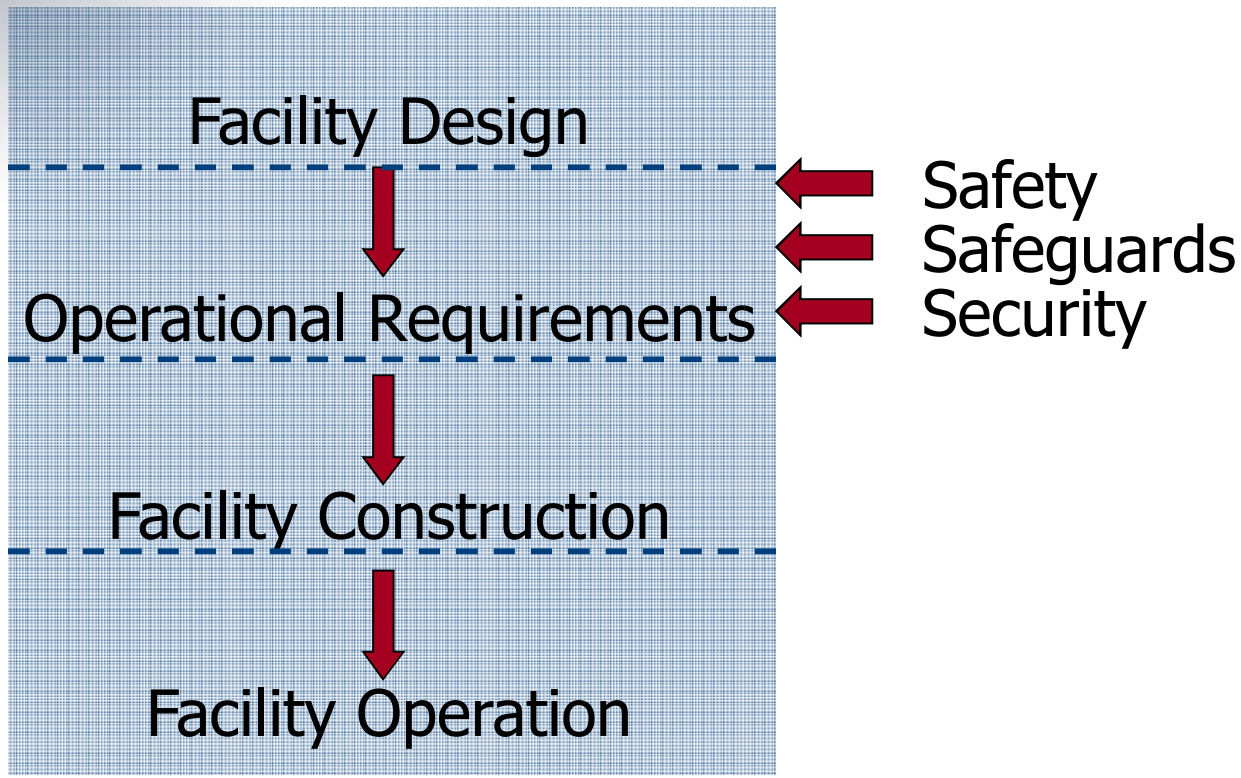
- Nuclear Fuel Cycle Facilities must be:
  - Safe
  - Secure
  - Non-proliferating
  - Cost effective
- Expressed as 4 facility functions
  - Operations
  - Safety
  - Security
  - Safeguards

What if we integrated these functions into one system?

Current Approach: Functional Tension



Our Proposal: Functional Synergy



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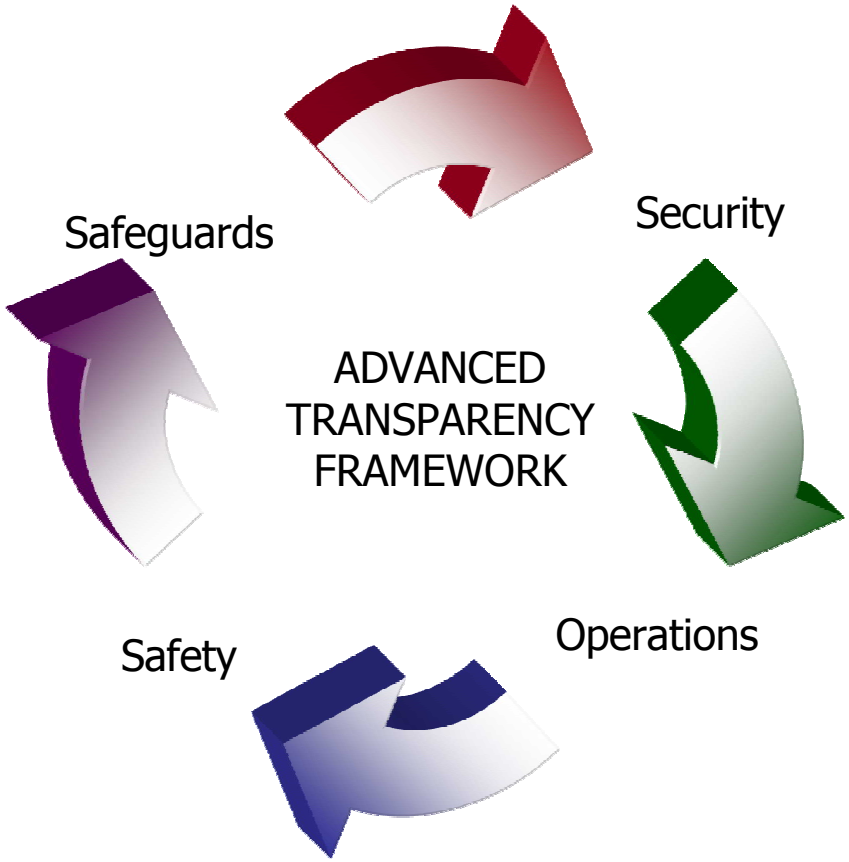
ISOSS

- Integrating the SOSS into the nuclear facility requires two steps:
  - First, the facility design must integrate the four factors.
  - Second, the operational facility must provide data to support the factors.



A system designed to feedback through the 4 functions.

Intrinsic Security Factors

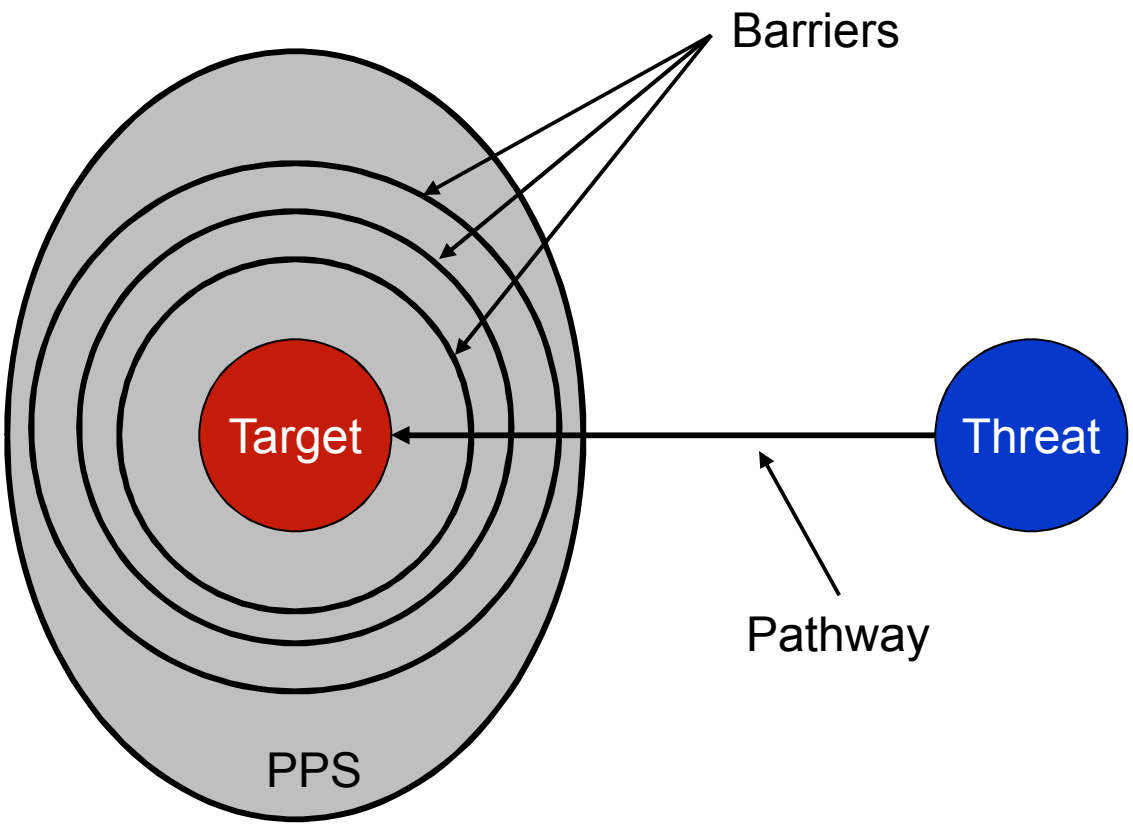
- Maximum use of intrinsic barriers to vital systems
- Maximum use of passive safety systems
- Comprehensive technical design of a security system that considers detection, delay, and response to a broad spectrum of threats.

Physical Protection Strategies

- Primary strategy achieving a globally uniform level of PP
- Secondary strategy involves R&D to increase the intrinsic material barriers that impede theft/sabotage
  - Security by design
- Tertiary strategy reducing long-term risks via global system architecture
  - Spent fuel return, limiting fuel cycle capabilities, etc

PP Approach - Simple

DEPO
Design and Evaluation Process Outline



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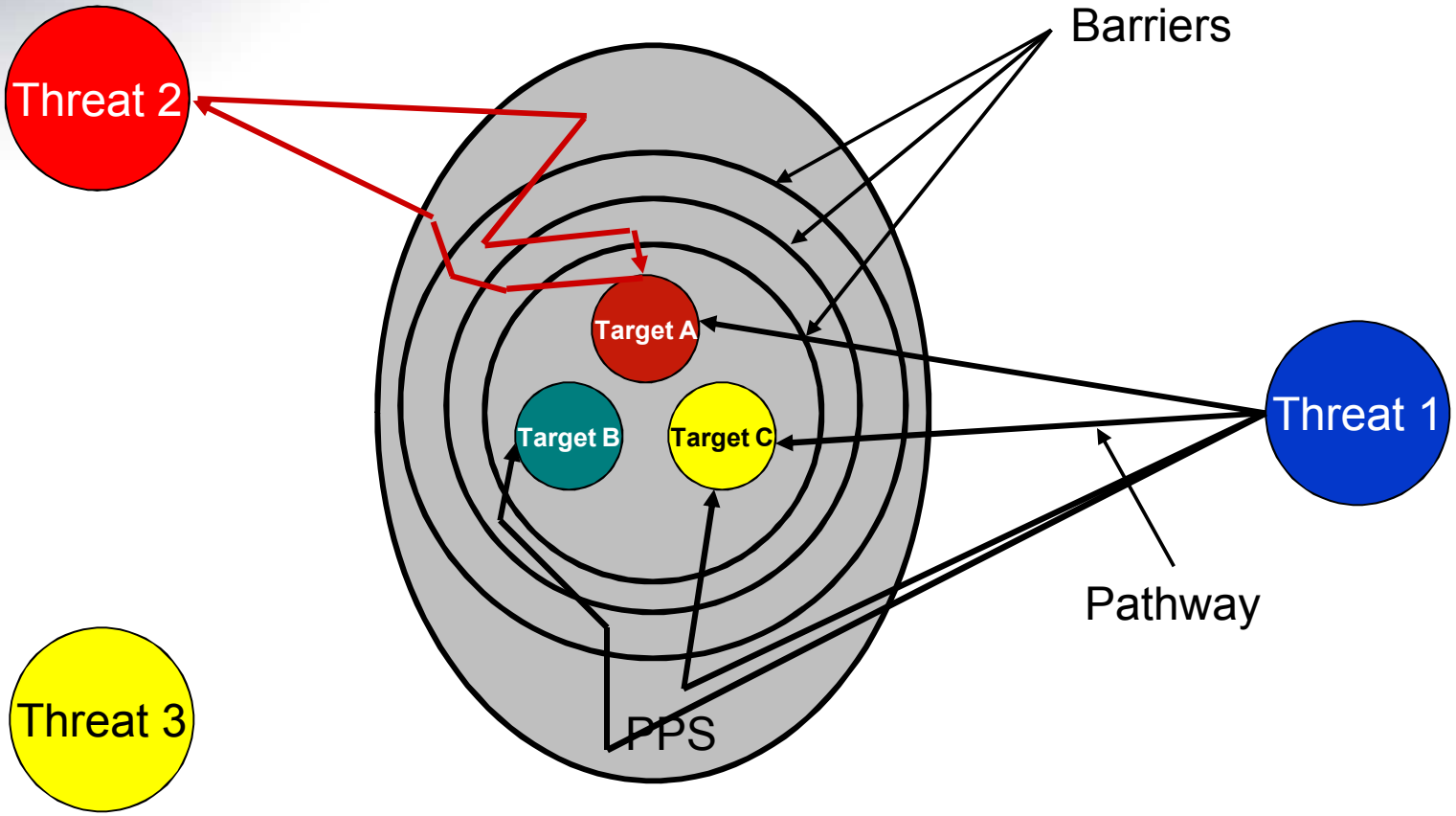
PP Approach - Comprehensive



Exportation of Reactors

- Minimize the reliance of host
- Provide a basis for international network for safety transformation
- Minimize reliance on operators & onsite response force

Three Challenges of ISOSS

- Safeguards and certainly security need to be considered at an earlier time.
- Achieving efficient integration will require concurrent engineering research.
- Development of system communication and security technology will be required.

Development Phases of ISOSS

- Static phase
  - Accomplished in the design of the facility to optimize safety, security and safeguards attributes with operational attributes
- Dynamic phase
  - Accomplished during the operation of the facility
  - Monitoring all SOSS attributes and taking the appropriate actions through a predetermined set of procedures
  - Plant operator is responsible for all aspects of secure, safe and legitimate operation

Conclusion

- The integration of Safety, Operation, Security and Safeguards needs to be considered in the early design phase
- Will allow for a single system that will satisfy
  - The operator with regards to efficiency
  - The regulators safety consideration
  - The community and nation for safety
  - The international community for legitimate use of the facility