SAFETY, SECURITY, AND SAFEGUARDS BY DESIGN
Developing tools to ensure safe, secure, and economically competitive nuclear energy.

WHAT IS 3SBD?

Safety, Security, and Safeguards by Design (3SBD) is an approach to reactor design that considers each of these elements early in the design phase to develop safe, secure, and economically competitive reactors. Considering 3S (and related regulatory requirements) early in the design phase helps to optimize design and prevent costly retrofits in the future.

DESIGN EVALUATION PROCESS OUTLINE

The Design Evaluation Process Outline (DEPO) methodology is a systems engineering methodology that is often used to design physical protection systems (PPS), but can be applied to each of the S's for 3SBD.
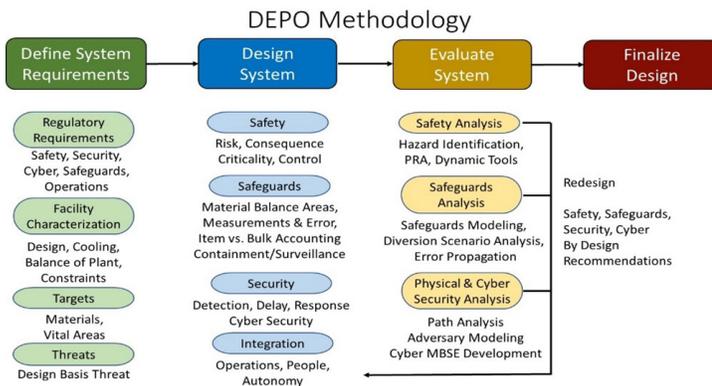

Figure 1 DEPO Methodology

All systems have similar defining requirements and then differ in the design and evaluation phases. Different methods and tools are used to determine performance metrics. The 3SBD process includes considering these needs early in the process and iterating on designs until acceptable performance metrics are achieved.

SANDIA'S CAPABILITIES IN 3S

Sandia has developed state of the art modeling tools to support 3SBD for advanced reactors and nuclear fuel cycle facilities.

Safeguards

Sandia has developed the Separation and Safeguards Performance Model (SSPM), a MATLAB Simulink model that tracks nuclear material through a nuclear facility, and MAPIT, an open-source desktop application for performing material accountancy analysis, safeguards statistical test and process measurements. Both tools assist in the design and evaluation of safeguards systems.

Safety

MELCOR and MELCOR Accident Consequence Code System (MACCS) were developed at Sandia. Both codes are used by the NRC and simulate accident scenarios. MELCOR models the progression of severe accidents at nuclear facilities, while MACCS focuses on the impact of severe accidents at nuclear facilities on the surrounding environment.

Security

Sandia provides a full spectrum of cyber and physical security research and analysis capabilities to protect energy critical infrastructures. Security software, such as Scribe and PathTrace, help provide assessment of risks and vulnerabilities and table top simulations used for training exercises.

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