

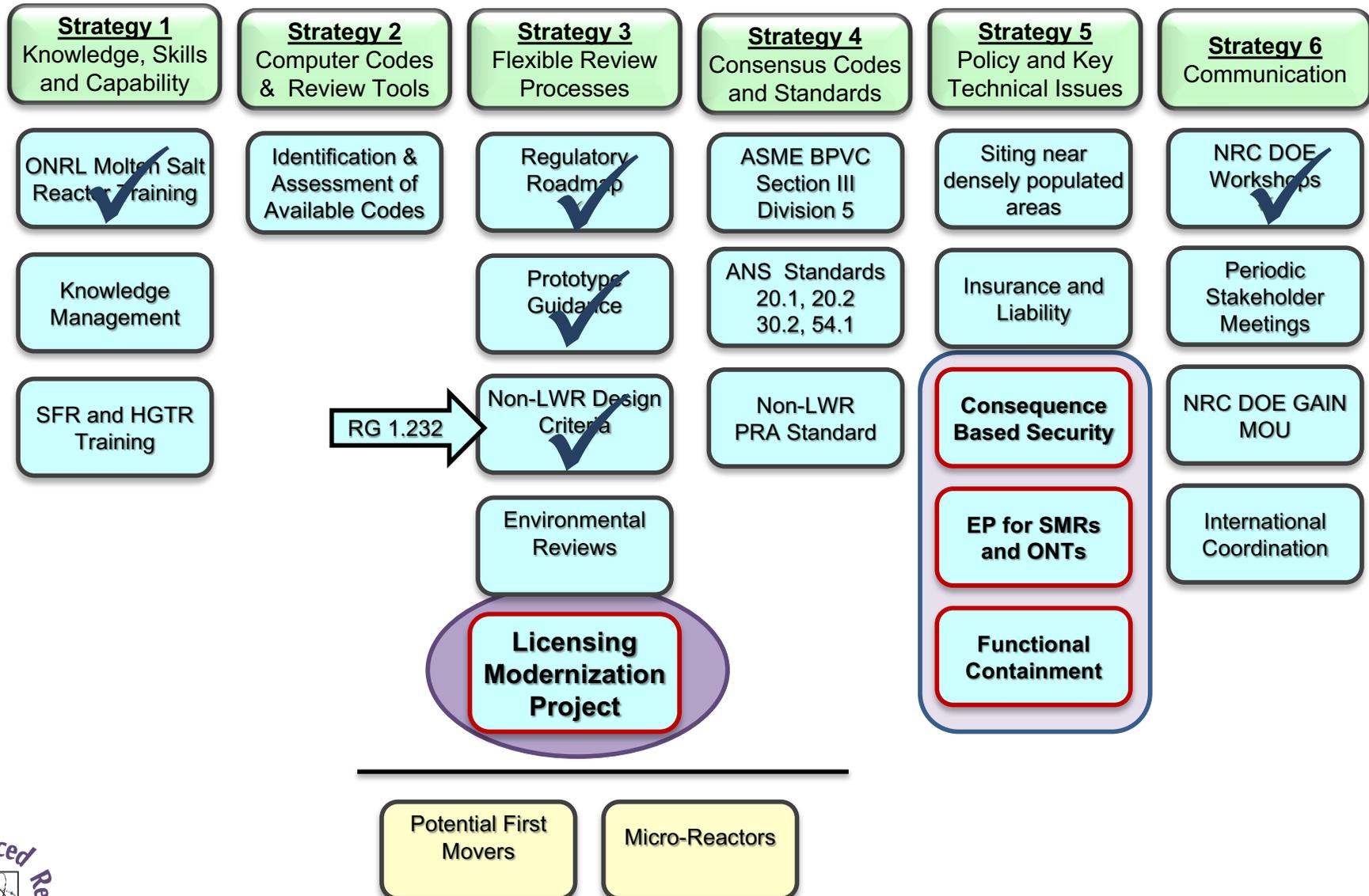


# A Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Licensing Non-Light-Water Reactors

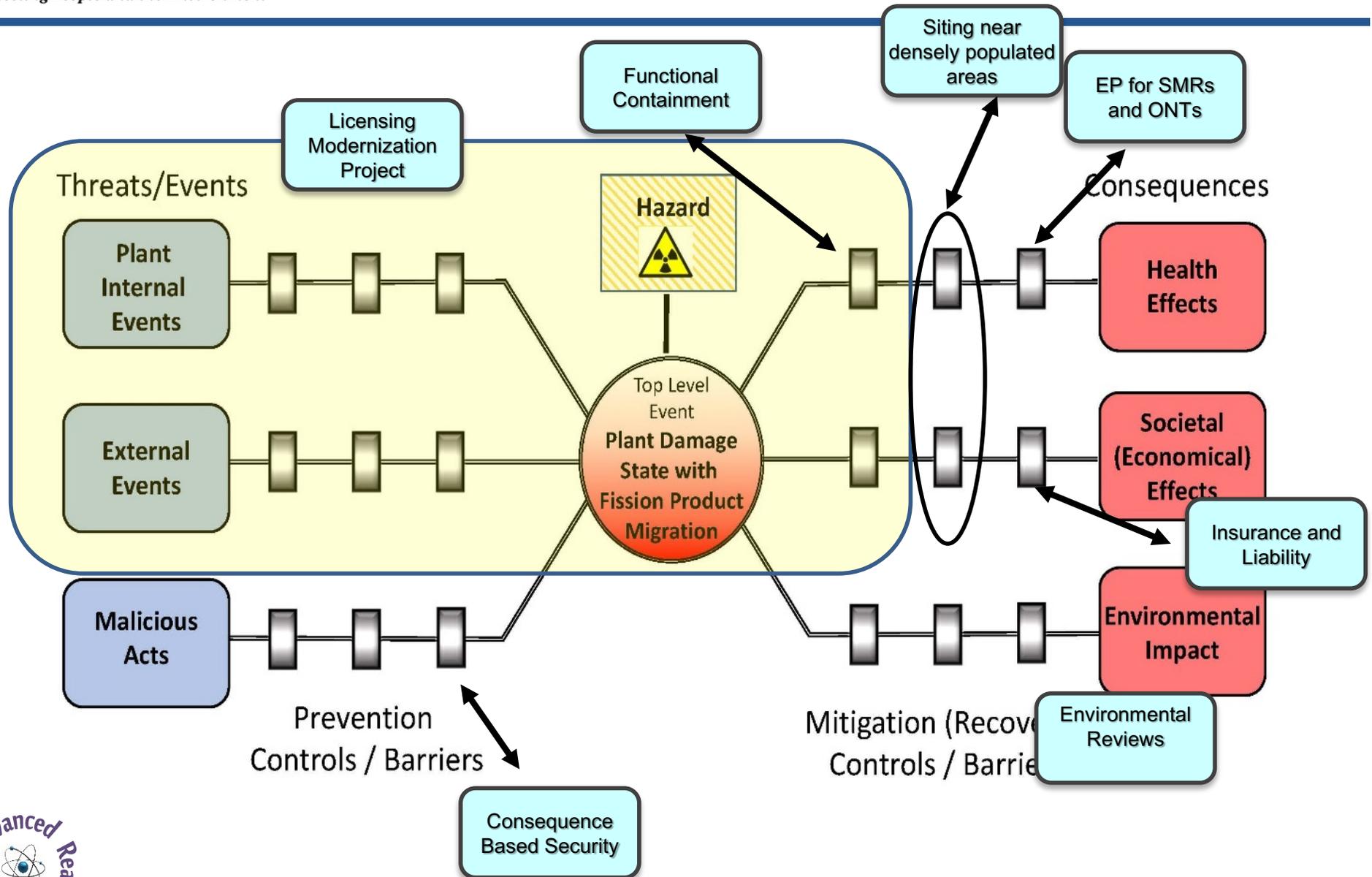


October 3, 2018

# Implementation Action Plans

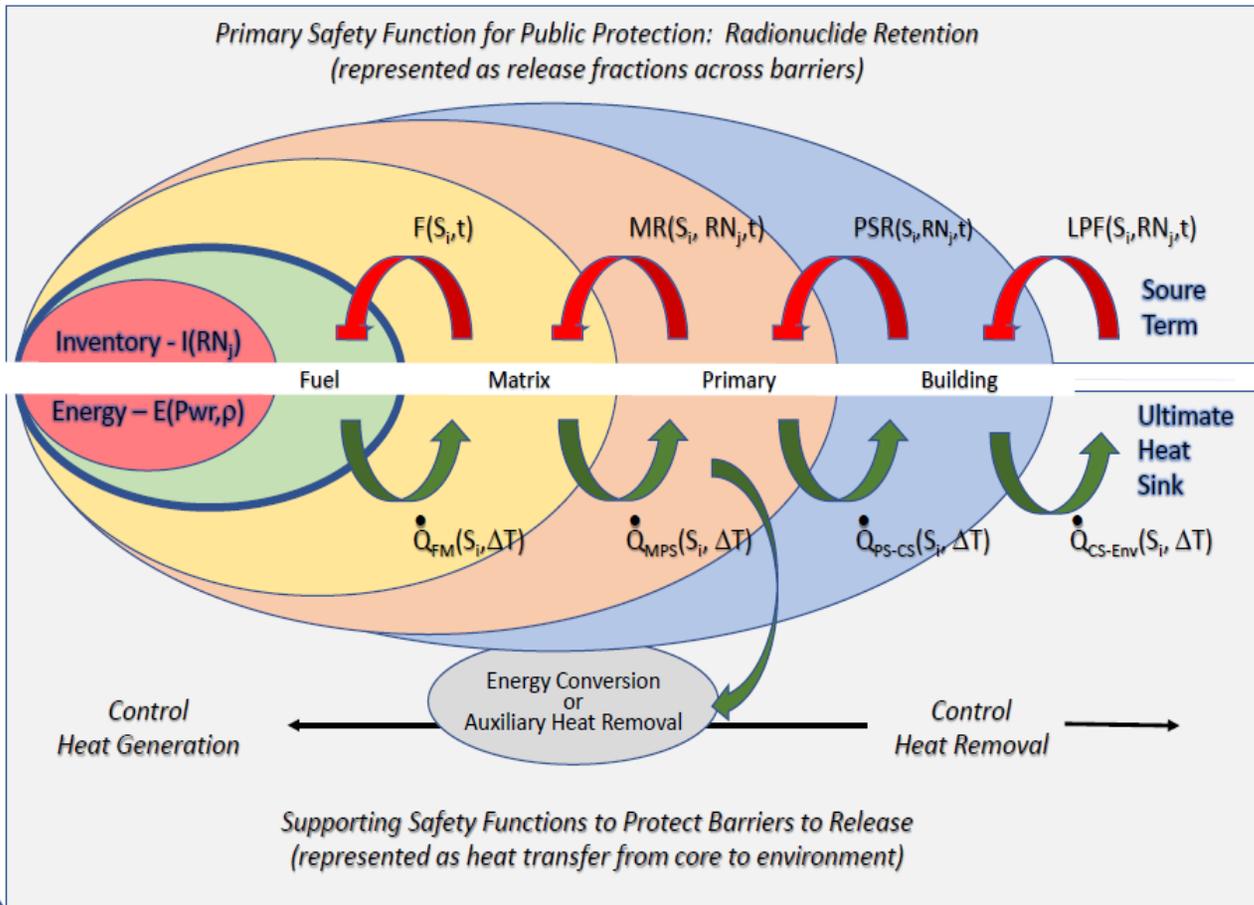


# Integrated Design/Review



# Revisit First Principles

## Fundamental Safety Functions and Mechanistic Source Term



$I(RN_j)$	Inventory
$RN_j$	Radionuclide Groups (j)
E	Heat Energy
Pwr	Power Level
$\rho$	Reactivity
F	Fuel Release Fraction
MR	Matrix Release Fraction
PSR	Primary System Release Fraction
LPF	Building Leak Path Factor
$S_i$	Event Sequences (i)
t	Time
$\dot{Q}$	Heat Transfer
FM	Fuel to Matrix
MPS	Matrix to Primary System
PS-CS	Primary System to Cooling System
CS-Env	Cooling System to Environment
$\Delta T$	Temperature difference

# Licensing Modernization Project (NEI 18-04)

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- General Approach
  - Licensing Basis Events
    - Probabilistic Risk Assessment
    - Deterministic
  - SSC Classification
    - Function and Risk Considerations
    - Safety Related
    - Non-Safety Related with Special Treatment
  - Defense in Depth Assessment
    - Structures, Systems and Components
    - Programmatic

# DG-1353: Informing the Content of Applications

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- ❑ NEI 18-04 provides useful guidance for applicants to identify and provide the appropriate level of information needed to satisfy parts of the regulatory requirements in 10 CFR 50.34, 10 CFR 52.47, 10 CFR 52.79, 10 CFR 52.137, and 10 CFR 52.157.
- ❑ Combination of deterministic evaluations and probabilistic risk assessments
- ❑ Information needed on fuel, primary, and other barriers to define limitations, performance characteristics, and as input to mechanistic source term
- ❑ Information needed on SSCs and programmatic controls associated with key safety functions
- ❑ Scope and depth for other information (e.g., ancillary plant systems) to be determined based safety/risk significance (i.e., roles in preventing or mitigating licensing basis events)
- ❑ Level of detail can also reflect potential performance-based approaches (see Introduction, Part 2, to NUREG 0800)

# DG 1353 & Related Commission Paper

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- Draft Regulatory Guide (DG) 1353  
*Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Inform the Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors*
  
- NEI 18-04  
*Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development*
  
- Related SECY
  - The staff recommends that the Commission approve the use of the technology-inclusive, risk-informed, and performance-based approach described in NEI 18-04 and DG-1353 for identifying LBEs, classifying SSCs, and assessing the adequacy of defense in depth. These key aspects of the design process will also be used to inform the appropriate scope and level of detail for information included to support licenses, certifications, and approvals for non-LWRs.

# Availability of Working Drafts

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ADAMS Accession No.

- **Industry Guidance (NEI 18-04)** **ML18271A164**  
*Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development*
- **Draft Regulatory Guide (DG) 1353** **ML18271A172**  
*Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Inform the Content of Applications For Licenses, Certifications, and Approvals for Non-Light Water Reactors*
- **Draft Commission Paper** **ML18270A334**