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Regulatory Process Improvements for Advanced Reactor Designs

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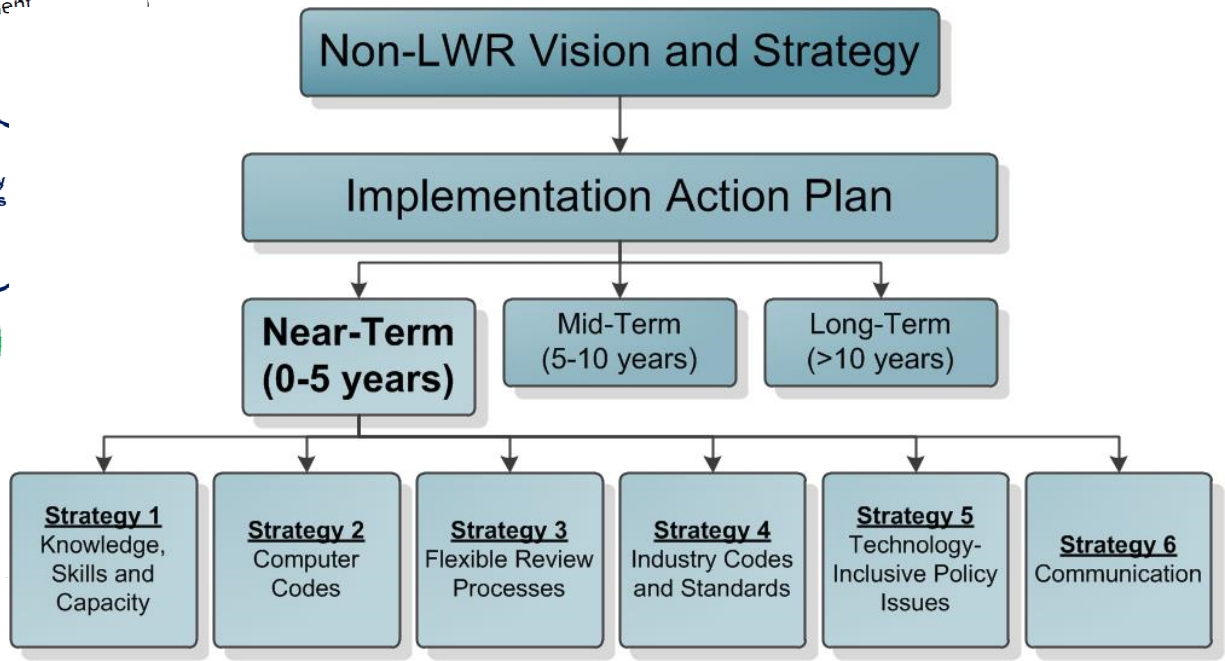
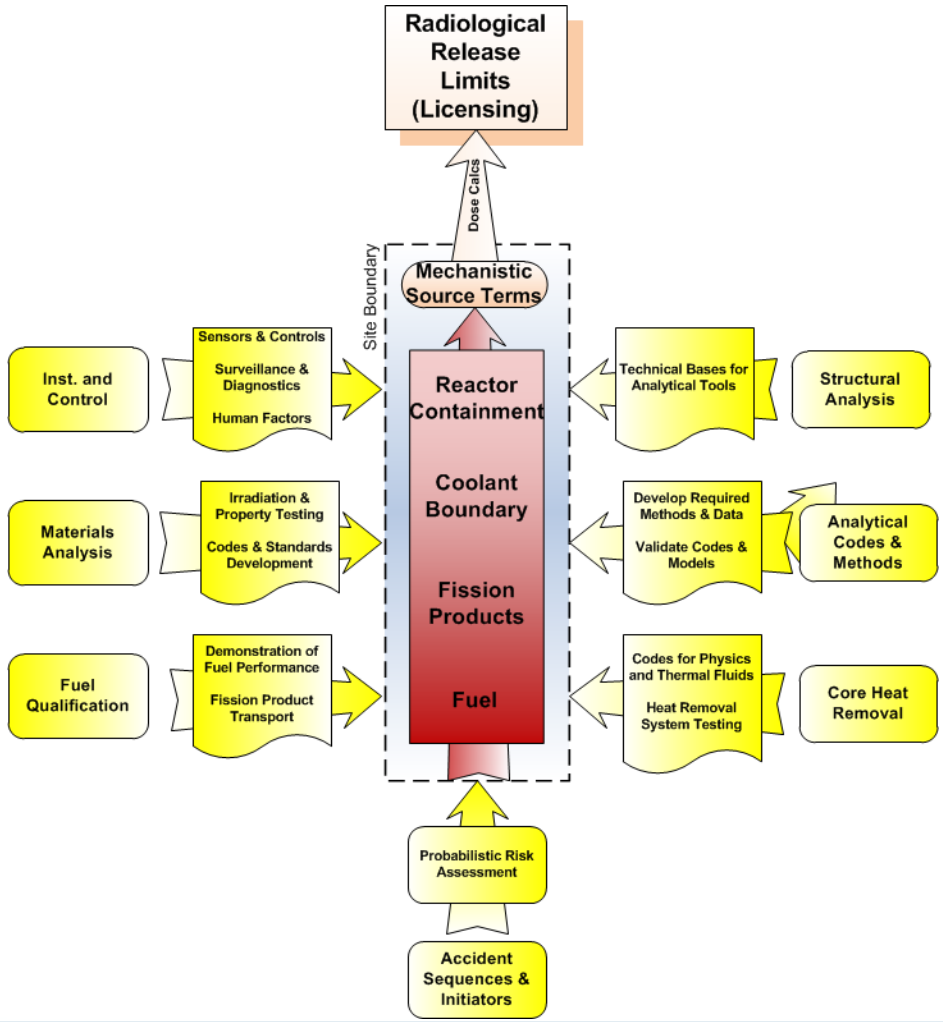
April 25, 2017

Vision and Strategies Implementation Action Plans



Key Inputs for Licensing (INL Figure)



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Licensing Project Plans

- Initial familiarization interactions
- Coupled licensing and review plans
  - Priorities for critical decisions
  - Resource and schedule constraints
  - Routine interactions, monitor, and adjust
- Developing important reference documents (e.g., topical reports, codes and standards)
- Research plans (e.g., test reactors, qualification testing)

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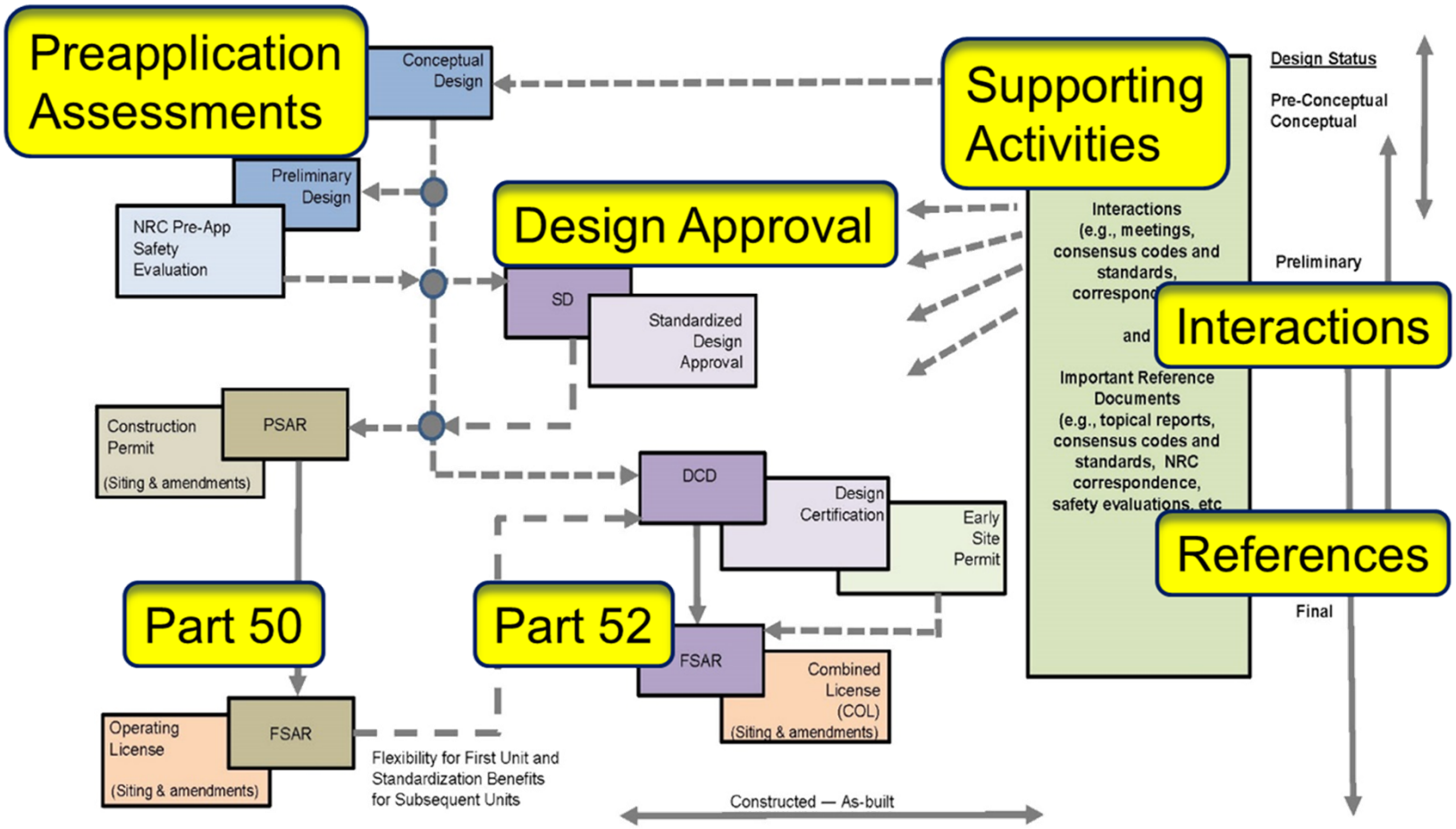
Flexible Approaches / Roadmap



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Preliminary (Preapplication) Design Assessments

All or selected topics to support critical decisions

RG 1.206
Chapters 1-19

- General Description of the Plant
- Site Characteristics
- Design of SSCs and Equipment
- Reactor
- Reactor Coolant and Connecting Systems
- Engineered Safety Features
- Instrumentation and Controls
- Electric Power
- Auxiliary Systems
- Steam and Power Conversion System
- Radioactive Waste Management
- Radiation Protection
- Conduct of Operations
- Verification Programs
- Transient and Accident Analyses
- Technical Specifications
- Quality Assurance and Reliability Assurance
- Human Factors Engineering
- Probabilistic Risk Assessment/Severe Accident Evaluation

Other Parts of Applications & Possible Issues

- Emergency Planning
- Security
- Staffing
- Mitigating Strategies
- Aircraft Impact Assessment
- Environmental Report
- Financial
- Inspections, Tests, Analyses, and Acceptance Criteria
- Insurance
- Fuel Cycle
- Other (design or technology specific)

Organization/translation of design information into licensing basis information

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Enhanced Safety Focused Review for SMRs

Key Review Considerations

Safety-significance	Regulatory compliance	Novel design	Shared structures, systems, and components	Licensing approach

Safety margin	Defense-in-depth	Operational programs	Impact on safety functions	Additional risk insights	Other considerations

Review Tool

Output:

Scope and Depth of Review

- Provide supplemental approaches for implementation of NUREG-0800, Introduction - Part 2 and Design Specific Review Standard reviews
- Systematic thought process applicable to non-structure, system, or component and programmatic reviews

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NGNP Framework

INL/EXT-09-17139
Next Generation Nuclear Plant
Defense-in-Depth Approach

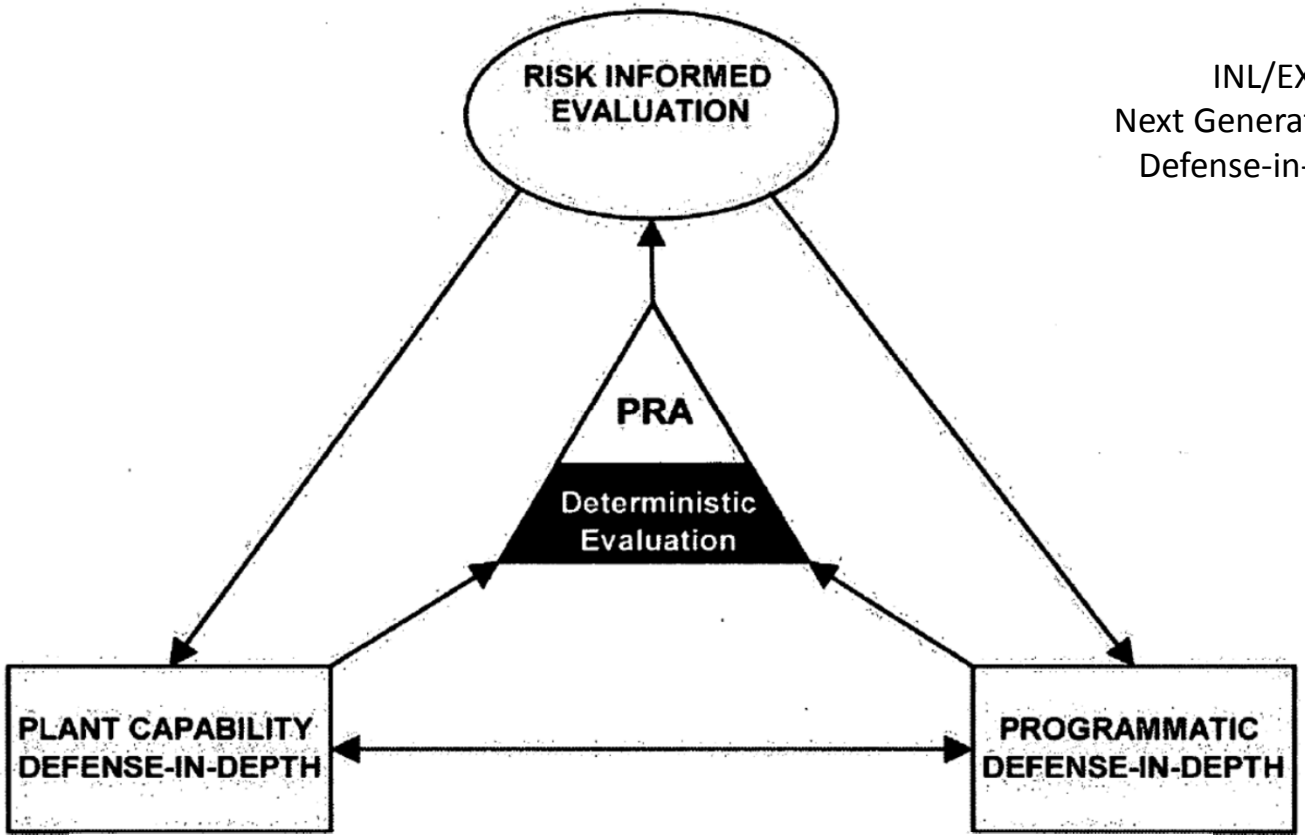

Figure E-1. Illustration showing the three major elements of the NGNP framework.

Addressing Uncertainties

- Operating Experience
- Research and Testing
  - Historical
  - Ongoing & Future
    - Research and Test Reactors
  - International
- Analysis
  - Validation
- Prototype Testing
- Operational Programs