

August 9, 2016

NRC Staff and Nuclear Energy Institute Slides for Public Meeting on Advanced Reactor, Non-Light Water Reactor Regulatory Reviews



**Public Meeting on  
Advanced, Non-light water  
Reactor Regulatory Reviews**

**Office of New Reactors**

July 27, 2016

- **Bridge Number**  
**(888) 570-6344**

**Pass Code**  
**3222936**

- **Webinar**

<https://attendee.gotowebinar.com/register/5274661119593408002>

# Agenda

- Introductions and Meeting Objectives
- NRC Background and Status
- Industry Background and Status
- Discussions
- Plans and Goals for Future Interactions



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# Regulatory Flexibilities

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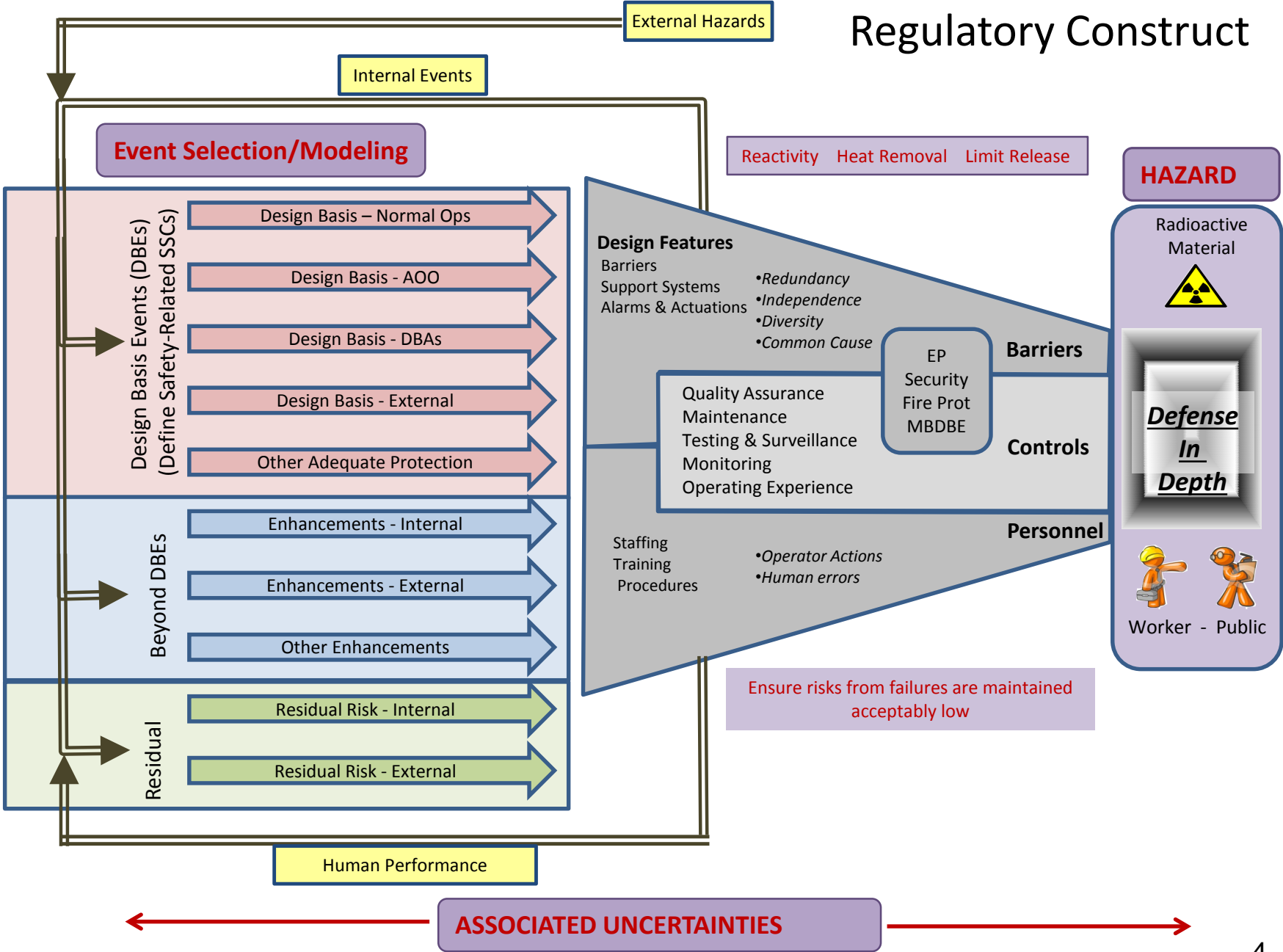
- Goal is to better align regulatory processes with related plans for developing non-LWR technologies
  - Design process
  - Research and Development
  - Business/Financial
  - Public policy/Fuel cycle
  - Deployment/Market conditions

# Regulatory Background

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- NRC Regulations
  - Procedural Requirements
  - Technical Requirements
- Related References
  - Commission Policy Statements
  - Consensus Codes and Standards
  - Regulatory Guides
  - Industry/Vendor Documents & related NRC safety evaluations

# Regulatory Construct





# NGNP Licensing Topics

INL/EXT-10-19521,  
 “Next Generation  
 Nuclear Plant Licensing  
 Basis Event Selection  
 White Paper”  
 September 2010

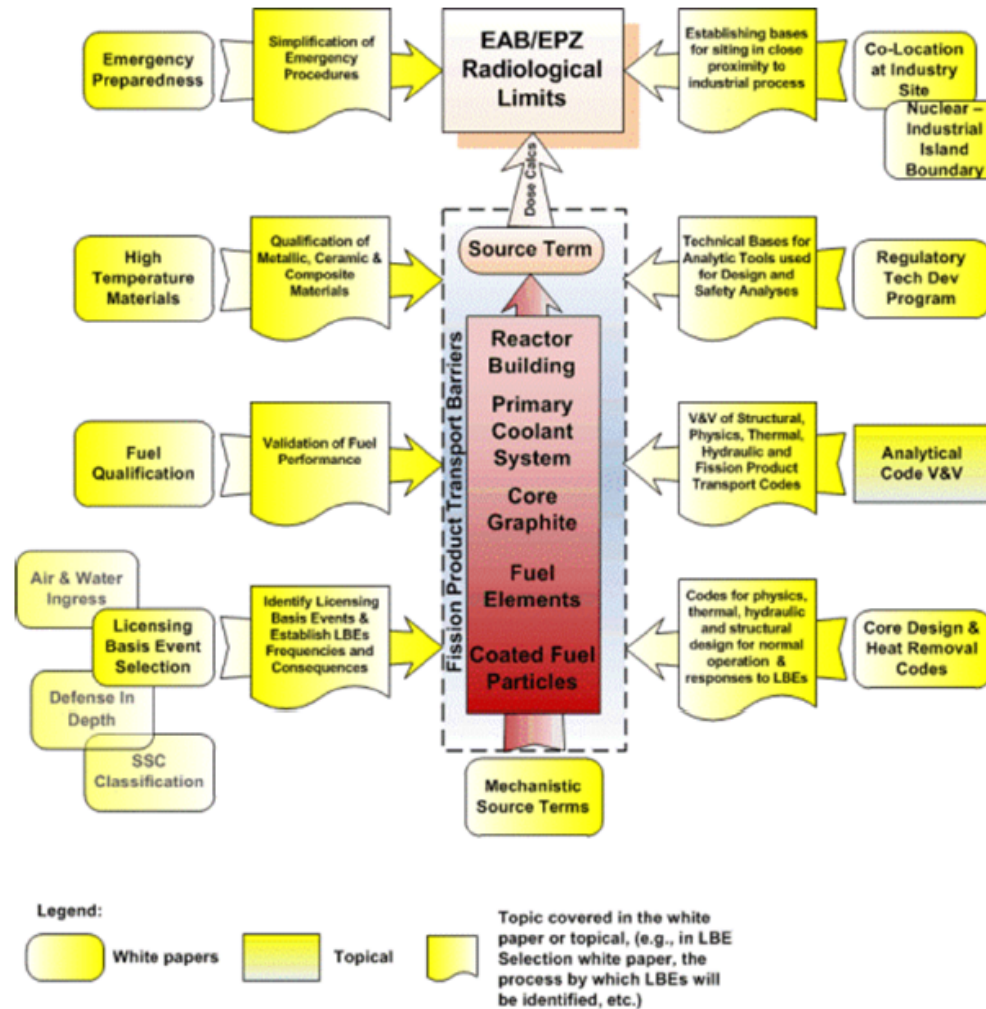
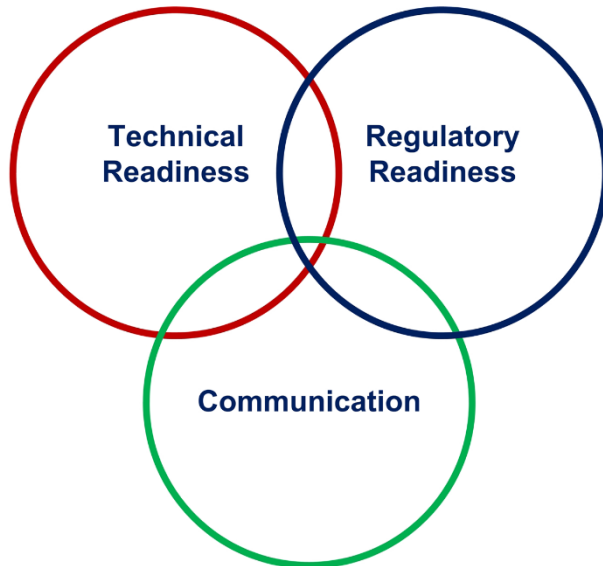


Figure 1. Relationship of NGNP licensing topics.

# Vision and Strategy

## STRATEGIC OBJECTIVES & STRATEGIES

### Strategic Objectives



### Strategies & Contributing Activities

- Near-Term (0-5 Years)
- Mid-Term (5-10 Years)
- Long-Term (Beyond 10 Years)

# Regulatory Readiness

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## Short Term

- Establish a more flexible, risk-informed, performance-based, non-LWR regulatory review process within the bounds of existing regulations, including the use of conceptual design reviews and staged-review processes. This flexibility will accommodate potential applicants having a range of financial, technical, and regulatory maturity, and a range of application readiness.

# Regulatory Readiness

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## Contributing Activities

- Establish the criteria necessary to reach a safety, security, or environmental finding for non-LWR technologies
- Determine appropriate licensing bases and accident sets for non-LWR technologies
- Identify and resolve gaps in current regulatory framework
- Develop a regulatory review “roadmap” reflecting design development lifecycle and appropriate interactions
  - Possible research and test reactors
- Update prototype reactor guidance
- Engage on technology- or design-specific licensing project plans and develop regulatory approaches commensurate with the risks posed by the technology

# Regulatory Readiness

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## Mid Term

- Initiate and develop a new non-LWR regulatory framework that is risk-informed, performance-based, and that features staff review efforts commensurate with the demonstrated safety performance of non-LWR designs

## Long Term

- Continue development, finalize, and promulgate a new non-LWR regulatory framework (if needed) that is risk-informed, performance-based, and that features staff review efforts commensurate with the demonstrated safety performance of non-LWR designs

# Technical Readiness

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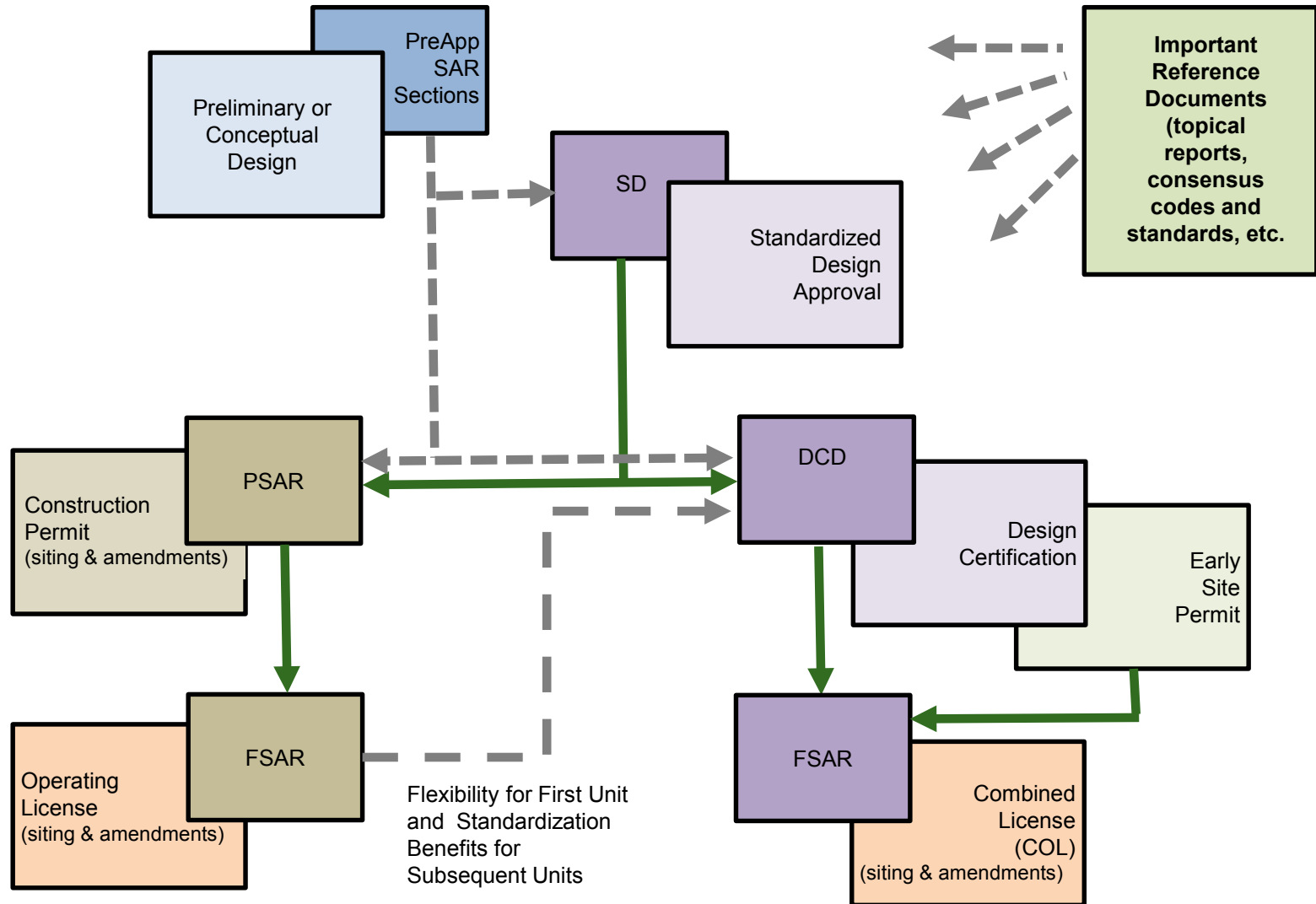
- Acquire/develop sufficient knowledge, technical skills, and capacity to perform non-LWR regulatory reviews
- Acquire/develop sufficient computer codes and tools to perform non-LWR regulatory reviews
- Facilitate industry codes and standards needed to support the non-LWR life cycle (including fuels and materials)
- Identify and resolve generic policy issues (near term) and technology-specific policy issues (mid term)

# Licensing and Design Review Regulations

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- Design:
  - Standard design certifications (Pt 52, Subpart E)
  - Standard design approvals (Pt 52, Subpart B)
  - Manufacturing licenses (Pt 52, Subpart F)
- Siting:
  - Preapplication early review of site suitability issues (Pt 50, App Q)
  - Limited Work Authorization (Pt 52)
  - Early site permit (Pt 52, Subpart A)
- Design, Siting, Construction and Operation (NPPs, Research Reactors, Test Facilities, Prototype reactors)
  - Construction permit / Operating license (Pt 50)
  - Combined licenses (Pt 52)
  - Fuel Fabrication Facility construction and operation license (Pt 70)

# Licensing Approaches





# Preapplication Activities

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Potential preapplication discussions

- Preliminary/Conceptual design
- Basic safety case for reactor design
- **Licensing plan** and relationship with other project plans (e.g., research)
  - Fuel and materials qualification
  - Analytical code development and validation
  - Other research and confirmatory testing
  - Testing facilities (test loops, RTRs)

# Preapplication Activities

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## Preapplication Interactions

- Meetings
- Preliminary design documents
- Correspondence, white papers, and technical reports
- Readiness reviews, audits
- Topical reports
- Guidance documents
  - Industry guidance documents (e.g., templates)
  - Consensus codes and standards

Preapplication activities help establish foundation, including important reference documents, for formal processes leading to licenses, certifications, and approvals

# Preliminary/Conceptual Design Reviews

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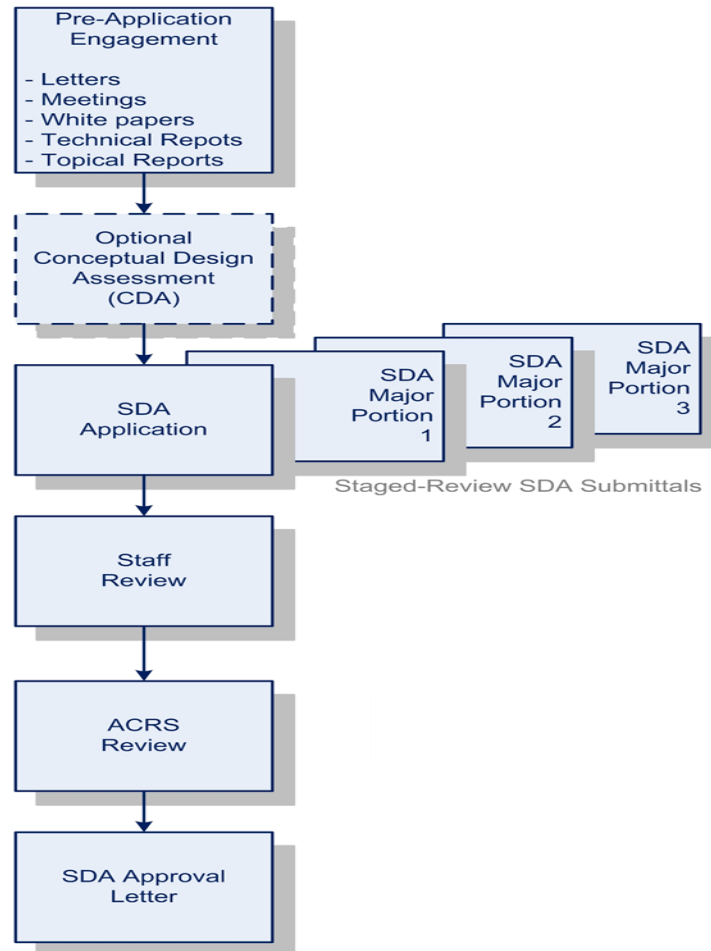
- Advanced Reactor Policy Statement
  - NUREG 1226
  - NUREGs 1338(draft), 1368, and 1369
- Goal to provide feedback on:
  - key safety features
  - potential policy issues
  - technical issues
  - research and testing

# Staged Licensing

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- Various approaches can be included in licensing plan
- Recent focus on Standard Design Approval (SDA);
  - Subpart E to 10 CFR Part 52
  - Addresses major portions of facility
  - Can support CP or DC/COL
  - Provides some measure of regulatory finality
    - NRC staff, Advisory Committee on Reactor Safeguards
  - Challenge to define accompanying levels of technology readiness and design details

# Possible Staged Design Review Using Standard Design Approval

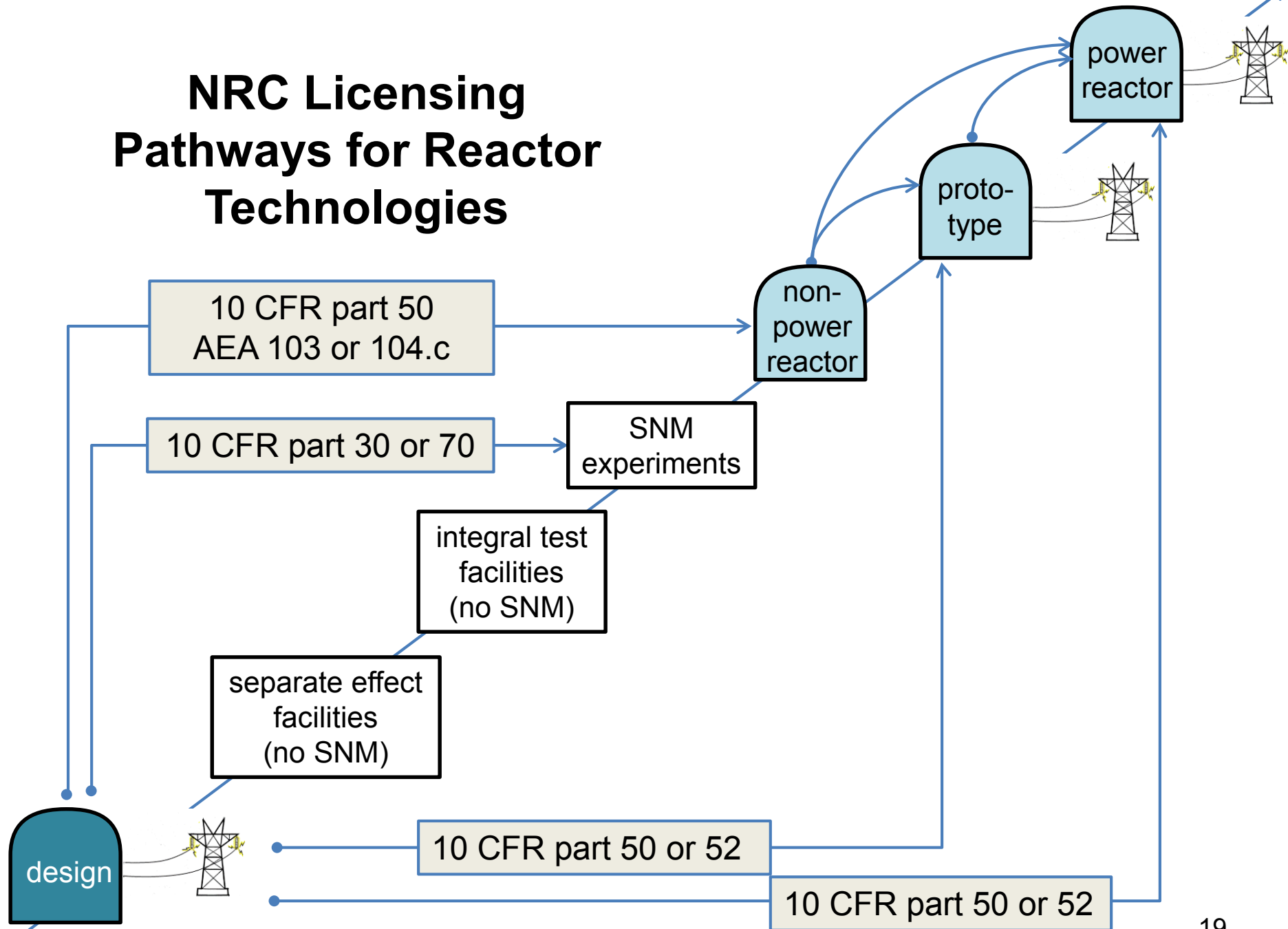


# Research Activities

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- Recommend early discussions on research and testing plans
  - thermal-hydraulic test loops
  - fuel/materials qualification
  - operating experience
    - historical, international
  - Research and test reactors
    - major projects
    - siting/design reviews

# NRC Licensing Pathways for Reactor Technologies





# Discussion



# NEI Staged Application Survey Results

Advanced Reactor Regulatory Task Force  
July 27, 2016 • NRC

# ARRTF Focus Areas

- Staged Application Review & Approval
  - Technology Inclusive RI-PB Reg. Structure
  - Policy
  - Demonstration Reactor
- 
- Focus areas have NOT been prioritized against each other, yet

# Staged Application Review & Approval

- Problem Statement:

The existing NRC application review & approval process provides limited opportunity to clearly and meaningfully stage an application review into discrete activities with progressive levels of regulatory confidence and finality. Without such a staged alternative, many reactor developers face significant uncertainty throughout the entire application review process, regardless of the regulatory option they select.

# Advanced Reactor Developer Feedback

- NEI survey to inform industry input to further development of staged application review and approval processes at NRC
- Sharing preliminary results today
- Continuing to assess specific feedback

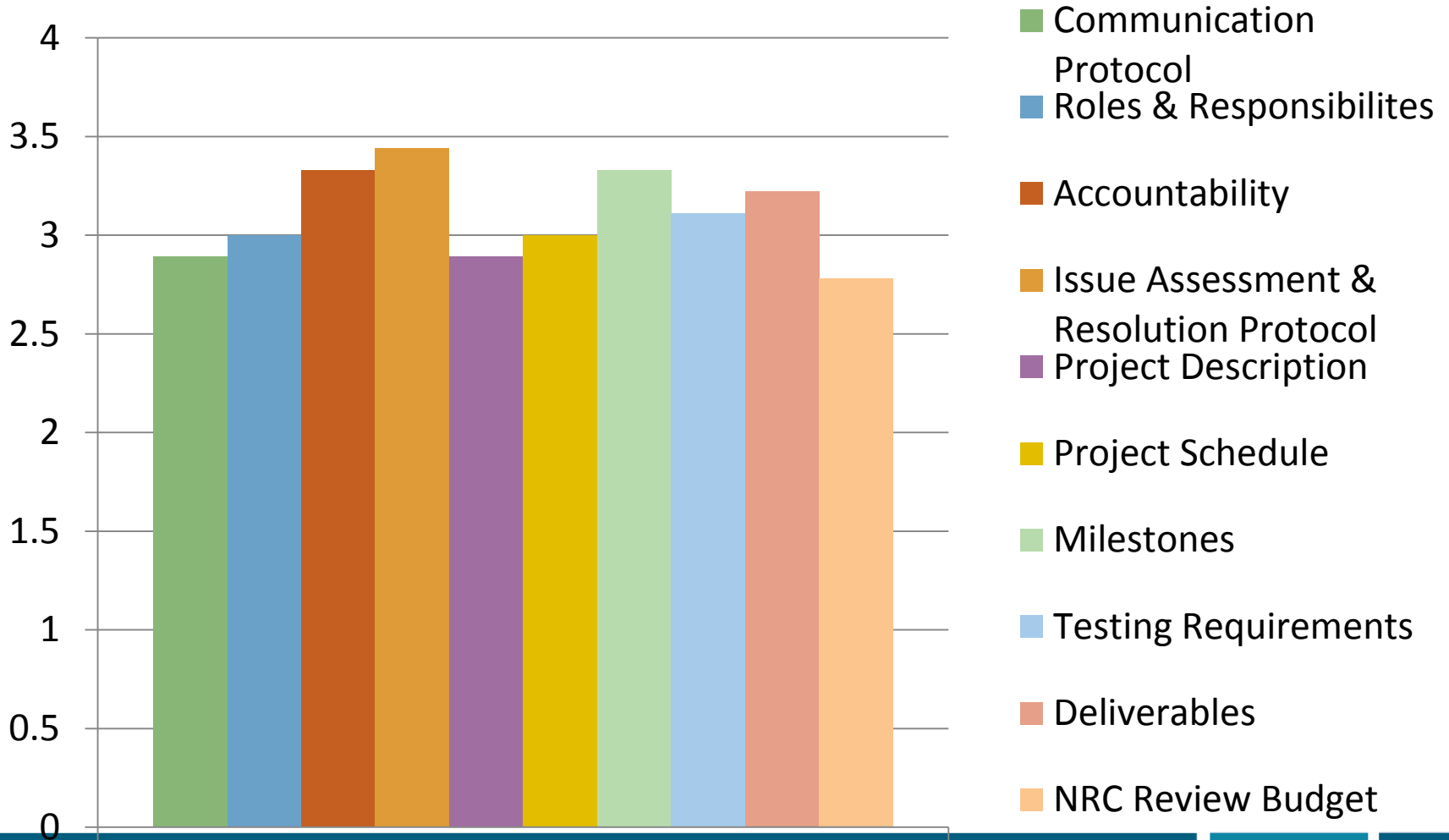
# What would be the most useful approach to defining “stages?”

- Desired Regulatory Outcome
- Degree of Detail Required

# Generic Licensing Project Plan or Regulatory Engagement Plan (REP)

- Still weighing benefit of a generic REP
  - Generic set of suggested topics may be useful
- Most useful component would be protocols for issue assessment and resolution
- Elements from other plans necessary to commercialize a design would generally be considered when developing a REP
  - Those plans would NOT be formally included

# Possible components of a REP



# Pre-application guidance – RG 1.206

- Generally useful
- Need more on:
  - How to minimize repeating work
  - Mechanisms for NRC to provide formal feedback on white papers & technical reports
  - Accountability to address and resolve issues identified
  - Possibility for a fixed price project with clear scope & deliverables



# Conceptual Design Assessment

- Process: may be desirable
- Outcome: Limited value added if scope is open to re-review without sufficient basis
- Meaningful conclusions: targeted elements for NRC review, fundamental technology or regulatory barriers
- Could there be a Conceptual SER/SAR?

# White Papers, Technical & Topical Reports

- Value is in documented NRC response
- Clear guidance to decide whether report is technical v. topical is desired
- Create efficiencies with guidance on expectations for “standard” topical report reviews

# Standard Design Approval

- The time has come to develop guidance on “major portions”
  - Scope
  - Level of detail
  - “PPE-type” approach to describing interfacing systems

# Other Staging Opportunities

- Transparent data on review costs across the application spectrum for benchmarking
- More reduced fee interactions during pre application for small businesses and startups
  - Small business license fee structure
- Further clarity on the need/basis for licensing a demonstration plant

# Path Forward

- Survey responses indicate those interested in a staged process need it in ~2 years
- Refine the survey data to develop industry proposals
- Survey the investment community to understand their thoughts on staging