# What Society Needs in Part 53

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BREAKTHROUGH INSTITUTE

# The Breakthrough Institute

- Independent research center that identifies and promotes technological solutions to environmental and human development challenges.
- Represents Society and its collective interests.
- Does not receive funding from industry.

# Realizing a Technology-inclusive Rule

A technology-inclusive rule is defined in the Nuclear Energy Innovation and Modernization Act (NEIMA) of 2019 as a regulatory framework developed using methods of evaluation that are flexible and practicable for application to a variety of reactor technologies, including, where appropriate, the use of risk-informed and performance-based techniques and other tools and methods.

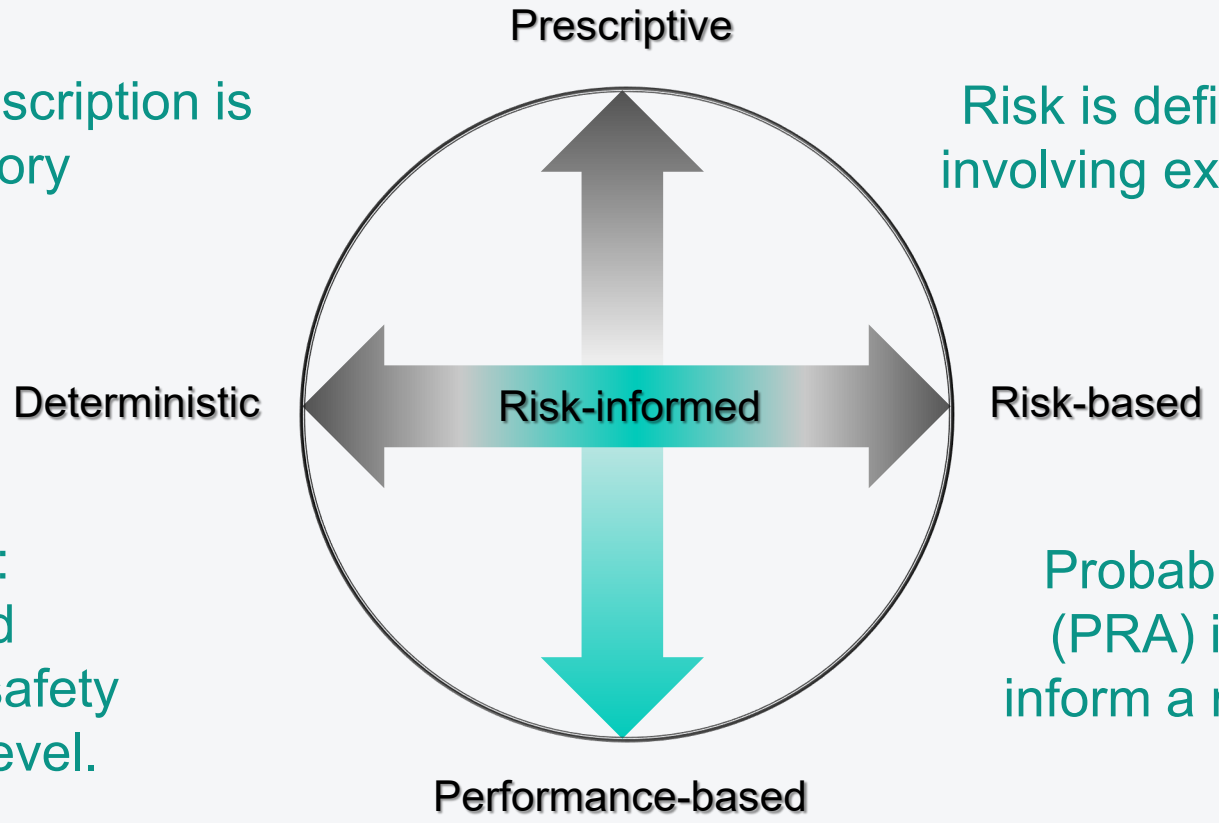
# Concerns and Opportunities

- Part 53 is necessary to improve the general welfare of Society by enabling both innovation and commercialization of advanced nuclear reactors.
- It remains unclear how either Framework A or Framework B conforms with NEIMA or meets the needs of Society.
- NRC is crafting prescriptive and deterministic rule language and frameworks that could constrain development of emerging technologies vital to climate change mitigation, energy security and other pressing concerns in Society.
- A 1000-page proposed rule package that industry will not use will not be responsive to NEIMA.
- Part 53 should establish high-level safety goals and allow greater flexibility for a wide range of diverse and emerging technologies.
- Frameworks A and B could represent acceptable methods and should be relocated to guidance documents, which offer both clarity and flexibility.

# The Mandated Regulatory Approach

Some amount of prescription is necessary in regulatory requirements.



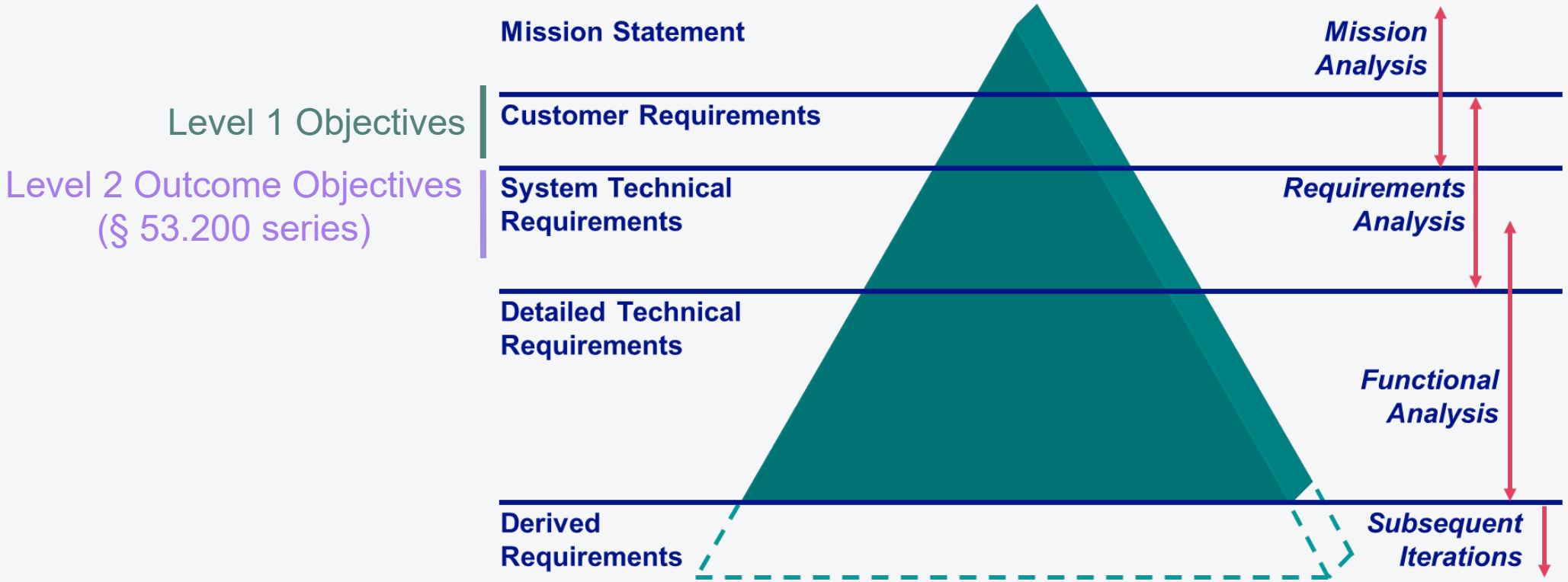

Risk is defined as a situation involving exposure to danger.

Objectives Hierarchy:
A performance-based regulation identifies safety objectives at a high level.

Probabilistic risk analysis (PRA) is one way to risk-inform a regulation, but not the only way.

# Typical Requirements Management Structure*

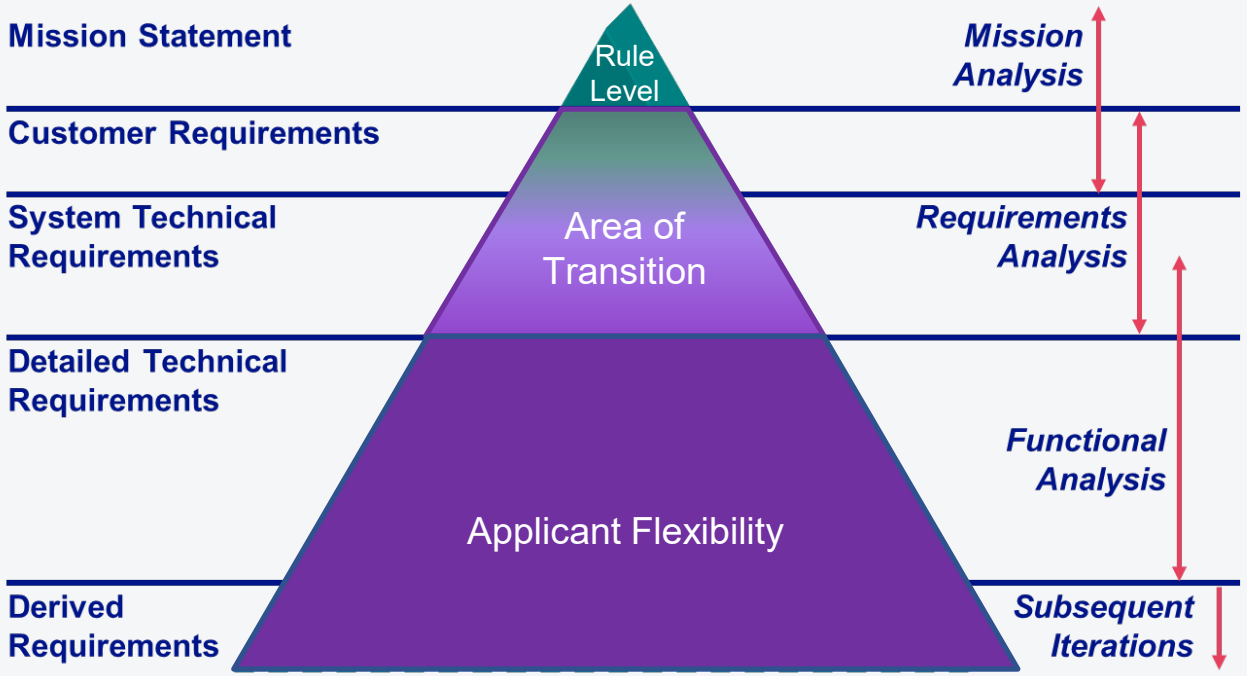



* Attribution: https://www.ans.org/file/980/RIPB+CoP+2-28-20+Presentation+Systems+Engineering.pdf, Slide 8

# Part 53 Requirements Management Structure

Level 1 Objectives

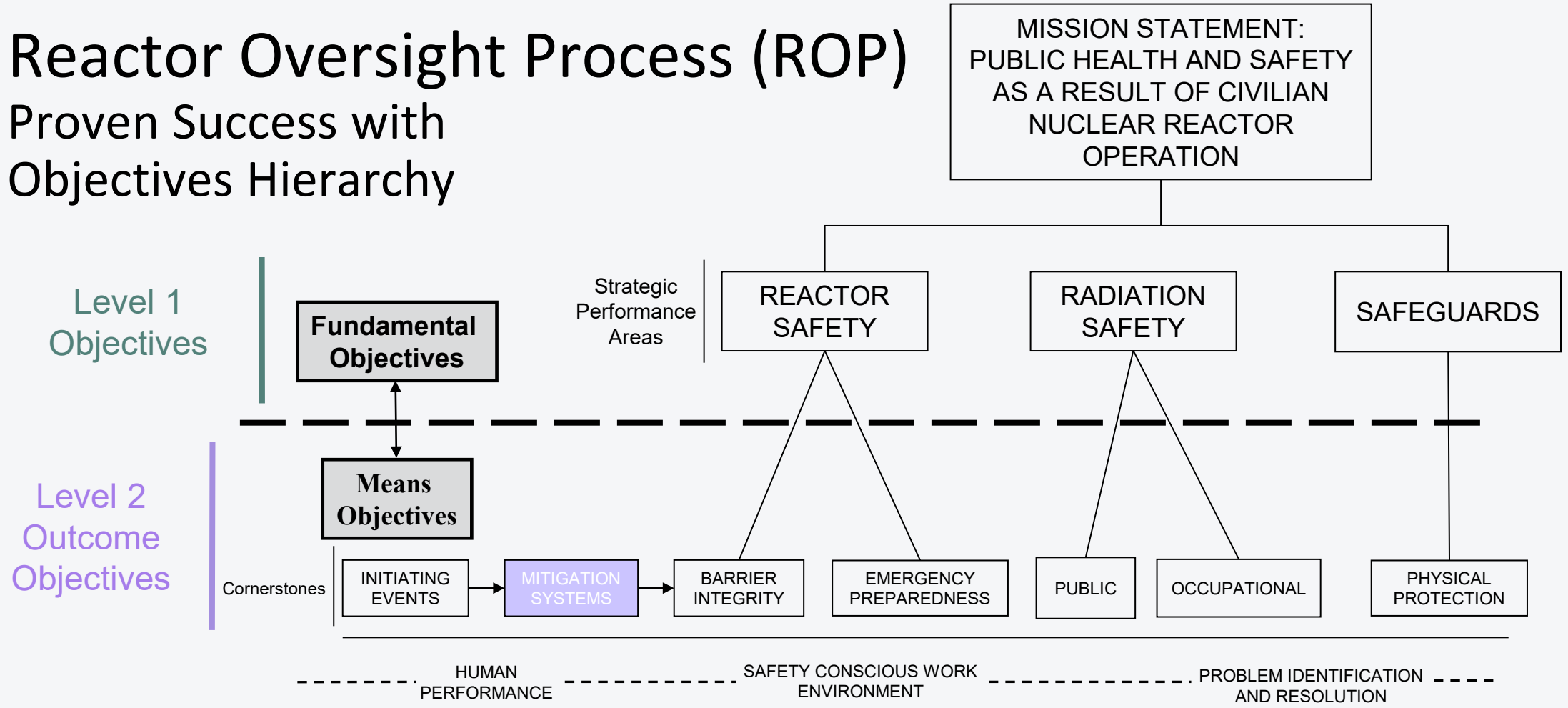
Level 2 Outcome Objectives (§ 53.200 series)



# Reactor Oversight Process (ROP)

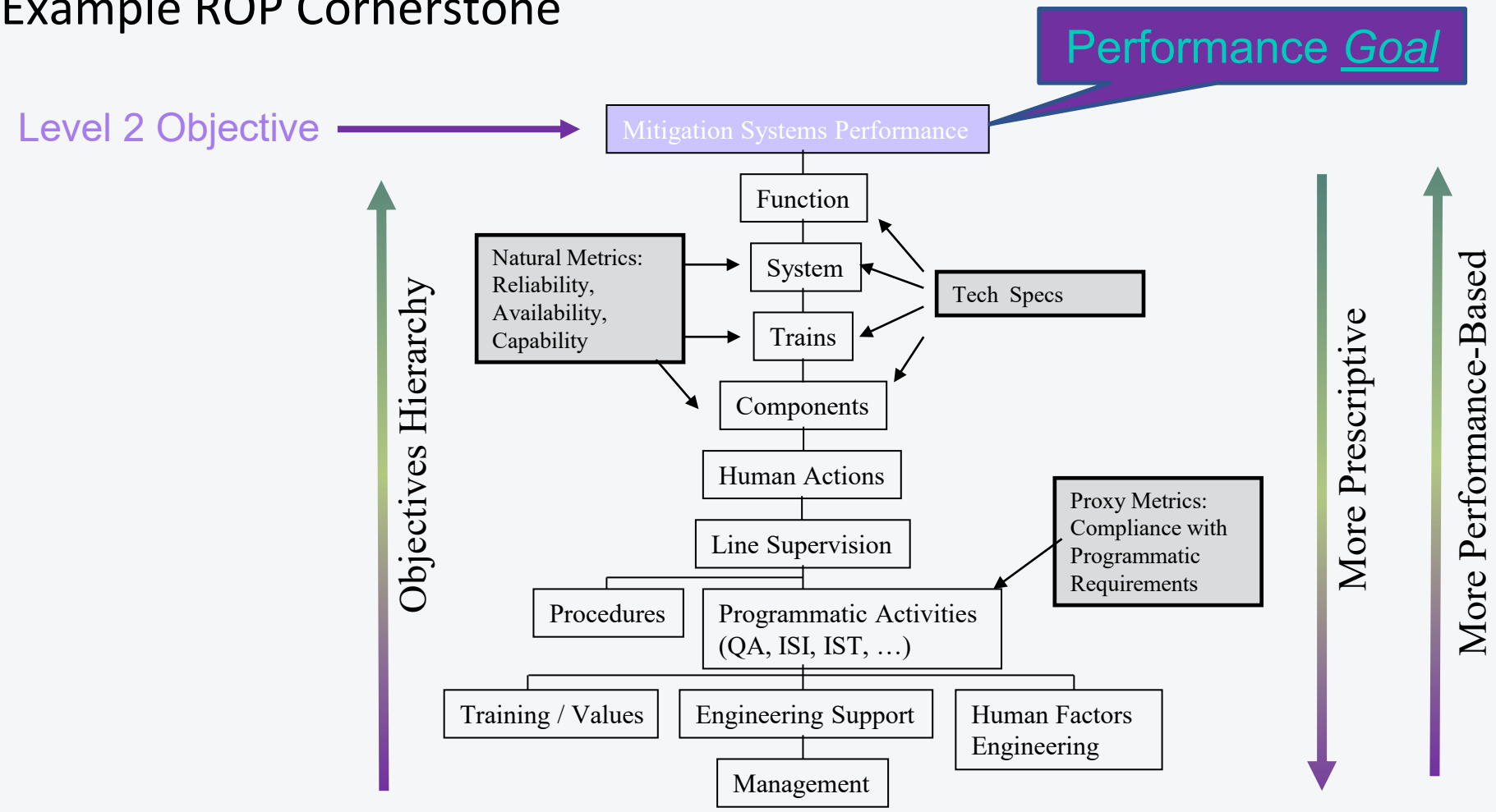
## Proven Success with Objectives Hierarchy



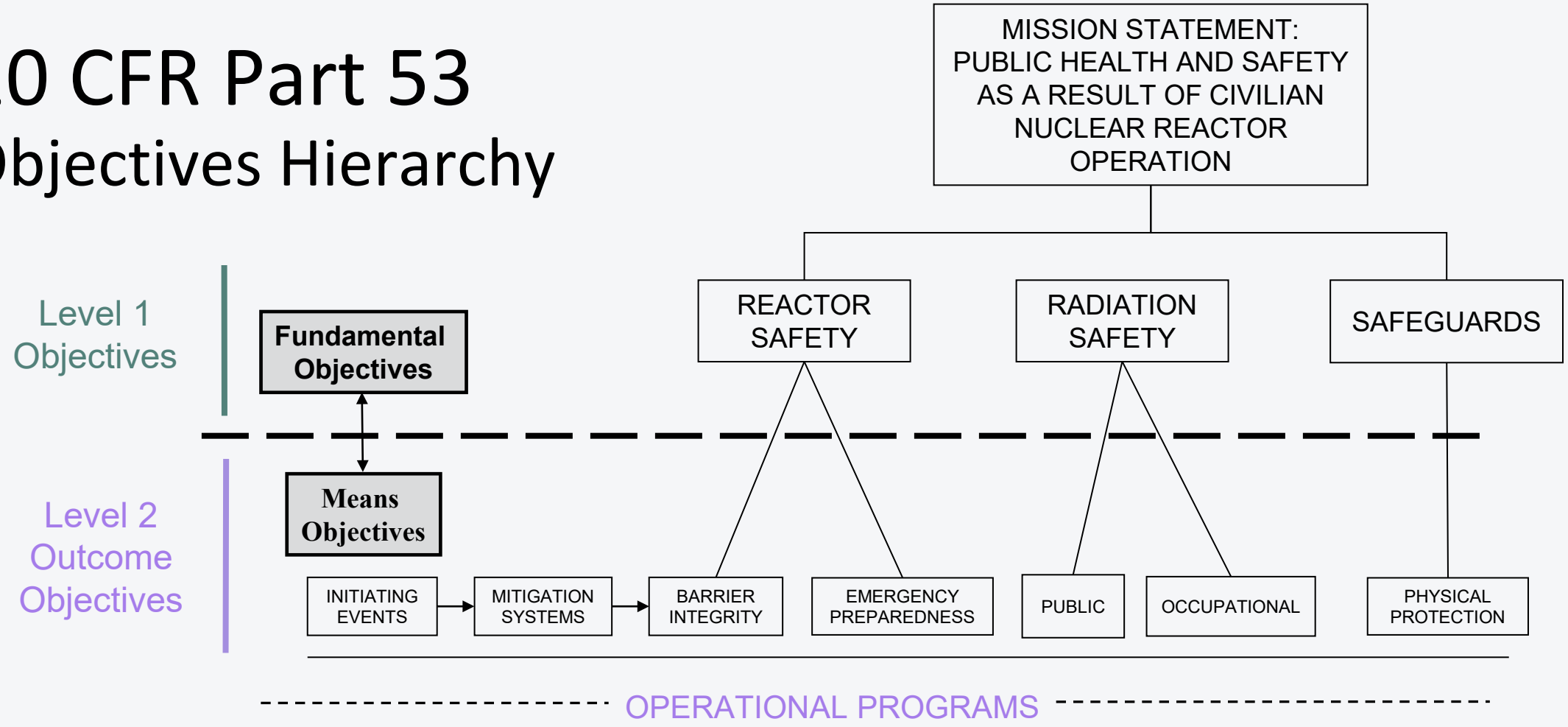

 

# Means Objectives Hierarchy

## Example ROP Cornerstone



# 10 CFR Part 53
## Objectives Hierarchy



# Operational Programs

Each applicant must describe operational programs that emphasize and reinforce industry best practices, for example in the following areas:

- Quality Management
- Human Performance
- Safety Conscious Work Environment
- Problem Identification and Resolution
- Radiation Management As Low as Reasonably Achievable
- Operator Training and Qualification

# NRC Staff Response

- What does the NRC staff think about this overview of a technology-inclusive, risk-informed and performance-based approach to Part 53?
- Does it make sense?
- Can the current rule be simplified to focus on safety performance in a structured objectives hierarchy?
- Can Framework A and B be relocated to guidance as acceptable methods vice requirements?
- What does NRC staff intend to do with this stakeholder input?

# Community of Practice (CoP)

Tomorrow, July 29, the American Nuclear Society's Risk-informed, Performance-based Principles and Policy Committee (RP3C) will host a CoP webinar, "A Performance-Based Approach for Part 53," that is open to the public.

- Stakeholders can access the RP3C CoP site on ANS Collaborate at the link below: https://collaborate.ans.org/communities/group-home?CommunityKey=0984f3cf-63e2-4c9a-8538-84c2c97c034d
- Recorded CoP presentations are posted on RP3C's website at the link below: http://www.ans.org/standards/rp3c/ (Just scroll down to find presentations)

# Quantitative Health Objectives (QHOs)

- On July 21, 2022, NRC staff briefed Commissioners and stated the following:
  - QHOs have served us well for decades
- However, this assertion does not support inclusion of QHOs in Part 53 because:
  - For decades QHOs have NOT been codified in regulation.
  - If that is the rationale, why the significant shift in policy?
  - How does this rationale comport with prior Commission direction to keep QHOs out of regulations?
- NRC staff's position continues to ignore scientific basis for why QHOs should not be codified in regulations.
  - QHOs do not provide a valid performance metric
  - QHOs do not reflect health effects observable in the population
  - QHOs introduce significant challenges associated with limitations of dosimetry
- Why does NRC staff believe that codifying QHOs is appropriate or justified?

# As Low as Reasonably Achievable (ALARA)

- NRC staff has said that they envision an ALARA program that would operate like it does with currently operating reactors.
- If this is the case, why does the staff not cross-reference existing sections of Part 50 and Part 20 for ALARA as they have done elsewhere in Part 53?
- Why does NRC staff believe that codifying ALARA is appropriate or justified?

# Facility Safety Program (FSP)

- NRC staff has said that this program should provide extra flexibility to the licensee.
- However, many stakeholders see the FSP as only a potential new burden.
- This seems to be an area where greater mutual understanding could lead to alignment.
- Could the staff please provide a theoretical example of how flexibility might be improved?

# Hearing Process Improvements

- Hearings on “contested” environmental issues are an outlier compared to other Federal agencies.
- Public access to hearings as they are currently conducted is burdensome and time consuming.
  - As such, the process may reduce or discourage public involvement.
- NRC should consider adopting an approach like that taken by other Federal agencies.
  - Contested issues are resolved through a comment/response process in parallel with the comment resolution process for the Environmental Impact Statement.
  - This process meets requirements of the National Environmental Policy Act (NEPA) and the Administrative Procedures Act (APA).
- A streamlined hearing process would be consistent with the Principles of Good Regulation and the intent of NEIMA, which is to enable “innovation and the commercialization of advanced nuclear reactors.”
- Is NRC staff willing to consider a more efficient approach to the hearing process?

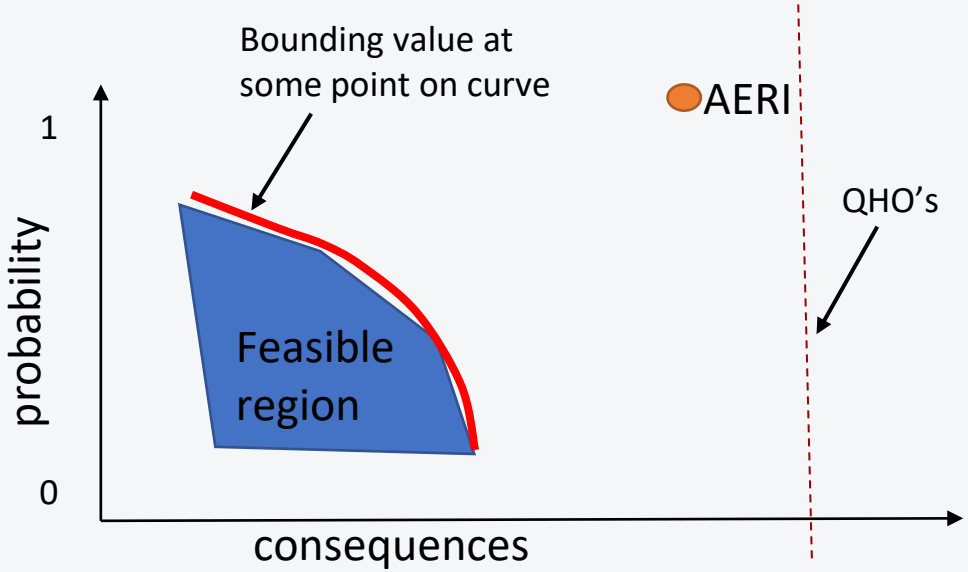
# Alternative Evaluation for Risk Insights (AERI)

- Excessively conservative bounding event
- Excessively conservative bounding event frequency
  - NRC's AERI assumes a frequency of 1 bounding event (BE) per reactor year.
  - This assumption is used to eliminate reliance on PRA to justify a postulated event frequency.
- Issues with this assumption
  - While the NRC staff's assumption successfully removes the need for a PRA, it does so at the expense of logic.
  - NRC staff indicated that "Assumed frequency of 1/yr consistent with frequency of all event sequences for LWRs," but bounding events are not "all sequences" and have specific considerations.
- How does AERI provide a performance-based, risk-informed path
- How is AERI aimed at what is "necessary and sufficient" for achieving safety goals?

# AERI (Continued)

- This alternative is contrasted to, and thereby constrained by, a PRA "mindset."
  - PRA is just one tool for risk analysis and it is not appropriate for all applications (or applicants).
  - Realistic constraints and bounding event frequencies are typically inputs to PRA, not outcomes.
- All event sequences are contained in a set of possible events
  - Analysis must be grounded in what is possible or feasible.
  - It is not feasible to have a bounding event at a reactor, rebuild the reactor, and resume operation every year.



# AERI (Continued)

- This alternative contravenes NRC policy and practice
  - If a reactor experienced a BE, the NRC would likely take enforcement action and provide close oversight under Inspection Manual Chapter 0350, “Oversight of Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns.”
  - This level of oversight would continue until NRC approved reactor restart.
  - It is unrealistic to expect a reactor would restart every year after annual BEs.
  - If a reactor had an bounding event the NRC would likely never let it operate again, let alone if it experienced a BE every year.
- History informs the future
  - The undamaged unit at Three Mile Island (TMI) was not approved to restart for several years
  - Davis-Besse required regulatory approval to restart.
- A more comprehensive view of risk must be used to ensure analysis achieves the following:
  - It is bounded by that which is possible.
  - It provides a scientifically defensible regulatory basis.
- How does AERI provide a realistic means of establishing reasonable assurance of adequate protection of public health and safety?

# Summary

We appreciate this opportunity to present to the NRC staff and reiterate the requests of numerous stakeholders for workshops to more collaboratively formulate a draft rule that is responsive to NEIMA and Society's needs.