ANS Meetings

IT'S GO TIME

Creating Momentum Toward Transformational Change

New Approaches for Licensing a Safety-Related Digital I&C Upgrade

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U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

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What I'll Be Covering Today

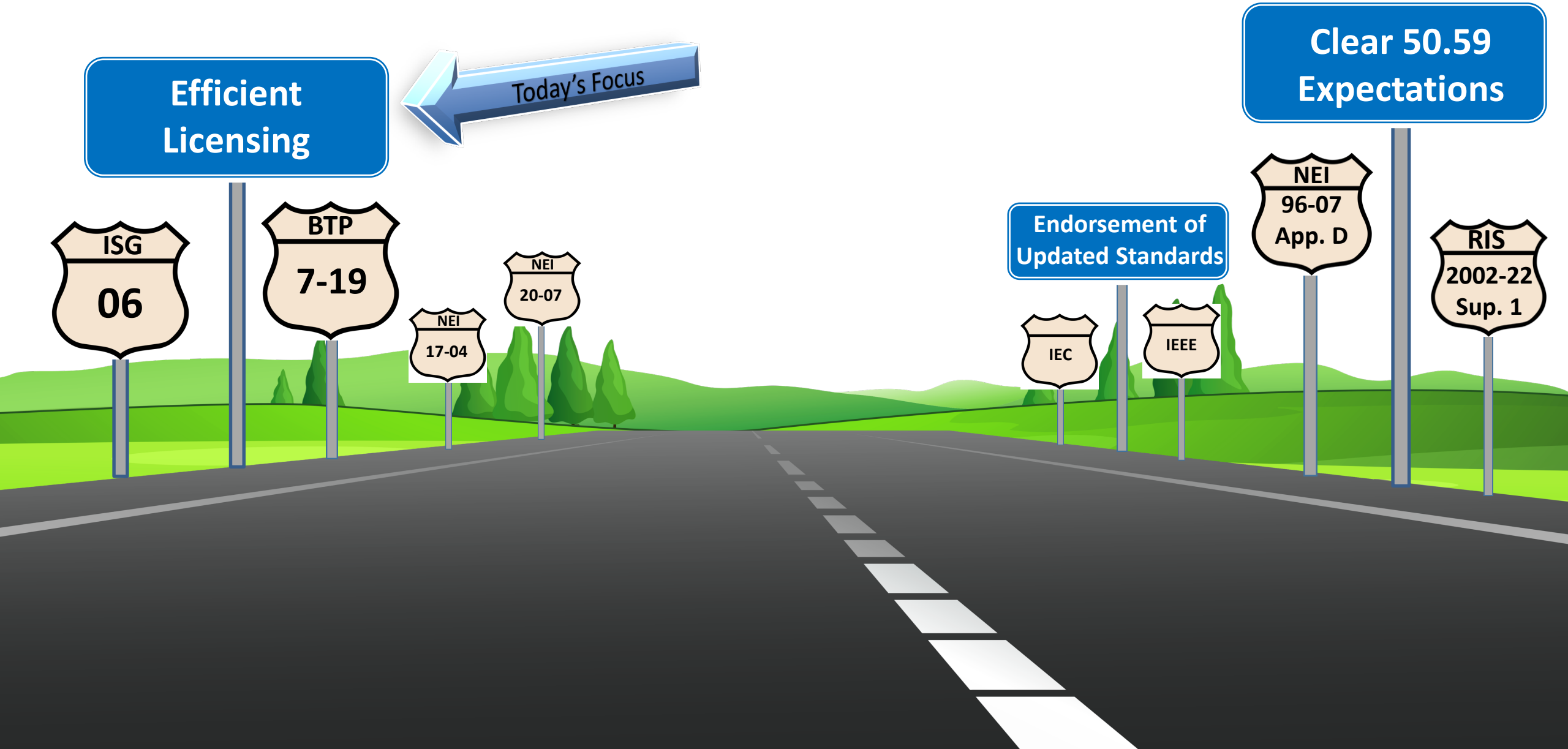
- ***NRC Vision***
- ***Licensing Initiatives & Accomplishments***
- ***What's Next***

NRC Vision for Digital I&C

"A clear regulatory structure with reduced regulatory uncertainty that enables the expanded safe use of digital I&C in commercial nuclear reactors while continuing to ensure safety and security."

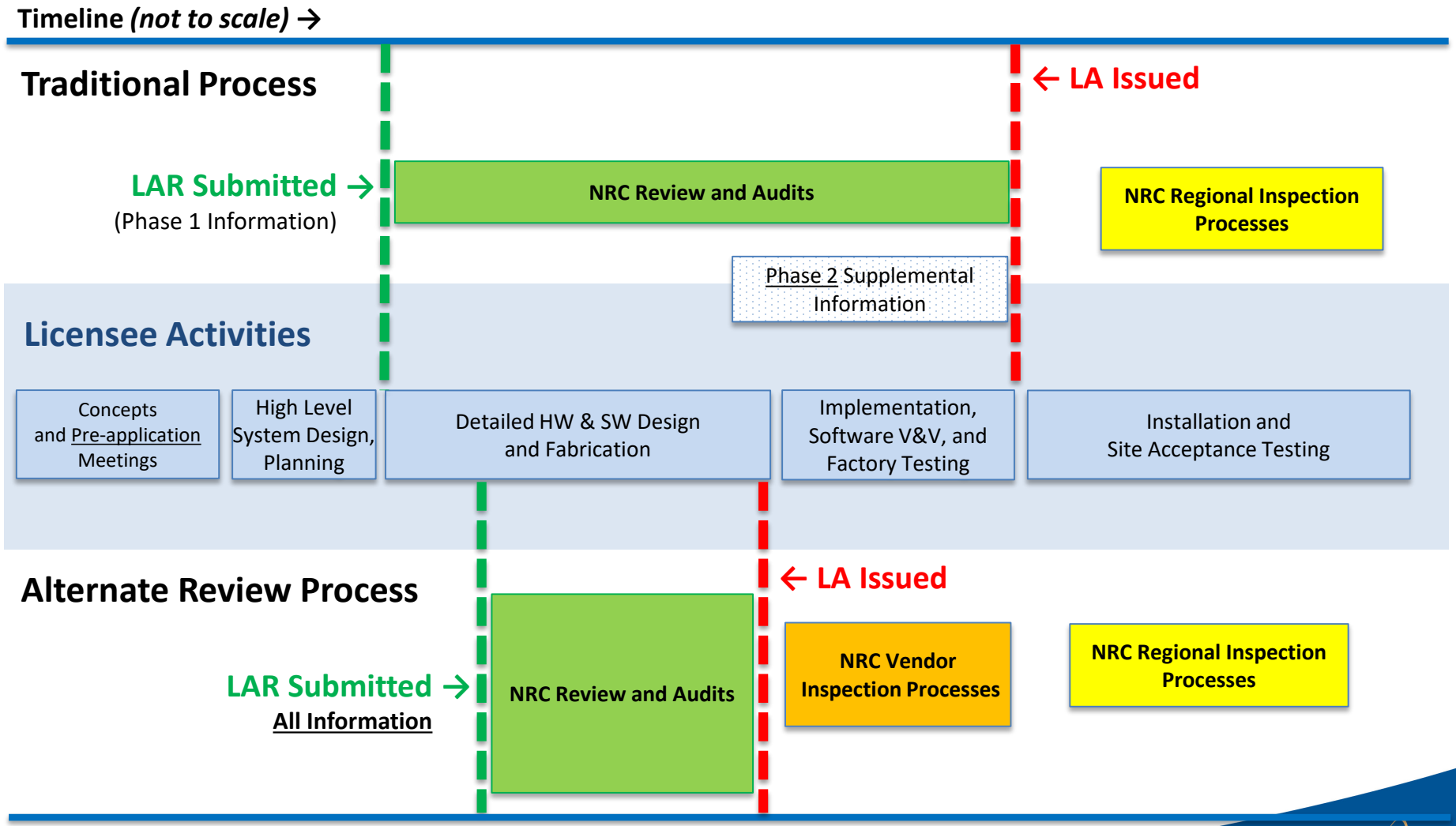
From NRC SECY-19-0112

The Road We're On



LICENSING INITIATIVES & ACCOMPLISHMENTS

NRC DI&C Interim Staff Guidance (ISG) 06 Revision 2



NRC Branch Technical Position 7-19

Risk-Informed Graded Approach

	Safety-Related	Non-Safety Related
Safety-Significant Significant contributor to plant safety	A1 **Analysis Needed:** D3 Assessment	B1 **Analysis Needed:** Qualitative Assessment
Non-Safety-Significant Not a significant contributor to plant safety	A2 **Analysis Needed:** Qualitative Assessment	B2 **Analysis Needed** None may be needed

Allows leveraging of any available risk information and insights

NRC Branch Technical Position 7-19

Clarification on Acceptable Methods for Addressing CCF

Category	Method Name and Description
Eliminate	**Internal Diversity** If sufficient diversity exists within in the protection system, then vulnerabilities to Common Cause Failure (CCF) can be considered to be appropriately addressed without further action.
	Simple Design A system is sufficiently simple such that every possible combination of inputs and every possible sequence of device states are tested, and all outputs are verified for every case.
Limit	**Design Measures** Design measures are used to reduce the likelihood of a CCF (e.g., self-diagnostic, failure analysis, etc.).
Mitigate	**Existing Equipment** An existing system or equipment is used to perform the diverse or different function to mitigate the loss of the safety function performed by the digital I&C system during a Design Basis Event (DBE).
	Manual Operator Action (MOA) Actions that can be reasonably taken by operators to identify CCF failures and mitigate consequences within a realistic time frame during a DBE.
	Diverse Actuation System (DAS) Independent and diverse system that can activate protection systems if primary system fails during a DBE. Technology used can be analog or digital.
Accept	**Consequence Calculation** Consequence models, using best estimate methodologies, demonstrated that CCF failures concurrent with DBEs and Anticipated Operational Occurrences do not result in doses that exceed 10% of the applicable siting dose guideline values.

Next step is second briefing of ACRS Subcommittee in September after staff incorporates feedback received at June Subcommittee meeting

Standards

- Endorsement of IEEE-603-2018
- Endorsement of IEEE 7-4.3.2-2016
- Considering broader use of International Electrotechnical Commission standards

Licensing Accomplishments

- **New Reactors:**
  - APR1400 Design Certification
  - NuScale Design Certification
- **Research Reactors:**
  - Purdue
  - MIT
- **Topical Reports:**
  - Lockheed Martin (Nuclear Protection & Control)
  - Mitsubishi Heavy Industries (Mitsubishi Total Advanced Controller)
  - Radiy (RadICS Digital I&C Platform)
- **Operating Reactors:**
  - Hope Creek Power Range Neutron Monitoring System

WHAT'S NEXT?

Operating Reactor License Applications

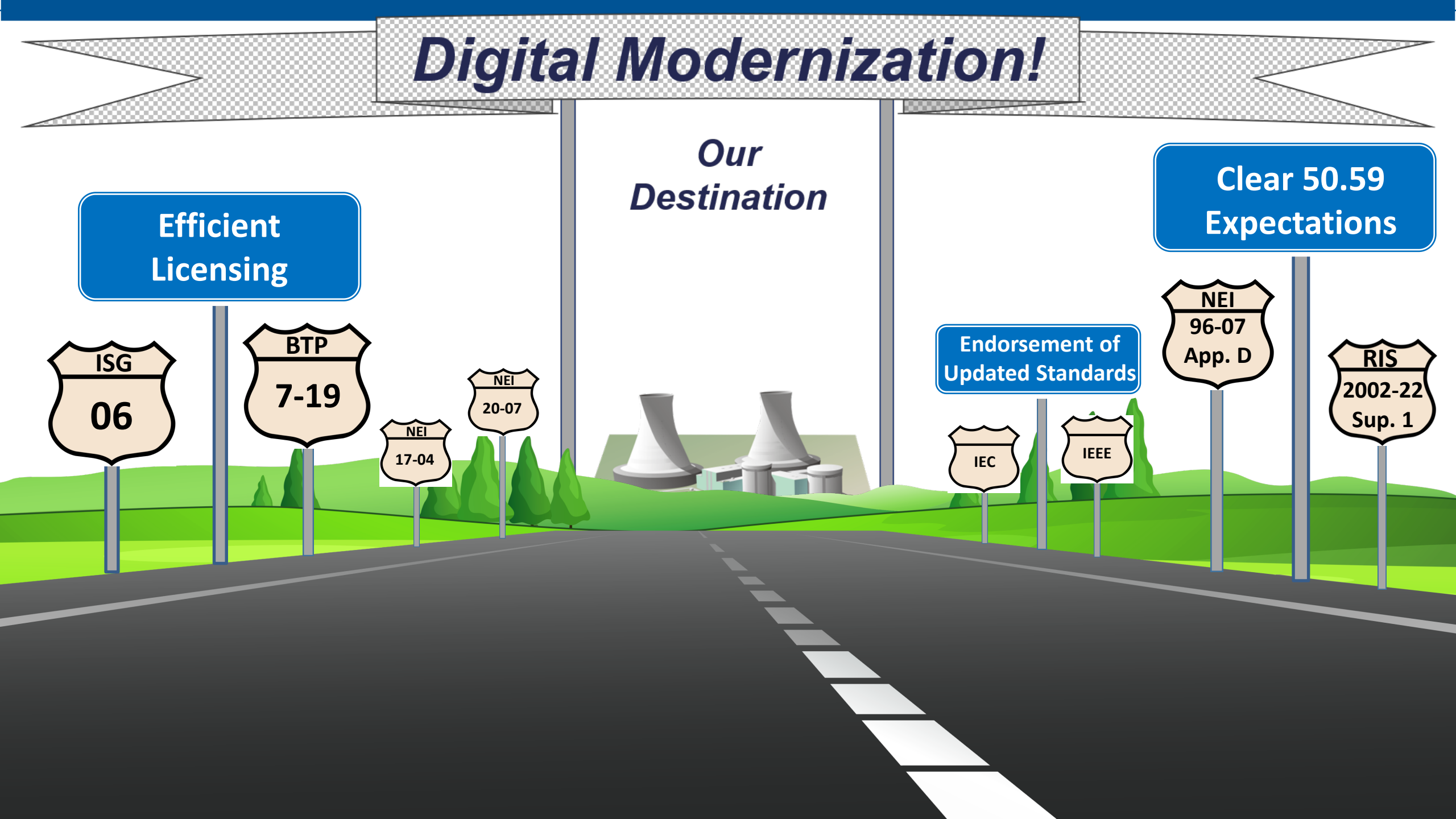
- Developing NRC safety evaluation report templates
- Assessing inspection procedure enhancements
- Preparing staff in all relevant disciplines (I&C, human factors, systems engineers, lawyers)
- Reviewing Waterford Core Protection Calculator application
- Conducting pre-application discussions with Exelon regarding a broad digital modernization license application request anticipated June 2021

Advanced Reactor Applications

- Developing NRC staff review guidance for I&C evaluations
- Preparing staff in all relevant disciplines
- Review of Oklo application

NEI 20-07

- New guidance for addressing common cause failure
- Particularly focuses on the use of defensive measures as a way to demonstrate quality of digital systems
- NEI expects to provide a draft to NRC in September


Digital Modernization!
Our Destination
Efficient Licensing
ISG 06
BTP 7-19
NEI 17-04
NEI 20-07
Endorsement of Updated Standards
IEC
IEEE
Clear 50.59 Expectations
NEI 96-07 App. D
RIS 2002-22 Sup. 1