

IMPLEMENTING INNOVATION AS A NUCLEAR REGULATOR

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ABSTRACT: The implementation of new technologies for nuclear applications involves all segments of the nuclear industry. Each segment is facing a different set of challenges and questions, some of which may require new process and greater coordination with other parts of the industry. As the regulator for the use and handling of nuclear materials for civilian purposes in the United States, the U.S. Nuclear Regulatory Commission (NRC) has consistently assessed and implemented innovative technologies in its processes and through licensees and license applicants in the U.S. This article examines how the NRC has handled innovation internally and external to our regulatory body by describing challenges and enablers to help sustain innovation while considering regulatory implications. A summarized history and description of current activities of the InnovateNRC Program is provided to explain the NRC's efforts to support the agency's transformational aspirations in becoming a modern risk-informed regulator and drive change from within.

ARTICLE: The implementation of new technologies for nuclear applications involves all segments of the nuclear industry. Each segment is facing a different set of challenges and questions, some of which may require new process and greater coordination with other parts of the industry. As regulator for the safe use and handling of nuclear materials for civilian purposes in the United States, the U.S. Nuclear Regulatory Commission (NRC) has consistently assessed and implemented innovative technologies in its processes. Also, the NRC continuously assesses how technological innovations are used by licensees and license applicants in the U.S. to protect the American people and the environment. This article examines how the NRC has approached innovation both internally and external to our regulatory body by describing examples of challenges and enablers to help sustain innovation while considering regulatory implications.

Historically, each technical area has led efforts to assess the application of new principles and methods that have the potential to increase process efficiencies while still meeting regulatory requirements. Examples include new technologies pursued by nuclear licensees, results from research and development activities, or new principles and/or methodologies proposed by professional organizations to be included in codes and standards. From a regulatory perspective, the NRC engages with experts in the specific technical field(s) as early as possible to understand the implications of these new technologies to capture diverse perspectives and a solid technical justification to ensure technologies meet applicable regulations.

The NRC has a long history of engaging with entities that are either developing or implementing disruptive innovations. However, there is ongoing work to assist the NRC become more transformative and innovative, and that might be news for some. These efforts are described in the NRC's public website under [NRC's Transformational Journey](#).

As explained in link provided above, the NRC's journey to become a modern, risk-informed regulatory agency is ongoing. This article provides insights regarding the creation and sustainability of a formal innovation program within the NRC, which is one of the focus areas supporting NRC's transformation. The challenge being addressed was that the agency did not have an agency-wide best practice to monitor and promote the progressive evolution of internal processes. In 2017, the NRC created and implemented innovation panels both at the local and agency level, with

representation from across the agency to evaluate various innovative suggestions. Then in 2018, the NRC committed to developing and began putting in place the infrastructure for an agency-level innovation program to support the pursuit of new and better ways to work while maintaining the highest safety standards. Also, the InnovateNRC program strives towards a culture that encourages, supports, and expects everyone to identify, research, prototype and implement better ways to work. Since then, the NRC has evaluated best practices and resources to establish an innovation program that allows the aspirational cultural shift for innovators to enhance agency processes. As a direct result of the request from management, the InnovateNRC Program was established.

The InnovateNRC Program saw great potential in deploying and managing a platform where innovators could interact, crowdsource solutions to common issues, and exchange ideas. The platform identified for this purpose, called [IdeaScale](#), offers capabilities for crowdsourcing within the agency, which has allowed for teamwork, networking, and the gathering of platform data. This data helps the NRC understand where the agency is actively looking for process improvements and how often different segments of the organization are considering new ways of working. The platform contributes to the holistic view the agency has adopted to assess progress towards our transformational aspirations.

The InnovateNRC Program benefits from a network of volunteers across the agency. These volunteers serve in different capacities but share a common goal: to assist and promote innovation activities. These volunteers also serve as liaisons with the InnovateNRC Program to communicate progress and to help evaluate innovative opportunities. Innovation volunteers include both staff and management at all levels to consider diverse perspectives and leverage different influence levels. Management support and participation has been instrumental to motivate staff in contributing towards innovation. The InnovateNRC Program engages with volunteers on a regular basis to maintain awareness and communication within its network.

Another enabling element has been educating the whole agency about services offered by the InnovateNRC program. The program initiated a series of podcasts where innovation related topics were discussed between a diverse group, to offer alternative views and share relevant details to spark interest on innovation. Simultaneously, a series of workshops were developed to help different segments of the organization realize their contribution towards supporting innovative initiatives. Each workshop was designed to train volunteers and other interested parties on the innovation platform, to provide recommendations for socializing ideas within their organization, and to support others in presenting ideas to increase the potential for implementation. Innovation education has allowed greater involvement and increased use of our platform. Also, it has helped others see the potential an innovative environment has on improving internal processes.

Innovators at the NRC are recognized for their contributions. Since 2021, the agency has presented an annual innovation award, where successful innovations are evaluated to select the innovation of the year. This ceremony provides visibility and perspective to the greater audience regarding examples of what can be achieved with an innovative mindset. A key element to sustaining a culture of innovation is the sharing of success stories of innovations that have been implemented across the agency. The NRC leverages the IdeaScale platform to serve this purpose and actively promotes these successes throughout the year through various mechanisms. Another key element to sustaining a culture of innovation within the NRC has been to seek out and collaborate with agency innovators leading in key technical areas. For example, the InnovateNRC program proactively engaged with those leading agency efforts to prepare for the application of [artificial intelligence](#). By doing so, the program gains insights regarding how these initiatives are shaping the landscape of technology across the agency. Also, these insights provide the program with an advantageous point of view for recognizing opportunities to coordinate and collaborate among groups that might not

typically collaborate. Networking and benchmarking opportunities within the NRC and with our external stakeholders are critical to know what is happening, to understand priorities of other like-minded programs, to compare best practices and lessons learned, while exploring opportunities for collaboration.

As regulators, a significant enabler of understanding innovation and process changes come from data. As such, the NRC has dedicated resources within its innovation efforts to assist with data collection and visualization to support decision-making. EMBARK serves as the agency center of expertise for data collection analytics and visualization to support risk-informed decision-making and is a focal point for leading multi-office transformational initiatives. Dashboards and other services provided by EMBARK are adding great value to the way the NRC is meeting its goals. Some of these products (like MAP-X) serve both NRC and external stakeholders. Their mission is to serve as the NRC's catalyst for change and is responsible for being an innovation and transformation accelerator across NRC program and corporate offices. EMBARK is a great example of how the NRC is enabling innovation by making data visualization available to support process improvement.

These efforts are promoting the cultural shift needed within the NRC to support our transformational goals. It is imperative to embrace this mentality so that our processes can adapt and grow with the progress happening outside the NRC. As the InnovateNRC program continues to support the agency's goals, early communication and alignment between all interested parties may help us to cope with the nation's increasing energy demands.