

# Technology and NEPA: A Roadmap for Innovation

## Executive Summary

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Improving American **competitiveness, security, and prosperity** depends on private and public stakeholders' ability to responsibly site, build, and deploy proposed critical energy, infrastructure, and environmental restoration projects. Some of these projects must undergo some level of **National Environmental Policy Act (NEPA) review**, a process that requires federal agencies to consider the environmental impacts of their decisions.

Technology and data play an important role in and ultimately dictate how agencies, project developers, practitioners and the public engage with NEPA processes. Unfortunately, the status quo of permitting technology falls far short of what is possible in light of existing technology. Through a workstream focused on technology and NEPA, the [Federation of American Scientists](#) (FAS) and the [Environmental Policy Innovation Center](#) (EPIC) have described how technology is currently used in permitting processes, highlighted pockets of innovation, and made recommendations for improvement.

Key findings, described in more detail below, include:

- Systems and digital tools play an important role at every stage of the permitting process and ultimately dictate how federal employees, permit applicants, and constituents engage with NEPA processes and related requirements.
- Developing data standards and a data fabric should be a high priority to support agency innovation and collaboration.
- Case management systems and a cohesive NEPA database are essential for supporting policy decisions and ensuring that data generated through NEPA is reusable.
- Product management practices can and should be applied broadly across the permitting ecosystem to identify where technology investments can yield the highest gains in productivity.
- User research methods and investments can ensure that NEPA technology are easier for agencies, applicants, and constituents to use.

## Introduction

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The Federation of American Scientists (FAS) is a nonprofit, nonpartisan organization that works to embed science, technology, innovation, and experience into government and public discourse. The Environmental Policy Innovation Center (EPIC) is a nonprofit, nonpartisan organization focused on building policies that deliver spectacular improvement in the speed of environmental progress.

FAS and EPIC have partnered to evaluate how agencies use technology in permitting processes required by NEPA. We've [highlighted pockets of innovation](#), talked to stakeholders working to streamline NEPA processes, and made evidence-based [recommendations](#) for improved [technology practices](#) in government. This work has substantiated our hypothesis that **technology has untapped potential to improve the efficiency and utility of NEPA processes and data.**

Here, we share challenges that surfaced through our work and actionable solutions that stakeholders can take to achieve a more effective permitting process.

## Background

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NEPA was designed in the 1970s to address widespread industrial contamination and habitat loss. Today, it often creates obstacles to achieving the very problems it was designed to address. This is in part because of an emphasis on adhering to an expanding list of requirements that adds to administrative burdens and encourages risk aversion.

Digital systems and tools play an important role at every stage of the permitting process and ultimately dictate how federal employees, permit applicants, and constituents engage with NEPA processes and related requirements. From project siting and design to permit application steps and post-permit activities, agencies use digital tools for an array of tasks throughout the permitting “life-cycle”—including for things like permit data collection and application development; analysis, surveys, and impact assessments; and public comment processes and post-permit monitoring.

Unfortunately, the current technology landscape of NEPA comprises fragmented and outdated data, sub-par tools, and insufficient accessibility. Agencies, project developers, practitioners and the public alike should have easy access to information

about proposed projects, similar previous projects, public input, and up-to-date environmental and programmatic data to design better projects.

Our work has largely been focused on center-of-government agencies and actions agencies can take that have benefits across government.

Key actors include:

- **The Permitting Council.** [Established](#) in 2015 through the Fixing America’s Surface Transportation Act (known as FAST-41), the Permitting Council is charged with facilitating coordination of qualified infrastructure projects subject to NEPA as well as serving as a center of excellence for permitting across the federal government. Administrative functions and salaries are [supported](#) primarily by annual appropriations. Infrastructure Investment and Jobs Act (IIJA) funding [enables](#) “ongoing operation of, maintenance of, and improvements to the Federal permitting dashboard” while Inflation Reduction Act (IRA) funding [supports](#) the center of excellence and coordination functions.
- **The Council on Environmental Quality (CEQ).** CEQ is an office within the Executive Office of the President established in 1969 through the National Environmental Policy Act. Executive Order 11991, issued in 1977, gave CEQ the authority to issue regulations under NEPA. However, President Trump rescinded that EO in January 2025 and issued a new Executive Order on [Unleashing American Energy](#). This new Executive Order directs the Chair of CEQ to provide “guidance on implementing the National Environmental Policy Act...and propose rescinding CEQ’s NEPA regulations found at 40 CFR 1500 et seq.” CEQ has received annual appropriations to support staff as well as supplemental funding. The IRA [provided](#) CEQ with \$32.5 million to “support environmental and climate data collection efforts and \$30 million more to “support efficient and effective environmental reviews.”

Below, we outline key challenges identified through our work and propose actionable solutions to achieve a more efficient, effective, and transparent NEPA process.

## Challenges and Solutions

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Challenge: Product management practices are not being applied broadly to the development of technology tools used in NEPA processes.

Applying product management practices and frameworks has potential to drastically improve the return on investment in permitting technology and process reform.

**Product managers** help shepherd the concept for what a project is trying to achieve and get it to the finish line, while **project managers** ensure that activities are completed on time and on budget. In a [recent blog post](#), Jennifer Pahlka (Senior Fellow at the Federation of American Scientists and the Niskanen Center) contrasts the project and product funding models in government. Product models, executed by a team with product management skills, facilitate iterative development of software and other tools that are responsive to the needs of users.

Throughout our work, the importance of [product management](#) as a tool for improving permitting technology has become abundantly clear; however there is substantial work to be done to institutionalize product management practices in policy, technology, procurement, and programmatic settings.

### Solutions:

- **Create process maps for the permitting process - in detail - within and across agencies.** Once processes are mapped, agencies can develop tailored technology solutions to alleviate identified administrative burdens by either removing, streamlining, or automating steps where possible and appropriate. As part of this process, agencies should evaluate [existing software assets](#), use these insights to streamline approval processes, and expand access to the most critical applications. Agencies can work independently or in collaboration to inventory their software assets. Mapping should be a collaborative, iterative effort between project leads and practitioners. Mapping leads should consider whether the co-development of user journeys with practitioners who play different roles in the permitting process, such as applicants, environmental specialists (federal employees), and public commenters, would be a useful first step to help scope the effort.
- **Hire product management and customer experience specialists in strategic roles.** Agencies and center of government leaders should carefully consider

where product management and customer experience expertise could support innovation. For example, the Permitting Council could hire a product management specialist or customer experience expert to consult with agencies on their technology development projects. Fellowship programs like the Presidential Innovation Fellows (PIF) or U.S. Digital Corps can be leveraged to provide agencies with expertise for specific projects.

- **Strategically leverage existing product management guidance and resources.** Agencies should use existing resources to support product management in government. The 18F unit, part of the General Services Administration (GSA)'s Technology Transformation Services (TTS), helps federal agencies build, share, and buy technology products. 18F offers a number of [tools](#) to support agencies with product management. [GSA's IT Modernization Centers of Excellence](#) can support agency staff in using a product-focused approach. The Centers focused on Contact Center, Customer Experience, and Data and Analytics may be most relevant for agencies building permitting technology. In addition, the [U.S. Digital Service](#)<sup>1</sup> (USDS) "collaborates with public servants throughout the government"; their staff can assist with product, strategy, and operations as well as procurement and user experience. 18F and USDS could work together to provide product management training for relevant staff at agencies with a NEPA focus. 18F or USDS could create product management guidance specifically for agencies working on permitting, expanding on the [18F Product Guide](#). These resources could also explore how agencies can make decisions about building or buying when developing permitting technology. Agencies can also look to the private sector and NGOs for compelling examples of product development.
- **Learn from successes at other agencies.** We have written about how agencies have successfully applied product management approaches [inside](#) and [outside](#) of the NEPA space.

## Challenge: Siloed, fragmented data and systems cost money and time for governments and industry

As one partner said, "NEPA is where environmental data goes to die." Data is needed to inform both risk analysis and decisions; data can and should be reused for these purposes. However, data used and generated through the NEPA process is often siloed and can't be meaningfully used across agencies or across similar projects.

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<sup>1</sup> The Trump Administration has proposed renaming the U.S. Digital Service to the U.S. Department of Government Efficiency Service.

Consequently, applicants and federal employees spend time and money collecting environmental data that is not meaningfully reused in subsequent decisions.

#### Solutions:

- **Develop a data fabric and taxonomy for NEPA-related data.** [CEO's Report to Congress on the Potential for Online and Digital Technologies to Address Delays in Reviews and Improve Public Accessibility and Transparency](#), delivered in July 2024, recommends standards that would give agencies and the public the ability to track a project from start to finish, know specifically what type of project is being proposed, and understand the complexity of that project. The federal government should pilot interagency programs to coordinate permitting data for existing and future needs. Chief Environmental Review and Permitting Officers (CERPOs) should invest in this process and engage their staff where applicable and appropriate.
- **Establish a [Digital Service for the Planet](#) to work with agencies specifically on how environmental data is collected and shared across agencies.** The Administration should create a Digital Service for the Planet (DSP) that is staffed with specialists who have prior experience working on environmental projects. The DSP should support cross-agency technology development and improve digital infrastructure to better foster collaboration and reduce duplication of federal environmental efforts to achieve a more integrated approach to technology—one that makes it easier for all stakeholders to meet environmental, health, justice, and other goals for the American people.
- **Centralize access to NEPA documents and ensure that a user-friendly platform is available to facilitate public engagement.** The federal government should ensure public access to a centralized repository of NEPA documents, and a searchable, user-friendly platform to explore and analyze those documents. Efforts to develop a user friendly platform should include [dedicated digital infrastructure](#) to continually update centralized datasets and an associated dashboard. Centralizing searchable historical NEPA documents and related agency actions would make it easier for interested parties to understand the environmental assessments, analyses, and decisions that shape projects. Congress can require and provide resources to support this, agencies can invest staff time in participation, and agency leaders can set an expectation for participation in the effort.

## Challenge: Technology tools used in NEPA processes fall far short of their potential

The status quo of permitting technology [falls far short](#) of what is possible in light of [existing technology](#). Permitting tools we identified in our [inventory](#) range widely in intended use cases and maturity levels. Opportunities exist to reduce feature fragmentation across these tools and improve the reliability of their content. Additionally, many software tools are built and used by a single agency, instead of being efficiently shared across agencies. Consequently, technology is not realizing its potential to improve environmental decision-making and mitigation through the NEPA process.

### Solutions:

- **Set [more ambitious modernization goals](#).** We have the technological capabilities to go above and beyond data fabric and taxonomy. CEQ and the Permitting Council can focus on helping agencies scale successful permitting technology projects and develop decision support tools. This could include **supporting agency tools to bring e-permitting into the modern era, which speeds processing time and saves staff time**. Agency tools to enhance could include USACE's Regulatory Request System and tool for tracking wetland mitigation credits (RIBITS), USFWS's tool for Endangered Species Act consultation (IPaC), the Permitting Council's FAST-41 dashboard, and CEQ's eNEPA tool. Policymakers and staff working to improve permitting technology should consider replicating the functionality of successful existing tools, and automating the determination of "application completeness", which has frequently been cited as a source of delays.
- **Institutionalize human centered design (HCD) principles and processes.** Agencies should encourage and incentivize deployment of HCD processes. The Permitting Council, GSA, and agency leadership can play a key role in institutionalizing these principles through agency guidance and staff training. Applying human-centered design can ensure thoughtful, well-designed automation of tasks that free up staff members to focus their limited time and attention on matters that need their focus and, crucially, increase the number of NEPA decisions the federal government is able to reach in a designated period of time.
- **Prioritize development of digital applications with easy-to-use forms.** Application systems may look different from agency to agency depending on their specific needs, but all should prioritize easy-to-use forms, working

collaboratively where applicable. Relevant HCD principles include entering data once, user-friendly templates or visual aids, and auto-populating information. Eventually, more advanced features could be incorporated into such forms—including features like AI-generated suggestions for application improvements, fast-tracking reviews for submissions that use templates, and highlighting deviations from templates for review by counsel.

- **Create better pre-design tools to give applicants more information about where they can site projects.** Improved pre-design tools can help applicants anticipate components of a site that may come up in environmental reviews, such as endangered species. Examples include [Vibrant Planet’s landscape resilience tool](#) and the [USFWS iPAC platform](#). These platforms can be developed by agencies or by private-sector and nonprofit organizations. Agencies should seek opportunities to invest in tools that meet multiple needs or provide shared services. The Permitting Council and/or CEQ could lead an interagency task force on modernizing permitting and establish a cross-agency workflow to prevent the siloing of these tools and support agencies in pursuing shared services approaches where applicable.
- **Invest in decision-support tools to better equip federal employees.** Many regulators lack either the technical skillset to review projects and/or lack the confidence to efficiently and effectively review permit applications to the extent needed. Decision-support tools are needed to lay out all options that the reviewer needs to be aware of to make an informed and timely decision that isn’t based on institutional knowledge (e.g., existing categorical exclusions or nationwide permits that fit the project). These types of decision-support tools can also help create more consistency across reviews. CEQ and/or the Permitting Council could establish a cross-agency workflow to prevent siloing of these tools and support agencies in pursuing shared services approaches where applicable.

**Challenge: Existing NEPA technology tools are difficult for agencies, applicants, and constituents to use**

Agencies generally do not conduct sufficient user research in the development of permitting technology. This can be because agencies do not have the resources to hire product management expertise or train staff in product management approaches. Consequently, agencies may only engage users at the very end (if at all), or not think expansively about the range of users in the development of technology for NEPA



applications. Advocacy groups and permit applicants aren't well considered as tools are being developed. As a consequence, permitting forms and other tools are insufficiently customized for their sectors and audiences.

### Solutions:

- **Incorporate user research into existing projects.** Agencies can build user experience activities and funding into project plans and staffing for bespoke permitting tool development. There are resources available to agencies to incorporate user research if they don't have the talent in-house (as many don't). These include the 18F unit, GSA's IT Modernization Centers of Excellence, USDS, and the Presidential Innovation Fellows program.
- **Elevate case studies of agencies using user research to improve product delivery.** As a center of excellence, the Permitting Council can support elevating agencies using user research. CEQ can also support sharing both challenges and opportunities across agencies. CERPOs can exchange ideas and elevate case studies to explore what is working.
- **Launch a [regulatory sandbox](#) for permitting.** A sandbox would allow testing of different forms and other small interventions. The sandbox would provide an environment for intentional AB testing (e.g., test a new permitting form with ten applicants). The sandbox could be managed by the Permitting Council or another agency, but responsibility to oversee the sandbox should be contained within one single agency. This office should be empowered to offer waivers or exemptions. Ideally, a customer experience specialist would lead the activities of the sandbox. Improving forms that project proponents or public commenters might encounter during the NEPA process is low-hanging fruit that could be a first focus area for the sandbox. Better forms would make processes simpler for applicants, but would also make it possible for agencies to receive and manage associated geospatial and environmental data with applications.

### Challenge: Poor understanding of the costs and benefits of NEPA processes

Costs and benefits of the federal permitting sector have to date been poorly quantified, which makes it difficult to decide where to invest in technology, process reform, talent, or a combination. Applying technology solutions in the wrong place or at the wrong time could make processes more complicated and expensive, not less. For instance, automating a process that simply should not exist would be a waste of

resources. At the same time, eliminating processes that provide critical certainty and consistency for developers while delivering substantial environmental benefits would work against goals of achieving greater efficiency and effectiveness.

A more reliable, comprehensive accounting of NEPA costs and benefits will help us design solutions that cost less for taxpayers, better account for public input, and enable rapid yet responsible deployment of energy infrastructure and other critical projects.

#### Solutions:

- **Equip agencies with case management systems that automatically collect data needed for process evaluation.** Case management software systems support coordination across multiple stakeholders working on a shared task (e.g., an Environmental Impact Statement). Equipping agencies with these systems would enable automatic capture of data needed to conduct rigorous cost-benefit assessments, providing researchers with rich data to study the impacts of policy interventions on staff time and document quality. Automatic data collection would also drastically reduce the need for expensive and time-consuming retrospective data gathering and analysis efforts. and
- **Rapidly execute on a permitting research agenda to support innovation.** Establishing a robust case management system may take time. In the interim, agencies, philanthropy, nonprofits, and others can undertake research projects that inform nearer-term decisions about NEPA. Collaborations with user researchers, designers, and product managers will make this research agenda successful. Key gaps a research agenda could address include:
  - **Money and Time Federal Agencies Spend on NEPA Tasks**
    - How many staff whose primary job is spent on permitting-related tasks does each agency employ at the national, region, and field levels? The study scope could start with the agencies on the Permitting Council, as they are agencies with relatively large roles in the permitting process.
    - How do staffing levels correspond with the number and kind of permitting actions by region and field office? Sources for agency staffing data could include General Services Administration employment classifications and agency NEPA offices.
    - What is each agency's total budget allocated for NEPA review? Do budget codes accurately reflect permitting work?

- **Research Gap 2: Private Sector Cost and Scale.** The NEPA sector is larger than just the federal government. For example, private-sector consulting firms sometimes help project sponsors prepare their applications and navigate federal processes. A number of private sector entities support the permitting process through government contracts. Questions include:
  - What is the total market size of the permitting private sector (dollar amount and employees)?
  - What percent is spent on federally mandated permits? How does this break down by task? What are the most expensive labor components and why?
- **Research Gap 3: Technology-related Costs**
  - Building on FAS and EPIC's [permitting inventory](#), what is the annual technology budget for each agency's major permit tracking system? Answers to this question should include both internal and external staff costs.
  - How many years has each system been in operation? How did the application receive initial funding (e.g., appropriation, general fund, permitting-specific budget)? This helps us know 1) which systems are likely in the most need of an upgrade and 2) how likely it is that funding will be available in the future to modernize.

## Conclusion

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Policymakers, agencies, and permitting stakeholders should recognize the important role that systems and digital tools play in every stage of the permitting process and take steps to ensure that these technologies meet user needs. Developing data standards and a data fabric should be a high priority to support agency innovation and collaboration, while case management systems and a cohesive NEPA database are essential for supporting policy decisions and ensuring that data generated through NEPA is reusable. Leveraging technology in the right place at the right time can support permitting innovation that improves American competitiveness, security, and prosperity.