



# Data-Driven Autonomous Decision Making

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PNNL is operated by Battelle for the U.S. Department of Energy

PNNL-SA-211327

# AI and LLM Primer



# AI and LLM

## Perspective: Human-Like Reasoning

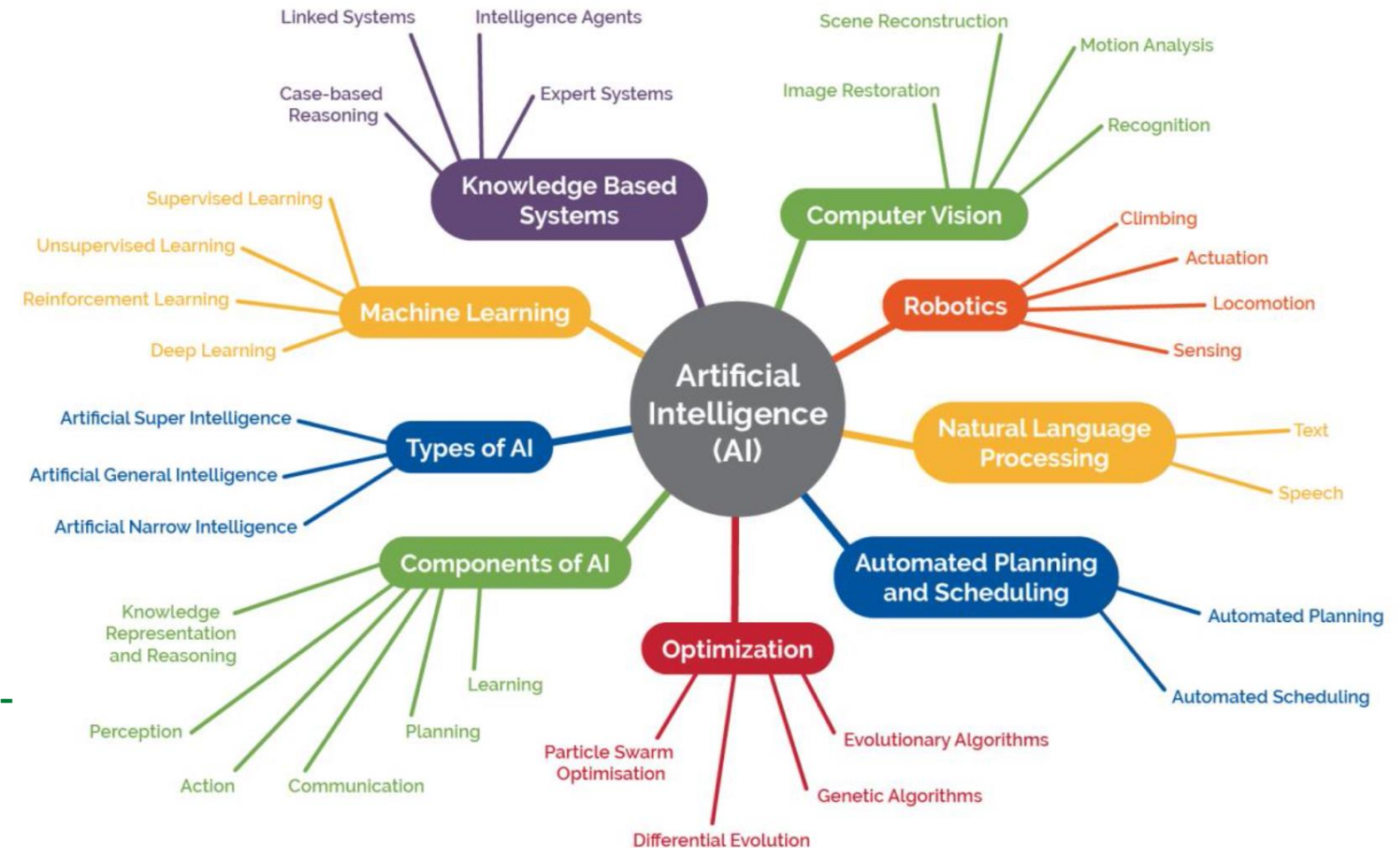
“The theory and development of computer systems able to perform tasks normally requiring human intelligence such as, visual perception, speech recognition, learning, decision-making, and natural language processing.”

## Perspective: An Algorithm that Pursues a Goal

“Any computational method that is made to act independently towards a goal based on inferences from theory or patterns in data.”

## Perspective: Intelligence Augmentation

“Augmented intelligence is a design pattern for a human-centered partnership model of people and artificial intelligence (AI) working together to enhance cognitive performance, including learning, decision making, and new experiences.”



# Modern AI/LLM Development Lifecycle

## 1. Data Collection 📊

This is where we gather \*huge\* amounts of text (for LLMs) or text and images (for VLMs). Think of it as collecting all the books, websites, and pictures the model will learn from.



## 2. Data Processing 🛠️

Raw data can be messy! This step involves cleaning the data, fixing errors, removing irrelevant parts, and getting it ready for the model to understand. It's like organizing and cleaning up the collected books.



## 3. Data Augmentation ✨

To make the model even smarter and more robust, we sometimes create new training examples by slightly changing the existing data. For text, this could be changing sentence structure. For images, it could be rotating or zooming. This helps the model learn to handle variations.



## 4. Pre-training 📖

This is the \*massive\* initial training phase! The model reads and learns from the enormous dataset (trillions of words!). It learns grammar, facts, reasoning, and how words relate to each other by trying to predict the next word. This takes a lot of time and powerful computers!





# Modern AI/LLM Development Lifecycle

## 5. Post-training & Alignment

After pre-training, the model is smart but might not always be helpful or safe. This stage involves further training to make the model follow instructions better, be less likely to generate harmful content, and align with human values. Think of it as teaching the smart robot good manners and how to be helpful.



## 6. Fine-tuning

If you want the LLM to be really good at a *\*specific\** task (like writing poems, or answering medical questions), you give it more training on a smaller, specialized dataset for that task. This is like teaching a general-purpose robot a specific skill.



## 7. Domain Adaptation

Sometimes, you want the LLM to work well with text from a very specific area or 'domain' (like legal documents or scientific papers). Domain adaptation is like helping the model understand the special language and concepts used in that specific field.



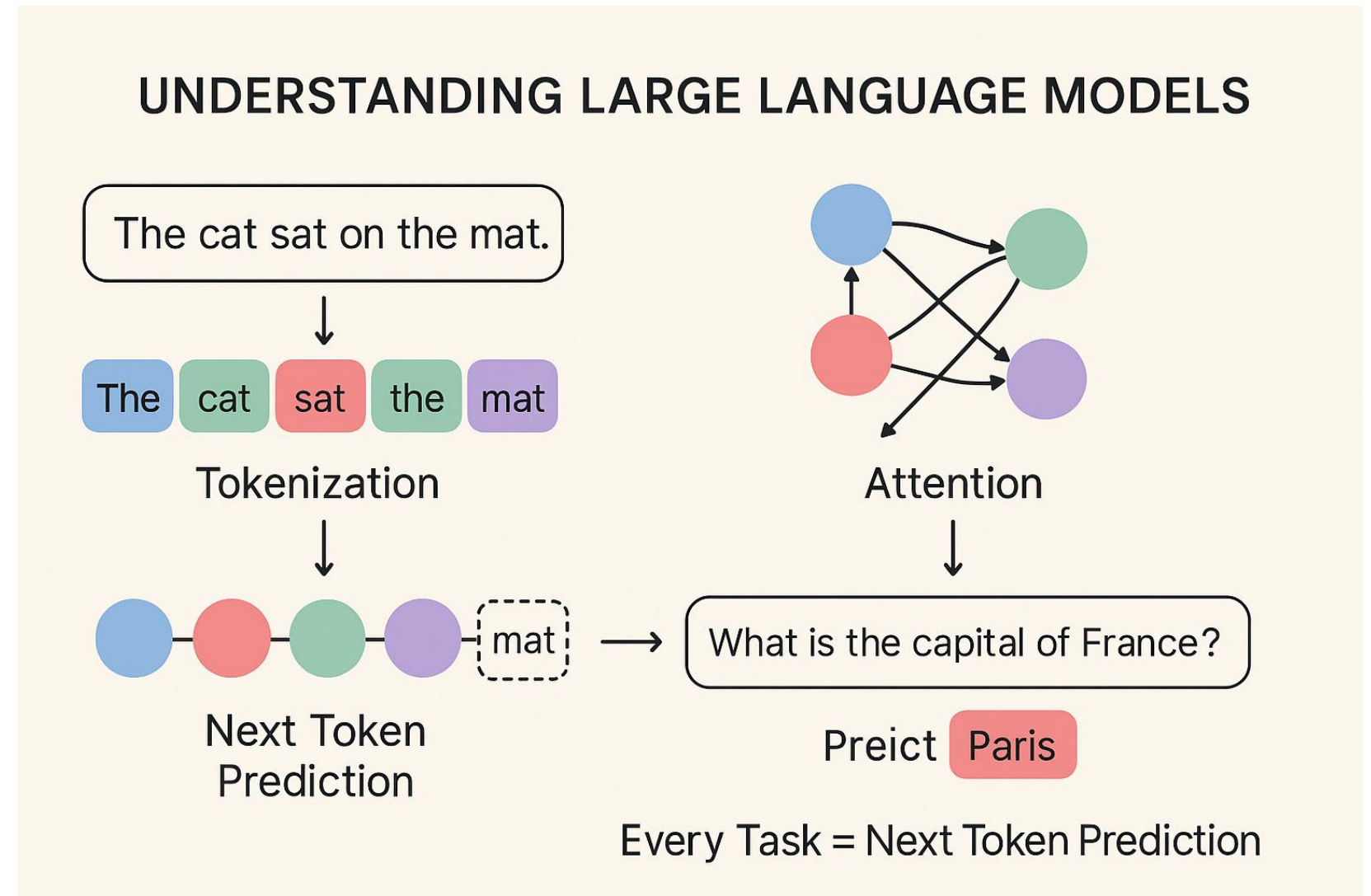
## 8. Evaluation

Throughout and after training, we test the model on data it has *\*never\** seen before to see how well it's performing on different tasks and if it's safe and helpful. We measure its accuracy and quality.

# Understanding Large Language Models (LLMs)

Imagine a super-smart computer program that's read tons and tons of books, articles, and websites. It learns how words usually go together and can then create new sentences, answer questions, and even write stories!

That's kind of what a Large Language Model (LLM) is. LLMs are great at understanding and generating human language.



GPT-4 generated this image with the prompt "Create a a GIF that help 8-grader to understand Large Language Model, Help to understand how Tokenization works, how attention works, how next token prediction works, how every task is an instance of next token prediction"

Did you note the spelling mistake in the image above?

# LLM Primer

## Tokenization Breaking Down the Code

Tokenization - Computers are great with numbers, but not so much with words directly. So, the first step is to break down sentences into smaller pieces they \*can\* understand. These pieces are called "tokens". Tokens can be whole words, parts of words (like "ing" or "un"), or even punctuation.

It's like taking a big Lego structure apart into individual bricks!

Type your own sentence below and watch it turn into tokens:

Let's bring Permitting Technology into the 21st Century !

Let

s

bring

Permitting

Technology

into

the

21st

Century

!

**Cool Fact:** LLMs use different ways to tokenize. Some break words into smaller "subwords" so they can handle new or misspelled words better!

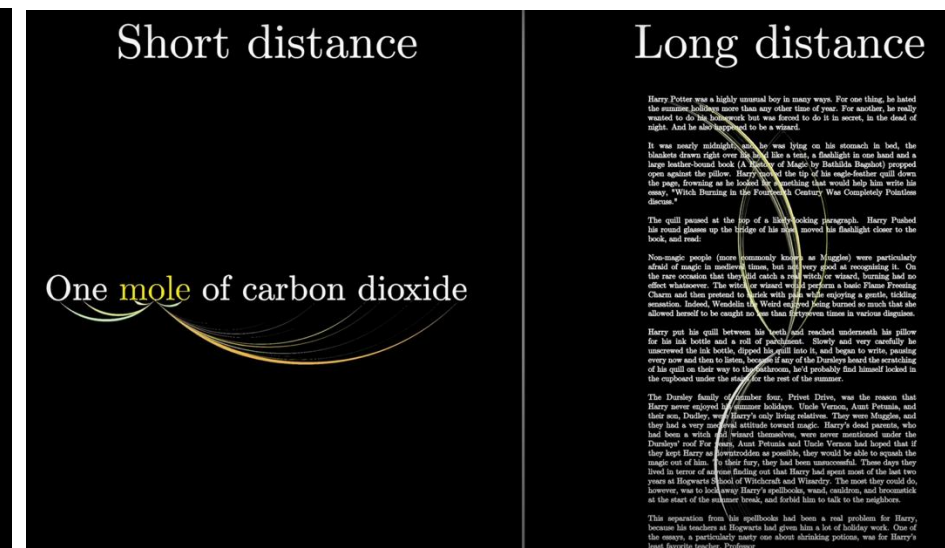
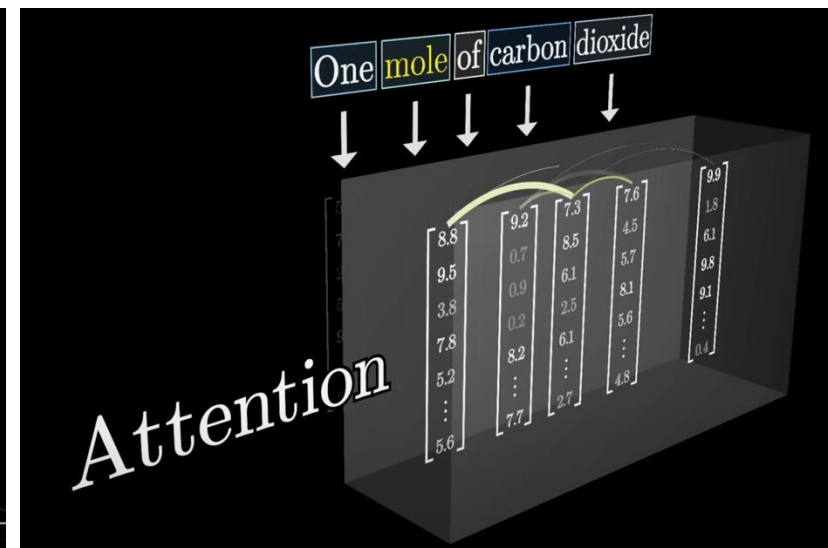
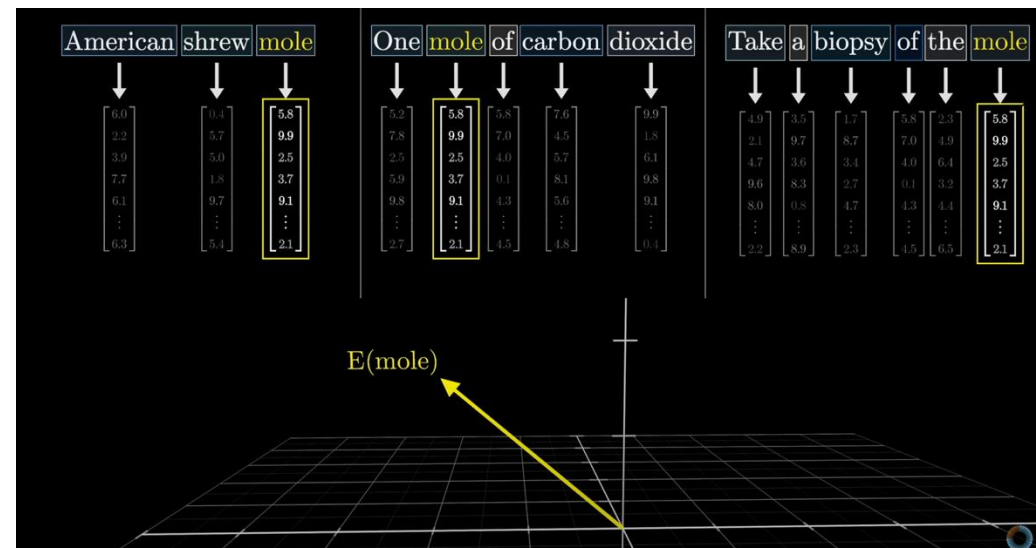


# LLM Primer

## Attention - Who's Talking to Who? 🇺🇸

When you read a sentence, you naturally know which words are important and how they relate to each other.

LLMs need to do this too! "Attention" is a clever mechanism that helps the model figure out which words in the sentence are most important when it's thinking about a specific word.



# LLM Primer


## Next Token Prediction - The Guessing Game 🧠

At its core, a lot of what an LLM does is try to predict the *\*very next\** token that should come in a sequence. Based on everything it's seen before (the input text and the tokens it has already generated), it calculates the chances (probabilities) for *\*every possible\** next token.

### Temperature: Controlling Creativity 🔥

When predicting the next token, the LLM doesn't *\*always\** pick the single most likely one. "Temperature" is a setting that controls how adventurous the model is.

Input sequence: "Let's bring Permitting Technology into the 21st"

Temperature:  0.7

Predict Next Token!

The model thinks the most likely next token is: **Century**

Here are the possibilities the model considered (probabilities adjusted by temperature):

Century: 63.7%

century: 17.2%

.: 11.4%

st: 4.6%

C.: 2.4%

year: 0.6%

**How it Chooses:** With temperature, the model still uses probabilities, but temperature "smooths" or "sharpens" these probabilities before making a choice.

# LLM Primer

Everything is a Prediction Task! ✨

Almost anything you ask an LLM to do can be framed as predicting the next token. The LLM just keeps predicting token after token until it thinks it's finished the task.

## Task: Translation 🌐➡🇫🇷

*Input: Translate English to French: 'Hello'*

**Model Predicts: 'Bonjour'** (It predicts the French tokens that should follow the instruction)

## Task: Summarization 📖➡✍️

*Input: Summarize this article: [A really long article about space]*

**Model Predicts: [A short summary about space]** (It predicts the tokens that condense the article)

## Task: Question Answering 🤔➡💡

*Input: Answer this question: 'What is the capital of France?'*

**Model Predicts: 'Paris'** (It predicts the tokens that directly answer the question)



# LLM Primer

LLM Agents - Using Tools! 🤖🔧

Imagine giving the smart LLM brain the ability to *\*do\** things in the real world, not just generate text! That's where LLM Agents come in. An agent is an LLM that can decide to use external "tools" or APIs (Application Programming Interfaces) to get information or perform actions.

Think of tools as special gadgets the LLM can use, like a calculator, a search engine, or a weather app.

Ask the Agent:

What's the weather in Vienna today?

Ask Agent

Agent Thinking: 🤔 I need to understand the user's request.

Agent Thinking: The user is asking about the weather. I need a weather tool.

Agent Calling Tool: 🔧 Calling **WeatherTool** with query: 'weather in vienna today'...

Tool Result: ✅ WeatherTool returned: 'Sunny, 65°F'

Agent Response: Based on the weather tool, the weather in vienna today is Sunny, 65°F.

When you give an agent a task, it:

**Thinks:** It uses its language understanding to figure out what you want.

**Decides:** It decides if it needs a tool to complete the task.

**Calls Tool:** If needed, it figures out *\*which\** tool to use and *\*what information\** to give the tool (like asking a weather tool for the weather in a specific city). This is like using an API.

**Gets Result:** The tool performs the action and gives the result back to the agent.

**Responds:** The agent uses the tool's result (and its own knowledge) to give you a final answer in natural language.

# LLM + Human Decision Making

- ❖ Cognitive Model Priors
- ❖ Collaborative Decision Making
- ❖ Understanding Limitations

# Cognitive Model Priors: LLMs as Master Conversationalists

- The Turing's "imitation game." If the interrogator couldn't correctly determine which respondent was the computer and which was the human, it would suggest, on a very general level, that the machine could imitate a human.
- 3-party Turing test: Participants communicate with both a human and AI, then decide which is which
- Current Status: LLMs excel as master conversationalists

NEWS FEATURE | 25 July 2023

## ChatGPT broke the Turing test – the race is on for new ways to assess AI

Large language models mimic human chatter, but scientists disagree on their ability to reason.

By [Celeste Biever](#)

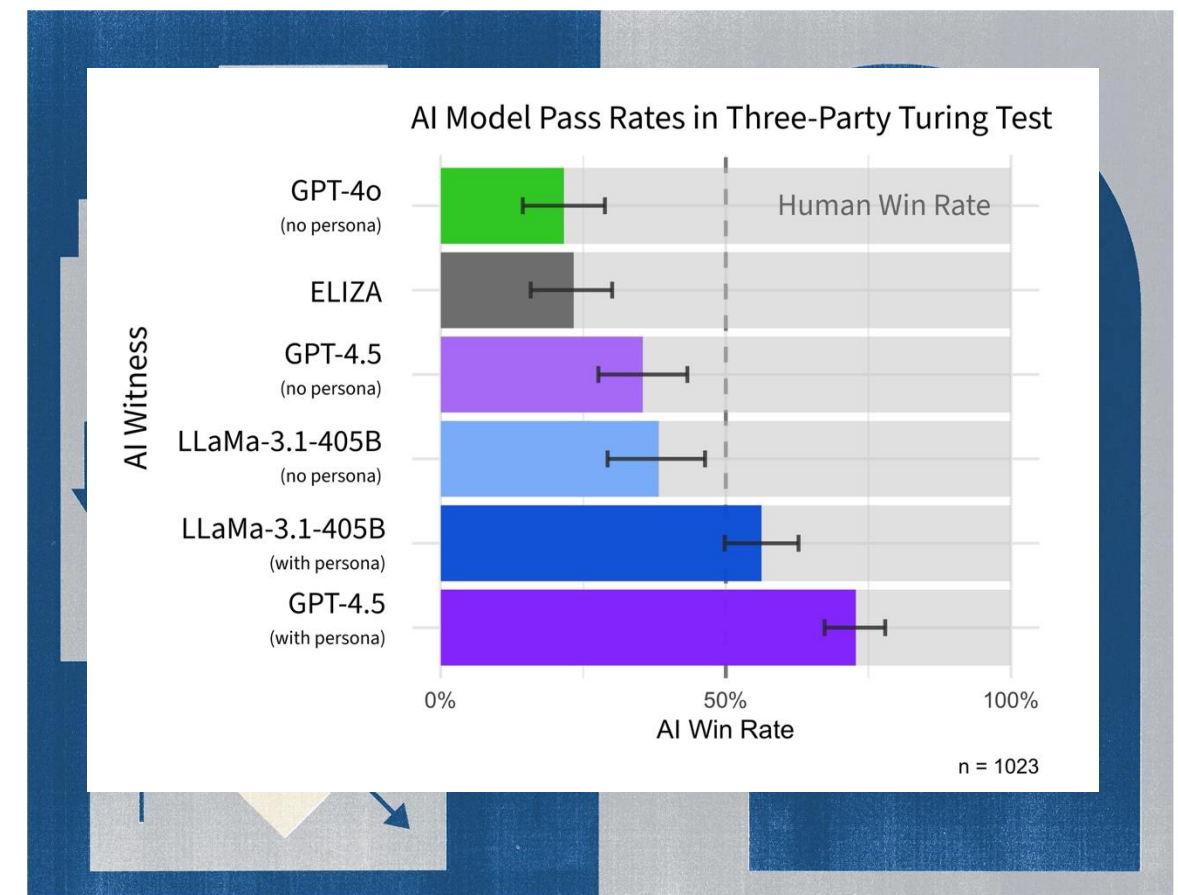


Illustration by The Project Twins



# Cognitive Model Priors: Reflection, Trust and Empathy

LLMs possess “soft skills” and simulate nuanced behaviors

- Can simulate believable human behaviors such as reflection and planning
- Can understand and model trust behaviors in interactive scenarios with high human alignment [[Xie et al. 2024](#)]
- Capable of human centered empathetic communication [[Ayers et al. 2023](#)]

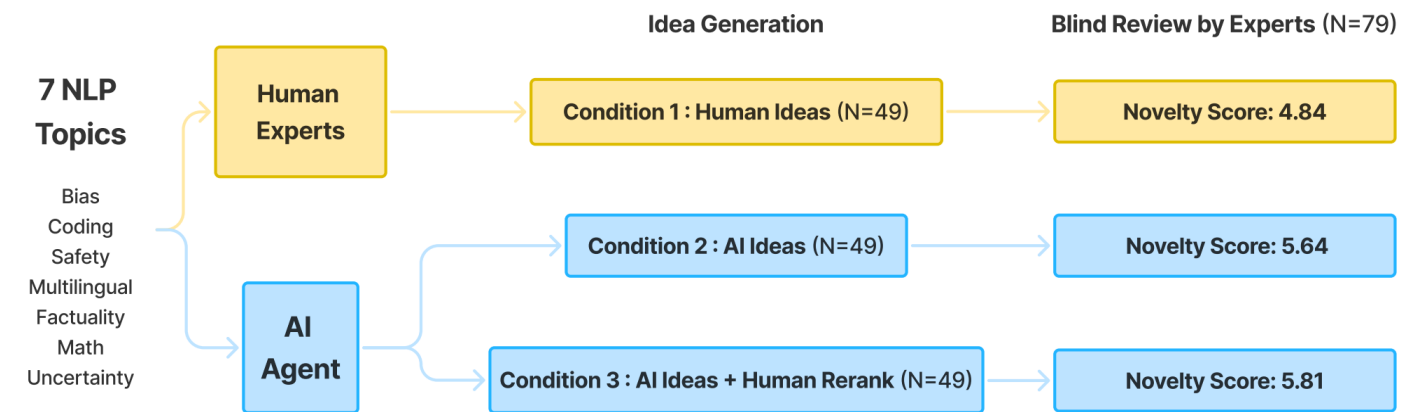


[Generative Agents: Interactive Simulacra of Human Behavior](#)

# Cognitive Model Priors: Idea Generation and Strategic Thinking

LLMs demonstrate cognitive abilities such as idea generation, problem solving, and generating innovative solutions

- Generate research ideas considered more novel than those from human experts and are strong in concept generation [[Ege et al. 2025](#)]

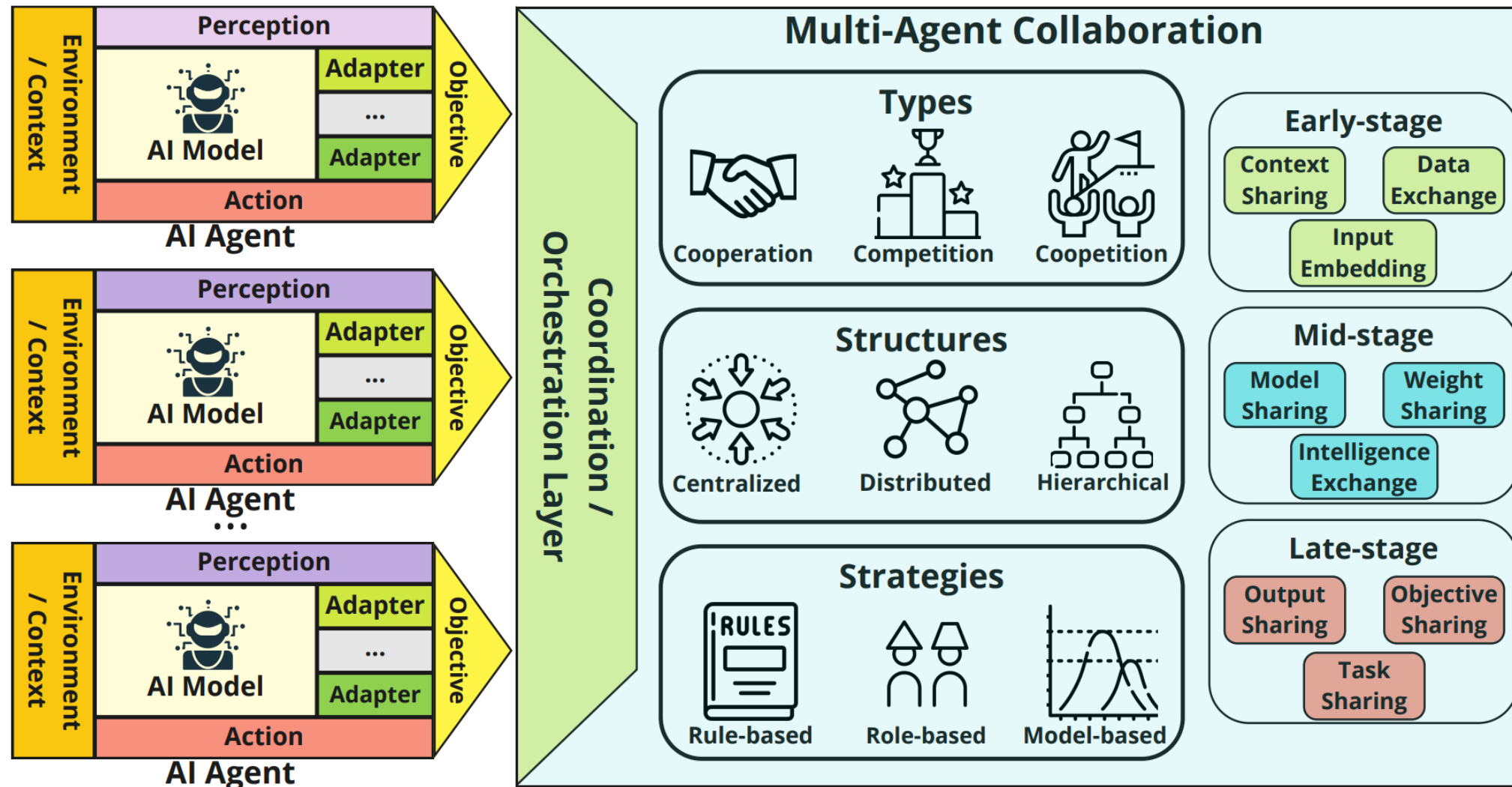


LLM-generated ideas are judged as more novel than human expert ideas: [Si et al. 2024](#)

- LLMs can accurately simulate strategic behavior especially when structured as multi agent systems [[Sreedhar et al. 2024](#)]
- Problem solving can be enhanced by scenario simulations to explore optimal solutions to complex multi variable problems [[Rasal et al. 2024](#)]



# Collaborative Decision Making w/ LLM Agents

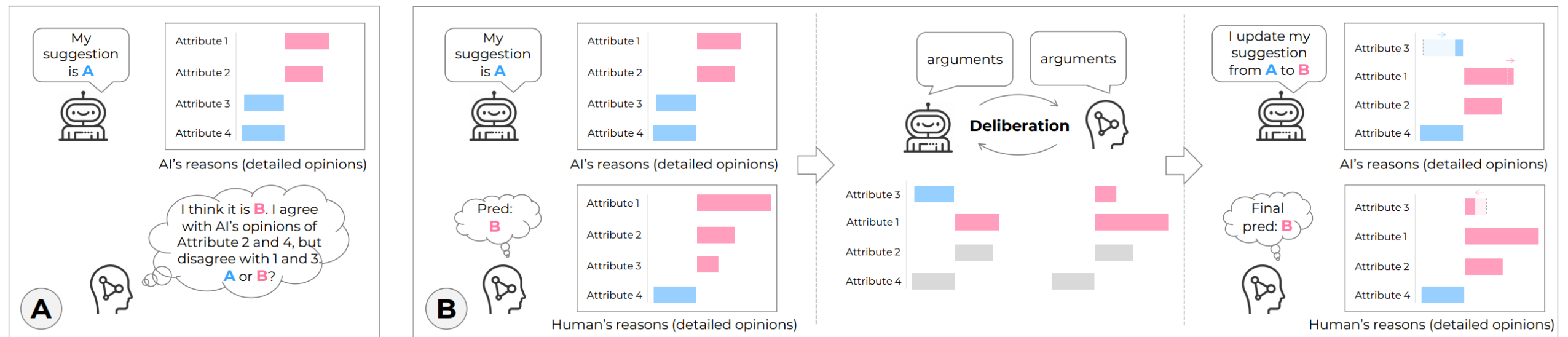


[Multi-Agent Collaboration Mechanisms: A Survey of LLMs](#)



# Collaborative Decision Making Across Domains

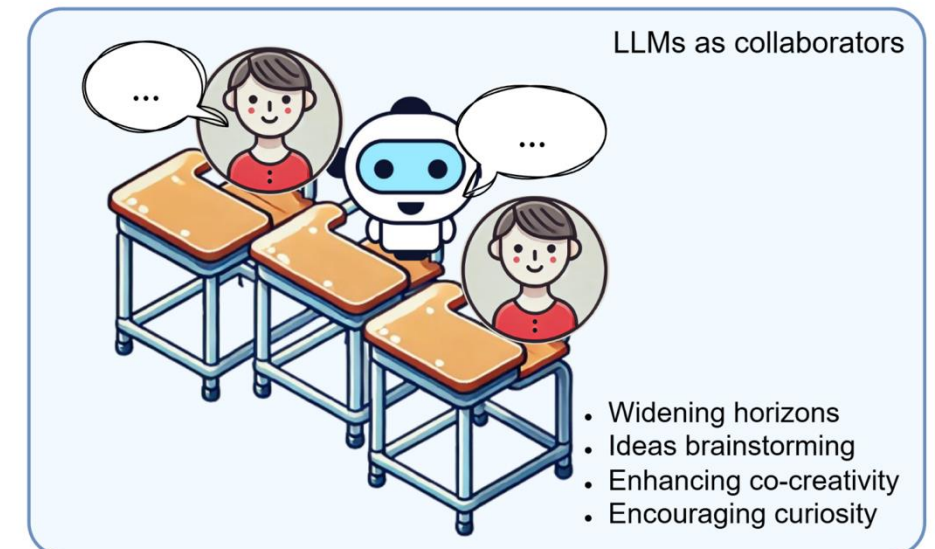
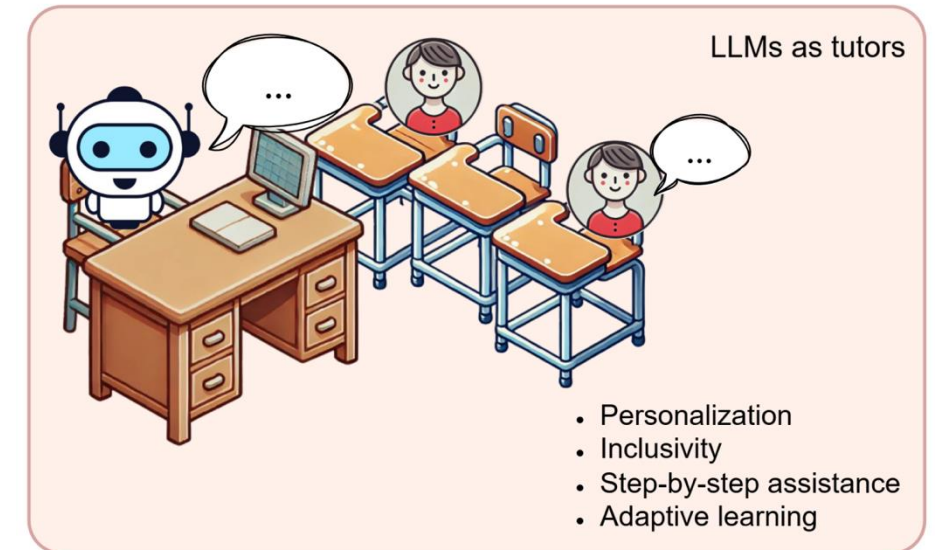
- Professional workflows and decision making in sectors like Law [[Siino et al. 2025](#)], and Medicine [[Kim et al. 2024](#)]
- LLMs are assisting in tasks such as drafting documents, review and legal research and speeding up the processes [[Guha et al. 2023](#)]



Enhancing Human AI collaborative decision making: [Ma et al. 2025](#)

# Collaborative Decision Making Across Domains

- Can play personalized dual roles as a collaborator and as a tutor to address diverse needs [[Grassucci et al. 2025](#)]
- AI tools that facilitate decision-making and automate processes in ecological research and conservation. [[D'Souza et al. 2025](#)]
  - Prescriptive analysis tools that not only interpret past and present data (as in descriptive and predictive analytics) but also suggest specific actions or policies to achieve desired outcome.
  - Integrating heterogeneous datasets, including global biodiversity databases (e.g., GBIF), remote sensing and land-use data, socio-economic datasets, and spatial metrics to model ecosystem dynamics and human-environment interaction



Source: [Grassucci et al. 2025](#)



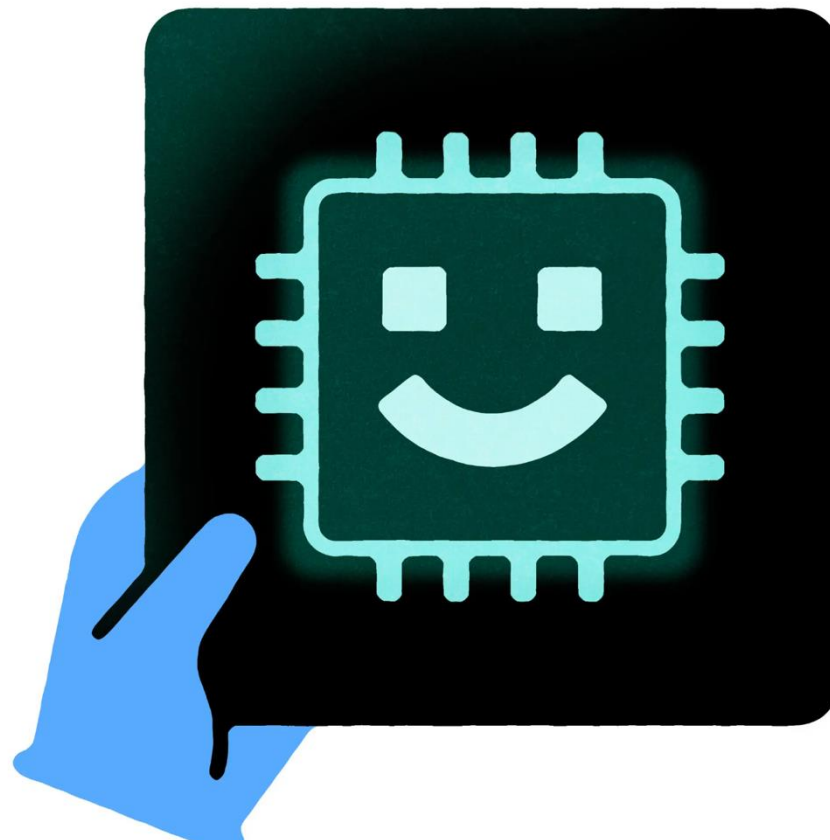
# Collaborative Decision Making Across Domains

The New York Times

OPINION  
GUEST ESSAY

## The Robot Doctor Will See You Now

Feb. 2, 2025



[The Robot Doctor Will See You Now](#)

nature human behaviour

Perspective

<https://doi.org/10.1038/s41562-024-0385-1>

## How large language models can reshape collective intelligence

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 Check for updates

Jason W. Burton<sup>1,2</sup>✉, Ezequiel Lopez-Lopez<sup>2</sup>, Shahar Hechtlinger<sup>2,3</sup>, Zoe Rahwan<sup>2</sup>, Samuel Aeschbach<sup>2,4</sup>, Michiel A. Bakker<sup>5</sup>, Joshua A. Becker<sup>6</sup>, Aleks Berditchevskaia<sup>7</sup>, Julian Berger<sup>2,3</sup>, Levin Brinkmann<sup>8</sup>, Lucie Flek<sup>9,10</sup>, Stefan M. Herzog<sup>2</sup>, Saffron Huang<sup>11</sup>, Sayash Kapoor<sup>12,13</sup>, Arvind Narayanan<sup>12,13</sup>, Anne-Marie Nussberger<sup>8</sup>, Taha Yasseri<sup>14,15</sup>, Pietro Nickl<sup>2,3</sup>, Abdullah Almaatouq<sup>16</sup>, Ulrike Hahn<sup>17</sup>, Ralf H. J. M. Kurvers<sup>2,18</sup>, Susan Leavy<sup>19</sup>, Iyad Rahwan<sup>8</sup>, Divya Siddarth<sup>11,20</sup>, Alice Siu<sup>21</sup>, Anita W. Woolley<sup>22</sup>, Dirk U. Wulff<sup>2,4</sup> & Ralph Hertwig<sup>2</sup>

Collective intelligence underpins the success of groups, organizations, markets and societies. Through distributed cognition and coordination, collectives can achieve outcomes that exceed the capabilities of individuals—even experts—resulting in improved accuracy and novel capabilities. Often, collective intelligence is supported by information technology, such as online prediction markets that elicit the ‘wisdom of crowds’, online forums that structure collective deliberation or digital platforms that crowdsource knowledge from the public. Large language models, however, are transforming how information is aggregated, accessed and transmitted online. Here we focus on the unique opportunities and challenges this transformation poses for collective intelligence. We bring together interdisciplinary perspectives from industry and academia to identify potential benefits, risks, policy-relevant considerations and open research questions, culminating in a call for a closer examination of how large language models affect humans’ ability to collectively tackle complex problems.

Burton, Jason W., et al. "How large language models can reshape collective intelligence." *Nature human behaviour* 8.9 (2024): 1643-1655.



# Understanding Limitations: Cognitive and Reliability

## Reasoning Gaps:

Tend to rely on surface-level patterns and correlations in their training data, [[Mondorf et al. 2024](#)] and struggle with critical thinking [[Yang et al. 2025](#)]

## Risk of generating confident misinformation:

Can generate highly plausible but incorrect information with high degree of confidence [[Xu et al. 2024](#)]

## The “Black Box Nature”:

Internal decision-making processes of LLMs remain opaque making it difficult to audit, explain basis of output [[Eigner et al. 2024](#)]

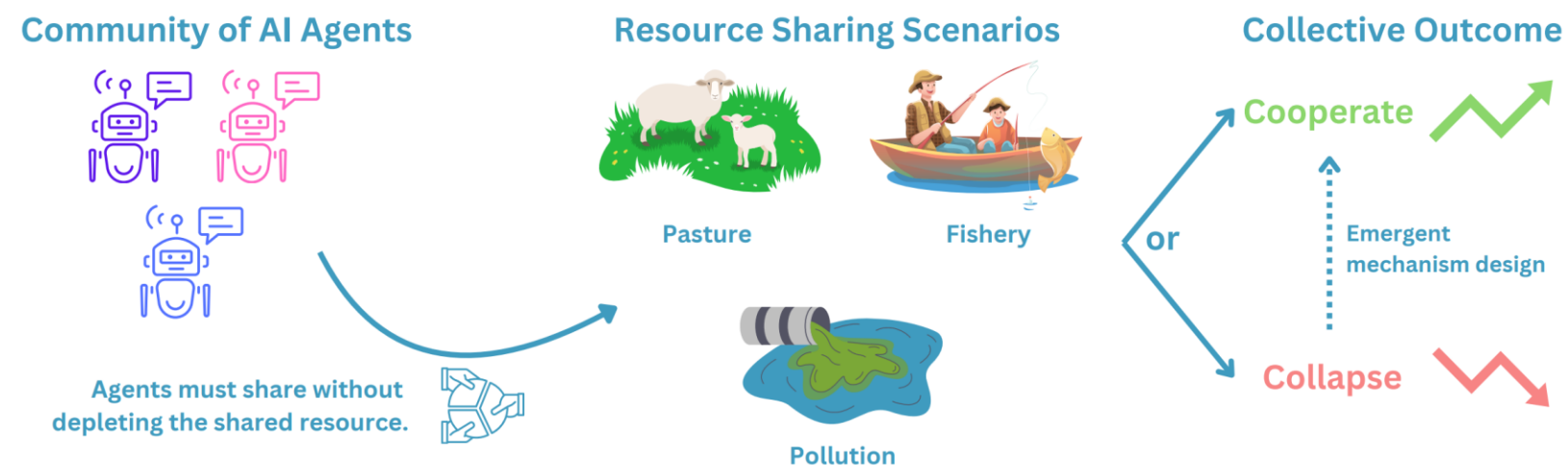
# Understanding Limitations: Societal, Contextual Risks

## Prevalence of Socio-demographic Biases:

- Can inherit and amplify harmful societal biases leading to potentially discriminatory outcomes [[Gupta et al. 2024](#)]

## Limited Long-Term Sustainable Cooperation:

- Evaluate the ability of LLMs to engage in cooperative behavior and effective governance of shared resource [[Piatti et al. 2024](#)]



# Understanding Limitations: Curiosity and Imagination

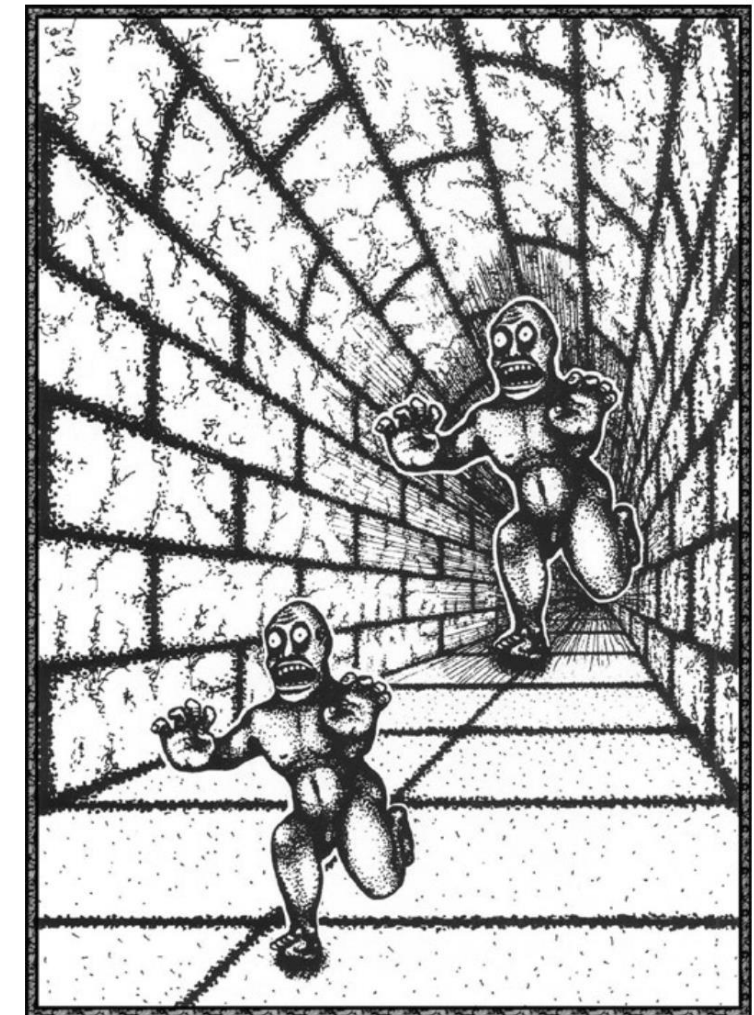
Google DeepMind CEO Demis Hassabis acknowledges the lack of true curiosity and imagination in present AI systems.

While AI can generate creative content, studies suggest it **may not yet match the depth and consistency** of human creativity.

AI can be a powerful tool to assist and augment human creative processes, but it **doesn't yet replicate the full scope of human creativity**, including intention and deeper understanding.

[Artificial intelligence could end disease, lead to "radical abundance," Google DeepMind CEO Demis Hassabis says](#)

Haase, Jennifer, Paul HP Hanel, and Sebastian Pokutta. "Has the Creativity of Large-Language Models peaked? An analysis of inter-and intra-LLM variability." arXiv preprint arXiv:2504.12320 (2025).

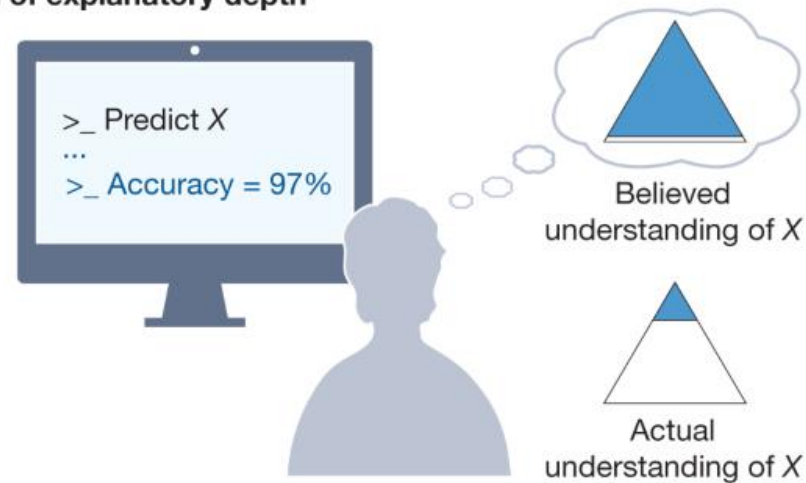


Source: Roger Shepard, "Terror Subterra," in Mind Sights: Original Visual Illusions, Ambiguities, and other Anomalies (New York: W. H. Freeman & Co, 1990). Downloaded from [http://direct.mit.edu/daed/article-pdf/151/2/139/2060633/daed\\_a\\_01906.pdf](http://direct.mit.edu/daed/article-pdf/151/2/139/2060633/daed_a_01906.pdf) by guest on 24 April 2025



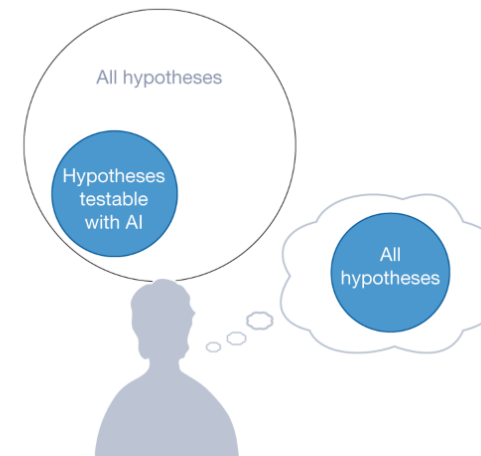
# Understanding Limitations: Do Not Trap to AI Illusions

**a Illusion of explanatory depth**



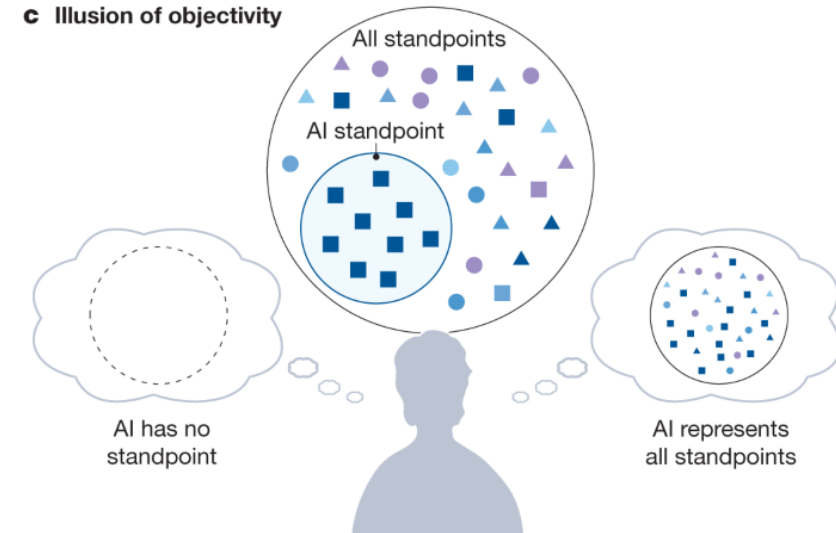
People relying on another person — or, in this case, an algorithm — for knowledge have a tendency to mistake that knowledge for their own and think their understanding is deeper than it actually is.

**b Illusion of exploratory breadth**



Research becomes skewed towards studying the kinds of thing that AI systems can test

**c Illusion of objectivity**



Researchers see AI systems as representing all possible viewpoints or not having a viewpoint.

# Thank you

Email

[yasanka.horawalavithana@pnnl.gov](mailto:yasanka.horawalavithana@pnnl.gov)





# Adopting AI Tools for Improving Permitting Outcomes and Efficiency

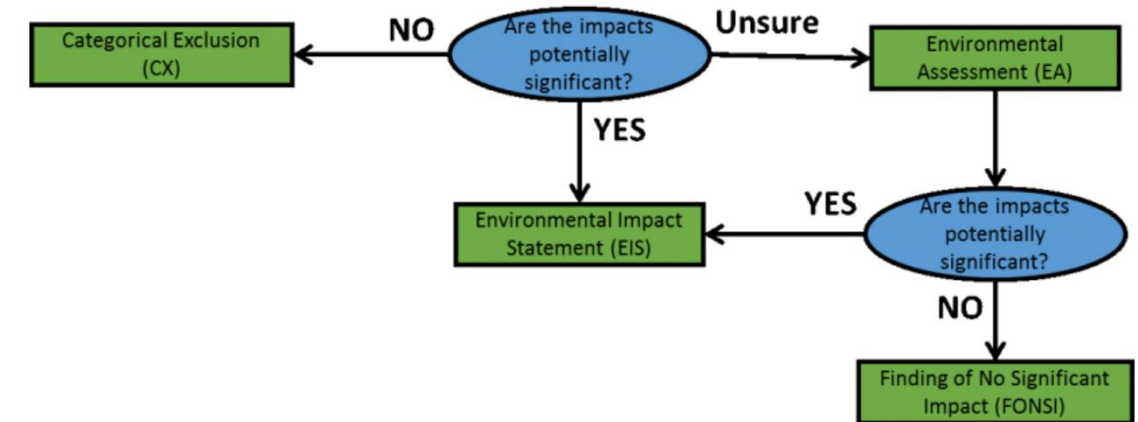


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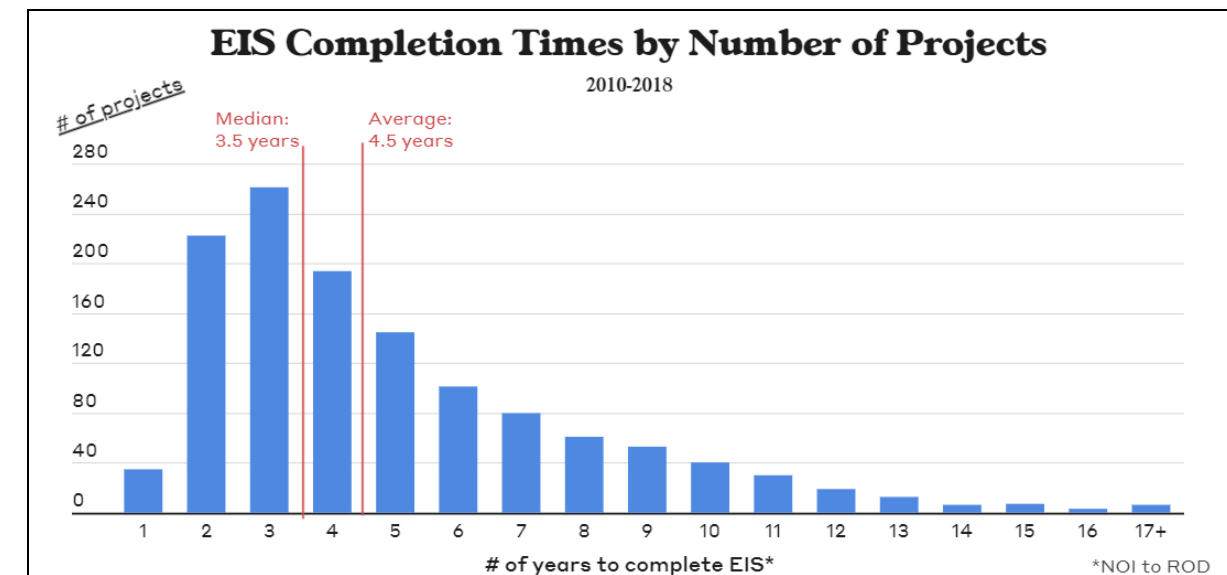


# Environmental Reviews

- The National Environmental Policy Act (NEPA) requires agencies to examine and disclose the potential significant environmental impacts of major actions
- NEPA does not require a substantive result, it only requires that agencies take a "hard look" at the impacts of their actions
- Three main levels of environmental reviews:
  - Environmental Impact Statement – for actions likely to have a significant impact
  - Environmental Assessment – for actions that may have a significant impact (EA results in either a Finding of No Significant Impact or a decision to prepare an EIS)
  - Categorical Exclusion – for actions that normally do not have a significant impact
- Typical NEPA timelines for site-specific renewable energy projects:
  - Environmental Impact Statement: 2.5 - 4 years
  - Environmental Assessment: 6-18 months
  - Categorical Exclusions: a few weeks to 6 months.

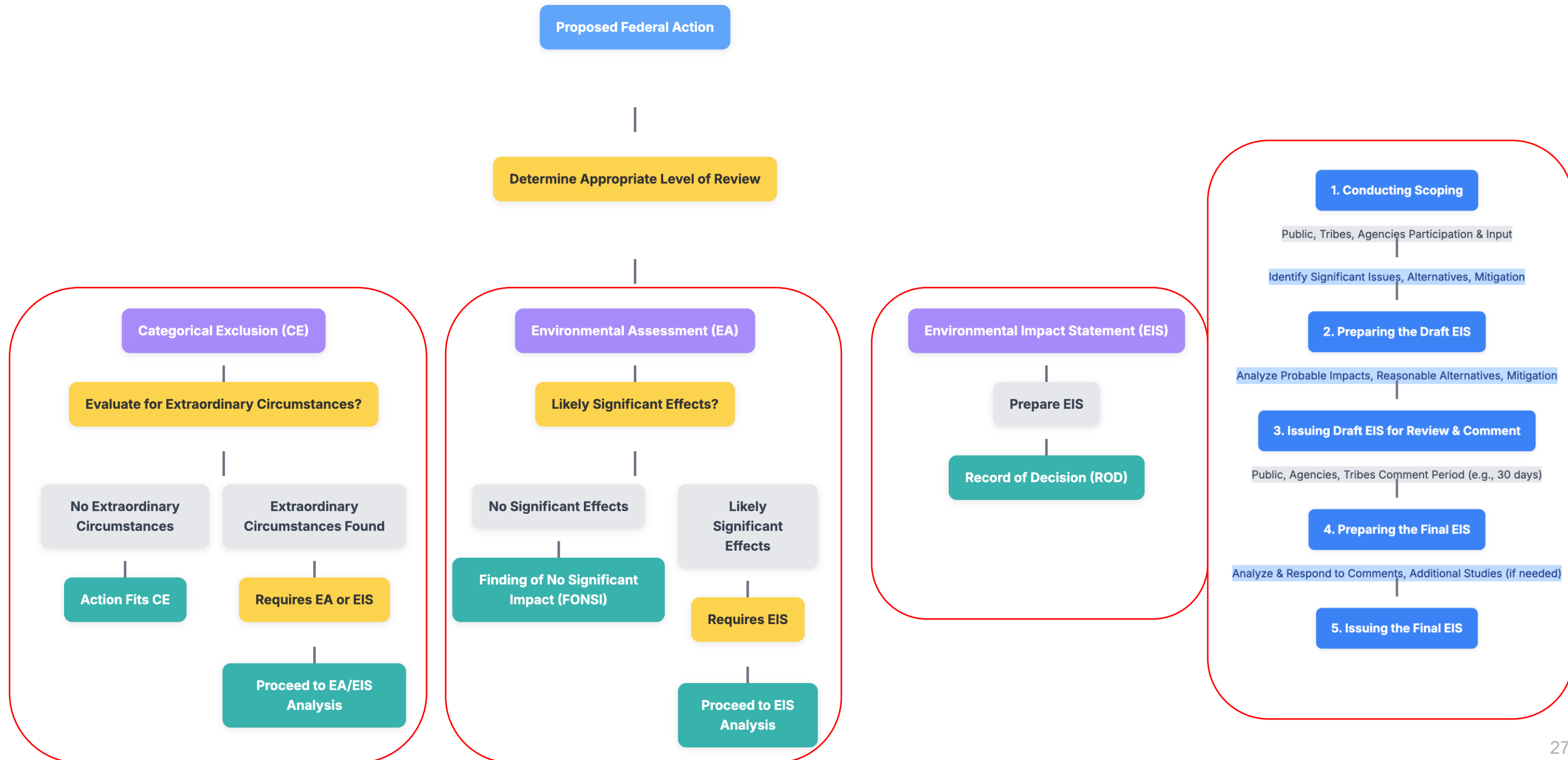


Simple Overview of NEPA Process



Source: [Council on Environmental Quality](#)

# NEPA Decision Making



# Recent Environmental Reviews



SunZia Southwest Transmission, a 550 mile transmission line project transporting renewable energy to residents in the southwest. The project will support modernizing renewable energy infrastructure, potentially lowering energy costs for consumers in AZ, NM, & CA.



Coastal Virginia Offshore Wind farm is the largest offshore wind project in U.S. history, expected to create 900 direct and indirect jobs and power up to 660,000 homes with renewable energy.

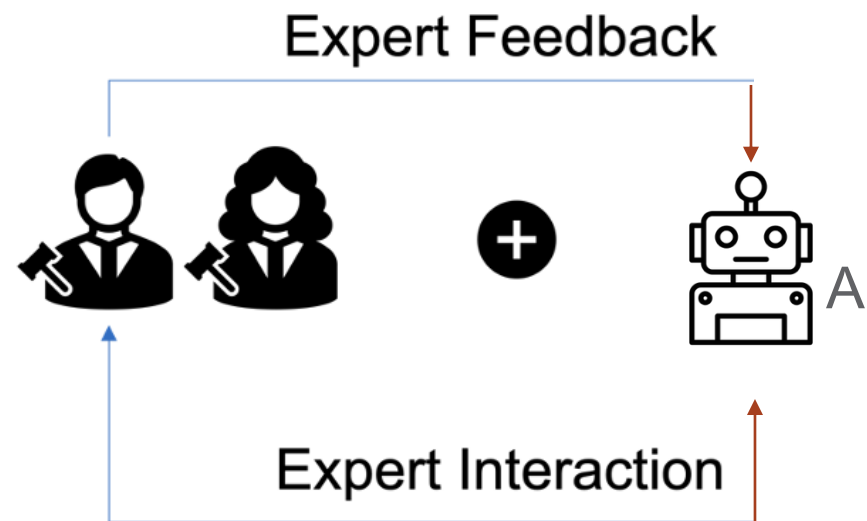


# AI-Driven Environmental Review and Permitting

## Critical Opportunity

Environment and permitting process is tedious, expensive and time taking. AI driven tools will assist in improving and streamlining the review process.

National Environmental Policy Act (NEPA) experts work to ensure compliance with environmental laws and regulations. NEPA experts interpret laws; understand and respond to public, private, governmental, and tribal input; and work with applicants to properly analyze and mitigate environmental impacts of federal actions.

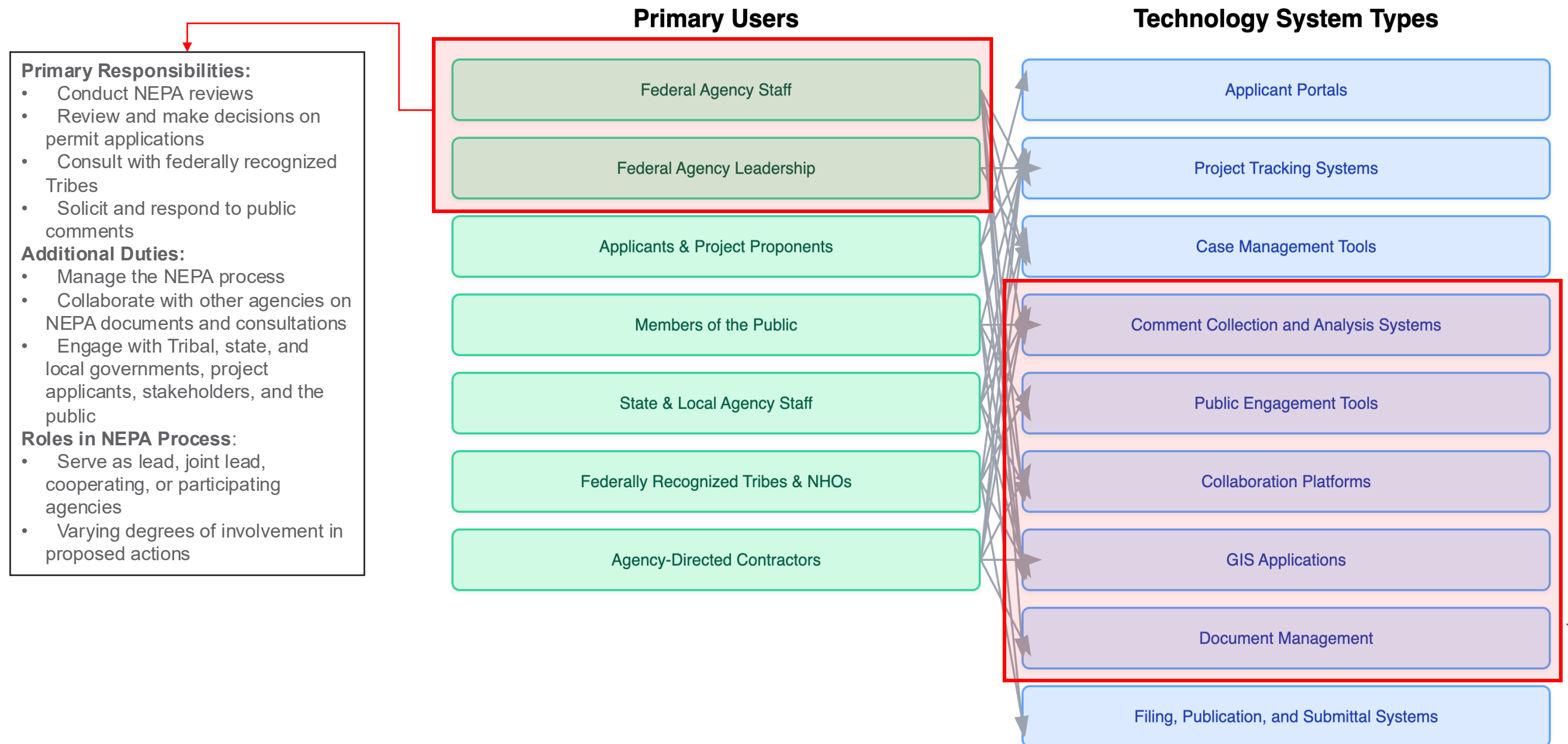


PermitAI project is developing AI tools to inform future environmental reviews by synthesizing information from thousands of existing environmental review documents for the purpose of efficiency gains, identification of otherwise unseen trends, and the creation of a comprehensive map and catalog of all National Environmental Policy Act (NEPA) efforts.

# Risk Based AI Integration to NEPA Workflow



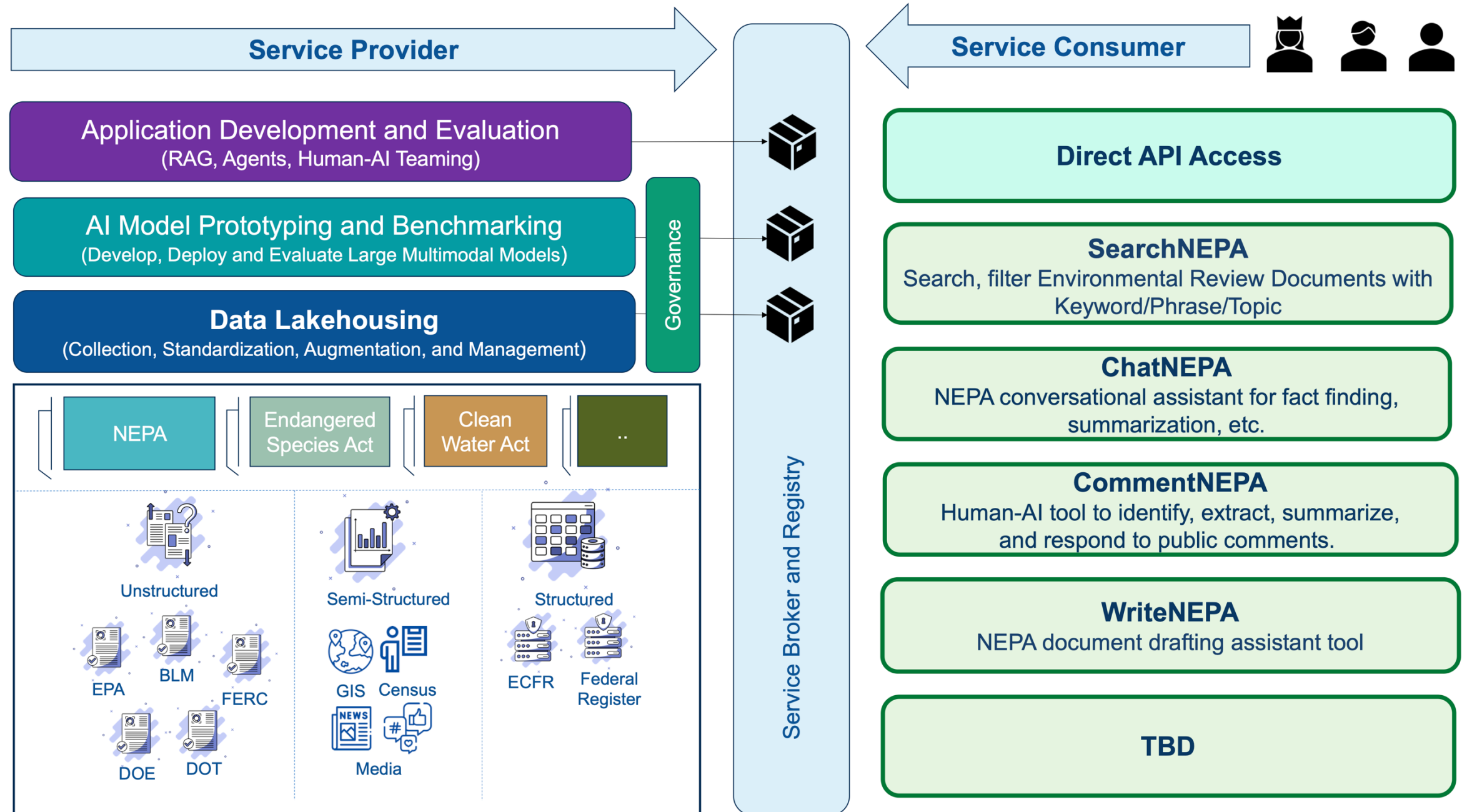
# NEPA and Permitting Technology Ecosystem





# PermitAI Services

## Accessible Structured Environmental Data

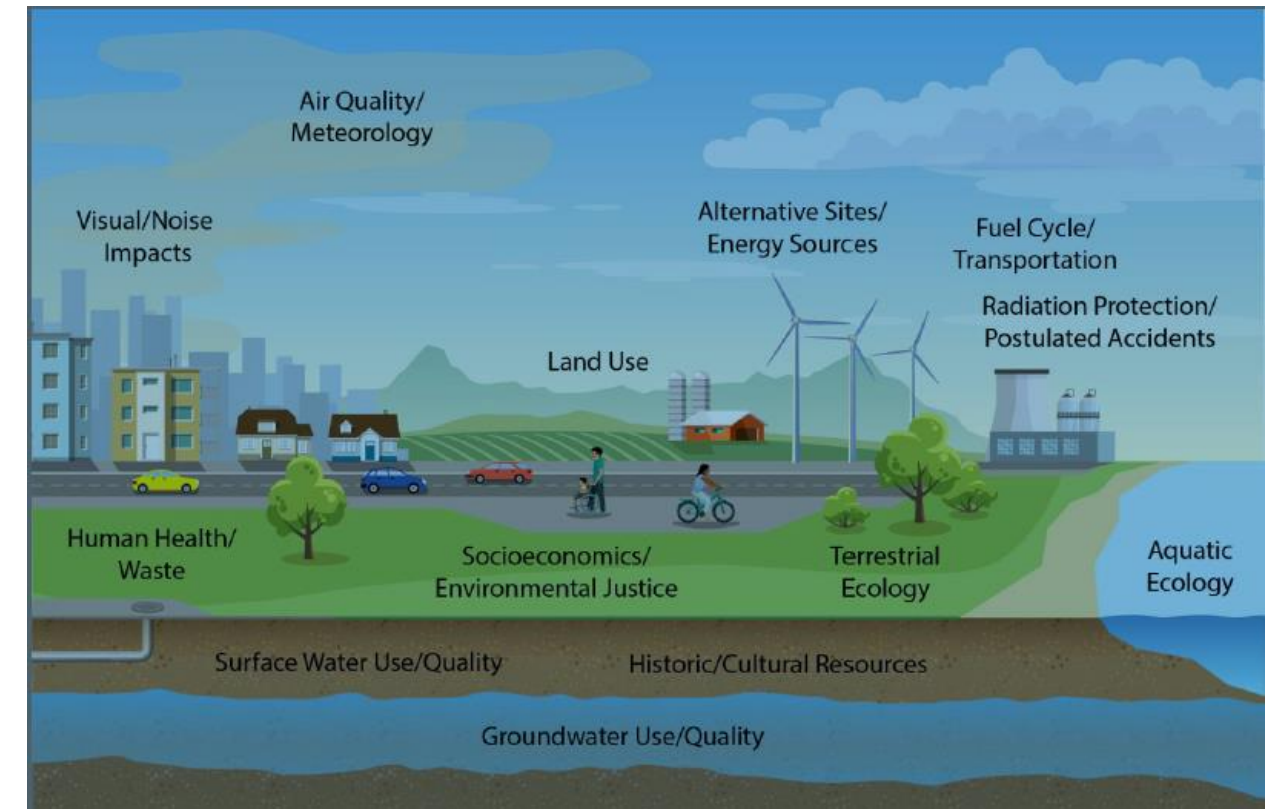


\*The list of applications is subject to change based on the sponsor request

\*Service Consumers can access services (eventually) without necessarily going only through our native developed applications

# Anatomy of a NEPA Document

1. Purpose and Need/Proposed Action Description
2. Affected Environment – Baseline conditions
  - a. Land Use/Visual/Transportation
  - b. Geology/Soils
  - c. Hydrology (groundwater/surface water)
  - d. Ecology (terrestrial/aquatic)
  - e. Air Quality/Meteorology/Climate Change
  - f. Historic & Cultural Resources
  - g. Human Health/Noise
  - h. Socioeconomics
  - i. Environmental Justice
  - j. Waste
  - k. Project Specific Hazards
3. Resource impact assessments from construction and operation
4. Cumulative impacts from other actions
5. Alternatives to the proposed action and environmental impacts
6. Mitigations/Conclusions



# NEPA Documents

PNNL An official website enabled by the Pacific Northwest National Laboratory


**SearchNEPA**

**DOCUMENT DETAILS**

**Pinto Valley Mine**

**LOCATION**  
Arizona

**TOTAL DOCUMENTS**  
8

**AGENCY**  
  
Forest Service

**DOCUMENTS**

- [PVM\\_Final\\_EIS\\_Vol4\\_2021\\_0326](#)
- [PVM\\_Final\\_EIS\\_Vol1\\_2021\\_0326](#)
- [PVM\\_Final\\_EIS\\_Vol2\\_2021\\_0326](#)
- [PVM\\_Final\\_EIS\\_Vol3\\_2021\\_0326](#)
- [2021-05-24\\_EPA\\_Comments\\_FEIS\\_Pinto\\_Valley\\_Mine\\_20210039](#)
- [PVM\\_Draft\\_EIS\\_2019\\_1213\\_Vol\\_1-508](#)
- [PVM\\_Draft\\_EIS\\_2019\\_1213\\_Vol\\_2-508](#)
- [2020-01-27\\_EPA\\_Comments\\_DEIS\\_Pinto\\_Valley\\_Mine\\_20190288](#)

PNNL An official website enabled by the Pacific Northwest National Laboratory

**SearchNEPA** AI For U.S. Environmental And Permitting Reviews

**DOCUMENT DETAILS**

**Gulf Intracoastal Waterway, Brazos River Floodgates and Colorado River Locks, Texas**

**LOCATION**  
Texas

**TOTAL DOCUMENTS**  
30

**AGENCY**  
  
U.S. Army Corps of Engineers

**DOCUMENTS**

- [28- Environmental Appendix D11 Part 3- Public Involvement](#)
- [2- Appendix A - Engineering Appendix](#)
- [3- Engineering Appendix A1 - HYDRAULIC ENGINEERING BREF](#)
- [21- Environmental Appendix D6 Cultural Resources](#)
- [23- Environmental Appendix D8 Mitigation Plan](#)
- [12- Engineering Appendix D10 - COST ESTIMATE](#)
- [1- GIWW BREF CRL Final Integrated Feasibility Report - Environmental Impact Statement](#)
- [4- Engineering Appendix A2 - HYDRAULIC ENGINEERING CRL](#)
- [5- Engineering Appendix A3 - PLATES - RECOMMENDED PLAN](#)
- [6- Engineering Appendix A4 - PLATES - ALTERNATIVE ANALYSIS](#)
- [7- Engineering Appendix A5 Quantities -Recommended Plan](#)
- [8- Engineering Appendix A6 - QUANTITIES - ALTERNATIVE ANALYSIS](#)
- [13- Appendix B - Economics](#)
- [9- Engineering Appendix A7 Structural Calculations](#)
- [20- Environmental Appendix D5 Coastal Consistency Detremination](#)
- [22- Environmental Appendix D7 Hazardous Materials Report](#)

Version  
Final

Volume 1 Volume 1 Volume .

Chapter 1 Chapter 2 Chapter 3

Chapter 4 Chapter 5 Chapter ..

Version  
Draft

Volume 1 Volume 1 Volume .

Chapter 1 Chapter 2 Chapter 3

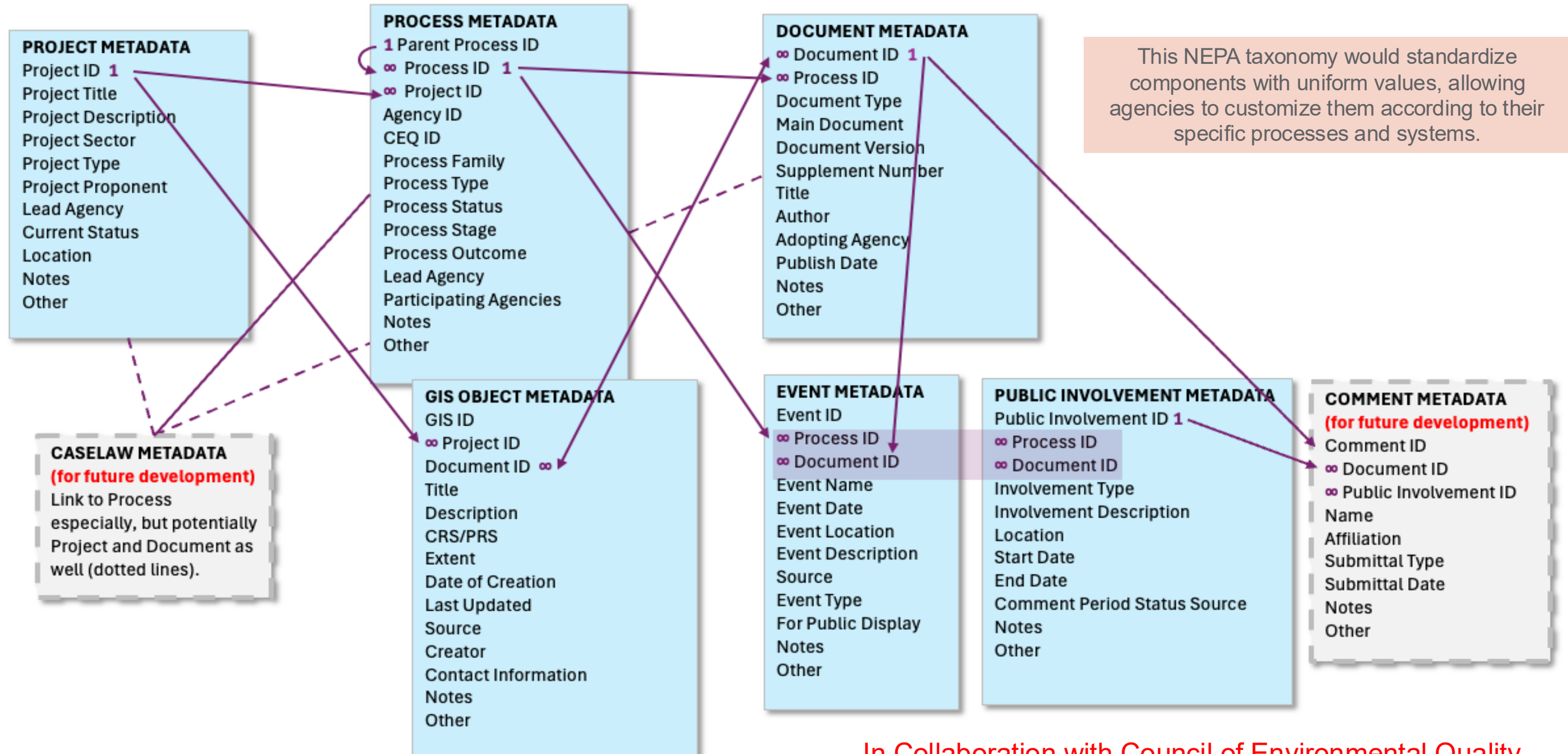
Chapter 4 Chapter 5 Chapter ..

Appendix

Comment Letters Maps Reports Biological Assessment Design Real Estate Plan Other



# NEPA Taxonomy and Metadata Standards







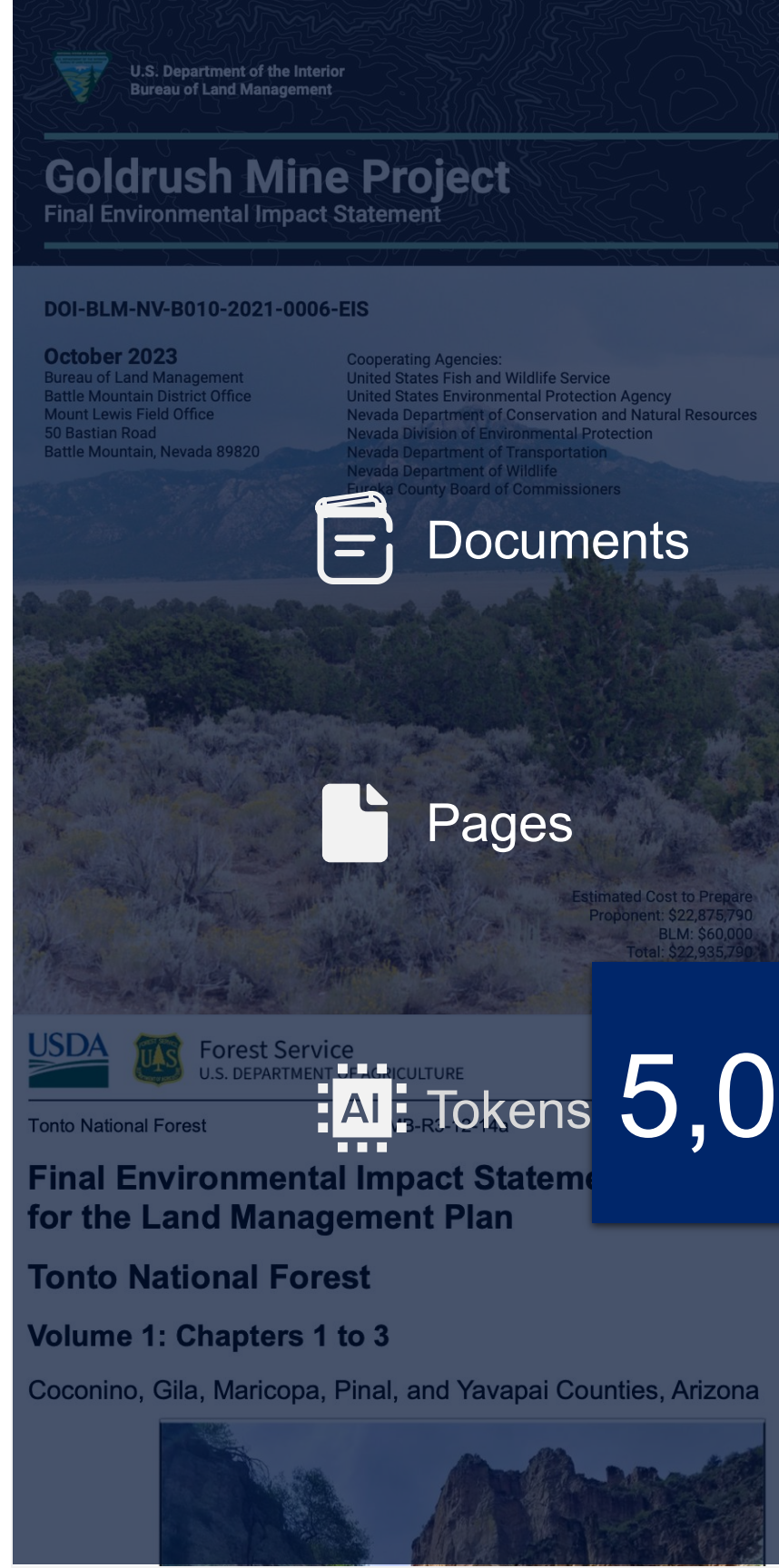
# NEPA Text Corpus (NEPATEC)

Documents are collected  
across 5+ Siloed Data Sources

- Environment Protection Agency (EPA)
- Department of Energy (DOE)
- Bureau of Ocean Energy Management (BOEM)
- United States Department of Agriculture (USDA)
- Bureau of Land Management (BLM)

Documents Authored by 100+  
U.S. Government Agencies

[We publicly released NEPA Text Corpus \(NEPATEC\) v1.0](#)  
(Available in HuggingFace)



Documents

80,057



Pages

4,508,321



Tokens

5,000,000,000+

MAX: 33,220,133/document

\*and growing

# NEPA Text Corpus (NEPATEC) – Project Sector

## Energy Production and Management

|                                  |   |   |
|----------------------------------|---|---|
| Carbon Capture and Sequestration | Conventional Energy Production  | Renewable Energy Production   |
|                                  | <ul style="list-style-type: none"><li>• Coal</li><li>• Land-based Oil &amp; Gas</li><li>• Nuclear</li><li>• Offshore Oil and Gas</li><li>• Rural Energy</li><li>• Other</li></ul> | <ul style="list-style-type: none"><li>• Biomass</li><li>• Energy Storage</li><li>• Geothermal</li><li>• Hydrokinetic</li><li>• Hydropower</li><li>• Solar</li><li>• Wind</li><li>• Offshore</li><li>• Onshore</li></ul> |

## Land Development and Urban Planning

|                            |                          |                          |                                  |
|----------------------------|--------------------------|--------------------------|----------------------------------|
| Land Development - Housing | Land Development - Urban | Land Development - Other | Public and Recreational Land Use |
|----------------------------|--------------------------|--------------------------|----------------------------------|

## Materials and Manufacturing

|               |                 |                                |
|---------------|-----------------|--------------------------------|
| Manufacturing | Mining - Metals | Mining - Non-Metallic Minerals |
|---------------|-----------------|--------------------------------|

## Transportation and Infrastructure

|  |           |                          |           |                     |   |
|--|-----------|--------------------------|-----------|---------------------|---|
| Aviation <ul style="list-style-type: none"><li>• Airports and Air Traffic</li><li>• Commercial Space</li></ul> | Broadband | Electricity Transmission | Pipelines | Ports and Waterways | Surface Transportation <ul style="list-style-type: none"><li>• Bridges</li><li>• Highways and Roads</li><li>• Public Transportation</li><li>• Railroads</li><li>• Utilities (electricity, gas, telecommunications)</li><li>• Others</li></ul> |
|--|-----------|--------------------------|-----------|---------------------|---|

## Agriculture and Natural Resource Management

|             |                                      |                           |                                    |                      |  |
|-------------|--------------------------------------|---------------------------|------------------------------------|----------------------|--|
| Agriculture | Ecosystem Management and Restoration | Habitat Conservation Plan | Land Use or Forest Management Plan | Rangeland Management | Threatened and Endangered Species Management |
|-------------|--------------------------------------|---------------------------|------------------------------------|----------------------|--|

## Military, Defense, and Emergency Response

|                                 |                      |
|---------------------------------|----------------------|
| Emergency and Disaster Response | Military and Defense |
|---------------------------------|----------------------|

## Technology and Data Management

|  |               |                                  |   |  |                |
|--|---------------|----------------------------------|---|--|----------------|
| Artificial Intelligence and Machine Learning | Cybersecurity | Data Storage and Data Management | Performance Computing and Advanced Computer Hardware and Software | Quantum Information Science and Technology | Semiconductors |
|--|---------------|----------------------------------|---|--|----------------|

## Water and Waste Management

|                  |   |
|------------------|---|
| Waste Management | Water Resources <ul style="list-style-type: none"><li>• Irrigation and Water Supply</li><li>• Other</li></ul> |
|------------------|---|





# SearchNEPA

## NEPA AI Research Tool

May 6, 2025



PNNL is operated by Battelle for the U.S. Department of Energy



# SearchNEPA Landing Page

Search  NEPA

Welcome. What permitting documents do you need? Type keywords to begin.

Stats

Reset to Landing Page

Keyword Search

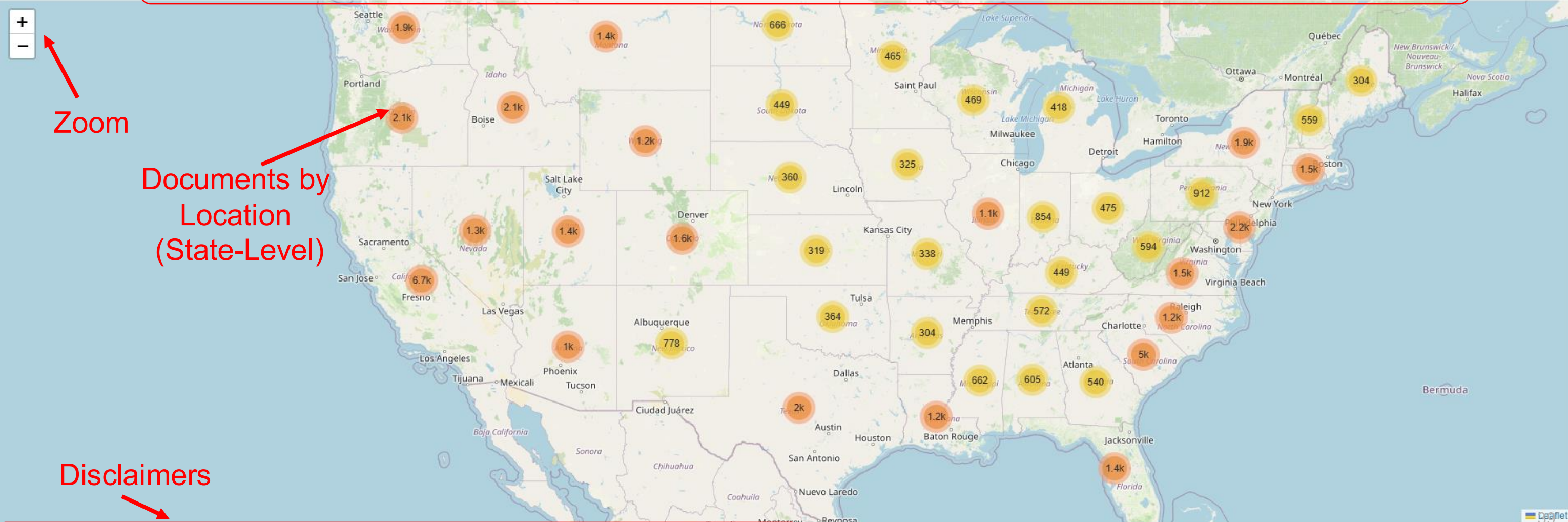
Release Notes



Zoom

Documents by Location  
(State-Level)

Disclaimers



# SearchNEPA Document Search Results

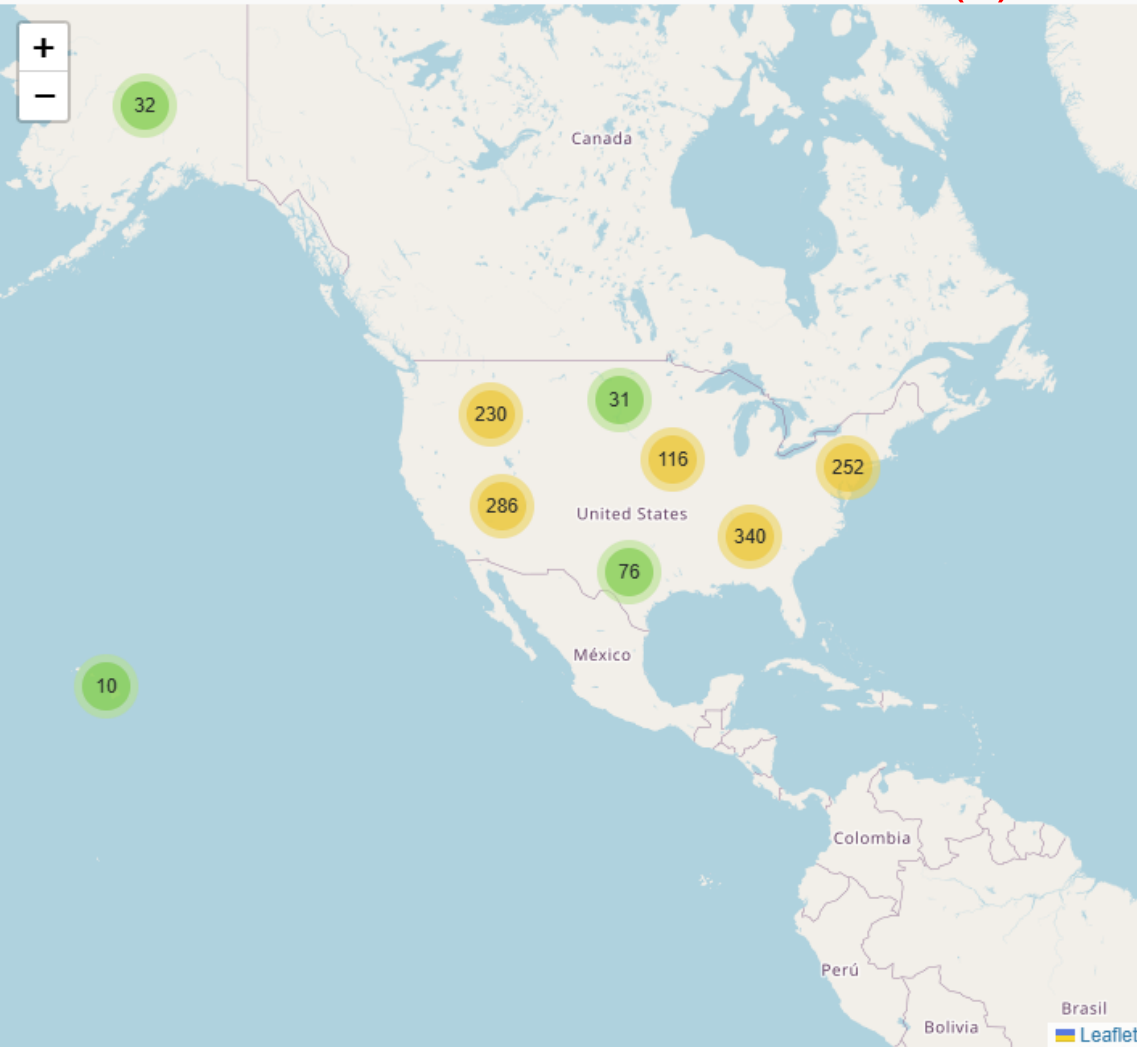
Search NEPA

Reset to Landing Page

Search permitting documents ...

Migratory Birds

Searched Term(s)



Ask ChatNEPA

Initiate ChatNEPA

Filters

Vol 4 CCSM FEIS Attchments B-E > 38 pages

Click for document

Eagle Take Permits for the Chokecherry and Sierra Madre Phase I Wind Energy Project

Click for project

Wyoming

Fish and Wildlife Service

EIS

FINAL

Not Supplemental

Map It

Chokecherry and Sierra Madre Wind Energy Project Environmental Constraints and Measures Phase I Wind Turbine Development TABLE 4. APPLICANT COMMITTED BEST MANAGEMENT PRACTICES (ROD TABLE D-3) 38 August 2015 Item Resource Concern Measure Applicability to **Migratory Birds** and Bats A-3-69 Soils – Erosion Control If, during operation, it is determined that snow accumulation causes significant accelerated erosion, appropriate mitigation measures (e.g., snow fence construction) would be developed and implemented. Measure will reduce impacts to soils, increase reclamation success, and maintain habitats that are used by **migratory birds** and bats. A-3-70 Soils – Excavation and Blasting Activities Foundations and trenches would be backfilled with originally excavated material as much as possible. Excess excavation materials would be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities. No applicability to **migratory birds** and bats. A-3-71 Soils – Excavation and Blasting Activities Borrow material would be obtained only from authorized and permitted sites. Existing sites would be used in preference to new sites when possible. No applicability to **migratory birds** and bats. A-3-72 Soils – Topsoil Handling Topsoil from all excavations and construction activities would be salvaged and reapplied during reclamation. Topsoil salvage will increase reclamation success and benefit **migratory birds** and bats per item A-3-41. A-3-73 Soils – Topsoil Handling Topsoil material suitable for site reclamation would be removed in conjunction with clearing and grading and reserved in local stockpiles. Topsoil storage areas would generally be located within staging areas and alongside roadways during construction. Topsoil salvage will increase reclamation success and benefit **migratory birds** and bats per item A-3-41. A-3-74 Soils – Wet Soils During Construction Construction activities would be suspended when soils are wet. Construction would resume when soils become dry enough to support construction equipment. The Environmental Inspector (EI) would determine when conditions are too wet to continue. Measure will reduce impacts to soils, increase reclamation success, and maintain habitats that are used by **migratory birds** and bats. ...

CP-KCS FEIS EPA Vol XI 01272023 > 28 pages

Canadian Pacific Acquisition of Kansas City Southern

Michigan, Oklahoma, Arkansas, Illinois, Texas, Missouri, Louisiana, Kansas, Iowa, Minnesota

Surface Transportation Board

EIS

FINAL

Not Supplemental

Map It

• please contact our office for further coordination. For communication and wind energy projects, please refer to additional

Search Results

594 Documents

Clear Filters


Sort by

AGENCIES

Animal and Plant Heal... - 3  
Bonneville Power Admi... - 1  
Bureau of Indian Affa... - 17  
Bureau of Land Manage... - 106  
Bureau of Ocean Energy... - 6  
Bureau of Prisons - 2  
Bureau of Reclamation - 6  
California Department... - 5  
Department of Commer... - 12  
Department of Energy - 41  
Department of Housing... - 2  
Department of State - 4  
Department of Transpo... - 1  
Department of Treasur... - 1  
Department of the Int... - 1  
Environmental Protect... - 2  
Federal Aviation Admi... - 3  
Federal Emergency Man... - 1  
Federal Energy Regula... - 94  
Federal Highway Admin... - 23  
Federal Railroad Admi... - 2  
Federal Transit Admin... - 5  
Fish and Wildlife Ser... - 27  
Forest Service - 135  
Minerals Management S... - 2  
National Aeronautics ... - 3



# ChatNEPA for NEPA Fact Finding

Search  NEPA

Reset to Landing Page

Search permitting documents ...

Adjust search

Migratory Birds transmission lines

AZ > Western Area Power Administration > EIS > OTHER  
Appendix\_1-6\_and\_8\_Ten\_West\_Link  
operational avian risks that result from interactions with **transmission lines**. This goal of this guidance is to reduce avian mortality from

AZ > Western Area Power Administration > EIS > FINAL  
Final\_EIS\_Ten\_West\_Link  
on structures increases collision risk for night migrating birds. **Transmission lines** crossing the Colorado River and its historic floodplain are a

AZ > Western Area Power Administration > EIS > DRAFT  
Ten\_West\_Link\_DEIS\_Ch\_1-Appx\_6  
; Impacts to native habitat and designated management areas; and **Migratory birds**. Segment already impacted by I-10, agriculture, **transmission lines**, and

AZ > Bureau of Land Management > EIS > FINAL  
APS\_SV2M\_FEIS\_Text  
Management Plan Amendment Electrocutation Risk Transmission line structures are attractive sites for raptors and **migratory birds** to perch, roost, loaf

NM > Forest Service > EIS > DRAFT  
20190702-CarsonDraftPlanVolume1DEIS  
**Migratory Birds** and Golden and Bald Eagles New Mexico Partners in

Close Chat

Back to search

summarize any mitigations in these documents that explain how migratory birds will be kept safe

Current search

Current Search results

Current chat answer

New prompt

Ask ChatNEPA.ai about these search results ...

AI can make mistakes. Check responses.

Current prompt

Applied filter

National Marine Fish... - 4

National Oceanic and ... - 5

National Park Service - 3

National Science Foun... - 4

National Security Age... - 1

Natural Resource Cons... - 4

Nuclear Regulatory Co... - 26

Office of Surface Min... - 1

Rural Utilities Servi... - 4

Surface Transportatio... - 4

Tennessee Valley Auth... - 11

Texas Department of T... - 3

U.S. Army Corps of En... - 47

U.S. Coast Guard - 3

U.S. Customs and Bord... - 2

United States Air For... - 5

United States Army - 5

United States Navy - 3

Utah Department of Tr... - 4

Western Area Power Ad... - 6

STATES

Alabama - 18

Alaska - 25

Arizona - 44

Arkansas - 20

California - 70

Colorado - 37

Connecticut - 11

Delaware - 8

District of Columbia - 7

# ChatNEPA for Project-level Fact Finding

Search  NEPA

Reset to Landing Page

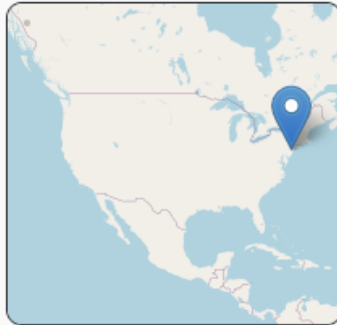
## Early Site Permit at PSEG Site

AGENCY

LOCATION



Nuclear Regulatory Commission



New Jersey

DOCUMENTS

✓ NJ > Nuclear Regulatory Commission > > FINAL  
NUREG-2168\_Vol\_1

✓ NJ > Nuclear Regulatory Commission > > FINAL  
NUREG-2168\_Vol\_2

✓ NJ > Nuclear Regulatory Commission > > FINAL  
NUREG-2168\_Vol\_3

✓ NJ > Nuclear Regulatory Commission > > COMMENT  
CEQ20150329

Project  
title

Current prompt

what is the purpose and need for this action?

The purpose and need for the proposed action are twofold. For the NRC, the purpose of issuing the Early Site Permit (ESP) is to provide early resolution of site safety and environmental issues, which contributes to stability in the licensing process. Although no reactor will be built under the ESP, the environmental review assumes the construction and operation of one or two reactors to meet the need for up to 2,200 MW(e) of baseload power in New Jersey by 2021 [1]. For the USACE, the purpose is to issue a Department of the Army permit to allow PSEG to perform dredge and fill activities necessary for building a power plant to generate additional baseload electricity [1].


Current  
chat  
answer

New prompt

Sources  
used in  
answer

Ask ChatNEPA.ai about this project ...


# ChatNEPA for Document-level Fact Finding

Search  NEPA


Reset to Landing Page

Appendix 1 6 and 8 Ten West Link

AGENCIES

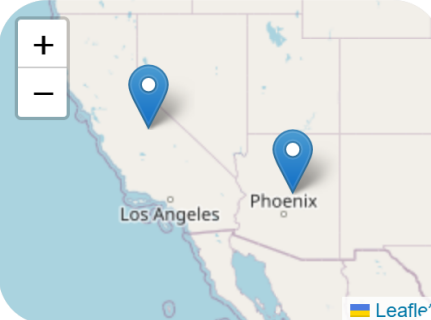


Western Area Power Administration, Bureau of Land Management



Western Area Power Administration, Bureau of Land Management

LOCATION



Arizona, California

829 of 1926

Ten West Link Transmission Project | Avian Protection Plan/Bird and Bat Conservation Strategy Plan Appendix F-3

2.1 Federal Endangered Species Act

The federal Endangered Species Act (ESA) is administered under the USFWS. The purpose of the ESA is to "provide a means whereby ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species." Section 9 of the ESA prohibits purposeful or "incidental" take of listed species, including killing or harming a listed species or its habitat. If an action with a federal nexus has potential to affect a listed species, consultation under Section 7 of the ESA is required between the lead federal agency and the USFWS.

2.2 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 provides for the protection of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) by prohibiting the take; possession; sale; purchase; barter; offer to sell, purchase, or barter; transport; and export or import of any bald or golden eagle, alive or dead, including any part, nest, or egg unless allowed by permit (16 United States Code [U.S.C.] § 668 (a); 50 Code of Federal Regulations Part 22.3). "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

2.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) was enacted in 1918 to put an end to the commercial trade of migratory birds and their feathers. The MBTA implements treaties and conventions between the United States, Canada, Mexico, Japan, and the former Soviet Union for the protection of migratory birds. This Act decrees that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected. Under this Act, it is unlawful to pursue, hunt, take, capture, kill, possess, offer to or sell, barter, purchase, deliver, transport, or receive any migratory birds (including parts, nests, eggs or other product, manufactured or not). In practice, most bird species with non-migratory life-histories are protected under the MBTA, as well. Virtually all native bird species in the United States are protected under MBTA, with the exception of upland game birds (order Galliformes: e.g., grouse and quail). While the USFWS is the lead federal agency charged with protecting migratory birds within the United States, under Executive Order 13186 all other federal agencies are charged with conserving and protecting migratory birds and the habitats on which they depend.

Historically, incidental take (i.e., take of birds resulting from an activity when the underlying purpose of that activity is not to take birds) has been considered a violation of the MBTA. In a December 22, 2017 memorandum, M-37050 (M-Opinion), the United States Department of the Interior Office of the Solicitor issued an opinion concluding that incidental take is not a violation of MBTA. On April 11, 2018, USFWS issued a guidance Memorandum acknowledging and clarifying what changes in practice should be made in light of the M-Opinion. For example, under this guidance memo, knowingly destroying an active bird nest along with the nesting substrate (e.g., vegetation clearing for construction) does not violate MBTA unless the nest is explicitly and intentionally destroyed along with the nesting substrate (e.g., tree trimming or removal to destroy an undesired nesting colony). While

June 2019 | 6

Ten West Link Transmission Project | Avian Protection Plan/Bird and Bat Conservation Strategy Plan Appendix F-3

incidental take of birds is no longer considered a violation of MBTA, avoiding or minimizing take of birds to the extent practicable is still a responsible, effective, and valuable way to avoid and minimize impacts to bird populations. Furthermore, minimizing impacts to individual birds is integral to many of the APMs, BMPs, and MMs required by the POD for this Project.

2.4 Arizona State Regulations

Current prompt

what does the MBTA prohibit?

Current chat answer

The Migratory Bird Treaty Act (MBTA) prohibits the pursuit, hunting, taking, capturing, killing, possessing, offering to sell, bartering, purchasing, delivering, transporting, or receiving of any migratory birds, including their parts (such as eggs, nests, and feathers) or products derived from them. This protection applies to virtually all native bird species in the United States, including those with non-migratory life histories, with the exception of upland game birds like grouse and quail [1][3].

Page Number

Page 829 of Appendix 1 6 and 8 Ten West Link

Part of the ADOPTION - Final Environmental Impact Statement and Proposed Resource Management Plan Amendments for the Ten West Link Transmission Line Project, overseen by the Western Area Power Administration, Bureau of Land Management

New prompt

Ask ChatNEPA.ai about this document ...

AI can make mistakes. Check responses.





# CommentNEPA

Auditable,  
Agentic Workflows with  
Feedback Alignment for  
Environmental Review

May 6, 2025



PNNL is operated by Battelle for the U.S. Department of Energy

# Environmental Review is Encumbered

Labor-intensive review process for subject-matter experts (SME).

- 10s x 1000s of letters of public correspondence.
  - 1000s of hours (~5 min per comment).
- Years to complete permitting process.

Pressures increasing:

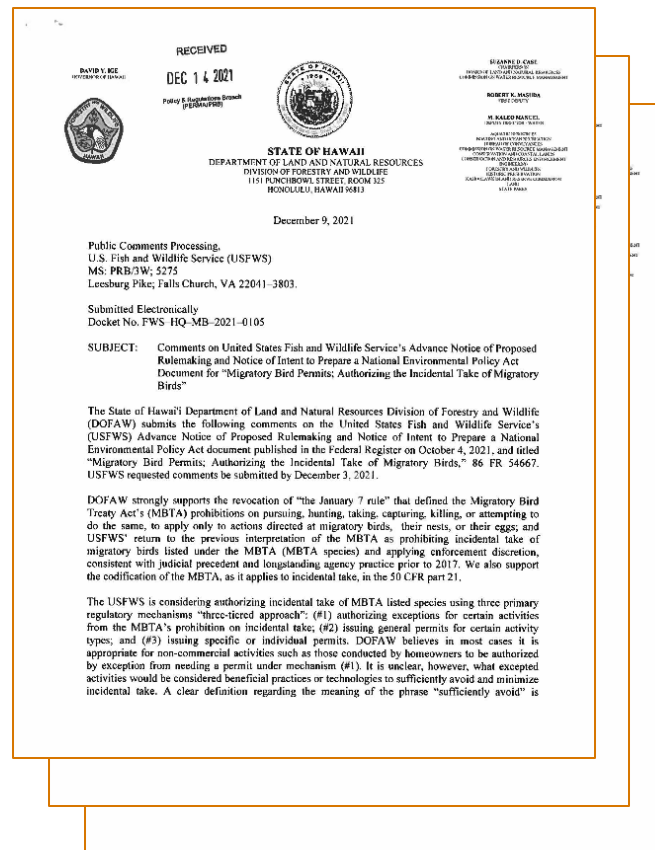
- Regulatory time constraints to complete analysis.
- Public use of AI increases volume.
- Industrial use of AI increases volume of projects.



# Current Practice

For each correspondence:

- Manually **bracket** (non-)comments.
- Manually sort into **bins**.

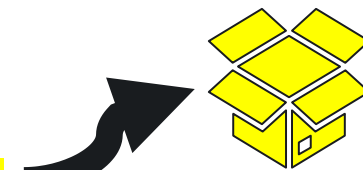


David G. Smith, representing the State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW), supports the revocation of the January 7 rule and a return to the previous interpretation of the MBTA. Smith's background in wildlife conservation highlights his concern for incidental take of migratory birds, as indicated by the extensive data and recommendations provided in the correspondence, including specific examples of incidental take such as seabirds on O'ahu due to light attraction and varying take levels at wind facilities on Maui. DOFAW's key concerns include the need for clear definitions of "sufficiently avoid," rigorous project monitoring for impacts and infrastructure-related take, preference for compensatory mitigation over a general conservation fee structure for significant projects, and critique of using funds for project-specific monitoring. Smith emphasizes that these regulations would benefit migratory bird populations, help prevent their up-listing to threatened or endangered status, and streamline compliance and litigation efforts.

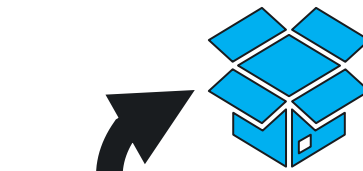


Tedious

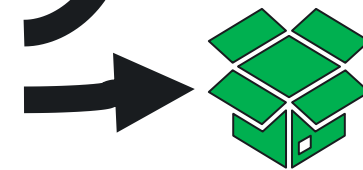
Time/Resource intensive



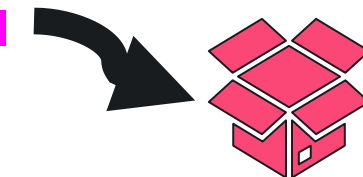
General Support



Compensatory Mitigation



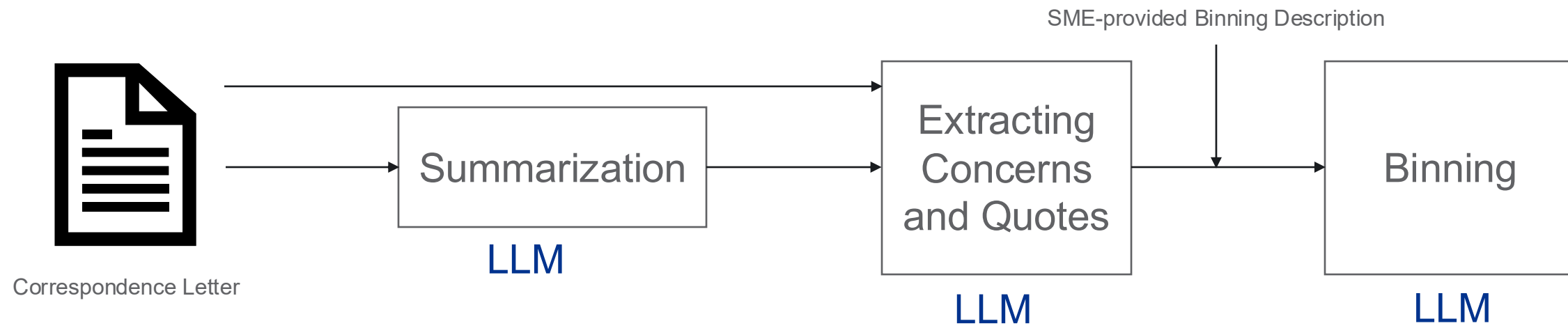
Monitoring



Impact on Wildlife



# Public Comment Processing w/ CommentNEPA



## Bin Labels


## Generated Concerns


## Extracted Quotes



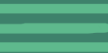








## Correspondence Letter

| Project | Subject Name                  | Concern  | Comment Text  | Filename   | Start |
|---------|-------------------------------|--|---|--|-------|
| WS      | Multiple Use                  | Solar energy development should not occur at the expense of remaining wild places.   | Solar Energy development need not come at the expends of our last few wildplaces.             | Draft2024SolarPEIS-1-500651771.json                      |       |
| WS      | General Opposition            | The author opposes increasing the solar panel project on BLM land, fearing it will create non-usable land for wildlife and humans.     | Please do not increase the solar panel project onto BLM.                                      | Draft2024SolarPEIS-1-500658779.json                      |       |
| WS      | General Opposition            | The author opposes increasing the solar panel project on BLM land, fearing it will create non-usable land for wildlife and humans.     | This would be adding building materialto the land and creating non usable land for wildlife   | Draft2024SolarPEIS-1-500658779.json                      |       |
| WS      | Multiple Use                  | The author contrasts the project with livestock leasing, where land can be repaired.   | This isbuilding onto BLM land not just leasing for livestock in which the land can berepaired | Draft2024SolarPEIS-1-500658779.json                      |       |
| WS      | Recreation                    | Impact on public recreation and OHV use  | Please consider thepublic recreation and OHV use of these lands in consideration with this    | DraftSolarPEISVol1-1-500680436.json                      |       |
| WS      | Recreation                    | Impact on public recreation and OHV use  | We have rights to use these lands and recreate on the lands.                                  | DraftSolarPEISVol1-1-500680436.json                      |       |
| WS      | General Support               | The author supports solar energy but is concerned about potential environmental harm.  | As an Ohioan who has installed solar energy panels on my home, I know thatsolar energy as     | [EXTERNAL] I support solar development in the r(68).json |       |
| WS      | General Support               | The author supports solar energy but is concerned about potential environmental harm.  | However, in order to avoid harming sensitiveanimals and cultural landscapes, solar energy     | [EXTERNAL] I support solar development in the r(68).json |       |
| WS      | Cumulative Impacts            | The author expresses concern about the loss of wild places and the cumulative impact of future development.                            | We donot have many wild places left and if this is allowed can you imagine thebuilding in 1   | Draft2024SolarPEIS-1-500658779.json                      |       |
| WS      | Preferred Alternative         | The author supports Alternative 5 to focus solar development on previously disturbed lands.  | As outlined in the Western Solar Plan draft environmental impact statement,Alternative 5      | [EXTERNAL] I support solar development in the r(68).json |       |
| WS      | Preferred Alternative         | The author supports Alternative 5 to focus solar development on previously disturbed lands.  | The Bureau of Land Management should choose this alternative,which would keep most hi         | [EXTERNAL] I support solar development in the r(68).json |       |
| WS      | Hazardous Materials and Waste | The author is concerned about the environmental impacts of solar panel disposal after their lifespan, including the need for recycling | What happensthen?   | Draft2024SolarPEIS-1-500656413.json                      |       |
| WS      | Hazardous Materials and Waste | The author is concerned about the environmental impacts of solar panel disposal after their lifespan, including the need for recycling | I think BLM should require that when the panels expire they should berecycled and the site    | Draft2024SolarPEIS-1-500656413.json                      |       |
| WS      | Hazardous Materials and Waste | The author is concerned about the environmental impacts of solar panel disposal after their lifespan, including the need for recycling | The recycling requirement should be flexible because thetechnology will change over the n     | Draft2024SolarPEIS-1-500656413.json                      |       |
| WS      | Hazardous Materials and Waste | The author is concerned about the environmental impacts of solar panel disposal after their lifespan, including the need for recycling | The reclamation requirements should also be flexible in light of climate change related effec | Draft2024SolarPEIS-1-500656413.json                      |       |
| WS      | Hazardous Materials and Waste | The author is concerned about the environmental impacts of solar panel disposal after their lifespan, including the need for recycling | The goal of the reclamation should be to restore the land toa natural condition that will su  | Draft2024SolarPEIS-1-500656413.json                      |       |
| WS      | Hazardous Materials and Waste | They express concerns about the potential for toxic chemicals from batteries to be left on BLM lands.                                  | Batteries at solar farms likelycontain cadmium and other potentially toxic chemicals.         | Draft2024SolarPEIS-1-500656413.json                      |       |
| WS      | Hazardous Materials and Waste | They express concerns about the potential for toxic chemicals from batteries to be left on BLM lands.                                  | Toxic chemicals should not be left on BLM lands.  | Draft2024SolarPEIS-1-500656413.json                      |       |

# CommentNEPA: Web Application

 **PNNL** An official website enabled by the Pacific Northwest National Laboratory


Comment  NEPA AI For U.S. Environmental And Permitting Reviews





📅 Tuesday, May 6, 2025


2 Open Projects

Concurrent projects


 Sort


 CFFF


 South Carolina

 Office of Nuclear Material Safety and Saf...

Issued on -  
Public engagement closed on -  
- residences in 1 mile  
255 public comments  
Completed comment ingestion

 MBTA

 Virginia

 U.S. Fish and Wildlife Service

Issued on -  
Public engagement closed on -  
- residences in 1 mile  
201 public comments  
Completed comment ingestion

 Agency Scoping

 Comment Ingestion

 Comment Binning  

Details

 Comment Analysis  

Details

 Report Out  

Details

 Review  

Details

Progress of SME-AI collaboration



# CommentNEPA: Web Application

CommentNEPA

CFFF

South Carolina

Office of Nuclear Material Safety and Safeguards

PNNL

An official website enabled by the Pacific Northwest National Laboratory



Selected Letter

|                               |                |
|-------------------------------|----------------|
| letter-icon                   | Correspondence |
| 25 letters                    |                |
| Letter from Tom Clements      | 13 comments    |
| Posted: Aug 24, 2020          |                |
| Letter from Warren Shurlock   | 15 comments    |
| Posted: Aug 27, 2020          |                |
| Letter from Dwmatherly        | 7 comments     |
| Posted: Aug 31, 2020          |                |
| Letter from Priscilla Preston | 8 comments     |
| Posted: Sept 9, 2020          |                |
| Letter from Pamela Glaw       | 14 comments    |
| Posted: Aug 31, 2020          |                |

AI-Extracted Concern

|   |          |
|---|----------|
| comment-icon  | Comments |
| 13 comments   |          |
| Potential use of High-Assay Low-Enriched Uranium (HALEU) in fuel fabrication  |          |
| "the draft EIS must discuss the possibility of this material being used to fabricate fuel at the Westinghouse fuel plant."  |          |
| "What would be the environmental and worker impacts of fabricating HALEU into fuel?"  |          |
| Dual-use nature of the facility for commercial nuclear fuel and tritium production for nuclear weapons  |          |
| "the overall facility meets the definition of a "dual-use-facility," correct?"  |          |
| "Given the nuclear weapons-related activities of WesDyne, the entire facility may well be more vulnerable to physical attack, insider threat or cyberattack, all of which might have associated environmental and health impacts."      |          |
| Regulatory oversight of the facility and its operations   |          |
| "Are both parts of the facility regulated (concerning industrial production activities and any environmental discharges) and by whom?"  |          |
| "Which agency or agencies regulates the industrial activities at the WesDyne facility?"   |          |
| Environmental and health impacts of chemical waste or wastewater generated by operations  |          |
| "Who regulates the matters related to potential environmental and health impacts, including any chemical waste or waste water (sewage) that might be transferred to the Westinghouse side of the facility or other on-site facilities?" |          |

Letter Graph Summary

AI-Generated Summary

Supporting Quote

I request that this and my other comments be included in the scoping record, be responded to in the draft EIS and that all of my comments be posted in ADAMS. I am emailing and mailing this comment. My second emailed comment of August 21, 2020 is also being mailed along with this comment. Please confirm receipt of this and earlier comments. Scoping Comments: 1. High-Assay Low-Enriched Uranium (HALEU) Use? As there is much discussion of use of high-assay low-enriched uranium (HALEU) as a nuclear reactor fuel, the draft EIS must discuss the possibility of this material being used to fabricate fuel at the Westinghouse fuel plant. Westinghouse must inform the NRC and public if it might have intentions to process HALEU into fuel. A so-called white paper of January 2018 by the Nuclear Energy Institute, titled Addressing the Challenges with Establishing the Infrastructure for the front-end of the Fuel Cycle for Advanced Reactors, states the following: "The NRC has licensed three fuel fabrication facilities that are operating now, using low-enriched uranium (i.e., less than 5% uranium-235) to produce low-enriched fuel for

# CommentNEPA: Web Application

CommentNEPA  CFFF ☐  South Carolina  Office of Nuclear Material Safety and Safeguards  An official website enabled by the Pacific Northwest National Laboratory



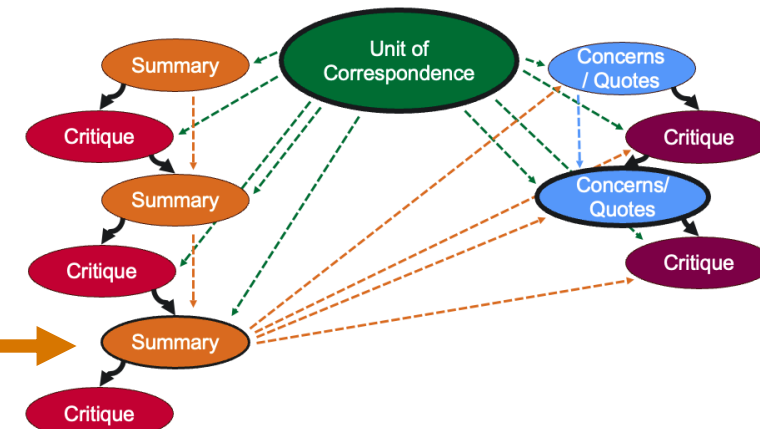
Selected Letter

| letter-<br>icon     | Corresponde<br>25 letters   | comment-icon<br>Comments<br>13 comments  |
|---------------------|---|--|
| MBTA                | Letter from Tom Clements<br>13 comments<br>Posted: Aug 24, 2020     | <b>Potential use of High-Assay Low-Enriched Uranium (HALEU) in fuel fabrication</b><br>"the draft EIS must discuss the possibility of this material being used to fabricate fuel at the Westinghouse fuel plant."  |
| <b>PROGRESS</b>     | Letter from Warren Shurlock<br>15 comments<br>Posted: Aug 27, 2020  | "What would be the environmental and worker impacts of fabricating HALEU into fuel?"   |
| Agency Scoping ✓    | Letter from Dwmatherly<br>7 comments<br>Posted: Aug 31, 2020        | <b>Dual-use nature of the facility for commercial nuclear fuel and tritium production for nuclear weapons</b><br>"the overall facility meets the definition of a "dual-use-  |
| Comment Ingestion ✓ | Letter from Andrea Issod<br>12 comments<br>Posted: Sept 1, 2020     | <b>Regulatory oversight of the facility and its operations</b>   |
| Comment Binning ✓   | Letter from Priscilla Preston<br>8 comments<br>Posted: Sept 9, 2020 | <b>Environmental and health impacts of chemical waste or wastewater generated by operations</b><br>"Who regulates the matters related to potential environmental and health impacts, including any chemical waste or waste water (sewage) that might be transferred to the Westinghouse side of the facility or other on-site facilities?" |
| Comment Analysis    | Letter from Pamela Glaw<br>14 comments<br>Posted: Aug 31, 2020      | <b>Adequacy of oversight by the South Carolina Department of Health and Environmental Control (DHEC) and the NRC</b><br>"Does the South Carolina Department of Health and Environmental Control (DHEC) regulate WesDyne? If not, why not?"   |
| Report Out          |   |  |
| Review              |   |  |

Selected Subtask

Letter **Graph** Summary

Click on node to inspect and provide feedback



input **NODE PROMPT**

You are an environmental analyst tasked with ensuring the summary of public commentary on a proposal while ensuring it accurately reflects the concerns raised about environmental impacts. Your role is to critique the provided summary for any deviations from the source text, omissions of key environmental concerns, or any added editorializing. Your critique should be constructive, focusing on improving the summary's fidelity to the original document and its comprehensive coverage of environmental issues.

input **NODE RESPONSE**

The summary provided is generally accurate and reflects the key points of Solectria's public commentary. It correctly identifies their support for incentives and opposition to tax credits. However, the summary could be improved by addressing the following points:

How well does the AI perform? Rating:

Prompt to LLM

LLM Output

SME Feedback



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PROJECTS

CFFF

MBTA

PROGRESS

Agency Scoping

Comment Ingestion

Comment Binning

Comment Analysis

Report Out

Review

Define Comment Bins

Add bins (optional). Then, compare and finalize binning comments pulled from the uploaded correspondence:

Anticipated Bins

☒ General Opposition


☐ Proposed Alternatives


☐ NEPA Process


☐ Human Health Hazards


☐ Socioeconomic Impacts


Enter another bin



























AI-Defined Bins

☐ Photovoltaic solar

☒ Housing


☐ Solar thermal


☒ Construction

 Rerun bin generation

Final Bins

Select bins to add them to "Final Bins"

 Continue with Anticipated Bins

 Continue with AI-Defined Bins

Cancel

Next

Select Categories of Concerns

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## PROJECTS

CFFF

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## PROGRESS

Agency Scoping



Comment Ingestion



Comment Binning



Comment Analysis



Report Out



Review

## Download Report

### EIS Appendix for CFFF

## Category of Concerns

### General Opposition

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## Summary

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## Citations to Letters

### Housing

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Download

AI can make mistakes. Check responses.

Back

Finish



## General Lessons Learnt So Far

- **Prioritizing Use Cases:** Focus AI integration efforts on specific areas of the decision process where AI adds demonstrable value (e.g., research, normalizing diverse viewpoints) and **addresses human limitations effectively**, rather than attempting to automate entire complex decisions universally.
- **Automating Foundational Tasks:** Actively identify and target **rote, repetitive, or data-intensive tasks** within the decision process that are prone to human error or consume significant time. Automating these foundational elements is often easier and frees up SMEs to focus on higher-level analysis, strategic thinking, and complex judgments.
- **Maintaining Human Oversight (SME In-the-Loop):** Ensure Subject Matter Experts (SMEs) remain **'in-the-loop' for critical decisions**. AI should primarily serve to augment human judgment and provide recommendations or analysis, allowing SMEs to review, validate, and ultimately take accountability for the final decision.
- **Emphasizing Standards and Interoperability:** Invest in **establishing clear data standards, model governance frameworks, and technical interoperability**. Making sure AI systems can seamlessly integrate with existing data sources, legacy systems, and human workflows is important for scalability, reliability, and maintainability.

# Lessons Learnt in AI Adoption

## Early Involvement of NEPA Experts into the Technology Development

- Enable NEPA SMEs to translate their expertise into prompts.
- Engineers often emphasize, “We’re going to build an agent that does XYZ,” when the real task is crafting a prompt.
- This creates barriers as domain experts feel excluded, not understanding “agents.”

### Opportunity:

- The beauty of LLMs lies in their ability to make AI accessible via natural language.
- Avoid wrapping everything in technical jargon to maintain this advantage.

# Lessons Learnt in AI Adoption

Reduce the Developer vs NEPA Expert Communication Gap

| Instead of saying...                             | Say...   |
|--|--|
| “We are implementing a RAG chatbot in NEPA”      | “We’re making sure the chatbot has the right information to answer questions about NEPA” |
| “Our model suffers from hallucination”           | “Sometimes the AI makes things up, so we need to check its answers about NEPA”           |
| “Our model can do long context modeling in NEPA” | “Our AI can understand and maintain long discussions about NEPA”                         |
| “Here is the agent drafting NEPA”                | “This is the AI assistant helping to draft NEPA documents”                               |



# Lessons Learnt in AI Adoption

## Improve User Trust and AI Interaction

- **Educate SMEs:** Help users form realistic mental models of the AI system's capabilities and limitations. E.g., the types and frequency of mistakes it can make, and the AI system's workings.
- **Promote SME vigilance:** Motivate users to pay attention and verify outputs, especially in high-stakes scenarios and when mistakes are likely. Draw users' attention to potential mistakes in AI outputs by using techniques such as uncertainty expressions and uncertainty highlighting.
- **Make it easy to verify outputs:** Decrease the cognitive load of verifying AI outputs against grounding data or reliable information sources. Consider techniques such as displaying excerpts from grounding data alongside outputs, to enable users to spot discrepancies.

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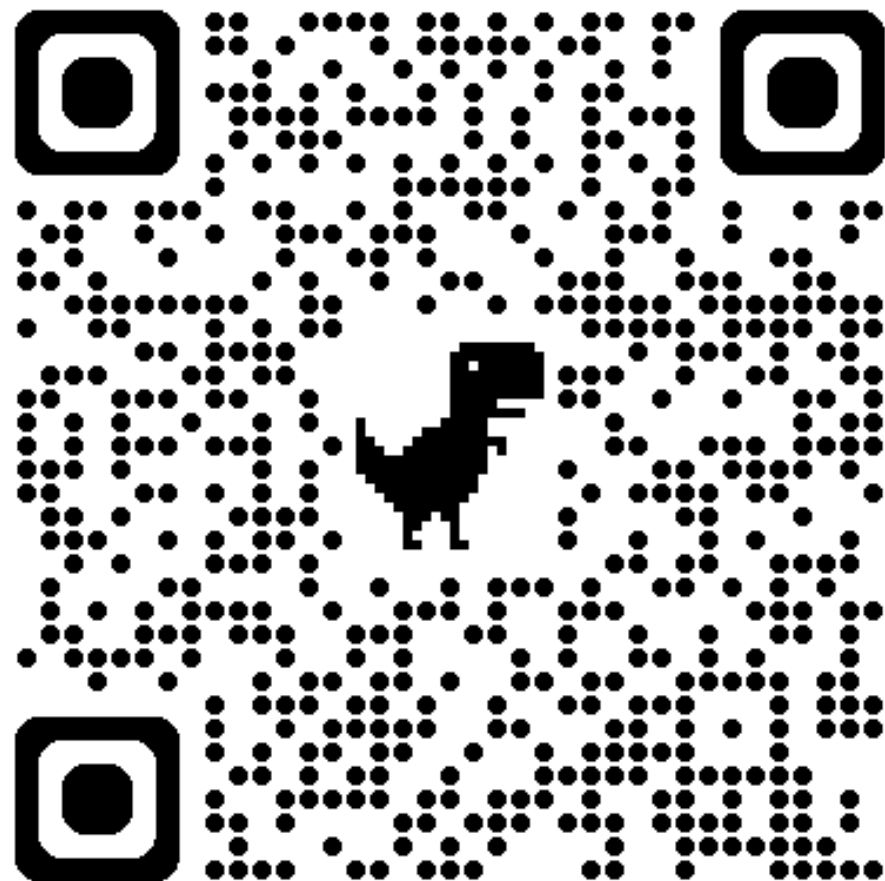
Bethel Tarekegne  
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PermitAI



## Faster Federal Permitting Using AI

Pacific Northwest National Laboratory is building a one-stop data platform and a powerful suite of artificial intelligence tools to streamline and accelerate the review process for critical federal infrastructure.





# Thank you

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