IDEAS · CHALLENGE

ADVANCED RESEARCH PROJECTS AGENCY • INFRASTRUCTURE

ARPA-I Ideas and Innovation Challenge

August 8, 2025

Note: *This document constitutes the complete official terms and conditions for the ARPA-I Ideas and Innovation Challenge. U.S. DOT reserves the right, in its sole discretion, to (a) cancel, suspend, or modify the Challenge, and (b) not award any prizes if no entries are deemed worthy. Any modifications to the ARPA-I Ideas and Innovation Challenge will be reflected in this document.*

Overview Information:

- **Federal Agency Name** – Advanced Research Projects Agency – Infrastructure (ARPA-I), U.S. Department of Transportation (U.S. DOT)

- **Announcement Type** – Prize competition / challenge via Challenge.gov

- **Dates/Time** – **All Times are Eastern Time Zone (ET)**
  - **Posting Date**: August 8, 2025
  - **Proposers Day Informational Webinar**: August 20, 2025, 1:00PM ET https://usdot.zoomgov.com/webinar/register/WN_V927AOjJSUCGnyShxKNe7w
  - **Submission Due Date**: Concept papers may be submitted on a rolling basis until September 17, 2025, at 5:00 PM

- **Anticipated individual awards** – Multiple awards are anticipated. Total prize purse has maximum value of $1,000,000.

- **Types of instruments that may be awarded** – Cash prizes

- **Agency contacts** –
  - The Technical POC for this prize challenge is Dr. Vincent Tang, Deputy Director, ARPA-I
  - Ideas and Innovation Challenge email: ideas.arpa-i@dot.gov
  - Ideas and Innovation Challenge website: https://www.transportation.gov/arpa-i/ideas-challenge

- **Frequently Asked Questions (FAQ):** FAQs for this Challenge may be viewed on the Challenge.gov website.

ARPA-I Ideas and Innovation Challenge

A Challenge prize competition soliciting innovative, breakthrough ideas and plans for future ARPA-I and U.S. DOT projects

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I. Overview

ARPA-I Ideas and Innovation Challenge Vision and Objectives

Americans are demanding more from our transportation sector—enhanced safety, faster project delivery, lower costs, increased efficiency, and improved resilience against physical and cyber threats for all users. Meeting these goals will require new and emerging innovative transportation technologies that can be scaled, deployed, and commercialized—advanced digital infrastructure, automation, modern air traffic control, novel infrastructure materials, new construction techniques, enhanced operations systems, smart planning tools, precision sensing, high performance computing, and more.

Authorized in Section 25012 of the Infrastructure Investment and Jobs Act (IIJA, Pub.L. 117-58; codified at 49 U.S.C. § 119), the Advanced Research Projects Agency – Infrastructure (ARPA-I) of the U.S. Department of Transportation is poised to **accelerate** and **commercialize** the essential breakthrough technologies that can tackle these national goals. ARPA-I is modeled after the successful Defense Advanced Research Projects Agency (DARPA), which has a proven track record of success that includes the development of world changing technologies such as the Internet, autonomous vehicles, and GPS.

The Ideas and Innovation Challenge, or **Ideas Challenge**, is ARPA-I's open call to innovators across the public and private sectors to help identify the most promising and transformative Research and Development (R&D) proposals that have the potential to deliver technologies that radically:

- Enhance the safe, secure, and efficient movement of people and goods,
- Lower the long-term costs of infrastructure planning, construction, and maintenance,
- Strengthen the resilience of infrastructure against physical, natural, and cyber threats, and
- Enhance the United States' position as a global leader in advanced transportation infrastructure technologies and materials.

Winning Ideas Challenge proposals may be awarded prizes of up to a total of $320,000 each across two stages, with the winners recognized by U.S. DOT leadership as well as by a distinguished panel of judges from the private and public sectors. The winners will be invited for further in-depth discussion of their ideas and proposals, and their ideas will aid in informing the R&D path forward for ARPA-I and U.S. DOT, including its modal R&D organizations. The organization of the Challenge will include:

- Stage 1: The submission of a Concept Paper describing a project idea for developing and commercializing a breakthrough transportation technology and/or capability:
    - Up to 15 Stage 1 prizes may be awarded. Each Stage 1 winner will be awarded a prize of $20,000 and invited to an U.S. DOT innovation workshop in late 2025, where they will present and discuss their concept with U.S. DOT R&D leadership and stakeholders and receive feedback to refine their ideas and approach for Stage 2.

- Stage 2: All Stage 1 winners will be eligible to submit a detailed project proposal and R&D plans for their concept. Up to 10 finalists will then be selected to the ARPA-I Ideas Challenge Finals event planned for early 2026 where they will present their project proposal to a distinguished panel of judges and audience members from the public and private sector to compete for Stage 2 prizes:
    - Up to five (5) Stage 2 prizes may be awarded to recognize the best proposals and plans submitted and presented, totaling $700,000.
    - Stage 2 prizes may be tiered; each prize will have a maximum value of $300,000.

- More details for Stage 2 will be provided in subsequent communications to Stage 1 applicants.

- The total prize purse for all Stage 1 and 2 cash prizes awarded will be a maximum of $1,000,000.

II. The ARPA-I Ideas Challenge

ARPA-I is calling for ideas and proposals that have the potential to transform America's transportation infrastructure. The Ideas Challenge is an opportunity to break barriers, question long-held assumptions, and drive the next era of transportation infrastructure technologies forward. Successful proposals will lay out a vision and path for the development of potential transformational technologies and identify viable paths to large-scale deployment and/or commercialization within the current public and private infrastructure ecosystem.

In Stage 1 of the Ideas Challenge, applicants will craft a concise Concept Paper (up to five pages in length, not counting a cover page, a single reference page, and a single biography page identifying the key participants in the proposal) that clearly define:[1]

- The important transportation infrastructure problem being addressed,
- The envisioned breakthrough capability or solution to that problem that could transform the transportation infrastructure of the United States, and
- Initial plans and key metrics that will help define a successful Research and Development (R&D) project as well as the proposed path to operationalization, deployment, and commercialization of that solution.

The Concept Papers selected as winners in Stage 1 of the competition will refine their ideas with feedback from U.S. DOT and will be invited to submit a detailed project proposal and R&D plan expanding on their concepts, with the best proposals recognized as Stage 2 winners at the Ideas Challenge Finals event. These proposals will form a portfolio of potential breakthrough projects to aid in informing the R&D path forward for ARPA-I and U.S. DOT programs, including in its Operating Administrations (OAs).

This Challenge is not about incremental change. It's about rewriting the innovation playbook. The future of transportation is waiting — and we are calling upon U.S. innovators to lead the way.

Topics Specifically Not Encouraged
U.S. DOT discourages submission of Concept Papers that involve incremental improvements, primarily policy or regulatory development, or traditional education and workforce training; or that focus solely on standards and interoperability specification development; or do not further ARPA-I and/or U.S. DOT missions.

III. Challenge Opportunity Description

Modeled on DARPA, ARPA-I aims to accelerate the development and delivery of breakthrough transportation technologies through a continuously updated and actively managed portfolio of metrics-driven, time-limited R&D programs. These ARPA-I programs will be focused on delivering

[1] Based on DARPA's Heilmeier Catechism: https://www.darpa.mil/about/heilmeier-catechism

transformational change in the transportation sector and are expected to be higher risk with higher potential rewards than traditional research portfolios. Each program will typically include:

- Multiple phases across a three- to four-year total timeframe; with go/no-go decision between phases based on key metrics;
- Multiple actively managed R&D projects working to achieve each program's goals through cooperative and competitive approaches under an overall program hypothesis for the envisioned breakthrough capability; and
- Planning for successful technology transition and commercialization approaches from day one, even for nascent technology concepts.

ARPA-I envisions three strategic focus areas - Knowledge, Construction, and Optimization, as well as a broad Enabling Technologies category - that align with ARPA-I's Congressional mandate to reduce infrastructure costs, increase transportation system safety, efficiency, and resiliency, and ensure U.S. global dominance in advanced transportation technologies.

ARPA-I encourages Ideas Challenge participants to propose R&D program and project ideas within the following strategic areas that could achieve breakthrough technologies relevant to one or more of U.S. DOT's OAs (https://www.transportation.gov/administrations). The best submitted ideas and plans will inform future R&D efforts and programs within ARPA-I and U.S. DOT.

The areas described below are not meant to be completely orthogonal or independent and some overlap and integration of areas would be needed to address larger strategic capabilities within ARPA-I and U.S. DOT's innovation mandate. The framing and examples below are intended as suggestions and not as an exclusive list.

1. Knowledge: *Tools that allow infrastructure operators to understand everything they need to know about their transportation infrastructure systems*.

ARPA-I envisions development of tools that allow infrastructure operators to create practical, cost-effective, at scale, dynamically updated models of America's infrastructure, including roads, bridges, highways, ports, airports, pipelines, and rail and marine infrastructure. Digital twins have the potential to unlock completely new capabilities and cost savings for the entire transportation system and to make these systems much safer. With these technologies, State DOTs and other infrastructure operators could use these tools to identify dangerous intersections or roadway segments across their networks, construction sites would be less likely to shut down over a breached utility or cut cable, and dynamically planned evacuation routes that ensure every family can safely escape violent storms and wildfires would be just a click away.

Example topic ideas for building **Knowledge** could include:

- Scalable and sustainable methods for characterizing local, regional or national multi-modal, multi-domain (air, land, sea) traffic patterns and freight logistics
- Novel wide-area sensor networks and their components, such as new radar and other sensing technologies
- AI-enabled infrastructure detection and classification tools for data from wide-area sensor networks
- Sub-surface imaging and characterization technologies
- Novel integrated safety monitoring systems for rail and transit

- Pipeline monitoring and safety (e.g. detection and monitoring of cracks, corrosion and/or other damage/threats, real-time leak detection, and emergency response)
- Hazardous materials monitoring and safety (e.g. real-time commodity tracking, packaging integrity monitoring, incident detection/monitoring/prediction, and emergency response)
- Zero-trust architectures and AI-powered infrastructure threat detection
- Advanced planning and analysis tools for transition of legacy systems to next generation intelligent transportation systems incorporating critical considerations such as safety, service continuity, risk, and scalability.

2. Construction: *Constructing infrastructure safer, faster, more cost-effectively, and with a longer lifespan.*

Imagine novel construction materials and methods, enabled by new AI discovery techniques, with game-changing impacts on how the transportation industry designs and builds infrastructure. Bioengineered concrete that repairs itself, new coatings and encapsulations to refurbish and enhance pipeline safety and tank cars, and AI-driven system engineering tools that drastically save construction time and reduce costs across multiple domains, may all be possible with the right investments in emerging technologies.

As new advanced materials and techniques leveraging rapidly developing technologies like AI and automation are being developed and adapted, significant opportunities remain to produce novel materials for construction that can increase performance while meeting the sector's stringent cost and safety requirements. Moreover, fundamental understanding and predictive capability for the construction sector's foundational materials such as concrete remains insufficient for planning long-term performance without significant reliance on empiricism and safety factors. A true predictive capability that would allow for significantly more efficient use of these materials could be enabled by emerging AI techniques and full, multi-scale modeling coupled with well-crafted experiments. At the systems engineering level, opportunities exist to leverage AI methods for rapidly producing infrastructure designs that could satisfy both physical and regulatory requirements from the start, shortening time to construction significantly.

Other example topic ideas for enabling **Construction** could include:

- Automation and robotics for construction and maintenance for workforce efficiency and work zone safety, including for ship building
- AI tools for construction project and process management, including streamlining permitting
- Automated materials labs and AI-enabled novel construction materials, such as resilient, high performance, low-cost pavement material
- Modular and prefabricated infrastructure designs
- Large-scale, low-cost 3D printing of roads, bridges, runways, rail beds and other infrastructure components
- *In-situ* quality control using novel sensors for materials monitoring during construction
- Efficiency-optimized use of construction materials and methods
- On-demand additive manufacturing, especially for spare parts and equipment repairs

3. Optimization: *Optimizing the movement of people and goods at scale in real time to radically increase system safety, enhance performance, and decrease costs, leveraging connectivity and automation*.

Imagine a fully networked traffic management system that dynamically adapts to dramatically reduce congestion while enhancing safety for pedestrians, fully streamlined freight systems that unlock cost savings for manufacturers and consumers alike, and optimized integration of AVs and AAM at scale.

While ongoing efforts to connect and coordinate America's infrastructure systems are accelerating, there remain huge opportunities to use emerging techniques in connectivity, AI, and high performance and edge computing to drive real time efficiencies at scale across all modes. ARPA-I envisions programs ranging from development of massively scalable virtual benchmarking environments for autonomous systems to efforts centered on developing autonomous infrastructure and concepts for city-scale traffic management on the ground and in the air.

An example response in this category could invoke new technical insights and ideas integrating automation, AI-driven decision-making and next-generation communication systems to revolutionize Air Traffic Control (ATC) for enhanced safety, efficiency, and scalability in an increasingly congested airspace.

It is recognized that Optimization capabilities will likely have strong dependence on capabilities in the Knowledge area, and respondents are encouraged to be thoughtful about the system of systems approaches that will likely be necessary to be successful.

Other example topic areas for **Optimization** could include:

- AV and related system-level technologies, including benchmarking tools
- Scalable and affordable technologies for wide-area AAM monitoring and traffic control
- AI-driven supply chain and freight optimization and resiliency tools, including for monitoring and reducing crime such as cargo theft
- Cost effective edge computing and AI models relevant for transportation
- Generative AI applications that enable interventions and faster decision making
- Quantum computing for transportation systems simulation and optimization
- Efficient and safe transportation of energy and hazardous materials across multiple modes.
- Novel technologies and techniques to maximize effective use of spectrum

4. Enabling and Foundational Technologies: Enabling and other foundational technologies that are not described above but that could create the basis for future technologies are also encouraged and will be considered. For example, a topic here could address novel approaches to enhance Positioning, Navigation, and Timing (PNT) capabilities, ensuring robust, secure, and scalable, affordable alternatives to traditional GPS for infrastructure applications.

IV. Application and Submission Information

For Stage 1, proposers must submit a Concept Paper and a supporting Summary as outlined below. Any eligible entity may lead the submission of up to three Concept Papers describing distinct technologies and is eligible to receive multiple Stage 1 prizes.

1. ARPA-I Concept Paper Submission

The Concept Paper should address the topics listed below. Strong submissions will be clear about the new technical insights and ideas being proposed that could lead to breakthrough capabilities for transportation infrastructure as well as their practical deployment and/or commercialization, while providing appropriate supporting data, graphics, figures, references, and evidence.

The Concept Paper is limited to a single Cover page, up to [5] five pages explaining the concept, a single reference page, and a single page for key author biographies and/or institution or company background. The Heilmeier Catechism is a recommended, but not required, means for structuring a submission. **Individual paragraphs or sentences with Confidential Business Information (CBI) included in any submission must be clearly marked and labeled as such. Marking the entire Concept Paper as CBI without further delineation is not sufficient.**

Include the following on the cover page of the Concept Paper: Project Title, Topic Area(s), Principal Author and co-authors, Institutions/Business Name, and a banner or vision statement: "What if we could_____?"[fill in the blank]. Please see attachment A for suggested format. The vision statement should be one sentence that clearly describes the intended impact of the final transportation infrastructure project, if successful. This impact can be stated in terms of cost, safety, time to delivery etc. For example, an appropriate Concept Paper vision statement might ask "What if we could deliver bridges in half the time, at half the cost, and with twice the lifetime using new AI assisted designs coupled with additive manufacturing?"

It is recommended for each submission to address the following questions for the proposed concept based on the Heilmeier Catechism as a way to structure your submission:

1) **Objective**: What new breakthrough capability do you aim to deliver? What transportation infrastructure problem are you trying to solve?
   - Provide a clear and concise statement of the problem to be solved, including the goals and objectives of the proposed project.
   - Describe the proposed concept with minimal jargon.

2) **State-of-Practice**: How is this problem addressed today? What are the limitations of the present approach(es)?
   - Outline the range of existing and alternate emerging approaches and identify what technical hurdles prevent the envisioned breakthrough capability. Provide relevant metrics and use them to quantitatively describe where today's solutions fall short. Provide appropriate references.

3) **Opportunity**: What is new about your approach? Why do you think this approach will be successful at this time?
   - Describe and support the new technical insight(s) and/or ideas that now potentially make developing the breakthrough technology and capability possible, and the highest risks and remaining unknowns that an R&D effort should address.
   - Using the same metrics for characterizing the current state-of-practice, quantify the expected performance of the envisioned breakthrough technology and capability.
   - Describe why this technology or capability has not been developed to date and why ARPA-I is the correct funding agency for this proposed new idea, technology, and/or capability. Why does your proposal fit better within the U.S. DOT rather than other agencies or entities? Are there natural opportunities for ARPA-I to partner with a U.S. DOT modal R&D organization, other agencies, and/or the private sector to fund the proposed development?

4) **Impact**: If the proposed project succeeds, what difference will it make?

- Describe how the project would support U.S.DOT priorities and describe the expected impact quantitatively.
- Describe the envisioned target customers, end users, private and public sector stakeholders, and transition partners and how they would benefit if the proposed project succeeded.
- Identify potential commercialization and deployment challenges to be overcome, and how they might be addressed, for the proposed technology to be operationally and/or commercially relevant, deployed and sustained.

5) **Plan**: What are the technical and commercialization plans and transition risks of the proposed project? How much will it cost? How long will it take to succeed? What might be appropriate mid-term and final target metrics to check for success?
   - Provide an outline of an R&D plan and transition strategy that describes the expected major tasks involved and how those tasks will address the highest risk items early. Lay out the potential major milestones and associated target metrics, and a high-level timeline.
   - Estimate the resources that might be required, as well as the envisioned team and partner organizations, that would make the proposed project and the transition of developed technologies to end-users successful, including operationalization, commercialization, piloting, and deployment at scale.

2. Summary Suitable for Public Release

Please provide a Summary of your Concept Paper that is suitable for public release and does not contain confidential or proprietary information. The Summary does not count against your five-page limit and should include:

> Summary: Briefly summarize the proposed R&D project, describing its objectives, the technical landscape and the problem addressed, the proposed technical, commercialization and transition approach and plan, and its potential impact. The one-page Summary should be written at a technical level suitable for an undergraduate student. The Summary shall not exceed 500 words. Authors and co-author information does not count towards this limit.
>
> Summary Slide: Provide a single PowerPoint slide summarizing the proposed R&D project. It should include its objectives, the technical landscape and the problem addressed, including key metrics, the proposed technical, commercialization and transition approach and plan, and its potential impact. You are encouraged to add key illustration(s), graph(s), chart(s) and/or table(s) summarizing the technology opportunity and/or its impact to the Summary.

Application and submission information for Stage 2 of the Ideas Challenge will be released at a later date.

V. Rules

Eligibility

The Challenge is open to individuals and teams (collectively, "Participants") from the private and public sectors in the United States, including, but not limited to, companies, innovators, entrepreneurs, universities and other institutions of higher learning, and research institutions. Teams must clearly identify a single Team Lead and all named team members must individually and collectively meet the Challenge's eligibility criteria. If any potential prize winner is found to be ineligible for any reason, including for failure to comply with Challenge rules, an alternate winner may be selected.

To be eligible to be awarded a prize under this Challenge, a Participant:

1. Shall register to participate in the Challenge under the rules as outlined in this document.
2. Shall comply with all the requirements under this announcement and any subsequently announced rules for the Challenge prize competition.
3. In the case of a private entity, shall be incorporated in and maintain a primary place of business in the United States or U.S. territory,
4. In the case of an individual, whether participating singly or as a part of a team, shall be a citizen or permanent resident of the United States or U.S. territory; and
5. Shall not be a U.S. DOT employee.
6. Shall not be another Federal entity or Federal employee acting within the scope of their employment (all non-U.S. DOT Federal employees must consult with their agency Ethics Official to determine whether Federal ethics rules limit or prohibit the acceptance of a cash prize stemming from a Federally sponsored prize competition).

In addition, these two restrictions apply to recipients of other Federal funds:

1. Federal grantees or recipients of Federal cooperative agreements may not use Federal funds to develop submissions for this Challenge unless consistent with the purpose of their grant award or cooperative agreement; and
2. Federal contractors may not use Federal funds from a contract to develop prize competition applications or to fund efforts in support of a prize competition submission.

Note: U.S. DOT reserves the right to disqualify any submission that it deems, in its sole discretion, to violate these Official Rules, Terms & Conditions.

Liability and Insurance Requirements

By registering and entering a submission, each Participant agrees to assume any and all risks and waive all claims against the Federal Government and its related entities, except in the case of willful misconduct, for any injury, death, damage, or loss of property, revenue, or profits, whether direct, indirect, or consequential, arising from their participation in this competition, whether the injury, death, damage, or loss arises through negligence or otherwise. By registering and entering a submission, each Participant further represents and warrants that it possesses sufficient liability insurance or financial resources, *to the extent permitted by applicable law*, to cover claims by a third party for death, bodily injury, or property damage or loss resulting from any activity it carries out in connection with its participation in this competition, or claims by the Federal Government for damage or loss to government property resulting from such an activity. Challenge winners shall be prepared to demonstrate proof of insurance or financial responsibility in the event U.S. DOT deems it necessary.

Payment of the Prize

Cash prizes awarded under this Challenge will be paid to the designated individual or Team Lead directly by U.S. DOT through electronic funds transfer. Winner(s) will be responsible for any applicable local, State, and Federal taxes and reporting that may be required under applicable tax laws. U.S. DOT will comply with Internal Revenue Service withholding and reporting requirements, where applicable. For Concept Papers submitted by a team, following payment to the Team Lead, U.S. DOT will not be involved in determining how prize money is divided or distributed amongst the team members.

Confidential and Business Information

Challenge submissions and communication with U.S. DOT are subject to the Freedom of Information Act (FOIA, 5 U.S.C. § 552). If the application includes information that the applicant considers to be a trade

secret or confidential commercial or financial information, the applicant should do the following: (1) Note on the front cover that the submission "Contains Confidential Business Information (CBI)"; (2) mark each affected page "CBI"; **and** (3) clearly highlight or otherwise denote the paragraph and sentences that contains CBI. U.S. DOT protects such information from disclosure to the extent allowed under applicable law. In the event U.S. DOT receives a FOIA request for the information, U.S. DOT will follow the procedures described in its FOIA regulations at 49 CFR 7.29. Only information that is ultimately determined to be confidential under that procedure will be exempt from disclosure under FOIA. U.S. DOT reserves the right to proactively publish any application information that is not marked as CBI.

Usage of Artificial Intelligence (AI)

Any use of AI tools (i.e. generative AI or large language model [LLM, e.g. ChatGPT]) in the preparation of the Concept Paper submission must be disclosed. If AI tools were used, indicate what AI tool(s) were used, the approximate percentage of the document that was generated or assisted by AI, and briefly describe the purpose (e.g., language enhancement, content generation) of such use. Each team or applicant remain fully responsible for verifying the accuracy, originality, and ethical integrity of all content, including AI-generated portions. U.S. DOT reserves the right to reject any paper submission that may have used AI in an unethical or illegal manner.

Representation, Warranties, and Indemnification

By entering the Challenge, each Applicant or Participant represents, warrants, and covenants as follows:

- Applicant is the sole author, creator, and owner of their Submission;
- The Submission is not the subject of any actual or threatened litigation or claim;
- The Submission does not and will not violate or infringe upon the intellectual property rights, privacy rights, publicity rights, or other legal rights of any third party;
- The Submission does not and will not contain any harmful computer code (sometimes referred to as "malware," "viruses," or "worms"); and
- The Submission, and contestants use of the Submission, does not and will not violate any applicable laws or regulations.

If an Applicant or Participant is unable to make any of the warranties as stated above, that Applicant or Participant must provide a clear written explanation of the reason(s) it cannot make any specific warranty. U.S. DOT will, in its sole discretion, determine whether such explanations are sufficient and acceptable.

Intellectual Property of Submissions

Applicants can utilize intellectual property developed prior to this prize competition as a part of their Submission. Neither the U.S. DOT nor anyone acting on its behalf will obtain any rights in intellectual property developed prior to or during this prize competition without the prior written consent of the Participant. By participating in the prize competition, the Participant is not granting rights in any patents, pending patent applications, or copyrights related to the technology described in their submission. However, by submitting their entry, the Participant is granting the U.S. DOT and any parties acting on its behalf certain limited rights as set forth herein.

By virtue of their submission to this prize competition, Participants grant to U.S. DOT and any parties acting on their behalf the right to:

1. Review, screen, and evaluate submitted materials per the Evaluation Criteria as detailed below.
2. Use the submitted materials in formulation and establishment of ARPA-I and/or U.S. DOT research programs.
3. Describe the submission in any materials created in connection with this prize competition.

Participant further grants the U.S. DOT, and anyone acting on its behalf the right to publicize Participant's name and, as applicable, the name of Participant's team members and/or the name of any Entity that assisted in preparing Participant's submission. Such authority includes posting or linking to the Participant's submission on U.S. DOT websites, including the Challenge website, and inclusion of the Participant's submission in any other media, worldwide, subject to the above restrictions relating to confidential business information. More specifically, such authority includes the right to copy, distribute, publicly display, and publicly perform all parts of Participant's submission that would not otherwise be exempt from disclosure under FOIA.

VI. Evaluation Criteria for the Challenge

The following criteria will be used for the evaluation of Stage 1 Concept Paper submissions, listed in descending order of importance: (1) Overall Scientific and Technical merit and (2) Potential Impact to the ARPA-I and U.S. DOT Missions. Only submissions that meet the eligibility criteria (see Section V, *Eligibility*) will be evaluated.

Overall Scientific and Technical Merit
This criterion involves consideration of the following:

- Whether the proposed concept is innovative and could lead to transformational breakthroughs in transportation and infrastructure, when compared to conventional or other alternative approaches, including via appropriate metrics.
- The feasibility of the proposed concept, as justified by the technical rationale and supporting information provided, including appropriate metrics.
- Sufficiency of the technical approach and R&D plan submitted to accomplish the proposed objectives, including identification of the highest technical and project or program risks and how they might be addressed, and the overall credibility of the team.

Potential Impact to the ARPA-I and U.S. DOT Missions
This criterion involves consideration of the following:

- The potential for a transformational impact compared to existing or other emerging technologies for one or more of ARPA-I's Ideas Challenge breakthrough technology objectives as laid out in Section I[2], and overall goals of safety, infrastructure acceleration, innovation, and efficiency as applied to transportation.
- Identification of challenges and risks that must be overcome for the proposed technology to be deployed if successfully developed, and viability of initial framework for transition to an operating partner and/or commercial deployment as appropriate for the proposed technology.

Each qualified submission will be evaluated based on the criteria above using the following ratings: Highly Recommended, Recommended, Acceptable, and Not Recommended. These ratings serve as guidance to select a balanced portfolio of concepts that align with the mission of ARPA-I, as well as the missions and priorities of the U.S. DOT and its Operating Administrations.

[2] "…technologies that radically: Enhance the safe, secure, and efficient movement of people and goods; Lower the long-term costs of infrastructure planning, construction, and maintenance; Strengthen the resilience of infrastructure against physical, natural, and cyber threats; and Enhance the United States' position as a global leader in advanced transportation infrastructure technologies and materials."

Example descriptions of Concept Papers that could merit each rating are provided below:

Highly Recommended – Concepts described have excellent scientific and technical merit to produce a breakthrough technology that will very likely have transformational impact on the transportation sector, even if high risk. Critical risks are clearly identified and prioritized, with proposed R&D designed to address the highest risks first where feasible, and appropriate mitigations are proposed where feasible. The proposed R&D plans, transition and/or commercialization plans, and the envisioned team, are very credible.

Recommended – Concepts described have strong scientific and technical merit to produce a breakthrough technology that will likely have transformational or significant impact on the transportation sector, even if high risk. Critical risks are clearly identified, and appropriate mitigations proposed where feasible. The proposed R&D plans, transition and/or commercialization plans, and the envisioned team, are generally credible.

Acceptable – Concepts described have acceptable scientific and technical merit to produce a breakthrough technology that will somewhat likely have transformational or significant impact on the transportation sector, even if high risk. Some risks are identified, and mitigations proposed where feasible. The proposed R&D plans, transition and/or commercialization plans, and the envisioned team, have deficiencies but are credible for early planning.

Not Recommended – Concepts described has one or more of the following: 1) Unacceptable scientific and technical merit for producing a breakthrough technology; 2) Proposed technology is not likely to have transformational or significant impact on the transportation sector; 3) Proposed R&D plans, and/or transition and/or commercialization plans, and/or envisioned team are not credible or adequately developed.

VII. How to Enter

TIP: The system will time-out after 20 minutes of inactivity, so please submit your information all at once to avoid having to start over. The submission package consists of one [5] five-page Concept Paper, a one-page Summary and a Summary Slide uploaded to:
https://www.challenge.gov/?challenge=arpa-i-ideas-challenge

Concept Paper: Please see attachment A for suggested format. All submitted materials must be contained in a single PDF file consisting of a Cover page, a maximum of 5-pages for contents, a single reference page, and a single page for personnel biographies and/or organization background, and no larger than 8MB in total file size. Text in the concept paper may be no smaller than 11- point font size with 1" margins. *Note that the page and file size limit is absolute*.

- Note: The total page limit is 8 pages (1 cover page, 5-page contents, 1 reference page, 1 background page for biographies/organization) *INCLUDES* any/all materials submitted, including images, charts and diagrams. Submissions over the 8-page limit will not be accepted and will be ineligible for prizes.
- Note: Submitted materials that exceed 8MB in total submission size will not be accepted and will be ineligible for prizes.

Respondents should carefully consider how their submission addresses the evaluation criteria (above) and how it provides all the information necessary for the evaluation of the concept.

Summary and Summary Slide: The one-page Summary cannot exceed 500 words. Text in the Summary may be no smaller than 11-point font size with 1" margins. Text in tables or graphics of any font size are acceptable provided they are legible. The Summary Slide must be a single PowerPoint slide.

Submissions received after September 17th, 2025, 5:00 PM ET will not be accepted and are ineligible for the Challenge without exception. Please contact ideas.arpa-i@dot.gov if you experience any technical difficulties while submitting your proposal.

Attachment:

- Attachment A Concept Paper template

Attachment A: ARPA-I Ideas and Innovation Challenge Concept Paper Template

Cover Page (1 Page)

Include a single cover page for your Concept Paper with the information below. The vision statement should be one sentence that clearly describes the intended impact of the final transportation infrastructure project, if successful. This impact can be stated in terms of cost, safety, time to delivery, etc. For example, "What if we could make bridges in half the time, at half the cost with twice the lifetime using new AI assisted designs coupled with additive manufacturing?"

ARPA-I Ideas and Innovation Challenge Concept Paper

Project Title:

Vision Statement: What if we could_____ *[fill in the blank]*

Topic Area

Principal Author and Co-Authors

Institution(s)

Contact Information *[email, phone, address]*

Note: Delete all template instruction text before submission.

Concept Paper (5 Pages)

Describe the project idea for developing a breakthrough technology and/or capability. Reference the Evaluation Criteria for Prize in the Ideas and Innovation Challenge announcement to ensure this concept paper addresses both 1. Overall Scientific and Technical Merit and 2. Potential Impact to the ARPA-I and USDOT Mission. The Heilmeier Catechism in the announcement is a suggested but not required framework for response.

This section is limited to five pages.

References (1 Page)

Use a consistent style to cite references. Limit references in total to one page. Example reference:

1. *Thrun, Sebastian, et al. "Stanley: The robot that won the DARPA Grand Challenge." Journal of Field Robotics 23.9 (2006): 661-692.*

Key Personnel Biographies and/or Institution and/or company background (1 Page)