

CESMII RESEARCH PROJECTS

Request for Proposals

Scaling & Deploying Smart Manufacturing Solutions

CESMII's fifth Request for Proposals, for industry-led projects that scale and deploy Smart Manufacturing solutions across sites, companies, industry segments, and supply chains.

\$4.6M

Federal funding
allocated

\$9.2M

Total with required cost share

~4

Number of anticipated
projects

12–24 mo

Period of performance

ASK A QUESTION

[RFP questions form](#)

RFP, TEMPLATES AND UPDATES

cesmii.org/scale-and-deploy-resources

AT A GLANCE

Highlights

- This fifth Request for Proposals solicits projects that scale and deploy Smart Manufacturing solutions across manufacturing sectors and supply chains. Technical projects must conform to CESMII's three SM Imperatives and provide objective conformance and portability evidence.
- Approximately \$4.6M in federal funding is allocated for this RFP, with a required cost-share contribution match of \$4.6M (total \$9.2M).
- RFP proposal submission, selection, and project launch dates are shown below.

KEY DATES

Request for Proposals Issued	[Date TBD]
Informational Webinar	[Date TBD]
Teaming: if you want to participate in Teaming, add your information to the Teaming sheet before the concept paper is due.	
Concept Paper Due	Jan 8, 2027
Concept Paper Selection	Feb 8, 2027
Proposal Submission Deadline	Apr 12, 2027
Anticipated Project Selection	Jun 14, 2027
Anticipated Project Start	Sep 21, 2027
Period of Performance (max)	12–24 Months

FUNDING

Federal Funding Allocated for RFP	\$4.6M
Minimum Cost-Share contribution for RFP	\$4.6M
Total Funding Allocated for RFP	\$9.2M
Anticipated # of Projects	~4 (total across all areas of interest)
Max Federal Funding per Project	~\$1.0M–1.2M

Everything for this RFP is on the RFP landing page, cesmii.org/scale-and-deploy-resources:

- The RFP, templates, and related information
- Submission forms for concept papers and proposals. Submissions must come from the project lead organization and must not include any proprietary information.
- Informational webinar details and other updates
- The latest dates and funding amounts, which are subject to change

Questions? Submit them through the [RFP questions form](#). Questions and answers are posted publicly on the RFP landing page.

ABOUT THIS DOCUMENT

This document outlines the process CESMII will use to solicit, review, and award projects under this RFP. CESMII reserves the right to adjust emphasis on the areas of interest, the selection of proposals, and the negotiation of statements of work for selected projects, consistent with the ongoing update to the Institute Roadmap and with current U.S. Department of Energy priorities.

DOCUMENT HISTORY

Revisions

For revisions, please refer to cesmii.org/scale-and-deploy-resources.

REV. NO.	DATE	DESCRIPTION OF MODIFICATION
R0	[Date TBD]	As released

IN THIS RFP

Contents

Highlights	2
Revisions	3
Contents	4
1. Background	5
2. About This RFP	6
3. Areas of Interest	8
3.1 Manufacturing and Energy Productivity	8
3.2 Supply Chain Resiliency	9
3.3 Smart Manufacturing for Battery Manufacturing	10
3.4 Digital Twins and Artificial Intelligence for Manufacturing	10
4. Common Project Requirements	11
4.1 Manufacturer Outcomes and Scale	11
4.2 Architecture, Interoperability, and Data Governance	12
4.3 Reuse, Replication, and Ecosystem Deliverables	12
4.4 Team, Governance, and Execution	13
5. Selection Process and Award Decisions	13
5.1 Responsiveness Gate	13
5.2 Evaluation Criteria	14
5.3 Selection Process	15
Appendix A: Smart Manufacturing Imperatives: Requirements and Evidence	16
A.1 Common Technical Requirements	16
A.2 Data Aggregation/Broker Service for Supply Chain Projects	18
Appendix B: Typical Use Cases for Supply Chain Projects	19
B.1 Recommended Supply Chain Resilience Measures	20
Appendix C: Minimum Smart Manufacturing Familiarity and Training Expectations	20
Appendix D: Proposal Submission Documents, Additional Resources and Background Information	21
D.1 Required Submission Content	21
D.2 Additional Resources	21
D.3 Background Information	22
Appendix E: Existing Asset Reuse and the Scale-and-Deploy Package	22
E.1 Existing Asset Reuse Assessment	22
E.2 Required Scale-and-Deploy Package	23

SECTION 1

Background

The Smart Manufacturing Institute (“Institute” or “CESMII”) is one of 18 Manufacturing USA Innovation Institutes designed to revitalize American manufacturing and support domestic manufacturing competitiveness. CESMII, awarded to the University of California, Los Angeles (UCLA), is a national network that brings together over \$200 million in public-private investment and more than 200 partners from industry and academia across the United States. The Institute's goal is to accelerate Smart Manufacturing (SM) adoption through the integration of advanced sensors, controls, platforms, and modeling to radically improve productivity, precision, performance, and energy efficiency. The institute's current focus is on scaling and deploying Smart Manufacturing technologies and education across industries nationwide.

CESMII's approach is also directly aligned with the President's Executive Order Launching the Genesis Mission, a DOE-led national initiative to harness artificial intelligence to double the productivity of American science and engineering within a decade. The Genesis Mission includes AI-augmented advanced manufacturing and critical materials. CESMII's Smart Manufacturing Imperatives (Appendix A), namely open, standards-based information modeling through SM Profiles™, interoperable platform requirements through the Smart Manufacturing Interoperability Platform (SMIP™), and the i3X™ open common API, provide an architectural foundation for secure, portable, and scalable manufacturing applications. Together with the SM Marketplace and CESMII's portfolio of digital-twin and AI-enabled solutions, these capabilities position CESMII to translate AI-driven scientific advances into deployed manufacturing value.

As the nation's primary advocate for SM adoption, CESMII has developed numerous innovations in SM technology, practice, and Education and Workforce Development (EWD). This mission is tightly aligned with the U.S. National Strategy for Advanced Manufacturing and with the framework proposed in the National Academies of Sciences, Engineering, and Medicine's [Options for a National Plan for Smart Manufacturing](#). In addition to CESMII's existing record of SM capabilities and solutions that have demonstrably reduced energy consumption across multiple industry verticals, its cross-cutting approaches directly support CMEI's mission by enabling rapid development of materials and processes and by optimizing manufacturing processes that strengthen the resiliency of critical-material supply chains.

CESMII's mission is driven by an Institute Roadmap that identifies the themes and topics of particular importance to developing the SM solutions necessary to achieve CESMII's goals. Information on the Institute Roadmap is available at cesmii.org/cesmii-roadmap.

DOE PORTFOLIO ALIGNMENT

This RFP directly supports the Advanced Materials and Manufacturing Technologies Office (AMMTO) and the Office of Critical Minerals, Materials, and Manufacturing (CM3) by advancing cross-cutting materials and manufacturing innovation, secure domestic supply chains, energy technology manufacturing, workforce capability, and the scale-up and commercialization of solutions across critical-mineral value chains. The RFP also complements DOE's Genesis Mission by creating trusted, contextualized manufacturing data and portable digital-twin and AI applications that can connect design, simulation, sensing, and operations. The Digital Twins and AI area requires operational validation, model governance, human oversight, and replication without project-specific rebuilds.

SECTION 2

About This RFP

SUMMARY

CESMII's fifth Request for Proposals seeks industry-led projects that scale and deploy Smart Manufacturing solutions across sites, companies, industry segments, and supply chains, with a focus on strengthening American manufacturing competitiveness, boosting energy productivity, and enhancing domestic supply chain resilience, backed by \$4.6 million in federal funding and a matching cost-share, and requiring technical conformance to CESMII's three SM Imperatives for objective evidence of scalability and portability. Smart Manufacturing at Scale strengthens the U.S. energy industrial base by improving the quality, efficiency, scalability, and resilience of energy technology manufacturing.

Based on priorities aligned with the Institute Roadmap and DOE priorities, CESMII has issued four RFPs since its inception in 2016, supporting nearly 60 collaborative R&D and education projects with a total investment of over \$30 million, including federal funding and cost share. The Institute has also invested over \$9 million in standards-based, vendor-agnostic methods and technologies for contextualizing manufacturing information, implementing interoperable platforms, and enabling portable applications through open interfaces. In addition, CESMII has invested over \$3 million in education initiatives and \$12 million in its national network of SM Innovation Centers.

Experience across these projects has reinforced a central lesson: valuable point solutions do not scale when information models, platforms, and application interfaces remain proprietary or project specific. This RFP therefore treats the SM Imperatives as architectural requirements for technical project outcomes. The objective is not to prescribe a vendor or product; it is to ensure that funded solutions can be understood, integrated, reused, and sustained beyond the initial deployment. The three key imperatives, namely, open, standards-based information modeling (SM Profiles), interoperable platform requirements, and a common API can drive scalability, reduce complexity, and unlock real-time value from manufacturing data across systems, applications, and the supply chain.

In this, its fifth RFP, CESMII will pursue industry-led projects that demonstrate the scaling and deployment of Smart Manufacturing solutions across sites, companies, industry segments, and supply chains, strengthening American manufacturing competitiveness, accelerating energy productivity, and building resilient domestic supply chains. Scaling and deployment may include:

■ **Scale:**

- Scaling SM from unit process step, to factory, to enterprise
- Scaling SM across the supply chain: manufacturer, tier suppliers, and small and medium manufacturers (SMMs)
- Functional scaling: from data acquisition and visualization to AI and Digital twin based predictive and proactive control

■ **Replicate and Proliferate:**

- Proliferating SM solutions nationally, across new industry verticals and small, medium, and large companies
- Replicating SM solutions from one factory to another in the same industry

■ **Quantify and validate:**

- Validating portable applications and reusable information models across conformant platform implementations and operational environments
- Quantifying the reduction in deployment time, integration effort, lifecycle cost, and vendor dependence from the first implementation to subsequent deployments

These projects will support CESMII's Scale and Deploy plan by turning interoperability into measurable adoption and manufacturing value. Through this RFP, CESMII will fund projects that demonstrate impact across the four areas of interest in Section 3, create reusable and portable technical outcomes, and establish a credible path from demonstration to sustained industry deployment. Projects will align with DOE priorities and the Genesis Mission in advancing America's energy economy, strengthening critical-material and battery supply chains, and applying artificial intelligence and digital twins to manufacturing.

FUNDING

Approximately \$4.6 million in federal funding will be made available for this RFP, matched by a required \$4.6 million minimum cost share (total \$9.2 million). Details on the areas of interest, project requirements, and selection process are provided in the sections below.

SECTION 3

Areas of Interest

SUMMARY

The four CESMII areas of interest (Manufacturing and Energy Productivity, Supply Chain Resiliency, Smart Manufacturing for Battery Manufacturing, and Digital Twins and Artificial Intelligence for Manufacturing) seek industry-led proposals that address specific, high-value operational challenges and demonstrate scalable, measurable improvements across multiple sites or companies. Projects must define clear baseline and target metrics, align with Smart Manufacturing Imperatives, and advance solutions beyond basic data capture or conventional analytics by enabling repeatable operational decisions and robust workflow optimization. Each proposal must articulate the technical barriers unmet by current commercial or CESMII assets, detail the novel methods or capabilities to be developed, and provide evidence of superior performance compared to existing alternatives. Cross-company collaborations, technical rigor, and practical replication pathways are critical, ensuring sustained impact and broad adoption across American manufacturing sectors.

CESMII invites proposals across four areas of interest that demonstrate the scaling and deployment of integrated Smart Manufacturing capabilities to improve productivity, energy performance, quality, supply-chain resilience, and American manufacturing competitiveness. Proposals may address one area or, where well justified, span multiple areas. Each proposal must identify its primary area of interest, define the manufacturer value to be created, and explain how the solution will scale beyond the initial use case.

3.1 Manufacturing and Energy Productivity

Smart Manufacturing for energy technologies and manufacturing industries

KEY GOALS

Boost productivity; improve quality; optimize energy use; and increase competitiveness by driving innovation in manufacturing processes and products through Smart Manufacturing technologies.

**WHAT WE ARE
LOOKING FOR**

Industry-led projects addressing a manufacturer-defined, high-value operational problem and deploying the resulting capability across two or more production sites, lines, or participating companies. Proposals must define baseline and target metrics, conform to the SM Imperatives, and quantify the time, cost, and effort required for the first and subsequent deployments. Solutions should progress beyond isolated data capture or stand-alone dashboards by enabling repeatable operational decisions, workflow, prediction, optimization, or control; the technology selected must be justified by the use case. Teams must evaluate existing CESMII, industry, and standards-based assets for reuse as described in Appendix E, without assuming that every prior asset is applicable. If applicable, the project must identify a specific technical barrier that existing commercial or CESMII assets cannot address and explain what new method, architecture, model, or capability the project will develop.

3.2 Supply Chain Resiliency

Smart Manufacturing for resiliency in integrated supply chains.

KEY GOALS

Proactively predict and mitigate disruptions through real-time visibility, agility, and data exchange; optimize production processes; improve quality and reduce waste; increase operational excellence and energy productivity across the supply chain.

**WHAT WE ARE
LOOKING FOR**

Industry-led demonstrations of SM-enabled resilience for a supply chain comprising a large manufacturer or coalition and 6 to 10 participating SMMs. Industries of particular interest include automotive, semiconductor and microelectronics, aerospace and defense, critical materials manufacturing, energy storage, and industries addressed by CESMII previously, though compelling use cases from other sectors are welcome. Proposals must define the disruption or continuity problem, the operating decisions to be improved, and quantitative resilience measures such as time to detection, time to survive, time to recover, resilience margin, alternate-source coverage, production loss, and customer service during disruption. Cross-company information exchange must use the minimum data and cadence justified by the use case, preserve participant control, and conform to the SM Imperatives through shared SM Profiles and i3X™ interfaces. See Appendices A–C.

3.3 Smart Manufacturing for Battery Manufacturing

Smart Manufacturing to strengthen battery and critical-minerals supply chains

KEY GOALS

Improve battery manufacturing yield, throughput, and quality through real-time process monitoring, predictive analytics, digital twins, AI and advanced control; reduce the energy intensity and costs through SM-enabled process optimization; and strengthen the resiliency and traceability of domestic battery and critical-minerals supply chains (for example, lithium, graphite, cobalt, nickel, and rare earth element inputs).

WHAT WE ARE LOOKING FOR

Proposals from battery manufacturers, battery-materials processors, or their systems-integration and technology partners that deploy a Smart Manufacturing solution in one or more operational facilities and define a credible replication path to additional sites, lines, or suppliers. Proposals must address specific challenges in the battery manufacturing process and/or supply chain that can be solved through Smart Manufacturing technologies. Projects must conform to the SM Imperatives and demonstrate quantifiable improvement in yield, throughput, quality, energy intensity, cost, traceability, or supply continuity. Teams must evaluate existing CESMII and industry assets for reuse and identify the portable information models, applications, and deployment artifacts the project will contribute. CESMII particularly welcomes teams that bring direct battery or battery-materials manufacturing expertise.

3.4 Digital Twins and Artificial Intelligence for Manufacturing

Apply digital twin AI technologies to solve specific high-value manufacturing use cases

KEY GOALS

Accelerate the safe and effective adoption of digital twins and AI/ML models that improve manufacturing decisions, including performance and quality prediction, energy optimization, production efficiency, anomaly detection, and constraint analysis; validate performance in operational manufacturing environments; and create portable applications and deployment artifacts that can be reused across sites and conformant platforms. Specific Use cases could include cross-cutting next generation energy materials and manufacturing process technologies, innovative energy solutions, such as energy storage systems

**WHAT WE ARE
LOOKING FOR**

Proposals that pair manufacturers with technology providers and/or academic partners to deploy a digital-twin or AI solution for a clearly defined manufacturing use case, with measurable baseline-to-outcome metrics (such as reduced downtime, energy savings, defect or scrap reduction, or improved production). Proposals must address data provenance and quality, model validation, human oversight, and explainability commensurate with operational risk. Projects using physics-informed or hybrid (physics- and data-driven) digital twins are encouraged. Data and context must be represented through SM Profiles, applications are encouraged to use conformant platforms through i3X™ for required functions, and the project must demonstrate how the solution can be replicated without rebuilding project-specific integrations. Proposals may apply digital twins and/or AI to any manufacturing context, including, but not limited to, the industries and use cases described in Areas 3.1–3.3.

SECTION 4

Common Project Requirements

CESMII requires each proposal to clearly articulate the following:

- 1 What limitation in the current state of practice prevents the problem from being solved adequately today?
- 2 What new technical capability, method, model, architecture, or knowledge will this project create?
- 3 How will the project demonstrate that the result performs better than existing commercial, open-source, CESMII, or industry alternatives?

The following requirements apply to proposals submitted under any area of interest. CESMII may tailor final acceptance criteria during statement-of-work negotiation, but the resulting obligations will remain consistent with these requirements.

4.1 Manufacturer Outcomes and Scale

- **Manufacturer-defined use case.** Each project must identify the operational owner, the decision or workflow being improved, the affected production environment, and the measurable business or manufacturing value expected.

- **Baseline and validation.** Projects must complete a techno-economic analysis and measurement plan before implementation, including baseline values, target KPIs, data sources, calculation methods, validation responsibility, and a plan for sustained measurement after deployment.
- **Scale demonstration.** Projects must deploy or validate the solution in multiple operational environments appropriate to the area of interest and report the time, cost, integration effort, and performance for the first and subsequent implementations. Projects must establish quantitative targets for evaluation of the impact. A single-site pilot without a validated replication pathway will not satisfy the intent of this RFP.

4.2 Architecture, Interoperability, and Data Governance

- **Interoperability and Reuse Plan.** Each technical proposal must include an architecture diagram and compliance matrix showing information sources, trust boundaries, SM Profiles and namespaces, platform components, i3X™ server and client roles, applications, integrations, and the evidence that will demonstrate conformance and portability.
- **Imperative 1: Information modeling.** Manufacturing information used by the solution must be represented through open, standards-based SM Profiles, using existing standards and companion specifications wherever practical. Projects must deliver the relevant type definitions, namespace and version information, relationships, and mappings from source data.
- **Imperative 2: Interoperable platform requirements.** Platforms must instantiate SM Profile types as contextualized objects, preserve the relationships among equipment, materials, processes, products, people, and systems, support required historical and real-time data, and provide secure access through open interfaces.
- **Imperative 3: i3X™ open common API.** Platforms must expose the i3X™ functions required by the project, and applications must consume those functions through i3X™ rather than depend solely on platform-specific APIs. Project-specific interfaces may supplement i3X™ only when justified and documented.
- **Conformance and portability evidence.** Projects must provide applicable i3X™ conformance-test results and demonstrate at least one application against a CESMII-approved conformance environment without any considerable application-code changes.
- **Cybersecurity and data governance.** Proposals must consider cybersecurity aspects such as identification, authentication, authorization, encryption, segmentation, auditability, data ownership, provenance, quality, retention, permitted use, cross-company sharing, and incident response. Supply-chain projects must preserve participant control and exchange only the minimum information required for the approved use case.

4.3 Reuse, Replication, and Ecosystem Deliverables

- **Existing Asset Reuse Assessment.** Teams must inventory relevant CESMII project outcomes, SM Profiles, applications, Marketplace offerings, open-source assets, commercial products, and industry standards; identify what will be reused, adapted, or rejected; and explain the technical and economic rationale.
- **Scale-and-Deploy Package.** Each project must create the project-specific implementation and replication package described in Appendix E. This is a deliverable produced by the project.

- **Packaging and distribution.** Reusable profiles, applications, connectors, documentation, training materials, and deployment artifacts must be packaged for use by other manufacturers under the data-rights and licensing terms negotiated in the award. The SM Marketplace is a preferred distribution channel when appropriate.
- **Open interfaces and open source software.** Conformance to the SM Imperatives (through Open Interfaces) does not require every software component to be open source. Proprietary components are permitted when the project preserves open information models, i3X™-based access, application portability, transparent licensing, manufacturer data access, and a credible sustainment path.

4.4 Team, Governance, and Execution

- **Manufacturer leadership.** Projects should be led by a manufacturer that owns the vision, use case, operating requirements, and site demonstration. A technology provider or systems integrator may lead when the proposal documents substantial manufacturer authority, resources, data access, and responsibility for adoption.
- **Execution readiness.** Proposals must document committed personnel, participating sites, cost share, data access, cybersecurity approvals, procurement assumptions, key risks, and a schedule not exceeding 24 months.
- **CESMII participation and stage gates.** CESMII staff and designated SM Innovation Centers will participate in architecture review, information-model review, conformance planning, deployment and KPI reviews, and final acceptance. Proposed milestones must include these reviews and the evidence required at each gate.
- **Training and workforce adoption.** Required business, operations, engineering, IT, OT, application-development, and data-governance roles must complete CESMII-provided or CESMII-approved training appropriate to their responsibilities. See Appendix C.

SECTION 5

Selection Process and Award Decisions

CESMII anticipates funding approximately four projects under this RFP, with up to \$1.2 million in federal funding per project and a required minimum 1:1 cost share. CESMII may adjust the number and mix of awards across the four areas of interest based on proposal quality, portfolio balance, available funding, and alignment with Institute and DOE priorities.

CESMII will first assess each submission for responsiveness to the mandatory requirements below. Responsive proposals will then be evaluated against the weighted criteria in Section 5.2. Final award decisions rest solely with CESMII, which may negotiate scope and statements of work, adjust the award portfolio, or decline to fund proposals that do not sufficiently support the objectives of this RFP and current DOE priorities.

5.1 Responsiveness Gate

- Complete and timely submission using the required templates, with no proprietary information in the concept paper.

- Documented manufacturer commitment, required cost share, participating sites, and authority to provide the necessary operational access and data.
- A defined use case, baseline and target KPIs, scale objective, and credible path to operational adoption.
- A cybersecurity and data-governance approach, preliminary intellectual-property and licensing plan, and commitment to deliver the Scale-and-Deploy Package.

CESMII may find a proposal nonresponsive when a mandatory element is absent, materially incomplete, or conditioned on requirements inconsistent with this RFP.

5.2 Evaluation Criteria

CESMII will evaluate proposals using the following 100-point framework to make the strategic priorities of the RFP explicit and to distinguish scalable, interoperable deployments from one-off demonstrations.

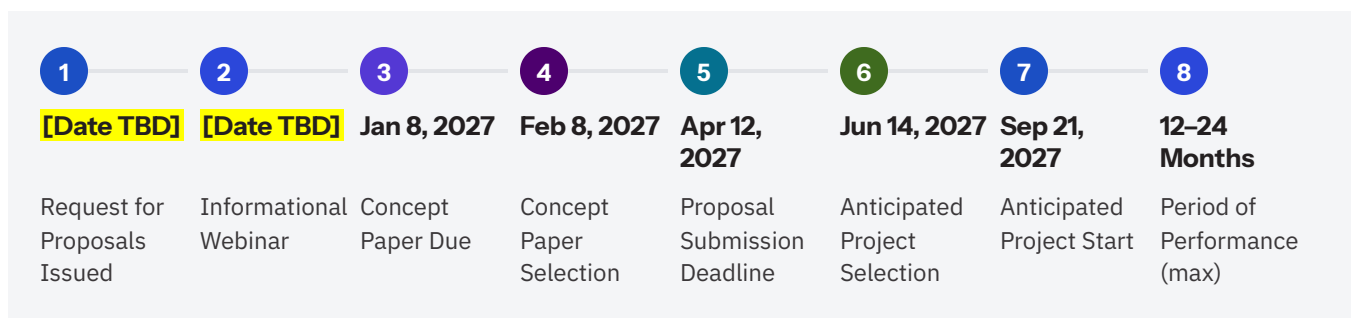
EVALUATION CRITERION	WEIGHT	WHAT REVIEWERS WILL ASSESS
Manufacturing and energy impact	25 	Clarity and significance of the manufacturer-defined problem; strength of baseline, target KPIs (such as quality, resiliency, throughput), and expected operational, energy, supply-chain, or economic value.
Scale, replication, and economic advantage	20 	Credible deployment beyond a single pilot; reduced time, cost, and complexity for subsequent deployments; applicability across sites, companies, or industry segments.
SM Imperatives and interoperability	20 	Quality of the information-modeling, platform, and i3X™ plan; conformance evidence; application portability; avoidance of project-specific or proprietary integration as the sole access path.
Technical merit, feasibility, and risk	20 	Soundness of the approach, maturity of the technology, cybersecurity and data-governance controls, project risks, and qualifications of the team.
Team, resources and project execution	15 	Capabilities and expertise of the team, project management and execution approach, clarity of deliverables and outcomes.
Total	100	

5.3 Selection Process

Selection of awards will follow the process described below:

- a** Within a week from issue of this RFP, CESMII will provide informational webinars for interested teams and offer an opportunity for Q&A
- b** Teams will first submit a concept paper using the template, page limit, submission instructions, and deadline published on the [RFP landing page](#).
- c** The concept papers will be reviewed by CESMII, and teams will be notified of their selection to move to the full proposal stage
- d** Selected teams will submit full proposals through the [RFP landing page](#), using the published template and including the required content identified in Appendix D.
- e** CESMII will notify the selected teams by **[Date TBD]**.
- f** Following successful contracting with the selected teams, the projects may be launched by **[Date TBD]**.

The timeline for the above process is shown below.



Teaming: if you want to participate in Teaming, add your information to the [Teaming sheet](#) before the concept paper is due.

APPENDIX A

Smart Manufacturing Imperatives: Requirements and Evidence

The SM Imperatives apply to technical outcomes under every area of interest. They define architectural capabilities and interoperability evidence; they do not require the purchase of a specific CESMII product or selection of a particular vendor. Proposals must address each imperative in the Interoperability and Reuse Plan and convert the final commitments into measurable statement-of-work acceptance criteria.

A.1 Common Technical Requirements

1 IMPERATIVE 1 Open, Standards-Based Information Modeling (SM Profiles)

SM Profiles establish shared meaning by defining what manufacturing information represents, how it is structured, and how it should be interpreted by people, applications, and systems. Profiles are based on open, standards-based type definitions, including OPC UA Part 5 concepts, and may incorporate applicable industry standards and companion specifications. Profiles should be reusable, versioned, extensible, and independent of a single vendor's internal schema.

REQUIRED EVIDENCE

Identify the types, namespaces, relationships, and source-data mappings required by the use case; identify existing standards and profiles that will be reused or extended; and deliver the resulting information-model artifacts, version metadata, documentation, and test examples under the negotiated licensing terms.

2

IMPERATIVE 2

Interoperable Platform Requirements (SMIP)

A platform satisfying the SMIP requirements instantiates SM Profile type definitions as strongly typed objects; preserves graph relationships among equipment, materials, processes, products, people, locations, and business systems; manages relevant historical and real-time information; and provides secure, governed access to applications. The underlying product, database, deployment model, and vendor may vary.

REQUIRED EVIDENCE

Provide a platform requirements matrix, deployment architecture, data-flow and trust-boundary diagram, mappings to the project SM Profiles, and a demonstration that contextualized objects and relationships can be accessed through the required i3X™ functions. Source protocols such as OPC UA, MQTT, MTConnect, and others may be used where appropriate, but source-protocol support alone does not demonstrate SMIP conformance.

3

IMPERATIVE 3

Open, Common API (i3X™)

i3X™ (Industrial Information Interoperability eXchange) is CESMII's vendor-agnostic, open, common API for interacting with contextualized manufacturing information. It standardizes how applications discover and use manufacturing information across different conformant platforms, reducing custom integration and enabling application portability and reuse.

REQUIRED EVIDENCE

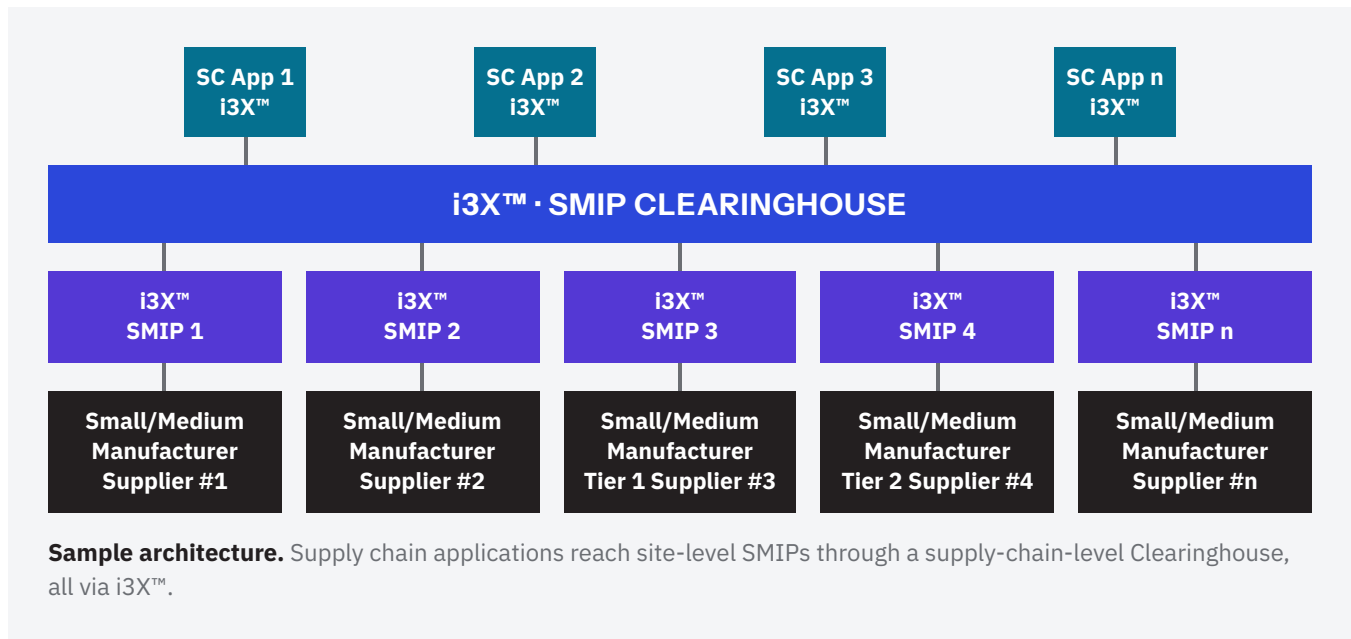
Identify required i3X™ server and client roles, supported endpoints and operations, identity and authorization controls, error and version handling, and applicable conformance-test results. Applications must use i3X™ for the functions covered by the specification rather than rely solely on a proprietary platform API.

- **Application portability and packaging:** Applications that consume SM Profiles through i3X™ should be portable across conformant platform environments. Projects must identify the application artifacts, configuration, dependencies, license, deployment instructions, and validation evidence needed for another manufacturer to implement the capability.

The SM Marketplace may be used to distribute applications and related assets, but publication to the Marketplace is a dissemination choice and acceptance deliverable, not a substitute for technical conformance to the three SM Imperatives.

A.2 Data Aggregation/Broker Service for Supply Chain Projects

Project teams must identify technology provider partners to develop an interoperability Clearinghouse for data sharing between SMIPs. The developed Clearinghouse must support i3X™, SM Profiles, data ingestion and access between SMIPs, and the availability of data for applications. A sample architecture is shown below.



- SMIP1, SMIP2, etc. represent individual instances of the SM Interoperability Platform for each entity or manufacturer.
- The Clearinghouse is a supply chain level SM Interoperability Platform, that consumes data from the SMIPs, aggregates data into a common model, manages claims and access controls, and routes traffic between clients and the appropriate SMIP.
- SC App1, SC App2, etc. represent supply chain-level applications for resilience and productivity, including traceability, quality, reliability, demand response, operational excellence, etc.
- The Clearinghouse layer must ensure that the selected data at each company site is securely protected for every participant.
- The Clearinghouse layer should connect to SMIPs at individual sites for sharable data, preferably through i3X™ read/subscribe operations, and send the data to the supply chain-level SMIP.
- The Clearinghouse layer must enable data from multiple participants or sites to be concatenated, categorized, and stored in context, then made available for analysis and model building.

- Wherever possible, the Clearinghouse layer should leverage existing technology, especially open source and existing standards, including i3X™.

APPENDIX B

Typical Use Cases for Supply Chain Projects

This appendix provides representative use cases that supply chain proposals under Area 3.2 may address.

1 Visibility and Traceability (Digital Thread)

- Standardized integration, organization, access, and visibility to information for real-time decision making across the supply chain
- Traceability of data (product, production, quality) from manufacturer and suppliers, from raw materials to parts to finished goods
- Standardized data exchange between the manufacturer and suppliers, at scale, to enable real-time visibility

2 Quality Improvement

- Ensuring processes and procedures for right-first-time production through automated data capture and analytics
- Ensuring consistent product quality across multiple suppliers, production facilities, or processes
- Proactive decision making to minimize the impact of raw material quality/specification variability on yield and product quality

3 Demand Response

- Real-time data to improve production scheduling, inventory management, resource utilization, and decision-making capabilities
- Planning, scheduling, and inventory optimization under volatile demand/supply swings or rapidly changing customer preferences
- Data-driven collaboration with external partners, suppliers, distributors, and customers to improve inventory, delivery, demand forecasting, and production schedules

4 Operational Excellence

- Digital thread and digital twin with AI and advanced simulation capabilities of the supply chain for both discrete and continuous operations
- End-to-end supply chain predictive analytics for anomaly detection and proactive decision-making
- AI-based verification and validation to ensure first-time success and on-time delivery

5 Internal and External Efficiency

- Internal efficiency: ensuring resources are used efficiently to minimize cost, including inventory turnover and waste
- External effectiveness: the ability to perform on-time, complete, accurate orders with proper documentation for customer satisfaction

B.1 Recommended Supply Chain Resilience Measures

Supply-chain proposals should consider selecting a small set of measures tied to the specific disruption and operating decisions being addressed. Enterprise averages are insufficient when they mask a critical product, component, supplier, site, or logistics node.

- Time to detect and time to initiate an effective mitigation action.
- Time to Survive, Time to Recover, and the resilience margin calculated as Time to Survive minus Time to Recover.
- Lead-time variability, days of critical supply, available surge capacity, and time required to activate an alternate source or route.
- Production hours, throughput, revenue, and customer service at risk, including on-time-in-full performance during disruption.

APPENDIX C

Minimum Smart Manufacturing Familiarity and Training Expectations

Each proposal must identify the roles affected by the project and provide a role-based learning plan. Participants may enter with different levels of experience, but the project must establish the common knowledge needed to design, govern, operate, and sustain the funded capability.

- 1 All project leaders and manufacturer stakeholders must understand CESMII's First Principles of Smart Manufacturing (see Appendix D2), the business purpose of interoperability, and the project's operational outcomes and KPIs.
- 2 Information-modeling roles must understand namespaces, type definitions, relationships, existing industry models, SM Profiles, and the governance required to version and extend them.
- 3 Platform, integration, and application roles must understand the SMIP requirements, i3X™ server and client responsibilities, security, conformance testing, and application portability.
- 4 Operations, engineering, IT, OT, and data-owner roles must understand source systems, data quality and provenance, cybersecurity, access control, model or analytics validation, and operating support.
- 5 Supply-chain participants must understand the relevant buyer, supplier, production, quality, inventory, logistics, and corrective-action processes, as well as the approved cross-company data-sharing rules.

APPENDIX D

Proposal Submission Documents, Additional Resources and Background Information

D.1 Required Submission Content

- Concept-paper and full-proposal templates, submission forms, page limits, submission instructions, and deadlines will be published at cesmii.org/scale-and-deploy-resources.
- The full proposal must include a preliminary technical architecture, the Interoperability and Reuse Plan and SM Imperatives compliance matrix, an outcome and KPI measurement plan, a scale and replication plan, and an Existing Asset Reuse Assessment.
- The full proposal must also include a cybersecurity and data-governance plan, commercialization and sustainment plan, preliminary intellectual-property and licensing approach, workforce plan, project schedule and stage gates, risk register, letters documenting manufacturer and site commitments, **RTES-required submissions**, foreign entity and/or foreign work waiver requests (if applicable), and all required cost-share documentation.

D.2 Additional Resources

- Outcomes from past CESMII projects are summarized at cesmii.org/projects.

- CESMII's Smart Manufacturing Principles are documented at [First Principles of Smart Manufacturing - CESMII](#)
- CESMII's technology strategy and the three SM Imperatives are described at cesmii.org/technology.
- SM Profile concepts and implementation resources are available at cesmii.org/technology/resources.
- The i3X™ specification, implementation guidance, and conformance resources are available at i3x.dev and github.com/cesmii/API.
- Applications and other ecosystem offerings can be explored through the [SM Marketplace](#).
- CESMII's Institute Roadmap is available at cesmii.org/cesmii-roadmap.
- Current RFP materials, templates, revisions, questions, and answers will be maintained at cesmii.org/scale-and-deploy-resources.
- Cost share requirements are detailed in the [CESMII Cost Share Requirements \(PDF\)](#).
- RTES documentation requirements and foreign entity/work waiver requests can be found at [Research, Technology, and Economic Security \(RTES\) Review](#)

D.3 Background Information

- The National Academies' [Options for a National Plan for Smart Manufacturing](#) provides additional national context for CESMII's strategy.
- Mission and priorities of DOE's Office of Critical Minerals and Energy Innovation (CMEI), including its Advanced Materials and Manufacturing Technologies Office (AMMTO), are described at energy.gov/cmei.
- The Executive Order *Launching the Genesis Mission* (November 24, 2025) is available at whitehouse.gov.

APPENDIX E

Existing Asset Reuse and the Scale-and-Deploy Package

E.1 Existing Asset Reuse Assessment

The assessment must be completed during proposal development and updated during the project. Reuse is expected when technically and economically sound, but no asset is mandatory merely because it appears on a CESMII website or resulted from an earlier project.

- Inventory relevant CESMII project outcomes, SM Profiles, applications, connectors, Marketplace offerings, education assets, and SM Innovation Center capabilities.
- Identify applicable external standards, companion specifications, open-source components, commercial products, and manufacturer-owned assets.

- For each reuse candidate, state whether it will be reused as-is, extended, replaced, or not used, with the technical, licensing, support, cybersecurity, and economic rationale.
- Identify gaps that require new development and explain how the new outcome will avoid duplicating an existing capability.
- Maintain traceability from the reuse decision to the project architecture, budget, schedule, risk register, and final deliverables.

E.2 Required Scale-and-Deploy Package

The Scale-and-Deploy Package is the project-created implementation and replication guide. It must be usable by a qualified manufacturer, systems integrator, or technology provider that did not participate in the original deployment. At minimum, the package must include:

- 1 Manufacturer problem statement, use-case boundaries, prerequisites, assumptions, and expected business value.
- 2 Baseline, target, and achieved KPIs, including data sources, formulas, validation methods, and lessons from operational use.
- 3 Reference architecture, trust boundaries, data flows, SM Imperatives compliance matrix, and i3X™ server/client responsibilities.
- 4 SM Profiles, namespaces, relationships, version metadata, source-data mappings, test data, and model documentation.
- 5 Application, connector, configuration, deployment, and conformance artifacts, with dependencies and supported environments.
- 6 Hardware, software, services, skills, and site-readiness requirements, including a bill of materials or equivalent cost model and any recurring deployment and operating costs.
- 7 Step-by-step installation, configuration, commissioning, validation, and troubleshooting procedures.
- 8 Cybersecurity, identity and access management, data governance, and cross-company data-sharing procedures.

9 Results from the first and subsequent deployments, including elapsed time, integration effort, cost, issues, and changes needed for replication.

10 Licensing, intellectual-property and data-rights terms.

CESMII and the project team will identify which portions of the package may be published, shared with members, or distributed through the SM Marketplace, subject to the award's intellectual-property, data-rights, confidentiality, and licensing terms.

Questions about this RFP?

Submit your questions through the [RFP questions form](#). Questions and answers are posted publicly on the RFP landing page.

[Ask a question](#)