Endless Forge Program Areas of Interest (AOI)

Dated

18 Feb 2026

ATTACHMENT 1: AREAS OF INTEREST (AOI)

Endless Forge (EF) is Manufacturing as a Service (MaaS), an adaptive, surge-adaptive, resilient, and scalable manufacturing capability to enable US industrial base dominance. EF represents a new manufacturing paradigm, shifting away from vertically integrated and sequential value chains to adaptive and fast-acting regionalized production networks. If successful, EF will offer the DAF the ability to scale any weapon system at speed through a platform-agnostic approach that can respond to battlefield performance.

AFRL is interested in innovative products, technologies, and services related to the AOIs listed below. Where appropriate, AFRL is looking to introduce fresh industry entrants, early-stage manufacturers, or small businesses offering novel technologies, processes, or expertise that expand the program's innovation landscape. This may include partnerships with new or emerging manufacturing focused companies that bring innovative capabilities not represented in prior project or program cycles. In addition, partners may need to operate in classified environments or have the potential to do so. Recognizing that some emerging companies may not yet have the required clearances or infrastructure in place, the program may support and guide partners through the process of becoming eligible to work in secure or classified spaces and obtain their Facility Clearance Levels (FCL) and safeguarding as needed. The level of detail provided for each topic or the order in which they appear is not intended to convey any information regarding relative priority.

There are two main AOIs to rapidly accelerate the EF concept. AFRL has structured this solicitation into two areas of interest: AOI 01 (EF Technology Sprints), which are focused on smaller projects to reduce technical risk in specific enabling technology areas, and AOI 02 (Technology Demonstration), which is focused on demonstrating the overall Endless Forge concept, as a pathfinder pilot to catalyze broader adoption of Manufacturing-as-a-Service across the Air Force and Department of War.

AOI 01: EF Technology Sprints - Activated Digital Thread for Battlefield Responsiveness

AFRL is seeking innovative solutions to operationalize digital architecture capable of responding to battlefield dynamics in near real-time. The objective is to close the loop between battlefield

data and the manufacturing floor, creating an adaptive manufacturing ecosystem that expedites the re-configuration of weapon systems to enhance warfighter lethality. Solutions are sought to drastically reduce design-to-field cycle times by addressing one or more of the following technical challenges:

(1) **Model-Based Quality Assurance & Digital Certification.** *Goal: Transition from physical-test-dependent to analysis-led certification.* To realize surge manufacturing, the bottleneck of physical requalification for every design change must be eliminated. Solutions are sought that leverage Certification by Analysis (CbA) and probabilistic simulation to validate manufacturing variability and design changes. Approaches should address how seamless data interchange can support certification allowing for rapid acceptance of re-configured components without extensive physical testing campaigns.

(2) **Modular Integration & Factorial Manufacturing.** *Goal: Enable "Plug-and-Play" hardware responsiveness.* Modularity across design, manufacturing, and logistics is identified as a critical enabler for rapid reconfiguration. Approaches treating the weapon system as a composable platform are requested. Solutions must address the configuration definition, interface management, and system integration logic required to support factorial manufacturing. Responses should demonstrate how these frameworks enable intelligent, fast reaction to engineering changes across the lifecycle.

(3) **IntelDevOps: Battlefield-Informed Adaptive Engineering.** *Goal: Directly link intelligence streams to engineering sprints.* Current feedback loops are identified as being too slow for modern conflict. IntelDevOps strategies are required to ingest battlefield data (trend analysis, gap analysis, adversary adaptation) and translate them into immediate engineering requirements. Approaches should demonstrate the ability to capture weapon system performance data in contested environments and automatically suggest re-design or re-configuration strategies to counter emerging threats. Approaches must articulate a precise mathematical problem formulation for how re-design or re-configuration strategies are generated to ensure the computational approach is well-defined and tractable.

(4) **Software-Defined Manufacturing & Physical AI.** *Goal: Decouple process planning from human latency.* To support rapid changes, automation of the "manufacturing compiler" is necessary. Solutions utilizing Physical Artificial Intelligence (AI) to couple real-world physics with statistical models, including but not limited to automating process planning, tooling configuration, inspection, and assembly logic, are of interest. Responses should focus on Manufacturing as a Service (MaaS) workflows where software-defined control planes allow for immediate production reconfiguration based on new requirements.

(5) **Secure Data Exchange and Validation.** *Goal: Trust the data, secure the thread.* A responsive digital thread requires a resilient backbone. End-to-end solutions for a secure data ecosystem ensuring data integrity across organizational silos are requested. Approaches should address the following:

- Zero-Trust Architectures: for multi-party access and change authorization.
- Schema Validation: for conflict resolution and interoperability.
- Semantic Inferencing: for connecting disparate data silos.
- Uncertainty Quantification: for validating the reliability of surrogate models used in decision making.

(6) Engines and Subsystems. *Goal: Rapid development of low-cost sub-systems.* Engines, actuators, avionics, fuel pumps, and other subsystems can drive high system cost and timeline. The AFRL team will entertain novel and innovative ideas to address this systemic design and manufacturing issue. Rapid fielding and manufacturing on mass are key for subsystems to match the overall EF technical goals.

(7) Other. Goal: Any digital thread technology or approach not covered above that would facilitate the rapid design and manufacture of the physical systems sought in AOI 2.

Phase I	**Accepted Until**
Phase I White Paper	**24 months after release**

AOI 02: EF – Technology Demonstration and Leave Behind Capability

AFRL is seeking innovative approaches to demonstrate the overarching EF technology goals. The EF goals can impact multiple systems across multiple warfighting domains, including but not limited to the following:

- Attrition-Tolerant Mass & Subsonic Systems (sUAS/Munitions/Decoys)
- Autonomous Collaborative Platforms (ACPs)
- Space Systems and Ground Support Equipment for Space
- High-Speed Affordable Weapons

The intent of AOI2 is to demonstrate EF across several of these domains, each being important to the overall AFRL and Air and Space Force mission space. These different domains are not in competition. The AOI2 demonstration is planned as a 2-year development effort ending in a final demonstration of EF technology goals at the end of 2 years. A gated approach with thresholds based on key performance parameters (KPPs) will be implemented. With producibility timelines being the primary concern, other KPP examples include but are not limited to product demand, cost, quality, rate, safety, supply chain resilience, and modularity re-design capability. The intention is to award multiple performers across the warfighting domains listed above.

To successfully achieve AOI2 demonstration of EF technology objectives proposers are encouraged to leverage existing fielded or high TRL design systems as a starting point. This will allow re-designs of current needed capability, significantly increasing overall leave behind capability, while lowering timeline and complexity of new designs. Leveraging AOI1 activities or partnering with AOI1 performers will be highly encouraged. Leave behind capability is a large goal of this demonstration program. Note that even with a partnership with an active program, there needs to be a joint willingness between proposer team to incorporate EF manufacturing technology into overall program. Solutions are expected to demonstrate a production network that utilizes the Manufacturing as a Service (MaaS) model to produce at speed, achieving system requirements, modular fieldable designs that do not have lengthy traditional timelines of existing acquisition channels/timelines. Key enablers of EF are dictated previously, and in AOI1, including but are not limited to data registration, model-based engineering, in-situ thermal and structural validation, tool-less assembly, and advanced metrology technologies that can speed up system acceptance. The solution should both (1) radically expedite production, assembly, and final checkout and (2) expand total capacity of the production network. Incorporation of IntelDevOps and its ability to surge needed systems is a key overall demonstration feature of AOI2.

Notional Timeline

AO2 DEMONSTRATION KEY EVENT	START	END
MAAS FACTORY NETWORK DESIGN	KO	≤ 4 months
RE-DESIGN CODR OF WEAPON SYSTEM WITH KEY EF TECH INCLUDED (AOI1)	2 months	≤ 6 months
MANUFACTURING READINESS REVIEW AND PDR	6 months	≤ 12 months
DEMO 1 – FACTORY NETWORK DEMO	12 months	≤ 12 months
SPRINT TO CDR, FINALIZE MANUFACTURING PLAN	12 months	≤ 18 months
DEMO 2 – INTELDEVOPS DRIVE BUILD	18 months	≤ 18 months
MANUFACTURE AND FIELD INITIAL SYSTEM	18 months	≤ 24 months
EF TECH ADDATIVE MODULAR SURGE **DEMO 3 – EF FIELD DEMO / CAPABILITY**	24 months	Classified Appendix

Note: All times are post kickoff. This schedule is notional, and the team will entertain faster timelines to meet demonstrations.

AO2 demonstration objectives will be held in a classified appendix that can be sent through secure channels prior to white paper submittal.

Phase I	Accepted Until
Phase I White Paper	**24 months after release**

OPERATIONS SECURITY (OPSEC)

The recipient shall participate in all activities associated with the disciplines of the organization's Industrial Security, Information Security, Science and Technology Protection (S&TP), Personnel Security, Operations Security (OPSEC), and Antiterrorism programs, following appropriate measures in each program as required for this particular agreement. Security measures are required to reduce program vulnerability from successful adversary collection, exploitation of critical information, and violations of export control requirements. The prime recipient shall ensure all subrecipients, if applicable, conform to these requirements as required by the prime recipient.

SCIENCE AND TECHNOLOGY PROTECTION PLAN (STPP) REQUIREMENTS

Any potential critical technology element (CTE) generated as part of this effort will be reviewed to determine the need for a S&T Protection Plan (STPP) or to be included as part of an existing STPP.