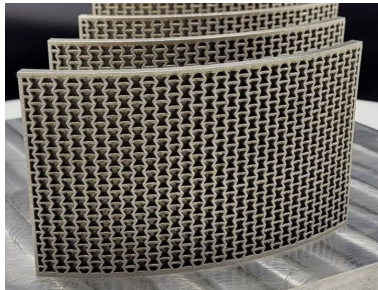# Dayton Regional Ecosystem for Additive Manufacturing: DREAM

DREAM Overview

Objective: Spur economic growth by developing keep capabilities and technologies that support the utilization of Additive Manufacturing

Opportunity: The greater Dayton region and the state of Ohio have established a nascent ecosystem that supports the emerging technology of Additive Manufacturing.

- The opportunity exists to build on this nascent base to create a distributed, trusted, and flexible manufacturing capability here in Ohio based on laser powder bed fusion (LPBF) and digital engineering tools that support the design and near real time performance evaluation of parts subject to the inevitable defects that occur during the manufacturing. This capability can then be applied to critical parts such as hypersonic systems and submarines, and be flexible for rapid pivots to parts needed during emergencies such as hurricanes and pandemics

Approach: Execution of individual projects that collectively develop the workforce and enable new technologies that expand the Additive Manufacturing capabilities of the ecosystem and transition to DoD and Commercial OEMs and spur economic development.

DREAM Value Stream
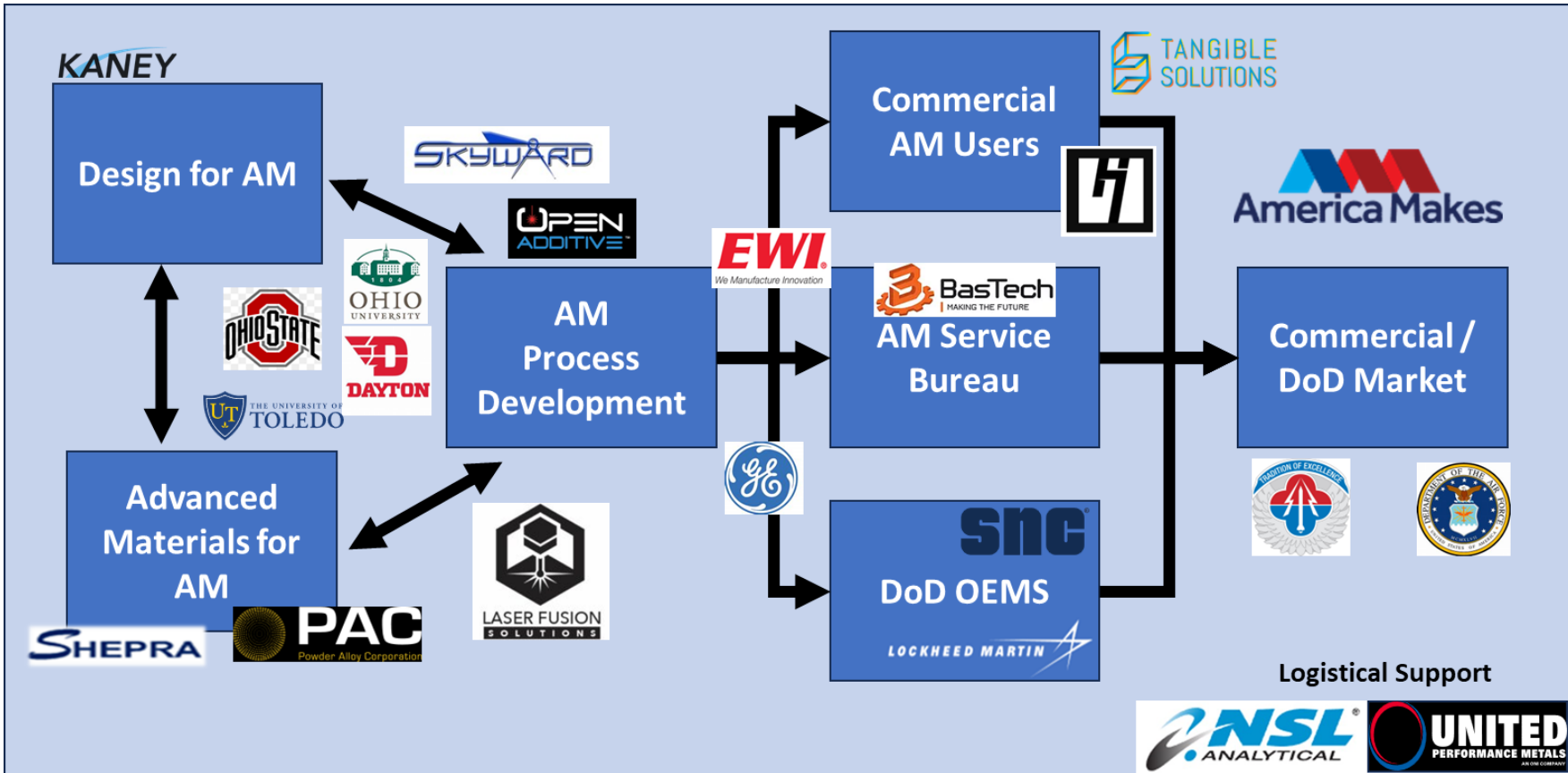

DoD Science & Technology Priorities
Advanced Materials & Manufacturing
Artificial Intelligence & Autonomy
Space Technology
Hypersonics

Jobs Ohio Priorities
Advanced Manufacturing
Aviation & Aerospace
Military & Federal
Automotive

The DREAM value stream spans the entire innovation pipeline to turn concepts and capabilities into market realities

DREAM: Development and Application of a Process Information Rapid Assessment Toolkit (PIRAT) for Additive Manufacturing
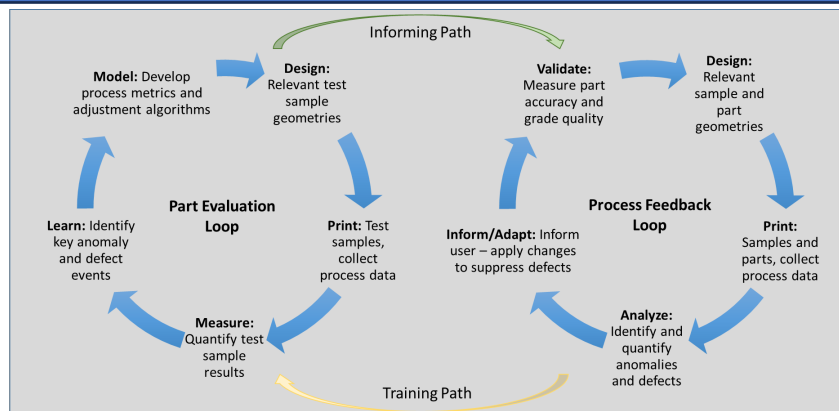
Description: Apply SBIR-developed 1) Predictive Modeling, 2) In-Process Sensing, 3) Automated Image Analysis, and 4) Machine Learning (ML) with 5) Expert Training and 6) Process Automation to improve quality, consistency and efficiency of Laser Powder Bed Fusion and Directed Energy Deposition AM to achieve 7) Partial Automation and a 8) Comprehensive Digital Record.

Objective: Develop a distributed, trusted, and flexible LPBF/DED manufacturing capability in Ohio to produce critical aerospace and hypersonic-related parts.

Benefits: Increase quality and speed of LPBF and/or DED AM processes to reduce process validation time and increase AM-based part production rates.

Approach: Iteratively apply learning and informing ML algorithms to instruct AM system operators and achieve partial process automation

Collaborators: Skyward, Ltd., Ohio State University Center for Design Manufacturing Excellence, Laser Fusion Solutions, SHEPRA, AFRL-Mantech (AFRL/RXM),

End Users: Open Additive, EOS, Northrop Grumman Corp.

Deliverables:
1. In-process (layer by layer) predictive modeling
2. In-process image analytics (edge computation to optimize speed and file sizes)
3. Machine Learning algorithms incorporating expert knowledge and optimized informing paths for AM users
4. Partial automation of a LPBF and/or DED AM process
5. Comprehensive digital record of as-built standard test parts with comparison to post-process dimension and performance analyses

Find Defects
  Before scrapping
Fix the Process
  During the build
Finish the Parts
  High Quality
  Repeatable
  Digital Record

DoD Science & Technology Priority:
Advanced Materials & Manufacturing

JobsOhio Priority:
Advanced Manufacturing
Aviation & Aerospace
Defense & Federal

Budget Request

Item / Task	Non-Reoccurring	Reoccurring
Iteration 1&2 Test Samples and Analysis (Learning)	$750K	
Iteration 3&4 Test Samples and Analysis (Learning and Informing)	$750K	
Demonstration of Process Informing, Limited Automation, and Comprehensive Digital Record	$500K	
Total	$2,000K	$0K

FY'25 Congressional Budget Request: $2M

Program Element: Manufacturing Technology Program: 060368F, Materials 0602102F