



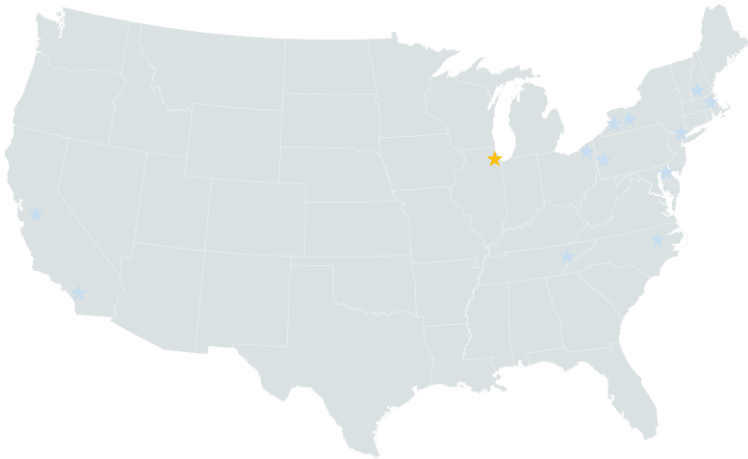
**DMDII**  
+ a UI LABS Collaboration

# DMDII FUTURE FACTORY

ACCELERATING PHM TECHNOLOGY ADOPTION THROUGH  
ADVANCED RESEARCH AND AGILE TESTBEDS

**Tyler Vizek** – Project Innovation Engineer, Future Factory Thrust Lead

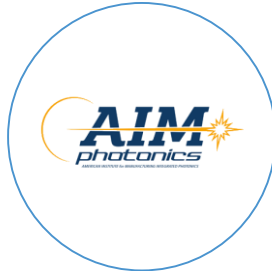
# Manufacturing USA – Spurring the Development of Disruptive Technologies



Biofabrication  
Manchester, NH



Advanced Functional Fibers & Fabrics  
Boston, MA



Photonics Integrated Circuits  
Rochester, NY



Additive Manufacturing  
Youngstown, OH



Robotics  
Pittsburgh, PA



Chemical Processing  
New York, NY



Lightweight Metal Manufacturing  
Detroit, MI



Smart Sensors & Process Controllers  
Los Angeles, CA



Digital Manufacturing & Design  
Chicago, IL



Advanced Composites Manufacturing  
Knoxville, TN



Recycling  
Rochester, NY



Flexible Hybrid Electronics  
San Jose, CA



Biopharmaceuticals  
Newark, DE



Wide Bandgap Semiconductors  
Raleigh, NC

**Move Manufacturing to the Left**

**Integrate, Reduce-to-Practice to Drive ROI**

*Design – process/  
product development*

*Future factory*

***Every Part  
Better  
Than the  
Last***

*Cybersecurity*

*Supply chain*

**Protect America's Growing Digital  
Manufacturing Advantage**

**Deliver Promise of the Digital Thread  
& Digital Twin**

## RESEARCH PROJECTS THAT ADVANCE THE STATE OF **PROGNOSTICS AND HEALTH MANAGEMENT** TECHNOLOGY ON THE FACTORY FLOOR:



**15-14-09: Bottom-Up Plug-and-Play Hardware/Software Toolkit for Monitoring, Diagnostics and Self-Correction**



**15-14-01: Cloud Enabled Machines with Data Driven Intelligence**



**16-04-01: Achieving Smart Factory Through Predictive Dynamic Scheduling**



# 15-14-09: Bottom-Up Plug-and-Play Toolkit for Monitoring, Diagnosis and Self-Correction

National Center for Manufacturing Sciences | Georgia Institute of Technology | Perisense



## Industry Challenge

- Legacy platforms are vital to the manufacturing ecosystem but have no digital footprint
- There are few affordable, turnkey solutions that enable flexible data collection and visualization



## Project Solution

- Development of a sensor retrofit kit offering that is adaptable to a variety of production use cases
- Development of cloud application that aggregates and analyzes sensor data to inform decision making



## Impact for PHM

- Affordable, flexible, plug-and-play retrofit kits that add value in both transparency and predictive maintenance use cases
- Ability to gather a rich pool of production necessary for PHM analytics

# 15-14-01: Cloud Enabled Machines with Data Driven Intelligence

Pennsylvania State University | GE | Microsoft | Case Western Reserve University | University of Central Florida



## Industry Challenge

- Lack of infrastructure to support in-process, remote monitoring, diagnosis, prognosis and self-correction
- Limitations in accessing, synchronizing and processing massive, high-speed data streams



## Project Solution

- Development of parallel and distributed machine learning algorithms for online diagnosis and prognosis
- Development of a hybrid cloud prototype that integrates local, private cloud with public HPC cloud



## Impact for PHM

- Validated machine learning algorithms for degradation events and predicting remaining useful life
- Scalable, high-performance computing infrastructure for prognostics and health management applications



# 16-04-01: Achieving Smart Factory through Predictive Dynamic Scheduling

FORCAM | Lockheed Martin | Predictrics | Northeastern University



## Industry Challenge

- MES OEE, machine health, and maintenance scheduling information are siloed in disparate systems
- Time-based preventative maintenance without effective equipment health monitoring



## Project Solution

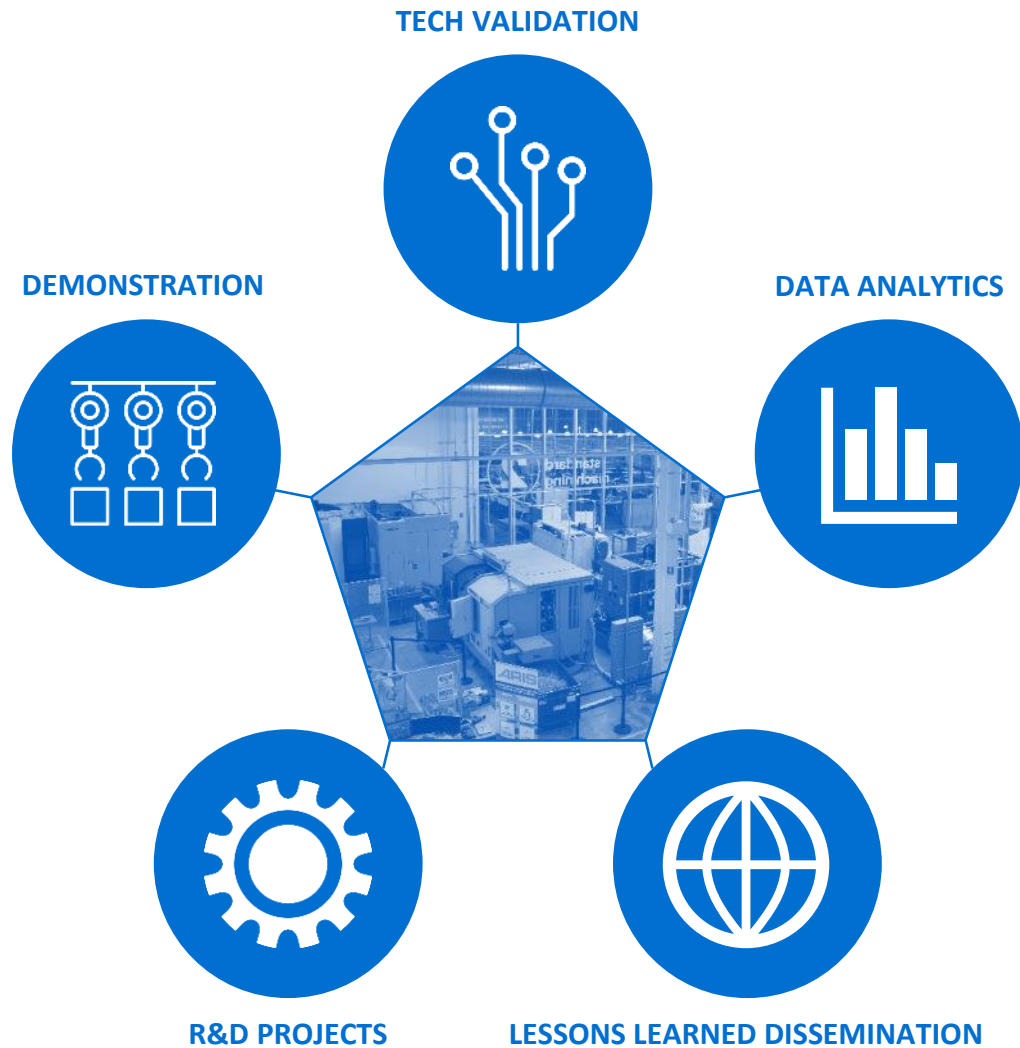
- Unified OEE and machine health dashboard
- Dynamic scheduling module that incorporates production OEE and machine health information to optimize maintenance activities



## Impact for PHM

- Aggregation of key manufacturing information into one source of truth
- Dynamic schedule optimizer leverages data to improve uptime, productivity and spare parts management with “just-in-time maintenance”

# DMDII TESTBEDS CREATE A SANDBOX ENVIRONMENT FOR EXPERIMENTATION AND VALIDATION OF **PROGNOSTICS AND HEALTH MANAGEMENT** TECHNOLOGY



## DISCRETE TESTBED

PREDICTIVE MAINTENANCE FOR MACHINES + AUXILIARY EQUIPMENT IN DISCRETE MANUFACTURING

## PROCESS TESTBED

DESIGNING AROUND HIGH VALUE USE CASES FROM PROCESS MANUFACTURING MEMBERS





# A vision for US Manufacturing

*Every part better than the last*



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