Clean Energy Smart Manufacturing Innovation Institute (CESMII) Overview

Accelerating the Smart Manufacturing Transformation

Jim Wetzel
An interagency team building partnerships with U.S. Industry and Academia
• DOE Selected - June 2016
• DOE Cooperative Agreement - Dec 2016
• Opened Institute – Jan 2017
• Headquarters – LA (UCLA)
Smart Manufacturing Journey...

**Roadmap:** Operations & Technology for SM systems

**Action Plan:** Implementing 21st Century Smart Manufacturing

**Infrastructure Specification:** Increasing SM Platform Definition & Development

**Implementation Plan:** Review & Refine Collaboration Roles & Alignment

**Establisht Work Groups:** Identify & Drive Priority areas
- Test Bed
- Platform
- People
- Business

**SMLC Incorporates as 501c6:**
Building Capacity & Resources; Leveraging Resources; Advocacy for SM

**DOE, NSF, NIST Awards:**
$13 million in Project Work to develop SM Platform Prototype

**ACCELERATE DOE FOA**

**Membership Expansion**

**CESMII Selection**

**Spin-off parallel activities**
CESMII Reach is Comprehensive
A Network of Networks

Five Regional Centers
1. North East (NY) 2. South East (NC) 3. Gulf Coast (TX)
4. California (CA) 5. Pacific North West (WA)

CESMII HQ
• Based in LA
• Institute Administration
• Central Platform and Marketplace Development and Management
What is Smart Manufacturing?

CESMII Mission – by the numbers

- Double energy productivity in US manufacturing every 10 years
- Halve the cost of deploying SM systems relative to state of the art in 5 years
- Increase the SM workforce in US multi-fold in 10 years
- Double the SM supply chain rate of increase in value and participation
- Reduce U.S. energy use in 10 years while increasing manufacturing competitiveness
CESMII Integrated Strategy
Optimize Manufacturing and Increase Energy Productivity

Business Practices

Enabling Technologies

Workforce Development

SM Platform Infrastructure
What is Smart Manufacturing?

Smart Manufacturing (SM) is the business, technology, infrastructure, and workforce practice of optimizing manufacturing through the use of engineered systems that integrate operational technologies and information technologies (OT/IT).*

*Throughout the roadmap, these integrated engineered OT/IT systems are referred to as “cyber-physical systems.”
Smart Manufacturing: Converging OT and IT

“Cloud Era”

Enterprise Intelligence

Business Intelligence

Operational Intelligence

Cyber Security

“Data Contextualization”

ERP Systems, Data Warehouse

Application Outsourcing, Relational DBase

Best of Breed Applications

Business Transaction Data

Real-time Production Data

Technology & Organizational Barriers

Commodity Equipment & Specialized Applications

Tiered Control Environment Segregation

Vendor Proprietary Systems

IT

OT

“Cloud Era”

“Data Contextualization”
SM enables the **right information** and **right technology** to be available at the **right time** and in the **right form** to the **right people**, powering smart decision-making within factories and across entire value chains.
What is Smart Manufacturing?

**Infrastructure**

**OT/IT Assets Integration**

- **OT**
  - Instrumentation
  - Real-Time Analytics
  - Performance Tools
    - Monitoring
    - Optimization
    - Control
    - Maintenance
    - Scheduling
    - Planning

- **IT**
  - Computing Hardware
  - Communication Protocol
  - Interoperable Middleware
  - Variety of Software

- **OT+IT**
  - Advanced Soft Sensors
  - Real/Right-Time Analytics
  - SM Platform
    - Seamless Integration
    - Ease of Commissioning
    - Performance Guarantees
    - Energy Efficiency
    - Safety and Reliability
    - Speedy ROI

- **Seamless Integration of Legacy Investment**

**Orchestration**

**Workflow Composability**

**Deployment**

**Marketplace Tools**

- SaaS
- PaaS
- WFaaS

**Workflow**

- Contextualization Mapping

- Data → Contextualization → Analytics

**KPI**

- BUSINESS Solutions
- OPERATIONAL Performance
- ASSET Management
- WORKFORCE Development

**Clean Energy Smart Manufacturing Innovation Institute**
A Glimpse of What we are WORKING on…

Research & Development (R & D)

- Infrastructure Requirements
- Process modeling & measurements
- AI/ML/BOTS
- Platform Requirements
- Use Case Characteristics

Technology (OT and IT)

- Process Technology
- Open Standards
- Sensor technologies
- Prediction, Control and Optimization
- Testbed Architecture
- Data Analytics and HPC

Workforce Development (WFD)

- Certification
- Training
- Skills Development
- Curriculum
- Learning Factories
- Train the trainers
DATA/DECISION CENTRIC OPTIMIZATION

DATA

DATA

DATA

WORKFLOW

INGESTION

CONTEXTUALIZATION

ANALYTICS

Testbed 1

Testbed 2

Testbed 3

SM PLATFORM
So...How’s your STITCHING?

It’s all about the flow from beginning to end... and the connected threads
RFP
IS OUT -$10.5M
JANUARY 31, 2018
PARTNERSHIP
Become a Member
Strength of CESMII’s Collaboration Network

- Investment in key industry-driven priorities
- Accelerate technology adoption
- Realize business results, energy sustainability and innovation
- Shared participation, non-proprietary results, IP

- Form relevant partnerships
- Solve collective challenges, catalyze R&D Investment
- Develop a strong workforce via education/training
- Improve economic development, increase jobs

Industry: Users, Providers, Third-party Integrators

Large

Medium

Small

Academia & Research, Govt. Labs, Associations

Vocational & Community Colleges, K-12
We Meet You Where You Are

"Smart Manufacturing enables an ecosystem that makes the impossible, possible."

Bringing together the Ecosystem

- **Large Companies**
  - (500+ employees/members)
- **Medium Companies**
  - (>100 and <500 employees/members)
- **Small Companies**
  - (<100 employees/members)
- **Community Colleges, K-12 Educational**
- **Academics, Govt. Labs, and Non-profits**

**CESMII is tackling barriers that no one entity can address alone.**

- **Advanced Technology**
  - Sensors
  - Controls
  - Platforms
  - Models

- **Workforce**
  - Curriculum Development
  - Certifications
  - Training
  - Nationwide strategy

- **Impact**
  - Energy
  - Productivity
  - Optimization
  - Performance
  - Accelerated technology adoption
  - New business models

- **Economic Development**
  - Improved jobs
  - Energy sustainability
  - Competitiveness
  - Innovation
  - Revitalized communities and access
THANK YOU & QUESTIONS

Email: info@cesmii.org

https://twitter.com/SMCoalition
Facebook.com/SMLeadershipCoalition
http://www.linkedin.com/groups/Smart-Manufacturing-Leadership-Coalition

Accelerating Your Smart Manufacturing Transformation