Panel

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Outline

Workshop 1

- Overview – Jim
- AI for the Factory Floor – Stephan
- AI for Industry-Wide Data Sharing – Bruce
- AI for Discovery of Capabilities and Solutions – Bruce
- AI for Supply Chain Resilience – Stephan
- Key Findings – Jim
- Comments/Questions from Participants – Don (Moderator)

Workshop 2

- Objectives and Plans – Said
- Feedback on Workshop 2 Plans – Don (Moderator)
- Close – Jim
Industry-Wide Strategies for the Adoption of AI in Manufacturing

- **AI for Building Resilient Supply Chains**
  - Prioritize Industry-Wide Data-Centered Supply Chain Resilience Network Effects

- **AI for Industry-Wide Data Sharing**
  - Prioritize Secure Affordable Available Managed Data Exchange

- **Meaningful Shared Data**
  - AI Tools and Applications
  - Interconnectedness with Trust Network Effects and Manufacturing Web

- **AI for Discovery of Capabilities and Solutions**
  - Prioritize Data Savvy Workforce Using/Sharing Data

- **AI for the Factory Floor**
  - Prioritize Factory/Shop Floor Data-Centered Machine/Process Operations
AI for the Factory Floor

- Throughput, Quality, Cost, Fulfillment remain key KPIs
- Today's computational modeling is one-off, expensive, expert-driven
- AI-driven digital twins enabled by real-time sensing emerging for predictive modeling and real-time control at machine and system level
- Quality assurance and predictive maintenance are quick wins
- Standards and ontology are critical for scalable general AI modeling
- Data-driven models reduce implementation time but need to be explainable and easily validated
- Huge AI potential if configuration and install can be automated
AI for Industry-Wide Data Sharing

- Manufacturing Science has made huge strides in what is possible, but lack of generality (high cost) has stunted implementation

- AI methods hold the promise of cost-effectiveness and ease of implementation
  - Increased training data $\rightarrow$ more powerful solutions
  - Data access is a prerequisite and a major challenge

- Manufacturers are reluctant to share data, and in the “pre-AI” era they had no financial incentive to do so

- Now, their data potentially is worth something!

- We need tools for secure discovery of and access to training data
  - Federated learning, homomorphic encryption, synthetic data, vendor-curated data, trusted brokers, fee for data, solutions as a service…
AI for Discovery of Capabilities and Solutions

- Once we have solutions, we need AI tools to find them
- AI-based tools for discovery have transformed most other industries
- Manufacturing resources have little or no visibility; most solutions are generated in-house or by companies in proprietary supply chains
- Product-focused SMEs have few means of identifying domestic manufacturers and often turn to China for production
- Manufacturing SMEs have limited options for obtaining business outside of large company supply chains
- Can AI provide tools for:
  - Automating the discovery and set-up of process controls
  - Accessing production capabilities and solutions
  - Improving supply chain visibility and coordination
A Notional Example in Process Control

- Manufacturers have tools to make CAD models of parts that they’ve produced web-accessible
  - These models have been web-crawled, indexed and categorized for similarity
- Manufacturer A wants to produce Part B on Machine Model #XYZ, which has a standard suite of sensors
- The previously stored data streams from all parts similar to Part B that have been produced on Machine Model #XYZ have been used to train a ML-based process controller
- The process control software to produce Part B can be purchased for download
- The data streams from producing Part B are purchased (or credited) to update and improve the control software
- We have the beginning of a self-financing manufacturing service marketplace that becomes increasingly valuable as it adds users
AI for Building Resilient Supply Chains

- Resilience becoming a key KPI besides cost and on-time delivery
- Connectiveness, visibility, and standards imperative for resiliency
- Small & Medium Manufacturers paramount for supply chains: need simple consumable AI to connect and optimize for cost and resiliency
- Manufacturing USA Institute CEOs suggest national data exchange, WFD of agile workforce and advisory council for national orchestration in case of crisis
- Transformational role for AI in connecting supply chains, safeguarding data, enhancing analytical decision support
Key Findings

Make data, tools, solutions, and capability for adopting AI into an industry-wide strategy

- Increase the power of AI/ML in the factory by sharing the right, non-proprietary data
- Address the standards, infrastructure and practices for sharing data with trust
- Figure out how to get the right data to those who can build the tools and solutions
- Address access and reuse of data and application capability
- Prepare the workforce to use, apply, innovate and evolve with new data, tools, solutions and capabilities
- Start an AI Adoption Cycle
Workshop 1

Q & A
Workshop 2
R&D Strategies to Scale the Adoption of AI for Manufacturing Competitiveness

**GOAL:** Identify R&D recommendations for AI solutions in each strategic area and determine how they integrate into an adoption cycle

**STRUCTURE:** Five small panels (12-14 experts), each including two co-chairs - AI and Mfg Communities

1) AI for the Factory Floor
2) AI for Building Resilient Supply Chains
3) AI for Industry-Wide Data Sharing
4) AI for Discovery of Capabilities and Solutions
5) Integration of Strategic Areas

**DURATION:** 3 hours discussion plus 1 hour summary and report out

**TIMING:** Panels over a 2-week period (May 31, 2021 – June 11, 2021)
Workshop 2
R&D Strategies to Scale the Adoption of AI for Manufacturing Competitiveness

AI for the Factory Floor
What agreements, methods, and tools are needed to protect sensitive information while preserving its extensible value

AI for Industry Wide Data Sharing
What agreements, methods, and tools are needed to index data and proven part/material production models for scaled use

AI for Discovery of Capabilities and Solutions
How do we adapt and extend software tools that have enabled networked service models in other industries

AI for Building Resilient Supply Chains
What about supply chains do we measure and make transparent to motivate both innovation and resilience

Integration of Strategic Areas
How do we coordinate the R&D on tools and build the industry capability and trust to start an adoption cycle
Workshop 2

Feedback on Objectives, Format, and Approach with Expert Co-Chairs (AI and Manufacturing)
Thank You

Please send comments to: Alengineeringworkshop@oit.ucla.edu

Workshop Report: https://ucla.in/3lqiJEa
Please share report

Workshop 2 will extend Workshop 1

Co-Chairs:
Jim Davis, UCLA
Stephan Biller, AMI
Jim St. Pierre, NIST