

NIST/OAGi Smart Manufacturing Workshop April 18-19, 2016

### **Breakout Session: *Crowdsourcing of manufacturing knowledge***

Chair – Dr. Farhad Ameri, Texas State University ([ameri@txstate.edu](mailto:ameri@txstate.edu)),

Co-chair – Dr. William (Bill) Bernstein, NIST ([william.bernstein@nist.gov](mailto:william.bernstein@nist.gov)).

#### Abstract:

Formal knowledge models are the necessary components of smart manufacturing systems. One of the main challenges in developing formal knowledge models is to efficiently elicit knowledge from distributed resources and form a coherent body of knowledge that can be validated and extended by user communities. Most of the existing knowledge models in the manufacturing domain are developed in a centralized and top-down fashion. This session is interested in exploring the requirements, challenges, and opportunities regarding capturing manufacturing knowledge from “the crowd”.

#### Objective:

The objective of this session is to bring together experts from industry and academia to discuss the issues around development, validation, and extension of manufacturing knowledge models enabled by crowdsourcing capabilities and also to understand some of the fundamental challenges of such an undertaking. This breakout session will explore the driving factors behind developing community-based knowledge models and will identify the research and development needs in this area. Ideally, a set of recommendations will be proposed for the development of a Smart Manufacturing (SM) knowledgebase to assist small and medium size manufacturers on their production management problems.

#### Tentative Schedule:

<b>Monday, April 18<sup>th</sup></b>	
Introduction: Meet & Greet	1:00pm
Background: Session Objective	1:45pm
Topic #1: Requirements	2:15pm
15-min Break	3:15pm
Topic #2: Approaches	3:30pm
Topic #3: Tools, Methods, and Standards	4:30pm
Wrap-up	5:30pm
<b>Tuesday, April 19<sup>th</sup></b>	
Topic #4: Stakeholders	8:15am
Summary: Steps Forward & Wrap-up	9:15am
End	10:15am

#### Session structure:

This breakout session will be divided into four topic areas, each including (1) a 15-minute “Deep Dive” presentation showcasing relevant work from a single participant and (2) 45-minute moderated group discussion. More detail is provided below.

**1. *Requirements for knowledge capture in smart manufacturing***

(April 18<sup>th</sup>, afternoon session 1)

Deep Dive Presentation: Farhad Ameri, Associate Professor, Texas State University

For this topic, the focus is on understanding the types of knowledge that should be captured and formalized for a Smart Manufacturing knowledgebase. What types of knowledge should be captured? What kinds of questions could be explored? Also, existing efforts related to the development of manufacturing knowledge models will be discussed. Furthermore, the desired level of formality for manufacturing knowledge models will be investigated. The requirements of knowledge-based systems in smart manufacturing will be discussed as well. The support structures that would enable success will also be discussed.

**2. *Approaches for Knowledge capture: top-down vs. bottom-up***

(April 18<sup>th</sup>, afternoon session 2)

Deep Dive Presentation: Bill Bernstein, Systems Integration Division, NIST

This topic focuses on knowledge capture and elicitation approaches for Smart Manufacturing. What are the motivations for adopting a crowdsourcing approach? Can crowdsourcing capabilities be successfully applied to capturing manufacturing knowledge? How to validate the captured knowledge and maintain its consistency overtime?

**3. *Tools, methods, and standards for knowledge capture for smart manufacturing***

(April 18<sup>th</sup>, afternoon session 3)

Deep Dive Presentation: Alex Brodsky, Associate Professor, George Mason University

This session focuses on tools, methods and standards that are currently available for development, representation, and validation of knowledge models for smart manufacturing. What standards are already available and what standards need to be developed? The panel will also discuss if the existing standards landscape is suitable for a crowdsourcing environment.

**4. *Stakeholders of knowledge models for smart manufacturing***

(April 19<sup>th</sup>, morning session 1)

Deep Dive Presentation: *TBD*

The objective of this session is to develop and understanding about various parties that will benefit from the existence of open-source knowledge models for smart manufacturing. In particular, the following questions will be addressed: How to create and incentivizes communities of knowledge users? Is there a need and role for a neutral party in the creation of a SMS knowledgebase? Is there an opportunity to combine the more focused efforts of different groups to leverage infrastructure and expand the breadth of coverage? What incentives and governance models would be needed? Is there an opportunity to combine the more focused efforts of different groups to leverage infrastructure and expand the breadth of coverage? How to find synergies among developers and users?

**Outcome:**

The outcome of this break out session will be summary of key takeaways from each topic. This will be developed into a publishable form providing an initial roadmap for creating a community-based Smart Manufacturing knowledgebase.