IMS AM Cluster Overview

Dan Nagy, Managing Director

IMS

Intelligent Manufacturing Systems

Brief History

Intelligent Manufacturing Systems

Established MANUFACTURING R&D network

…running for over 20 years

Industry-led R&D program

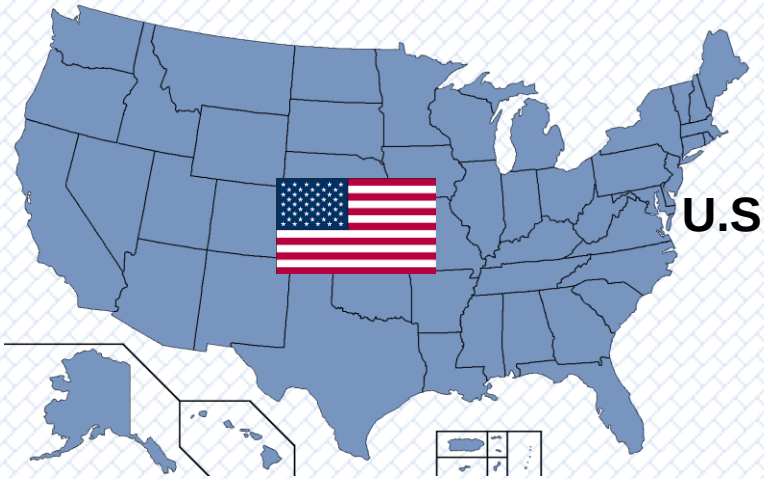
…for advanced manufacturing technologies and innovation

Experienced in formation of collaborative R&D

… *between institutions*, *companies*, *projects*

Established global platform support services

… *coaching*, *workshops*, *forums, WMF*



U.S. DEPARTMENT OF COMMERCE
(NIST)

28 Countries

NATIONAL COUNCIL FOR SCIENCE & TECHNOLOGY
(CONACYT)

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INTELLIGENT MANUFACTURING SYSTEMS

EUROPEAN COMMISSION
(DIRECTORATE GENERAL RESEARCH, DIRECTORATE GENERAL COMMUNICATION NETWORKS, CONTENT AND TECHNOLOGY)

DEPARTMENT OF SCIENCE AND TECHNOLOGY
(Advanced Manufacturing Technologies)

INTELLIGENT MANUFACTURING SYSTEMS

New R&D Program
Project Clustering

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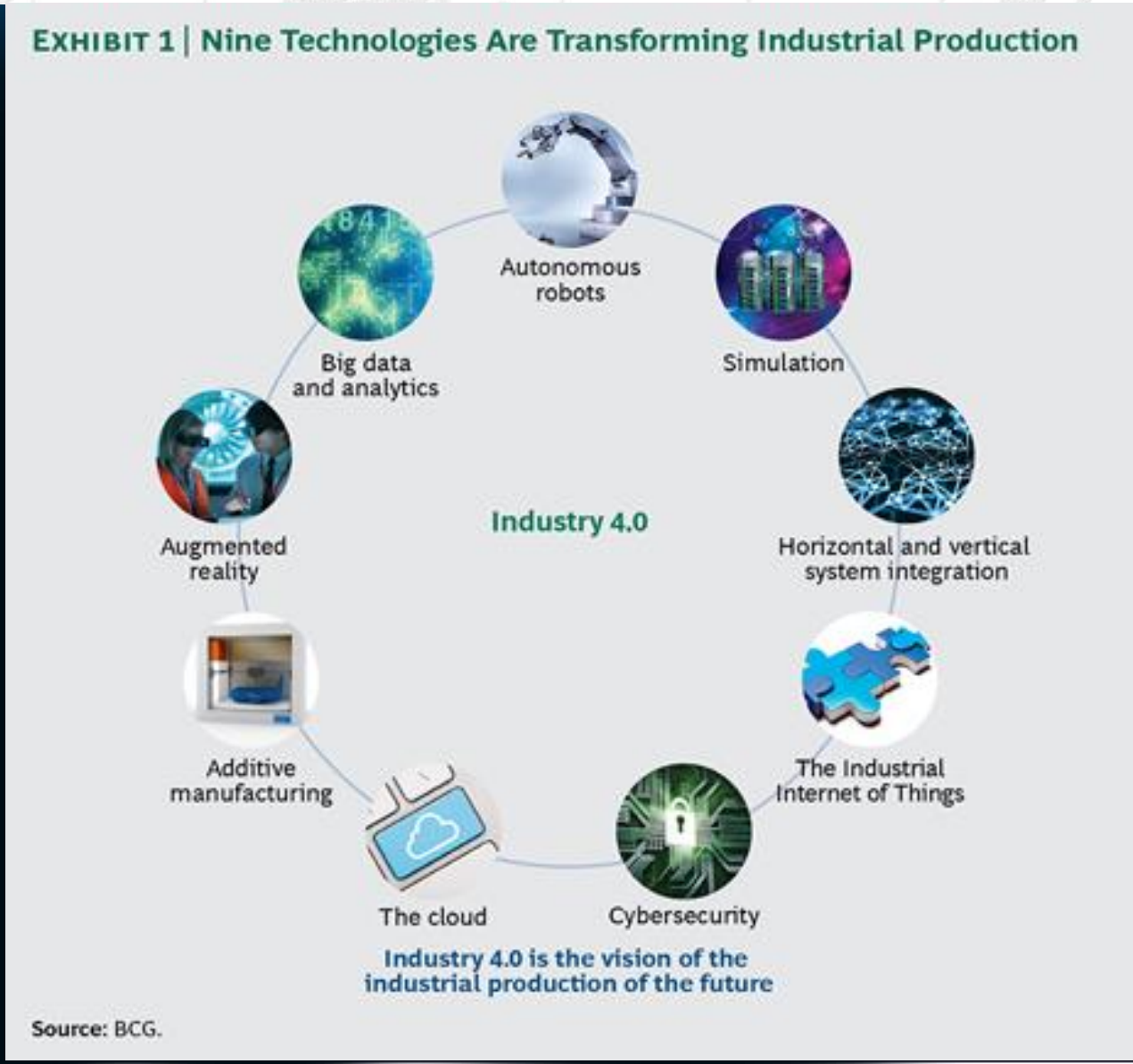
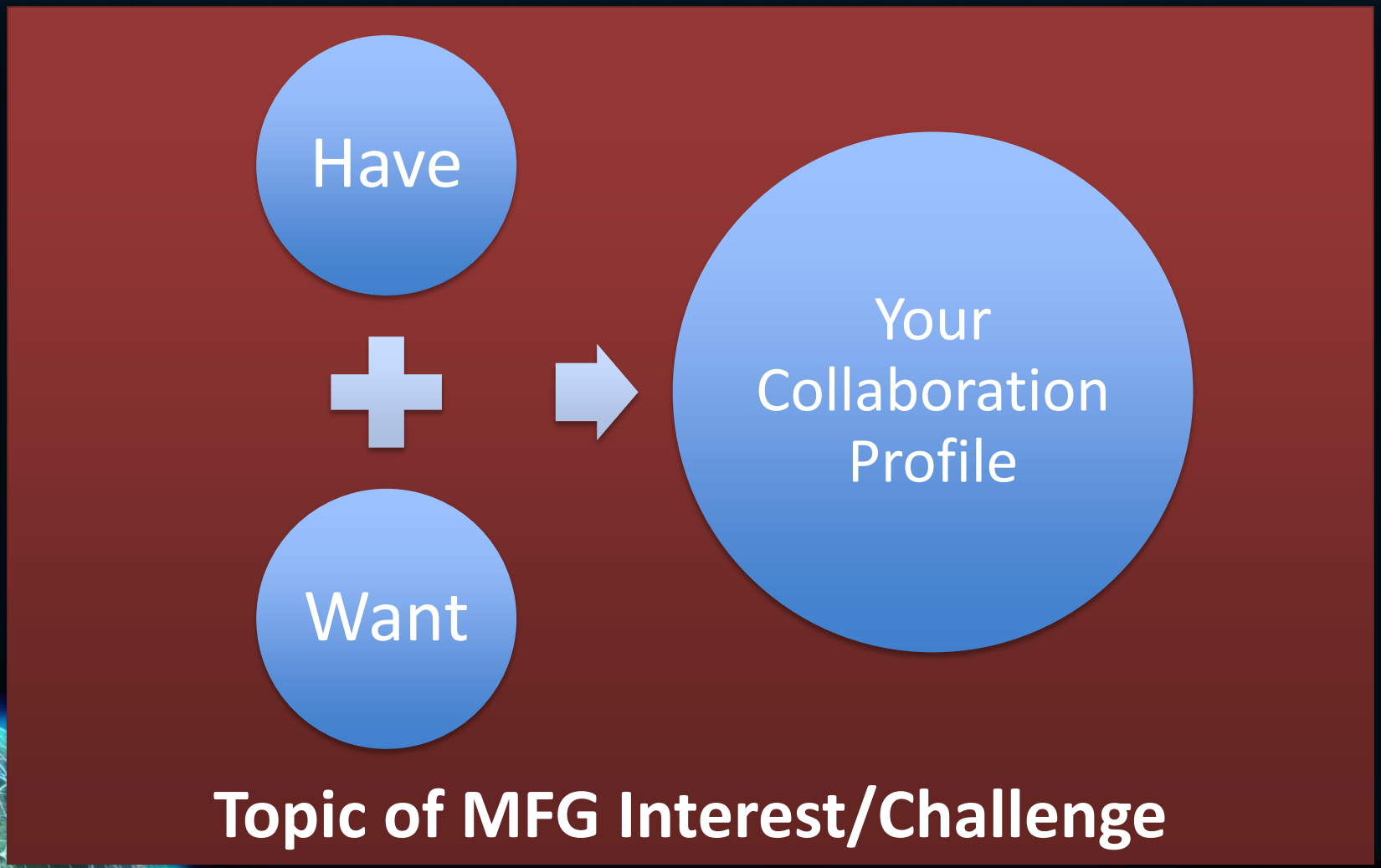
Hot Areas for Global R&D

Nine technology trends that are the building blocks of Industry 4.0 and explores their potential technical and economic benefits for manufacturers and production equipment suppliers.



Goal


Have
Want
Your Collaboration Profile
Topic of MFG Interest/Challenge

IMS Program Supports Transformation

- Research: Project Clustering Platform

  New platform for project clustering to leverage R&D, reduce risks, provide global solutions

  - Facilitators
  - International project matching
  - Regional workshops
  - International workshops
  - Proven methodology for cluster formation

No charge for IMS services or workshops!

Methodology Example

Additive Manufacturing Platform

- Additive Manufacturing Project Cluster Workshop
  - 2 May 2016, Barcelona Spain
  - 38 projects attended worth an estimated 100 million in R&D from the European Union, Mexico, South Africa, and United States
  - 6 new project research clusters formed under IMS

Methodology Example

Workshop Methodology

- Topic selected
- Project search
- Request project summaries, top 3 exploitable results, TRL levels
- Circulate summaries and request cross interest (weighted)
- Weighted interest levels charted
- Themes emerge, workshop held

Methodology Example

Workshop Methodology

- Each project has ten minutes to brief project, exploitable results, and what exploitable results they need
- Clusters formed and met
- Defined
  - Areas of collaboration
  - Goals and objectives
  - Next steps

Outcomes

Cluster formed: Industrially Robust AM Chain

Champion: Prabir Chaudhury
(Exova), Prabir.Chaudhury@exova.com

- Members hope to develop an industrially robust Metal Additive Manufacturing (MAM) supply chain in order to establish AM as a main stream manufacturing technology. Work will include development of cost effective and performance specific raw materials, properties database, machine capabilities, testing and qualification protocols, NDT techniques and in-situ quality testing. This cluster will involve users of the MAM technology and its supply chain from raw material to finished and qualified metal parts.
- Questek, Exova, AMAZE*, Borealis, NDTLBM, FOFAM, MANSYS.

Outcomes - Metals

Cluster formed: Metals for AM

Champion: David Wimpenny (MTC), david.wimpenny@the-mtc.org

- Members will define and complete project template by the end of June, and will share Health, Safety, and Environment (HSE) assessments and exchange comments by the end of the year.
- DEDREF, FORMING, SISAMex, NANOTUN3D, OXIGEN, (At the request of these committing projects, the AMAZE representative returned to this group.)

Outcomes - Metals

Cluster formed: TAS-AM (Titanium Aero Structures AM)

Champion: Daniel Safranchik,
Technion, danielsafranchik@gmail.com

- Members will collect and consolidate existing Ti AM technology, with the goal of creating a “comprehensive multi-national specification guideline”. This will include Ti material properties (throughout production), qualification/certification/testing, and AM technologies and processes. Gaps will be identified and, if possible, addressed. Members will investigate external funding opportunities and recruitment of additional collaborators. An MOA was signed and is on file.
- NIU,MEDAERO, REProMag, RepAIR, AATiD, FOFAM

Outcomes - POLYMER- CERAMICS-BIOMATERIAL

Cluster 1: BioAMplant or IamI

Champion: Dirk W. Grijpma, University of Twente (EU)

Leaders from other regions:

- Gerrie Booysen – South Africa
- Leopoldo Ruiz-Huerta – Mexico

- Members will collaborate on developing bioactive printable materials and additive manufacturing methods, either organic or inorganic, that are resorbable by either bone or soft tissue in the human body.
- ToMAX, BIOSCAFFOLDS, HYDROZONES, UNAM-MADIT, POLYAM, RAPIDOS

Outcomes - GENERIC TECHNOLOGIES

Cluster: Assistive Tools for Extending Additive Manufacturing

Champion: Paula Queipo, FOFAM, pqr@prodintec.com
Regional Leaders: Deon De Beer – DESIGN, Paula Queipo – FOFAM, Hugo Medellin – UASLP

GOALS AND OBJECTIVES:

- Extending AM technology and knowledge for market deployment.
- Seamless integration at all levels (integration with conventional technology).
- Broader applications.
- New materials availability.
- Competitive decentralized tools and services for enhancing AM take-up.
- Interoperable services in a decentralized marketplace.
- AM for society.
- Enhancing AM capabilities for new markets.
- Development of open accessible platforms.
- Reduce cost of technologies and materials.

Outcomes - GENERIC TECHNOLOGIES

Cluster formed: Additive Manufacturing Knowledge based Decision Support for Industry

CHAMPION: Jens Pottebann – iBUS (Interim)

Regional Leader: Hans Van Toor – MANSYS (EU)

GOALS AND OBJECTIVES:

- Interoperability along product lifecycle.
- **Enabling industry with access to quality assurance and quality control for additive manufacturing.**
- Quality assurance.
- Cloud based system.
- Rules for design from metrology.
- Quality vs. Feasibility vs. Economics Trade-offs.
- Decision Support Software (DSS).
- AM + Supply Chain Management (SCM).

Outcomes

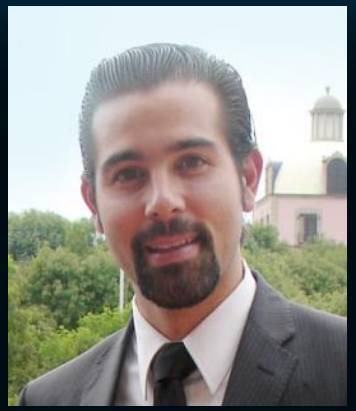
What's the reality?

- Three active
- Multiple meetings
- Meeting tomorrow in St. Gallen
- Work in Progress
- Need for Cluster Coach – funding approved

IMS R&D Provided Services

Knowledge • Networks • Resources • Knowledge • Networks • Resources

- *International and local project coaching*
  - *Project clustering*
  - *Consortium building*
  - *Project brokerage*
  - *Network access to 30+ countries*
- *Local workshop support*
- *Local promotion*



Mexico
David Romero

European Union
Christoph Runde

South Africa
Garth Williams

United States
Steven R. Ray

World Manufacturing Forum

WMF
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WORLD MANUFACTURING FORUM™ 2017

WMF

Monterrey, Mexico November 7-9 • 2017

"Towards a Digital Market & Connected Manufacturing Ecosystems"

The Event Center at the horno3 Museum of Science and Technology

Thank you!

www.ims.org
www.worldmanufacturingforum.org

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WMF2017

World Manufacturing Forum

- Global invitation-only event, high budget
- For 2017, will bring focus to Mexico
- Global stage for manufacturing interests
  - Discuss policy to promote manufacturing innovation
  - Explore challenges, view future direction and roadmaps
- Draws decision makers from around the globe
  - Over 80% self identified from the executive suite or leadership position
- Creates networking opportunities for industry, policy makers, and academia

WMF MONTERREY, MEXICO
WORLD MANUFACTURING FORUM™ 2017

November 7-9 • The Event Center at the horno^3 Museum of Science and Technology

25+ Qualified Speakers • 6 Challenging Sessions • Industrial Tours • Workshops & Exhibitions

OVERVIEW: The fifth edition of the World Manufacturing Forum will assemble in Monterrey, Mexico on 7-9 November 2017 at the Parque Fundidora to explore the theme "*Towards a Digital Market and Connected Manufacturing Ecosystems*". Global policy experts and industry leaders from large multi-nationals to small-to-medium sized enterprises, and academic leaders will discuss the policy, economic, social, and technical challenges that influence global manufacturing. The sessions will explore:

Opening Session: Mexico's Manufacturing Competitiveness & Global Partners Mexican authorities will provide an overview of the influence of design, engineering and advanced manufacturing activities at the WMF host country, Mexico, as strong drivers for economic prosperity, highlighting infrastructure development, job creation, and contribution to the GDP. Such overview will include the presentation of national industrial and trade policies as well as science & technology policies.

Session 1: *Industrial Policies for Digital & Interconnected Manufacturing Market.*
The Digital Marketplace, which forms the "digital thread", is expected to connect and drive future manufacturing supply chains. This marketplace will further drive rapid innovation, efficiency, and global collaboration. Cross-border policies and cooperation are needed to enable ecosystems of this scope and size.

Session 2: *Connected Factories and Value Chains*
Platforms for connected factories along a value chain ecosystem must be developed in a standardized way so that those entering or exiting a value chain may easily participate or disconnect. What are the reference architectures currently in development and how can they be implemented in create a value chain ecosystem?

Session 3: *Digital Workforce & Future Manufacturing Jobs*
Connected manufacturing ecosystems will drive new architectures, but will also change how we utilize our workforce. The future company workforce will extend beyond its walls to also become interconnected as a shared resource. These employees will need to be agile, highly trained, and able to address rapid-fire challenges and changes. How do we train for such a workforce?

Session 4: *Energy and Resource Efficient Manufacturing*
Efficient use of resources will continue to drive manufacturing from business and social drivers. What are the major barriers for further efficiencies in manufacturing ecosystems? How can value chains drive these efficiencies in a cooperative way to spur innovation, reduce costs, and be environmentally responsible?

Session 5: *New Business Models & Service Engineering*
The distinction between products and services has blurred as they are integrated into global manufacturing value chains. This major evolution will continue to expand and innovate thanks to powerful digital networks transforming regional businesses to globally integrated enterprises, and global enterprises to reach regional resources. What are the requirements and barriers for this new business model?

Session 6: *Technology Trends for the Factory of the Future*
New manufacturing technologies to enable production of innovative products, drive resource efficiencies to lower costs, and provide better communication and satisfaction with customers. What are these technologies, materials, and processes on the horizon?

Speakers are expected to present policy views supporting and defining manufacturing megatrends such as the digitalization of industry, challenges for SMEs in the global marketplace, manufacturing intelligence, social innovation as a driver for new products, services, and technologies, financial challenges that affect industrialized and emerging economies, the circular economy and zero waste, and other disruptive technologies.



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Register now for this dynamic event and place yourself at the leading edge of global manufacturing trends. The quality of the speakers and session content is matched by the venue. The Event Center is at the amazing **horno3** Science and Technology Museum, transformed from an industrial archaeological site.

For further information, visit **www.worldmanufacturingforum.org** **contact: dnagy@ims.org**

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Final Thoughts

The future of manufacturing will be influenced by innovation developed through Industry 4.0 technologies

Collaboration can provide better, cost-effective solutions to manufacturing challenges for non-IP sensitive topics

IMS has an international network and programs to bring manufacturers together

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- *The future of manufacturing will be influenced by innovation developed through Industry 4.0 technologies.*
- *Collaboration can provide better, cost-effective solutions to manufacturing challenges for non-IP sensitive topics*
- *IMS has an international network and programs to bring manufacturers together*