2009 DMC Gee Whiz/Manufacturing Sciences Session

Monday, November 30

1:30 **Leveraging the National MEP Network for DOD Supplier Scouting, Assessment, and Development**
David Stieren, NIST MEP

1:45 **Finding and Qualifying U.S. Manufacturers to Supply Hard-to-Source NSNs for the Defense Logistics Agency (DLA)**
Ken Bernauer, DLA Defense Supply Center Columbus
Samm Bowman, NIST MEP

2:20 **Preparing to Operate a Military Vehicle Supply Base in a Model-Based Enterprise Environment**
Roy Whittenburg, BAE Systems
Montana Mallett, NIST MEP

3:00 **BREAK**

3:30 **DARPA Manufacturing Sciences**
Toni Marechaux, Strategic Alliances, Inc., Moderator

5:00 **ADJOURN**

BAE SYSTEMS

MBE Supply Chain Readiness Assessment Rules

Project Introduction By Roy Whittenburg USCS

BAE SYSTEMS

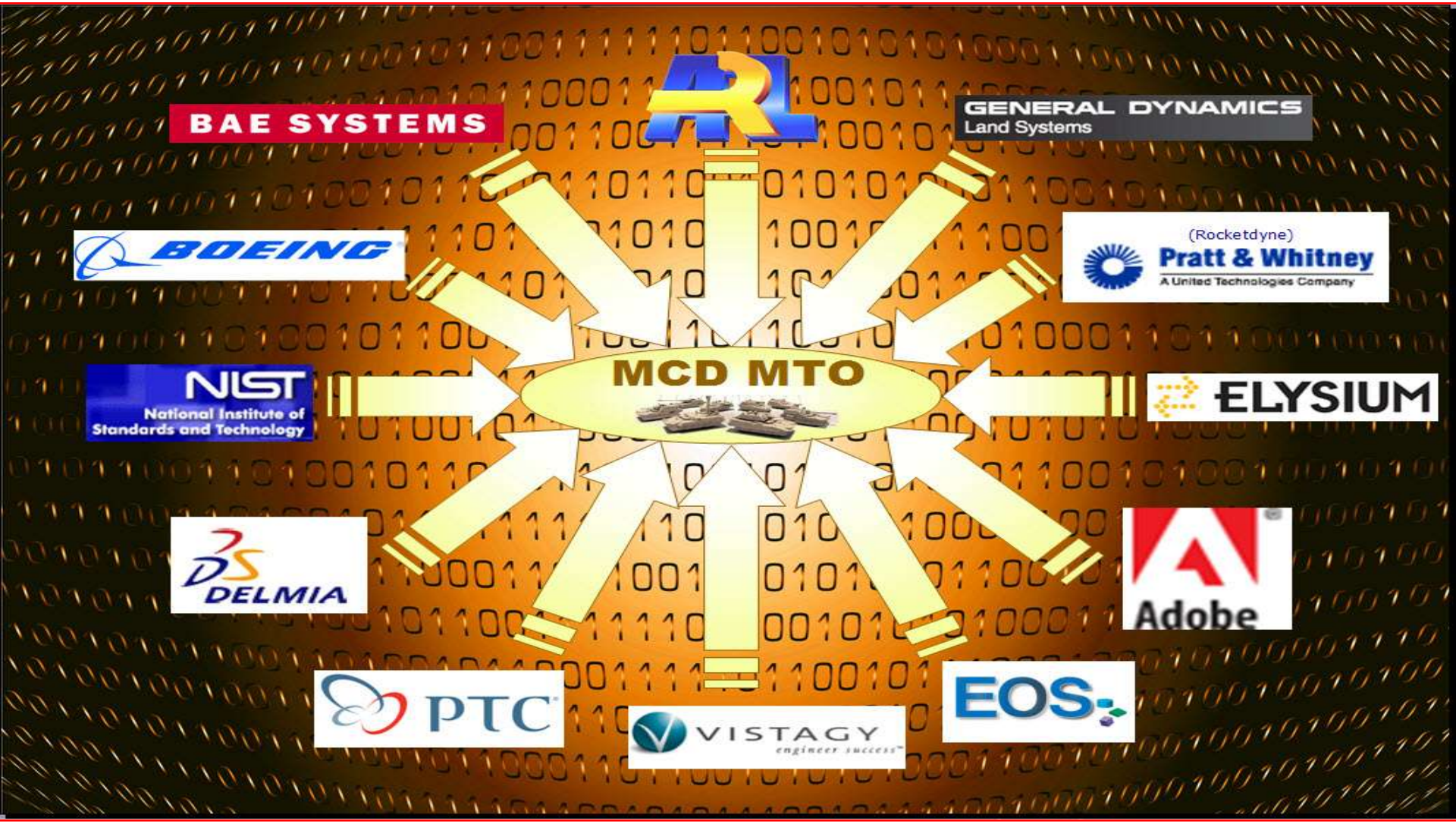
What is Model Based Enterprise?

A fully integrated and collaborative environment founded on 3D product definition detail and shared across the enterprise; to enable rapid, seamless, and affordable deployment of products from concept to disposal

MBD

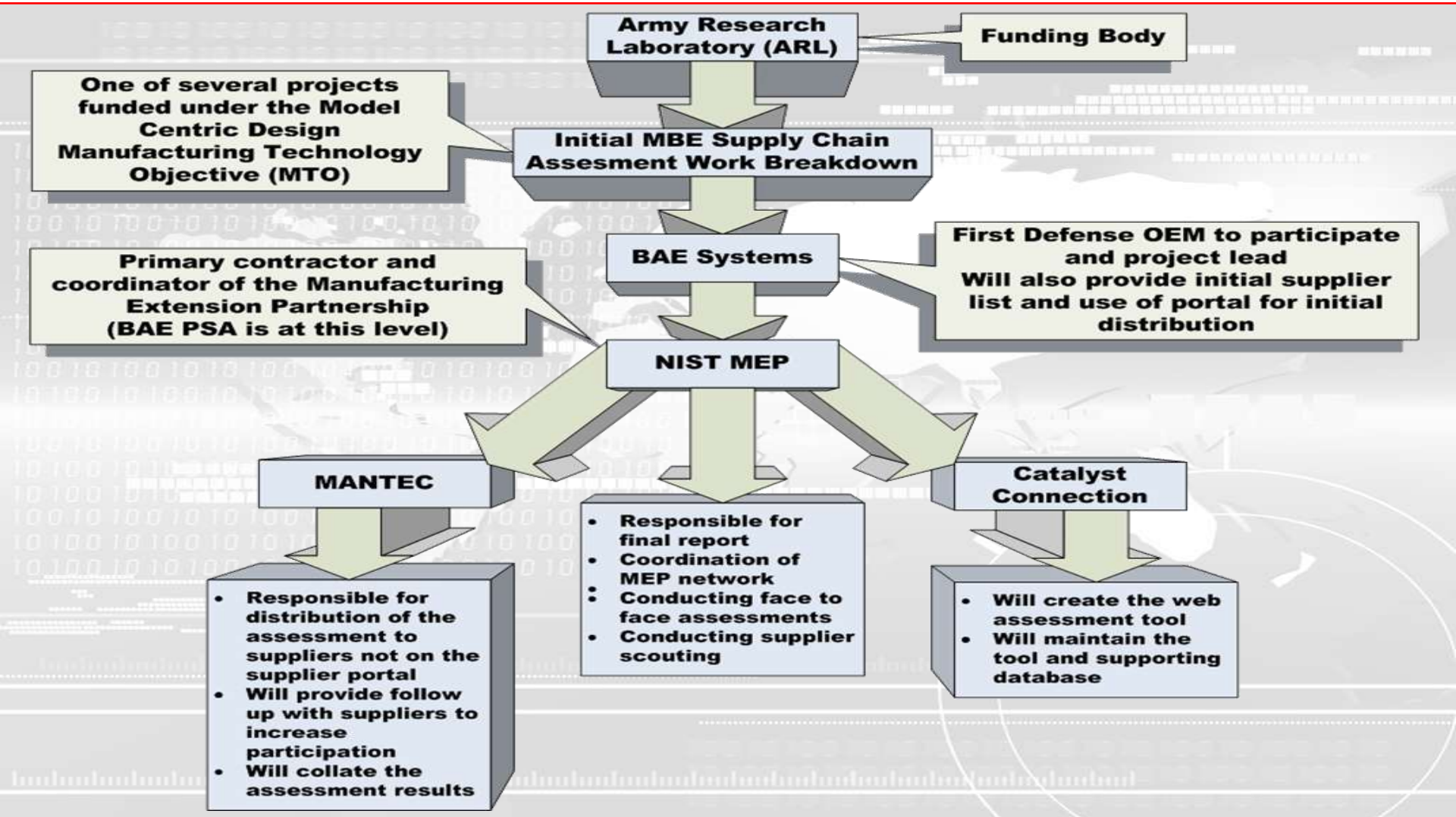
Concept → Design → Production → Sustainment → End Of Life

Our Sponsor

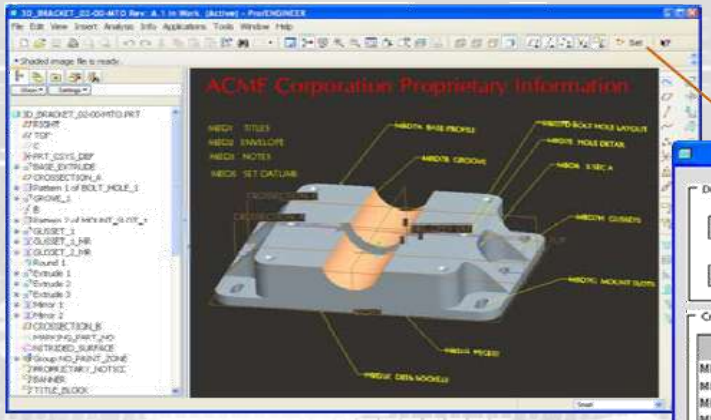


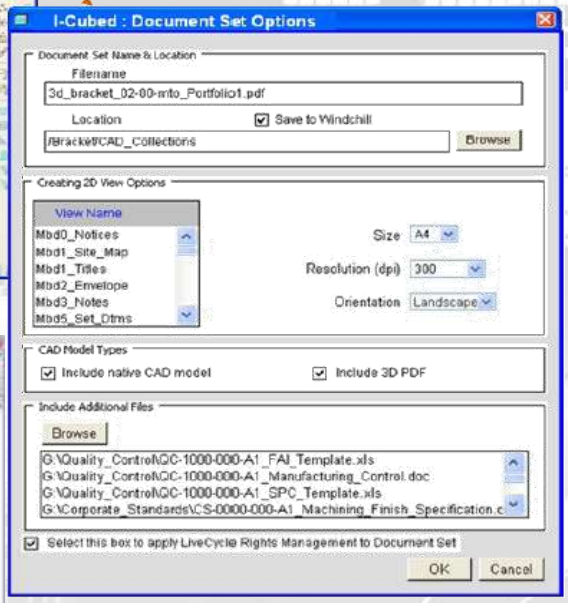
BAE SYSTEMS

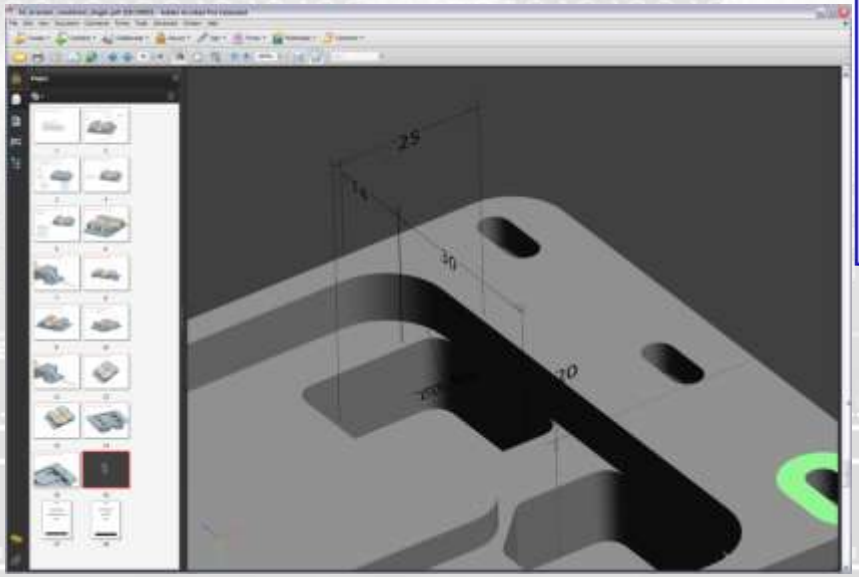
The Team



Quick Print and Portfolio Creation







Either the CAD user or the PLM system can initiate the creation of Quick Prints that attach all files needed and are Digitally Rights Managed for TDP Delivery of the $(DP)^2$

Preparing to Operate a Military Vehicle Supply Chain in a Model-Based Enterprise Environment

2009 Defense Manufacturing Conference
Gee Whiz! Session

Orlando, FL
November 30, 2008

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Manufacturing Extension Partnership (MEP)
National Institute of Standards and Technology (NIST)
U.S. Department of Commerce

www.mep.nist.gov

What is MBE?

- An MBE environment is a production system that employs concurrent product development with electronic, interoperable engineering tools and methods to optimize design, manufacture and supportability.

- MBE Vision: Master models that ***fully*** represent the complete design are distributed electronically throughout the entire enterprise.

- Because these models are comprehensive and fully annotated, they only need to be created ***once*** and do not need to be re-mastered.

- Every detail of their content can be extracted and seamlessly transitioned to all downstream uses, including:
  - manufacturing, suppliers and subcontractors
  - quality, procurement,
  - maintenance, repair, and overhaul.

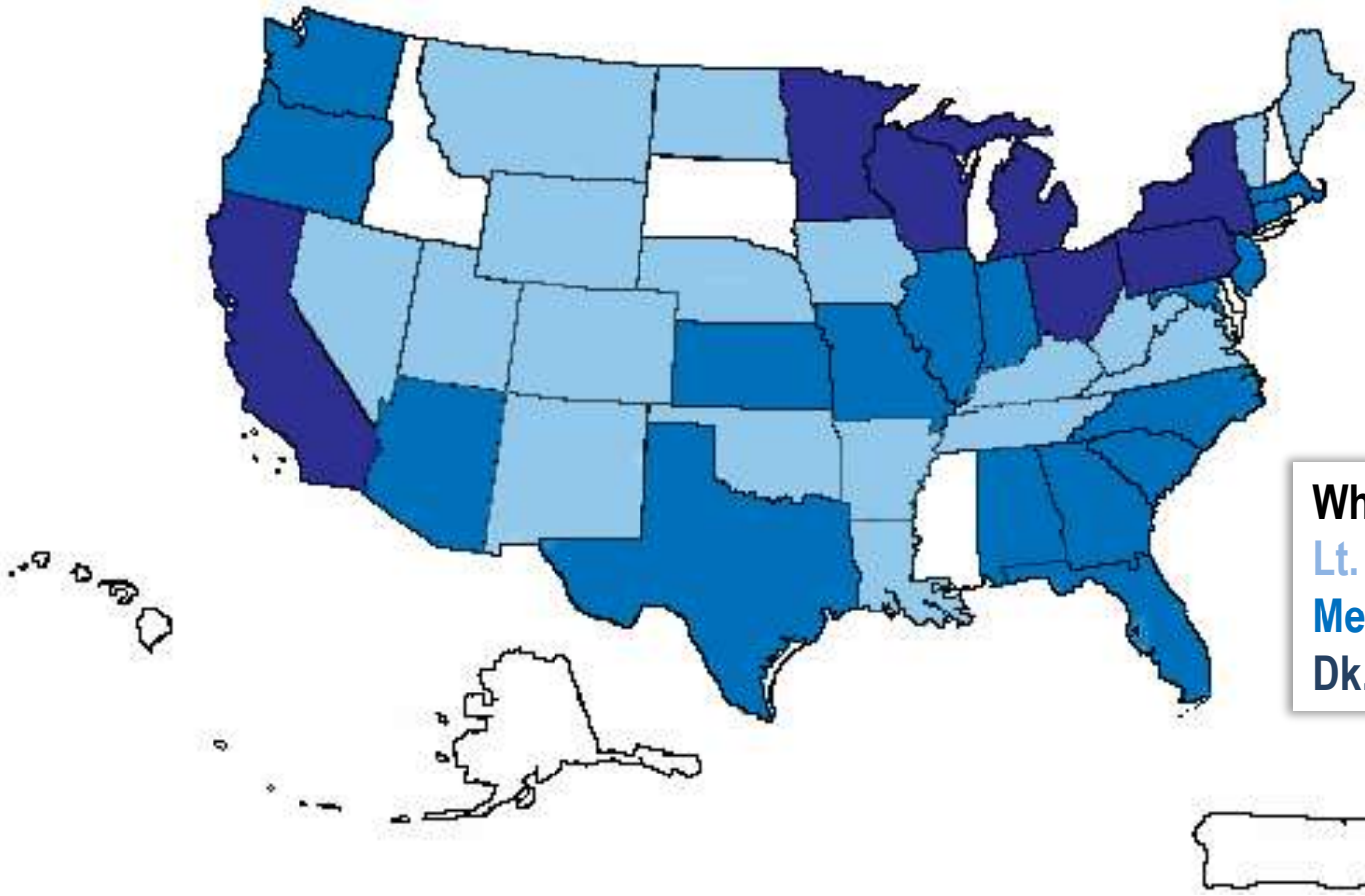
The Project Process

Photo courtesy of BAE Systems
www.baesystems.com

- Multi-phase assessment:
  - 10 BAE suppliers assessed onsite by NIST MEP, with local MEP Center participation
  - 850 BAE suppliers contacted for online assessment
    - 445 suppliers assessed
    - Led by MANTEC (York, PA MEP)
    - Technical infrastructure provided by Catalyst Connection (Pittsburgh, PA MEP)
- Potential new suppliers being identified via scouting searches
  - Led by NIST MEP, using same attributes examined in onsite & online assessments
- Supplier assistance / development / qualification to be developed for Phase Two, the MBE implementation phase
  - Phase One assessments used to develop pilot implementation projects as part of a Phase Two efforts
  - MEP Centers Nationwide can respond to these opportunities

MBE Assessments

The MBE Project Team conducted an online assessment targeting a pool of 850 BAE identified suppliers, representative of the larger military ground vehicle supply chain. Ultimately, ***445 companies from across the nation participated*** in the assessment



White: 0 Suppliers
Lt. Blue: < 5 Suppliers
Med. Blue: 5-10 Suppliers
Dk. Blue: >10 Suppliers

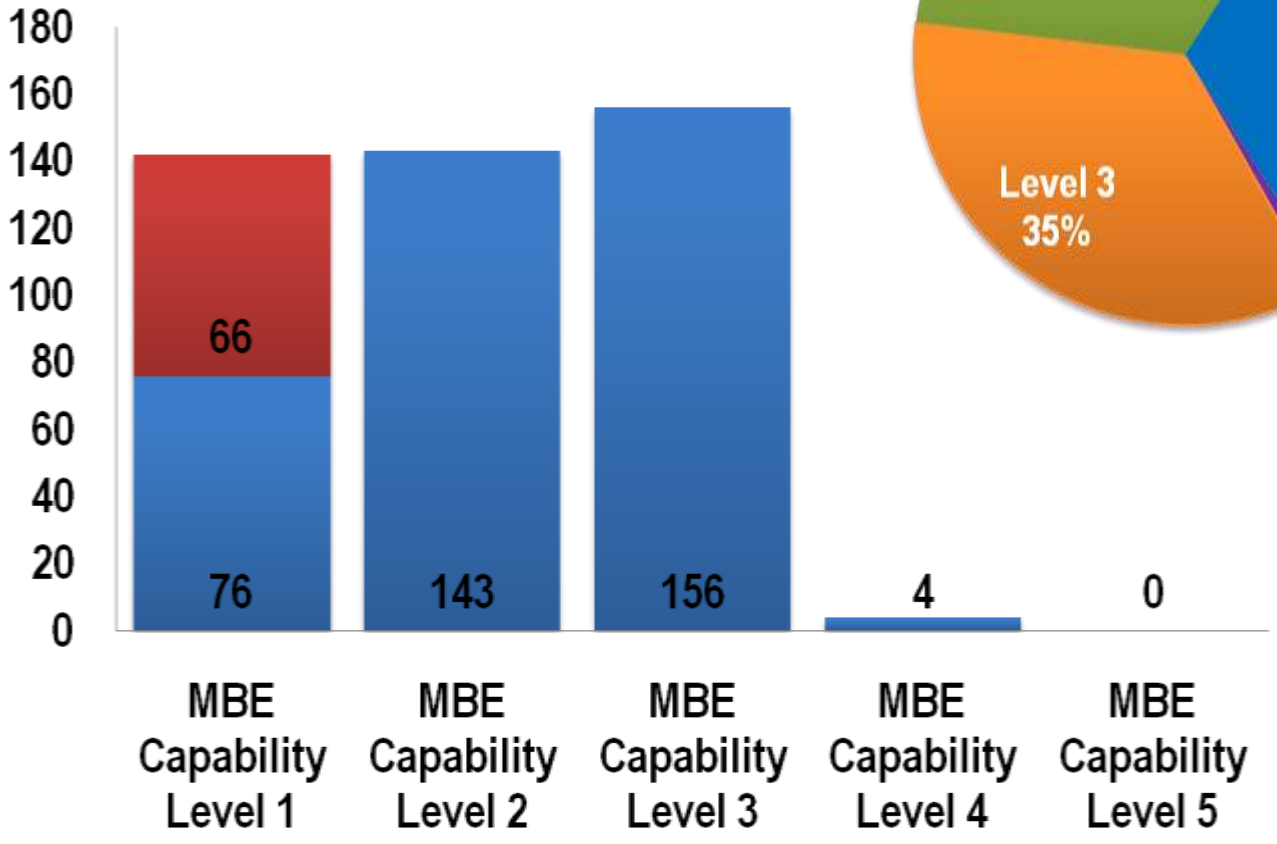
MBE Capability Metric

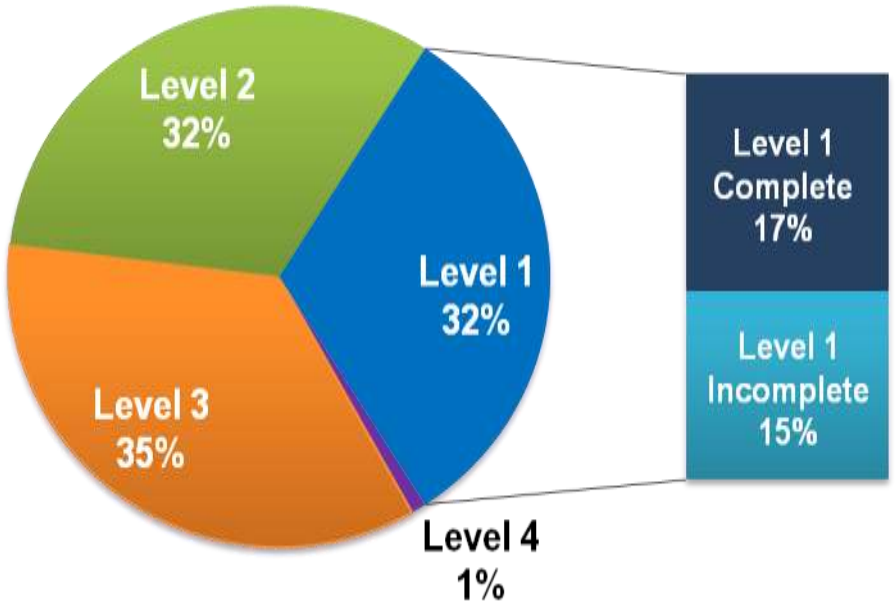
MBE Capability Level 1	MBE Capability Level 2	MBE Capability Level 3	MBE Capability Level 4	MBE Capability Level 5
Very little computer-driven/automated/CNC ops Most or all ops based upon 2D drawings Receive, send electronic manufacturing files in .pdf or other 2D format Use s/w to assist business/management functions, but little or no electronic cross-dept integration/re-use of data	Both CNC, manual ops Can accept 3D models from customers, but convert to 2D drawings to drive manufacturing processes Small amounts of electronic cross-dept integration / re-use of info exists	Majority of mfg processes are computer-driven / automated / CNC operations Planning, programming for manufacturing processes is performed using combination of 3D models, 2D models, 2D drawings Cross-dept integration exists via use of MRP system (or "MRP-like" software)	All manufacturing processes are planned / programmed based upon 3D model info Significant cross-dept integration, re-use of info exists via extensive use of MRP, ERP systems Some use of PDM / PLM systems occurs	All manufacturing processes are planned / programmed based upon 3D model info All company ops are integrated, driven by the same 3D model info - PDM / PLM systems serve as the data integration hub for company ops

The metric above was developed from the 10 onsite assessments and applied blindly to all participating suppliers.

MBE Assessment Results

Supplier Capability Ratings



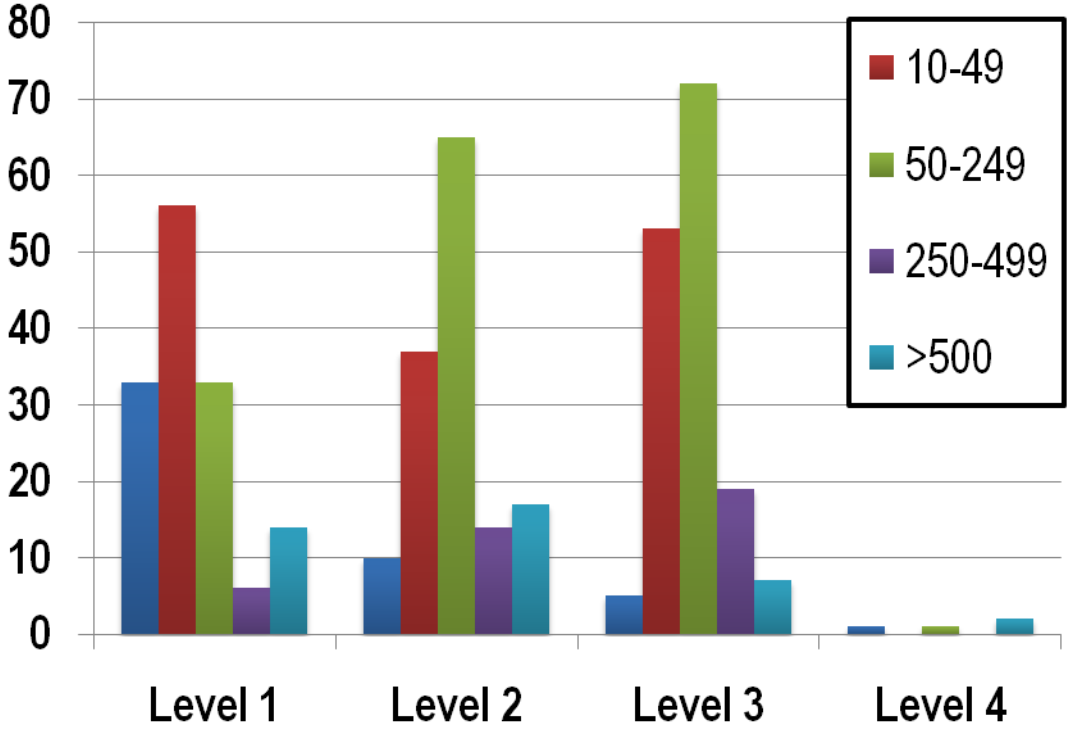


NOTE:
66 Level 1 ratings were due to incomplete info in assessments

MBE Assessment Results

Supplier Demographics

Company Size
By Number of Employees



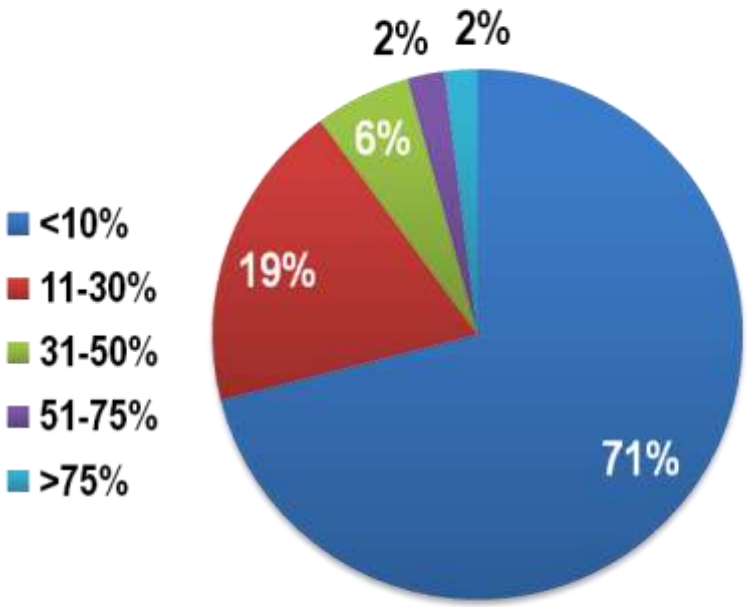
Quality Certifications
By Number of Participating Suppliers

ISO	258	TS	34
AS	75	QS	2
MIL	40	NADCAP	9

Information was also gathered on the participating suppliers' set-aside categories and product lines

MBE Assessment Results
Business Dynamics

% of Business to a Single OEM
In this case BAE Systems



All Participating Suppliers

Company Business Model

	Contract Manufacture /Build-to-Print	Design & Build	Design, Outsource, & Assemble
1	6	21	8
2	99	78	38
3	132	85	41
4	4	3	2

Information was also gathered on the percentage of the participating suppliers' business that goes to defense vs. commercial customers

MBE Assessment Results

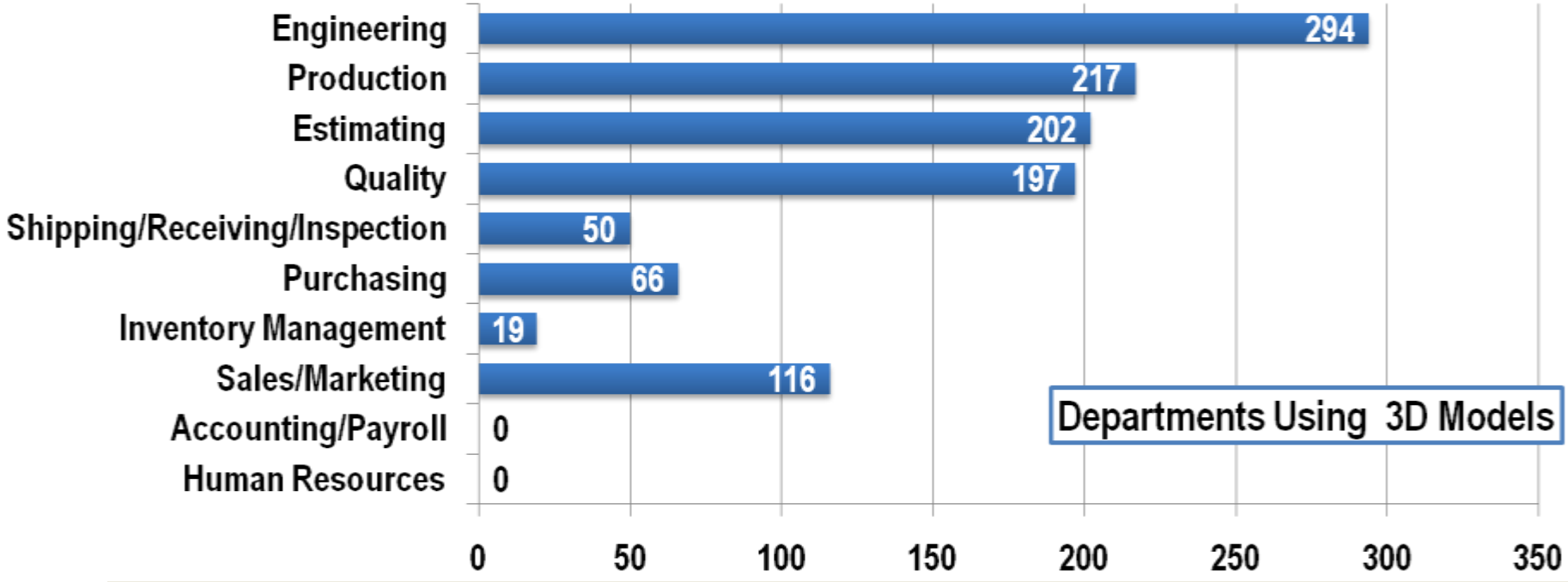
MBE Familiarity & Interest

- **Are you familiar with the concept of MBE?**
  - **Level 1:** 42% Yes; 49% No; 9% No Answer
  - **Level 2:** 77% Yes; 22% No; 1% No Answer
  - **Level 3:** 91% Yes; 9% No
  - **Level 4:** 100% Yes
- **Are you aware of the DOD move to 3D?**
  - **Level 1:** 51% Yes; 40% No; 9% No Answer
  - **Level 2:** 73% Yes; 26% No; 1% No Answer
  - **Level 3:** 100% Yes
  - **Level 4:** 100% Yes
- **Are you interested in learning about MBE and how it works?**
  - **Yes** 89%
  - **No** 8% (*37 of the 38 suppliers that answered "No" were Level 1 companies)*
  - **No Answer** 3%
- **Would you be willing to operate your production facility or line as an integrated part of an MBE environment?**
  - **Level 1:** 37% Yes; 16% No; 47% No Answer
  - **Level 2:** 73% Yes; 22% No; 5% No Answer
  - **Level 3:** 93% Yes; 7% No
  - **Level 4:** 100% Yes

MBE Assessment Results

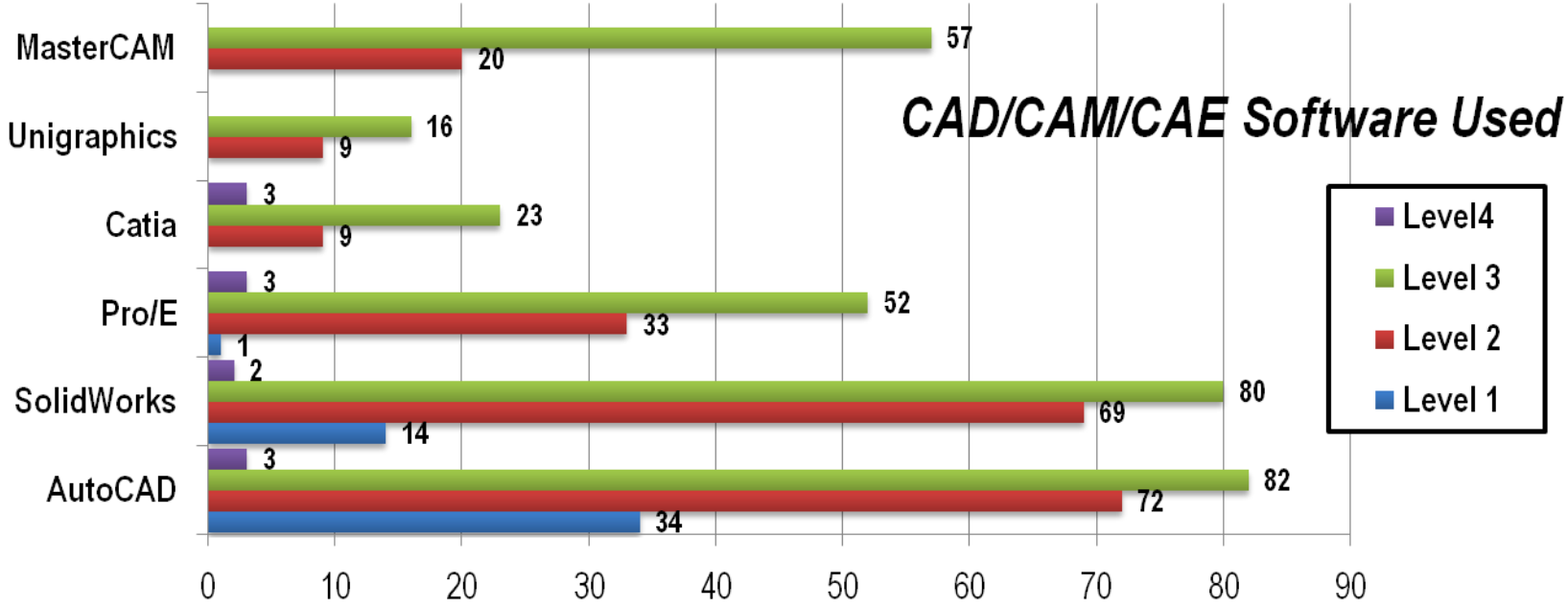
Use of 3D Software & Models

- Use of 3D models – Conversion to 2D?
- Departments using 3D models
- CAD/CAM/CAE Software Used
- Data File Formats – Can Utilize/Use most often



MBE Assessment Results

Use of 3D Software & Models



Data File Formats

Which of the following data formats can your company utilize?

- **PDF:** 80%
- **DXF:** 70%
- **IGES:** 64%
- **STEP:** 62%

Which do you use most often?

- **PDF:** 24%
- **DXF:** 12%
- **IGES:** 11%
- **STEP:** 26%

MBE Assessment Results
Impacts & Challenges

- **MBE Impacts from a Supplier Perspective**
  Including Machined Parts, Assemblies, and COTS items
  - Lead Time Reduction
  - Cost Reduction

- **Obstacles & Challenges**
  - **Cost and Investment**
    Capital Investment, Time Investment, Personnel Training, Additional Staff/Expertise, Software and Equipment Upgrades
  - **Customer/Supplier Commitment**
    Customer Date, Supplier/Subcontractor Readiness
  - **Cultural and Business Barriers**
    Business Culture Transformation, Business Case

Observations & Conclusions

- MBE Awareness is high among military ground vehicle suppliers
- Over 70% of participating suppliers do less than 10% of their overall business with a single OEM (in this case BAE Systems) – support from the DOD would significantly strengthen the business case for developing MBE capabilities
- *MBE Capabilities & MBE Readiness are not the same thing*
- Company culture will present major challenges for MBE implementation efforts
- It is possible, if not likely, that companies will pursue a "path of least resistance"
- Detailed technical and business requirements must be defined and communicated

Next Steps
Phase Two

The MEP MBE Team is working with BAE Systems to develop and implement Phase Two of this MBE supplier development effort. Plans include:

- An MBE Website
  Developed by Catalyst Connection for BAE to use as a way to keep their suppliers informed of MBE implementation efforts and development opportunities
- Supplier Pilot Projects
  Three companies, supply chain vs. supply base, MEP will record the process and use it to develop a plan for scalable, customizable, assistance for individual suppliers.
- MBE Education & Training Summit
  Tentatively to be held in Michigan and used to develop supplier understanding of MBE and the business case for implementation, as well as to gauge supplier interest and commitment.