

Data Exchange Convergence



Recommendation for Standards Initiation



Agenda

- **Review of NEMI Project - Jim McElroy, NEMI**
- **Industry perspectives:**
 - OEM - Dan O'Neill, Lucent Technologies
 - EMS - Henry Jurgens, Celestica
 - PWB - Dana Korf, Sanmina (presented by George Arrigotti, Intel)
- **Standardization process - Dave Bergman, IPC**
- **Call for Participation - all**
- **Panel Discussion**



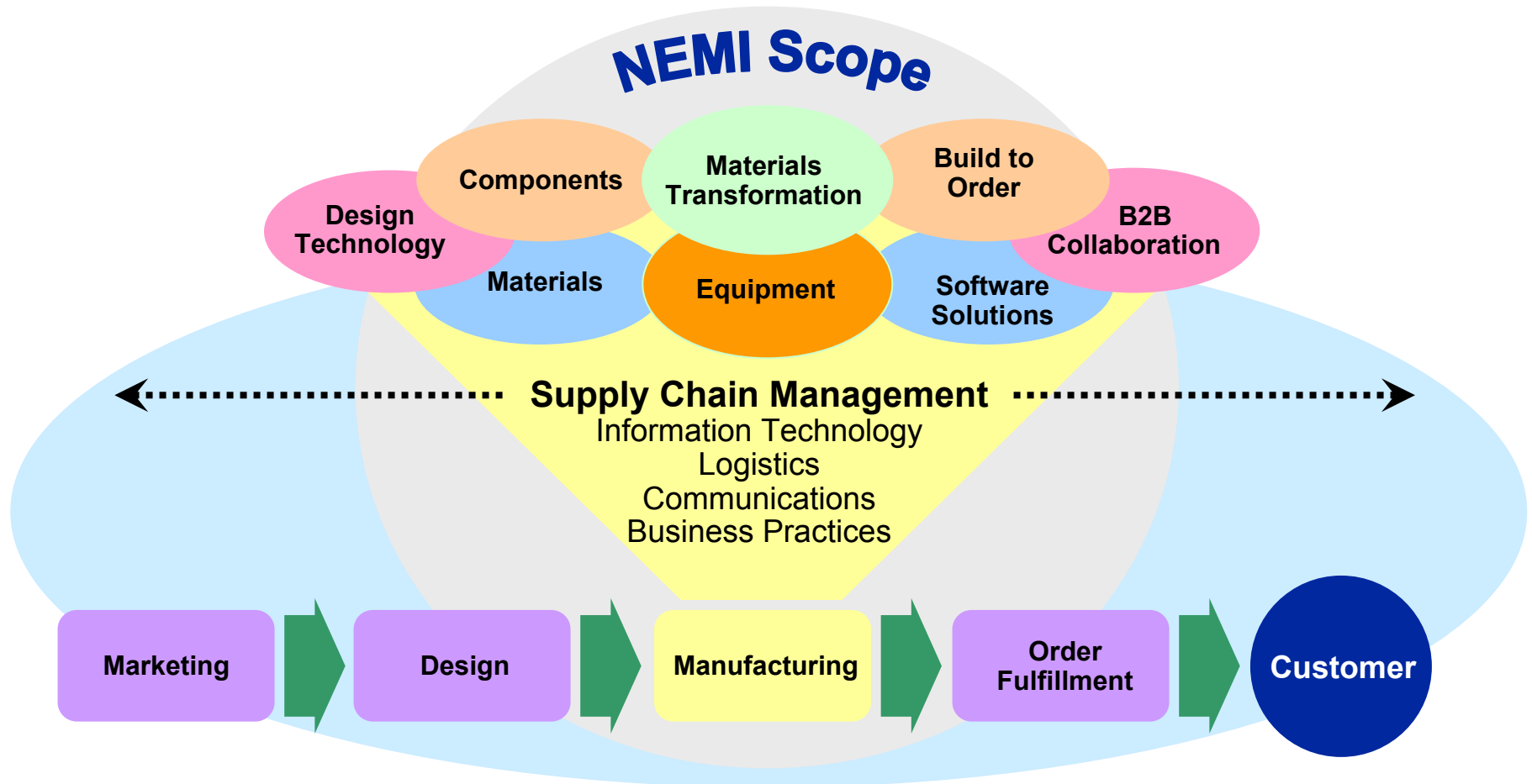
The Need for Intelligent Data Exchange

- **Today's methods for design to mfg. data exchange rely on outdated, inefficient, and nonstandard techniques**
 - Many are still using Gerber format
 - Surrounded by an assortment of “roll your own” information structures
- **Progress has been made by two major initiatives**
 - IPC's GenCAM
 - Valor's ODB++
- **However, Industry adoption has been slow**
- **The cost to Industry of sticking to status quo is Significant!**



About NEMI

Assure the Global Leadership of the North American Electronics Manufacturing Supply Chain



Connect with and Strengthen Your Supply Chain



What Does NEMI Do?

Leverage the combined Power of Member Companies to Provide Industry Leadership

- **NEMI Conducts Industry Forums on Emerging Topics**
- **NEMI Roadmaps the Needs of the North American Electronics Industry**
- **NEMI Identifies Gaps (both business & technical) in the North American Infrastructure**
- **NEMI Stimulates R&D Projects to fill these Gaps**
- **NEMI Establishes Implementation Projects to Eliminate these Gaps**
- **NEMI Stimulates Standards to speed the Introduction of New Technology & Business Practices**

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NEMI Convergence Project Overview

- **Purpose:**

- Lower Industry Wide Cost of Data Exchange.
- Improve Time to Market of New Products:
 - » More Robust Solutions
 - » Reduced Error Rate
- Consolidation of existing/emerging CAD/CAM Data Exchange Formats.
- Promote Development of Software Solutions based on converged Format.

- **Strategy:**

- Focus Convergence on Next Technology Platform (XML).
- Open to Broad Industry Participation.
- Organized with Convergence Management Team and Technical Team.
- Output of this Project is a Technical Recommendation that can be used as input to Standards and Solutions Development.

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Project Objectives

- **Develop Technical Recommendation for CAD/CAM data exchange format geared towards:**
 - Wide adoption
 - Timely deployment
- **Build on strengths of current solutions:**
 - GenCAM
 - ODB++
- **Encourage early adoption & implementation thru tool development, demonstrations, and partnerships with other consortia/industry groups.**



Organization/Approach

- **Convergence Technical Team (CTT)**
 - Responsible for coming up with technical recommendation.
 - Subgroups of Technical Team will work in Parallel to Evaluate Major sections of existing formats to determine most efficient starting point.
 - Open to All Interested Parties with a stake in the outcome.
 - Work is Internally Focused.

- **Convergence Management Team (CMT)**
 - Responsible for Insuring that Project is focused on needs of Industry.
 - Responsible for overall scope, timeframe, and goals of project.
 - Structured membership criteria with Emphasis on the Customer.
 - Responsible for Accepting Technical Recommendation and providing all External communications (to press, other organizations, etc.).



CMT Members – Focused on Users

- **Randy Allen** **Valor Computerized Systems**
- **George Arrigotti** **Intel**
- **Kent Balius** **Merix**
- **David Bergman** **IPC**
- **Gary Carter** **Fujitsu Networks**
- **Tim Easterling** **SCI Systems**
- **Allan Fraser** **GenRad/Teradyne**
- **Henry Jurgens** **Celestica (Co-chair)**
- **John Kastritis** **Motorola**
- **Dana Korf** **Sanmina (Co-chair)**
- **Frank McBryan** **Nortel Networks**
- **Jim McElroy** **NEMI**
- **Karen McConnell** **Lockheed Martin**
- **Dan O'Neill** **Lucent Technologies**
- **David Tsou** **Xerox**



CTT Members – Open to Industry

Dieter Bergman, IPC

Roger Carlson, Lucent

Pawel Chadzynski, Ohio DA

Gaurang Choksi, Intel

Les Cotton, Jardon Eng.

Michael Christ, Motorola

Dino Ditta, Router Solutions

Andy Dugenske, Georgia Tech

David Godlewski, NEMI

Doug Hebling, Cadence

Ed Hickey, Cadence

Bill Honeycutt, Motorola – Co chair

Skip Hopgood, Sanmina

Mosik Kovarsky, Valor

David Martin, Intel

Jim Marvel – PCof A

John Maxwell, Mentor Graphics

Michael McCaleb, NIST

Michael McLay, NIST

Norm Meeker, ETEC Systems

John Minchella, Celestica – Co chair

Joe Morrison, ADIVA

Bob Neal, Agilent

Raul Oropeza, Xerox

Jim Reader, AGCS

Bill Reeves, EMC

Jeff Ruff, Fujitsu Network Com.

Rick Stanley, EMC Corp.

Mark Steele, Toppan Electrics

Shawn Turner, Technomatix-Unicam

David Wedeking, GenRad/Teradyne

Frank Wong, Xerox

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Strengths of NEMI Data Exchange Project

- **NEMI's Strong OEM & EMS Constituency**
 - The Voice of the Customer
 - User Representatives Leading both CMT & CTT
- **IPC's Strong Standards Infrastructure and Strong PWB Fabricator Constituency**
 - Strong History of Collaboration between IPC and NEMI on Standards
 - Broad membership from Industry with greatest representation coming from PWB fabricators & their suppliers
- **Build from Excellent work on Intelligent Data Exchange**
 - Valor's ODB++
 - IPC's GenCAM
 - Infrastructure Investments



Accomplishments of CTT

- 1. Initial work mapped capabilities of GenCAM and ODB++.**
- 2. Created set of user requirements that any future standard should support (PWB fabrication, PWB assembly, Test/Inspection, etc.).**
- 3. Several different approaches attempted to create an integrated starting point that would capture the “best of both”.**
- 4. Final approach involved “starting at each end” and working towards a common goal. The CTT team was organized into two groups – one that used GenCAM as a base, the other that used ODB as a base and build to a complete solution. Two proposals/approaches to the standardization process created (both geared to meet user needs).**



Accomplishments of CMT

- 1. Initial work focused on guidelines/scope for project.**
- 2. Developed list of industry leaders in all key segments of supply chain.**
- 3. Developed a decision process that would be basis for making recommendation.**
- 4. Conducted 2 phases of industry feedback to proposals (solution providers first and then users).**
- 5. Summarized/documented feedback and communicated this information (along with specific company responses).**
- 6. Conducted industry-voting process to be basis of recommendation.**



Discussion of Results

- **Summaries of industry feedback phase as well as specific company input is available at:**
www.nemi.org
- **Results of voting process did not differ appreciably from feedback phase. Small differences due to:**
 - Complement of companies that participated during each phase
 - Change of preference (from neutral position).
- **Weighted vote (based on company size/influence) did not differ appreciably from raw vote.**
- **Individual company votes kept private. Summaries by market segment shared.**



Companies who Voted

EMS Providers:

- Celestica
- Flextronics
- MSL
- Plexus
- SCI Systems
- Sanmina
- Solectron
- Xetel

PWB Fabricators:

- DDI
- Photo Circuits
- Merix
- MEI
- Protech
- Toppan
- Tyco
- Via Systems



Companies who Voted

OEMs:

- **Damlier-Chrysler**
- **Delphi-Delco**
- **Cisco**
- **EMC**
- **Fujitsu Network Communications**
- **HP**
- **IBM**
- **Intel**
- **Lockheed Martin**
- **Lucent Technologies**
- **Maxtor**
- **Motorola**
- **Nokia**
- **Nortel Networks**
- **StorageTek**
- **Sun**
- **Xerox**



Companies who Voted

Solution Providers:

- Adiva
- Agilent
- Cadence
- Frontline
- Intercept
- Mentor
- Ohio Design Automation
- Orbotech
- Router Solutions
- Technomatix-Unicam
- Teradyne
- Tibor-Darvis
- Valor



Results of Industry Voting

Market Segment	GenCAM Start Point (raw vote)	ODB Start Point (raw vote)	GenCAM Start Point (weighted)	ODB Start Point (weighted)
EMS	0	8	0	13
OEM	5	12	10	22
PWB fabricator	0	8	0	13
Solution Provider	8	5	10	7
Totals =>	13 (28%)	33 (72%)	20 (27%)	55 (73%)



Recommendations

- 1. PIN form submitted to IPC to request the start of a standards committee. Starting basis for this group would be the industry preferred proposal to achieve a converged standard.**
- 2. Held joint CMT/CTT meeting to discuss path forward and to request participation in the standards committee.**
- 3. Seek active participation in the standards process by all companies that participated in the industry feedback and voting stages.**
- 4. Start planning/execution of the next phase of NEMI convergence project to focus on the industry acceptance work and to help recruit the critical mass required for the IPC standards work.**



Summary

- **Significant Benefits to Industry to Achieve Single Standard for CAD to CAM Data Exchange.**
- **Convergence Project has met key objectives:**
 - Recommendation for Standardization made to IPC
 - Recommendation based on proposal that uses ODB (X) as starting point and adds missing elements from GenCAM
- **Next phase based on dual initiatives:**
 - IPC standards committee develops detailed standard
 - NEMI CMT works on industry adoption.