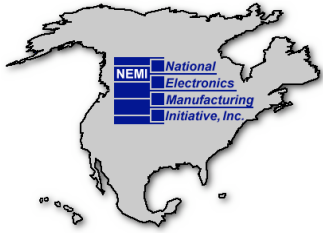




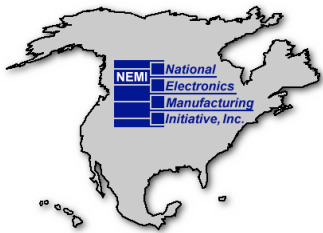
**Improving Communication
for Product Realization**
Dismantling the Tower of Babel

Jim McElroy
1/28/03



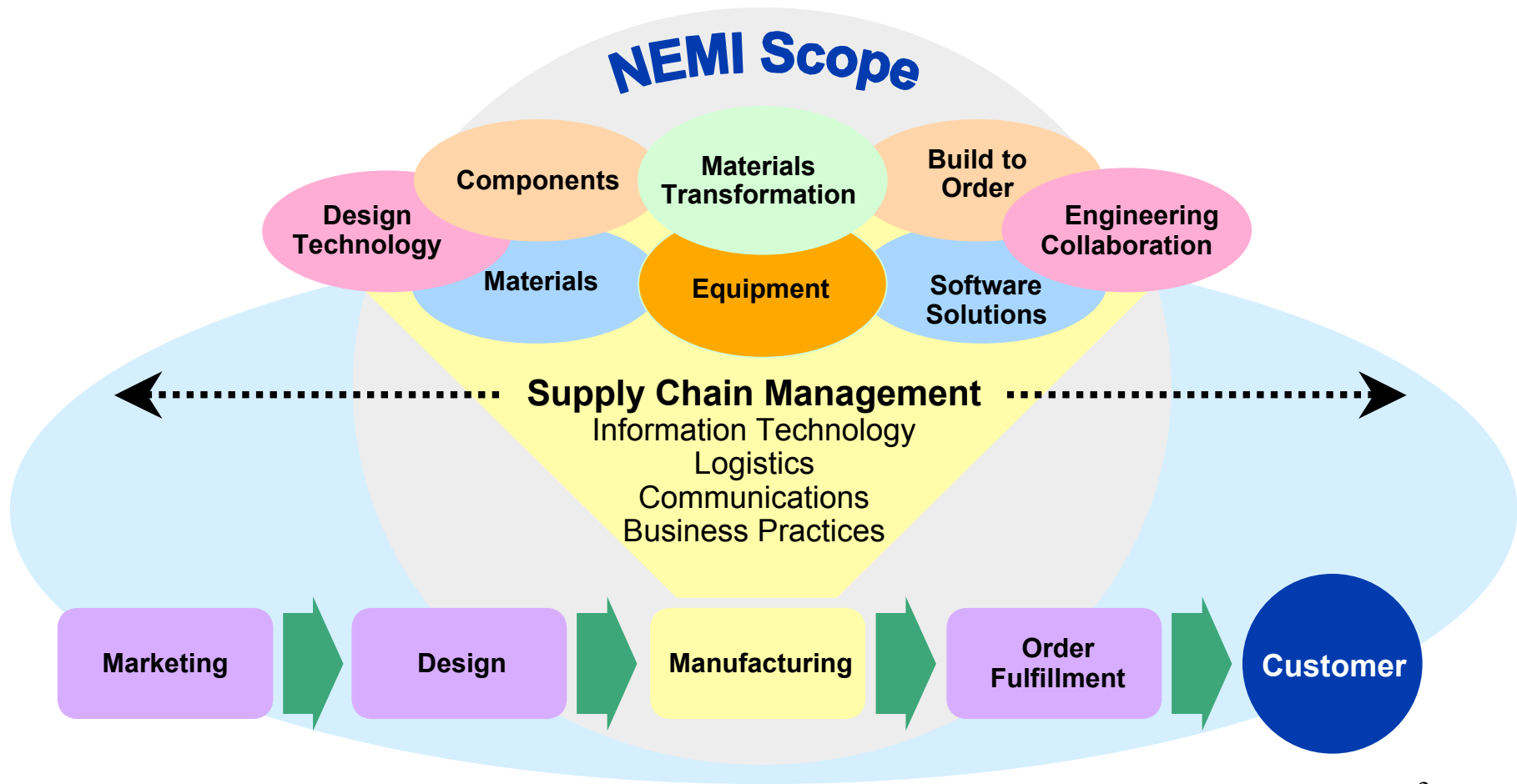
What is NEMI?

- **NEMI = *National Electronics Manufacturing Initiative***
 - Industry-led consortium; 65 member companies
 - North American electronics manufacturing supply chain
- **Activities**
 - Roadmap industry needs (every two years)
 - Identify business & technical gaps in manufacturing infrastructure
 - Stimulate R&D projects to fill gaps
 - Establish implementation projects to eliminate gaps
 - Stimulate standards to speed introduction of new technology & business practices

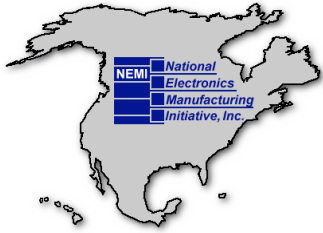


NEMI Mission

Assure global leadership of the North American electronics manufacturing supply chain

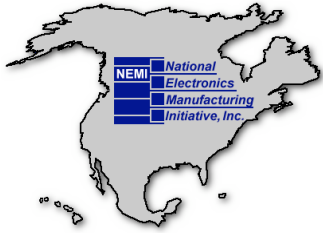


Connect with and Strengthen Your Supply Chain



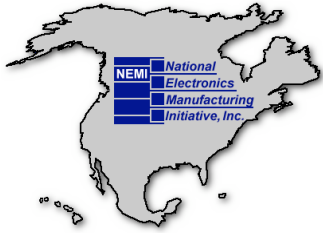
Evolution of Electronics Industry

How it was:	How it is:
OEMs were Focused on Regional market.	OEMs serve the global marketplace.
Vertically Integrated OEMs.	Distributed Virtual Supply Chain.
OEM Focus on Materials Transformation.	Broader Focus includes SCM & Business Practices.
OEM Focus on Performance of Technology.	OEM Focus on Integration of Technology.
OEM Defines Best Solutions.	OEM Emphasis on Industry Standard Solutions.
Long Product Life Cycles.	Shorter Life Cycles.



Evolution of Electronics Industry (Cont.)

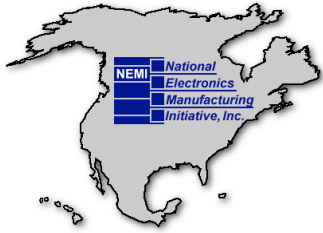
How it is:	Evolving to:
OEM serve the global marketplace.	“Regional frontiers” left – All population centers served.
Distributed virtual Supply Chain.	Distributed Competency Model (from concept to grave).
Broader Focus includes SCM & Business Practices.	OEM only focuses on SC orchestration to provision the Customer.
OEM Focus on Integration of Technology.	OEM Focus on Integration of Solutions.
OEM Emphasis on Industry Standard Solutions.	Emphasis on Industry Standard Subsystems.
Shorter Life Cycles.	Electronics hardware an element of solutions.



Changing Roles & Responsibilities

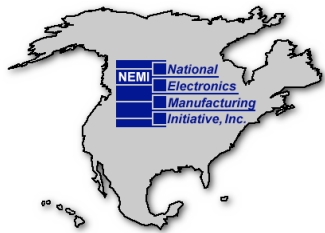
Attribute	OEM:	EMS:	Supplier:
R&D Focus:	End Product & Market	Mfg. Process Integration	“Widget” Technology
Design Focus:	Architecture of Product	Growing Design Content	“Widget” Design
Execution Focus:	Life cycle Supply/Demand	Board/System Manufacturing	“Widget” Manufacturing
Key Value:	Customer Knowledge	Integration of Manufacturing	Knowledge of Technology
Popular Business Strategy:	Virtual Company	Supply Chain Facilitator	Create Global Footprint
Key Issue:	Margin loss	Margin growth	Competition from Abroad

Connect with and Strengthen Your Supply Chain



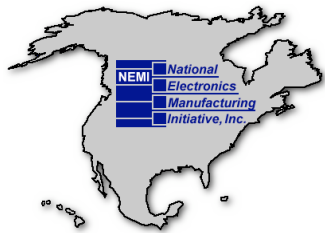
Automotive Outsourcing Growing

- **2001 ERIM/supply solution study of automotive supply chain found:**
 - **Coordination between OEMs and top-tiers is well-developed, but not with lower tiers**
 - **15% of OEMs insist that suppliers do e-business with *their* suppliers; will rise to 77% in 2-3 years**
 - **Collaborative engineering expected to grow from 16% today to 67% in 2-3 years**
 - **14%-49% of supplier base is capable of e-business today (depending on business activity); will grow to a minimum of 54%, maximum of 78% in 2-3 years**



NEMI Strategy

- **As product realization process becomes increasingly distributed, complexity of communications increases.**
- **Focus on developing industry standard approaches and practices for exchanging information.**
- **Progression of work:**
 - **Factory floor**
 - **OEM & EMS data exchange**
 - **Design intent**
 - **Process performance**
 - **Co development**



NEMI Portfolio

Factory Floor

Plug & Play Factory Project

interchangeability of hardware and software on a (distributed) **factory floor**

Supply Chain

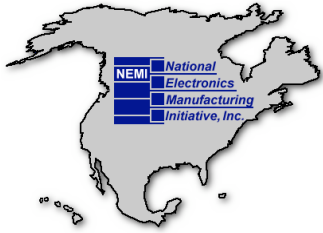
Virtual Factory Information Interchange Project

shorten time and reduce cost to establish and maintain information exchange partnerships across the **supply web**

Data Exchange Convergence Project

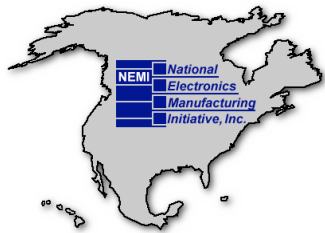
lower the industry-wide cost of design exchange through the consolidation of existing **CAD/CAM** exchange formats; promote development of software solutions built on a single exchange format

Specifications available at <http://webstds.ipc.org>



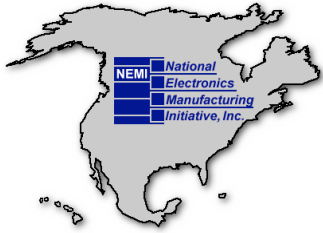
Virtual Factory Standards — PDX

- **Product Data eXchange (PDX)**
 - **IPC-2571 Generic Requirements for Electronics Manufacturing Supply Chain Communication**
 - **IPC-2576 Sectional Requirements for Electronics Manufacturing Supply Chain Communication of As-Built Product Data**
 - **IPC-2577 Sectional Requirements for Supply Chain Communication of Manufacturing Quality Assessment (*proposal*)**
 - **IPC-2578 Sectional Requirements for Supply Chain Communication of Bill of Material and Product Design Configuration Data**
 - **All standards are released and ANSI approved, except as noted**



Data Integrity

- **The Perfect Bill of Materials (BoM)**
 - BoM should provide all information EMS and suppliers need for purchasing and manufacturing
 - Have high error rates (40-80%)
 - Redundant data processing
 - Resolution can take days or weeks
 - Need standardized contents, data format
 - Need tools to validate BoMs
 - **NEMI efforts**
 - Workshop held (at Nortel Networks)
 - White paper written
 - Web seminar held
 - Continuing work on AML/AVL & solution providers¹
- Connect with and Strengthen Your Supply Chain*

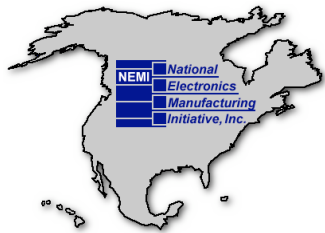


Distributed Development

- **Engineering Collaboration**
 - Distributed design engineering coupled with shrinking lifecycles make traditional methods of engineering collaboration inadequate
 - Where does the intellectual property reside?
 - How are responsibilities and liabilities shared?
 - How can early design trade-offs be done quickly and efficiently?
- **NEMI efforts**
 - Forum held (at Sun Microsystems)
 - Task group formed
 - Establishing plan to work gaps
 - While gaps clearly exist, cooperation is guarded.

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Connect with and Strengthen Your Supply Chain



Conclusions

- **Consensus-based industry standards are critical for improving supply chain communication**
- **A standard is only good if it's *adopted***
- **End users must help define requirements — get the key players involved**
 - **As the customer goes, so goes the supplier**
 - **There is much to be said for “critical mass”**
- **Embrace “competing” groups to help get industry consensus**
- **Success of industry consortia in any given area requires more than gap identification. Companies must be willing to work in cooperation (while competing) to resolve issues.**