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

*Connect with and Strengthen Your Supply Chain*
NEMI Mission

Assure global leadership of the North American electronics manufacturing supply chain

Connect with and Strengthen Your Supply Chain
# Evolution of Electronics Industry

<table>
<thead>
<tr>
<th>How it was:</th>
<th>How it is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEMs were Focused on Regional market.</td>
<td>OEMs serve the global marketplace.</td>
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<tr>
<td>Vertically Integrated OEMs.</td>
<td>Distributed Virtual Supply Chain.</td>
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<tr>
<td>OEM Focus on Performance of Technology.</td>
<td>OEM Focus on Integration of Technology.</td>
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<tr>
<td>OEM Defines Best Solutions.</td>
<td>OEM Emphasis on Industry Standard Solutions.</td>
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<tr>
<td>How it is:</td>
<td>Evolving to:</td>
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<td>----------------------------------------</td>
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<tr>
<td>OEM serve the global marketplace.</td>
<td>“Regional frontiers” left – All population centers served.</td>
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<td>Distributed virtual Supply Chain.</td>
<td>Distributed Competency Model (from concept to grave).</td>
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<tr>
<td>Broader Focus includes SCM &amp; Business Practices.</td>
<td>OEM only focuses on SC orchestration to provision the Customer.</td>
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<td>OEM Focus on Integration of Technology.</td>
<td>OEM Focus on Integration of Solutions.</td>
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<tr>
<td>Shorter Life Cycles.</td>
<td>Electronics hardware an element of solutions.</td>
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</table>
## Changing Roles & Responsibilities

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

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## NEMI Portfolio

<table>
<thead>
<tr>
<th>Factory Floor</th>
<th>Supply Chain</th>
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<tr>
<td><strong>Plug &amp; Play Factory Project</strong></td>
<td>interchangeability of hardware and software on a (distributed) factory floor</td>
</tr>
<tr>
<td><strong>Virtual Factory Information Interchange Project</strong></td>
<td>shorten time and reduce cost to establish and maintain information exchange partnerships across the supply web</td>
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<tr>
<td><strong>Data Exchange Convergence Project</strong></td>
<td>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</td>
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*Specifications available at [http://webstds.ipc.org](http://webstds.ipc.org)*

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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

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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 providers
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.
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.