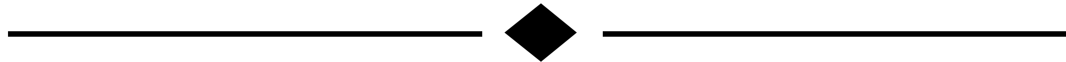
NEMI Roadmaps



Jim McElroy

NEMI Mission and Structure

Mission:

- NEMI is Dedicated to Improving the Volume Capabilities and Competitiveness of North American Electronics Manufacturing Companies.
- NEMI Brings Together North American Electronic Manufacturers with their Suppliers to Produce a World Class Volume Manufacturing Supply Chain.

Structure:

- North American Industry Led Consortium.
- Made up of Electronic Equipment Manufacturers, Suppliers, Associations, Government Agencies and Universities.
- Virtual Organization/Small Permanent Staff.

What Does NEMI Do?

- **NEMI Roadmaps the Needs of the North American Electronics Industry.**
- **NEMI Identifies Gaps 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 Activities to speed the Introduction of New Technology.**

NEMI Technical Methodology

NEMI Vision

Manufacturing System Plan

Product Sector Requirements

National Electronic Manufacturing Roadmap

NEMI Product Vision

NEMI Gap Analysis

NEMI System Plan

NEMI Technical Priorities

NEMI Five-Year Implementation Plan

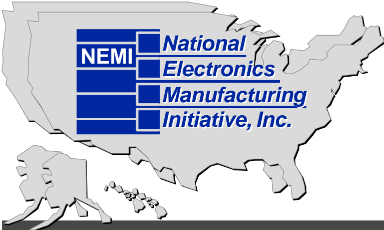
NEMI Projects

Roadmapping

Technical Planning

Roadmap Approach

- Led by Leading OEMs, who define cost and performance objectives
- Segmented by OEM Markets
- Top Down Industry Support, Bottom Up Technical Participation
- Implementation Focused
- Define Needs, Not Solutions
- Insure Manufacturing Systems View of Technology Tradeoffs
- Roadmap Manufacturing Technology Infrastructure, Not Product Designs
- Sanity Checks for Affordability/Consistency



NEMI 1998 Roadmap Linkages

USDC
DisplayRoadmap

NEMI Roadmap

NEMI Optoelectronics TWG

OIDA
Optoelectronics & Optical Storage Roadmaps

NEMI Mass Data Storage TWG

NSIC
Magnetic &Optical Storage Roadmap

NEMI/SIA Packaging TWG

NEMI/IPC Interconnect TWG

SIA
Semiconductor Roadmap

IMAPS Ceramic Substrates Roadmap

IPC
Interconnection Substrates Roadmap

ROADMAP DEVELOPMENT

PRODUCT SECTOR

TECHNOLOGY

	Low Cost	Hand Held	Cost/ Performance	High Performance	Harsh Environment
Packaging					
Board Assembly					
Final Assembly					
Interconnection Substrates					
Displays					
Energy Storage Systems					
RF Components					
Passive Components					
Mass Data Storage					
Supply Chain Management					
Environmentally Conscious Manufacturing					
Ceramic Substrates					
Digital & Mixed Mode Semiconductors					
Optoelectronics					
Factory Information Systems					
Modeling, Simulation & Design Tools					
Test, Inspection & Measurement					

1998 TWG Structure

TWG	Chair		Co-Chair	
Executive Summary	Irwin Asher	Lucent	Leo Feinstein	NEMI
Interconnect Substrates	Jack Fisher	ITRI	Dieter Bergman	IPC
Ceramic Substrates	Rene Cote	DuPont	Paul Van Loan	HP
Displays	Bob Pinnel	USDC	N/A	
Mass Data Storage	Roger Hoyt	IBM	N/A	
Optoelectronics	John Olenick	Eastman Kodak	Nan Jokerst	Georgia Tech
Digital & Mixed Mode Semiconductors	Paolo Gargini	Intel	N/A	
Energy Storage Systems	Frank Malispina	Motorola	Nick Smilanich	Energizer
RF Components	Peter Staecker	M/A-COM	Vijay Nair	Motorola
Passive Components	John Rector	IBM	Joe Dougherty	Penn State
Factory Information Systems	John Cartwright	Intel	Barbara Goldstein	NIST
Modeling, Simulation, and Design Tools	TBD	Lucent	David Williams	Sandia
Environmentally Conscious Manufacturing	Bob Pfahl	Motorola	N/A	
Supply Chain Management	Rich Beck	Compaq	N/A	OEM
Test, Inspection & Measurement	John Fulton	Compaq	Wm Anderson	NIST
Packaging	Bob Werner	SEMATECH	Ron Bracken	SRC
Board Assembly	John Thome	Motorola	Tom Davison Bill Barthel	Celestica Plexus
Final Assembly	John Rueping	Eastman Kodak	Mike Reagin	Delco

1998 Product Champions

Product Sector	Chair	Co-Chair
Low Cost Product Sector	OEM	J. Newkirk Kodak
Hand-Held Product Sector	John Thome Motorola	OEM
Cost/Performance Product Sector	George Arrigotti Intel	Greg Munie Lucent
High Performance Product Sector	Bill Chow Tandem	Evan Davidson IBM
Harsh Environment Product Sectors	Theresa Lindley Delco	Bill Murphy Lockheed Martin

1998 NEMI ROADMAPPING SCHEDULE

National Roadmap Coordinating Committee NEMI Headquarters	**Oct . 30, 1997**
TC, Product Champions, Substrates, and Packaging Planning Meeting-NEMI Headquarters	Dec. 2, 1997
Individual TWGs meet and teleconference frequently	Jan.-Mar.,1998
TWG/Product Champion Dinner - Double Tree Hotel - Portland, OR	Mar. 18, 1998
External Kick Off Working Meeting - Double Tree Hotel - Portland, OR	**Mar. 19-20., 1998**
Individual TWGs meet and teleconference frequently	Mar.-Jul., 1998
TC and TWG Chair Mid-stream Review - Dallas Airport	May 14, 1998
National Roadmap Coordinating Committee - Dallas Airport	May 15, 1998
Optional TWG Meetings at Workshop Site - Chicago Area	Jun. 22, 1998
Roadmap Workshop - Chicago Arlington Park Hilton	**Jun. 23-24, 1998**
- Review TWG reports	
- Identify cross-TWG issues and linkages	
- Open to broad North American participation	
TC and TWG Chair Workshop review	Jun. 25, 1998
TC and TWG Chair Working Meeting at NEMI Headquarters	Aug. 26, 1998
Draft from TWGs due to NEMI Headquarters	Aug. 31, 1998
Presentation of Roadmap to NEMI Board and Council - Eastman Kodak, Rochester, NY	**Sep. 15-16, 1998**
Compiled Hard Copy given to TC and TWG Chairs	Sep. 17, 1998
Cross Cutting TWG Reports and Product Sector Reports due to NEMI	Oct. 9, 1998
Hard copy to TC and TWG Chairs	Oct. 16, 1998
TC and TWG Chairs Product Champion Parameter Resolution Working Meeting-Compaq, Houston	Oct. 22-23, 1998
Publication of NEMI Roadmap	**Dec. 1998**

Flip-Chip Technology Gap Analysis for Portable Electronic Products (Forecast of Technology Status in Absence of NEMI)

	1997	1999	2001	2003
I/O Patterning				
-- Peripheral	Green	Green	Green	
-- Redistribution	Yellow	Yellow	Yellow	
-- Area Array - Std^{n}	Red	Red	Red	Yellow
-- CAD Tools Comp. Lib.	Red	Red	Red	Yellow
Wafer/Chip Bumping				
-- Evaporation	Green	Green	Green	Green
-- Screening/Stencil	Yellow	Yellow	Yellow	Green
-- Plating	Yellow	Yellow	Yellow	Green
-- Adhesives	Yellow	Yellow	Yellow	Green
Materials				
-- RF Properties	Red	Red	Red	Yellow
-- Underfill snap cure	Red	Red	Yellow	
-- PWB Requirements 2, 2, 2, 4 mils L/S/V/pads	Red	Yellow	Yellow	Green
-- Pb Free (low)				
RF Flip Chip Simulation	Red	Red	Red	Yellow
Flip Chip Repair	Red	Red	Red	Yellow

Mfg. Technology Sufficient

Inadequate Mfg. Technology— More Dev. Needed

Critical Need for Manufacturing Research & Development

NEMI Manufacturing System Plan

Factory Information Systems

Modeling, Simulation, and Rapid Prototyping

I/O Patterning
Wafer/Chip Bumping
Die Testing
RF Flip-Chip Pkg..
Simulation
Underfill Mat l/Proc...

Semiconductor Devices

Flip-Chip (Bare Die)

RF Components

Passive Components

Optoelectronics

Mass Storage (Magnetic & Optical)

Displays

Energy Storage Systems

Test, Inspection & Measurement

Via Formation
Fine-Line Formation
Solder Application
Embedded Discretes
Laminates
Adhesives
Photo Tools-High Density
PWB Electrical Test

Micro Via

Board Assembly

Final Assembly

Customer

Solder Application
Solder Vol... Meas.
Chip Place Equip.
Board Test

DFAA
Low-Cost Motion Platform
Low-Cost Cell Control
Image Acquisition
Final Test

Environmental Technology

Supply Chain Management

NEMI Accomplishments

Roadmap the Needs of the North American Electronics Industry:

- 1996 Roadmap Big Success; Helping to "Set the Agenda".

Identify Gaps in the North American Infrastructure:

- Gap Analysis/5 Year Plans Completed (Based on '96 Roadmap).

Stimulate R&D Projects to fill these Gaps:

- Georgia Tech./Binghamton Aligning R&D to NEMI Roadmap.
- NCMS Using NEMI Roadmap for R&D Direction in Electronics.
- ATP Focus Programs on Interconnect and Energy Storage.
- Working with NCMS & ITRI to Develop ATP Proposals.

Conduct Implementation Projects to Eliminate these Gaps:

- Successful Projects in Flip Chip, Microvia, Board Assembly & Final Assembly Technology Implementation Groups (TIGs).

Stimulate Standards to speed the Introduction of New Technology:

- Collaboration of Standards (with IPC, EIA & IEEE) Active in Flip Chip, Board Assembly & Final Assembly TIGs.