

SETTING TECHNOLOGY DIRECTION

What Is the iNEMI Roadmap?

Every two years, the International Electronics Manufacturing Initiative (iNEMI) maps the future manufacturing technology needs of the global electronics industry. The purpose: to identify key technology and infrastructure developments required to ensure the competitiveness of the supply chain over the next decade.

The roadmap is the foundation of all iNEMI activities. It identifies major trends in the evolution of technology across numerous disciplines, with an emphasis on identifying potentially disruptive events (business and technology). It provides the information needed to identify critical technology and infrastructure gaps, prioritize R&D needs to meet those gaps, and initiate activities that address industry needs.

The roadmap's usefulness reaches far beyond iNEMI and our members. It is recognized as an important tool for defining the "state of the art" in the electronics industry as well as identifying emerging and disruptive technologies. It is used by industry, government funding agencies and university research programs to help prioritize R&D efforts for the greatest return on investment.

How Is It Produced?

iNEMI solicits input from industry experts representing all aspects of the global electronics manufacturing supply chain.

Efforts are organized into Product Emulator Groups (PEGs) and Technology Working Groups (TWGs). The PEGs, each chaired by a major OEM in the specific sector covered, define the future technology needs of "virtual products." The 2011 Roadmap will cover six areas: 1) aerospace/defense, 2) automotive, 3) consumer/portable, 4) medical 5) netcom (network,

2011 Roadmap Facts & Figures

Content:

1800 pages of information
27 chapters covering 6 product sectors and 21 technology areas

Contributors:

575 individuals
310 organizations
from 18 countries

datacom and telecom) and 6) office/large business systems (see Table 1). Each PEG chapter forecasts future product attributes, including cost and density drivers.

The TWGs identify trends for numerous technology and infrastructure areas (see Table 2), and contrast those trends with

anticipated product needs. Composed of experts from OEMs, EMS providers, suppliers, government agencies, universities and related consortia/trade associations, the TWGs predict the evolution of technology and/or business practices, identify gaps and "showstoppers" in existing technology and infrastructure, and develop recommendations for their respective areas.

What Areas Are Covered?

For each roadmapping cycle, iNEMI determines technology, infrastructure and business practice areas according to what is happening in industry and what changes are expected to have the greatest effect on electronics manufacturing.

In some cases, areas are influenced by other roadmaps, such as the International Technology Roadmap for Semiconductors (ITRS) or IPC's International Technology Roadmap for Electronic Interconnections. In others, we are requested to cover a specific topic by another organization or

Table 1. 2011 Product Emulator Groups (PEGs)

PRODUCT EMULATORS	CHARACTERISTICS
Aerospace / Defense	Products that must operate in extreme environments.
Automotive	Products that must operate in automotive (i.e., harsh) environments.
Consumer / Portable	High-volume consumer products for which cost is the primary driver, including hand-held, battery-powered products driven by size and weight reduction.
Medical	Products that must operate in highly reliable environments.
Netcom (Network / Datacom / Telecom)	Products that serve the networking, datacom and telecom markets and cover a wide range of cost and performance targets.
Office / Large Business Systems	Products that seek maximum performance, with cost as a secondary consideration.

The iNEMI, ITRS and IPC roadmaps use "product emulators" from similar sectors to forecast future product needs. PEGs are chaired by representatives from OEM companies.

a government group. In addition, iNEMI members, through our Technical Committee, help determine the technology and infrastructure issues on which the roadmap should focus.

This latest roadmap covers 21 technology and business process topics. New for 2011 is a combined chapter on MEMS (micro-electromechanical systems) and sensors. Sensors have been covered in previous roadmaps, and MEMS have been discussed in several chapters. However, this is the first time that MEMS will be discussed as a standalone topic. Also this cycle, we have expanded the Packaging TWG to Packaging & Component Substrates.

Table 2. 2011 Technology Working Groups (TWGs)

MANUFACTURING TECHNOLOGIES
Board Assembly Final Assembly Test, Inspection & Measurement
COMPONENT / SUBSYSTEM TECHNOLOGIES
Electronic Connectors Energy Storage & Conversion Systems Interconnect Substrates – Ceramic Interconnect PCB - Organic Large-Area Flexible Electronics Mass Data Storage MEMS / Sensors* Optoelectronics Packaging & Component Substrates Passive Components Photovoltaics RF Components & Subsystems Semiconductor Technology Solid State Illumination
BUSINESS PROCESSES / TECHNOLOGIES
Information Management
DESIGN TECHNOLOGIES
Environmentally Conscious Electronics Modeling, Simulation & Design Tools Thermal Management

* new in the 2011 Roadmap

Table 2. The 2011 iNEMI Roadmap covers 21 technology and business process areas, contrasting trends with anticipated product needs. TWGs are composed of experts from OEMs, EMS providers, suppliers, government agencies, universities and related consortia/trade associations.



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How Has the Process Evolved?

Since the first roadmap in 1994, iNEMI has enjoyed increasingly greater support and participation from industry. This effort involves a broad spectrum of organizations in the critical task of defining industry needs.

Earlier roadmaps dealt exclusively with technology needs and focused on issues of concern to North American-based companies. However, we recognize that good business practices can be as critical to companies as the technologies used in their products, and that most large companies are operating globally. We continue to expand the roadmap's focus to address business practices as well as technology needs, and to broaden our geographic focus for a more global view.

Since 2004, iNEMI has proactively recruited global participation in the roadmapping process. These efforts were broadened for the 2009 Roadmap with strengthened international workshops and alliances with other global electronics organizations.

Coordination with Other Industry Efforts

iNEMI coordinates with other roadmapping organizations to synchronize timelines, agree on and refine product sector definitions, identify common elements, facilitate cross-functional groups, and coordinate roadmapping schedules. Direct links with other roadmaps and other organizations include: ITRS (semiconductors), IPC (interconnection substrates), the Optoelectronics Industry Development Association (OIDA, optoelectronics and optical storage), the Information Storage Industry Consortium (INSIC, magnetic and optical storage), the Supply Chain Council (SCC, product lifecycle information management), the International Microelectronics and Packaging Society (IMAPS, ceramic substrates), the Surface Mount Technology Association (SMTA, board assembly), MEMS Industry Group (MIG, MEMS), and IEEE's Components, Packaging & Manufacturing Technology (CPMT) Society.

For Information

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