

# 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" from five areas: 1) automotive, 2) consumer/portable,

**2009 Roadmap Facts & Figures**

1400 pages of information organized in 25 chapters covering 5 product sectors and 20 technology areas

**Contributors:**

- > 550 individuals
- > 250 organizations from 18 countries on 4 continents

3) medical, 4) netcom (network, datacom and telecom) and 5) 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

Table 1. 2009 Product Emulator Groups (PEGs)

PRODUCT EMULATORS	CHARACTERISTICS
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.

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

New in the 2009 Roadmap are sections on solid state illumination, RFID item-level tag and photovoltaics. These topics have been added in response to increased industry interest in the opportunities and technology needs of these potential growth areas. This latest roadmap covers 20 technology and business process topics. Addressing the shifts in each of these areas, along with

**Table 2. 2009 Technology Working Groups (TWGs)**

MANUFACTURING TECHNOLOGIES
Board assembly Final assembly Test, inspection & measurement
COMPONENT / SUBSYSTEM TECHNOLOGIES
Electronic connectors Interconnect substrates – ceramic Interconnection PCB - organic Large-area flexible electronics Mass data storage Optoelectronics Packaging Passive components Photovoltaics* RF components & subsystems RFID item-level tag* Semiconductor technology Solid state illumination*
BUSINESS PROCESSES / TECHNOLOGIES
Information management
DESIGN TECHNOLOGIES
Environmentally conscious electronics Modeling, simulation & design tools Thermal management

\* new in the 2009 Roadmap

The 2009 iNEMI Roadmap covers 20 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.

the related technology gaps and business needs, benefits the entire electronics industry.

## 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), and IEEE's Components, Packaging & Manufacturing Technology (CPMT) Society.

## For Information

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