



iNEMI[®]

International Electronics Manufacturing Initiative

Industry Collaboration

*Benefits of iNEMI
Participation*

Advancing manufacturing technology

Topics Covered

- **iNEMI overview:**
 - Organization
 - Methodology
 - Global Focus
- **Deliverables:**
 - Roadmaps
 - Projects
 - Forums
 - Position Papers
- **Value of Membership**

The iNEMI Organization

- **A Not-for-profit, highly efficient R&D consortia**
 - **Funded by Corporate membership**
 - **Staffed currently with 7 employees worldwide**
 - **Led by an international board with management depth that represents a cross section of our industry**
- **Includes leading industry companies/organizations as members:**
 - **OEM, ODM, EMS, and supplier companies**
 - **Government labs**
 - **Academic institutions**
- **Implements a full global agenda that is manifested through proven collaboration methods that deliver lasting results:**
 - **Close challenging technical gaps in the manufacturing infrastructure**
 - **Deliver proactive engineering solutions on key environmental challenges**

iNEMI Key Deliverables

- 1. Technology roadmaps: Comprehensive industry, member, product, and technology forecast of 10-year needs.**
An unparalleled knowledge and information resource
- 2. Technology deployment projects: Timely, high impact projects to enable results that support members' businesses.**
- 3. Research priorities and programs that engage members.**
- 4. Proactive forums across the international landscape on key industry issues.**
- 5. Position papers to focus industry direction.**

Key Value Add from iNEMI Staff

- **Manage the iNEMI business – Set annual plan goals and deliverables that have the highest return for members and measure performance to these goals**
 - **Ensure growing business impact for the membership**
- **Lead and direct the technical plan – Charter, review progress, and resolve issues with the development and research project teams.**
- **Direct the biennial development of the iNEMI roadmap – orchestrate the work of 550 plus participants into one well written roadmap document.**
- **Provide the methodologies and systems support for consistent quality project management.**
- **Keep the membership continually updated on iNEMI programs, projects and key events.**
- **Synchronize INEMI directions and deliverables with partner consortia and organizations.**
- **Utilize key marketing and press publications that secure positive visibility and impact of iNEMI membership accomplishments.**

OEM/ODM/EMS Members



Alcatel-Lucent

Boston
Scientific

Delivering what's next.™



DELPHI



Celestica™



Absolutely, Positively, Perfect and On-Time™



FOXCONN® FLEXTRONICS



HUAWEI



MICRO SYSTEMS
ENGINEERING

i n v e n t



QUANTA
COMPUTER



SANMINA-SCI



Current Supplier Members



Electronic Materials



Association/Consortium, Government, Consultant & University Members



ITIC



Information Technology Industry Council

pinfa



ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES®



ITRI
Industrial Technology
Research Institute



NIST

National Institute of Standards and Technology



INEMI Mission: Forecast and accelerate improvements in the Electronics Manufacturing Industry for a sustainable future.

We Accomplish This By:

- Being the recognized leader at projecting future manufacturing technology needs and closing gaps for the global supply chain.
- Effectively guiding and leveraging the strength of the consortium's industry leading international membership.
- Driving high impact collaborative R&D Results through constantly improving methodologies.
- Becoming "the" recognized forum for addressing environmental gaps and setting the manufacturing electronics industry direction.
- Defining and implementing science based sustainable solutions in high impact areas including the environment and health care.
- Proactively leverage and gain impact from key government agencies and labs.

Leadership through Innovative Projects

- A proven approach for identifying the technology needs and gaps of the industry through our roadmapping process
- A set of research priorities with four major focuses:
 - Energy
 - Environment
 - Medical Electronics
 - Miniaturization
- A strong track record of developing supply chains to introduce new materials, processes, and technologies into production. Examples:
 - HDI (high density interconnect)
 - Pb-Free
 - BFR-Free
- iNEMI has projects organized by 7 Technology Integration Groups (TIGs)
 - Currently 20+ projects that address technology gaps
 - Addressing member technical and infrastructure needs

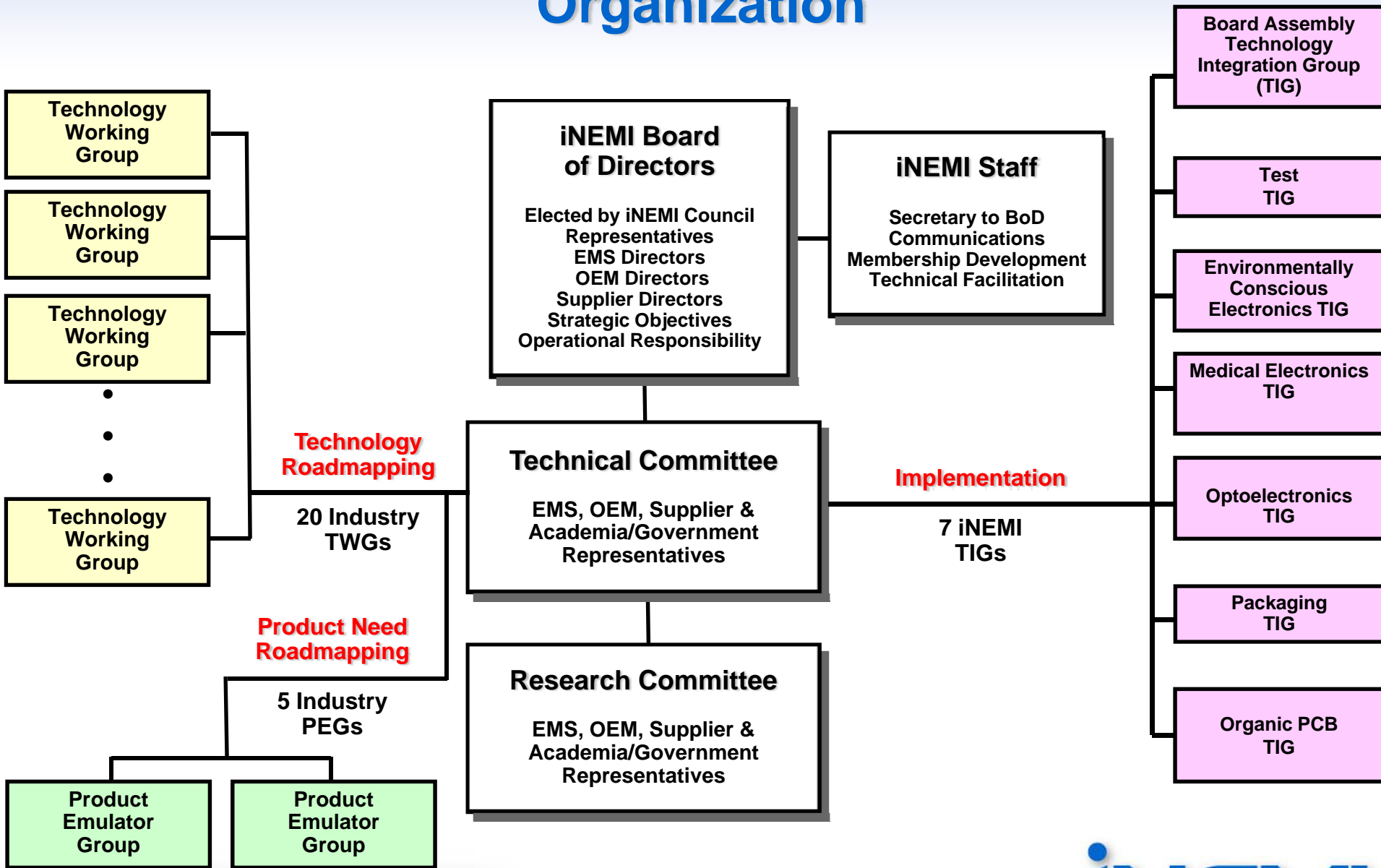


Protection of Intellectual Property

- **iNEMI has a well proven framework for collaboration:**
 - **Organization by-laws**
 - **Intellectual Property Policy**
 - **Project Participation Agreement**
- **These documents – agreed to by all members, set the rules for engagement:**
 - **Handling of proprietary information**
 - **Agreement on information sharing**
 - **Within project and within iNEMI members**
 - **External to project and iNEMI**
- **In addition, projects are designed to keep competitor information restricted. Confidentiality is maintained when required.**



Organization





inEMI[®]

International Electronics Manufacturing Initiative

Deliverables

Advancing manufacturing technology

Highlights of 2009 Results

- **2009 Roadmap released to public.**
- **Technical Plan completed & published to members.**
- **Research Priorities Document completed & published.**
- **3 Forums organized:**
 - **Environmental Leadership Forum (USA)**
 - **Global ICT Environmental Initiatives (Belgium)**
 - **Packaging Substrates Workshop (Japan)**
- **Technology projects**
 - **15 existing & 7 new members joined HFR-Free Leadership Program**
 - **26 Initiatives or Projects on Books**
 - **Completed 5 Projects**
 - **Many additional projects on packaging & sustainability in development**
- **Position Paper**
 - **“Low Halogen” (“BFR/CFR/PVC-Free”) position Statement**

Projects Launched in 2009

- **HFR-Free Leadership Program**
 - **HFR-Free PCB Materials**
 - **HFR-Free Signal Integrity**
- **Characterization of Pb-Free Alloy Alternatives**
- **Eco-Impact Evaluator for ICT Equipment**
- **Surface Mount Assembly & Rework – Reliability**
- **Creep Corrosion**
- **Build in Self Test (BIST)**
- **PVC Alternatives**



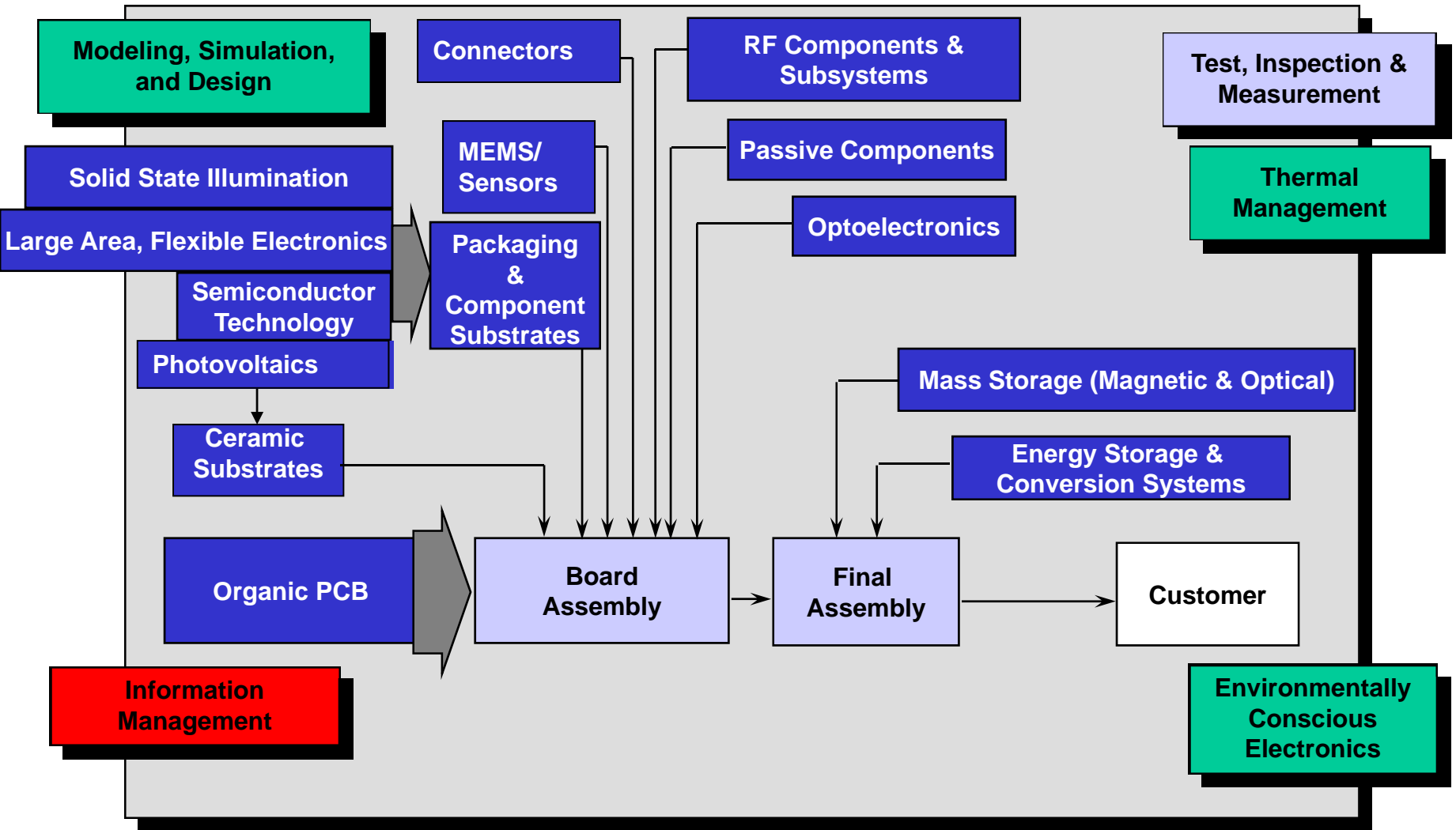
inEMI[®]

International Electronics Manufacturing Initiative

Roadmaps

Advancing manufacturing technology

2011 Technology Working Groups (TWGs)

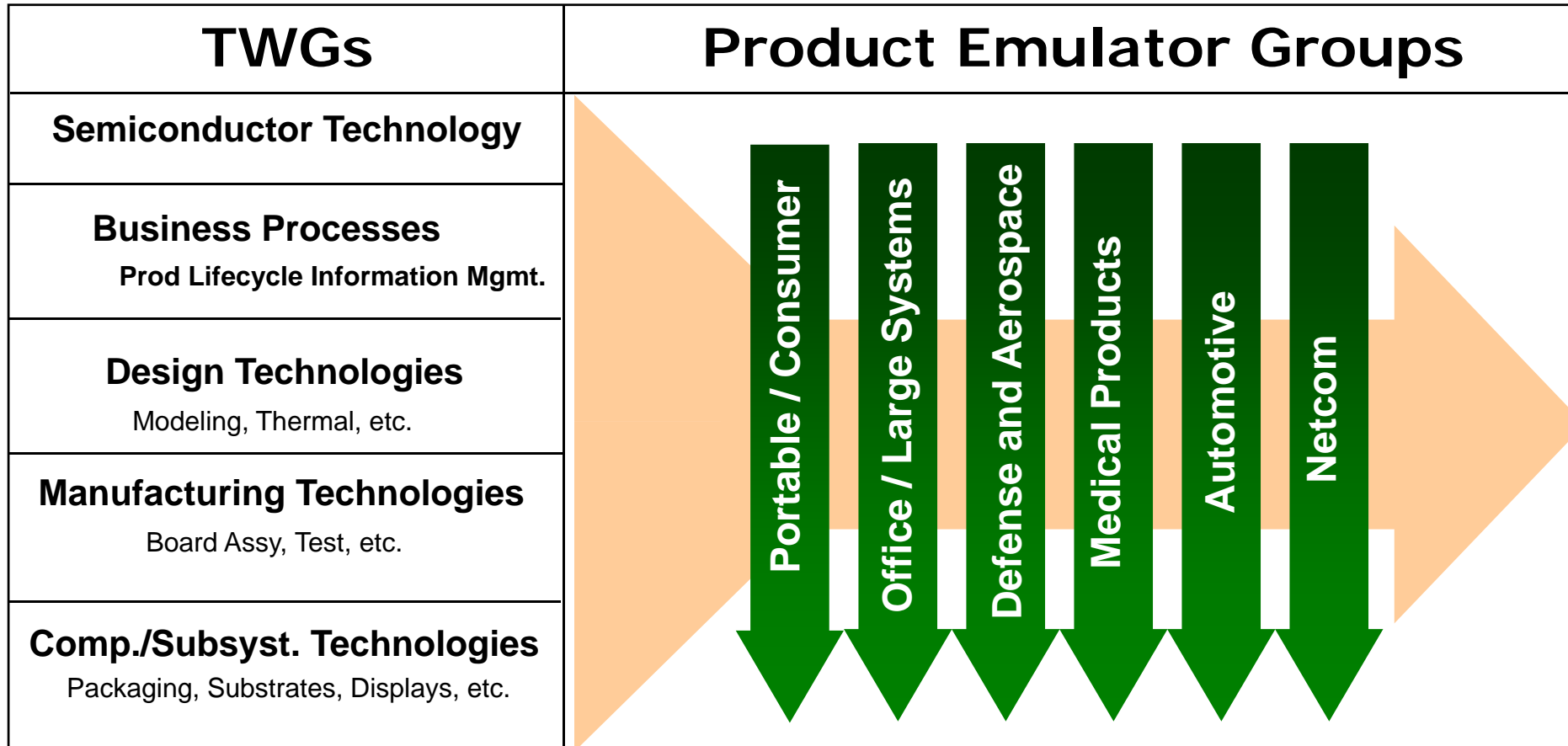


Red=Business Green=Engineering Blue=Manufacturing Blue=Component & Subsystem



Roadmap Development

Product Sector Needs Vs. Technology Evolution



Statistics & Results for the 2009 iNEMI Roadmap

- **> 550 participants**
- **> 250 companies/organizations**
- **18 countries from 4 continents**
- **First time technology roadmaps for:**
 - **Solid State Illumination**
 - **Photovoltaic's**
 - **RFID Item-Level Tag**
- **Established the complete Technology Roadmaps for the Mfg Electronics Industry for 2009-2019**
 - **Over 1400 pages of information and hard data**
 - **Touches all portions of the supply chain**
 - **Process ensures industry view – not company specific**

2010 iNEMI Roadmap Workshops

2011 iNEMI Roadmap - North American Workshop

Tuesday, June 1, 2010

8:00 a.m. - 5:30 p.m. Local Time

Room TBD

ECTC / Paris Las Vegas

Las Vegas, Nevada

REGISTRATION DEADLINE: May 21, 2010 (earlier if meeting reaches capacity)

2011 iNEMI Roadmap - Asia Workshop

Tuesday, June 8, 2010

09:00—17:00

Dayuan, Taoyuan, Taiwan

Hosted by: Taiwan Printed Circuit Association (TPCA)

Co-sponsors: Taiwan Semiconductor Industry Association (TSIA), Advanced Microsystems and Package Technology Alliance (AMPA) and Surface Mount Technology Association (SMTA) Taiwan

Register by May 11 for discounted rate

2011 iNEMI Roadmap - European Workshop

Wednesday, 16 June, 2010

09:00-16:30

IMEC Headquarters

Leuven, Belgium

REGISTRATION DEADLINE: June 12 (earlier if meeting reaches capacity)

To register, go to: www.inemi.org





inEMI[®]

International Electronics Manufacturing Initiative

Projects

Advancing manufacturing technology

Profile of Successful Projects

The “sweet spot” of iNEMI projects

- **Address knowledge gap(s) of industry**
 - Common problem
 - Best solved by working together
 - Timed success that aligns to business needs.
- **Requires teamwork across multiple levels of the supply chain**
 - Ensures efficient alignment of goals and investments of the varied team players.
 - Supports the company’s commercial interests.
- **Delivers a coordinated industry wide response and capability set**
 - OEMs
 - ODM/EMS providers
 - Materials, equipment, software, and/or component suppliers
- **Often supports a big social need – e.g. environmental, energy, medical.**



Environmentally Conscious Electronics TIG

- **Current Projects and Initiatives**
 - Pb-Free Rework Optimization
 - Pb-Free Wave Soldering
 - PVC Alternative Initiative
 - Eco-Impact Evaluator for ICT Equipment Initiative
 - HFR*-Free Leadership Program
 - HFR-Free PCB Materials
 - HFR-Free Signal Integrity
 - HFR-Free High-Reliability PCB
 - **All require detailed cooperative resource commitments**
 - Results will align closely to member needs and global regulatory requirements.
 - Financial Value – TBD but a must to compete (BIG!!)
 - Societal impact – TBD but BIG!! - Reduce carbon footprints; reduce hazardous material impacts.
- *Halogenated Flame Retardant

Environmentally Conscious Electronics TIG

Specific Results and Benefits Include:

- **iNEMI efforts from 1998-present accelerated convergence of Pb-free to SAC alloys**
 - **iNEMI members were better prepared for introduction (ahead of non-members) and shared the cost for this market advantage.**
 - **Methodologies developed & deployed to reduce tin whisker risk.**
 - **Robust Pb-free rework processes developed.**
 - **Estimated Resource investments of 100 man years across 25 companies (Average 4 man years/company) over 8 years; plus an estimated \$1M US spent on materials and testing.**
 - **Savings/year average of around 1.2 man years per company per year plus \$40,000 in materials and testing.**
 - **The money saved on Pb-free alone overwhelms the cost of iNEMI membership.**
 - **Plus the Pb-free reliability is scientifically understood.**
- **The (leveraged) investments and challenges in HFR-Free work is expected to match or exceed those of Pb-free.**
- **Additional Pb Free efforts are currently being worked under iNEMI projects.**
- **There is no where else that your company can tap into this breadth and depth of shared science expertise.**
 - **And the quality of Senior Technologists and Engineering People that participate in iNEMI efforts is just remarkable**



The 25 International Companies That Participated in Pb-Free

OEMs/EMS

Alcatel
Celestica
Cisco
Dell
Delphi
Hewlett-Packard
IBM
Intel
Jabil
Kodak
Lace Technologies
Lucent
Motorola
Nortel Networks
Plexus
Sanmina-SCI
Solectron
StorageTek

Material Suppliers

Alpha Metals
Cookson
Heraeus
Indium
Kester
Shipley
Nihon Superior

Components

AMD
ChipPAC
FCI Electronics
Intel
Motorola
Texas Instruments

Govt. & Other

CMAP
IPC
NIST
SUNY-B/IEEC

Equipment

Agilent
BTU
Universal
Vitronics-Soltec

**A Proven Model for Complex
Collaborative Development**





INEMI[®]

International Electronics Manufacturing Initiative

Forums

Advancing manufacturing technology

2009 Forums

Environmental Leadership Forum

October 8, 2009 (at SMTAI, San Diego, California)

Speakers from industry, academia and other organizations will present the current landscape and identify new collaborative efforts.

Global ICT Environmental Initiatives

A Symposium Sponsored by Intel and iNEMI

October 27-28, 2009 (Brussels, Belgium)

Address ongoing issues related to “low-halogen” electronics, as defined by the elimination of brominated flame retardants (BFRs), chlorinated flame retardants (CFRs) and PVC from electronic products.

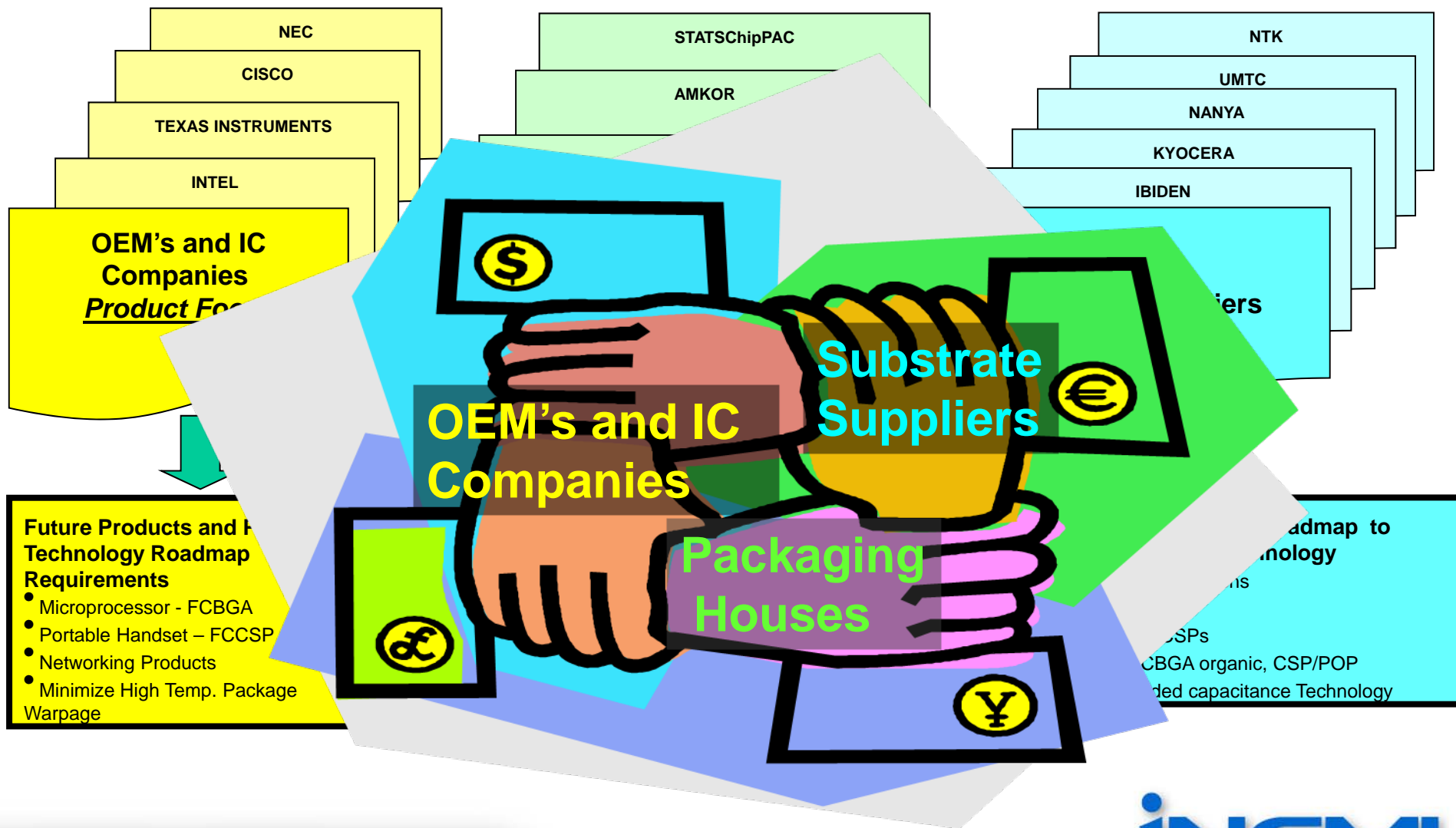
Packaging Substrates Workshop

November 17-18, 2009 (Lucent Tower, Nagoya, Japan)

Identify gaps in organic substrate technology that need to be addressed to facilitate the continued miniaturization of electronics packaging.



Packaging Workshop - 57 People from 31 Firms



Identified Initiatives: Packaging Workshop

- **Warpage**
 - **Identify primary factors of warpage**
 - **Qualification Criteria including Substrates, Package, and Board Level**
- **Miniaturization**
 - **Wiring Density Program**
- **Holistic Approach to Packaging**
 - **Develop Holistic Modeling Process**
 - **Optimizing time to yield covering design, materials, packaging**
 - **Reliability Methodology for Substrates**



inEMI[®]

International Electronics Manufacturing Initiative

Position Papers

Advancing manufacturing technology

Position Papers - Examples

- **NEMI Members Release Position Statement on the Definition of “Low Halogen” for Electronic Products**
Statement defines BFR/CFR/PVC-Free
- **iNEMI High-Reliability Group Makes Recommendations for Pb-Free Manufacturing Requirements**
Group Addresses Primary Areas of Concern for Complex, Thermally Challenging Electronic Assemblies
- **Tin Whisker User Group Publishes Updated Set of Recommendations to Help Reduce Risk of Tin Whiskers**
Latest publication includes new guidelines, revised recommendations and expanded discussion of key issues
- **iNEMI Members Want Unique Part Numbers for RoHS-Compliant Components**
iNEMI announced that the majority of its OEM and EMS members strongly support the use of unique part numbers for RoHS-compliant components.

Example of Impact:

The last example took 70 man hours of effort from 14 members (5 hours/member company) and resulted in industry acceptance within two weeks.



INEMI[®]

International Electronics Manufacturing Initiative

Value of Membership A Summary

Advancing manufacturing technology

Value Proposition

- **iNEMI offers the opportunity to collaborate with the entire supply chain in an efficient manner – across the Globe!**
 - To understand and accelerate strategic directions
 - To define future needs and opportunities
 - To jointly create industry standard technology solutions
- **Today's increasingly distributed supply chain makes this more important than ever**
- **iNEMI is a low OH, member driven organization that adapts to industry changes quickly and provides timely leadership**
- **iNEMI provides five important *cost saving/risk reduction* deliverables:**
 1. Technology roadmaps
 2. Technology deployment projects
 3. Research priorities
 4. Forums on key industry issues
 5. Position papers to focus industry direction



Annual Participation Fees

Participating Members		(For Profit)
Corporate Sales (USD)	Membership Dues	
\$0-5M	\$5,000	
\$5-10M	\$10,000	
\$10-100M	\$15,000	
\$100M-1B	\$25,000	
\$1-10B	\$40,000	
\$10-15B	\$55,000	
\$15B+	\$75,000	
Affiliate Members		(Not-For-Profit)
Category	Membership Dues	
University	\$5,000	
Org./Gov. Lab/R&D Center	\$10,000	

Cost Effectiveness of Membership

- **Leverage resources – Typical company benefits are 8X to 20x on key projects for fast ROI and outcomes:**
 - Reduce resource demands and \$ investments for your company
 - Accelerate results
 - Have the technology ready when your business requires it
- **Reduce risk of technology introduction:**
 - Leverage/Share costly reliability studies
 - Align and prepare source of supply
- **Collaborate with key customers and suppliers**
- **Influence innovation and direction of technology**
- **Become recognized as an industry leader**

www.inemi.org

Email contacts:

Bill Bader

bill.bader@inemi.org

Bob Pfahl

bob.pfahl@inemi.org

Grace O'Malley - Europe

gomalley@inemi.org

Haley Fu - Asia

haley.fu@inemi.org



INEMI[®]

Advancing manufacturing technology

Advancing manufacturing technology



INEMI[®]