

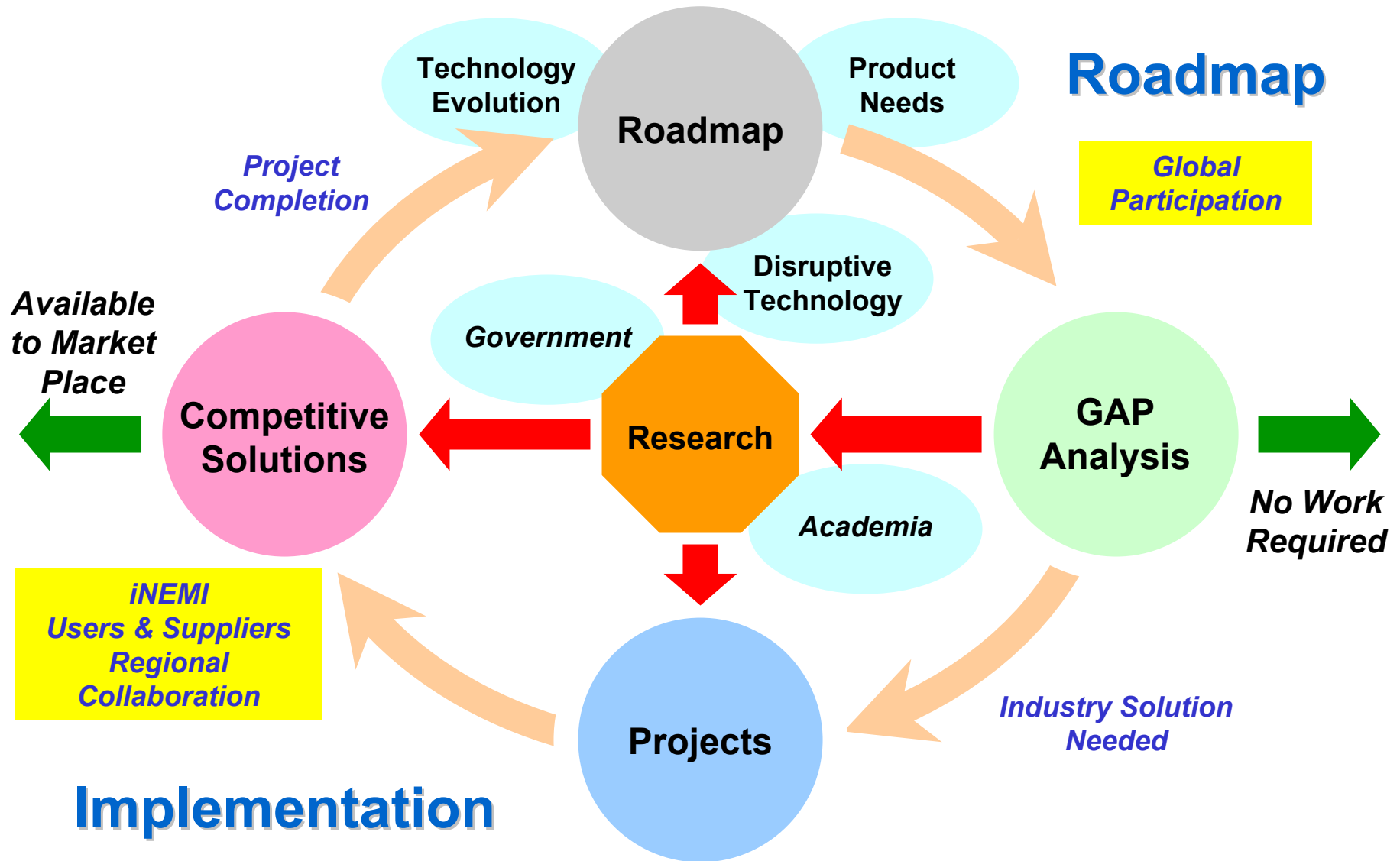


International Electronics Manufacturing Initiative

***iNEMI 2007 Roadmap
Overview***



***Chuck Richardson
iNEMI Staff Manager, Roadmapping
Productronica, November 16, 2005***



- iNEMI Roadmap is **customer need driven**, not technology driven.
- OEM driven Product Emulator Groups (PEGs) start roadmapping process by presenting what they need to remain competitive in the world market.
- Focus of Roadmaps is on process and technology rather than end products.
- Technology Working Groups (TWGs) respond and identify gaps and showstoppers. They do not provide solutions.
- iNEMI Technical Committee prioritizes gaps and forms Technology Integration Groups (TIGs) to close them.

- **> 470 Participants**
- **> 220 Companies/organizations**
- **11 Countries from 3 Continents**
- **19 Technology Working Groups (TWGs) (added Sensors)**
- **7 Product Emulator Groups (PEGs)**
- **Over 1200 Pages of Information**
- **Roadmaps the needs for 2005-2015**



International Electronics Manufacturing Initiative

Major Trends From 2004 Roadmap

- **Environmental considerations will expand**
 - RoHS/WEEE is the beginning
 - Significant impact to supply chain/information needs
 - Design for Environment/Sustainability
 - Defensive posture has reduced industry's influence on regulations
- **Manufacturing migration to low cost regions continues**
 - Some corrections seen due to security/logistics costs
 - Commodity design is following
- **SiP is a major trend in portable products**
 - Infrastructure issues need attention
 - Could find use in other sectors where mixed IC technologies are used
- **Lack of integrated design/simulation tools is:**
 - Delaying new technology adoption
 - Impacting product time to market

- **The predicted end of semiconductor scaling could have major implications:**
 - **Non classical CMOS**
 - **Beyond CMOS**
 - **Increased thermal challenges**
 - **Significant impact to packaging/interconnect**
- **Nanotechnology has the potential to dramatically effect electronics:**
 - **Materials**
 - **Displays**
 - **Sensors**
 - **Power**



Nano Composites: stronger, tougher, stiffer, lighter materials (adhesives, structural, thermal, electronic, optical functionality)

Nano displays: Large, lower cost and brighter displays based on embedded carbon nanotubes

Nano sensors: smaller, more sensitive Nano scale sensors for bio, optical, chemical and physical sensing

Nano antennas: Nano scale fractal antennas for multiple spectra and broadband

Nano power: High capacity power sources (storage, conversion, advanced fuel cells, photonic energy), parasitic energy harvesting, nanobiotech related functionality

- **2007 Roadmap cycle began at SMTAI.**
 - **Product Emulator Group's (PEG's) will start process by reviewing emulators.**
 - **Meeting held on September 30, 2005**
- **European Kick-off meeting at Productronica.**
- **Next event will be held in conjunction with APEX conference Next February.**
- **Asian workshops likely in Japan & China (Q2 '06).**
- **We welcome participation by Industry**
 - **Contribution of content experts**
 - **Better understanding of Industry direction/challenges**

- **Change Name to Better Reflect Year of Public Release (from 2006 Roadmap to 2007 Roadmap).**
- **Maintain strong linkages with other roadmaps.**
- **Begin European / Asian roadmap meetings.**
- **Maintain emphasis on disruptive events (business & technical).**
- **Maintain emphasis on identifying market needs and business situations.**
- **Increase quantification of needs.**
- **Prioritize Research and Deployment needs.**
- **Increase strategic vision of the roadmap: 2011-2017**

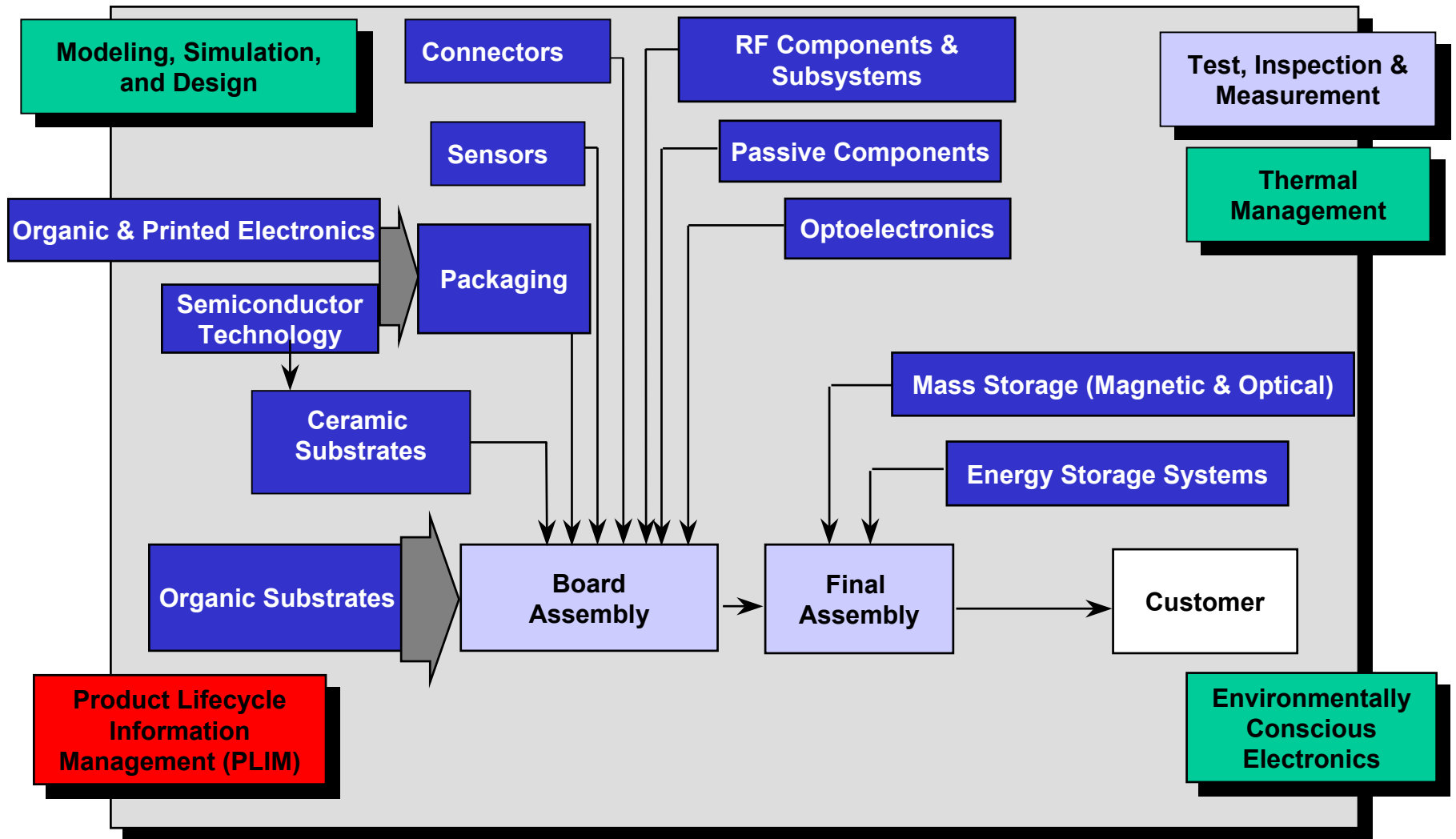
Emulators	Characteristics
Portable / Consumer	High volume Consumer Products for which cost is the primary driver including Hand held, battery-powered products driven by size and weight reduction
Office Systems / Large Business Systems	Products which seek maximum performance from a few thousand dollar cost limit to literally no cost limit
Network / Datacom / Telecom Products	Products that serve the networking, datacom and telecom markets and cover a wide range of cost and performance targets
Medical Products	Products which must operate within a highly reliable environment
Automotive	Products which must operate in an automotive environment
Defense and Aerospace	Products which must operate in extreme environments

Yellow = New Emulator for '04

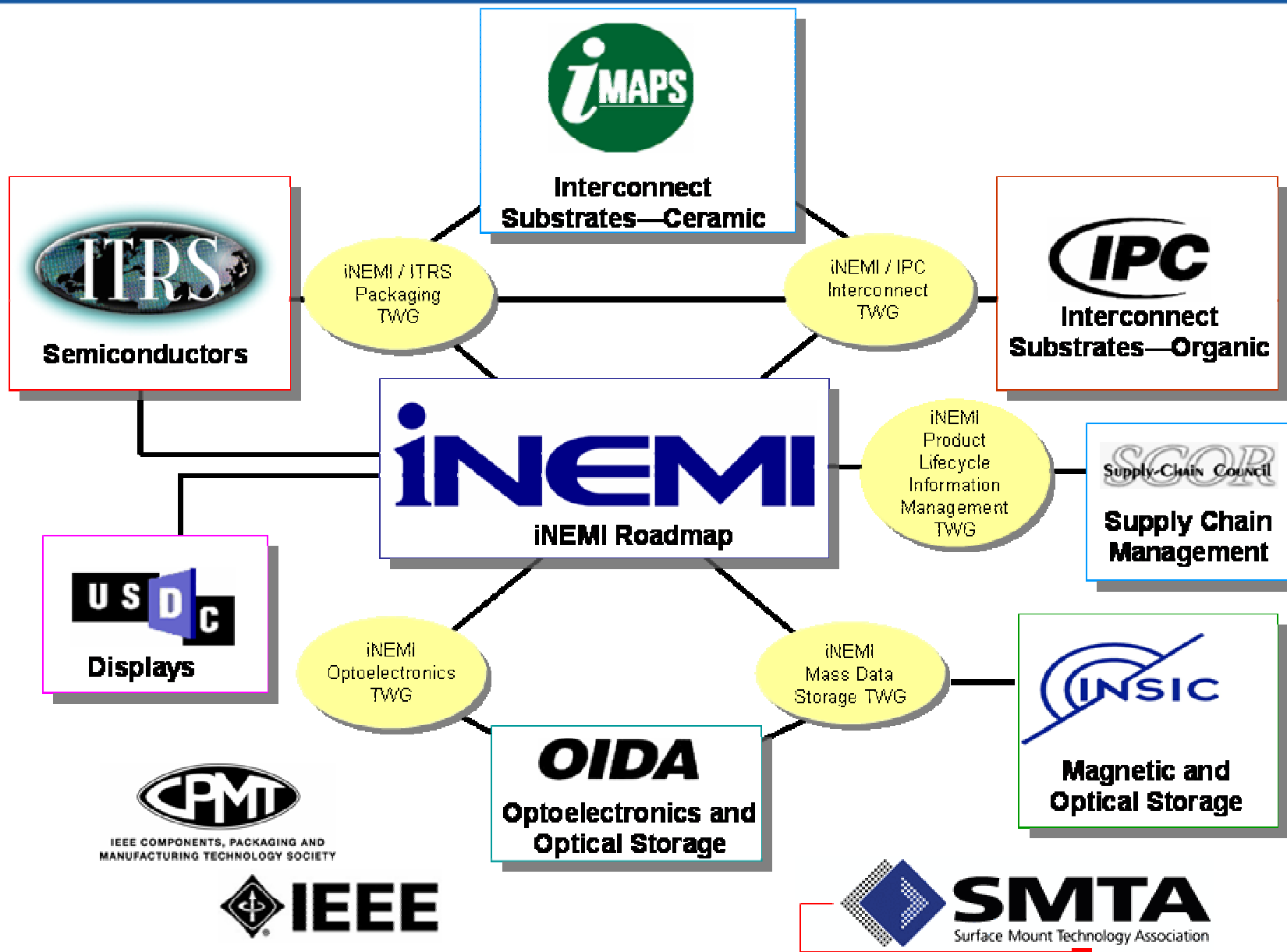
Green = Broadened focus for '04



Microsoft Excel
Worksheet



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



Product Emulator	Chair(s) 2004	Chair(s) 2006
Automotive Products	Jim Spall, Delphi	Jim Spall*
Aerospace/Defense Products	William E. Murphy, Lockheed Martin	William E. Murphy*
Medical Products	Terry Dishongh, Intel	Anthony Primavera, Guidant Terry Dishongh, Intel
Consumer / Portable Products	Gerry Bird, 3M	Susan Noe, 3M*
Office/Large Business System Products	Tom Pearson, Intel George Katopis, IBM Erich Klink, IBM	Erich Klink, IBM Europe Tom Pearson, Intel
Network, Data, Telecom	Mike Schabel, Lucent	Need Replacement*

Need Co-Chair*

Business Processes / Technologies	Chair(s)	Co-Chair(s)
Product Lifecycle Information Mgmt.	Eric Simmon, NIST	
Design Technologies		
Modeling, Simulation & Design	Sanjeev Sath, SAE	S.B. Park, Binghamton U.
Environmentally Conscious Electronics	Mark Newton, Dell	Joe Johnson, Cisco
Thermal Management	Tom Roth, Cam Murray, 3M	
Manufacturing Technologies		
Board Assembly	Dongkai Shangguan, Flextronics	Kim Hyland, Solectron
Final Assembly	Mike Reagin, Delphi	Reijo Tuokko, Tampere U.
Test, Inspection & Measurement	Michael J. Smith, Teradyne	Stig Oresjo, Agilent

Component / Subsystem Technologies	Chair(s)	Co-Chair(s)
Semiconductor Technology	Paolo Gargini, Intel	Alan K. Allan, Intel
Optoelectronics	Need OEM	Laura Turbini, CMAP
Passive Components	Philip Lessner, Kemet	Joseph Dougherty, PSU
Packaging	Joseph Adam, Skyworks Solutions	Bill Bottoms, NanoNexus
Connectors	John MacWilliams, Consultant	
RF Components & Subsystems	Eric Strid, Cascade Microtech	J. Stevenson Kenney, GIT John Barr, Agilent
Sensors	Mike Azarian, U. Maryland	Gans Ganesan, U. Maryland
Energy Storage Systems	Dan Doughty, Sandia Labs	
Interconnect Substrates (Ceramic)	Howard Imhof, Metalor	Ton Schless, Midas Vision
Interconnect Substrates (Organic)	John T. Fisher, Consultant	Dieter Bergman, IPC
Mass Data Storage	Tom Coughlin, Coughlin Associates	Roger F. Hoyt, Retired
Organic & Printed Electronics	Dan Gamota, Motorola	

- **3Q2005: Select Product Sector Champions, teams and refine data charts**
- **3/4Q05: Product Sector Champions Develop Emulators**
 - **September 6, 2005 – Teleconference with P.E. Group Chairs**
 - **September 30, 2005 Roadmap Kick-off with PEG/TWG/TC at SMTAI**
 - **November 16, 2005 European Kick-off at Productronica**
 - **December 2005 review meeting with TC on PEG Emulators**
- **2004 chapter, format, Exec. Summary mailed to each TWG chair (Word 6.0) 1/4/2006**
- **Organizing Teleconference with TWG Chairs 1/11/2006: (offer APEX TWG meetings)**
- **February 6-7, 2006 PEG Workshop/TWG Kick-off at APEX Meeting in Anaheim:**
 - **Product Sector Tables Complete – Chapters Written**
 - **Cross cut issues addressed**
- **April, 2006 Roadmap Workshop - Japan**
- **May 15, 2006 Telecon With TWG Chairs**

- **May 24, 2006 – Open Roadmap Presentation in Herndon, VA**
- **May 25, 2006 – TC Meeting in Herndon**
- **May 25, 2006 – TWG/PEG Cross Cut Meeting, Herndon**
- **June, 2006 - Roadmap Workshop Europe**
- **July 1, 2006 – TWG Drafts Due for TC Review**
- **August 9, 2006 – TC Face-to-Face Review with TWG Chairs in Buffalo**
- **September, 2006 – Council Review of Key Issues and Preliminary Summary @ SMTAI, Final Roadmap Chapters Due 9/22/06**
- **October 31, 2006 – Edit, Prepare App. A-D, Exec. Summary**
- **November 20, 2006 – Go To “Press”**
- **December 4, 2006 – Ship to Members**
- **Feb, 2007 – Industry Release at APEX**

- **Excellent opportunity to “test the iNEMI collaboration waters” without committing to membership.**
- **The experience leads to a better understanding of the “state of the art” in those areas of participation.**
- **Early access to the roadmap chapter’s technical and business information for the participating company.**
- **Opportunity to shape the industry’s future priorities concerning R&D.**
- **Opportunity to impact iNEMI’s future direction through “technology gap” identification and solutions most important to your company.**

- **Those who participate in the Roadmap creation get a broad view of the supply chain landscape from customers, competitors, and suppliers.**
- **Roadmaps can become “self fulfilling prophecies” as many within Industry focus on the identified challenges and benchmark their company against the user needs.**
- **As General Dwight D. Eisenhower was fond of saying, “It’s not the Plan (that is created) but the Planning (process) that provides maximum insight”.**

- **iNEMI roadmaps/gap analyses help set the agenda for electronics industry.**
- **iNEMI is providing the Leadership required to work emerging technologies/opportunities.**
- **iNEMI is Leveraging R&D investments (academia & government) to address industry's agenda.**
- **Projects lead to improved deployment (faster, better, lower cost) created across supply chain.**
- **Standards efforts (with IPC, EIA, IEEE, and RosettaNet) are encouraging broad utilization of emerging technologies/solutions.**

www.inemi.org

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