



**inEMI**<sup>®</sup>

International Electronics Manufacturing Initiative

# 2009 Technology Plan Gap Meetings - Introduction

*March, April , 2009  
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Advancing manufacturing technology

# 2009 Technical Plan Schedule

- **TIG Chairs to Hold Gap Analysis Meetings at APEX / OFC**
- **TIG Chairs Hold Gap Analysis Meetings as Follows:**
  - **iNEMI Optoelectronics TIG Meeting @ OFC/NFOEC 3/23/09**
  - **iNEMI Board & System Mfg. Test TIG Meeting @ APEX 3/31/09**
  - **iNEMI Board Assembly TIG Meeting @ APEX 4/1/09**
  - **iNEMI Environmental TIG Meeting @ APEX 4/1/09**
  - **iNEMI Organic PCB TIG Meeting @ APEX 4/1/09**
  - **iNEMI Organic Packaging Substrates TIG Meeting @ APEX 4/1/09**
  - **iNEMI Medical TIG Meeting @ APEX 4/1/09**
- **TIG Chairs / TC Discuss Gaps / Technical Plan Status at APEX 4/3/09**
- **Technical Plan Drafts from TIGs due 5/15/09**
- **T.C. Face to Face on Technical Plan at ECTC 5/30/09**
- **Final Technical Plans Due to Chuck 7/15/09**
- **Release 2009 Technical Plan to Members 8/15/09**

# Technical Plan Template

## CONCEPT

- **2009 Roadmap is the Strategy Document**
- **GAP Analysis is foundation for Technical Plan**
- **Technical Plan = Implementation Plan**

# Technical Plan Template

- **Outline for each TIGs Technical Plan input**
  - **Introduction**
  - **Gap Analysis and Five-year plan**
  - **What has changed**
  - **TIG Plan**
    - **Projects/programs to focus on short term -prioritize**
    - **Identify areas where research is needed -prioritize**
  - **Summary**

# Introduction

- **Scope:** Defines TIG responsibility
- **Background:** This is a brief set of statements on what this TIG's technical plan contains, how it was developed, and any other pertinent information.

# Five-year Plan

- The 5-year plan chart (See example next chart) is the heart of the Technical Plan. It is a visualization of all steps in the Manufacturing Process covered by the TIG indicating by what year the technologies need to be deployed to realize the product sector requirements per the 2009 technology roadmap.
- The year increments to cover for the 2009 technical plan are: **2009** (as a basis use the 2009 roadmap plus any known changes since then), **2011, 2013, 2015**.

# Test 5 year plan

## Drivers

- Limited board test access
- Cost reductions
- Process optimization
- Test time reduction
- Outsourcing
- Environmental Requirements
- Time to Market

### Attributes

Min Test Pad Size (mils) - 20  
 Via / Pad Size (mils) – 24/10  
 BGA pitch – .4mm /.7mm  
 LF Substrate Materials  
 LF Board Finishes  
 Board node count – <15k  
 New LF solder alloys –  
 I/O Signal speeds – 10Ghz  
 High Density Interconnect (HDI)  
 Fault Coverage  
 Evolving fault spectrum  
 Bonding and Underfill of BGAs

### Attributes

Min Test Pad Size (mils) - 20  
 Probeable Micro Via / Pad Size (mils) – 11/5 (HDI)  
 BGA pitch – .4mm /.6mm  
 LF Substrate Materials  
 LF Board Finishes  
 Nodes – >15k  
 New LF solder alloys –  
 I/O Signal speeds > 20 Ghz  
 High Density Interconnect  
 Evolving fault spectrum

### Attributes

Min Test Pad Size (mils) –18  
 Micro Via / Pad Size (mils) – 12/5 (HDI)  
 BGA pitch – .3mm /.5mm  
 LF Substrate Materials  
 LF Board Finishes  
 Nodes – >15K  
 New LF solder alloys -  
 I/O Signal speeds >30 Ghz  
 High Density Interconnect  
 Evolving fault spectrum

### Attributes

Min Test Pad Size (mils) - 18  
 Micro Via / Pad Size (mils) – 12/5 HDI  
 BGA pitch – .3mm /.5mm  
 LF Substrate Materials  
 LF Board Finishes  
 Nodes – >15K  
 New LF solder alloys -  
 I/O Signal speeds >100 Ghz  
 High Density Interconnect  
 Evolving fault spectrum

### Deployed Technology

Repeatable LF processes  
 Bead Probe  
 Adv. ICT  
 Adv. Boundary Scan & BIST

### Deployed Technology

Bead Probe  
 Adv. Test Solutions  
 Adv. Boundary Scan & BIST  
 Common Diagnostics Model  
 Adv. Functional Test Solutions  
 Fault Coverage Metrology

### Deployed Technology

Adv. Test Solutions  
 Adv. Structural Test  
 Adv. BIST  
 Virtual Access  
 Common Diagnostics Model  
 Adv. Functional Test Solutions

### Deployed Technology

Adv. Test Solutions  
 Adv. Structural Test  
 Adv. BIST  
 Virtual Access  
 Common Diagnostics Model  
 Adv. Functional Test Solutions

### Research /Development

Bead Probe  
 Board Flex impact due to Pb-Free  
 Board Flex standard  
 Design for Test  
 Fault Coverage Metrology

### Research /Development

Bead Probe  
 Board Flex impact due to Pb-Free  
 Board Flex standard  
 Design for Test  
 Adv. Test Solutions (HDI)

### Research /Development

Adv. Test Solutions  
 Design for Test  
 New test techniques

### Research /Development

Adv. Test Solutions  
 Design for Test  
 New test techniques

2007

2009

2011

2013

# Gap Analysis Charts

- The year increments to cover for the 2009 gap analysis charts are also: **2009** (as a basis use the 2009 roadmap plus any known changes since then), **2011, 2013, 2015**.
- The GAP analysis chart (red, yellow, and green bar charts) is a forecast of technology status in the absence of iNEMI efforts. (Example follows for previous cycle)
- iNEMI projects should concentrate on the red and yellow areas where iNEMI effort is needed to develop the technology and/or bring it in earlier.
- This is the heart of the technical plan. The use of visuals (bar charts, time lines, color codes) convey a quick reference for the targeted audience.

# Test Gap Analysis

## Board

- Decreased Test Access-----
- Board Flex Standards-----
- Lack of Coverage Assessment Methods-----
- High speed signals (interposers) -----
- Lack of test solutions for HDI -----
- Design for Test -----
- Lack of Boundary Scan on digital devices -----

2007

2009

2011

2013



## Functional, System

- Lack of Coverage Assessment Metrology-----
- At speed testing -----
- Fault diagnostics-----
- Lack of DFT standards (BIST) -----



## Test equipment/Tools/Capabilities

- Node count exceeds tester capability-----
- Need low cost test equipment-----
- Lack of test expertise at CMOs/ODMs-----
- New test solutions/strategies-----



Green = No Gap Issues or Resolved

Yellow = Known Gap Mitigation Techniques Red = No Known Solution – Development Required



# What has changed

- **What changes have occurred in recent years (2-3) that may have changed the content of the GAP Analysis and/or the 5-year plan (if one existed).**
- **New TIGs will need to describe changes (e.g. see Situation Analysis section in each chapter) highlighted in the 2009 technology roadmap. Highlight any critical items/showstoppers faced by the TIG.**

# TIG Plan

- **In this section describe the projects and programs, from the Gaps and 5-year plan that the team will tackle in the next 1-2 years. Typically these projects are those that require deployment, implementation, and/or integration.**
- **Outline also what technologies require research to encourage either government agencies or universities to fund/pursue. Typically these require significant additional development and/or research, and may not be in iNEMI's scope.**

# Summary

- **This is a good section to summarize key findings and final thoughts.**

## Format and Changes for the 2009 Technical Plan

- The plan will be bound in a booklet for easy distribution. Also to be made as an Acrobat document.
- MS Word will be used. Two columns per page for all the text parts. Embedded graphics for the charts.
- Each TIG's input will be a section within a chapter in the plan. The plan will include other brief introductory material about iNEMI, the roadmap, and the product sectors to give it completeness.
- The Research priorities will be published as a separate document again this cycle.
- The audience for this technical plan besides iNEMI members will be potential members, therefore the sections need to be self contained.
- Includes names of the latest TIG membership and contributors to each section (available from Secretariat)

# 2007 iNEMI Technical Plan Example



Microsoft Office  
rd 97 - 2003 Docum

# 2007 iNEMI Research Priorities Example



Adobe Acrobat  
Document