Association Connecting Electronics Industries

IPC

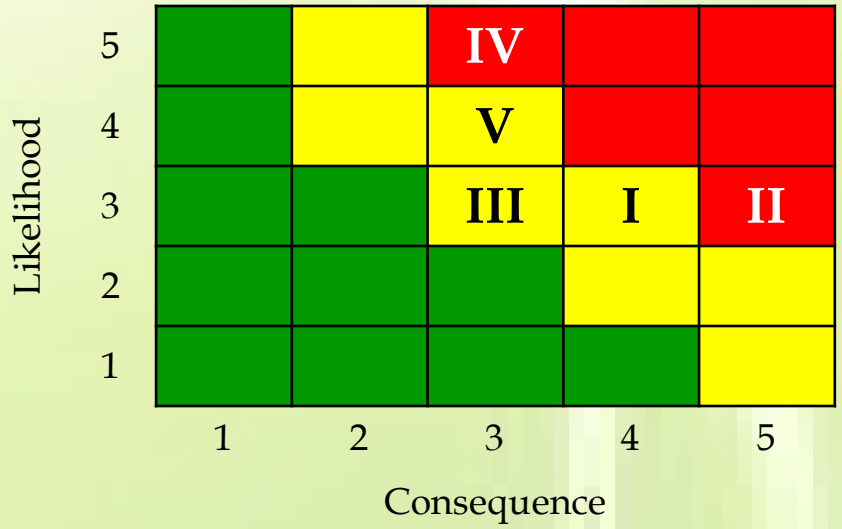
Pb-free Risk Management

Pb-free Electronics Risk Management PERM

Performance risk assessment for Pb-free electronics in aerospace and defense:

I. Tin Whiskers
II. Mechanical Failure
III. Copper Dissolution
IV. Processing Temperatures
V. Mixed Solder Alloys

5 Potential Failure Modes



Lead-Free Manhattan Project (LFMP)

- In 2009 SMEs identified 72 projects to close Pb-free knowledge gaps related to risk and reliability
- IPC sponsored LFMP re-baseline 2015
  - 44 completed, ongoing, discontinued, or low priority projects
  - 28 hi-priority projects remaining without funding sources

Risks and Gaps Remaining

- Closing remaining **knowledge gaps critical to aerospace and defense (A&D)** to mitigate the performance risks caused by Pb-free usage
- Additional funding is not forthcoming because remaining hi-priority gaps are of no consequence to commercial suppliers, so **will not be closed without A&D effort**

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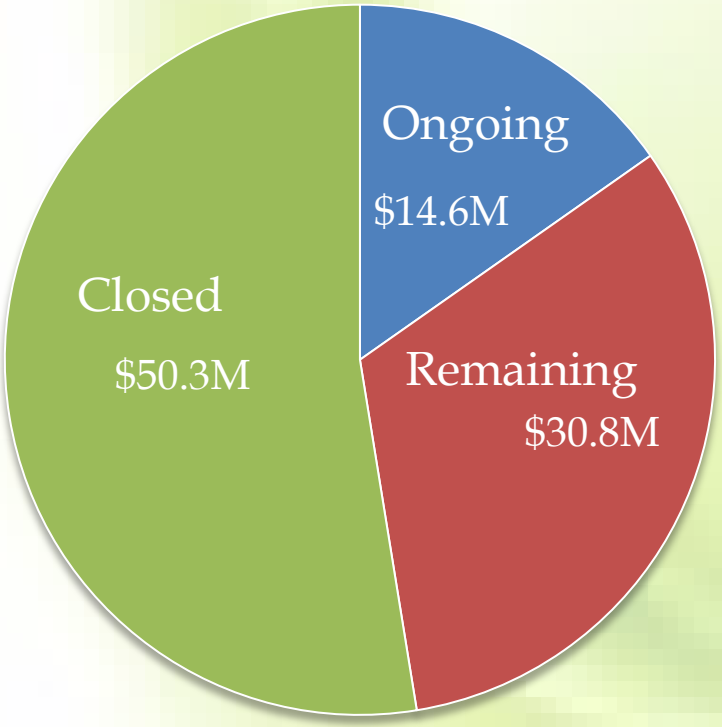
Lead-Free Manhattan Project (LFMP) Rebaseline 2015



Estimate to Complete (including Management and Systems Engineering) = $40M

- Many of knowledge gaps closed in last five years by collective efforts of industry, universities and DoD
- Requirement for some projects dropped over time based on new insights gained in prior research
- Ongoing projects are sponsored by commercial industry needs
- Remaining knowledge gaps are not sponsored by any funding sources
- **Closing remaining knowledge gaps is critical to aerospace and defense (A&D)** to mitigate the performance risks caused by Pb-free and to the address the landscape of parts available in the supply chain (Obsolescence of Pb)
- Gaps identified are associated with tin whiskers, electronic assemblies, solder joint integrity, electronic components and printed circuit boards
- **Remaining gaps are unfunded** and of no consequence to commercial suppliers