

## Workshop on High Confidence Embedded Systems May 1-2, 2003 Carnegie Mellon University

The two aims of the May 1-2 Workshop are to

- *report on the status of on-going research projects in the HCES initiative; and*
- *develop a roadmap for future HCES research.*

Presentations from the three research groups and the poster session on Thursday will achieve the first objective. Industry speakers on Thursday afternoon will lay the groundwork for addressing the second objective. The sessions on Friday will then be devoted to identifying specific elements of a roadmap for future research on methods and tools for implementing high-confidence embedded systems. We want to answer the questions:

### What are the missing pieces? What breakthroughs are needed?

To prepare for the workshop discussions, we would like the participants to think about their reactions to the following statements. The purpose of these statements is to stimulate thought and discussion. Our goal is develop a cohesive set of recommendations for a research roadmap to address all of the issues raised in this collection of half-truths. As you read each statement, consider the following questions:

- What technologies already solve at least part of the problem?
- Why does current technology fall short?
- Are fresh directions needed to make real progress, or will incremental advances be sufficient?

- Embedded systems present challenges and constraints that make conventional software engineering tools irrelevant for this domain.
- Thus far, tools aimed at embedded systems development have only been point solutions to parts of the overall problem. There is no apparent way at to combine these tools into an integrated complete solution.
- Tools to apply formal methods to embedded systems always assume that requirements have already been converted into specifications, but effective tools aren't available for this conversion.
- New methods are needed for documenting designs so that embedded systems can be supported throughout their life cycle.
- Legacy systems are a bigger problem than new system design, but the research hasn't addressed the legacy problem.
- Creating end-to-end solutions for embedded system design is not simply a matter of integrating existing tools. The tools themselves need to be re-thought with the end-to-end problem in mind.