ARO HCES
Discussion Group
Out-Brief

May 2, 2003
Group 6
In this brief...

- We focus more on what “we” (members of this program) are doing/have-done...
- How we can be more effective as a program...
  - we are not adding new team members...
  - how can we be more effective with what we have?
- What we need to do to help sell the program... (2-yrs, and beyond)
In the beginning...

- Embedded systems – a good domain for formal methods
  - systems tend to be smaller
  - more interest in high-confidence in this domain due to market pressures, liability issues, etc.
- Relatively easy to take existing successes in e.g., hard-ware and extend them to embedded systems
Where we are after three years?

- We have demonstrated some successes on individual tools with in groups in specific areas
  - use these to sell the program!
- Harder than we thought...
  - Dealing with hybrid systems (main issue: continuous elements)
  - Dealing with interaction (Ford – Will Milam)
- Collaboration...
  - program has fostered interaction between people from different communities within project groups (good and progress made!)
  - Little (any?) collaboration between groups
  - No progress in tool integration among groups
Where we are after three years?

- Lack of big picture view of what development might/should look like using our tools in the embedded domain
  - ...how should tools fitting into current development processes (we said that market pressures could encourage greater use of formal methods)
  - ...how should tools fit into certification efforts (we said that liability issues would encourage greater use of formal methods)
  - stems from our lack of knowledge of e.g., certification processes and artifacts
  - stems from lack of common problems between groups

- Lack of metrics/benchmarks for measuring success/impact that we might be making
What’s next for the next two years?

- Strive for end-to-end common road-map embedded systems development
- Identify what is still lacking in fundamental research
  - e.g., continuous elements, interaction among system components
- Our tools need to be clearly placed in development process to demonstrate not only technical feasibility, but methodological and process feasibility
What’s next for the next two years?

- Strive for **end-to-end common road-map** embedded systems development for one or more product-lines
  - document(s) summarizing on how our tools have been able to fit into the development/certification effort
  - identifying how our tools can be instrumented to produce development/certification artifacts/documents that add value to current processes (documents as 1<sup>st</sup> class citizens)
- teams need “forcing functions” to
  - help us development a coherent view/dream of how our tools/techniques work together to effect practice
  - help foster/focus collaboration and tool integration efforts
What’s next for the next two years?

- End-to-end tool integration is probably not feasible for us over the next two years, but we should integrate or tie together tools that are intersecting.
- Increase industrial participation
  - leverage existing contacts/test-cases
    - Generalized infusion pump
    - Ford – automotive open experimental platform
  - we need to make efforts to understand development process
    - need help discovering appropriate contacts
  - we need industrial evaluation/testimonials of our work
What’s next for the next two years?

- Identify...
  - holes that we can fill by intersecting/overlapping efforts across groups
  - holes that remain to be filled
    - some we don’t have expertise
    - some we can address in two years
  - metrics – what does it mean for our techniques to be effective/successful
  - metrics – what does it mean for our teams/program to be effective/successful