Issues raised in formal methods

- (Butler) *"Formal methods is the application of mathematical logic to digital system design and verification"*
- *3rd generation research requires (1) expertise in the problem domain, (2) expertise in formal methods, (3) positive collaboration.*
- (Miller) *"We're not interested in doing formal methods; we're interested in verifying our systems"*
- (everybody) *How do you quantify added value?*
- (French) *" It would be nice to have some upgrade of technique rather than just an upgrade of process."*
- *Computer programmers are not engineers."*

Issues raised in formal methods

- *Formal methods is a way you do your job."*
- (Miller) *"Formal methods lacks methods."*
- (Kelly) *We didn't need to train the entire project.*
- (Rushby) *"Not everybody needs to do this stuff."*

Certification in formal methods

- Strong CS background
- Exposure to (hybrid) system engineering
- 3–5 courses in logic and program verification (plus math)
- Technical training in a range of tools (V&V, CASE, and CAD)
- For qualification: *experience.*

Status of formal methods

- ○ Low critical mass in Academe
- ○ Application niche is still narrow
- ○ Can't tell when you've suceeded (THERAC25 spec: "Don't kill anybody.")
- ○ Expectations are becoming more realistic.
- ○ Research not ready for prime time.
- ○ Technical transfer at scale doesn't make sense.
- ○ Real progress in research
- ○ Is horizon receding faster?

Next 5–10 years

- Focus on reusable technology (algorithms, theories, clock sync, floating point)
- Develop verification/consulting industry
- Consumers *must* make demand known, and reward FM skills.
- Industry must assume some of the cost (short and long term)

Speculation on research

- FM is like CAD was 25 years ago, but without the $ to integrate.
- Integration is *very* challenging for both engineering and academic reasons.
- General recognition of the need for a diverse tool set is leading to preliminary experience “in the lab.”
- There will continue to be a gap (gulch) between research focus and applied interest.