

The Future of Formal Methods Circa 2008

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We see an oddity that formal methods are being applied more widely than ever with notable success, yet in North America the subject **does not seem to be a part of mainstream computing**; there are **fewer students** being trained in the area, **fewer faculty** being hired with this background, and **less research funding**.

What explains this anomaly?

Historical Perspective

The 30 period from 1975 to 2005 was one in which formal methods was an exciting mainstream area. We saw the birth of practical interactive **theorem provers** and the steady success of **model checking** which has had a large impact on industry. There are at least **ten Turing Awards** for this kind of work.

Many universities produced excellent PhD graduates in this area, and the undergraduate curriculum was rich in the formal; methods courses.

Historical Perspective Continued

This historical period is notable for a confluence of interests that generated **a focused impact**.

- Programming languages, especially functional
- Logic, foundations of constructive mathematics
- Logic & AI, interactive provers, SAT solvers
- Verification of hardware and software
- Logic programming
- Programming methodology

State of Formal Methods Circa 2008

The tools built in the 1975 – 2005 period suffice for most applications.

No new insights with **potential major impact** have rallied the core researchers.

There are elements of formal methods taught in programming courses and in software engineering.

Formal logic is part of the CS curriculum.

How to Move Forward

The natural forces that create applications, improve the standard tools, integrate new tools, and increase computing power will in due course yield striking results.

The right results will stimulate another boom.

We should seek out the compelling **fundamental results** and try to organize five year large scale funding as from NSE Expeditions.

We can **enhance the current** curriculum by concerted efforts, e.g. Benjamin Pierce's Course, Jeannette Wing's suggestions.