

## Galileo: A Tool Built From Mass-Market Applications

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## Problem

- From-scratch development in small markets is difficult
  - functionality, usability, interoperability
  - cannot amortize development costs
  - software isn't built, or is lacking in certain dimensions
- Example domain: dynamic fault tree modeling & analysis
  - modular, multi-paradigm
  - model combinations, orders of failures
  - analyze for unreliability, sensitivity

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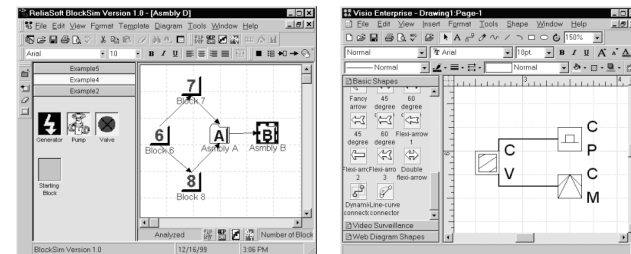
## Package-oriented programming

- Mass-market applications as components
- Tight integration (not "platform approach")
- Key enabler: shared integration standard
- Potential: functionality, ubiquity, low cost, sub-domains
- Cost to understand/use? Customization, limitations, workarounds, evolution

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## Package-oriented programming



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## Galileo

- Experiment in using POP to build a sophisticated tool meeting industrial requirements
- POP provides the GUI superstructure
- Hosts dynamic fault tree modeling framework
- Some features:
  - ┆ textual or graphical editing views
  - ┆ semi-automatic rendering between views
  - ┆ POP interface
  - ┆ integrated user interface
- Perhaps 10,000 LOC

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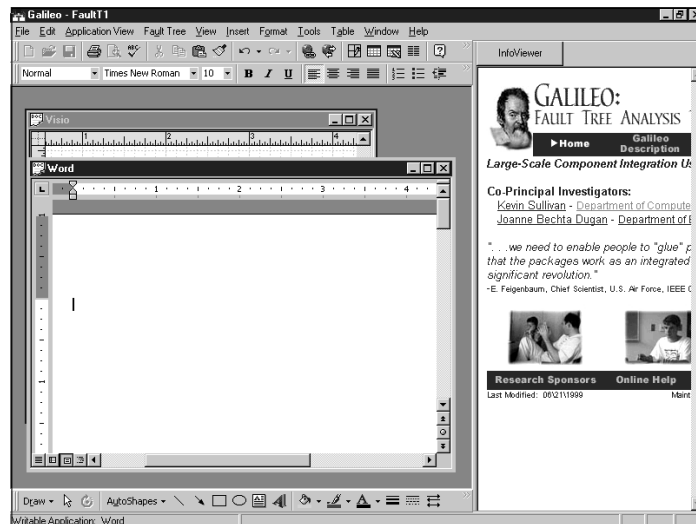
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## Recent developments

- Careful reimplemention of the analysis core
  - ┆ supports different modularization policies
  - ┆ addresses maintainability and evolvability issues
- Prototype of new user interface
  - ┆ provides crucial domain-specific editing operations
  - ┆ examples: "add & attach new gate", "delete subtree"
- Formal specification of the DFT framework
  - ┆ need tools that implement models with well-defined meanings
  - ┆ approach: formally specify the meaning using the Z formal specification language

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## Evaluation

- POP has great potential as CBSD model
- Risk is high: current instance of POP problematic
- Galileo shows potential, but does not yet meet many requirements
- Downloaded by over 150 institutions in 32 countries.

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## Summary

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■ *Galileo is a sophisticated, low-cost tool built from mass-market applications. It represents an ongoing evaluation of the POP model for building interactive systems from components.*

■ Papers:

- Kevin J. Sullivan, David Coppit, and Joanne Bechta Dugan. The Galileo Fault Tree Analysis Tool. In *Proceedings of the 29th Annual International Symposium on Fault-Tolerant Computing*, pages 232-5, Madison, Wisconsin, 15-18 June 1999. IEEE.
- David Coppit and Kevin J. Sullivan. Formal Semantics of Models for Computational Engineering. International Symposium on Software Reliability Engineering, San Jose, CA, 8-11 Oct 2000. (*to appear*)

<http://www.cs.virginia.edu/~ftree/>