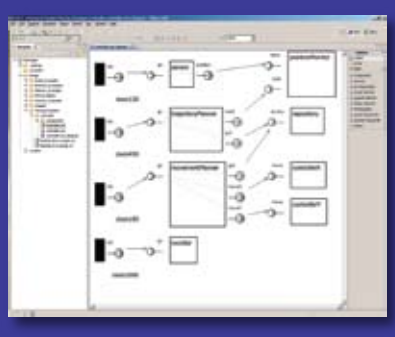
PACC STARTER KIT

PREDICTABILITY BY CONSTRUCTION

The PACC* Starter Kit is an integrated set of tools that demonstrates how technologies can be combined to deliver objective confidence in predictions of system behavior.

Constructive Features

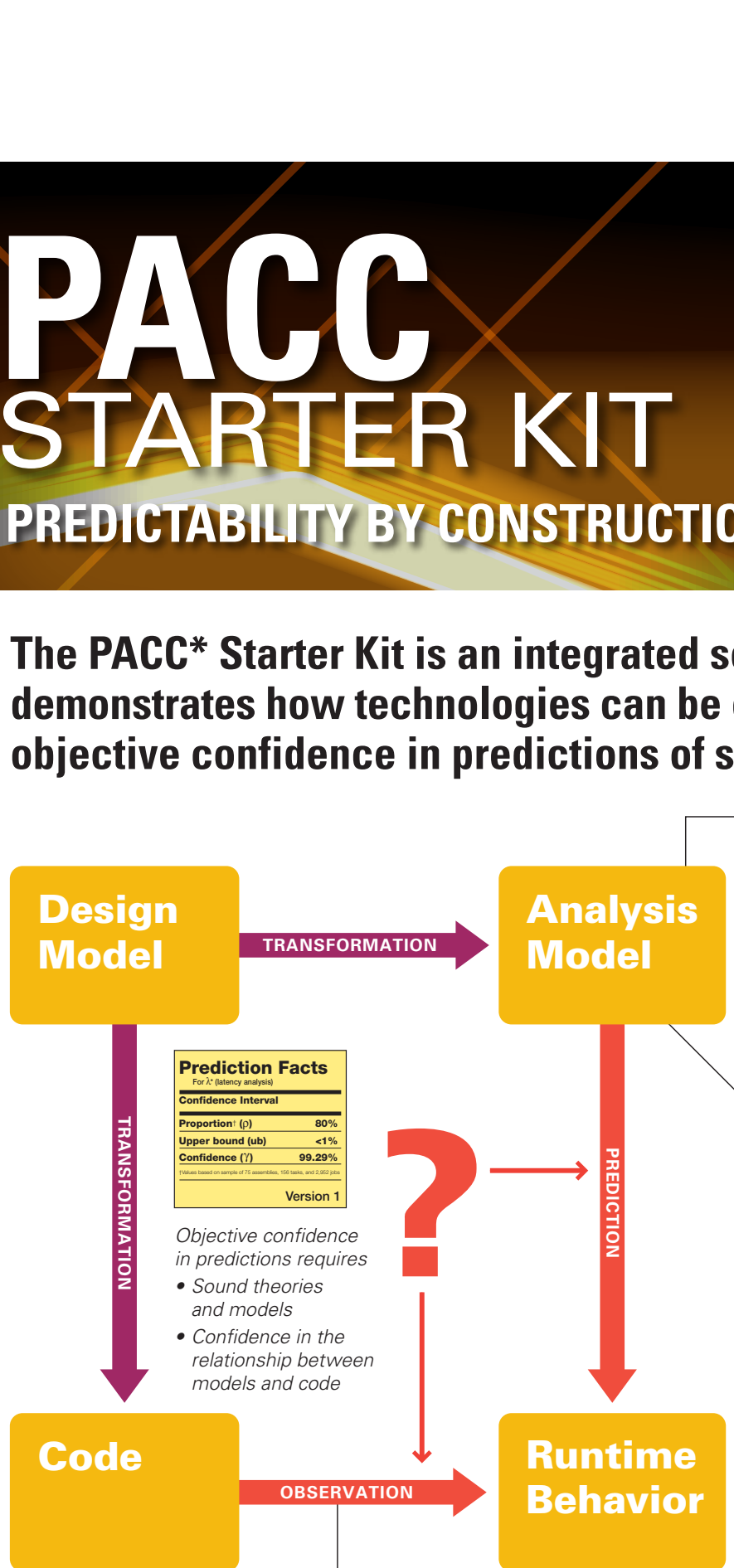
- Design language (UML statecharts + component wiring)
- Code generation
- Execution environment
  - Pin component technology
  - RTOS real-time extensions
- Measurement tools
  - Performance
  - Memory use



Analytic Features

- Performance
  - Worst-case latency
  - Average-case latency
  - Sporadic-server latency
- Behavior
  - Based on software model checking
  - Proof generation on success
- Security
  - Buffer overflow detection
- Memory consumption

* *PACC stands for Predictable Assembly from Certifiable Code.*



Performance Analysis

The Performance reasoning framework uses sound performance theories and simulation techniques to predict average- and worst-case response times of a component-based application.

Analysis is done in two automated steps:

- Design specification is transformed into a performance model.
- The performance model is evaluated by different kinds of evaluation procedures.
  - Closed formula (e.g., Rate Monotonic Analysis)
  - Discrete-event simulation

Statistical evidence provides objective confidence in predictions.

Behavior Analysis

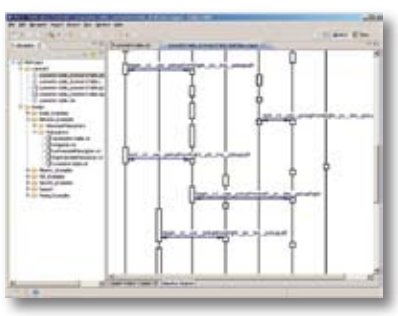
The Behavior Analysis reasoning framework uses software model checking to verify user-defined claims regarding software behavior.

When a behavior claim does not hold, a counterexample is produced.

- Complete execution trace leading to the failure
- Trace summarized in a sequence diagram

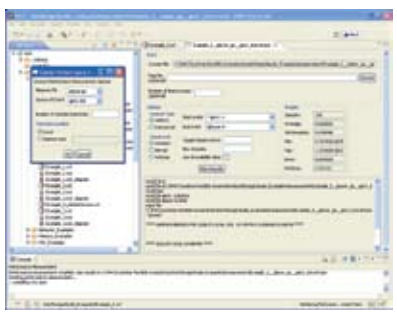
When a behavior claim holds, a certified binary can be generated.

- Certifying model checking techniques generate invariants from which a proof is constructed.
- Proof-carrying code techniques are used to embed the proof in the binary.



Performance Measurement

- Allows measurement of
  - Event interarrival time
  - Latency
  - Component execution time
- Provides the data needed for performance predictions
- Allows validating the prediction against measured observations



Audio Examples

The PACC Starter Kit includes a library of audio components to build examples.

- WAV decoder
- Tone generator
- PCM player and display
- Audio processing components: adder, subtractor, inverter, gain, delay, switch