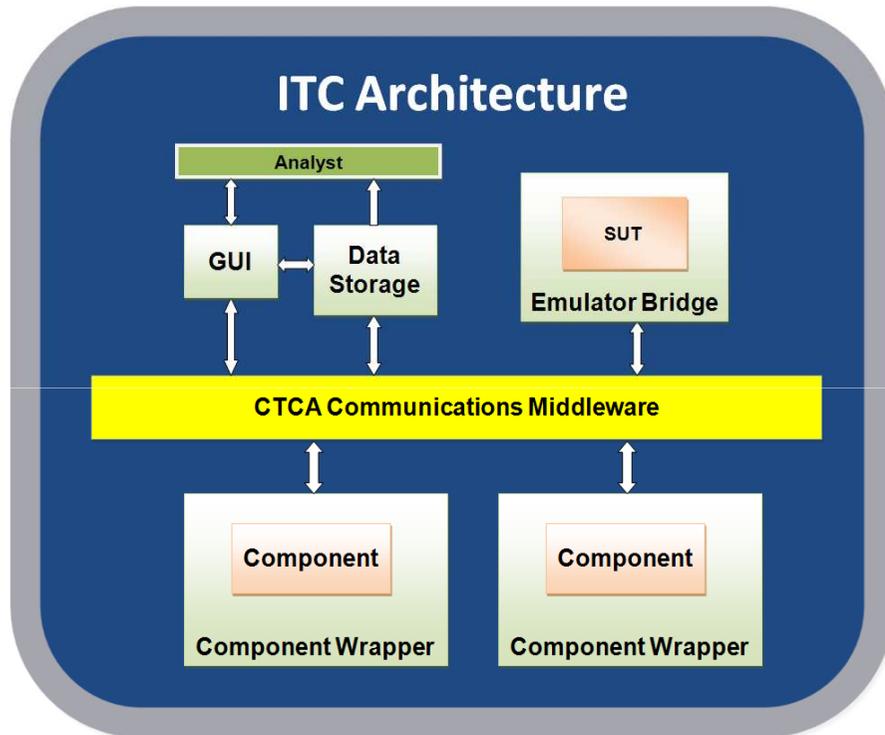


- The Independent Test Capability (ITC) Research and Development team has formed a partnership with the GSFC GO-SIM team to develop a software-only simulator for GPM. The GPM Operational Simulator (GO-SIM) includes the GPM ground system and database, flight software executable, and spacecraft simulators. This will provide the GPM IV&V team the ability to load and run software binaries, inject errors via the ground system, stress the system under test, and validate findings from other IV&V analyses. A demonstration will be provided of the work accomplished to date.



GO-SIM

September 16, 2010

Presenters:

*Justin Morris,
Steven Seeger,
Brandon Bailey*

Team Members

Justin Morris, ITC Lead
Steven Seeger, Lead Software Engineer
Brandon Bailey
Shawn Carroll
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Mike Wise
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- **Background**
- **GO-SIM Architecture**
- **GO-SIM Demonstration**
- **Integrating GO-SIM Components into the ITC**
- **Summary**

- Examined current IV&V projects for pilot study
- GPM Project Identified
 - Collaboration with GPM Operational Simulator Project
 - GSFC team investigating software-only simulation tools using ground simulator and spacecraft simulators

	Objectives	Means to Achieve
2	Perform dynamic analysis on a current mission	Collaborating with GSFC GO-SIM effort to build software-only



GO-SIM Overview

Software-only Simulator

Components

- Wind River Simics
- Primary Instrument Simulations
- ASIST Ground System
- Goddard Dynamic Simulator (GDS)
- Wind River workbench integration

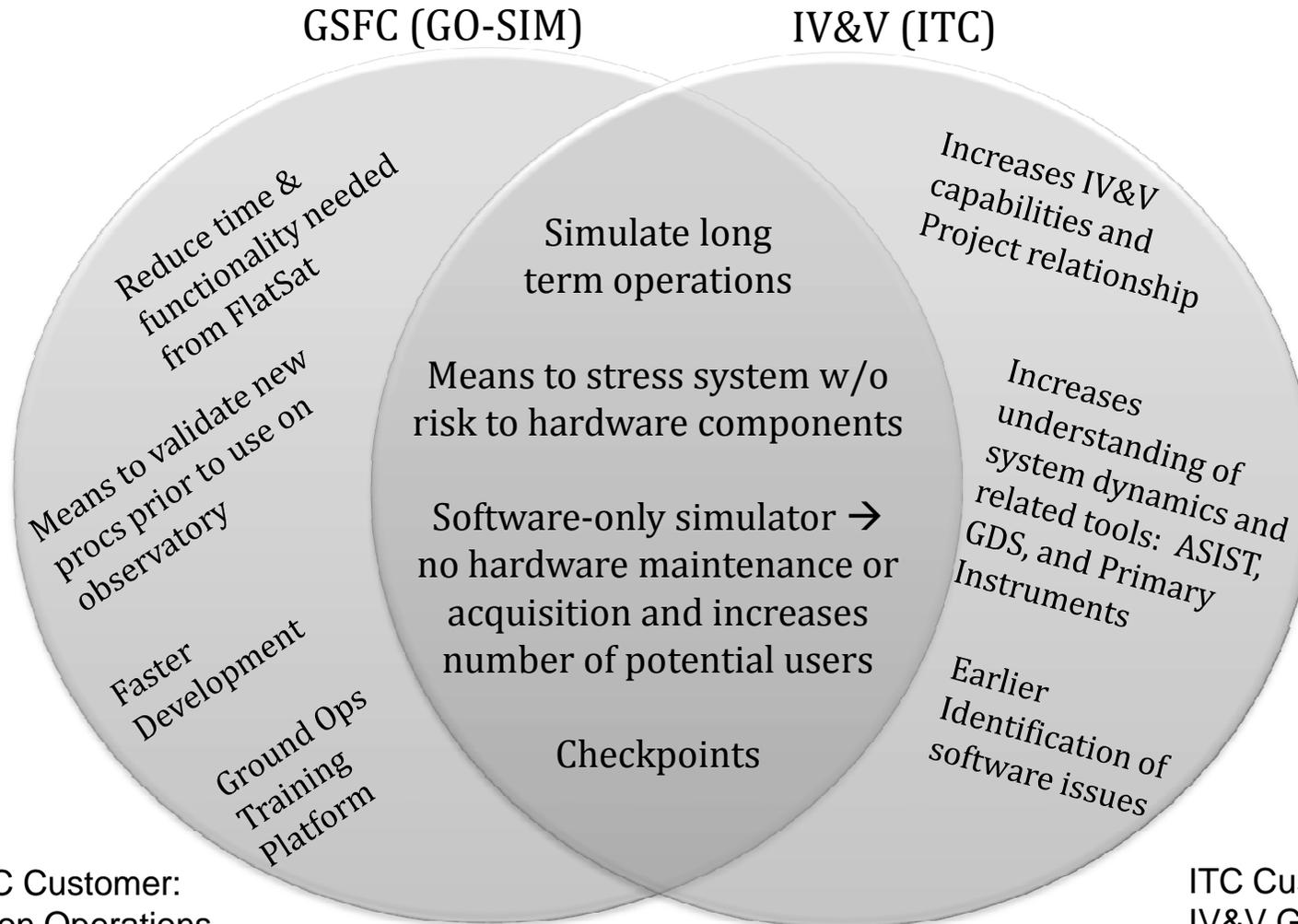
Capabilities

- Load and run **unmodified** flight software binaries
- Execute flight scripts
- Single-step debugging
- Inject errors via ground system
- Stress system under test
- Validate findings from other analyses



Independent Test Capability

GO-SIM Value



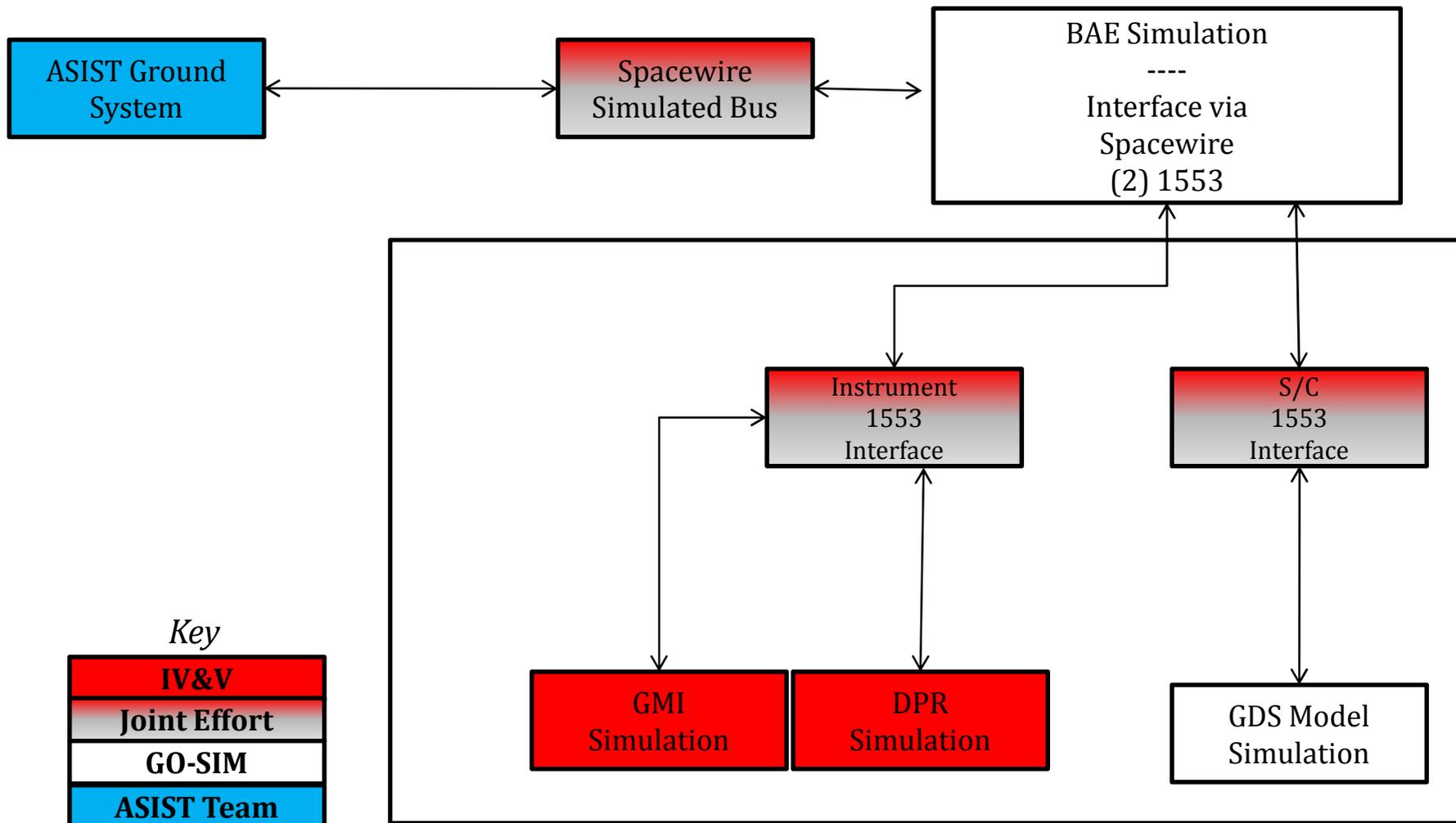
GSFC Customer:
Mission Operations

ITC Customer:
IV&V GPM Team



Independent Test Capability

GO-SIM Architecture



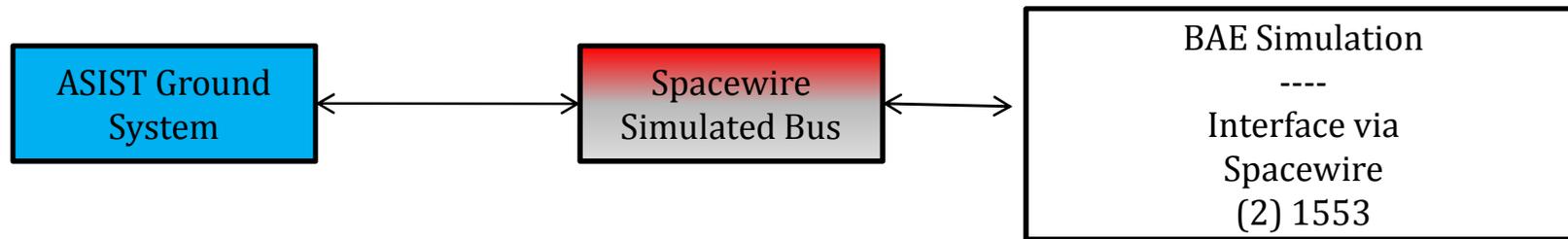
Key

IV&V
Joint Effort
GO-SIM
ASIST Team

- Primary Instrument Simulations
 - Pack and unpack formatted messages and packets
 - Receive and respond to instrument commands and requests for data
 - Handle necessary telemetry components
 - Maintain state just like the real instrument



GO-SIM DEMONSTRATION



ASIST

- GPM Ground System
- Features
 - Database-Driven Command, Monitoring & Control
 - Interactive Commanding
 - Script-Driven Test Procedures
 - Real-Time Page Displays
 - Real-Time Events Log
 - Command Status Window
 - Limit Checking
 - Real Time Plots (via gnuplot)

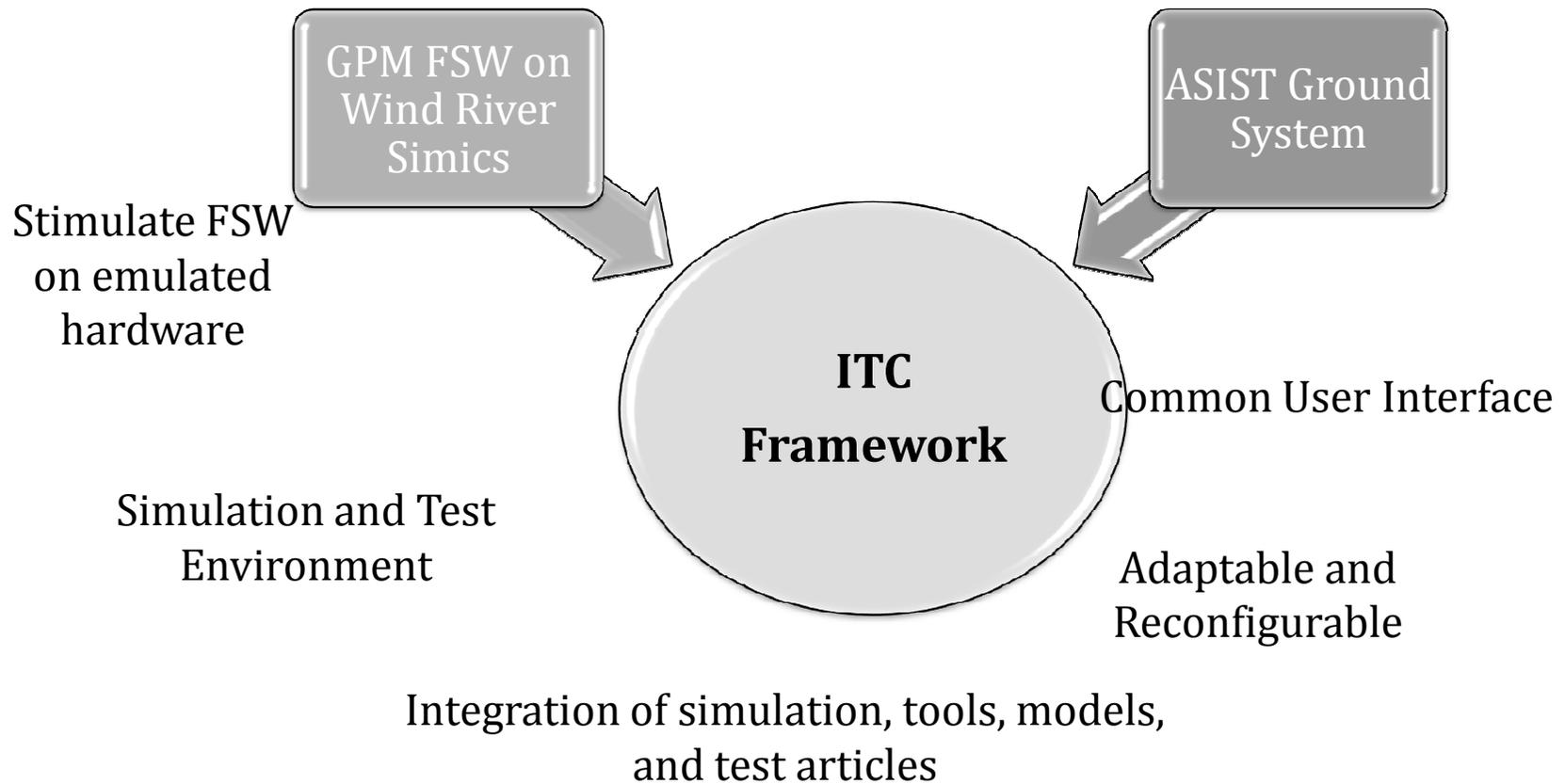
Simics

- Complete functional virtual platform
- Provides toolset to define, develop, and deploy system simulators
- Model system components
 - BAE RAD 750
 - 1553 models (2)
 - Spacewire
 - IO card simulation

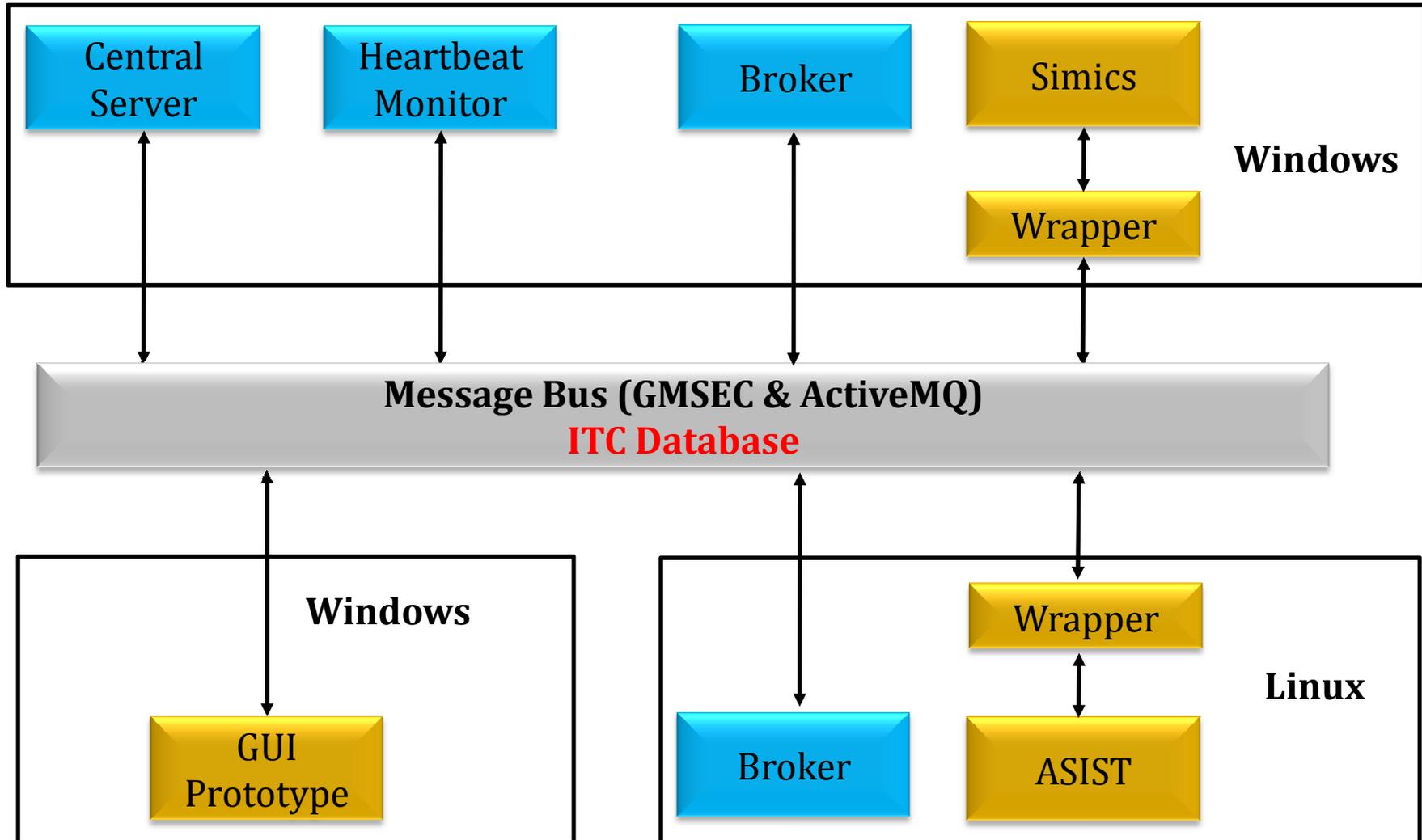


INTEGRATING GO-SIM COMPONENTS INTO THE ITC

Will support GPM's independent testing



Integrating GO-SIM Components into the ITC





ITC DEMONSTRATION WITH GO-SIM COMPONENTS

- gc_hs_gencmds.prc
 - Verifies that CFS Health and Safety command function properly
 - Commands Tested
 - NO-OP
 - Reset Counters
 - CPU Aliveness
 - Other miscellaneous commands
 - Invalid versions of commands tested



Independent Test Capability

The 3 Questions: Command Testing

Q1

- **Events:** Send a No-op Command
- **Expected Results:** Upon receipt of a No-op command, HS shall increment the HS Valid Command Counter and generate an event message.
- **Requirements:** HS1000; HS1003

Q2

- **Events:** Send an invalid HS command.
- **Expected Results:** The Command Rejection Counter increments and an error event message is generated.
- **Requirements:** HS1004

Q3

- **Events:** Send a No-op Command with an invalid command length
- **Expected Results:** The Command Rejection Counter increments and an error event message is generated.
- **Requirements:** HS1002, HS1004

- **Background**
- **GO-SIM Architecture**
- **GO-SIM Demonstration**
- **Integrating GO-SIM Components into the ITC**
- **Summary**



QUESTIONS?