



The Real-time and Embedded Systems Forum

Andrew Josey
Director, Server Platforms

Wednesday, July 18th

~~9:00 - 10:10~~ ~~**General Plenary**~~ - processes general forum business, including high level subgroup, liaison, other consortia and standards activity reports
(**Dock Allen, Diane Schleicher, Russ Richards, and Kevin Quick**)

10:10 -10:40 **Break**

11:00 -12:30 **Safety Critical Software**
Session Leader: Dave Emery, MITRE

Will assess requirements and how the forum can address this area. This session will include presentations and a discussion.

Joseph Wlad, Wind River Systems
***Mike La Haye**, OSE Systems, Inc.

12:30 – 2:00 **Lunch**

* Rescheduled for Thursday 0900 

Wednesday (continued)

2:00 - 5:30 **Security Working Group Open Session**
~~Session Leader: Sam Bowser~~

Evaluating response to call for information for security requirements for real-time and embedded systems. Will commence with several presentations on current approaches for security, followed by general discussion of security requirements for real-time and embedded systems.

Stephen L. Rangel, Green Hills Software – Development of Applications with COTS RTOS Technology

Edwin Lee, Raytheon – *Security in Real Time Operating Systems*

Robert Allen, Boeing – Real Time Embedded Avionics Systems
Security and COTS Operating Systems

Sam Bowser, Aerospace Corp.
An Approach to Security for Soft Programmable Radios

3:30 - 4:00 **Break**

Wednesday (Security WG, continued)

4:00 – 5:30 **Discussion of Security Requirements for
Real Time and Embedded Systems:**

Joe Weiss, EPRI – Process Control Security Forum and
Electrical Power Infrastructure Issues

Russ Richards, DISA – Proposed Security APIs Status

Thursday, July 19th

9:00 - 12:30 **QoS/Real-Time and Embedded Systems**
(Joint Working Group)

A joint session with the QoS group (Thursday morning) at which we will review the quality of service scenario developed since the Berlin meeting.

Parallel Breakout - Security Working Group.

Security working group will continue working on charter and white paper.

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Thursday (continued)

~~2:00 – 3:30 **Profiles Working Group Open Session:**~~
includes invited presentations from the following:

Joe Gwinn, IEEE SSWG-RT Chair
POSIX Status Update

Doug Robinson, DISA
Moving the DII COE Into the 21st Century

Michael Tiemann, CTO Red Hat
EL/IX Status with Respect to POSIX

This will be followed by a discussion session on requirements for new profiles, in particular addressing:

- Can we bring together the EL/IX spec and POSIX 1003.13 profiles?
- What is missing from the current profiling efforts?

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Glen Logan and Robert Allen**

6:30 **Informal Social**

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Famous Understatements

“I think there is a world market for maybe five computers.”
(**Thomas Watson, IBM 1943**)

“Computers in the future may weigh no more than
1.5 tons.” (Popular Mechanics, 1949)

“There is no reason anyone would want a computer
in their home.” (Ken Olson, DEC, 1977)

“640K ought to be enough for anybody.”
(Bill Gates, Microsoft, 1981)

Post-PC Computing

- ❑ By 2003, more than 50% of the people using the Internet will do so with handheld and/or portable (Post-PC) devices (IDC).
- ❑ By 2002, more than 55 million Post-PC devices will ship, and by 2005 shipments will exceed shipments of PCs (IDC).

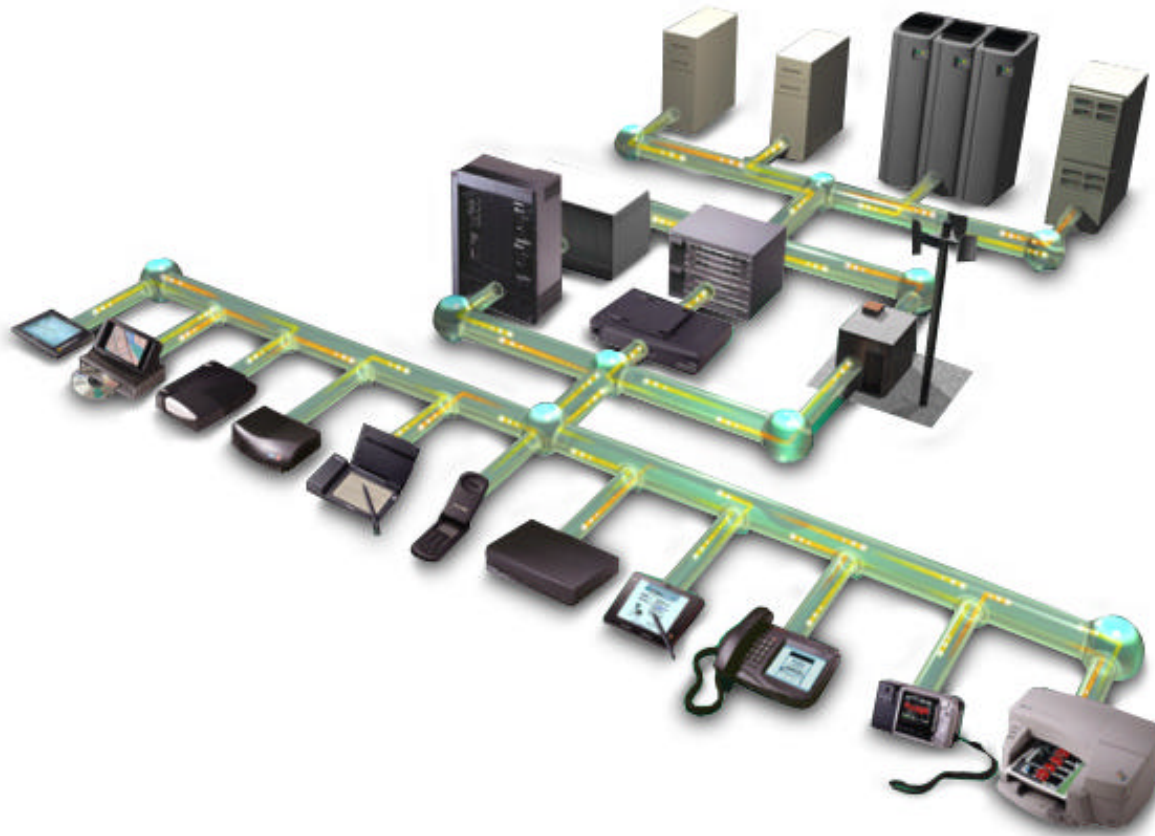
Market Drivers

- ❑ Hardware performance continues to increase
 - Moore's Law continues
- ❑ Bandwidth is increasing rapidly
- ❑ Computing and communications proliferate beyond the desktop
 - Smart devices are becoming prevalent

What Are Smart Devices?

- ❑ Anything with a microprocessor that's not called a "computer"
- ❑ Traditional "embedded" products
 - *industrial,*
 - *aerospace,*
 - *medical*
 - *automotive control,*
 - *test, etc*
- ❑ The Internet
 - Servers, infrastructure and clients

The Internet: The World's Largest Embedded System



The Resulting Problem: Complexity



Time-to-Market

Real
HW **Functions**
Network
Systems
Management
Speed
Internet
DRIVERS
Connectivity
Density
Functionality
Multimedia

Mission

Improve the time and cost, to market adoption, of real-time and embedded solutions by providing a forum where we can share knowledge and integrate open initiatives, and certify approved products and processes

Members

- ❑ FDS Embedded Systems Co. Ltd
- ❑ Hewlett-Packard Company
- ❑ IBM Corporation
- ❑ Lineo Inc
- ❑ LynuxWorks Inc
- ❑ The Mitre Corporation
- ❑ MontaVista Inc
- ❑ NASA SEWP Goddard Space Flight Center
- ❑ Rockwell Collins Inc
- ❑ REDSonic, Inc
- ❑ Silicon Graphics Inc
- ❑ Sun Microsystems Inc
- ❑ The Boeing Company
- ❑ The J Consortium
- ❑ The US Department of Defense Defense Informations Systems Agency
- ❑ TimeSys Corporation
- ❑ VenturCom, Inc
- ❑ DoD Open Systems Joint Task Force (OSJTF)

Products vs Standards: The Big Debate

- ❑ Standards have not proven to be 'sufficient' for either portability or interoperability
 - Portability has not been 'absolute'
 - Common products provide much better interoperability
- ❑ Product-based approach strongly limits the choices for the system developer/integrator

Scope of the Forum

- ❑ Operating system APIs (Application Programming Interfaces)
- ❑ Operating system profile standards
- ❑ Safety Critical Software
- ❑ Quality of Service
- ❑ Security policy and APIs for Real-time and Embedded Systems
- ❑ Real-time Java®
- ❑ Real-time CORBA ®

Liaisons

- ❑ IEEE PASC
- ❑ NCITS R1
- ❑ The Object Management Group
- ❑ The US Department of Defense, Open Systems Joint Task Force
- ❑ Society of Automotive Engineers
- ❑ J Consortium
- ❑ Java Community Process
- ❑ UDI Consortium

Collaboration is Key!

THE *Open* GROUP

Forum Activities

- ❑ Regular meetings at the Open Group quarterly conferences
 - open plenary session
 - closed working group sessions
- ❑ Initial Working Areas:
 - Testing and Certification
 - Profiles
 - Real-time Security
 - Quality of Service

Activities

<u>Sub- Group</u>	<u>Activity</u>
Testing and Certification	<ul style="list-style-type: none">❑ Test tools for suppliers to establish confidence their products conform❑ An independent certification program for suppliers' products that delivers guaranteed conformance to the buyer.
Profiles	<ul style="list-style-type: none">❑ Build upon existing work, adding extensions to address market requirements.

Activities (Cont'd)

Security	<ul style="list-style-type: none">□ File System and Network Security Guidelines have been established for full function, non-real-time Oss. However, requirements for Kernels implemented on Real-time OSs (such as LynxOS, VxWorks) are still to be established
New opportunities	QoS for Real Time and Embedded Real-time Behavioral Specification Safety Critical Systems and Critical Infrastructure

Security Overview

- ❑ Many real-time and embedded systems control critical systems
 - Human lives depend on these systems functioning as designed
- ❑ The unique nature of the operating environment and the protection of such systems present a unique challenge

Security for Real-time and Embedded Systems

- ❑ These systems, by themselves frequently cannot contain all the necessary security functionality to adequately protect them
- ❑ Software security solutions must work in conjunction with other security safeguards (e.g., physical security) to achieve an acceptable level of risk
- ❑ Software security cannot be considered in a total vacuum
- ❑ Bottom line there are **currently** no specific RT/Embedded security standards

Quality of Service

- ❑ "Real-Time" flavors of commonly used network/distributed computing services, providing bounded time options and Quality of Service support
 - TCP
 - Sockets
 - Directory Services
 - Guards, Firewalls, etc
- ❑ Reliable and Unreliable network broadcast protocols
- ❑ Real-Time Data Management/Database Services
 - "I need the answer to this query in .03 seconds, or we'll be dead..."

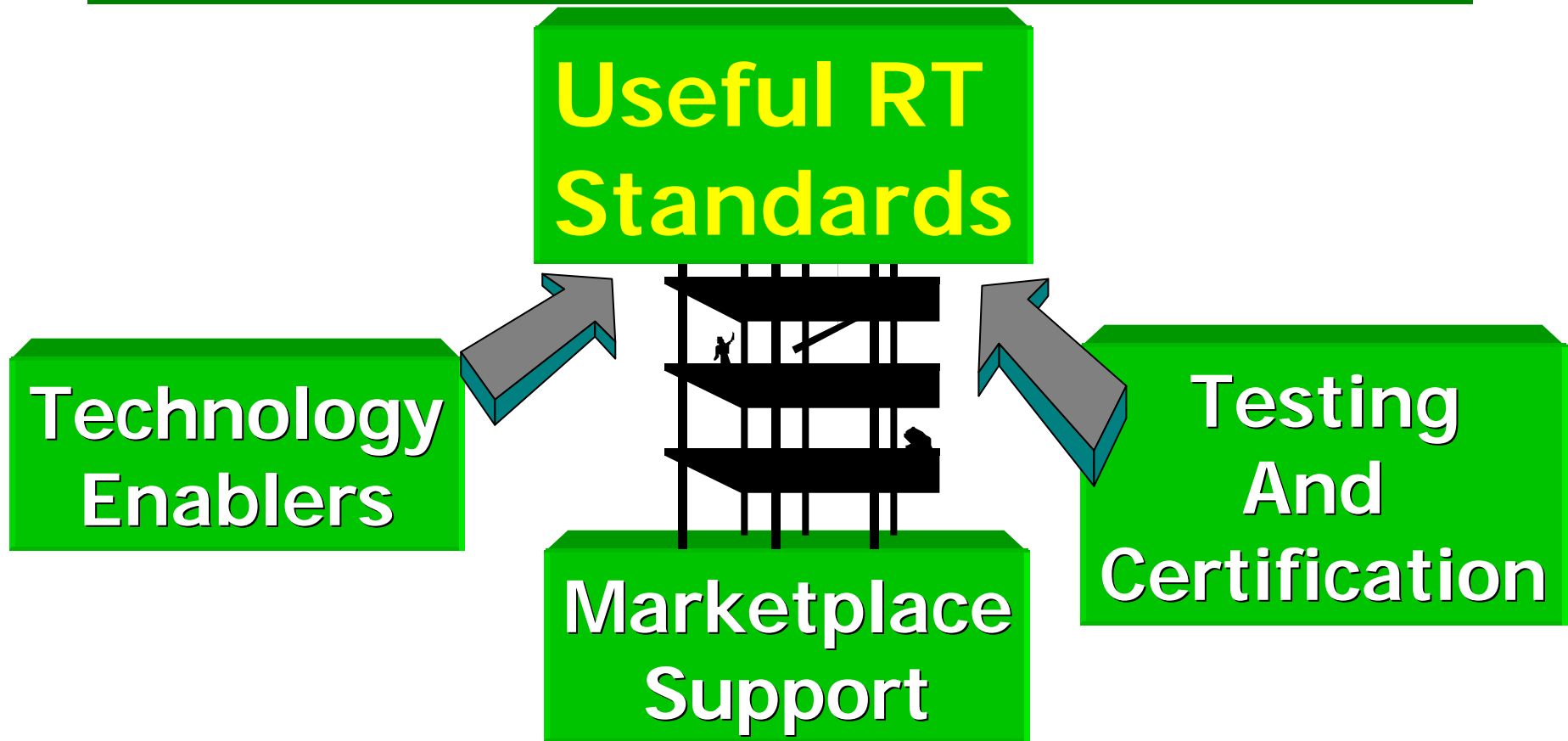
Specifying Real-Time Behavior

- ❑ Few examples exist on how to specify Real-Time behavior of software components and standards
- ❑ How should Real-Time behaviors be tested/validated?
- ❑ How to move QoS into standards, allowing QoS properties across products and systems?
- ❑ What are the effects of 'composing' Real-Time systems from software written by different developers/manufacturers?

Challenges for the Real-Time Open Systems Community

- ❑ Improvements in 'specification technology'
 - Standards that are more complete, less ambiguous, more interoperable
- ❑ Improvements in test and verification approaches
 - More test tools
 - Open Source test suites?

The Goal



More Information

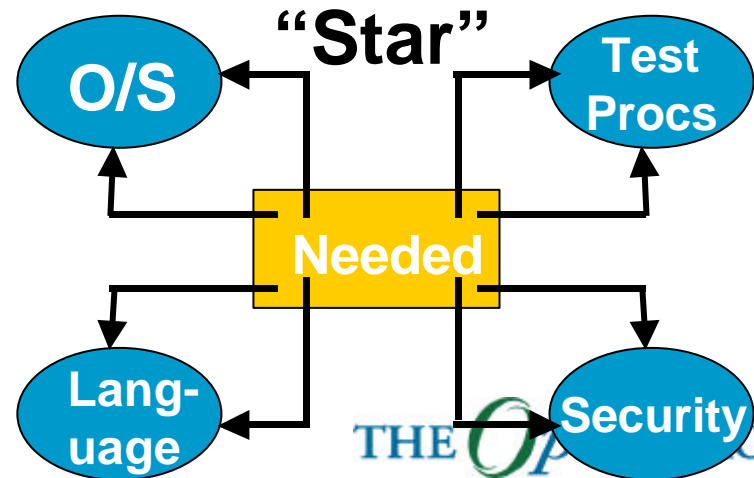
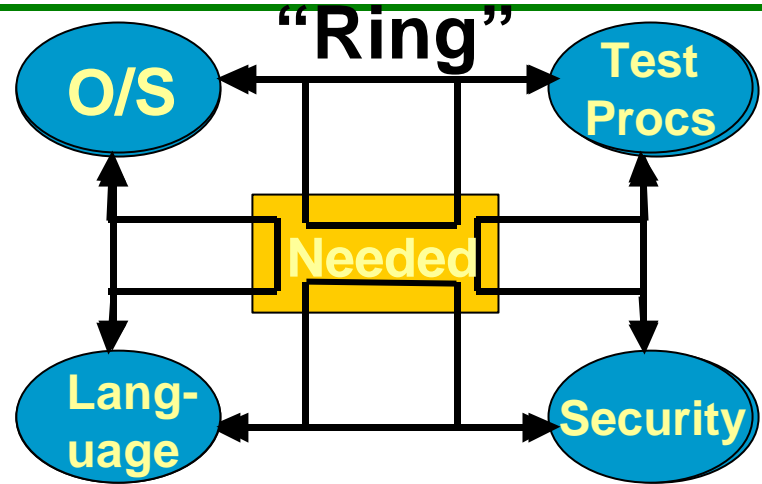
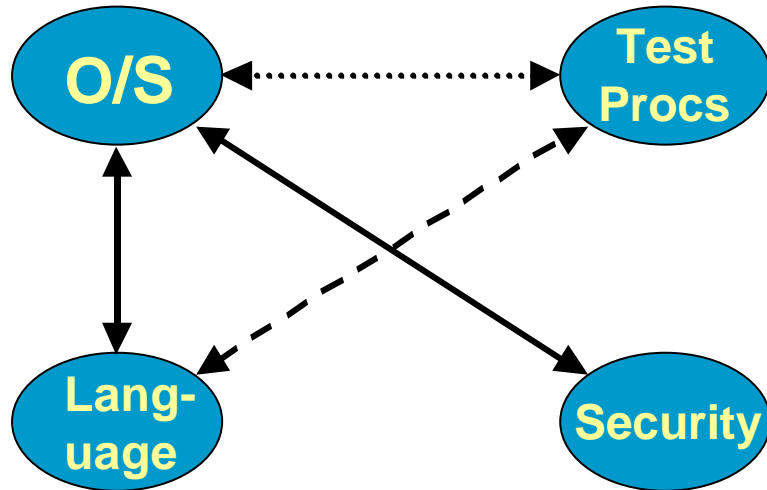
- ❑ <http://www.opengroup.org/rtforum/>
- ❑ Email:
 - Andrew Josey
a.josey@opengroup.org
 - Joe Bergmann
j.bergmann@opengroup.org



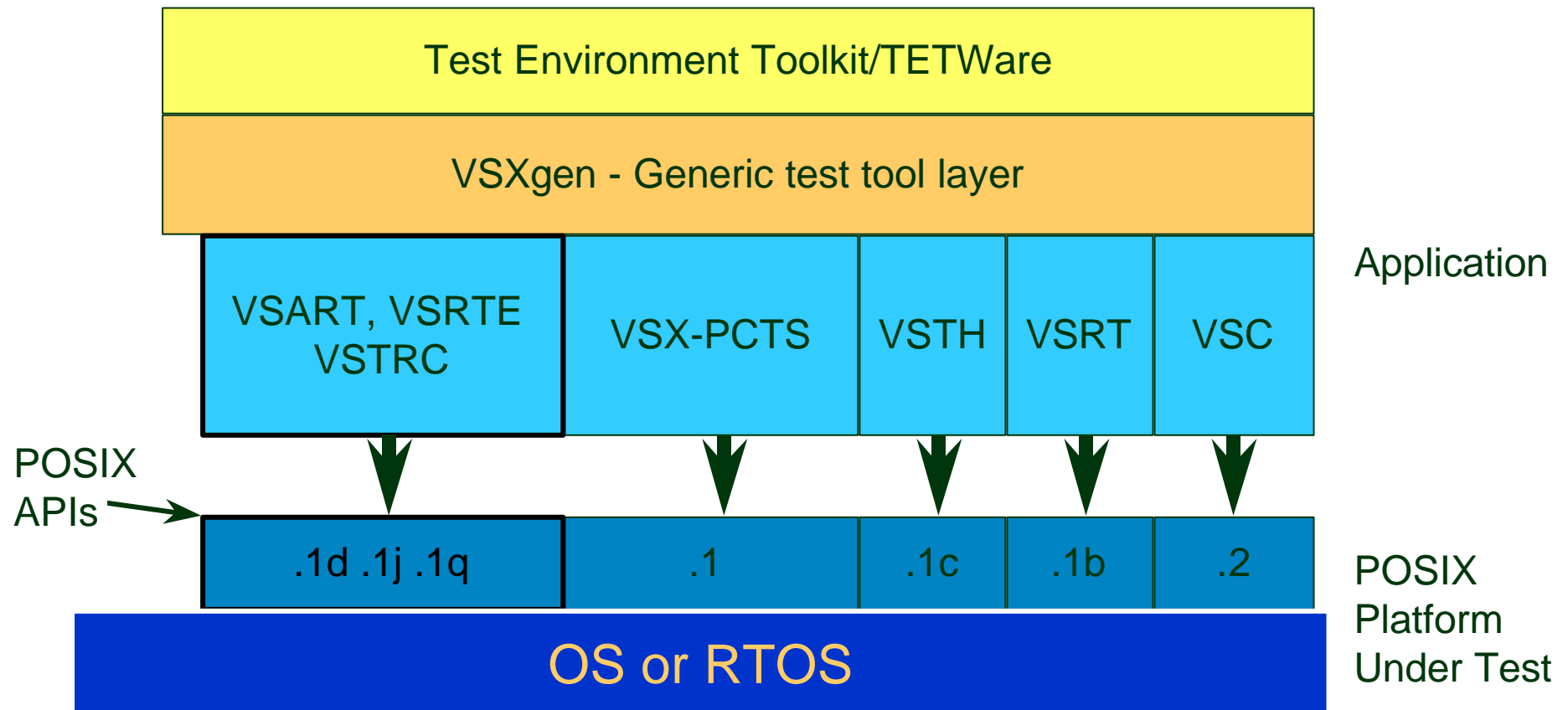


Collaborative Activities Are Key

Cooperation



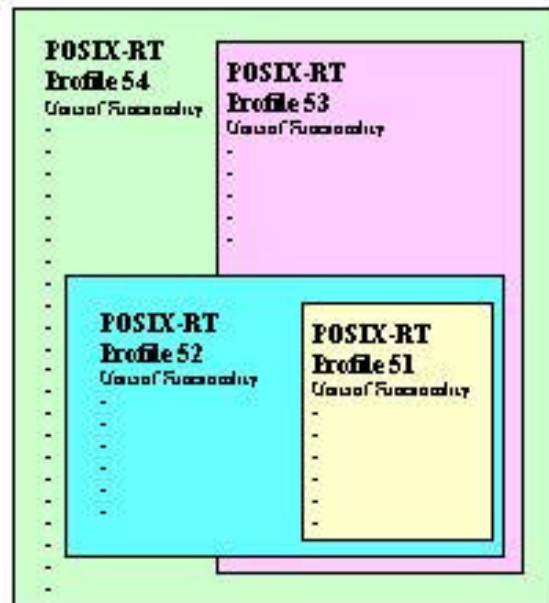
Operating System Test Tool Architecture



Note: All POSIX options are tested by test tools

POSIX Profiles

POSIX Approach to RT Kernel Configuration POSIX RT Profiles: Relationships



Profile 54: All POSIX.1,
Multi-process, Threads, File System

Profile 53:
Multi-process, Threads, No File System

Profile 52:
Single Process, Threads, File System

Profile 51:
Single Process, Threads, No File System

Portable Operating System Interface (POSIX)
IEEE Industry Standard
ISO 9001 Industry Standard

Allows Portability of Applications

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