IEEE POSIX®

Certified by IEEE and The Open Group

POSIX® : *Certified by IEEE and The Open Group – a briefing.*

The Source for POSIX Certification

http://posixcertified.ieee.org

January 2006.

THE *Open* GROUP

Agenda

- ❑ What is POSIX?
- ❑ POSIX 1003.1, 2004 Edition Status
- ❑ POSIX 1003.13-2003
  - ■ PSE54 Multipurpose Realtime Product Standard
  - ■ PSE52 Realtime Controller Product Standard
- ❑ POSIX: *Certified by IEEE and The Open Group*
- ❑ 2006 updates

THE *Open* GROUP

POSIX® /pahz-icks/

- *POSIX, pronounced pahz-icks* as in positive, not *poh-six*, or other variations

- POSIX is a registered trademark of the IEEE
  - Licensed through certification

- An acronym for *Portable Operating System Interface*

THE *Open* GROUP

POSIX® /pahz-icks/

- ❑ POSIX is a family of standards developed by the Portable Applications Standards Committee (PASC) of the IEEE Computer Society

- ❑ Main subject areas:
  - System Interfaces (C, Fortran, Ada Bindings)
  - Commands & Utilities
  - Test Methods

THE *Open* GROUP

What is POSIX?

- ❑ Its about *portability*
    - ▪ Both programmers and application source code
    - ▪ Portability of the OS kernel itself and/or application binary code are <u>not</u> objectives
- ❑ POSIX is a set of books specifying APIs
    - ▪ It is neither a piece of code
    - ▪ Nor an operating system
    - ▪ It is a rich, proven API

THE *Open* GROUP

What is an API?

❑ Application Program Interface

❑ A written contract between system developers and application developers

❑ It is not a piece of code, it is a piece of paper defining what the two sets of developers are guaranteed to receive and are in turn responsible for providing
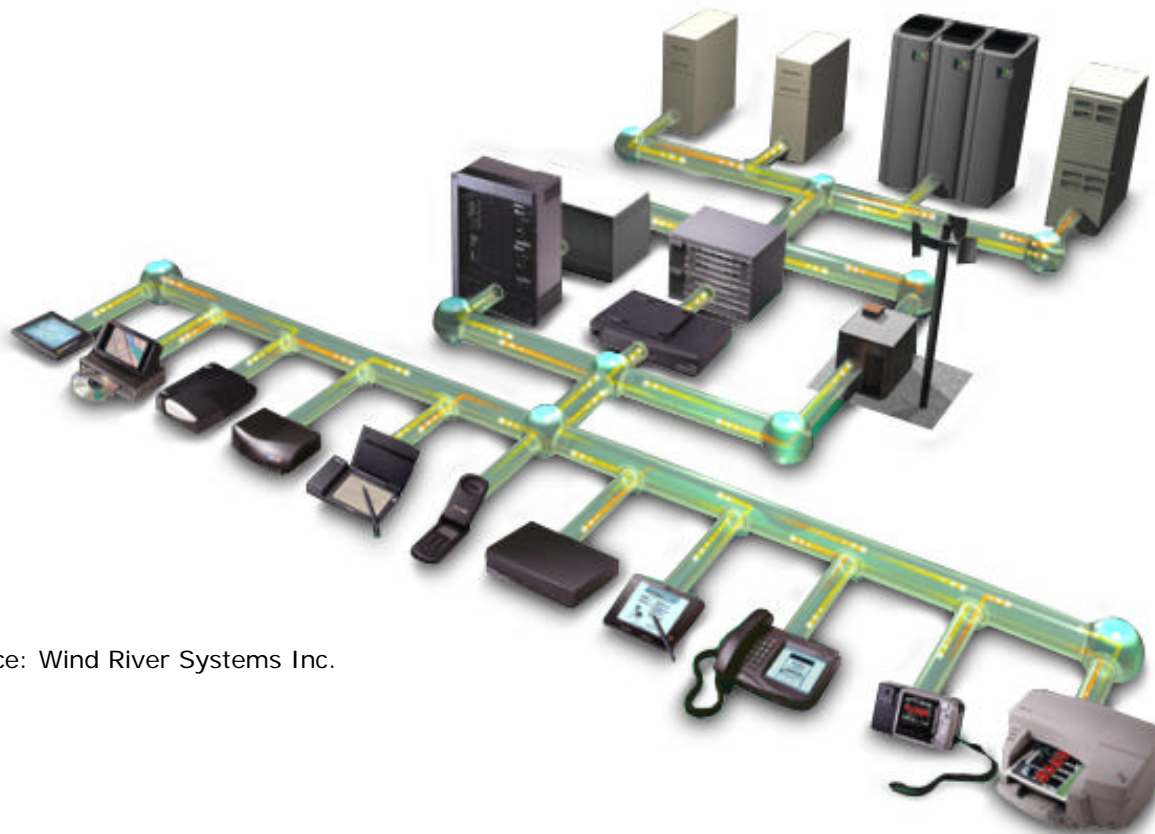
The Need for Standard APIs

Standardized Functionality
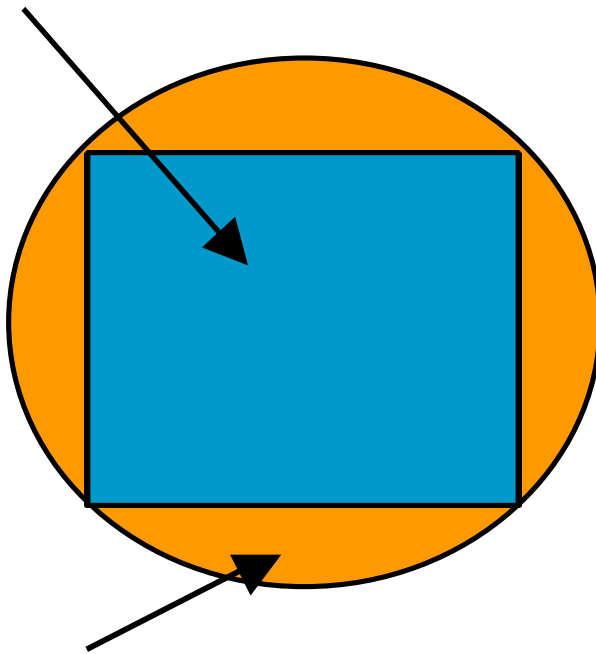
Private Product Specific Functionality

- ❏ Standardized "square" peg in the round hole
  - ▪ "bits where change is not interesting"
  - ▪ Where the benefits of commonality outweigh the value of differences
  - ▪ Where we can achieve economies of scale, including interoperability

THE *Open* GROUP

Scalable API Portability
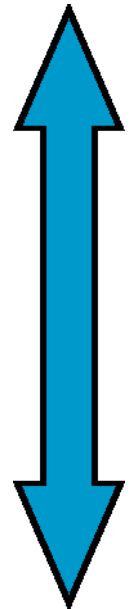

POSIX APIs support portability across a range of devices

Diagram Source: Wind River Systems Inc.
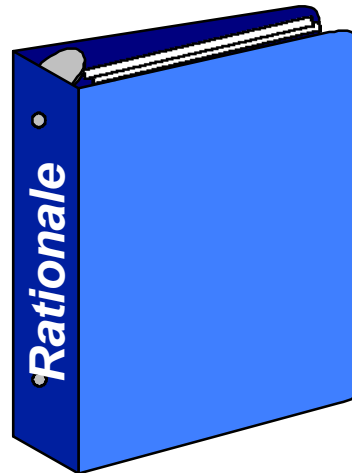
THE *Open* GROUP

POSIX *1003.1, 2004 Edition*

- *Approved December 6th 2001*
- 2004 Edition incorporates two Technical Corrigenda
- Developed by the *Austin Group (see later)*
- Supersedes all the major POSIX standards except 1003.13 (realtime profiles) and 1003.5 (Ada bindings)
- A combined system interfaces (including all realtime POSIX) and utilities specification as a single 4000 page standard
- The core of DoD's mandated Joint Technical Architecture (JTA) OS Services, replacing 1003.1-1996 and its amendments
- Technically identical to the Base specifications of the Single UNIX Specification and ISO 9945

THE *Open* GROUP

The Common *Base* Specifications

IEEE Std 1003.1,

ISO/IEC 9945

The Open Group Base
Specifications Issue 6

*The Core of the
Single UNIX Specification V3*

The *Austin Group*

- The *Austin Group* combines the formal standards process of the IEEE and ISO, with the industry standards of The Open Group and the community at large.
- *Electronic participation*
- *Participation in the group is free.*
- *The final standard in html is available for free download from the world wide web.*

Motivation for the Profiles Standard

- ❑ The POSIX 1003.1 Standard:
  - ■ Allows writing portable real-time applications
  - ■ Very large: inappropriate for embedded real-time systems
- ❑ POSIX.13:
  - ■ Defines four real-time system subsets (profiles)
    - ■ *Minimal*: Small embedded systems
    - ■ *Controller*: Industrial controllers
    - ■ *Dedicated*: Large embedded systems
    - ■ *Multi-Purpose*: Large general-purpose systems with realtime requirements
  - ■ C and Ada language options

THE *Open* GROUP

POSIX *1003.13-2003*

- *Approved December 10th 2003*
- *A set of POSIX Realtime profiles*
- Supersedes POSIX.13-1998 updated to address
  - 1003.1-2001 (which includes all of realtime POSIX)
  - Profiles of all 1003.5-series standards (Ada bindings to POSIX)
  - Field experience with 1003.13-1998
  - Input from the Linux, realtime and/or embedded Linux, and traditional RTOS communities

THE *Open* GROUP

POSIX 1003.13

❏ POSIX 1003.13 is a subprofile standard of 1003.1-2001

  ▪ It allows diverse realtime operating systems "clothed" with a runtime library to comply

  ▪ This standardizes the application-to-RTOS API, allowing considerable application code portability between different RTOS offerings, which portability had not been possible in the past

  ▪ RTOS+wrapper offerings can be compared and competed directly

 ▪ There are currently four profiles

THE *Open* GROUP

POSIX 1003.13 Profiles Overview

❑ Defines four real-time system subsets (profiles)

- *Minimal*: Small embedded systems
    - Platform: Small embedded system, with no MMU, no disk, no terminal
    - Model: controller of a "Toaster"
- *Controller*: Industrial controllers
    - Platform: Special purpose controller, with no MMU, but with a disk containing a simplified file system
    - Model: industrial robot controller

THE *Open* GROUP

POSIX 1003.13 Profiles Overview

- *Dedicated*: Large embedded systems
  - Platform: Large embedded system with file system on disk, with an MMU; software is complex and requires memory protection and network communications
  - Models: avionics controller, cellular phone cell node
- *Multi-Purpose*: Large general-purpose systems with realtime requirements
  - Platform: Large real-time system with all the features, including a development environment, network communications, file system on disk, terminal and graphical user interfaces, etc.
  - Model: workstation with realtime requirements:
    - air traffic control systems
    - telemetry systems for Formula One racing cars

POSIX 1003.13 Profiles
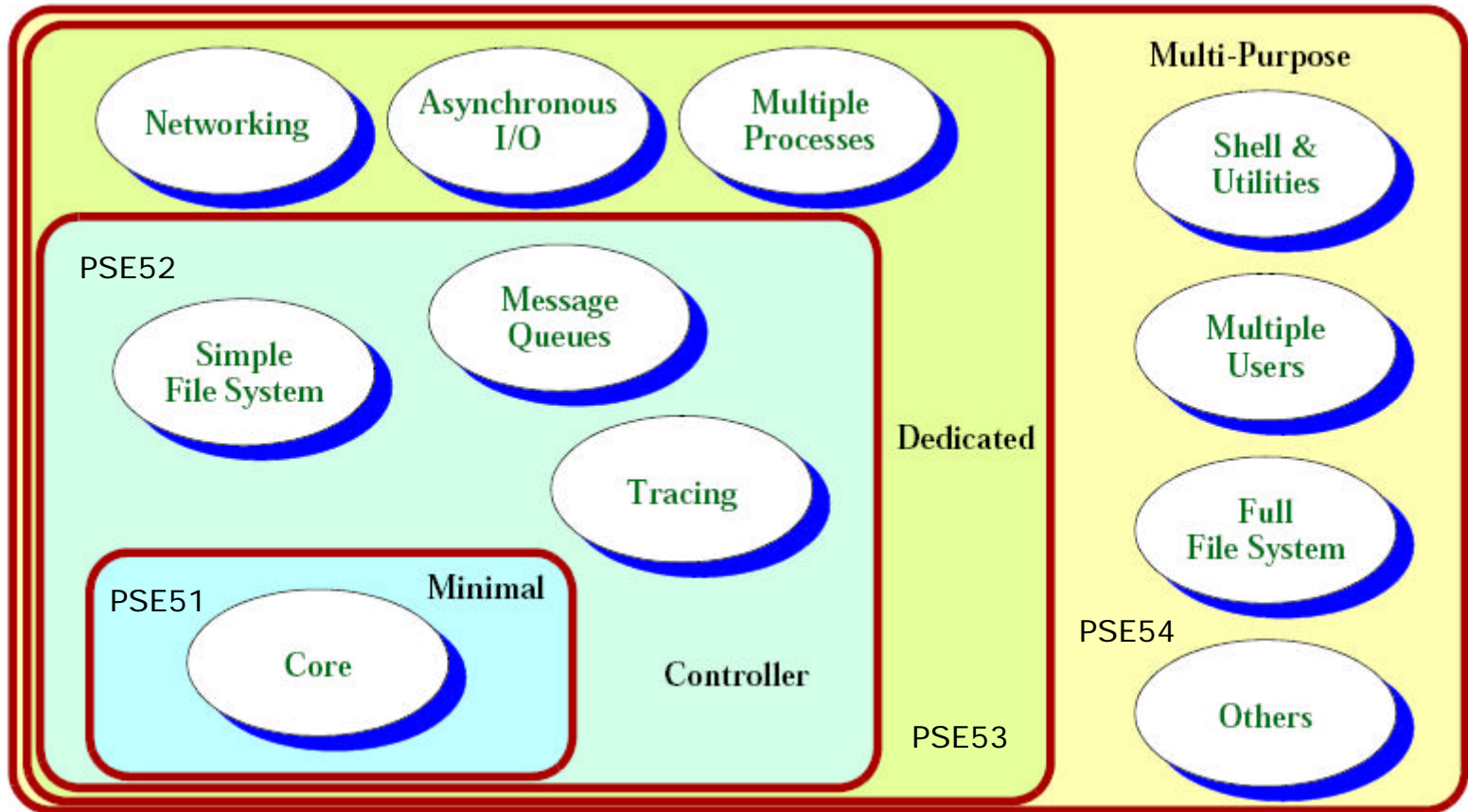
Portable Operating System Interface
IEEE Standard POSIX 1003.13

THE *Open* GROUP

POSIX 1003.13 Timeline

Copyright (c) 2006 The Open Group
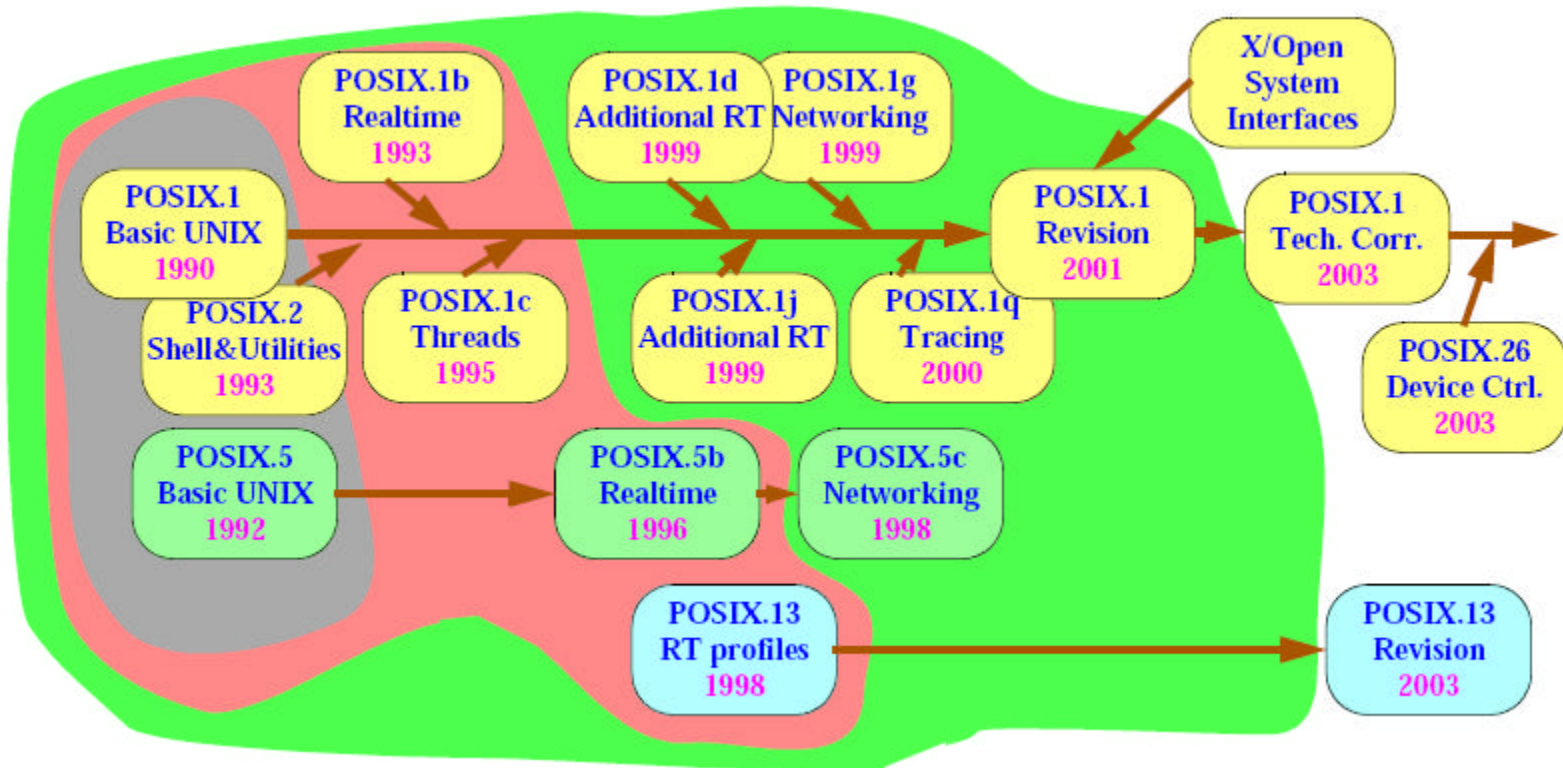
POSIX® *Certified*
by IEEE and The Open Group

How compliance claims can be proven….

IEEE

THE *Open* GROUP

Program Principles

❑ Clear and well-defined:

  ▪ certification policies

  ▪ processes for achieving and maintaining certification

  ▪ based on industry best practice.

❑ Certification backed up by conformance testing

Certification Agreement

❑ Vendor guarantee of conformance to specifications.

  ▪ Vendor 'Warrants & Represents'

❑ This guarantee ensures that:

  ▪ Products conform to a specification

  ▪ Products remain conformant throughout the life of the product's registration

  ▪ Any non-conformance will be fixed in a timely manner

THE *Open* GROUP

Benefits of Certification(1)

❑ For Procurement:

- Assurance of POSIX conformance and interoperability

- Level of assurance matched to the needs of the particular application

THE *Open* GROUP

Benefits of Certification (2)

❑ Suppliers can demonstrate and provide objective evidence to their customers that their products are compliant with the industry recognized 2003 edition of IEEE 1003.1 POSIX Standard

❑ Products that successfully pass all the test suites and obtain a related certification certificate are able to carry the POSIX Certified trademark

THE *Open* GROUP

1003.1-2003 *Base* Certification

- ❏ Certification for the *Base mandatory* features of POSIX 1003.1
- ❏ 1003.1-2003 System Interfaces
    - ▪ Mandatory POSIX System Interfaces
    - ▪ Tested by VSX-PCTS2003
- ❏ 1003.1-2003 Shell and Utilities
    - ▪ Mandatory POSIX Shell & Utilities
    - ▪ Tested by VSC-PCTS2003

THE *Open* GROUP

POSIX 1003.1, 2003 Test Suites

VSX-PCTS 2003

System Interfaces & Headers

VSXgen - Generic test suite layer

Test Environment
Toolkit, (*TET3.6-lite*)

VSC-PCTS 2003

Shell & Utilities

THE *Open* GROUP

POSIX 1003.13 Certification PSE54

❑ PSE54:2003 Certification

  ▪ Covers in addition to 1003.1 several Realtime options from 1003.1

  ▪ Certification against PSE54 Multipurpose Realtime 1003.13 Product Standard

  ▪ Tested by:

    ▪ PSE54-2003 Test Suite

    ▪ VSC-PCTS2003

POSIX 1003.13 PSE54 , 2003 Test Suites

VSPSE54:2003

*System Interfaces & Headers,
(includes threads and realtime
options)*

VSXgen - Generic test suite
layer

Test Environment
Toolkit, (*TET3.6-lite*)

**VSC-PCTS
2003**

*Shell
& Utilities
(Includes
tests for SDO
and UP)*

THE *Open* GROUP

POSIX 1003.13 Certification PSE52

❑ PSE52:2003 Certification

■ Certification against PSE52 Realtime Controller 1003.13 Product Standard

■ Tested by:

■ PSE52-2003 Test Suite

IEEE

THE *Open* GROUP

POSIX 1003.13 PSE52 , 2003 Test Suite
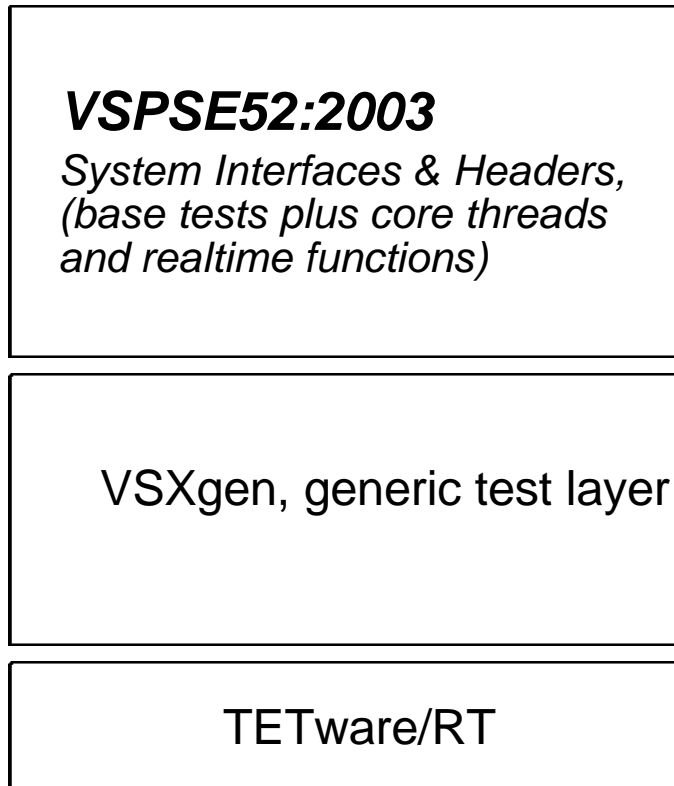
Test Architecture Supports
Embedded Target

VSPSE52:2003

System Interfaces & Headers,
(base tests plus core threads
and realtime functions)

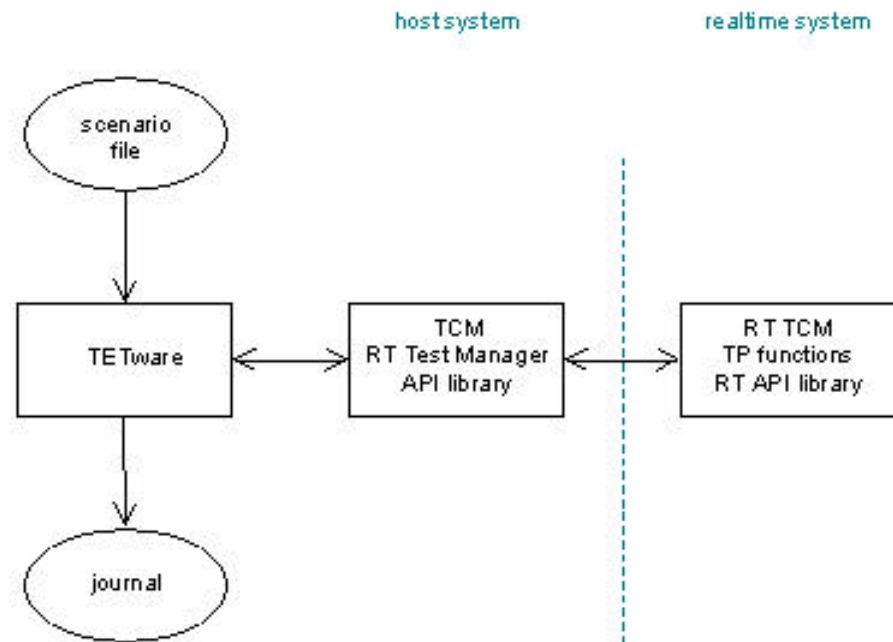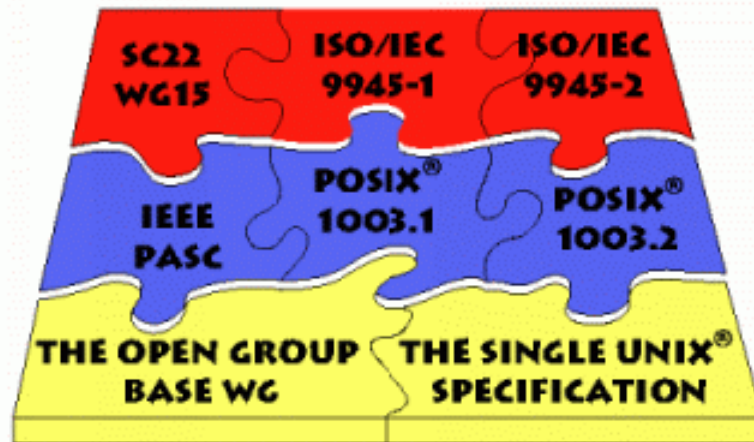VSXgen, generic test layer

TETware/RT

Figure 2: TETware Realtime Testing Architecture

THE *Open* GROUP

2006 Updates

Copyright (c) 2006 The Open Group

THE *Open* GROUP

POSIX.1/ Base Specifications *Draft* Roadmap

2005

Jan 2006

July 2006

Dec 2006

2007-

Interpretation Notes to Ed.

External Specs Identified

External Specs Material submitted

POSIX 1003.1, 2004 Edition

Revision Underway

POSIX 1003.1, 200x Edition

ISO C TC2

Issues Raised in SD/5

Aardvark Corrections
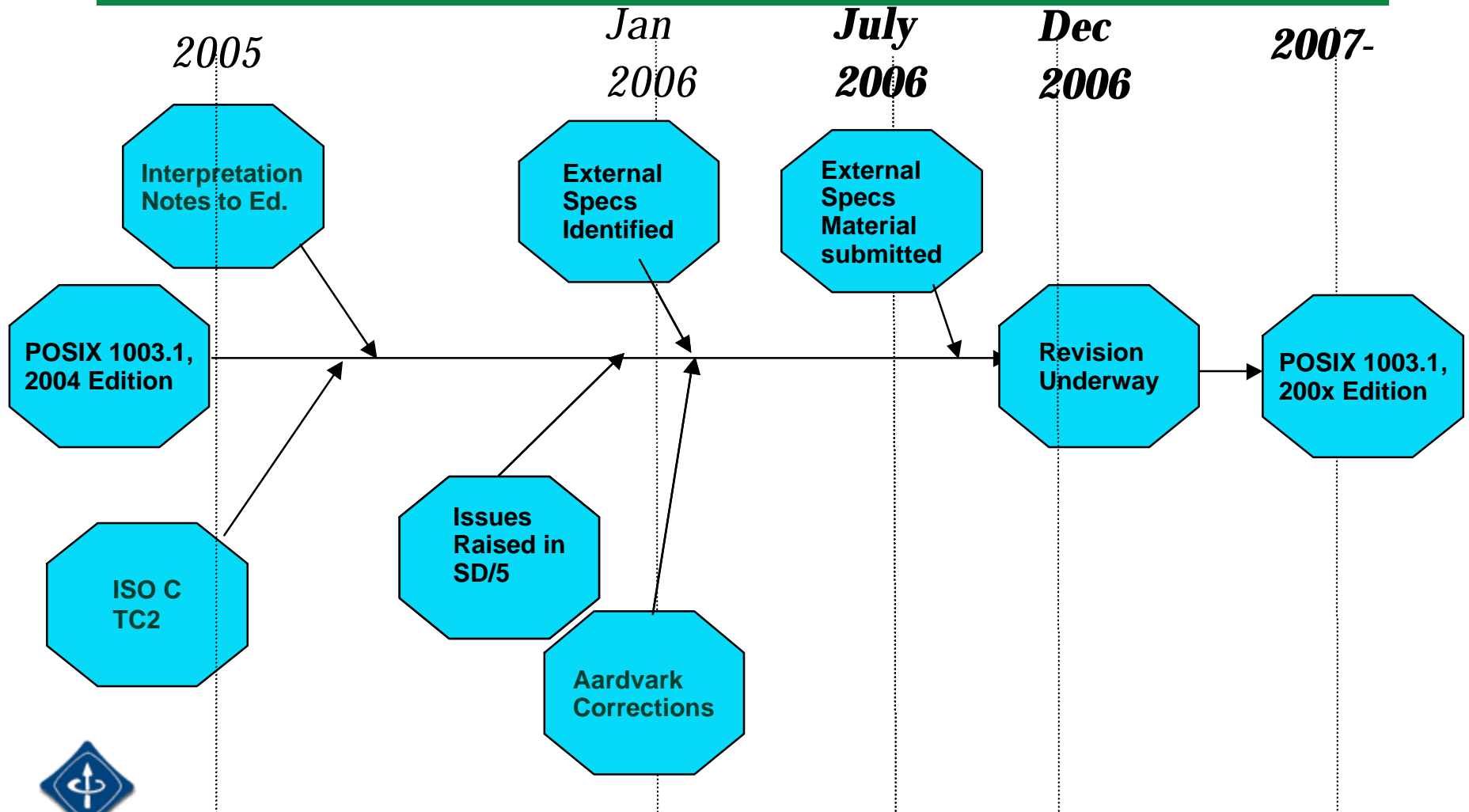
THE *Open* GROUP

Base WG Submissions

- Extended API Sets Part 1…4
  - Selected Gnu libc functions
  - Hardened file system related functions
  - Robust Mutexes
  - Thread-aware locale extensions

THE *Open* GROUP

IEEE POSIX®

Certified by IEEE and The Open Group

POSIX® : *Certified by IEEE and The Open Group – a briefing.*

The Source for POSIX Certification

http://posixcertified.ieee.org

January 2006.

IEEE

THE *Open* GROUP