



AN/UYQ-70 Technology Insertion '99 VME Migration

5/4/99



Slide 1



Summary of '99 Plans



This part of the '99 Technology Investigation plan is broken down into two areas.

- Technology Migration
 - Backplane
 - Processor
 - Operating System
 - Real-Time Mission Critical
 - Non-Mission Critical
- SPARC SBC Trade-off

Note that other issues like the Mission-Essential (low-cost) enclosure and cooperation with the SPAWAR IT-21 initiative are not discussed here!



Technology Migration

How can the future of the existing Q-70 technology be extended?

- Introduction
- Backplane
- Processor
- Operating System
 - Real-Time Mission Critical
 - Non-Mission Critical



Current AN/UYQ-70 Technology



The current AN/UYQ-70 is based on 1994 technology.

- AN/UYQ-70 Backplane
 - Based on standard VME (IEEE 1014)
- AN/UYQ-70 Processor
 - Current baseline HP 743 Single Board Computer (SBC)
 - Recompete is based on HP 744-132 SBC
 - Most users already desiring HP 744-165 SBC
- AN/UYQ-70 Operating System
 - Recompete OS use HP-UX 10.2 & HP-RT 3.0



Reason for Migrating

All standards and products have limited lifetimes and must eventually be replaced.

- HP 744 -165MHz is the “end of the road” for the HP PA-RISC VME Processor line
- HP is moving to CompactPCI (cPCI) with PA 8500 processor
 - Will run HP-UX 11, *may* run UX 10.20
 - Has no Real Time OS support
 - Primary customer is telecom industry
 - Lacks high end graphics support



Some Backplane Choices



The basic choices are: PCI, cPCI, VME, VME64x, or some combination of them.

- VME (IEEE 1014) is not desirable
 - Newer processors are not being offered in this market
- PCI is not recommended with the existing consoles
 - The PCI market does not offer the ruggedized packaging
- CompactPCI (cPCI) market is not ready yet
 - cPCI market is dominated by the Telecommunications industry where legacy Q-70 I/O & Graphics technologies are not important
- Mixing IEEE 1014 and CompactPCI is not desirable
 - Mixed backplanes require backplane networking middleware
 - Mixed bus system complicates Interbus communication
 - Mixing IEEE 1014 and VME64 extensions is most desirable solution



Backplane Recommendation

VME + VME64x + PMC carrier modules will allow access to the legacy modules & new technologies while maintaining the proven, rugged AN/UYQ-70 form factor.

- Mixing IEEE 1014 & VME64 extensions is most desirable
 - VME64x works seamlessly with IEEE 1014 bus
 - Legacy support via 1014, introduce faster processors via VME64x
 - High performance networking support via PMCs for ATM, Fast Ethernet, F/W SCSI, GSS2 graphics
 - Newer I/O technologies are available on PMC modules with local PCI interfaces and not available on VME modules
 - Local PCI busses will reduce the traffic on the VMEbus and extend its useful life
 - Backplanes with a mixture of 5 and 3 rows will allow continued support for the legacy Q-70 VME modules (like NTDS, RSC)



Some Processor Choices



The HP 744 is the last of its kind and will not be supported forever.

- Stay with HP 744-165MHz -- not acceptable
 - Current product will not meet future performance requirements
 - Lifetime buy inconsistent with Open Systems goals
- Move to a PowerPC Processor -- not desirable
 - Not mainstream -- Limited market
 - Future closely tied to Apple product plans
 - IBM (workstations) & Motorola (embedded systems) diverging
- Move to Alpha -- not desirable
 - Not available in VME form factor -- high heat dissipation
 - Targeted primarily for high end servers -- small market
- Move to MIPS -- not desirable
 - Silicon Graphics, major MIPS user, is shifting to Intel
 - Rapidly losing market share



Processor Recommendations

The COTS marketplace will provide growth options for main stream processors.

- Introduce SPARC Single Board Computer (SBC)
 - Minimal change to present Q-70 architecture: IEEE-1014 with 3-Rows
 - Preserves high-end RISC architecture path
 - Full featured UNIX available
 - Migration path for existing HP-based applications



Processor Recommendations (cont)

The COTS marketplace will provide growth options for main stream processors.

- Long Term Goal: Move to Intel SBC
 - Mainstream technology: **Follow the market!**
 - Competitive cost
 - Lowest risk: Well-defined road map
 - Rich choice of Operating Systems



Some Mission Critical OS Choices



The goal is to replace both HP-UX and HP-RT with only one Operating System.

- Windows NT is not acceptable in the short term
 - Real time capability is not built-in, although it can be obtained via third party add-on software
 - Lack of proven stability
 - More effort is required to migrate UNIX applications to Windows NT
- Linux is not suitable either
 - Shareware, lack of formal Configuration Management (CM)
 - No credible real time support
 - Several flavors compete for market share in web servers
 - Limited availability of development tools



Mission Critical OS Recommendation



SUN/Solaris can replace both HP-UX and HP-RT.

- Solaris is recommended as the Mission Critical OS
- Replace both HP-UX and HP-RT with Solaris
 - Many applications do not require hard real-time
 - Future Solaris releases have high potential for hard real-time support
 - Solaris is an excellent bridge from legacy to new software technology
- Proven stable, scaleable
- Runs on both Sparc and Intel platforms
- Good development support
- Good support from Sun (historically)



Migration of Applications to Solaris



SUN has an extensive toolset to support migration from HP-UX.

- Sun has a comprehensive program to help migration of existing applications from HP-UX and other Unix environments to Solaris
- SUNWcmigr tools contain
 - *score* utility for porting of source code
 - *scriptran* utility for migrating shell scripts
 - *oldworld* - save old Unix configuration
 - *newworld* - restore old Unix configuration on a new Solaris 2.x system
 - *appmap* - launch applications in a mixed platform environment
 - *y2000_install.sh* - examine executable binaries for year 2000 issues.



Migration to Solaris

SUN has web site data supporting migration.

- SUNWjmigr tool contains
 - JumpStart documentation used to configure a "lab environment" that will reflect the configuration of user workstation systems
- Migration kit can be downloaded from web site
 - http://opcom.sun.ca/migration_tools
 - Provides a Sample Migration Plan and tools to help port Unix infrastructure and applications to Solaris 2.x
- Related material can be found at <http://nce.sun.ca/>
(Click on "competitive migration" button)



VxWorks is an Alternative

A second Operating System can be added for real-time applications if required.

- If future Solaris releases do not include hard real-time features... then VxWorks can be used
 - Runs on both SUN/Sparc and Intel Pentium II platforms
 - UNIX-like, but not POSIX-compliant
 - Proven real time response
 - Presently used in Vertical Launch System (VLS) program



Non-Mission Critical OS Recommendations



Windows NT is not suitable for real-time combat systems (today), but it is the premier Operating System for desktop productivity products.

- Short term: Windows NT/UNIX Cohabitation
 - Defense Information Infrastructure Common Operating Environment (DII COE)
 - Joint Maritime Command Information System (JMCIS)
 - Information Technology for the 21st Century (IT-21)
 - DII COE and IT-21 would be supported by adding a VME64 based Intel SBC
 - running Windows NT and CITRIX clients
 - using an X-windows UNIX-based server



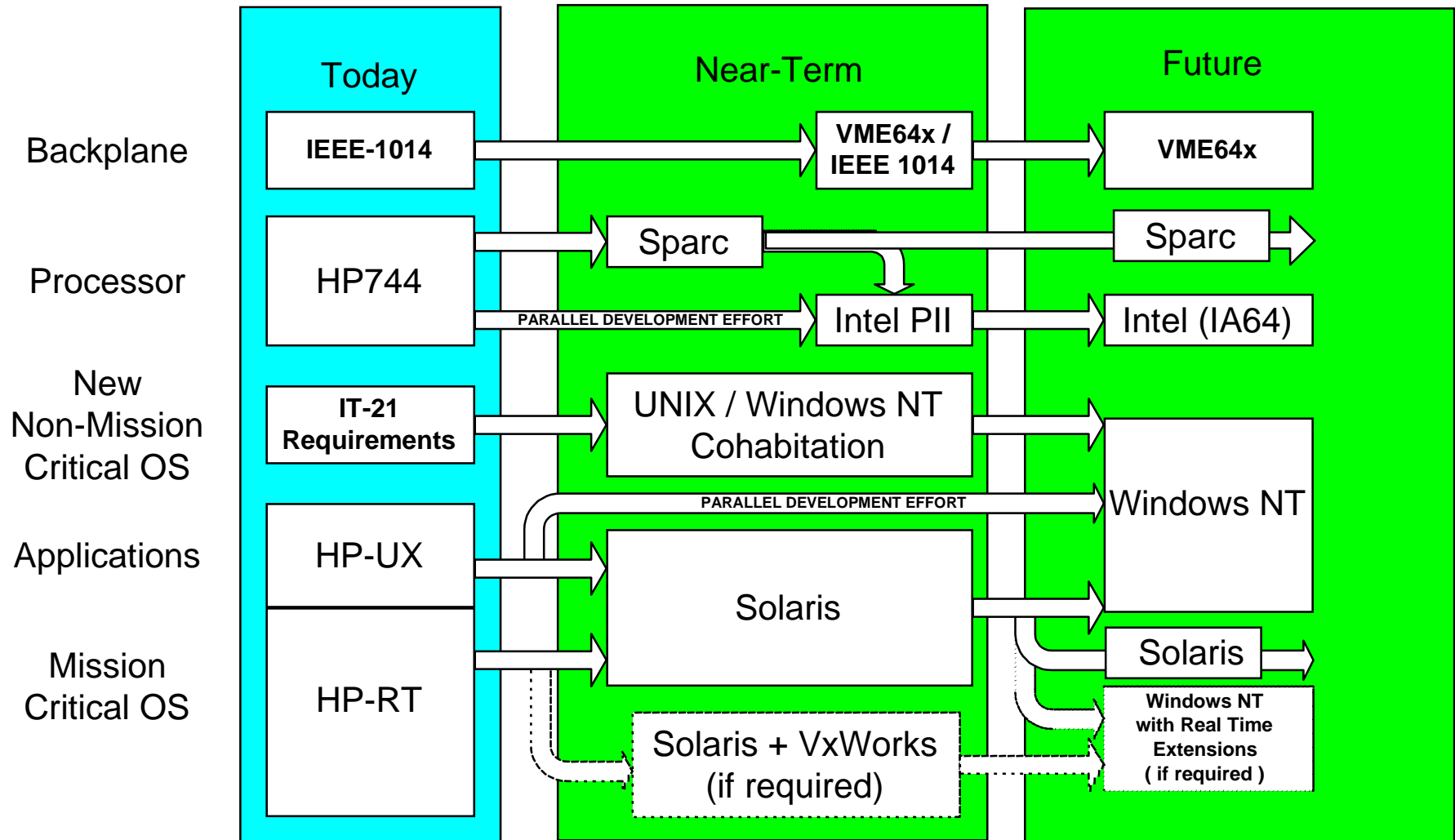
Non-Mission Critical OS Recommendations (cont)

In the long term a Windows NT OS will maximize the benefits of the Q-70 OSA.

- Long term: Open Windows NT
 - Maximize benefits of COTS marketplace trends
 - Start moving towards future sailors now
 - Continue to monitor the marketplace



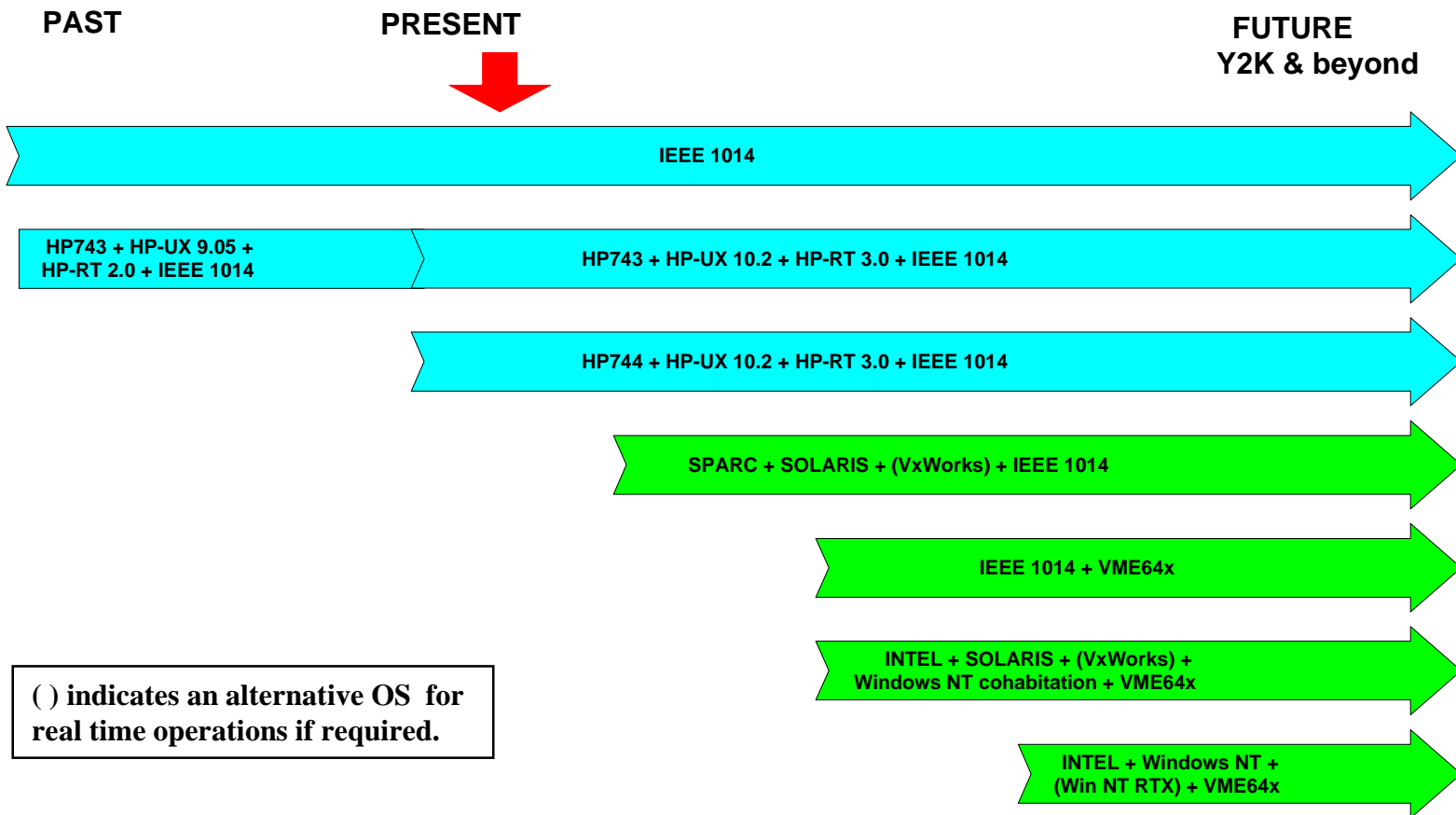
VME Technology Insertion





Q-70 VME Product Options

Q-70 users will have a choice of more CPUs and OSs in the future.





Q-70 Product Options

Q-70 users will have a choice of more CPUs and OSs in the future.

Past	Present	Future		
HP743 •HPUX 9.05 •HPRT 2.0 •IEEE 1014	HP743 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 HP744 •HPUX 10.2 •HPRT 3.0 •IEEE 1014	HP743 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 HP744 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 SPARC •SOLARIS •(VxWorks) •IEEE 1014	HP743 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 •VME64x/IEEE 1014 HP744 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 •VME64x/IEEE 1014 SPARC •SOLARIS •(VxWorks) •IEEE 1014 •VME64x/IEEE 1014 INTEL (P2) •SOLARIS •(VxWorks) •WindowNT Cohabitation •VME64x/IEEE 1014	HP743 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 •VME64x/IEEE 1014 HP744 •HPUX 10.2 •HPRT 3.0 •IEEE 1014 •VME64x/IEEE 1014 SPARC •SOLARIS •(VxWorks) •IEEE 1014 •VME64x/IEEE 1014 INTEL (IA64) •SOLARIS •(VxWorks) •WindowNT Cohabitation •VME64x/IEEE 1014 •Windows NT Mission Critical

() indicates an alternative OS for real time operations if required.





UNIX to Windows NT Migration



Some future applications do not require a real-time OS and may want to exclusively use Windows NT.

- The goal is to develop a set of “how to get there” guidelines for users who want to migrate to Windows NT from UNIX
 - UNIX to Windows NT Migration Tools
 - Windows NT Real-time extensions



Migration to Windows NT



Evaluating the migration tools is part of our Windows NT migration plan.

- Develop a Q-70 migration plan to Windows NT
 - Become active in the Windows NT 2000 beta program
 - Port a current HP-UX Q-70 Application to Windows NT
 - Evaluate UNIX porting tools
 - OpenNT/Interix
 - Nutcracker (used on JMCIS)
 - Evaluate X11 Performance
 - Port a current HP-RT Q-70 Application to Windows NT
 - Evaluate Windows NT real-time extension tools
 - InTime
 - RTX
 - Hyperkernel



Migration to Windows NT (cont)



Guidelines will make it easier for applications to transition to Windows NT.

- Evaluate RT Performance
- Determine real-time OS requirements
 - Evaluate & discuss existing architectures with users
- Show feasibility of porting Windows NT applications
 - Provide migration metrics
 - Provide Windows NT performance data
- Create guidelines for development of NT drivers
 - Develop sample Windows NT driver(s)



Summary of Recommendations

Prior Q-70 Technology Investigations will be the foundation for the 1999 activities.



Where We Want To Be (Short Term):

Backplane – VME64 Ext (X86 VME64 card) and/or VME1014 (Legacy NTDS, etc.)
Processor – SPARC, X86
OS – *Unix*: Solaris; (*Real Time*: VxWorks);
Windows: WinNT
Graphics – Solutions for GSS1, Radar Scan Converter, & Video
I/O Bridge – PMC (ATM, 100BaseT, SCSI F/W, GSS2)

Where We Want To Be (Long Term):

Backplane – PCI, PCI Radar Scan Converter and I/O
Processor – Intel IA64-based
OS – *Unix*: Solaris; (*Real Time*: VxWorks);
Windows: WinNT

1999 Technology Investigations:

- Demonstration Plans
- Source Selection
- VME64 Mechanical Study
- HP-UX to Solaris Migration Tools
- Solaris RT vs. VxWorks
- Unix to NT migration tools
- RT extensions to NT

Demonstrations:

- VME64 +1014 Backplane
- Sparc + X86 implementations
- Windows NT Cohabitation
- Port sample applications:
 - HP UX to Solaris
 - HP RT to Solaris
 - *HP UX to WinNT
 - *HP RT to WinNT w/ real-time extension

* in support of the 1999 Technology Investigations
() indicates an alternative OS for Real Time operations if required



SPARC SBC Trade-off

Themis USP Iii Family Selected.

- Trade-off conducted between Force and Themis SPARC solutions; available upon request to Mr. William L. Wilder, System Engineer at PMS-440
- Force solution is a 5-Row VME solution and Themis is a 3-Row VME solution
- Current Q-70 is 3-Row VME backplane
- Themis selected based on backplane impact to existing users