

Implementing Tivoli at Princeton University

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Issues for Higher Education

- ◆ Economic justification is difficult
- ◆ Different time constraints than business
- ◆ Few colleges or universities use ESM systems
- ◆ Many locally developed tools



Bringing Tivoli to Princeton

- ◆ Princeton Partnership 2000 project
 - ◆ Convert applications to distributed platforms
 - ◆ Provide infrastructure comparable to mainframe
- ◆ Tivoli/Princeton partnership
 - ◆ Broad range of products
 - ◆ Evaluate applicability in higher education



Implementation Timeline

- ◆ June 1998 – Purchased Tivoli suite
- ◆ December 1998 – TWS (Maestro) in production
- ◆ Sept-Dec. 1998 – Framework/DM/TEC architecture planning and initial implementation
- ◆ April 1999 – Permanent ESM group formed
- ◆ Sept. 2000 – All production systems monitored



Tivoli Products Initially Installed

- ◆ Enterprise Console
- ◆ Distributed Monitoring
- ◆ Workload Scheduler (Maestro)
- ◆ NetView
- ◆ Service Desk



Current Tivoli Configuration

- ◆ Distributed Monitoring
 - ◆ 150 Solaris and Windows NT hosts
 - ◆ Monitor system health (CPU, Memory, Disk, etc.)
 - ◆ E-mail and pager notification from TEC & DM
 - ◆ Web page monitor
- ◆ Workload Scheduler (Maestro)
 - ◆ 25 hosts, 300 schedules, 2000 jobs
 - ◆ Monitored via DM and TEC



Current Tivoli Configuration

◆ NetView

- ◆ Used in addition to existing tools
- ◆ Processing SNMP traps
- ◆ Notifications via e-mail and pager
- ◆ Not sending Tivoli events

◆ ~~Service Desk~~

- ◆ Replaced by locally developed Web application

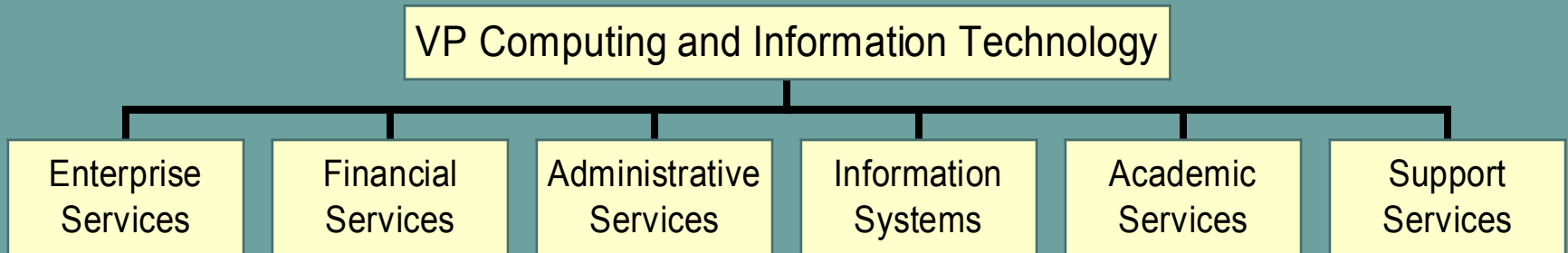


Staffing/Organization

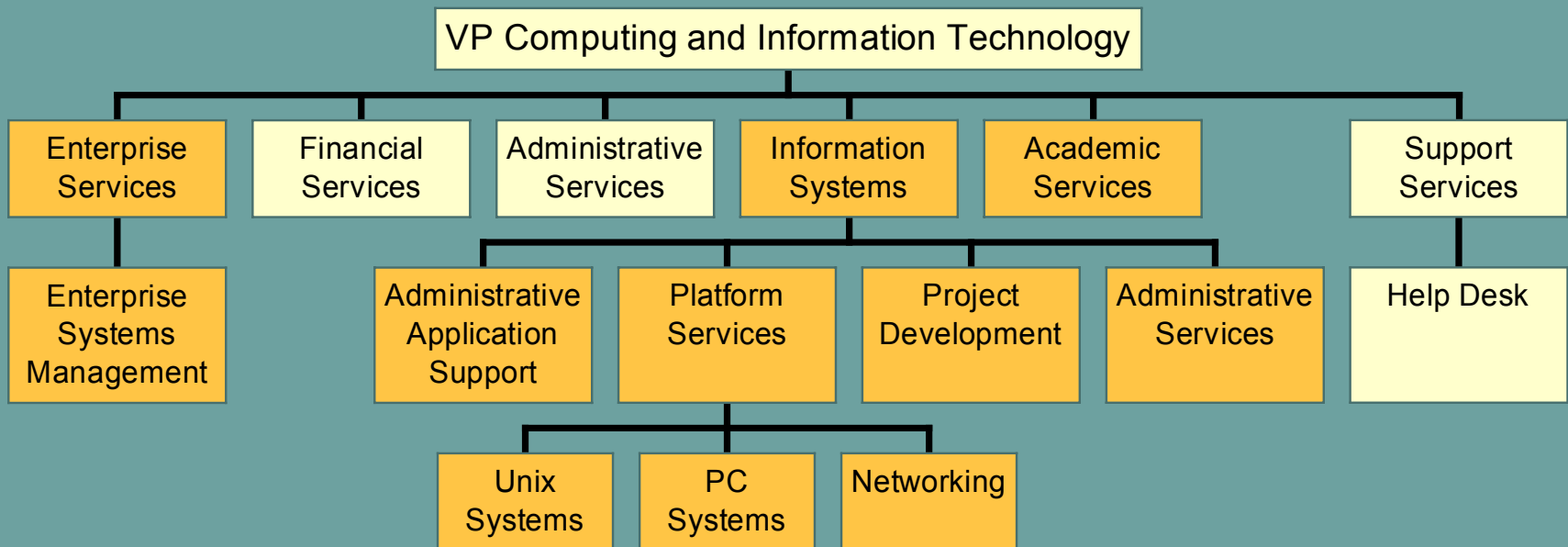
- ◆ Began with temporary project team
- ◆ Hired consultants for initial design and installation
- ◆ Created permanent ESM group after initial installation
- ◆ Service Desk implemented by Help Desk staff
- ◆ Netview implemented by Networking staff



Princeton IT Organization



Departments using Tivoli



Enterprise Systems Management

- ◆ Manager
- ◆ Two system administrators
- ◆ Responsibilities
 - ◆ Tivoli Monitoring
 - ◆ Tivoli Workload Scheduler
 - ◆ Dazel Output Management



Completed Projects

- ◆ Heartbeat system
- ◆ Customized event display
 - ◆ Group events by host and application area
 - ◆ Modify event contents via TEC rules
 - ◆ Web event display
- ◆ Web page monitor
- ◆ Tools to instrument non-Tivoli monitors



Web Event Display

Event Summary - Netscape

File Edit View Go Communicator Help

Tivoli event summary: Fri Mar 30 12:24:49 2001

Subtotals			CRITICAL	MINOR	WARNING	HARMLESS
	All	Alerts	2		3	348
cfsmiscservers	15	2	2			13
clusters	70					70
csg	33	3			3	30
dms	36					36
irix	8					8
publicunix	4					4
systemsnt	162					162
tivoli	5					5
webservices	20					20

Document: Done



ALERTS for ALL systems as of Wed Mar 28 15:05:51 2001

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Severity	Group	Host	Event Class	Message	Date	Repeat
CRITICAL	CSG	mmp	PU_sysidle	Value=0, Previous=22	Mar 28, 2001 15:03	0
CRITICAL	SystemsNT	assets	nt_SysPrcTotCpuTime	Value=100, Previous=99.7393	Mar 28, 2001 15:05	1
WARNING	CFSMiscServers	tango	PU_netin	Value=662737, Previous=807704	Mar 28, 2001 15:04	4
WARNING	CFSMiscServers	tango	PU_netout	Value=660513, Previous=834876	Mar 28, 2001 15:04	3
WARNING	CFSMiscServers	maestrosrv	universal_countstr	Value=34, Previous=22	Mar 28, 2001 09:30	1
WARNING	CSG	mailserver2	PU_mutex	Value=253, Previous=251	Mar 28, 2001 15:05	14
WARNING	CSG	mmp	PU_netout	Value=564758, Previous=623158	Mar 28, 2001 14:53	12
WARNING	CSG	forward	universal_countstr	Value=93, Previous=65	Mar 28, 2001 11:22	1



Planned Projects

- ◆ Logfile adapters for application logs
- ◆ Notification engine for TEC
- ◆ Manager for Oracle
- ◆ Application Performance Monitor



Lessons Learned

- ◆ Underestimated time and staffing needs
- ◆ Difficulty of replacing existing tools
- ◆ Top-down vs. bottom-up strategy



Why did we underestimate time and staffing?

- ◆ Turnkey application vs. toolkit
- ◆ Difficulty of changing current practices
- ◆ Time required to master products
- ◆ Operational tasks preempt development
- ◆ Open positions
- ◆ Multiple projects



Why not replace existing tools?

- ◆ Existing tools are
 - ◆ Not integrated
 - ◆ Not uniform
- ◆ But, these tools are also
 - ◆ Well understood
 - ◆ Tested and reliable
 - ◆ Integrated into operational processes



Development Strategies

Bottom-up



Top-down

- ◆ Start with infrastructure
- ◆ Synthesize application status from lower level events
- ◆ Users are system administrators
- ◆ Replace existing monitors

- ◆ Start with applications
- ◆ Analyze application problems based on lower level information.
- ◆ Users are application owners and operations
- ◆ Integrate existing monitors



Development Strategies

+ Bottom-up -

- ◆ Models application dependencies
- ◆ Drives high reliability
- ◆ Needs buy-in from system administrators
- ◆ Replaces existing tools

+ Top-down -

- ◆ Models end-user experience
- ◆ Adds value immediately
- ◆ More complex monitors
- ◆ Less sophisticated users



Summary – Tivoli@Princeton

- ◆ TWS schedules all new application systems
- ◆ NetView provides critical operation alerts
- ◆ TEC/DM monitors all production hosts
- ◆ Progress has been slower than expected
- ◆ Future TEC/DM development will focus on applications rather than infrastructure



For more information

- ◆ Princeton ESM Web site:
<http://www.princeton.edu/~esm>
- ◆ E-mail augustin@princeton.edu

