



User Facilities Project Status

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**PMG
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Progress Since Last PMG

◆ Project Definition refinements

- ➔ Project Costing
- ➔ Project Schedule & Milestones
- ➔ Project Resource Needs

◆ Results of DOE/NSF “Baseline” Review

- ➔ Comments from the committee

◆ Summary



User Facility Project

Size of US CMS Tier 1 Regional Center

Tape Storage (ESD/AOD/Raw/TAG/Calibration/etc.)	1.02 PB
Disk for AOD/TAG/user/cache/etc	0.8 PB
CPU for simulation, data reprocessing, analysis, data serving	167k Si95's

◆ Schedule overview

FY2000 – FY2004:

R&D phase (Stretched out)

FY2005-FY2007:

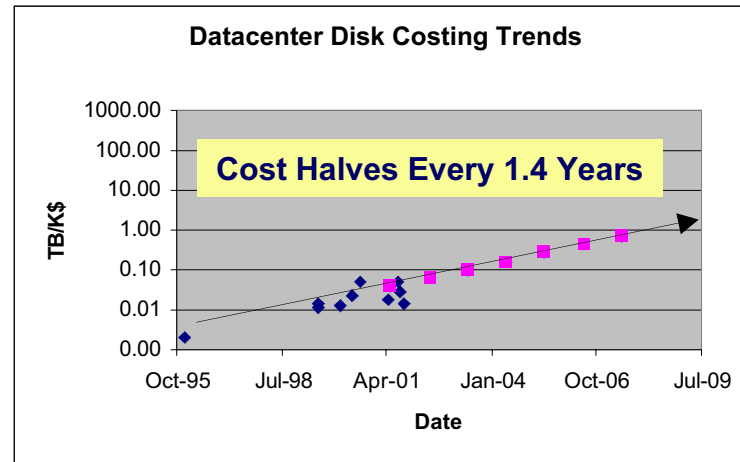
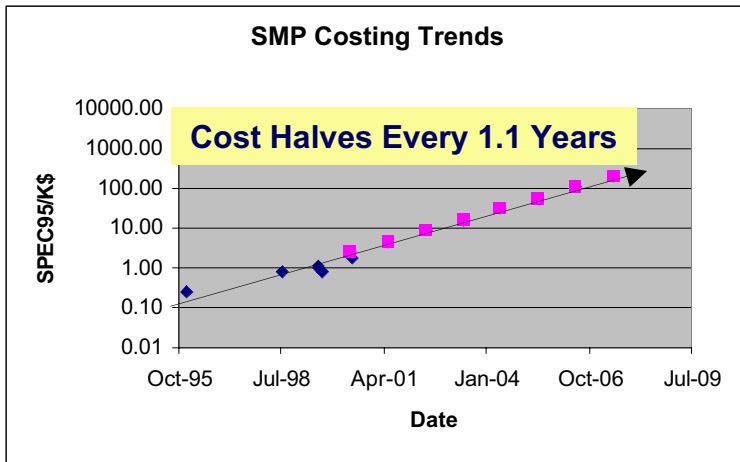
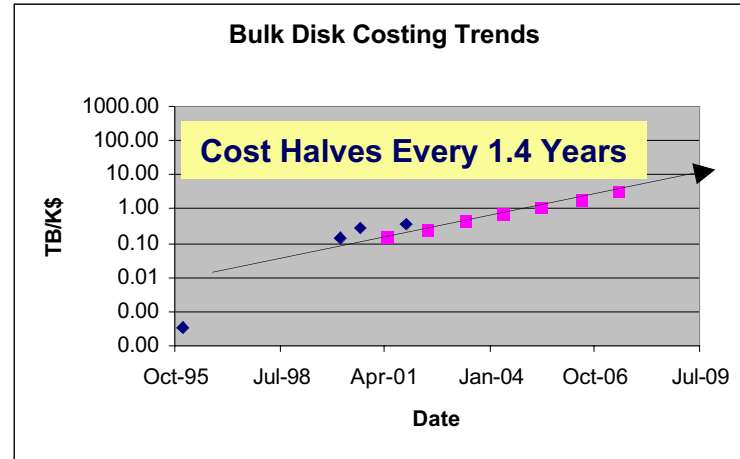
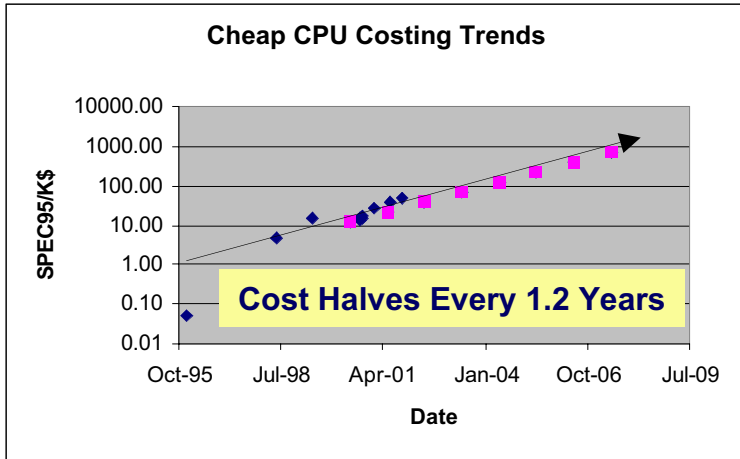
Implementation Phase (Shifted)

FY2008 and onwards:

Operations Phase



Costing Uncertainties





UF Equipment Funding Request

WBS #	2002	2003	2004	2005	2006	2007	2008
1.1 T1 Regional Center	0	0	0	2,866,049	2,984,127	2,937,831	2,646,796
1.2 System Support	29,000	23,200	0	34,800	0	0	15,428
1.3 O&M	0	0	0	0	0	0	0
1.4 T2 Regional Centers	232,000	240,000	870,000	1,870,000	1,500,000	1,750,000	1,250,000
1.5 T1 Networking	60,900	53,650	42,050	511,560	461,854	527,568	484,861
1.6 Computing R&D	511,489	472,203	492,080	0	0	0	0
1.7 Current Support	83,520	53,360	52,200	0	0	0	0
1.8 Local Comp. Supp.	11,600	95,120	127,600	23,200	52,200	23,200	48,430
Total	928,509	937,533	1,583,930	5,305,609	4,998,181	5,238,599	4,445,515



Tier 1 Installed Capacity by Year

	2002	2003	2004	2005	2006	2007
Simulation CPU (Si95)	2,000	3,000	4,000	7,200	28,800	72,000
Analysis CPU (Si95)	750	2,100	4,000	8,000	32,000	80,000
Disk (TB)	16	31	46	65	260	650
Server CPU (Si95)	50	140	270	1,500	6,000	15,000



Progress Since Last PMG

- ◆ **Project Schedule & Milestones**
- ◆ **Project Resource Needs**



Major Milestones

		FY2002				FY2003				FY2004				FY2005				FY2006				FY2007				FY2008			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1-2% Data Challenge	12/1/2001	█																											
User Analysis Cluster Commissioned	6/1/2002	█	█	█																									
FY02 Hardware Upgrade	8/1/2002				█																								
DAQ TDR	11/1/2002				█																								
Software Baseline: persistency choice	12/1/2002				█																								
5 % Data Challenge	1/1/2003						█																						
Design of T1 5% prototype	6/1/2003							█																					
Implementation of 5 % prototype	3/1/2004								█																				
Software and Computing TDR	12/1/2003								█																				
1st Pilot Tier 2 center	1/1/2004										█	█																	
20 % Data Challenge	6/1/2004											█	█																
Physics TDR	12/1/2004												█																
10 % Tier 1 RC	1/1/2005														█	█													
2nd Tier 2 Center	3/1/2005														█	█													
3rd Tier 2 Center	3/1/2005														█	█													
40 % Tier 1 online	10/1/2005																█												
4th Tier 2 Center	1/1/2006																		█										
LHC Running	4/1/2006																			█	█								
5th Tier 2 Center	10/1/2006																				█								
100 % Tier 1 online																											█		

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Vivian O'Dell, *US CMS User Facilities Status*



R&D Phase Plans

Need R&D to convince ourselves we know how to solve these problems

R&D Activities and Milestones

→ Monte Carlo Productions and Data Challenges

- Making Monte Carlo “grid enabled” helps research distributed computing issues
- Integrating Tier 1 and Tier 2 sites in US – prototype Tier 2 sites very important for this research

→ User Analysis cluster

- Building a user analysis cluster from commodity boxes
- Getting input from users EARLY

→ Disk

- Researching disk performance/reliability
- Input from US-ATLAS, US labs and computing centers

→ Tape

- Researching hardware/software for faster, easier tape access

→ Collaboratory

- Investigating Control Room Logbook



R&D Activities/Milestones

Distributed Monte Carlo production

Goals:

- Integration with T2's
- Development of Distributed production system
- Facilitate software deployment at remote sites
- Produce useful Monte Carlo for Physics Groups
- Develop tools for producing ntuple replacement
- Event documentation and databasing for users

For user facilities, this means supporting testbeds, supporting users, deploying software

Schedule of hardware/software upgrades and installation is in sync with CMS Mock Data Challenge Schedule



User Analysis Cluster Schedule

Milestones for FY02

➔ **02/01/2002**

- Prototype User Analysis Cluster R&D finished.**
- Design report released.**

➔ **03/01/2002**

- Commission User Analysis Cluster for ntuple analyses.**
- Release cluster to “experts”**

➔ **04/01/2002**

- Release cluster to users**

➔ **06/01/2002**

- Experience with User Analysis Cluster report released.**

➔ **07/01/2002**

- Design UAC upgrade**



Disk Project Schedule

Milestones for FY02

➔ 12/01/2002

- Finish testing new arrays (Winchester, Zyzzx, RAIDzone)
- Publish results
- Start long term (“acceptance-like”) test suites

➔ 02/01/2002

- Finish acceptance tests
- Publish results
- Release R&D raid arrays for use in UAC/production

➔ 03/01/2002

- Complete monitoring suite for measuring performance of RAID arrays in situ

➔ 05/01/2002

- Experience with RAID arrays in production/UAC and compare with test results

06/01/2002

- Finish small raid array experience survey document

➔ 07/01/2002

- Plan large RAID acquisition for FY03



FTE Profile

WBS #	2002	2003	2004
1.1 T1 Regional Center	0	0	0
1.2 System Support	1.1875	2.375	3
1.3 O&M	0.875	1	1.25
1.4 T2 Regional Centers	3.5	4	5.5
1.5 T1 Networking	0.5	2	2.5
1.6 Computing R&D	1.9375	3.9375	4.6
1.7 Current Support	0.875	1.4375	1.4375
1.8 Local Comp. Supp.	0.1875	1.875	2.375
Total	9.0625	16.625	20.6625
Total (Tier 1 only)	5.5625	12.625	15.1625



Tier 1 Work Plan 2002-2004

FY02:

- ➔ For 2002 we have descoped and will try to limp along with our small staff.
 - ❑ No network WAN monitoring
 - ❑ R&D slowed – not sure we will make projected schedules
 - R&D equipment waiting for testing
 - User analysis cluster schedule likely to be delayed
 - “reference” clusters not being kept in tune
 - Trying to support users – but installing debuggers, etc. takes more time than it should
 - Computer security issues being addressed very slowly
 - Abandoned T1/T2/T0 simulation efforts altogether for lack of manpower
 - Collaboratory, web support and documentation also suffering
- ➔ We are really short on networking and system management (relying heavily on current CD staff working off project)
- ➔ Both R&D and production efforts are suffering from lack of people.
- ➔ We are trying to keep a good balance between supporting current work and R&D projects.
- ➔ We have attracted a couple of guest scientists/engineers and hope that will help



Tier 1 Work Plan 2002-2004

FY03:

- ➔ Plans call for 12.6 FTE – an additional 7 FTE
- ➔ We will have in FY03 (keeping current staff)
 - ☐ 5 Full Time FTE's
 - ☐ _ time visiting scientist (M. Ernst, starts April 02)
 - ☐ 1/6 FTE in guest engineer (M. Souza, starts December 01)
 - ☐ + ~1.0 FTE in “off-project” people (?? If current levels persist)

1.2 System and user support	1.3 Operations & Infrastructure	1.5 Networking	1.6 R&D	1.7 Construction Phase Activities	1.8 FNAL based computing
2.4	1	2	3.9	1.4	1.9
1.2	0.9	0.5	2.9	1.0	0.2
1.2	0.1	1.5	1.0	0.4	1.7

Major hires in:

- System administration (both in 1.2 & 1.8)
- Networking LAN/WAN and monitoring (1.5)
- R&D and hardware simulation (1.6)
- Documentation & collaborative tools (1.2)



Tier 1 Work Plan 2002-2004

FY04

- Plans call for 15.2 FTE – an additional 2.6 FTE
- Assuming we hired the people we requested for FY03, then the table will look like:

1.2 System and user support	1.3 Operations & Infrastructure	1.5 Networking	1.6 R&D	1.7 Construction Phase Activities	1.8 FNAL based computing
3	1.3	2.5	4.6	1.4	2.4
2.4	1	2	3.9	1.4	1.9
0.6	0.3	0.5	0.7	0	0.5

Incremental hires in:

- System administration (both in 1.2 & 1.8)
- Networking LAN/WAN and monitoring (1.5)
- R&D and hardware simulation (1.6)
- Documentation & collaborative tools (1.2)
- Data center, computer siting, power, etc. (1.3)



T1 UF Milestones for FY01

WBS Number	Milestone Description	Milestone Date	Completion Date
1.3.3.1	Siting and power installation for CMS farm	10/01/2000	10/01/2000
1.5.1.1	Install and commission onsite network hardware for CMS linux farms	10/01/2000	10/01/2000
1.5.1	CMS Network upgrade: stage 1	08/01/2001	New est: 12/01/2001
1.6.3.1	Commissionn CMS linux farms	11/01/2000	11/01/2000
1.6.3.1.1	Production on reference cluster for commissioning/kerberos test	09/01/2001	New est: 12/01/2001
1.6.3.1.2	Installation/commissioning of "User" cluster	11/01/2001	New est: 02/01/2002
1.7.1.1	Complete CMSIM production on central farms	12/01/2000	12/01/2000
1.7.1.2	Hosting User Federation at FNAL		02/20/2001
1.7.1.3	Complete AOD** (ntuple)	01/30/2001	10/15/2001

~ 1 month Installation delay due to lack of manpower

~ 3 month estimated delay due to lack of sysadmin manpower

~ 3 month estimated delay due to lack of sysadmin/R&D manpower

~ 9 month estimated delay due to lack of manpower, production resources



Tier 2 UF Milestones for FY01

1st prototype Tier 2 (UCSD/CIT)

WBS Number	Milestone Description	Milestone Date	Completion Date
1.4.1.1	Vendor Selection for 1 st half of T2 hardware	10/01/2000	10/01/2000
1.4.1.2	Procurement of 1 st half of T2 hardware	12/01/2000	01/07/2001
1.4.1.2	Procurement of 1 st half of T2 hardware	12/01/00	01/07/2001
1.4.1.2.1	Commissioning and Testing of Half Size System		02/01/2001
1.4.1.2.2	Reconstruction of events from CMS Fall Production	03/21/2001	07/05/2001

4 month delay due to lack of manpower



Tier 2 UF Milestones for FY01

2nd prototype Tier 2 (University of Florida)

WBS Number	Milestone Description	Milestone Date	Completion Date
1.4.2.1	Installation and configuration of CMS and related production software	07/01/2001	09/07/2001
1.4.2.2	Setup and installation of testbed cluster	07/01/2001	09/21/2001
1.4.2.3	Commissioning of UF cluster on CMS production	08/01/2001	10/03/2001
1.4.2.4	Completion of 50k fully processed events	08/15/2001	10/10/2001
1.4.2.5	Installation of GRID software, GLOBUS, for running GDMP	09/15/2001	12/15/2001

3 month delay due to lack of manpower



Problems & Worries*

Physics issues

- Physics analysis center – we need to build a physics base in the US, especially at FNAL (need a scientific appt to start and build this effort)

Funding profile

- This is a moving target. We cannot define a doable project without a stable funding profile.

Manpower issues

- I've mentioned this before. We are really stretched thin. This is related to the funding profile uncertainty.

Project Management issues

- Need to get SoW's written for T1/T2's
- T1 & T2 funding are independent, which makes planning difficult
- iVDGL does not supply all manpower needed for centers – add'l support must come from other sources

* As presented in baseline review



Review Results and Comments

One Line Summary:

- Review committee endorsed proposed project schedule, scope, budgets and management plan
- Project should go forward as advertised (morally baselined)

Comments on User Facility

- Both Tier1 and 3 Tier 2 prototypes are operational and contributing to physics and R&D
- Good progress towards configuring these systems into useful grid for MC production
- Tier 1 delivering good support for Tier 2 sites
- Good level of effort underway on computer center component evaluations
- Personnel allocation: FY02 good/FY03 total OK, but too much network, not enough R&D/FY04 ditto
- Good cost model for various components
- Long Term T1 cost projections conservative

Recommendations for User Facility

- Continued focus on testing rather than highly robust production deployment
- Revisit Tier 1 hardware plans prior to procurement
- Benchmark staffing plans against commercial facilities



Summary

User Facility Project Planning updated

- Updated/refined hardware costing
- Updated/refined personnel profile
- Updated/refined schedule/milestones

User Facilities is Now “Morally Baseline”

User Facility Project Management Near term goals:

- Finish MS project plan (B. Banerjee)
- Complete T2 WBS for 1st prototype
 - Write/Sign SoW by end of the year
- Complete WBS for 2nd prototype
 - Write/Sign SoW by end of the year
- Implement better project tracking (especially w/T2's)
 - Tracking personnel against project projections
 - Tracking hardware against project projections
 - Update project from tracking experience

- Update “xproject”