Commodity Node Procurement Process Task Force: Status

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Run 2 Computing Review

September 13, 2005

Outline

- **Charge and Organization**
- **Research and Discovery Topics**
- **Plans for Completion**

Some Background

- Procurement of 1000's of PCs takes a large amount of effort.
- Housing all of these machines takes a huge (Megawatts) amount of power.
  - Should we be thinking about "performance per watt"?
- It is useful to examine the procedure used in recent years:
  - Vendor evaluation to qualify vendors.
  - Limited bids.
  - 30 day burn-in for acceptance.
  - Integrated PC/rack (Fermilab specifies rack configuration)
  - No formal consideration for power, cooling, space in bid evaluations.
- Some recent acquisitions have had problems.
  - Technical problems/failure during burn-in.
  - Leads to delays in getting the computing in production.
  - Can we do better?
- Many ideas for improving the process exist and may benefit all of us.

Charge and organization

- **Charge to the task force was sent to department heads June 2, 2005 by Vicky White.**
  - **CD-doc-886**
- **Steve Wolbers was asked to lead the task force.**
- **Mark Fischler was asked to serve to assist to formulate economic models.**
- **Departments were asked to nominate people and the task force has membership from CSS, CMS, Running Experiments, CEPA, CCF, Facility Operations.**
- **Work began in June and was interrupted once or twice by vacations.**

Charge

The task force is asked to:

1) **Consider the existing procurement strategy** and its pros and cons.
2) **Hear stakeholder and provider ideas** about possible modifications to the procurement process, including input from procurement and facilities providers.
3) **Consider the economic model of what it actually costs** us to procure, install and run systems over their lifetime. Here factors such as space, power, repairs, vendor liaison and visits, time spent on installs or vendor education, risk, integration costs, and more might be taken into account in a full economic model
4) **Consider which aspects of the economic model might in some way be considered in evaluating the value of a vendor's response to a bid.**
5) **Consider whether the acceptance process is optimal** for rejecting systems. Since it is actually hard to send systems back in reality the acceptance process has turned out to be merely the first step in the long process of owning systems and making them run reliably enough, including working with the vendor to address deficiencies.
6) **Recommend a procurement and acceptance strategy for the future. The** goal is to maximize the utility of the computers while minimizing the total cost, including costs associated with the procurement and operation of the systems.

Deliverables and Timescales (1)

- **From the charge:**
  - "Recommendation for either maintaining the current process or making some short term do-able modifications to it. We will need these before the end of June."
- **Committee's recommendation (June 20, 2005):**

  1) Lattice QCD should use their standard process.
  2) Run 2 and GP Farms can use the current process with necessary updates. Changes to take into account vendors, IPMI infrastructure, power, cooling and space needs, etc. are all within the boundaries of the current procurement methodology.

  The task force considered the possibility of recommending that the process used for the FY05 CMS node procurement be used for other FY05 procurements. However, the FY05 CMS process won't be finished until August-September, 2005. It is too early to evaluate that procurement at this time.

  Even though the task force cannot recommend the use of the FY05 CMS procurement process for remaining FY05 purchases the task force believes that it should be an option for those purchases.
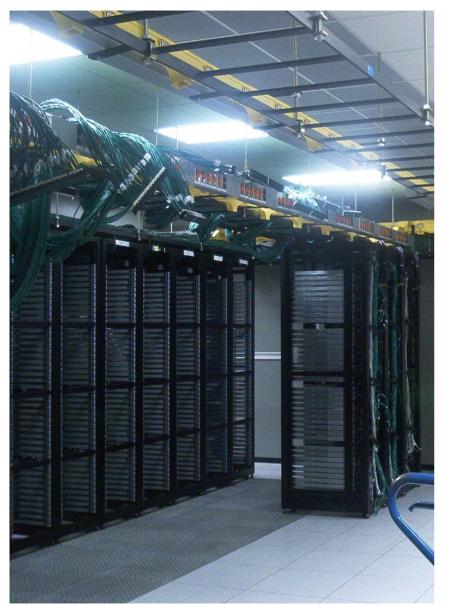
Deliverables and Timescales (2)

- **From the charge:**
  - *"Recommendation for procurement and acceptance processes for future procurements. We will need this before October 1."*
- **We won't make it by October 1 but we plan to be finished before the FY06 procurement cycle begins.**

Topics Covered or Scheduled

- **Computer Room Facilities Cost**
  - Space, Power, Cooling
- **Vendor and Hardware Qualification**
- **Concepts for Modeling Node Procurement**
- **PC Farm Acquisitions at Other Labs**
  - Argonne, BNL, CERN, JLAB
- **Lattice QCD Procurement**
- **Economic Models for Bid Evaluation Formula**
- **Meeting with Fermilab Procurement Department**
- **CMS Procurement Strategy FY05 and Plans and Ideas for the Future**
- **Moore's Law**
- **Racking/Packaging**

* All of these are documented in CD docDB

Recent Construction Costs

CD Computer Room Infrastructure Limits and Costs

	FCC1/2	GCC(A)	GCC(TR)	GCC(B)	LCC(108)	LCC(107)	FCC Upgrade	Monsanto Greenfield Site	"ACME"
Total Power KW	678	840		840	500	550	not designed		78
Total Cooling KW	790	720		840	200	550			78
Total Sq Ft	16,000	2,200	2,300	2,300	1,500	3,000		40,000	1,120
Rack Space Sq Ft	3,200	432		504	192	312		8,000	120
Max Racks	533	72		84	32	52		1333	20
Avg Rack Power Density KW	1	10		10	6.25	11			4
Cost to Build $M	10	2.2	0.675	2.9	0.4	1		21	0.35
Cost $K per Sq Ft to Build	0.6	1.0	0.29	1.3	0.3	0.3		0.53	0.3
Cost $K per Sq Ft/ 3 Yrs	0.21	0.33	0.10	0.42	0.1	0.1		0.18	0.1
Cost $K per Rack Space	19	31		35	13	19			18
Floor Space Watts/Sq Ft	42	327		365	133	183			70
Rack Space Watts/Sq Ft	212	1667		1667	1042	1763			650
Cost to Build $K/KW	15	3		3	2	2			4
Facilities Maint $K/Yr	150	70		70	20	40			60
CDO/OPS FTE	1.00	0.50	0.10	0.50	0.25	0.25			1.00
Sysadmin									
Networking									

	FY05	FY06	FY07						
Elec $/KW-HR	0.048	0.052	?						

Upgrades	FY02	FY03	FY04	FY05	FY06	FY07	Total		
FCC Gen/UPS	3.5								
FCC add 2 100 KVA UPS		0.5							
FCC ICW pipe replace		0.3							
GCC CRA				2.2					
GCC CRB					2.9	1.8			
GCC Tape Robot room					0.675				
GCC CRC						2			
Add Elec	0.1	0.1	0.1	0.1	0.1	0.1			
Total	3.6	0.9	0.1	2.3	3.7	3.9	14.5		

Some Observations

- **Space, Power, Cooling is important and it is expensive.**
  - **Performance/watt has become an important metric for computers.**
- **It would be wise to do as much as possible in common to save effort, to learn from each other, to gain some leverage from all the efforts.**
- **Fermilab is not significantly better or worse than any other place in how we acquire commodity PCs.**

Issues to be resolved

- **Weight to be put on various costs and benefits in the bid evaluation formula.**
  - Performance.
  - Infrastructure costs.
  - Other lifetime costs.
- **Vendor evaluation process.**
- **How to/whether to speed up acquisitions.**
- **Delivery schedule and acceptance process:**
  - All at once vs. a few racks at a time (delivery).
  - 2 weeks vs. 30 days (burn-in).
- **Racking strategies.**
- **Commonality of evaluation and acquisition process across the Division.**

The Plan/Conclusions

- **We will hear some more detailed reports over the next couple of weeks.**

- **Then we will work on recommendations with the goal of having them to Vicky well before the large FY06 purchases and certainly as early as possible given the lead time needed for evaluation, requisition-writing, approvals, etc.**