Working Group 8 Procurement, Accessibility and Cost of Ownership

Chair: Frank Thames

Vice-Chair: Jim Kasdorf

WG8 – Procurement, Accessibility, and Cost of Ownership Charter

- Charter

  - Explore the principal factors affecting acquisition and operation of HEC systems through the end of this decade. Identify those improvements required in procurement methods and means of user allocation and access. Determine the major factors contributing to the cost of ownership of the HEC system over its lifetime. Identify impact of procurement strategy including benchmarks on sustained availability of systems.

- Chair

  - Frank Thames, NASA

- Vice-Chair

  - Jim Kasdorf, Pittsburgh Supercomputing Center

WG8 – Procurement, Accessibility, and Cost of Ownership Guidelines and Questions

- Evaluate the implications of the virtuous infrastructure cycle i.e. the relationship among the advanced procurement development and deployment for shaping research, development, and procurement of HEC systems.

- As input to HECRTF charge (3c), provide information about total cost of ownership beyond procurement cost, including space, maintenance, utilities, upgradeability, etc.

- As input to HECRTF charge (3) overall, provide information about how the Federal government can improve the processes of procuring and providing access to HEC systems and tools

- Example topics:
  - procurement, requirements specification, user infrastructure, remote access, allocation policies, security, power and cooling costs, maintenance costs, reliability and support

Working Group Participants

- Frank Thames
- Jim Kasdorf
- Bill Turnbull
- Gary Wohl
- Candace Culhane
- James Tomkins
- Charles W. Hayes
- Sander Lee
- Charles Slocomb
- Christopher Jehn
- Matt Leininger
- Mark Seager

- Gary Walter
- Graciela Narcho
- Dale Spangenberg
- Thomas Zacharia
- Gene Bal
- Per Nyberg
- Scott Studham
- Rene Copeland
- Paul Muzio
- Phil Webster
- Steve Perry
- Cray Henry
- Tom Page

WG8 Paper Presentations

- Per Nyberg: Total Cost of Ownership
- Matt Leininger: A Capacity First Strategy to U.S. HEC
- Steve Perry: Improving the Process of Procuring HEC Systems
- Scott Studham: Best Practices for the Procurement of High Performance Computers by the Federal Government

Total Cost of Ownership

- Procurement of Capital Assets
  - Hardware
  - Acquisition cost (FTE)
  - Cost of money for LTOPS
  - Software licenses
- Maintenance of Capital Assets
- Services (Workforce dominated; will inflate yearly)
  - Application support/porting
  - System administration
  - Operations
  - Security

Total Cost of Ownership

- Facility
  - Site Preparation
  - HVAC
  - Electrical power
  - Maintenance
  - Initial construction
  - Floor space
- Networks: Local and WAN
- Training
- Miscellaneous
  - Residual value of equipment
  - Disposal of assets
  - Insurance

Total Cost of Ownership

- Can "Lost Opportunity" cost be quantified?
  - Lost research opportunities
  - Lower productivity due to lack of tools
  - Codes not optimized for the architecture
  - Etc.
- Replacement cost of human resources
- Difficulty in valuing system software as it impacts productivity (development and production) vice quantitative methods to measure hardware performance

Total Cost of Ownership

- Other Considerations
  - If costs are to include end-to-end services
    - Output analysis must be added (e.g., visualization)
    - Mass Storage
    - Application Development
      - Some architectures are harder to program (ASCI: 4-6 years application development; application lifetime: 10-20 years)
      - H/W architectures last 3-4 years → applications must last over multiple architectures

Total Cost of Ownership – Bottom Line

- Consider ***ALL*** applicable factors

- Some are not obvious

- Develop a comprehensive cost candidate list

Procurement

- Requirements Specification
- Evaluation Criteria
- Improving the Process
- Contract Type
- Other Considerations

Procurement

- Requirements Specification
    - Elucidate the fundamental science requirement
    - Emphasize quantifiable Functional requirements
    - Exploit economies of scale
    - Application development environment
    - Make optimum use of contract options and modifications
    - Maximize the use of technical partnerships
    - Consider flexible delivery dates where applicable (increases vendor flexibility)

Procurement (Continued)

- Requirements Specification (Continued)
  - Be careful about "mandatory" requirements → prioritize or weight them
  - Be aware of specifications which may limit competition
  - Avoid "over specifying" requirements for advanced systems
  - Fundamental differences in specification depending on the intended use of the system (Natural tension between Capacity vs Capability and general tool vs specific research tool)

Procurement (Continued)

- Evaluation Criteria
  - For options on long-term contracts, projected "speedup" of applications
  - Total Cost of Ownership
  - Use "Real Benchmarks"
    - Be careful not to water down benchmarks too much
    - On the other hand, don't push so hard that some vendors can't afford it
    - Other approaches needed for future advanced systems
  - Use Best Value
  - Risks

Procurement (Continued)

- Improving the Process
  - Insure users are heavily involved in the process
    - Eases vendor risk mitigation
    - Users have "decision proximity"
  - Non-disclosures required by vendors hamstring government personnel after award
  - Maintain communications between vendors and customers during the acquisition cycle without compromising fairness

Procurement (Continued)

- Improving the Process (Continued)
  - Consider DARPA HPCS Process for "Advanced Systems"
    - Multiple down-selects
    - R&D like
    - Leads to production system at end
  - Attempt to maintain acquisition schedule adherence

Procurement (Continued)

- Contract Type
  - Consider Cost Plus contracts for new technology systems or those with inherent risks (e.g., development contracts)
  - Leverage existing contracts that fit what you want to do
- Other Considerations
  - Don't have a single acquisition for ***ALL*** HEC in government
    - Leads to "Ivory Tower" syndrome and
    - A disconnect from users
    - Bottom Line: don't over Centralize

Procurement (Continued)

- Other Considerations (Continued)
  - Inconsistencies in way acquisition regulations are implemented can lead to inefficiencies (vendor issue)
  - Practices that would revitalize the HEC industry
    - What size of market is needed: At least several hundred million dollars per year per vendor
    - Recognize that HEC vendors must make an acceptable return to survive and invest

Accessibility

- ***Key Issue***: Funding in the requiring Agency to purchase computational capabilities from other sources
- There are many valid vehicles to providing interagency agreements to provide accessibility (e.g., Interagency MOU's)
- Suggested Process: DOE Office of Science and NSF process – open scientific merit evaluated on a project by project basis
- Current large sources would add x% capability to supply computational capabilities to smaller agencies
- Implementation suggestion: Consider providing a single POC for Agencies for HEC access (NCO?)