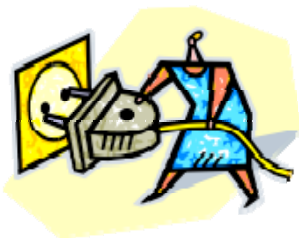


DOE Best Practices Workshop
Power Management
San Francisco, Sept. 28-29, 2010

Session 2d: Integrated Facility Planning for System
and Network Upgrades
Breakout Report



Breakout participants

Anna Maria Bailey (Lead)

Nicholas Nagy (Co-Lead)

Bryan Biegel

Myra Branch

Jason Budd

Segi Girona

Rick Griffin

Mark Hartzell

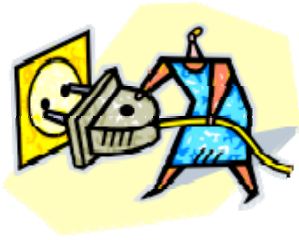
Ken'ichi Itakura

Sander Lee

Tim McCann

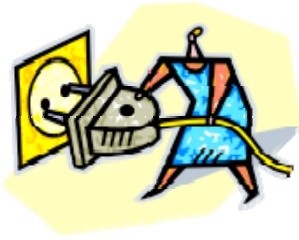
Terri Quinn

Richard Rivera



Outline of Breakout Discussion

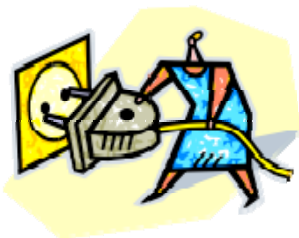
- *Integrated Facility Planning from the Rack to the Utility Level with Flexibility, Reliability, Scalability and Expandability*
 - *System Layouts*
 - *Consideration of 3-D layouts, Containers*
 - *Warehouse*
 - *Power*
 - *Power Quality, RUPS*
 - *Cooling*
 - *Fire Protection*
 - *Structural Requirements*
 - *Networking*
 - *Monitoring & Control*



Experience

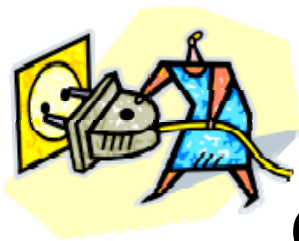
Novel / Interesting Approaches

- Utilizing ground water/grey water for cooling loops/sources.
- Recapturing makeup water from high humidity zones
- Integration of Facilities and HPC under common Management
- Networking cabling overhead vs under floor
- Flexible design for scaling in & out the infrastructure equipment
- Ability to have equipment on/off raised floor



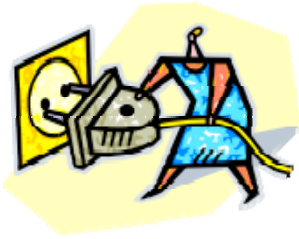
Best Practices

- Understanding regional strengths/weakness
- Flexibility and Expandability in overall infrastructure design
- Pay-as-you-go for growth
- Preparing for more water/liquid cooling requirements
- Higher voltage direct to computers
- Integration of highly skilled facility staff within the programs
- Leveraging resources effectively
 - Isolating lower density machines



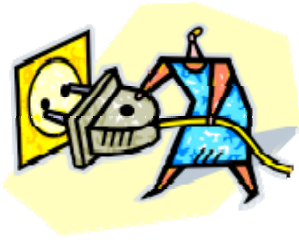
Gaps Looking Forward to New Systems

- *Wider range of cooling temperatures from the Vendors*
- *Uncertainty of power densities of future systems and cooling approaches*
- *Uncertainty of the network going forward*
 - *Bandwidth, Interconnects*
- *Weights of systems*



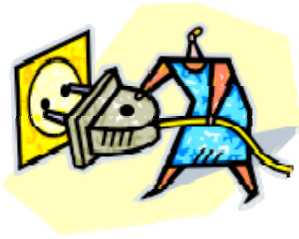
Evolve or start over for future systems?

- Evolve
 - Cooling solutions
 - Facility layouts
- Start Over
 - Building management systems are point constrained
 - Current facility is antiquated
 - Cost effective to build new vs rehab



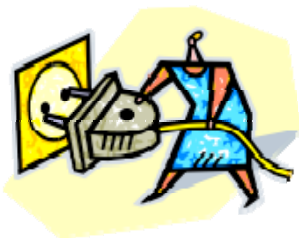
Issues shared with large commercial centers

- *Cooling*
- *Density*
- *Power Budgets*
- *Total cost of ownership*
- *Fire Protection*



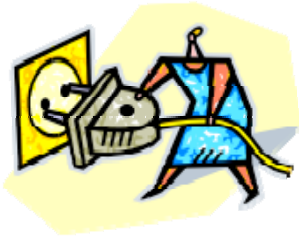
Hardware/facility/system interfaces to influence

- *Moving towards higher voltages/DC power option*
- *Expand liquid cooling for commodity products*
- *Enterprise solutions for Energy Management*



Status of (de facto) standards

- *NFPA 70E Electrical Safety*
 - *Improvements in DC for arc flash*
- *Fire Protection Standards for both data centers and HPC*
- *Standardize on the Emergency Power Off (EPO)*
- *Resolving the mandates outlined in DOE 430.2b*
- *Implementing latest ASHRAE guidelines*



Other key findings

- *Need to interact with Industry, Vendors, Users*
 - *Computer*
 - *Plant Infrastructure Equipment*