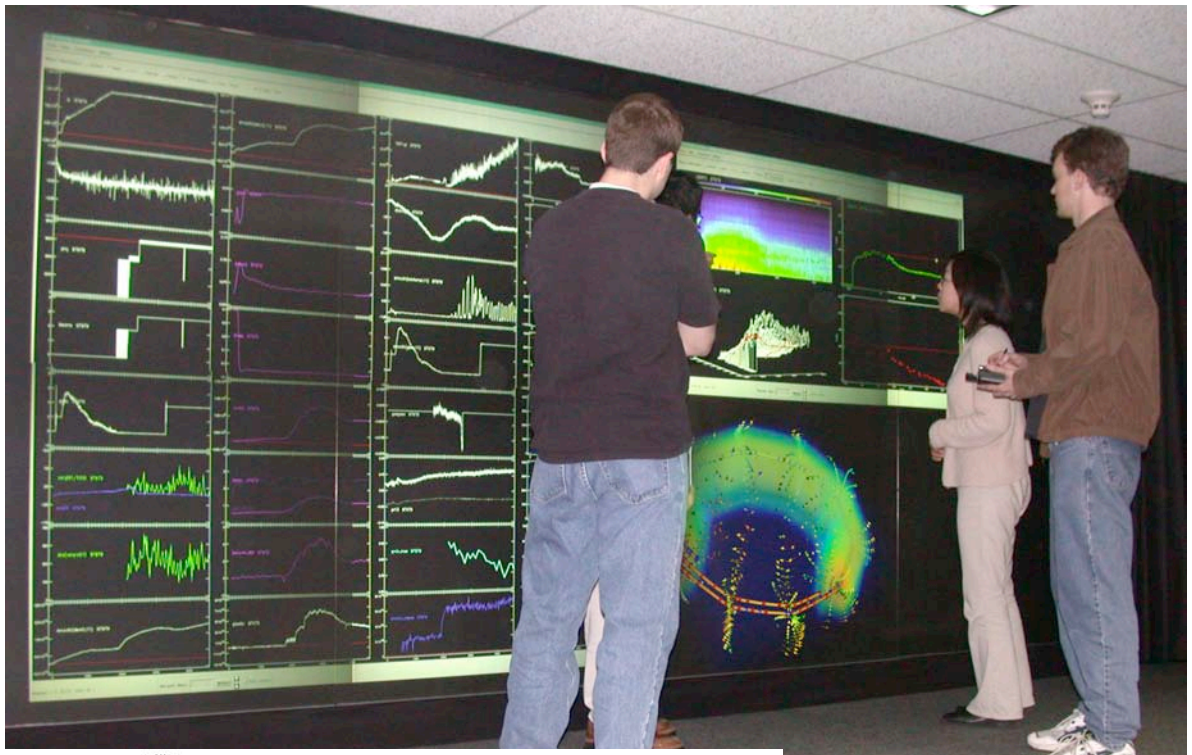
Answer to PAC Questions



by
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Office of Science
U.S. DEPARTMENT OF ENERGY

FusionGRID
www.fusiongrid.org

Charge to PAC

New scientific insights/conceptual breakthroughs enabled by the FES SciDAC program?

What would not exist if the NFC Project was never funded?

- **TRANSP & GATO FusionGrid Services**
  - More people using codes with less effort & better support
- **Shared displays and associated software in tokamak control rooms**
  - Stated by many as having a large impact on productivity
- **Significantly enhanced remote collaboration**
  - AG nodes (Macintosh & small scale) & VRVS
- **SCIRun visualization being used on fusion data**
  - NIMROD team

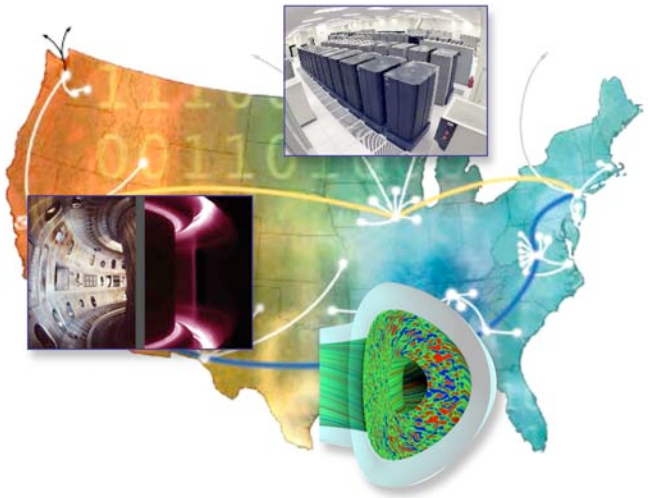
Charge to PAC (2)

Demonstrated utilization of terascale computing capability?

Demonstrate a collaborative path to terascale computing?

- **Pseudo real-time FusionGrid computing during tokamak operations**
  - Demonstrated with TRANSP this year
  - Deployed for routine usage next year

- **Path to utilize terascale computing to support experimental operations**
  - Network QoS
  - CPU scheduling
  - Faster CPUs and algorithms
  - Data management



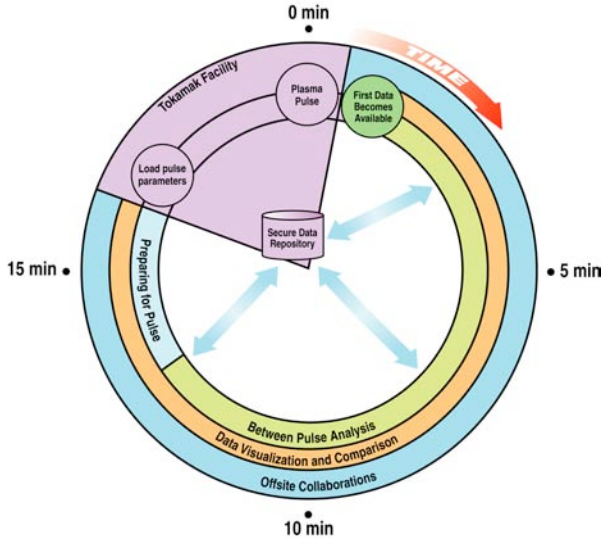
Charge to PAC (3)

Likelihood of timely delivery of reliable computational modeling capabilities addressing burning plasma physics issues relevant to ITER?

Likelihood of timely delivery of reliable capabilities addressing issues relevant to ITER?

- **All our capabilities are relevant to ITER**
  - Grid computing, shared displays, remote collaboration

- **The collaborative control room**



General Questions

What specific steps to take this year to make sure there is more analysis of simulation data?

How have you made data analysis easier?

- **For experimental data the answer is yes**
  - FusionGrid computational services have resulted in more usage with less overall effort
- **For simulation data the answer is not yet**
  - Data management solution for simulation data will help
  - Parallel MDSplus I/O utilizing Globus XIO to be completed

General Questions (2)

What kind of computer infrastructure do you need to be most effective (memory, CPU time) and what is your ideal computational source?

What computer infrastructure's do you support?

- **Our aim is all platforms used in FES research**
  - Very heterogeneous environment
- **FusionGrid security being ported to Windows**
  - Globus not available for Windows
- **AG now available on Macintosh OS X**
  - Web browser client will broaden scope
- **Shared display software away from X-Windows to VNC**
  - X-Windows does not run on all platforms

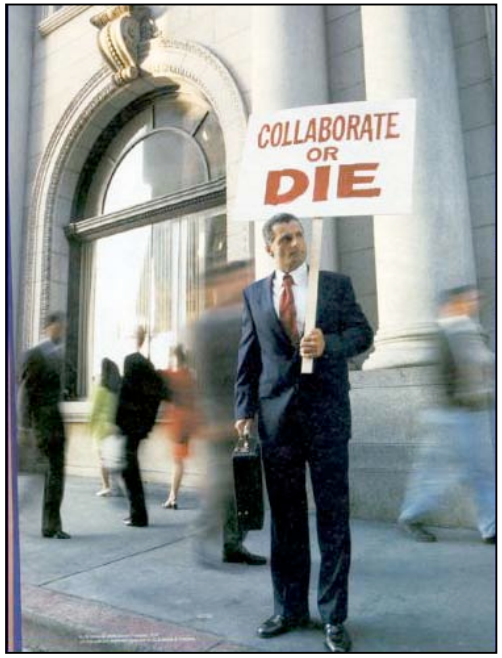
NFC Project Specific Questions

What are you hearing from the experimental user community that they need in the next few years?

- **Between-shot: transport => kinetic EFIT => stability analysis**
  - We are pushing FusionGrid's between shot capability
- **Reliable, robust, easy-to-use remote communication via AG nodes**
  - Robust in terms of network issues (eliminate multicast)
  - Easier to use in terms of "less clicks" to get started
- **Easy and quick to share visualizations**
  - Integrated seamlessly in AG
  - Not slowing down the local person's analysis
- **One comment: often we do not hear it, but demo and ask**
  - Grid computations and shared displays just two examples

NFC Project Specific Questions (2)

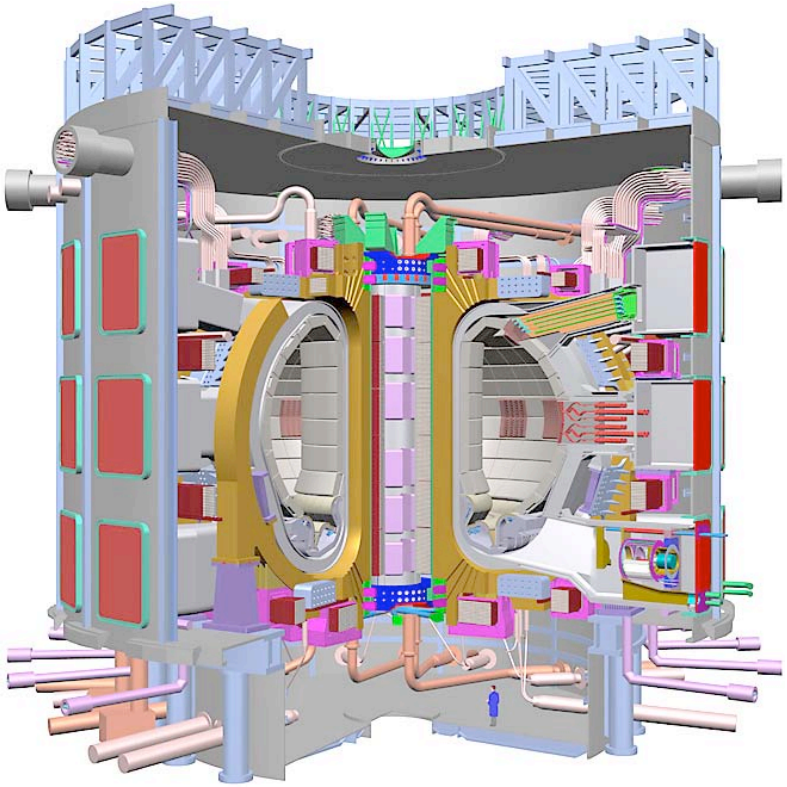
What are the needs that you perceive for FSP and ITER?



- **Change in mind-set to a collaborative culture**
  - Driven by management
  - Remote working meetings, shared code debugging/tracking, etc.
- **Complete data management solution**
  - Simulation data validation via comparison to experimental data
- **FSP used during experiments to analyze data**
  - To be made available as a FusionGrid computational service
  - "Depth" of physics driven by need

NFC Project Specific Questions (2)

What are the needs that you perceive for FSP and ITER?



The Collaborative Control Room

- **Secure computational resources scheduled as required**
- **Rapidly compare experimental data to simulation results**
- **Share individual results with the group via shared large displays**
- **Fully engaged remote scientists with audio, video, shared displays**

NFC Project Specific Questions (3)

What level of cross-cutting collaboration with other than fusion science disciplines involving Grid technology are planned including government and commercial?

- **Particle Physics Data Grid (PPDG)**
  - Grid and facility computation and storage resources to form effective end-to-end capability

- **Earth Systems Grid II**
  - Integrate supercomputers with large-scale data and analysis servers for next generation climate research

- **Collaboratory for Multi-Scale Chemical Science**
  - Advanced collaboration and meta-data management technologies to develop a grid and CMCS community portal

NFC Project Specific Questions (3)

What level of cross-cutting collaboration with other than fusion science disciplines involving Grid technology are planned including government and commercial?

- **InSORS** inSORS®
  - Private company deploying AG nodes
  - Economy of scale & long-term support
  - SAIC as example

- **Univa Corporation** Univa
  - Developing & supporting commercial Grid solutions
  - Based on Globus Toolkit

- **IBM, RSI (IDL) and others commercializing Grid technology**
  - Watch and see the developments

NFC Project Specific Questions (4)

What lessons have you learned from using home grown software versus off-the-shelf commercial software?

- **Commercial software is ready to go out of the box**
  - Does not make sense to compete (e.g. IDL)
- **Commercial market is very small in some of our areas of interest**
  - For example, shared visualizations with video conferencing
- **In some areas we have led the commercial world**
  - IBM, Sun, HP, Platform Computing adoption of Grid Computing
- **We need to be constantly vigilant**
  - When is it time to buy and when is it time to build
  - And has the time changed