THE SUCCESS OF FUTURE MACHINES BOTH TO THE INDIVIDUAL PARTNERS AND THE COLLABORATIVE CONTROL ROOM

THE NATIONAL FUSION COLLABORATORY PROJECT TOOLS
– Both functionality and to the broader international FES community
– Extend our existing collaborative tools to meet future needs
– Supercomputer: real-time experimental support
– ITER will be supported by a worldwide team

Collaborative technology critical to fully exploit present and future facilities
– A full integrated simulation (FSP)
– Fewer larger machines (ITER)

THE COLLABORATIVE CONTROL ROOM

FUSION SCIENCE TODAY AND IN THE FUTURE IS VERY MUCH A TEAM SPORT

EXPERIMENTAL FUSION SCIENCE IS AND WILL CONTINUE TO BE A VERY DEMANDING REAL-TIME ACTIVITY

PROJECT VISION: OPTIMIZE THE MOST EXPENSIVE RESOURCE - PEOPLE’S TIME

SUCCESSFUL GRID COMPUTING FOR FES: E.G. TRANSP

THESE NEEDS DEFINE THE COLLABORATIVE CONTROL ROOM

FUSION GRID: SECURE ACCESS TO FES RESOURCES

ACCESS GRID: REAL TIME COMPLEX COMMUNICATION FOR EXPERIMENTAL OPERATION

SHARE DISPLAYS INSTALLED IN FUSION CONTROL ROOMS

VRVS: WEB CLIENT COMMUNICATION FOR EXPERIMENTAL OPERATIONS

EXAMPLES OF SCIENTIFIC RESULTS

REAL-TIME GRID COMPUTING TO SUPPORT FES EXPERIMENTS

PATH TO SUCCESS HAS BEEN DEMONSTRATED AND PARTIALLY DEPLOYED

SUMMARY

THE SUCCESS OF FUTURE MACHINES BOTH TO THE INDIVIDUAL PARTNERS AND THE WORLD REQUIRES A ROBUST REMOTE COLLABORATORY CAPABILITY

SUBSTANTIAL WORK REMAINS TO CREATE A ROBUST INFRASTRUCTURE

THE NATIONAL FUSION COLLABORATORY PROJECT

THE COLLABORATIVE TOKAMAK CONTROL ROOM
D.P. SCHISSEL for the NATIONAL FUSION COLLABORATORY PROJECT

INTRODUCTION

COLLABORATION TECHNOLOGY CRITICAL TO FULLY EXPLOIT PRESENT AND FUTURE FES FACILITIES

– Collaboration technology critical to FES
– House large datasets (HV6)
– Host integrated resources (IP)

FES data sharing with ITER
– Establish new collaboration tools to meet future needs
– Both fundamental and in the broader international FES community
– Aimed to avoid collaborations in other scientific disciplines

THE NATIONAL FUSION COLLABORATORY PROJECT

– More efficient use of experimental facilities
– Integrate theory and experiment
– Experimental facilities

THE COLLABORATIVE CONTROL ROOM

FUSION GRID: SECURE ACCESS TO FES RESOURCES

– Authorizations: PKI via 3.x certificate and the FusionGrid CA
– By-pass certificate certificate management
– Authorizations contained in RWM system
– Data/DB super user access and management system

SUCCESSFUL GRID COMPUTING FOR FES: E.G. TRANSP

– Network access: data, codes, site tools
– Access is at least rather than probability
– Shared security infrastructure
– Shared visualization application tools

SHARED DISPLAY WALL CONTENT AT DIII-D DURING EXPERIMENTAL OPERATIONS

– Display information on large screens
– Display information on large screens
– Display information on large screens
– Display information on large screens

FES GRID BASED DATA ANALYSIS TO MOVE THE SCIENCE FORWARD

– Many bell-cabinet style servers
– Only limited by available hardware
– Maturation operable at a fusion plasma
– At future performance levels required for ITER operation

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CHANGE TO THE NEXT PICTURE BASED ON INFORMED DECISIONS

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REAL-TIME GRID COMPUTING TO SUPPORT FES EXPERIMENTS

– Transport analysis to support real-time experimental science
– Eventually desire supercomputers to support real-time science

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THE NATIONAL FUSION COLLABORATORY PROJECT TOOLS

ARE BEING USED TO BETTER FES RESEARCH

– Linux, Windows, and Macintosh OS X; small to large immersive nodes

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DATA MANAGEMENT FOR SIMULATION LARGE DATASETS

– Requires network QoS, grid computational scheduling, visualization, large data management, CPU scheduling
– Rapidly compare experimental data to simulation results
– Requires seamless interplay between grid and site security
– Requires unified and robust collaborative environment

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PATH TO SUCCESS HAS BEEN DEMONSTRATED AND PARTIALLY DEPLOYED

– The NFC Project is implementing and testing new collaborative technology
– Clear vision and work scope forward to the Collaborative Control Room
– Collaborative technology critical to the success of the FES program
– Potential to apply to new sciences leading to new collaborations, particularly in China and South Korea

SUBSTANTIAL WORK REMAINS TO CREATE A ROBUST INFRASTRUCTURE

– Create a unified environment, not individual pieces
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THE UNITED STATES DEPENDS ON A STRONG NATIONAL FUSION SCIENCE TODAY AND IN THE FUTURE

– Fusion grid computing to support experimental science
– Fast turnaround of scientific results
– Members of the team

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