

SciDAC Update

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SciDAC (Scientific Discovery through Advanced Computing)

- first Federal program to support and enable “CSE” and (terascale) computational modeling/simulation as the third pillar of science (relevant to DOE mission)
- a new way of “doing science”

What is Computational Science and Engineering (CSE)?

- a widely accepted label for an evolving field concerned with the science of and engineering of systems and methodologies to solve computational problems arising throughout science and engineering
- not “just programming”
- (ref.: Petzold, L. et al., Graduate Education in CSE, SIAM Rev., 43(2001), 163-177)

Modeling, Simulation, and CSE

- simulation and modeling tend to focus more on the end result (BER, BES, FES, HENP)
- CSE tends to focus more on how to get the end result (ASCR)
- important feedback loops among modeling, CSE, and simulation
- the science that is discovered is the ultimate measure of success

Foundations of CSE

- mathematics
- computer science
- applications

- CSE is *not* a subdiscipline of either CS or mathematics, but uses both parent disciplines heavily, along with application-specific knowledge

CSE is Team-Oriented

- successful CSE usually requires teams with members and/or expertise from at least math, CS, and (several) application areas
- language and culture differences
- usual reward structures focus on the individual
- incompatible with traditional academia
- SciDAC will help break down barriers and lead by example; DOE labs are a critical asset
- benefits for DOE and science are both technical and sociological

Successful Launch of Program

- SciDAC under way for over a year
- first PI meeting January 2002 in Washington DC
- theme: introduction to the integrated SciDAC program; initiation of team building
- second annual PI meeting to be held March 2003 in Napa, Calif.
- theme: assessing SciDAC progress

Examples of Early Success

- Steve Jardin (PPPL): “...[SciDAC] is a significant factor in our productivity, comparable to that obtained by going to the next-generation computer.”
- Tony Mezzacappa (ORNL): “The SciDAC Program is making possible a whole new class of supernova simulations.”
- Rob Ryne (LBNL): SciDAC algorithmic advancements and visualization in accelerator design enable us to “... optimize designs to reduce costs and risks and help ensure project success.”