

# ASC Contributions to the Nation's Stockpile Stewardship Program

- 1996** Delivered ASCI Red, the world's first teraFLOPS supercomputer
- 1998** Delivered ASCI Blue Pacific and ASCI Blue Mountain, the world's first 3-teraFLOPS supercomputers
- 2000** Demonstrated the first 3D simulation of a nuclear weapon primary explosion
- 2001** Demonstrated simulation of a 3D nuclear weapon secondary explosion
- 2002** Demonstrated 3D system simulation of a full-system (primary and secondary) thermonuclear weapon explosion
- 2003** Delivered a nuclear safety simulation of a complex, abnormal, explosive initiation scenario
- 2004** Provided simulation codes with focused model validation to support the annual certification of the stockpile life-extension refurbishments, including W88 pit certification
- 2005** Delivered a metallurgical structural model for aging to support pit lifetime estimations
- 2006** Delivered the capability to perform nuclear performance simulations and engineering simulations related to the W76/W80 Life Extension Programs to assess relevant performance over operational ranges, with assessments of uncertainty levels for selected sets of simulations
- 2007** Supported the completion of the W76-1 and W88 warhead certifications using quantified design margins and uncertainties
- 2008** Sited ASC Roadrunner, an advanced architecture platform and the first supercomputer capable of a sustained 1-petaFLOPS performance
- Near Future (2010-2012)** Deliver solutions to the energy balance issue, including high-fidelity models made possible by Roadrunner

Demonstrated the first 3D hostile-environment simulation

Accepted delivery of ASCI White, a 12.3-teraFLOPS supercomputer

Delivered a fully functional problem-solving environment for ASCI White

Demonstrated high-bandwidth distance computing among Livermore, Los Alamos, and Sandia National Laboratories

Demonstrated the initial validation methodology for early primary behavior

Completed 3D analysis for a stockpile-to-target sequence abnormal-environment crash-and-burn accident involving a nuclear weapon

Demonstrated the capability of computing electrical responses of a weapons system in a hostile (nuclear) environment

Delivered an operational 20-teraFLOPS platform—the ASCI Q machine

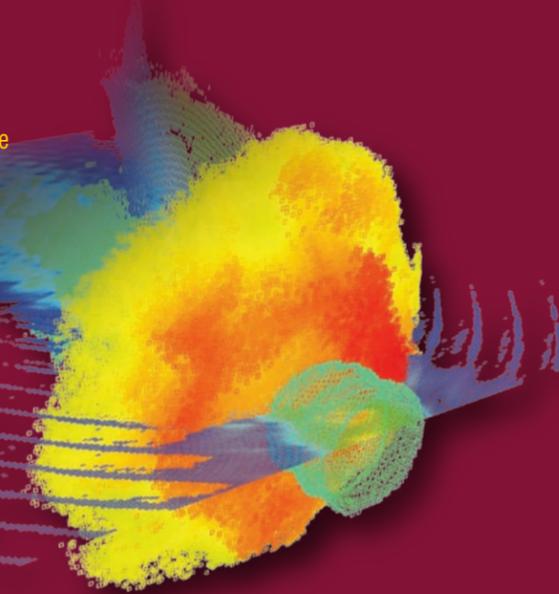
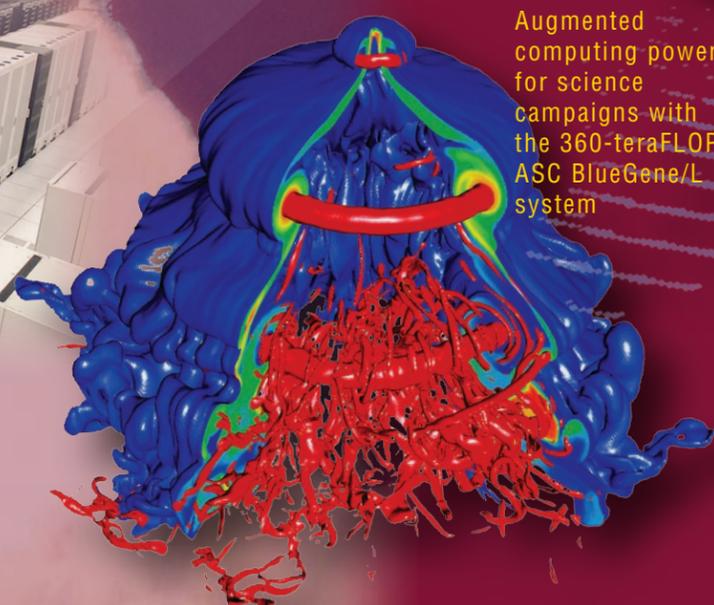
Documented Stockpile Stewardship Program requirements to move beyond a 100-teraFLOPS computing platform to a petaFLOPS-class system

Provided two robust 100-teraFLOPS-platform production environments by IBM and CRAY, supporting DSW and science campaign simulation requirements

Completed the original ASCI Program Level 1 milestones when the ASC Purple system was formally declared "generally available"

Augmented computing power for science campaigns with the 360-teraFLOPS ASC BlueGene/L system

Demonstrate an uncertainty quantification aggregation methodology for full-system weapon predictions



- ◆ ASC #1 Top500 winners
- ◆ ASC supercomputers
- ◆ ASC future supercomputers