



U.S. DEPARTMENT OF  
**ENERGY**

# WELCOME!



Colloquiums – July 31, 2012  
Workshop – August 1 – 2, 2012  
Reston, VA



**U.S. DEPARTMENT OF  
ENERGY**

---

# **Workshop on the Grand Challenges of Advanced Computing for Energy Innovation**

## **Colloquium Introduction**

**Alex R. Larzelere  
Office of Nuclear Energy  
U.S. Department of Energy**

**July 31, 2012**



# First – Thanks to the People Who Made This Possible

## ■ Workshop Chairs

- Dana Christensen, NREL
- Dona Crawford, LLNL
- Steve Ashby, PNNL

## ■ Colloquium Leads

- Steve Lee, DOE-SC
- Steve Hammond, NREL
- Benjy Grover, LLNL

## ■ Breakout Leads

- Ray Stults, NREL
- Moe Khaleel, PNNL
- John Grosh, LLNL

## ■ Event Organizers

- Lee Ann Dudney, PNNL
- Mary-Lynne Peters, PNNL
- Jim Peltz, DOE-NE
- Colin McCormick, DOE-S3

## ■ And All the Other Supporters Along the Way!



## Forbes



Josh Wolfe, Contributor



TECH | 5/08/2012 @ 6:26PM | 1,182 views

### Why the DOE Thinks Supercomputing Will Change Our Energy Future

*We sat down for an exclusive interview with U.S. Energy Secretary Steven Chu, who shared his thoughts on the current state of supercomputing. The Nobel Prize-winning scientist is betting that these super machines will play a key role in designing new products and solving longstanding energy challenges: from better engines to advanced nuclear reactors. He's backing his bet with significant resources, offering some of the Department's world-leading supercomputers for use by industry leaders.*




# We Are Building on Previous Workshops

## Simulation Summit Oct 13, 2010

**Simulation Summit**  
Wednesday, October 13, 2010, 8:30 AM - 3:00 PM  
Capitol Rotunda A and B, Hyatt Regency Washington on Capitol Hill, Washington, DC

7:45 - 8:00	Continental Breakfast and Registration
8:30 - 9:00	Welcome Steven Kawaletz, Under Secretary for Science of the Department of Energy
9:00 - 9:30	Keynote Ernest Moniz, Chief and the Green Design and Production of Reactors, Massachusetts Institute of Technology, and Institute of the President's Council of Advisors on Science and Technology
9:30 - 10:00	Introduction Steven Chu, Secretary of the Department of Energy
10:00 - 10:15	Break
10:15 - 10:45	Current Issues of High-Performance Computing in the United States Mary Anne, DOE Laboratory
10:45 - 12:45	Panel 1: An Effective Industrial High-Performance Computing Ecosystem Moderator: Charles Brannan, Senior Policy Advisor to the Director, OSTP Panelists: Tom Lager, Director, E.ON, Deutsche Energie; Sergio Moberg, Director of Operations, E.ON; Ray Johnson, Senior Director, Lockheed; Sila Khandekar, Vice President, Intel; Tom Swales, Intel Support, The Intel Group
12:45 - 1:15	Working Lunch: Made to Order, Sponsored Materials by Design through SDC&S Sharon Glaser, SDC&S
1:15 - 1:45	Panel 2: Education Strategies in High-Performance Computing Moderator: Alan Bishop, Assistant Director of Energy Simulation and Computation, Los Alamos National Laboratory Panelists: Michael D. Smith, Director, DOE Simulation; Donald L. Long, Director of Energy Simulation and Computation, Los Alamos National Laboratory; Thomas Pleschke, Applications Research, Intel; Ursula Chang, Intel
1:45 - 2:15	Panel 3: Industry, Government, Academic, and Consumer Collaboration Opportunities in Simulation Moderator: Steve Crawford, Assistant Director of Computation, Lawrence Livermore National Laboratory Panelists: Ernest Moniz, Chief and the Green Design and Production of Reactors, Massachusetts Institute of Technology; William Stein, U.S.A.C. Director; Dennis Kozlowski, Defense Program Secretary, AECU; Peter Engner, CH2M Hill
2:15 - 2:30	Summit Summary Nicholas Desrosiers, Vice President

**National Summit on Advancing Clean Energy Technologies**  
May 16 - 17, 2011

Report on  
**A NATIONAL SUMMIT ON ADVANCING CLEAN ENERGY TECHNOLOGIES**  
Entrepreneurship and Innovation through High Performance Computing

**EXPLORE AND COLLABORATE**  
\*\*\*\*\*  
AMERICAN INDUSTRY AND AMERICA'S NATIONAL LABS



**MODELING AND SIMULATION**

## Industry-National Laboratory Workshop on Modeling and Simulation March 7 - 8, 2012

# For This Workshop: Our Focus is on Grand Challenges

## Goal Statement:

Leverage the United States' leadership in advanced computing, modeling and simulation to deploy affordable, user-friendly, accessible platforms for broad use across America's energy sector.

## ■ Workshop Discussions Will:

- **Identify Grand Challenges**
- **Develop Recommendations**

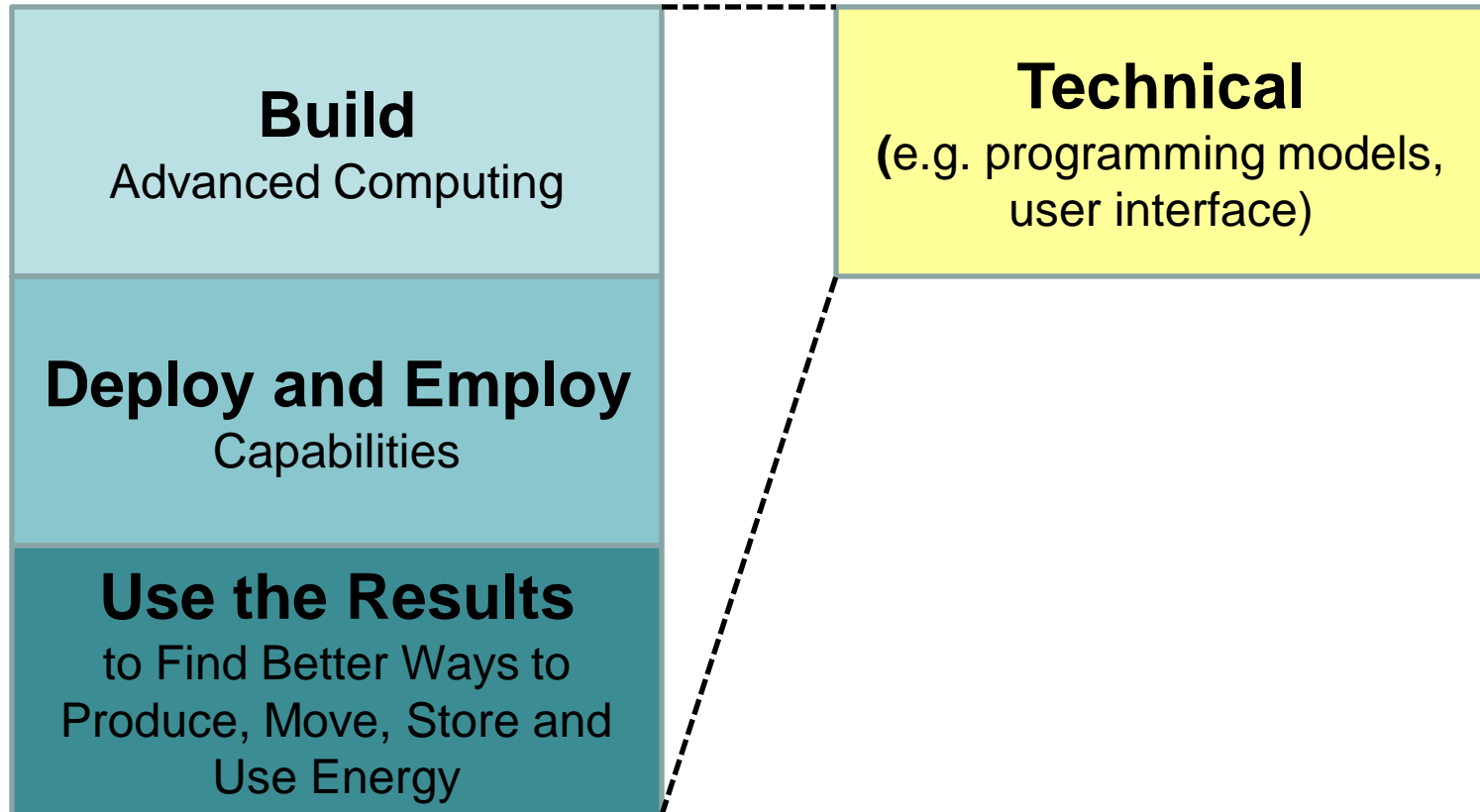




# Types of Advanced Computing Grand Challenges

## Action Challenges

## Ecosystem Challenges



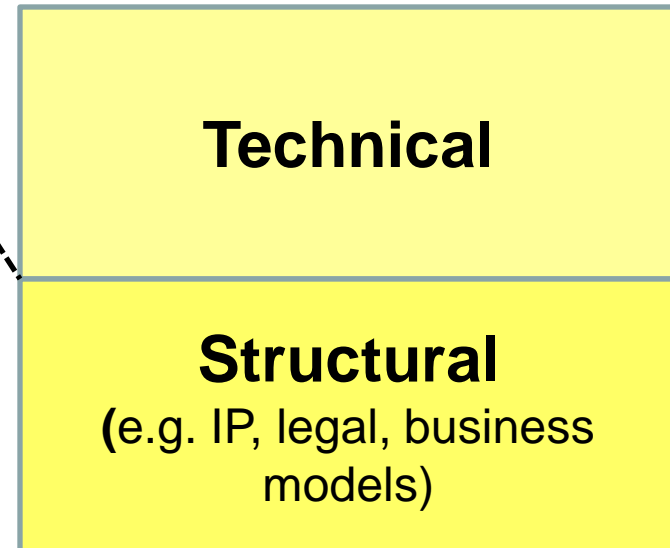


# Types of Advanced Computing Grand Challenges

## Action Challenges



## Ecosystem Challenges





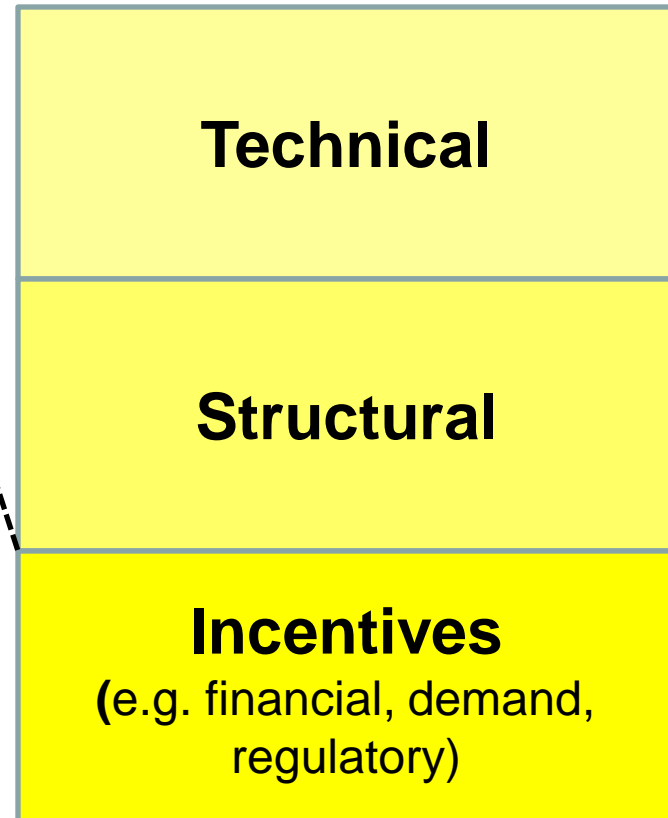


# Types of Advanced Computing Grand Challenges

## Action Challenges



## Ecosystem Challenges





## ■ Advanced Computing

- Modeling and simulation
  - Improved dimensionality, resolution and fidelity
- Data Analytics
  - Extracting knowledge out of large data
- Enabled by High Performance Computing
  - Hardware, Middleware, Applications Software
  - Capabilities potentially deployable a full range of systems (laptops and up)

## ■ Energy Innovation

- The creation of better or more effective products, processes, services, technologies, or ideas that are accepted by markets, governments, and society.
- To:
  - Generate Energy (really turn it into a more usable form)
  - Move Energy
  - Store Energy
  - Use Energy



# Three Discussion Tracks

Proven Impact	DOE Applied Programs	Potential Impact
<ul style="list-style-type: none"><li>■ <b>Current Users of Advanced Computing</b></li><li>■ <b>Focus</b><ul style="list-style-type: none"><li>● What did it take to get the proven impact of advanced computing</li></ul></li></ul>	<ul style="list-style-type: none"><li>■ <b>DOE Developers and Users of Advanced Computing</b></li><li>■ <b>Focus</b><ul style="list-style-type: none"><li>● What has worked for DOE programs and what has not</li></ul></li></ul>	<ul style="list-style-type: none"><li>■ <b>Potential Users of Advanced Computing</b></li><li>■ <b>Focus</b><ul style="list-style-type: none"><li>● What is holding potential users back</li></ul></li></ul>



## ■ Industry

- Energy Companies (both current users and potential users)
- Advanced Computing Developers
- Independent Software Vendors (ISVs)
- Engineering Service Companies

## ■ Universities

- Advanced Computing Research and Developers
- Energy Innovators

## ■ Department of Energy

- DOE Applied Programs (both current users and potential users)
- Office of Science
- NNSA
- National Laboratories
  - Advanced Computing Researchers and Developers
  - Current Applied Program Advanced Computing Users
  - Potential Applied Program Advanced Computing Users



# Workshop Structure

**Colloquiums**  
(Inform)

**Tuesday**

**Plenary Panel Sessions**  
(Learn)

**Breakout Groups**  
(Work)

**Wednesday**

**Breakout Groups**  
(Work)

**Plenary Wrap Up**

**Thursday**



# Administrative Matters

## ■ FYI:

- Emergency evacuation
- Chimes signal start of day and end of breaks
- Wireless Internet
- Wednesday no host lunch tickets
- Plenary room monitored (Wed. lunch)
- Restaurant list at registration desk

## ■ For Everyone:

- Complete evaluation form
- Turn phones, other electronic equipment to quiet mode

## ■ For Chairs and Breakout Leads

- Short meeting at 5:15 pm on Tuesday
- Report preparation meeting on Friday



U.S. DEPARTMENT OF  
**ENERGY**

# Have a Great Workshop!



Colloquium One – Grand Ball Room E-G  
Colloquium Two – Lake Fairfax  
Colloquium Three – Lake Anne