CSESSP Challenges Workshop Breakouts

A. **Opportunities from Improved CSE SW Sustainability and Productivity**
   Lead: Jack Dongarra, U Tennessee
   a. **Charge:** Explore the upside of improving our ability to create and sustain software for Computational Science & Engineering. Characterize opportunities available if we have a virtual "National Physical Infrastructure" for CSE software.
   b. **Starter questions:**
      i. How would CSE in National Labs, in government, and in industry be different if software life cycle costs were insignificant, if CSE software could be created, sustained, and ported quickly and with insignificant effort?
      ii. What would be the impact on science, government, and the economy?
      iii. What role can funding agencies play in fostering efforts?

B. **CSE Software in Industry/Manufacturing**
   Lead: Richard Arthur, GE
   a. **Charge:** Examine the challenges and opportunities facing the use of CSE SW in industry, particularly in Advanced Manufacturing.
   b. **Starter Questions:**
      i. What are the CSE SW challenges and opportunities for Fortune 500 firms? For second and third tier suppliers?
      ii. What are the impediments to more effective use and leverage of community-developed CSE software?
      iii. What role can funding agencies play in fostering efforts?

C. **Economics of Software Tools**
   Lead: Ray Idaszak, RENCI
   a. **Charge:** Examine the issue of developing and maintaining software tools relevant to this nationally critical, challenging domain that has to compete for scarce resources (e.g., skilled personnel) with a mass market for similar tools.
   b. **Starter questions:**

i. What concept-to-supported-product lifecycle models would support tools R&D? Where are the gaps in realizing these models?
ii. What industrial and manufacturing partnership models are there?
iii. What role can funding agencies play in fostering efforts?

D. **Social Sciences Applied to CSE Software Systems**
Lead: Daniel Katz, NSF
   a. **Charge:** Explore the relevance of the social sciences to understanding the development and sustainment of CSE software systems over decades by groups of individuals with scarce skill sets.
   b. **Starter questions:**
      i. How can theories of human behavior and technology be applied to describe, plan and improve CSE SW sustainability and productivity?
      ii. How can knowledge from other product development systems such as economics and manufacturing be leveraged in CSE SW product development?
      iii. What role can funding agencies play in fostering efforts?

E. **Workforce Development**
Lead: Abani Patra, SUNY Buffalo
   a. **Charge:** Examine issues around the training and education of a skilled workforce in CSE software.
   b. **Starter questions:**
      i. What new mechanisms are needed to support workforce development? How can a skilled workforce be nurtured across multiple agencies, industry, academia etc.? What role can on-demand learning and similar approaches play?
      ii. How can sustainability and productivity improvements and better workforce development impact each other?
      iii. What role can funding agencies play in fostering efforts?

F. **Role of Software Engineering Research**
Lead: Anshu Dubey, Lawrence Berkeley

a. **Charge:** Explore how software engineering could play a larger role in CSE software. Identify opportunities for collaboration, new areas for research, and transition of research to practice in the CSE software community.

b. Starter questions:

i. How can SW engineering knowledge from the broader software community be leveraged in CSE and customized for it?

ii. How can SW engineering improvements be incorporated and sustained on small CSE teams with few dedicated SW development resources?

iii. What role can funding agencies play in fostering efforts?

G. **Measuring Software Productivity and Performance**
Lead: Lois McInnes, Argonne

a. **Charge:** Examine how metrics, benchmarks and standards can be used to measure the effectiveness of productivity, performance and sustainability goals for CSE software.

b. Starter questions:

i. What is the potential role and impact of better productivity and performance measurement?

ii. How can productivity and performance metrics be practically defined and applied for CSE software efforts?

iii. What role can funding agencies play in fostering efforts?

H. **New Approaches for Faster, More Affordable CSE Software**
Lead: Sandy Landsberg, DOD

a. **Charge:** Explore flexible software engineering techniques (product line engineering, model driven architecture etc.); software architectures (cloud platforms, learning systems); system architectures (software defined networking); business/sustainability models.

b. Starter questions:

i. What are some of the “next best thing” approaches that could revolutionize CSE Software?

ii. What are the potential paths and payoffs of these approaches?

iii. What role can funding agencies play in fostering efforts?

Breakout session 1: Explore: A, B, C, D, E, F
Breakout session 2: Explore G, H,
Focus: A, B, C
Breakout session 3: Focus: D, E, F, G, H
Breakout session 4: Write up: A, B, C, D, E, F, G, H