

## Breakout\_D-2 (can map to issue name later)

Issue: [https://github.com/CFDSI/Kickoff\\_Workshop/issues/36](https://github.com/CFDSI/Kickoff_Workshop/issues/36)

Related Issues:

Issue Statement: [What new science and broader impacts will XFDSI enable?](#)

Discussion topic:

Moderator: Ellen

Note taker: Mike

Group Members: Mike Park, P.K Yeung, Paul Durbin, Oana Marin, Luciano Castillo,

Reporter: Ellen Longmire, Assad Oberai, Andres Tejada-Martinez, Raul Cal, Doug Smith, Ramesh Balakrishnan, Tim Barth, Jean Hertzberg, Jim Brasseur

Please address these topics in your discussion (moderators please make sure that there is enough time to cover all three before the session ends).

Describe the problem:

- **XFDSI proposal will be enhanced by clearly stating benefits, impact, and new science discoveries**
- **Opportunities in expanding both new science and broader impact**
- Pumps and compressors %20 energy use
- Over 50% compute time on supercomputers awarded to CFD applications
- **Untapped public enthusiasm for fluids/outreach to general public**
- **Advances in Education: undergraduate and graduate levels + professional development (industry)**
- Outreach to general public

2. What are potential solutions?

- Mobility is enhanced with access to tools
- Broader collaboration
- Reducing barriers to entry and discovery
- Education
- **Exposure to FD for non-traditional and underrepresented participants**
- **Essential to assure uniform access to resources**
- **Lower the barrier to entry for new entrants into research field**
- **Popularizing FD to other disciplines (media and science relations**

**committee)**

- **Unconventional applications (collaborations with other fields)**
- Address misconceptions about FD
- STEM impacts
- Fluid hobbyists
- Focus on data can encourage collaboration between experiments and simulations
- Organized tutorials for FD
- Update to MIT Fluids videos
- Democratize CFD access HPC to cloud services
- Advertise science impacts of FD
- **Enhance professional development**
- **Integration of software learning and physical processes**

3. What can CFDSI do to help?

- **Enabling continued FD research by PhDs that have moved on to under-resourced universities in the US or international**
- **Supporting underrepresented institutions with infrastructure (inclusiveness)**
- Connect with the APS-DFD Media and Science Relations Committee
- Combinations of experiments and simulations, better harmonization in education
- **Apply FD techniques into broader topics** [other disciplines?]
- Enable more complex
- **Enable impacts in other disciplines:** Geophysical, material properties, weather, climate, drones, personal air mobility, energy systems, biomimicry, patient specific modeling, fog water harvesting, microfluidics, human impact on environment, national security
- **Turbulence understanding can be applied to other chaotic systems (finance, weather, etc)**
- Bridging particle and continuum approaches
- Expand UQ beyond FD
- **Data learning for nonlinear systems**
- Operator (model) driven learning
- **Synergise experiment and simulation on same problem in class setting**
- **Enable everyone to access high fidelity experiments and simulations to blur lines and artificial barriers to collaboration**
- Include the biofluids and geo-fluids (meteorology, oceanography) communities
- **Fusing different types of data to make impact**
- Offer a wide range of inverse problems to be solved

4. Misc ideas so they don't get lost (e.g., Did you find new issues? If yes, create the

issues on GitHub!):

- 

5. Summary for report-back (Alternatively, just bold the key points above):

-