

Breakout_C-4 (can map to issue name later)

Issue: https://github.com/CFDSI/Kickoff_Workshop/issues/4

Related Issues:

Issue Statement: **What are the best topics for the sub-community workshops for CFDSI?**

Discussion topic:

Moderator: Adam Steinberg

Note taker: Colin Towery

Reporter: Jim Brasseur

Group Members:

- Colin Towery
- Kyle Niemeyer [Oregon State]
- Jim Brasseur [UC-Boulder]
- Adam Steinberg
- Paul Durbin
- Erik Johnson [USC]
- Damian Rouson
- Shawn Shadden [UC-Berkeley]
- PK Yeung
- Lorena Barba [GW]

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

1. Describe the Big Issues:

From GitHub Issue's comments section (posted by Ken Jansen):

In the original proposal, we envisioned 5 small (O(20) participants) workshops focused on the following activities:

1. Software Carpentry for CFDSI
2. Data Sources
3. Problem Definition and Interfaces
4. Error Indication and Adaptivity
5. Compression, UQ, and Optimization

Are these the right topics? Should Data Sources be split into experimental/computational streams/databases? Should the Software Carpentry be coordinated with URSSI? Should 3) and 4) be combined?

- This is about conceptualizing the institute, not discussing actual standards/definitions, education workshops, etc.
- What list of services could/will the CFDSI provide? If we have a list of services, we have a list of sub-communities.
- This vision is so broad, it could go in many directions, we need to define boundaries, but the unifying theme is promoting the development of software across the community.
- The final report of this NSF grant is not the proposal for the Institute, it's a white paper that defines community needs to create an RFP for an institute

2. What are the possible services the community might need?

- EDUCATION, TRAINING AND OUTREACH
 - Software Carpentry workshops
 - Pedogogy development
- STANDARDS AND PRACTICES
 - Promoting interoperability, convertibility, shareability
 - Promoting reproducibility and reliability
 - Promoting adoption and development of open source science
 - reference standards of algorithms
 - Benchmark problems and data
 - Code/data interfaces
- SOFTWARE DEVELOPMENT & SUSTAINABILITY
 - Solvers for generating data (simulation codes, other PDE/ODE solvers)
 - Analysis, discovery, visualization, and conversion/processing software
 - Knowledge Construction, Model Discovery
 - Outer-loop software: UQ, Inverse/Inference/PE, SA
 - Inter-analysis and collaboration between experiments and simulations
 - Data storage, maintenance, query, and sharing
- SOFTWARE AND DATA SHARING
 - Supporting exchange and analysis of software and data
 - Data storage, maintenance, querying from central or independent repositories
 - Benchmarking, V&V of software using reference computer system and problems
 - Supporting adoption and development of open source software and data (of all kinds)
 - Supporting interoperability, convertibility, shareability of code and data
- ORGANIZATIONAL STRUCTURE OF INSTITUTE
 - How are we going to support the community (PIs, grad students, etc.)?
 - (not a service)
 - maybe only after we conceptualize, discuss this after the 5 sub-committee workshops

- DEFINING THE BROADER COMMUNITY
 - Problem definition
 - Who is under the umbrella of a CFDSI community? Chemical engineers, Bio, industry, etc.

3. Scoping out sub-communities: Services

1. SUPPORTING SOFTWARE SHARING AND SUSTAINABILITY
 - promoting/supporting open source software and open science
 - Improving sustainability (i.e., ensure scalability on new hardware), shareability
 - How would CFDSI interoperate with URSSI and other organizations?
 - (Generic to all types of software, feeds into specific workshops below)
2. EDUCATION, TRAINING, AND OUTREACH
 - Workshops (e.g., Software Carpentry, fluid dynamics-specific)
 - Fellowships
 - Policy/culture advocacy, training, etc.
 - Increasing diversity of the research field
 - Teaching ourselves: Self-learning, guides and other wiki-like resources
3. SUPPORTING SOFTWARE FOR DATA CREATION
 - CFD simulation codes, solvers
 - Experimental sensor signal processing (e.g. data acquisition and conversion)
 - Error estimation
 - Uncertainty Quantification
 - Manipulation, restructuring and “filtering” of massive datasets
4. SUPPORTING SOFTWARE FOR DATA EXCHANGE
 - Compression
 - Transmission
 - Storage
 - Metadata, data descriptions
5. SUPPORTING SOFTWARE FOR DATA INQUIRY, INSIGHT, AND DISCOVERY
 - Data inputs (standardization of data storage formats?)
 - Parameter estimation, model development
 - Integrated analysis of computational and experimental data
 - Knowledge Extraction: integration among data, computer and human cognition

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

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

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