Common Software Stack for SoLID

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SoLID Collaboration Meeting
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Recent EIC Software Developments

- 2020: EIC software work begins in earnest for detector proposals. Two proto-collaborations form, each using individual software stacks:
  - ECCE: Fun4All/TGeo/ACTS (BNL homegrown + CERN)
  - ATHENA: Gaudi/DD4hep/ACTS (similar to CERN's Key4HEP) → Chao's talk, next
- March 2022: ECCE proposal chosen. ECCE and ATHENA merge into "Detector-1 collaboration"
- Current: Transition to a common EIC software stack. Timeline:
  - All main design decisions complete by end of July
  - "Usable" single software stack in place by October
- Timeline likely to be kept due to pressure from collaboration & management

EIC Software Decision Schedule (from David Lawrence)

			Discussion topic(s)	Decision topic(s)
May	**4**		*AIWG*	
	11		Transition Period	Present procedure. Decide on list and order of decision topics
	18		*No meeting (Streaming Readout X Workshop)*	
	25		Repository Geometry	Repository: - Location (GitHub, GitLab+Host) - Admins - Access
Jun	**1**		Geometry Documentation	Documentation: - Location of User documentation (wiki, repository,...) - Who will set up skeleton with list of topics (e.g. "Getting Started") Geometry: - Package (e.g. DD4HEP)
	8		Data Format	Data format - Generated events - Simulated data - Processed data (e.g. ROOT w/ specific tree format)
	15		Reconstruction Framework	
	22		Reconstruction Framework	Reconstruction Framework - Package
	29		Containerization Official buids	Containerization - platform (Singularity, Docker, multi, ...) - Supported OSes - Location of images (e.g. cvmfs) Official builds - Location (e.g. cvmfs, container image, ...)
Jul	**6**		Calibration DB Conditions DB	Calibration / Conditions DBs - Package - Server/Host - Access
	13		Continuous Integration	Continuous Integration
	20			
	27		Data preservation	Data Preservation - What is preserved (simulated, DSTs, ...) - Location(s) - Access (S3, xrootd, rucio, ...)
Aug	**3**			
	10		Distributed Campaign Workflow	Distributed Campaign Workflow - Package (DIRAC, PanDA, STAR(?), ...)

Ref.: `https://docs.google.com/spreadsheets/d/1AHBCeXObBhfRj-hEQfk5Cjq1de2IjG3yPnDQWplt0IQ/edit?usp=sharing`

EIC Software Stack for SoLID?

- Assume EIC software decisions will be reasonable & not too EIC-specific
- In principle, it will then be very advantageous for SoLID to adapt the main parts of the EIC stack
  - Community support (bugfixes, expertise, documentation, tutorials, examples, etc.)
  - Potential for back-contributions SoLID $\rightarrow$ EIC
  - Easier transitioning between experiments
  - Longevity of project guaranteed
- Potential downsides
  - Design decisions may be EIC-centric
  - SoLID contributions & requests may be given low priority
  - Unnecessary complexity
- Still much SoLID-specific work to do, *e.g.*
  - Geometry implementation
  - Data model
  - Reconstruction algorithms
  - Physics analyses
- Can start preliminary work now. See next talk.

Observations

- Standing up the entire EIC software program as laid out is a tall order
  - Ambitious goals
  - Tight schedule
  - Possibly insufficient personnel
  - Internal competition
- EIC plans to keep simulations separate from rest of analysis framework
- Some EIC software components may not work for us, *e.g.* Continuous Integration

Conclusions

- Ideally, there will soon be an EIC software ecosystem that SoLID could adapt
- If successful,
  - Will save much work
  - Provides broader user base, better support
  - Will align us with EIC for mutual benefit, easier transitioning
- Carries moderate risk. Not a tried-and-true solution. Likely to evolve.
- Preliminary work in progress. Follow EIC developments closely.