

Why are we changing the reconstruction software stack?

- **Starting point:**

- Software decision process end of August 2022.
- Many components developed from scratch.

Only 5 months ago.

- **Main issues during first simulation campaign:**

- Unclear boundary between roles of DWGs (development of reconstruction algorithms) and SWGs (development of reconstruction framework).
- Lack of configurability and flexibility for users: We prefer configuration files over having to recompile EICrecon.

- **Lessons learned:**

- **Policies** needed for collaborative software (*work in progress*).
- Enforce **modularity** to separate the development of (*today's discussion*):
 - **Framework and its services:** Driven by computing needs, major contributions from software experts.
 - **Reconstruction algorithms:** Driven by physics needs, major contributions from detector experts.
- **Validation** of reconstruction algorithms by detector experts needed (*discussion on Feb. 8*).

How does the work on a modular reconstruction connect to our software principles (SP)?

- **SP3** We will have a modular software design with structures robust against changes in the computing environment so that changes in underlying code can be handled without an entire overhaul of the structure.
- **SP4** We aim for a modular development paradigm for algorithms and tools without the need for users to interface with the entire software environment.
- **SP7** We will ensure that mission critical software components are not dependent on the expertise of a single developer, but managed and maintained by a core group.
- **SP8** We will provide a production-ready software stack throughout the development.

We will support the current version of EICrecon while re-factoring is in progress:

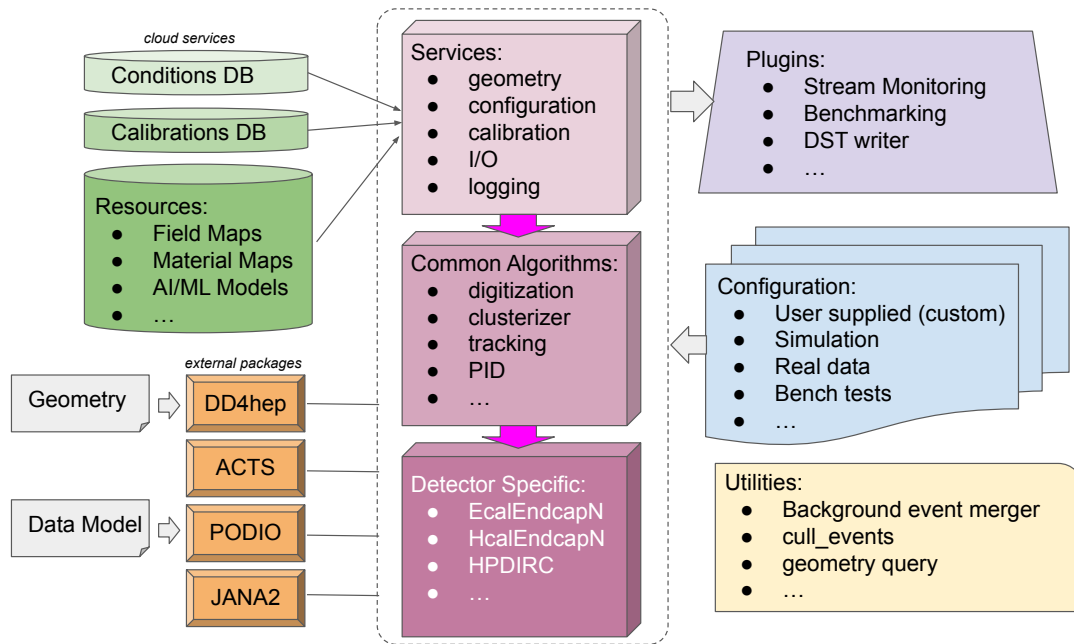
- We aim to make transition smooth:
 - We are **not** changing the framework: We are changing how reconstruction algorithms are integrated in JANA2.
 - We are **not** changing the algorithms: The changes are in the backend and infrastructure.
- Simulations for the BEMCal and bRICH reviews will be based on the current version of EICrecon (with needed fixes).
- The next simulation campaign might already use the the re-factored version of EICrecon with major improvements.

What is the status of the discussion?

Dec. 7 Discussion on reconstruction Software Stack ([Indico](#), [Live Notes](#))

Two presentations:

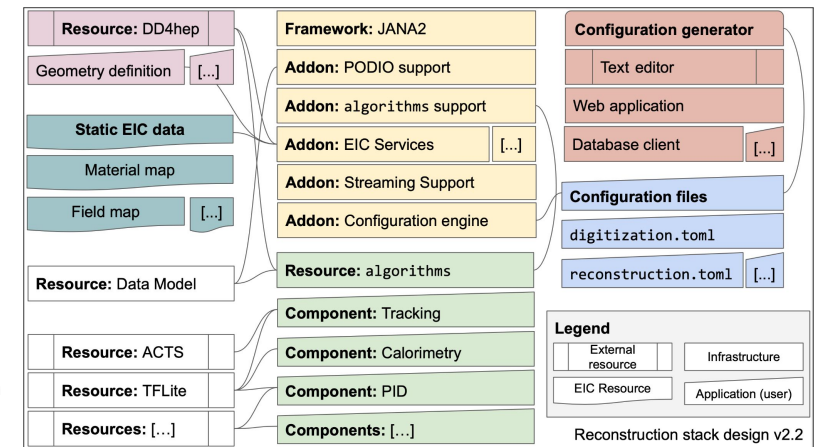
David – EICrecon Refactoring



Sylvester – algorithms: The case for framework- and experiment-independent algorithms at EPIC

A strawman re-design of the EPIC reconstruction stack

- Strictly modular approach reduces scope of each component
- Easier to onboard new users in any singular piece of the stack
- Every user can find their place based on experience and needs
- Better maintainability and more resilient against changing software needs
- Baked-in reproducibility by enforcing configuration files in every workflow



Discussion

- We have set our **priorities for 2023** and have started on work on an improved software stack for reconstruction:
 - Task forces on clustering, jet reconstruction, PID, and tracking algorithms.
 - Also on EICRecon, modular reconstruction, and simulation preparation.
- We have proposed **end of March** as target date for the **next simulation campaign**.
- Now, we will discuss our plan for a **modular reconstruction**:
 - We will hear from Nathan about **JANA2 and podio integration**.
 - We will hear from Sylvester about **framework-independent algorithms in JANA2**:
 - We need a prototype to make concrete next steps.
 - We need to define the boundaries between the JANA2 framework and the various reconstruction algorithms and the additional layer we introduce by using algorithms instead of JANA2 classes.
 - We need to define the boundaries of algorithms so that algorithms remains an API and API only.
- Based on the discussion, we need to develop a **plan for re-factoring EICrecon** (see slide 3):
 - The plan needs to include a move to configuration files as the (!) way to configure reconstruction parameters and initial settings. It needs to be obvious for any collaboration member what parameter and settings are used.