Update on Software and HSF Activities

LHCC Referee Meeting

AA Project Status

Projects starting to gather input and assemble plans for 2018

⇒ will be presented to experiments and LHCC early next year

Projects working full steam towards their end-of-the-year releases

- ROOT release *6.12*
- Geant4 *10.4*
- GeantV *public alpha*

Management Changes in EP-SFT projects

ROOT

- *Axel Naumann* took over from *Pere Mato* as leader of the project
- Continuing evolution of the project

Simulation Project

- *Pere Mato* took over from *Federico Carminati* as leader of the project
- Will intensify connections between Geant4 and GeantV efforts

Reminder - the GeantV R&D Project

The GeantV project has been carrying an extensive R&D program to **investigate new approaches** that aim to exploit modern computing architectures:

- *Its main feature is track-level parallelization, bundling particles with similar properties from different events to process them in a single thread*
- *Another important area investigated is the use of Machine Learning (ML) methods for fast simulation*

The GeantV project is a **collaboration**

- *Currently: CERN/SFT, FNAL, BARC, UNESP*

Some novel **components have already been integrated** in Geant4, notably the vector geometry library (VecGeom)

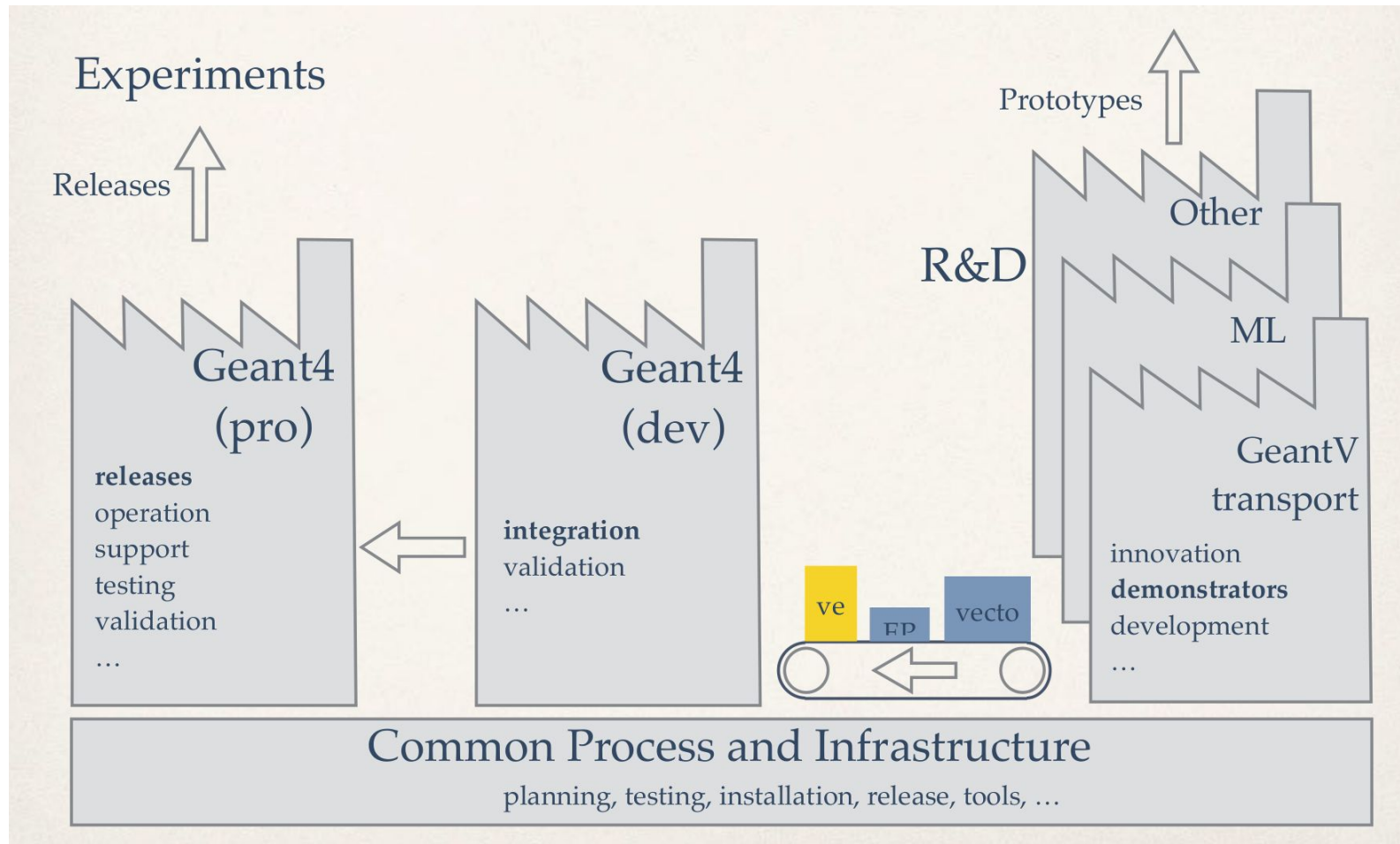# Simulation team

The vision for Geant4 and GeantV is

"One project, one deliverable, one team"

Three distinct activities

- *Research and development* of new components, investigations of new approaches, exploitation of new hardware, etc.
- *Integration and validation* of new components into the Geant4 toolkit
- *Maintenance and support* and continuous improvement

The total available person-power for simulation is ~16 FTE

Simulation Strategy in pictures...

From presentation by P. Mato to Geant4 Oversight Board Nov 14

...and in words

Ensure the support of experiments through **continuous maintenance, support and improvement** of the Geant4 simulation toolkit

Ensure that new developments resulting from the GeantV R&D program (and other R&D programs) **can be deployed in Geant4** once they are demonstrated to be beneficial

- Provide coherent vision to users
- **Major changes** (most probable with a backward incompatible API) **would be required** if the vector transport engine developed in GeantV is demonstrated to be successful

Rely on the Geant4 collaboration to evolve the toolkit and be ready to support the experiments during possible migrations

Community White Paper (CWP)

- **A Community White Paper (CWP) should describe a global vision for software and computing for the HL-LHC era and HEP in the 2020s**

- **The CWP will identify and prioritize the software research and development investments required**
  - to achieve improvements in software efficiency, scalability and performance and to make use of the advances in CPU, storage and network technologies
  - to enable new approaches to computing and software that could radically extend the physics reach of the detectors
  - to ensure the long term sustainability of the software through the lifetime of the HL-LHC

- **The HSF is engaging the HEP community to produce the CWP via a community process**
  - Initiated as an HL-LHC planning process
  - Aiming for a broader participation (LHC, neutrino program, Belle II, linear collider, …)
  - The resulting roadmap will be used for the HL-LHC computing TDR and other strategic plans

CWP Process

- **Plenty of past and future workshops, e.g.**

  - May 22-24 - HSF Workshop on the HEP Analysis Ecosystem (Amsterdam)

  - June 5-6 - Event Processing Frameworks Workshop (FNAL)

  - June 26-30 - HEP Software Foundation Workshop (Annecy)

- **Each WG prepared a paper containing challenges, areas for innovation and a roadmap of prioritized R&D actions for the next 5 years**
  - 1 year: assessment of the potential of new ideas
  - 3 years (time of HL-LHC computing TDRs): deciding what is worth implementing
  - 5 years: implementation phase
- **14 working group chapters available for community review**
  - Will go to arxiV once finished

Engaged more than 250 people and produced more than 300 pages of detailed description in many areas!

Synthesis paper

- [74 page document](#)
- 12 sections summarising R&D in a variety of areas for HEP Software and Computing
- **Almost all major domains of HEP Software and Computing are covered**
- Incorporated lots of community feedback on the first draft (released on October 20)
- Second draft distributed on November 17
- Time for feedback on second (and last) draft until December 1st
- **Will publish final synthesis paper this year**
  - Open to the whole community to [sign their support](#), already 106 supporters

This was a very successful HSF activity

Achieving a *useful* community consensus is not an easy process!

A Roadmap for HEP Software and Computing R&D for the 2020s

The HEP Software Foundation

v0.2 Released 2017-11-17