

# CERN-EP R&D Initiative Software Working Group

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# EP R&D Programme

- R&D programme on new Detector Technologies
  - Spans a 5-years period from 2020 onwards (with a possible extension by another 5 years)
  - Detector hardware, electronics and **software** for new experiments and detector upgrades beyond LHC phase II
- Working groups are for the key themes
  - To study the state of the art, limitations and main challenges
  - Define an **ambitious** and **focused** work programme with milestones, deliverables and resource estimates.
- Open Process
  - Interested colleagues - no matter if engineer or physicist, staff or user, at CERN or elsewhere - are invited to contribute to the definition of the R&D programme
  - *This is why we start with today's open meeting of lightning talks*

# Timeline

- 20 November 2017 - Kick off meeting

<https://indico.cern.ch/event/677108/>

Working groups form and start to develop first ideas

- 16 March 2018 - First Workshop

<https://indico.cern.ch/event/696066/>

WG meetings and preparation of their chapter

- October 2018 - Second Workshop
- November 2018 - Deliver final report

Future funding will be based on this report



**R&D**  
**on EXPERIMENTAL TECHNOLOGIES**

CERN's Experimental Physics department has launched a process to define its R&D programme on new Experimental Technologies. The R&D work would span a 5-year period from 2020 onwards (with a possible extension by another 5 years), and cover detector hardware, electronics and software for new experiments and detector upgrades beyond LHC Phase II.

**8 working group sessions**  
**Special R&D proposals**

- Silicon detectors
- Gas detectors
- Calorimetry and light based detectors
- Detector Mechanics
- IC Technologies
- High Speed Links
- Software
- Detector Magnets

**1st Workshop**  
**16 March 2018 (full day)**  
**CERN, main auditorium**

Please register!  
<http://indico.cern.ch/e/EP-RD-Workshop1>

 Experimental Physics  
Department  
R&D on Experimental Technologies

# Software Working Group - Lightning talks

- Open process to call for contributions of
  - ~3 slides, 10' time slot *including discussion*
- We have many interesting topics proposed
  - It wasn't possible even to fit in all the talks that were proposed for today
  - And some people also needed more time to get a contribution ready
- Second Session of Lightning Talks
  - <https://indico.cern.ch/event/702570/>
  - Monday 26th February, 09h30-13h00, Salle Dirac (building 40)
- Please let us know, if you haven't already, if you would like to contribute to that session
  - You reserve your slot with a speaker and a title

# Process from here...

- Outcome is a chapter proposing R&D projects for Software that...
  - Align with the challenges faced by the whole HEP programme
  - Development of specific expertise in CERN
  - Relevant for future projects (i.e., more than one experiment)
- To do that we need a core group of experts to review, aggregate and converge from the inputs we gather
  - Must be representative, but small enough to be agile and focused
    - Jakob and Graeme have started to do this
    - We try to cover all the domains and the experiment groups
  - We will communicate the results of this group back to the mailing list and feedback from everyone is welcome
- First task will be based around reviewing our inputs and selecting appropriate themes for the workshop on 16 March

# Software R&D Experience

- Previous R&D projects ran from 2007-2011
  - CERNVM and CVMFS
  - Concurrency
- Both these activities were a success
  - But they took many years to reach production
    - 10 years after the start we have production services, but continued refinement, development and adaption
    - We are not focused on HL-LHC startup, but benefits would come during HL-LHC running
- Key elements of success
  - Have something to show to users relatively early
  - Dedicated, but modest funding seems to work ( $\pi$  people)
    - This also fits with the anticipated level of support
  - This model seems to attract good people to the project

# Backup

# Software R&D Group

- Mailing list
  - [EP-RDET-WG7-Software@cern.ch](mailto:EP-RDET-WG7-Software@cern.ch)
- Sharepoint site
  - <https://espace.cern.ch/ep-rdet-wg7-software/>



# Questions and Inspiration!



- Physics motivation for a particular technology to be developed?
- New technologies might we be obliged to use in the future?
- A concrete piece of software that to be expected within 2 years?
- An educated guess about the potential of the technology in the next 5-10 years?
- Can we carry out the R&D work roughly within the current resource envelope?

[HSF Community Roadmap](#)

[OpenLab white paper](#) on future challenges

[Software technology forum](#)

- HEP algorithm toolbox for computing accelerators
- Machine learning for analysis, fast simulation, I/O tuning; error estimation and predictable system behavior
- Turn-key systems for future experiments; framework modularization and ready-made analysis facilities
- High-level programming paradigms and abstractions; declarative programming, software correctness guarantees, domain-specific languages, etc.