

R&D on Experimental Techniques

An initiative to define R&D on Experimental Techniques in EP for the period 2020 - 2025 (- 2030)

Proposal for scope, timeline, organization, etc.:

Scope:

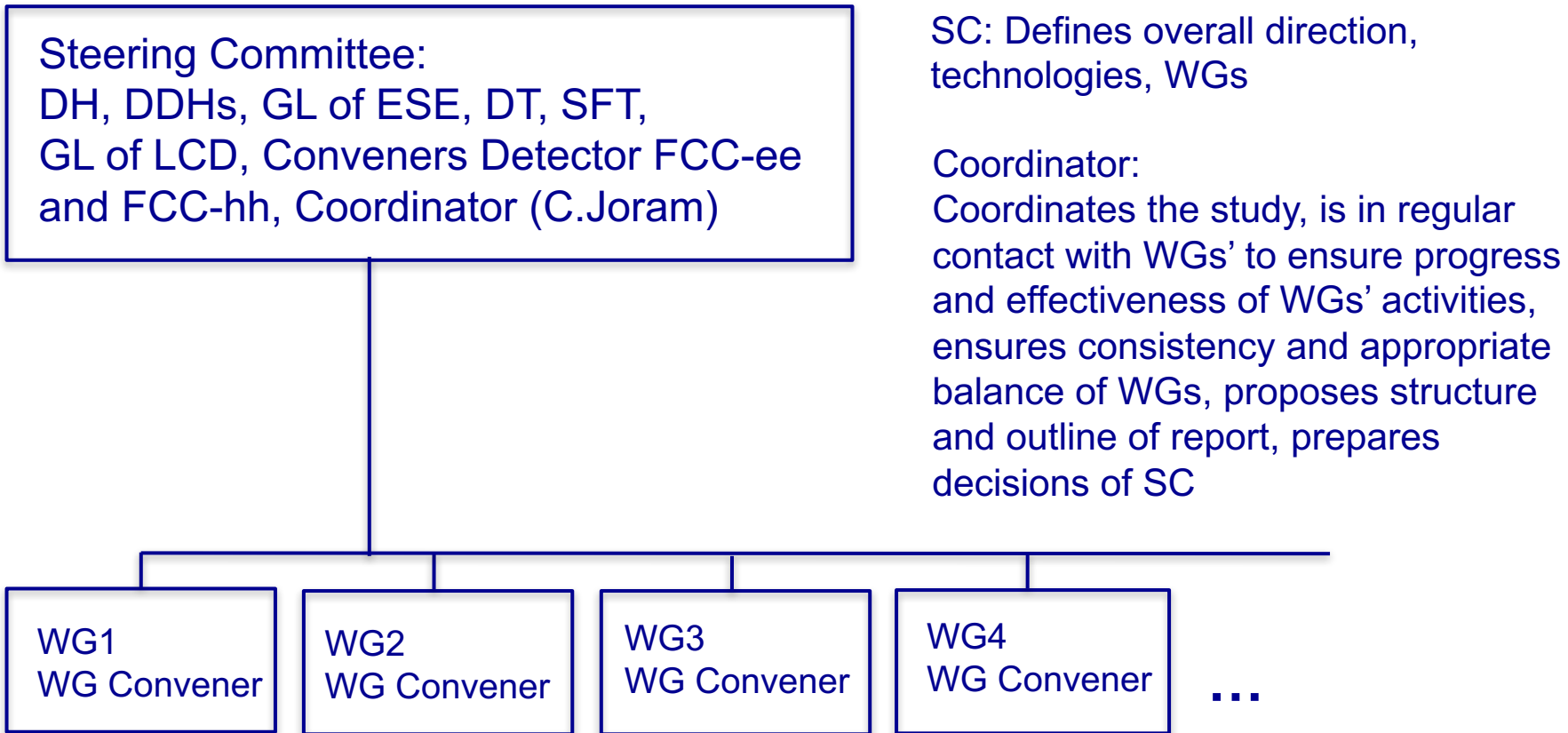
- Define the R&D strategy for experimental techniques for future experiments: future colliders, fixed target experiments, future LHC experiment upgrades, new (unconventional) ideas
- R&D on Detectors, Electronics, Software
- Identification of key technologies (with CERN experience)
- Definition of a roadmap with milestones and prototypes to be developed
- Define funding requirements
- Proposal for the organisation of R&D within EP

Timeline: kick-off meeting in 2017, final document end of 2018

Maintain and foster partnership with external research institutes and industrial partners (via RDxx groups!)

R&D on Experimental Techniques

Proposal for the organisation to define the strategy:



Working Groups on different technologies

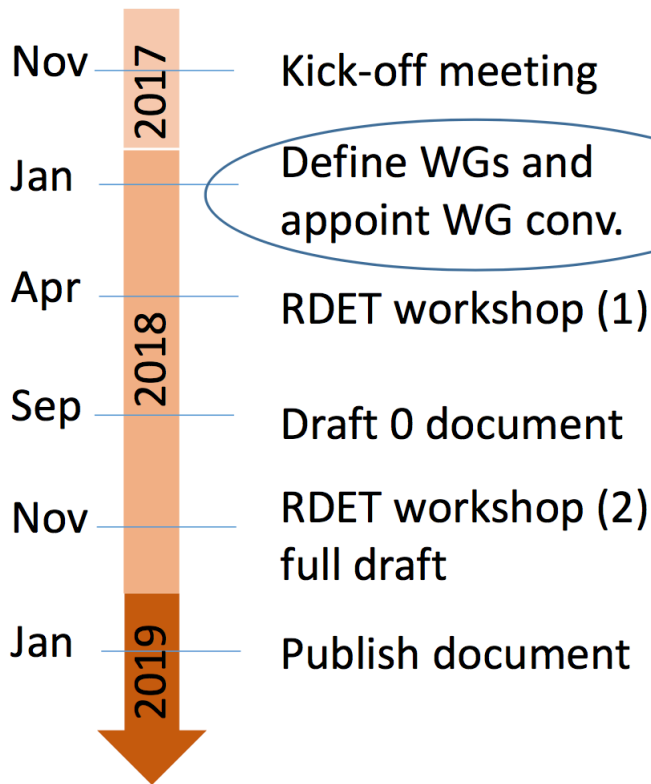
WG conveners coordinate the work within their group.

R&D on Experimental Techniques

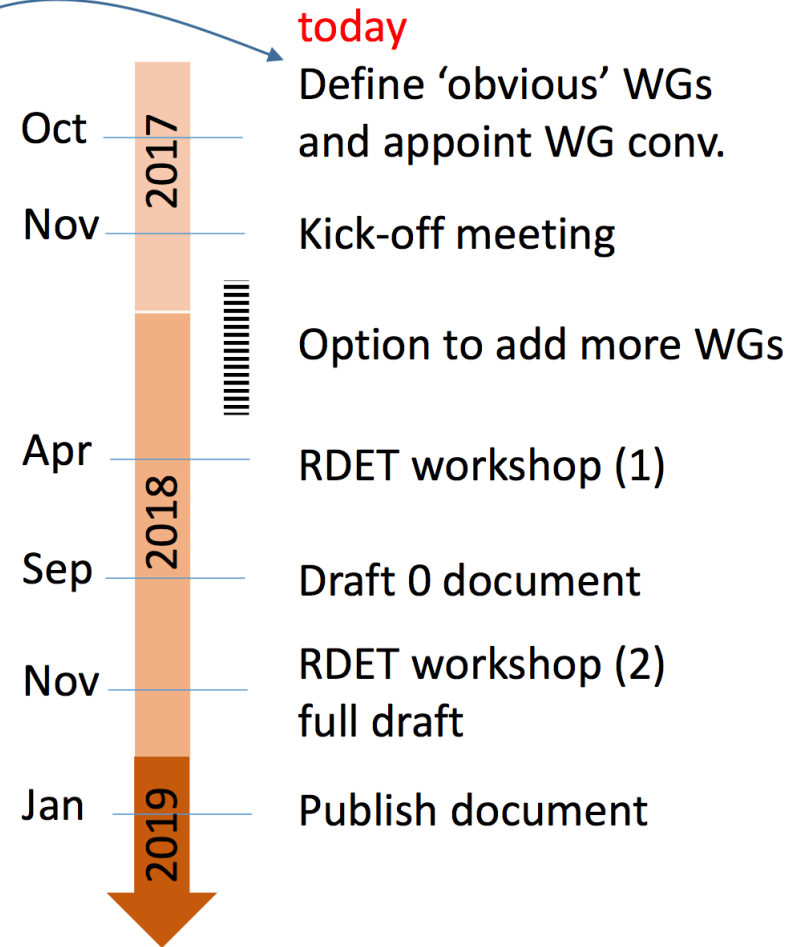
Proposals for working groups/technologies:

- **Silicon Detectors:** Integrated CMOS, LGAD, packaging and high density interconnect (chip-to-chip, wafer-to-wafer), tile-able solutions
- **Gas Detectors:** micro pattern detectors, solutions for large areas, fast detectors, environment friendly gases, technology transfer to industry
- **Calorimetry**
- **Detector Integration:** low-mass structures, cooling, microfabrication, composite technologies, robotics, precision metrology and alignment
- **IC Technologies:** hybrid pixel detectors, increased functionalities on chips, very deep submicron technologies, radiation hardness
- **High speed Links:** radiation hardness, power dissipation, silicon photonics, wireless solutions
- **Software for Experiments:** new techniques for simulation and reconstruction, customizable turn-key systems, new HW/SW technologies
- **Detector Magnets:** thin magnet technology

A possible time line



Alternative



Kick-off meeting - R&D on experimental technologies

Monday 20 Nov 2017, 09:30 → 12:10 Europe/Zurich

500-1-001 - Main Auditorium (CERN)

09:30 → 10:00	Coffee	30m
10:00 → 10:10	Introduction Scope, context, timeline Speaker: Manfred Krammer (CERN)	10m
10:10 → 11:10	Current R&D in LHC experiments Where will we stand in 2020? Expected R&D results and outlook on farther future	
10:10	ATLAS Speaker: Heinz Pernegger (CERN)	15m
10:25	CMS	15m
10:40	ALICE Speaker: Luciano Musa (CERN)	15m
10:55	LHCb Speaker: Massimiliano Ferro-Luzzi (CERN)	15m
11:10 → 11:50	The main challenges beyond HL-LHC Experimental requirements at future hadron and lepton machines	
11:10	Hadron machines Speaker: Werner Riegler (CERN)	20m
11:30	Lepton machines Speakers: Lucie Linssen (CERN), Patrick Janot (CERN)	20m
11:50 → 12:00	Towards an efficient and balanced R&D programme Process, first ideas on themes, organisation, roadmap, workshops Speaker: Christian Joram (CERN)	10m
12:00 → 12:10	Discussion	10m

Points of interest already identified

- **Very light tracker** with good momentum and impact parameter resolution
 - Silicon: solution for cooling
 - Wire chamber
- **Particle ID** (π , K, p, e)
- **Very thin detector solenoidal coil**
 - Possibility to have coil before calorimetry
- **Calorimetry**
 - Segmentation in double readout calorimeters
- **Fast readout** of Si detectors
 - VTX: 100 ns; luminometers: 20 ns
- **Mechanics for very busy forward region**
 - Luminometer support, etc.
- **Very large data flow**
 - 100 kHz of Z production
- **Online and offline computing**
 - Very large data volumes