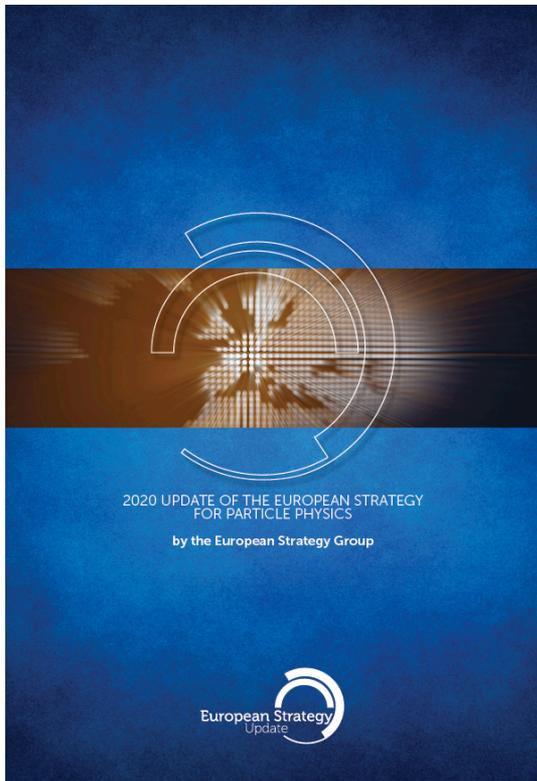




# The ECFA Detector R&D Roadmap

10.11.2020

Susanne Kuehn, CERN on behalf of the ECFA  
Detector R&D Panel



## Main report

C. The success of particle physics experiments relies on innovative instrumentation and state-of-the-art infrastructures. To prepare and realise future experimental research programmes, the community must maintain a strong focus on instrumentation. ***Detector R&D programmes and associated infrastructures should be supported at CERN, national institutes, laboratories and universities. Synergies between the needs of different scientific fields and industry should be identified and exploited to boost efficiency in the development process and increase opportunities for more technology transfer benefiting society at large. Collaborative platforms and consortia must be adequately supported to provide coherence in these R&D activities. The community should define a global detector R&D roadmap that should be used to support proposals at the European and national levels.***

<https://europeanstrategyupdate.web.cern.ch/>

“Delivering the near and long-term future research programme envisaged in this Strategy update requires advances in instrumentation through both focused and transformational R&D. Recent initiatives with a view towards strategic R&D on detectors are being taken by CERN’s EP department and by the ECFA detector R&D panel, supported by EU-funded programmes such as AIDA and ATTRACT. Coordination of R&D activities is critical to maximise the scientific outcomes of these activities and to make the most efficient use of resources; as such, there is a clear need to strengthen existing R&D collaborative structures, and to create new ones, to address future experimental challenges of the field beyond the HL-LHC.

Organised by ECFA, a roadmap should be developed by the community to balance the detector R&D efforts in Europe, taking into account progress with emerging technologies in adjacent fields. The roadmap should identify and describe a diversified detector R&D portfolio that has the largest potential to enhance the performance of the particle physics programme in the near and long term. This community roadmap could, for example, identify the grand challenges that will guide the R&D process on the medium- and long-term timescales, and define technology nodes broad enough to be used as the basis for creating R&D platforms. This will allow concerted and efficient actions on the international scale addressing the technological challenges of future experiments while fostering an environment that stimulates innovation and collaboration with industry.

Detector R&D activities require specialised infrastructures, tools, and access to test facilities. The National Laboratories and research institutes in Europe play a central and important role by providing access to these facilities and infrastructures, specialised expertise and user support. These technology platforms facilitate and stimulate strong engagement by industry.”



2

## Organize the development of a Detector R&D Roadmap

***To guide the Detector R&D process in Europe, defining an inclusive Detector R&D Roadmap would be a major step and a strong ambition for the community at large, both considering focused and transformational R&D and considering emerging technologies also in adjacent fields***

The updated European Strategy for Particle Physics calls upon ECFA to organize the development of a Detector R&D Roadmap

July 13th, 2020

Report from ECFA chair

15

From Plenary ECFA <https://indico.cern.ch/event/933318>

# Initiation of the Detector R&D Roadmap Panel

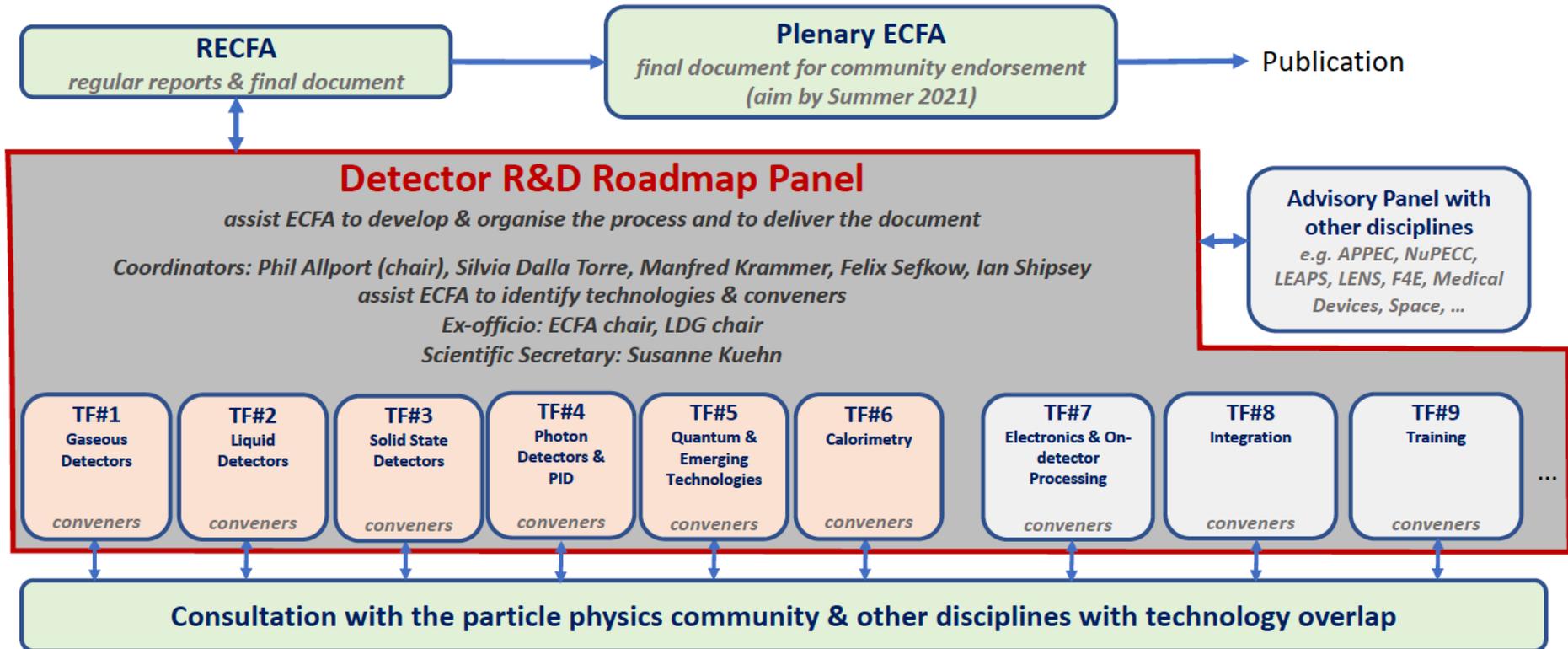


- The topic was first discussed in Restricted ECFA during its meeting on 17 April
- On the basis of this discussion, and wide-ranging consultations with amongst others the ECFA Detector Panel, CERN DG, President of Council and LDG chair, a strawman proposal for the organisational structure was presented for discussion to Restricted ECFA on 10 July
- The above mentioned consultation provided initial names for the membership of the **Detector R&D Roadmap Panel** that will assist ECFA to develop and organise the process, i.e. **the coordinators**
- Names were presented as an initial proposal to Restricted ECFA on 10 July, and with few changes both the organisational structure and the coordinators were agreed to be presented to Plenary ECFA
- On 13 July, the organisational structure and the coordinators were presented to Plenary ECFA for discussion after which they were endorsed
- A **call for nominations** for additional Panel members, i.e. **convener**s, was mentioned to Plenary ECFA and communicated in written to all ECFA members on 11 August (and a reminder early Sept)
- The list of nominations for convener
s is now in the hands of the Panel for further considerations- In consultation with the CERN EP department head, a **scientific secretary** was added to assist the Panel

# ECFA Detector R&D Roadmap Panel



## Organization to structure the consultation with the community



- Focus on the technical aspects given the EPPSU process as input
- Development of a matrix, where for each Task Force the identified future science programmes that they will need to address in terms of the main technology challenges to be met and estimate the lead-time over which the required detector R&D programmes may be expected to extend
- Create a time-ordered R&D requirements roadmap in terms of key capabilities not currently achievable

# Input and timeline of the process I

- The Panel is finalising the names of **Task Force (TF) conveners** and the scope of each Task Force; verifying as well coverage of diversity parameters.
- A **matrix of TF Technology areas versus future facilities** (based on EPPSU) is being developed.
- Next, several **technology experts** will be assigned as TF members in consultation with the conveners with a role to preparing the respective **Task Force Open Symposia**.
- In general, one **symposium for each TF** are scheduled for **March-April 2021** to **collect and help to organise input of the community**.
- The presentations and discussions at the open symposia aim to have broad coverage, inform the discussion and consultation with the community, and therefore they require dedicated preparation by conveners and experts.
  
- Each Task Force will itself connect to industry where relevant within its scope.
- Each future facility will be invited to present their information to the Task Force conveners and members.
- The role of the **Advisory Panel** is thought to be helpful to connect, where relevant, Task Force members with experts in adjacent fields to work together towards the roadmap and during the symposia. Other disciplines include APPEC (astroparticle), NuPECC (nuclear), LEAPS (accelerator-based photon sources), LENS (neutron), F4E (fusion for energy), ESA (space).
- RECFA members will have an opportunity to provide national input to conveners and experts, or to name an expert delegate for this.

# Input and timeline of the process II

- A multi-day **drafting session**, in or around May 2021, will bring together the coordinators and conveners to integrate all chapters into a coherent draft of the detector R&D roadmap.
- **Report at the RECFA meeting**, at this stage foreseen on 28 May 2021, with a further opportunity for **community feedback**.
- Consultation with **CERN Council** in June 2021, and a final community contact prior to the publication at the **EPS-HEPP conference** in July 2021.



- A European committee to review the R&D effort for future projects
- Created by ECFA in its meeting 24 Nov - 25 Nov 2011
- It was aimed at the detector R&D efforts of large-scale particle physics projects in their preliminary and preparatory phase, not yet approved and supported by a unique leading or host lab
- In November 2016, ECFA updated the mandate of the Panel and extended it to also include projects from the Astroparticle Physics Community.
- The European panel invites reviewing requests by the projects and sets up the appropriate review committee. It reviews the committee's recommendations after evaluation and monitors the subsequent progress.
- The panel is primarily concerned with large R&D projects, related to experiments involving many laboratories and requiring significant resources. Smaller projects are also encouraged to contact the panel if in need of advice. The idea is to help create a coherence of the global detector R&D effort by encouraging synergies between different activities.

Mandate: <https://cds.cern.ch/record/2211641>

# Summary

- ECFA Detector R&D Panel is progressing well towards identifying convenors and members for the technology and related Task Force areas.
- An ambitious timeline is envisaged which culminates in an European Detector Roadmap presented at the EPS-HEPP conference in July 2021.
- Inputs from the proponents of future facilities will be invited. We look forward, in due time, to receiving your input to this process.

# SPARE



# Links



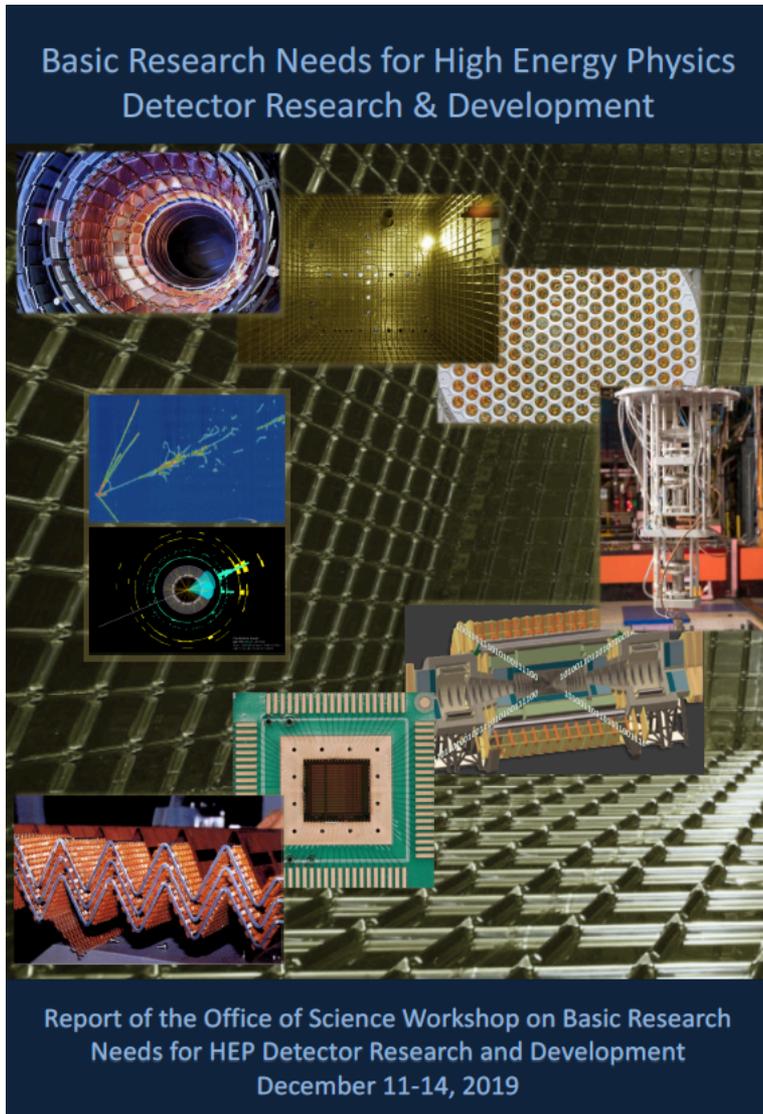
(1) <https://ep-dep.web.cern.ch/rd-experimental-technologies>

(2) <https://ecfa-dp.desy.de/members/>

(3) <http://aida2020.web.cern.ch/aida2020/>

(4) <https://attract-eu.com/>

# BRN: Higgs and Energy Frontier Timeline



## DOE Basic Research Needs Study on High Energy Physics Detector Research and Development

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[https://science.osti.gov/-/media/hep/pdf/Reports/2020/DOE\\_Basic\\_Research\\_Needs\\_Study\\_on\\_High\\_Energy\\_Physics.pdf?la=en&has\\_h=A5C00A96314706A0379368466710593A1A5C4482](https://science.osti.gov/-/media/hep/pdf/Reports/2020/DOE_Basic_Research_Needs_Study_on_High_Energy_Physics.pdf?la=en&has_h=A5C00A96314706A0379368466710593A1A5C4482)

# BRN: Higgs and Energy Frontier Timeline

Timeline for specific Priority Research Directions (PRDs) relevant for achieving the general detector requirements for the Higgs and Energy Frontier

