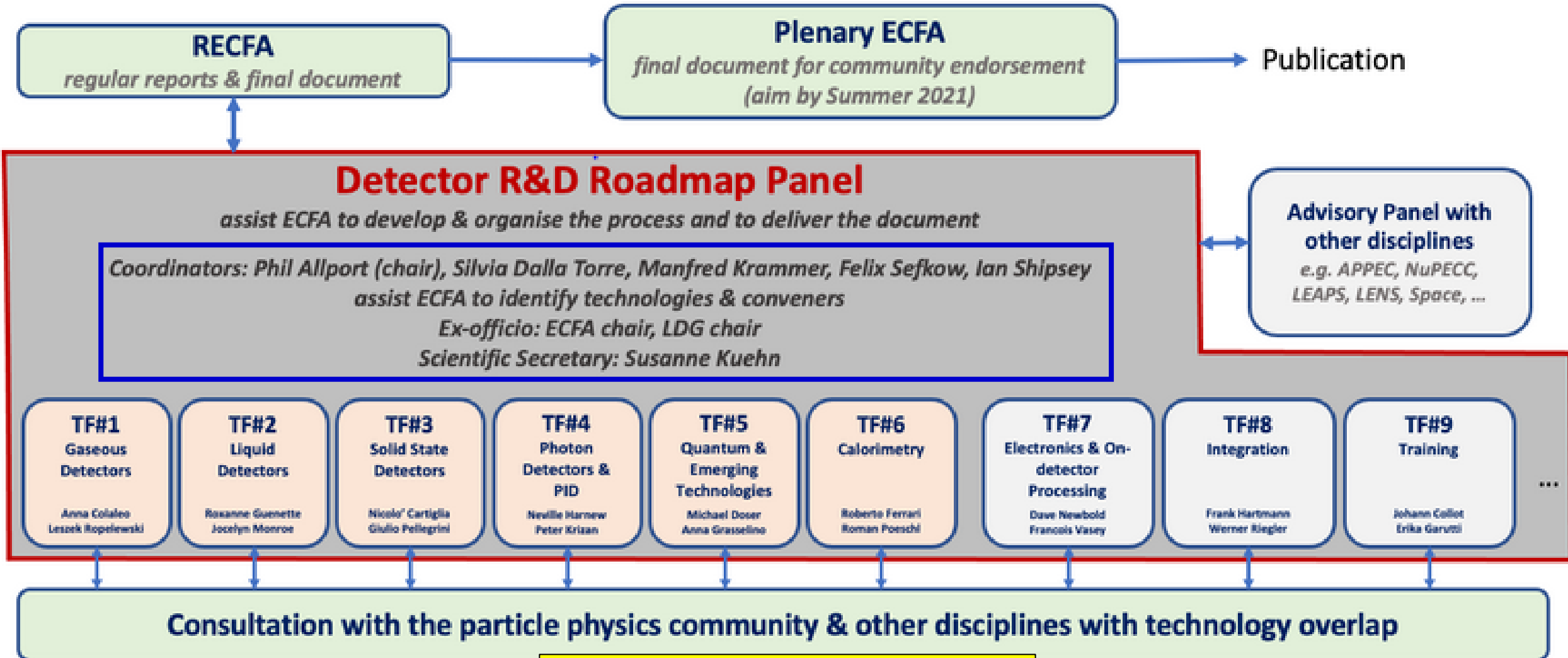# Discussione Roadmap ECFA Detector R&D

S. Dalla Torre

Organize the development of a Detector R&D Roadmap

"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**."

Extract from the 2020 Strategy update

Organization to structure the consultation with the community

RECFA
regular reports & final document

Plenary ECFA
final document for community endorsement
(aim by Summer 2021)

Publication

Detector R&D Roadmap Panel

assist ECFA to develop & organise the process and to deliver the document

Coordinators: Phil Allport (chair), Silvia Dalla Torre, Manfred Krammer, Felix Sefkow, Ian Shipsey
assist ECFA to identify technologies & conveners
Ex-officio: ECFA chair, LDG chair
Scientific Secretary: Susanne Kuehn

Advisory Panel with other disciplines
e.g. APPEC, NuPECC, LEAPS, LENS, Space, ...

TF#1	TF#2	TF#3	TF#4	TF#5	TF#6	TF#7	TF#8	TF#9
Gaseous Detectors	Liquid Detectors	Solid State Detectors	Photon Detectors & PID	Quantum & Emerging Technologies	Calorimetry	Electronics & On-detector Processing	Integration	Training
Anna Colaleo Leszek Ropelewski	Roxanne Guenette Jocelyn Monroe	Nicolo' Cartiglia Giulio Pellegrini	Neville Harnew Peter Krizan	Michael Doser Anna Grasselino	Roberto Ferrari Roman Poeschl	Dave Newbold Francois Vasey	Frank Hartmann Werner Riegler	Johann Collot Erika Garutti

...

Consultation with the particle physics community & other disciplines with technology overlap

Here the role of the national contacts

Comments about the structure

TF#1 Gaseous Detectors	TF#2 Liquid Detectors	TF#3 Solid State Detectors	TF#4 Photon Detectors & PID	TF#5 Quantum & Emerging Technologies	TF#6 Calorimetry	TF#7 Electronics & On-detector Processing	TF#8 Integration	TF#9 Training
Anna Colaleo Leszek Ropelewski	Roxanne Guenette Jocelyn Monroe	Nicolo' Cartiglia Giulio Pellegrini	Neville Harnew Peter Krizan	Michael Doser Anna Grasselino	Roberto Ferrari Roman Poeschl	Dave Newbold Francois Vasey	Frank Hartmann Werner Riegler	Johann Collot Erika Garutti

- ## Task Forces by **TECHNOLOGY**

- ## 6 TKs dedicated to detector technologies
- ## 3 TKs transversal to the others
  - ### Please, do not regard TF#9 "Training" as minor
  - ### In fact (miscellanea from my considerations)
    - Longer time needed to have a mature hardware expert respect to analysis expert
    - On average, less rewarding careers for hardware-dedicated physicists (in particular, young ones)
    - Experiments during 20 and more y with needs of hardware maintenance, while young physicists are pushed to data analysis
    - Progress in physics IF AND ONLY IF innovative break-through in instrumentation takes place

Overview of the Panel members and Task Forces

- TF1 Gaseous Detectors
  - Convenors: Anna Colaleo (INFN Bari), Leszek Ropelewski (CERN)
  - Expert members: Klaus Dehmelt (Stonybrook), Laura Fabbietti (TUM Munich), Barbara Liberti (INFN Roma), Joao Veloso (Aveiro)
- TF2 Liquid Detectors
  - Convenors: Roxanne Guenette (Harvard), Jocely Monroe (RHUL)
  - Expert members: Auke-Pieter Colijn (NIKHEF), Antonio Ereditato (Yale/Berne), Ines Gil Botella (CIEMAT), Manfred Lindner (MPI Heidelberg)
- TF3 Solid State Detectors
  - Convenors: Nicolo Cartiglia (INFN Turino), Giulio Pellegrini (IMB-CNM-CSIC)
  - Expert members: Daniela Bortoletto (Oxford), Didier Contardo (IN2P3-IP2I), Ingrid Gregor (DESY and Bonn), Gregor Kramberger (Jozef Stefan Insitute), Heinz Pernegger (CERN)
- TF4 Photon Detectors and Particle Identification Detectors
  - Convenors: Neville Harnew (Oxford), Peter Krizan (Jozef Stefan Insitute)
  - Expert members: Ichiro Adachi (KEK), Christian Joram (CERN), Eugenio Nappi (INFN Bari), Christian Schultz-Coulon (Heidelberg)
- TF5 Quantum and Emerging Technologies
  - Convenors: Michael Doser (CERN), Anna Grasselino (Fermilab)
  - Expert members: Caterina Braggio (Padova), Marcel Demarteau (ORNL), Andy Geraci (NWU), Peter Graham (Stanford), John March Russell (Oxford), Stafford Withington (Cambridge)
- TF6 Calorimetry
  - Convenors: Roberto Ferrari (INFN Pavia), Roman Poeschl (IN2P3-IJCLab)
  - Expert members: Martin Aleksa (CERN), Dave Barney (CERN), Frank Simon (MPP Munich), Tommaso Tabarelli de Fatis (INFN Milano-Bicocca)
- TF7 Electronics and On-detector Processing
  - Convenors: Dave Newbold (RAL), Francois Vasey (CERN)
  - Expert members: Niko Neufeld (CERN), Valerio Re (INFN Pavia), Christophe de la Taille (IN2P3-OMEGA), Marc Weber (KIT)
- TF8 Integration
  - Convenors: Frank Hartmann (KIT), Werner Riegler (CERN)
  - Expert members: Corrado Gargiulo (CERN), Filippo Resnati (CERN), Herman Ten Kate (Twente), Bart Verlaat (CERN), Marcel Vos (IFIC Valencia)
- TF9 Training
  - Convenors: Johann Collot (IN2P3-LPSC), Erika Garutti (DESY and Hamburg)
  - Expert members: Richard Brenner (Uppsala), Niels van Bakel (Nikhef), Claire Gwenlan (Oxford), Jeff Wiener (CERN)
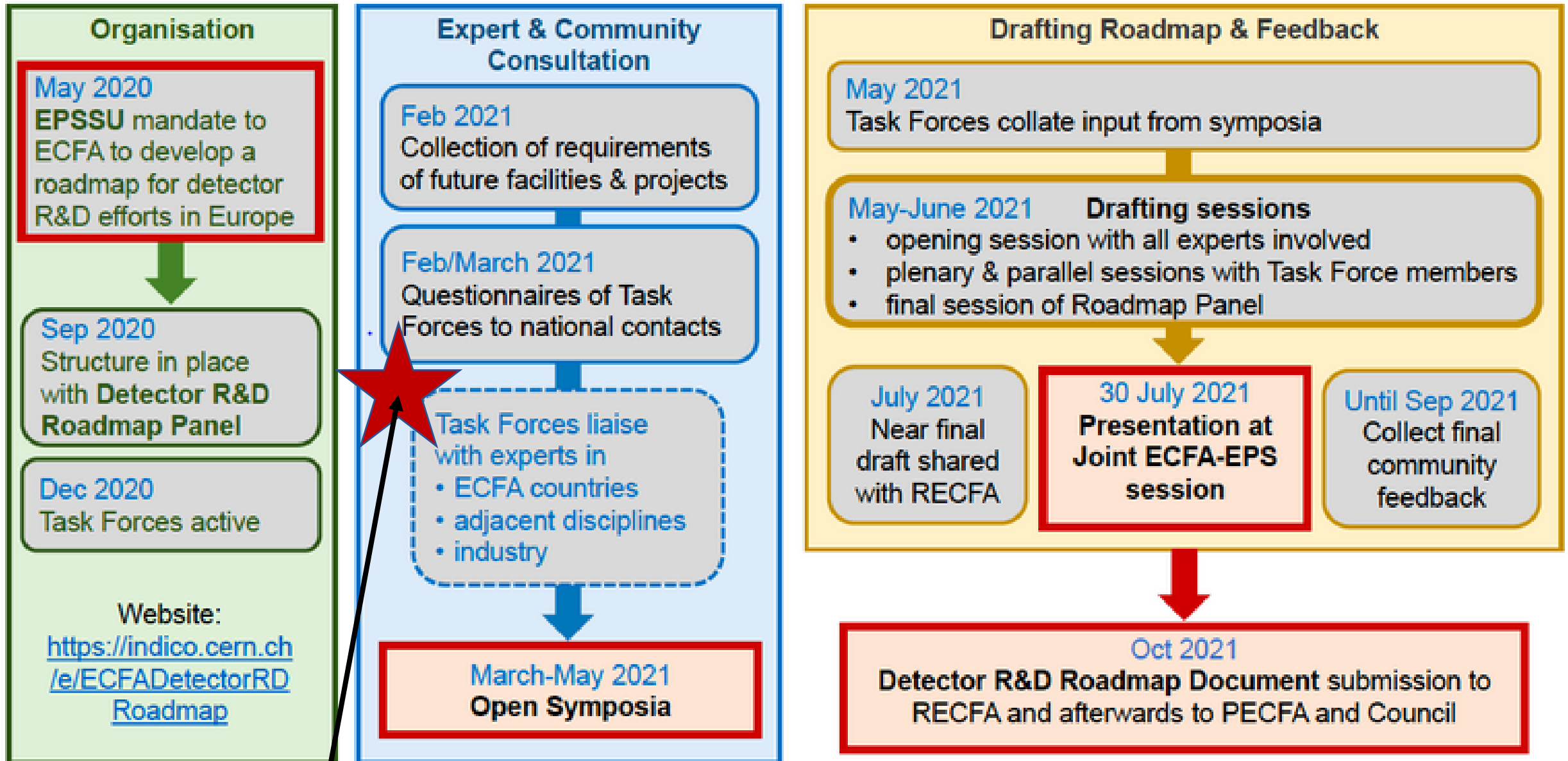
INFN
Conveners: 3 / 18
Members: 5 / 40

In total: 14%

OTHER DISCIPLINES considered in the process

- **APPEC** – astroparticle physics
- **NuPECC** – nuclear physics
- **LEAPS** – accelerator-based photon source
- **LENS** – advanced neutron sources
- **ESA** – space

ECFA Detector R&D Roadmap Process

Organisation

May 2020
EPSSU mandate to ECFA to develop a roadmap for detector R&D efforts in Europe

Sep 2020
Structure in place with **Detector R&D Roadmap Panel**

Dec 2020
Task Forces active

Website:
https://indico.cern.ch/e/ECFADetectorRDRoadmap

Expert & Community Consultation

Feb 2021
Collection of requirements of future facilities & projects

Feb/March 2021
Questionnaires of Task Forces to national contacts

Task Forces liaise with experts in
• ECFA countries
• adjacent disciplines
• industry

March-May 2021
Open Symposia

You are here

Drafting Roadmap & Feedback

May 2021
Task Forces collate input from symposia

May-June 2021 **Drafting sessions**
• opening session with all experts involved
• plenary & parallel sessions with Task Force members
• final session of Roadmap Panel

July 2021
Near final draft shared with RECFA

30 July 2021
Presentation at Joint ECFA-EPS session

Until Sep 2021
Collect final community feedback

Oct 2021
Detector R&D Roadmap Document submission to RECFA and afterwards to PECFA and Council

About input sessions

The invited speakers have **overviewed the main instrumentation opportunities, challenges, and planning of future facilities** to the roadmap panel

- 2 closed sessions, material is anyhow public

Links:

Session I (in general collider oriented), afternoon 19 February 2021: Input Session I

- Talk I: HL-LHC (incl. flavour physics)
- Talk II: strong interactions at future colliders
- Talk III: strong interactions at future fixed target facilities
- Talk IV: future linear high energy e+e- machines
- Talk V: future circular high energy e+e- machines
- Talk VI: FCC-hh
- Talk VII: muon collider

https://indico.cern.ch/event/994685/

Session II (in general non-collider oriented) afternoon 22 February 2021: Input Session II

- Talk I : neutrino short and long baseline
- Talk II: astro-particle neutrinos
- Talk III: DM-like facilities
- Talk IV: decay facilities
- Talk V: low energy facilities
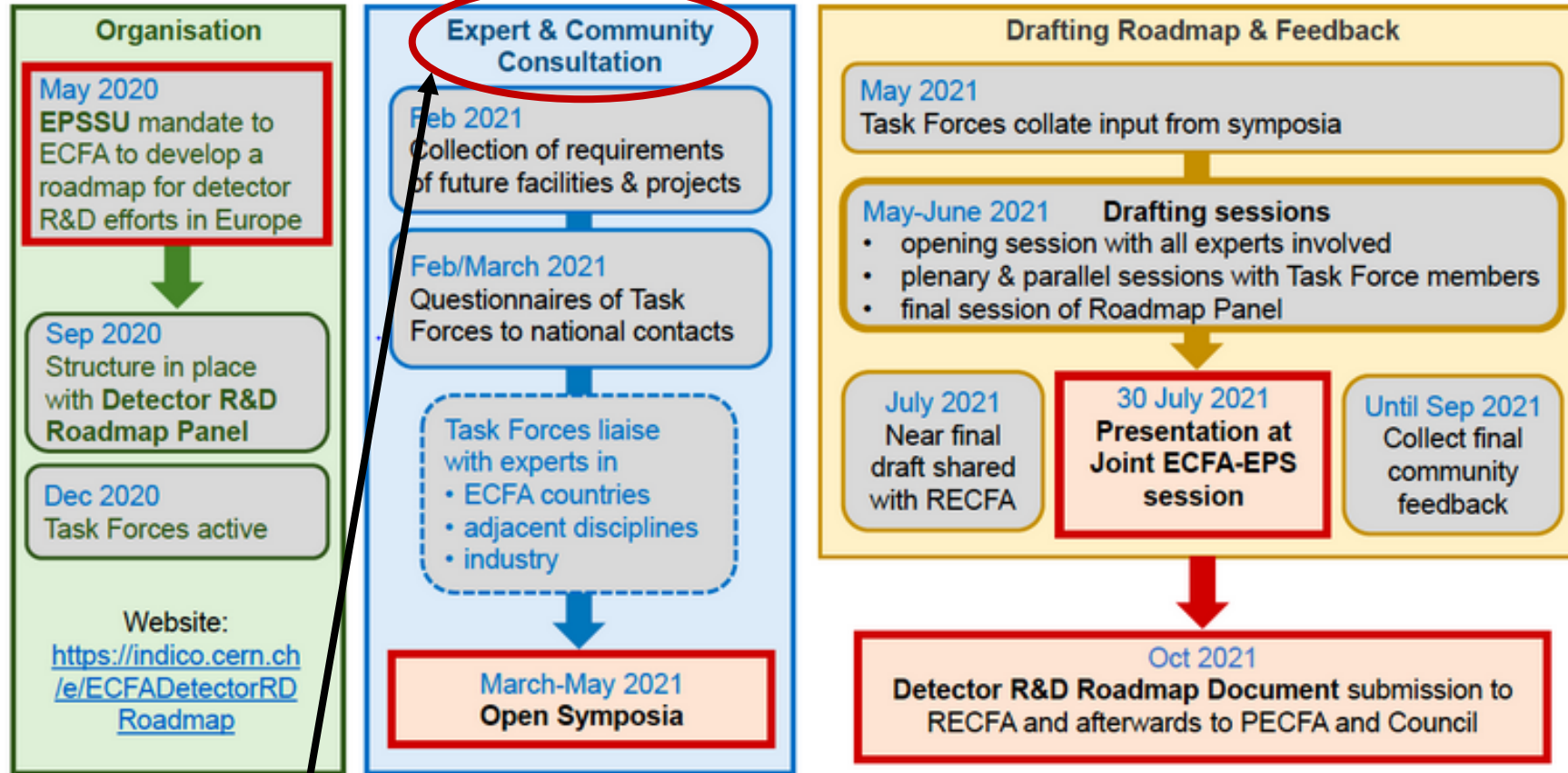
https://indico.cern.ch/event/994687/

About symposia (**key** step in the process)

- 9 of them, one for each TF

  - The symposia represent the main road for the material that will enter the roadmap report

  - Complete list , dates registration at https://indico.cern.ch/event/957057/program

  - Time range: 25/3 – 7/5

  - Presently programs w/o speakers, speakers will be published soon

> 25th March (TF7)
> 31st March (TF8)
> 9th April (TF2)
> 12th April (TF5)
> 23rd April (TF3)
> 29th April (TF1)
> 30th April (TF9)
> 6th May (TF4)
> 7th May (TF6)

ECFA Detector R&D Roadmap Process

YOUR ROLE

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- This (namely the present one) is the key phase for the contribution by the community
- Your FUNDAMENTAL input can be injected via 3 action lines:
    - Input to the national contact that, via questionnaires, send it to the panel (this workshop)
    - Your input directly to symposia invited speakers
    - Attending the symposia and contributing to the discussion

The most useful link

To get more information, to contribute, to register for the symposia:

- https://indico.cern.ch/e/ECFADetectorRDRoadmap