The FCC Physics, Experiments, and Detectors (PED) pillar, one of the main roles of which is to support and encourage a worldwide consortium of scientific contributors who can reliably commit resources to the development of the FCC-INT science project in the coming decade, is built on 4 blocks:

Physics programme (PPr)
This group addresses the phenomenological studies that constitute the physics potential of the FCC-integral project. This forum brings together theorists and experimentalists, where ideas, techniques and tools are developed, for the definition of the observables and measurements, of the targets (e.g., precision and discovery reach), and the overall analysis of their implications for SM and BSM physics. An integral part of the PPr deliverables is to propose a set of benchmark processes, to be used by the Physics Performance (PPe) group for the exploration of the detector requirements that are needed to match the expected performance targets. The PPr and PPe conveners act as a bridge between the two groups (within a global PED coordination group), in particular agreeing on the benchmark processes to be analysed in priority and in detail by PPe. PPr consists of six working groups:

1. EW physics (including precision measurements from both the ee and pp runs, and large Q2 observables from pp measurements)
2. Higgs physics
3. Top quark physics
4. Heavy Flavour physics (charm, bottom, tau)
5. QCD
6. BSM (indirect probes via precision measurements as well as direct searches of new particles and interactions)

Each WG will cover the phenomenological studies, the development of event generation tools, the calculation of the required higher-order corrections and, where appropriate, the relevant fitting formulae and the EFT formalism. A particular focus will be to identify 'benchmark' measurements that are of particular importance for physics discovery and towards which experimental designs, operation model, or theoretical calculations, should be optimized or evaluated. The experimentalists in these WG are thus encouraged to take part in the associated case studies developed in the Physics Performance group.

A similar WG structure, focused on FCC-ee, was in place during the preparation of the CDRs, with conveners drawn from the international community. For the CDRs, FCC-hh and FCC-eh had their own, independent, physics programme activities. The new structure is open to a discussion of the full FCC physics programme, in order to: (a) stimulate the discussion of complementarity and synergy between the two elements of the FCC integral project; (b) continue the exploration of the physics reach of FCC-hh; (c) encourage the cross talk between the ee and pp/LHC communities; and (d) stimulate the early engagement of the hadron community in the ee activities.

We expect each WG to be run by at least one experimental and at least one theory convener. WGs with a larger scope (e.g., EW, Higgs and BSM) may have more than these two conveners, also in view of the ee and pp required expertise. The conveners for this new phase of the FCC study have not been appointed as yet, but we have a list of names proposed by the various proponents of the study.

Physics performance (PPe)
The mandate of the FCC Physics Performance coordinators was approved in 2020, before the creation of the Physics Programme group. It was meant to provide a first mandate for the group to start, subject to future amendments to optimize its role in view of the evolution of the work and of the definition of the mandates of the other components of the PED pillar. For the FCC-ee part, a brief summary of the key points of the mandate is given here:

1. Deliver, document, and maintain, with input from the PPr conveners, a prioritized list of representative FCC-ee physics benchmark measurements
2. For each benchmark measurement, propose one or several case study(ies) aimed at delivering requirements for systematic uncertainties to be reduced and match – to the maximal possible extent – the statistical limit. Together with the "Detector Concepts" and the "Software" group, develop and implement the corresponding software in FCCSW.
3. Deliver operation and detector specifications required by FCC benchmark measurements.
4. With high priority, deliver a first working case study prototype, with its physics tools, analysis code, detector requirement, and corresponding documentation.
5. Progressively, have all ongoing benchmark measurements and case studies documented, both on a user-friendly web interface in the development phase; and in a preprint/publication upon completion, in view of compiling a set of consistent inputs for the future Physics CDR+.

The FCC-hh studies will aim at improving the reliability of performance studies for specific detector components, under a description of the challenging future high-luminosity environment more realistic than what used for the CDR. Performance studies will evolve in light of the progress made in the understanding of the new HL-LHC detectors and of the rapidly evolving analysis landscape and tools, e.g., to reconstruct highly-boosted objects. These activities will rely on the progress in modelling and simulation to arise from the Software WG.

Coordinators for this block are in place: Emmanuel Perez (CERN, EP) and Patrizia Azzi (INFN Padova. They are currently active, with regular meetings dedicated to the several case benchmark processes already under study (for details see https://www.overleaf.com/read/dyjpdszrqxhz). Replacing these coordinators would be counter-productive, as the work "just" started and is proceeding very well, see e.g., https://hep-fcc.github.io/FCCeePhysicsPerformance/

FCC physics software and computing (SC)
This activity had been launched during the CDR studies, with the goal of providing a common software platform to support both FCC-ee and FCC-hh studies. In that context, we have seen the development of fast simulation with DELPHES for physics studies and dedicated full simulation of sub-detector prototypes with GEANT4, mostly by FCC-hh, and a few parameterized FCC-ee Higgs studies with PAPAS. A mandate for the FCC physics software and computing coordinators was written in 2019, although minor updates are likely due, in view of the new overall environment. The FCC software framework is now seen as the prototype for a "turnkey software stack" for future experiments, as envisioned in the CERN/EP Detector R&D document submitted to the 2019-2020 update of the European Strategy for Particle Physics. The SC group is engaged in the global initiative in place to improve the compatibility of the software tools used by all "Higgs factory" proposals.

The current mandate covers Areas of work, Areas of management, and provides a timescale for the various deliverables. Several software Workshops, including tutorials (documented on the web for offline use), have already taken place.

Coordinators are in place (Gerardo Ganis and Clement Helsens) and fully working, but we will probably need a new coordinator soon. Candidate names, from outside of CERN, exist.

FCC detector concepts (DC)
For FCC-ee, the key ultimate target of this group is to provide evidence of a few complete detector concepts, capable of delivering the required physics performance, by the next European Strategy, supported by the appropriate community engagement and commitment. Among its possible tasks:

1. Define specific R&D required by the needs of FCC-ee;
2. Define what should appear in the CDR+ at end 2024 - early 2025, including
   a. a “generic detector” for which model exists in FCCSW (2021) and for which benchmarks, as well as cost, consumables (power etc.) can be estimated;
   b. a description of R&D and resources that are still required to achieve the detector requirements at that time;
3. Define what tools should be provided (and by whom) as community support for
   a. The common software platform FCCSW;
   b. The geometry, simulation and local reconstruction tools for various sub detectors available in FCCSW.

A task force of about 10 people, chaired by Mogens Dam (NBI), is preparing a proposal for the organization and the mandate of an FCC-ee effort on "detector concepts”. The task force includes authoritative members of the international community. A preliminary mandate ought to be ready by the end of May.

For FCC-hh, the targets include (a) revisiting the CDR baseline detector design, relying also on progress emerging from HL-LHC efforts; (b) exploring detector concepts for dedicated experiments (e.g., forward physics, flavour, exotica)

The DC group will operate in close contact to other initiatives, such as the AIDAInova EU project, the ECFA R&D Roadmap, and the CERN EP R&D Effort.

Other relevant points
1. Common part of the mandate for all 4 blocks is the community building effort, to generate interest and levy resources from the FCC National Institutes (and elsewhere), as well as seeking synergies and collaboration with LC, LHC, Snowmass, ...
2. Two further groups exist, run in coordination with the accelerator pillars: an EPOL group (energy calibration and polarization of the $e^{\pm}$ beams, study of the beam manipulations necessary to detect direct Higgs production at $\sqrt{s}$ = 125 GeV) and an MDI group (machine/detector interface). Each group is run by two appointed conveners, one from the accelerator and one from the physics sector (3/4 from non-CERN Institutions): Jorg Wenninger and Alain Blondel for EPOL; Manuela Boscolo and Nicola Bacchetta for MDI. The harmonization of the activities of the four blocks above is the ultimate responsibility of the overall coordinators of the PED pillar. At this time, a PED Steering Group is in place (formed

by authoritative members of the international experimental and theory communities), guaranteeing this overall coordination.

3. Ancillary committees furthermore exist: an informal forum of national contacts (convened by a French and a Polish representative), in connection with the FCC Global Collaboration working group (chaired by Emmanuel Tsesmelis); a speakers committee, to coordinate the planning of contributions to conferences. The creation of an editorial board for dissemination and communication is also foreseen. A specific secretariat for the FCC PED studies (with resources) would be an invaluable addition.