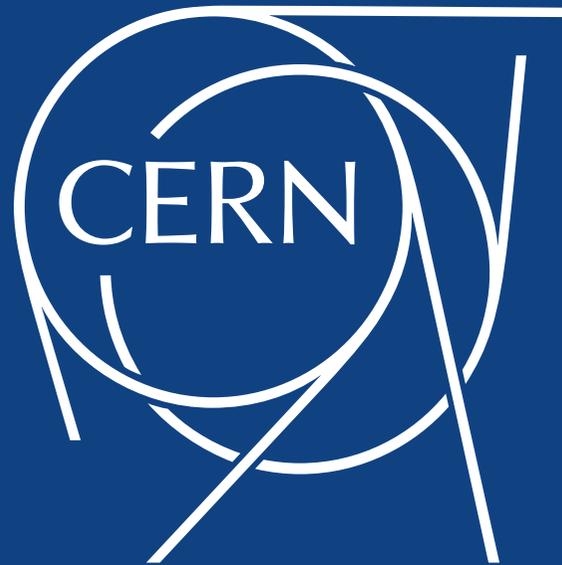


# News from the June Council Week



Fabiola Gianotti, 29 June 2020



# Introduction

Week # 7 since the beginning (18 May) of the gradual ramp-up of activities on site

Progressing very well → see F. Bordry's talk

Currently ~ 3500 people on site daily (up from ~ 300 during the safe-mode period).

Plan is to bring back on site each week:

+ 500 additional CERN's personnel\* and contractors needed for on-site work

+ 10% of the workforce that can telework

Priorities for activities and personnel on-site established by Department Heads and management of experiments, and reviewed weekly.

## Compliance with COVID-19-specific health and safety measures

(including personal protective equipment on surface and underground, hygiene measures, ventilation, people feeling unwell, vulnerable people, visitors, meetings, transport, duty travel, cleaning, ...)

is **CRUCIAL** to be able to continue ramp-up steadily and safely → updated here with other news related to CERN's plans <https://hse.cern/news-article/coronavirus-information-measures-and-recommendations>

\* CERN's personnel includes ALL categories: employed members (MPE: staff and fellows) and associated members (MPA: users, scientific associates, project associates, students, etc.)



## June Council Week at a glance

**Council and its subordinate bodies** (Scientific Policy Committee, Finance Committee, Audit Committee) **congratulated** CERN Management for prompt and efficient response to the unprecedented situation, and **CERN's personnel for exemplary compliance with the measures** put in place to prevent spread of infection on the sites **and for the impressive work done in spite of the COVID-19 challenges**

### **European Strategy for Particle Physics (ESPP)**

Council decided, unanimously and with enthusiastic support, to update the Strategy

### **Medium-Term Plan 2021-2025**

Draft version, which includes preliminary implementation of ESPP, received strong support

→ final version for approval in September

### **2019 Annual Progress Report and financial statements approved unanimously**

With congratulations to CERN on great accomplishments!

### **Fiver-yearly review of the financial and social conditions of the members of the personnel**

Council approved Management's proposal (developed in concertation with Staff Association) for financial and social conditions to be reviewed: salaries for staff, stipends for fellows and subsistence allowances for associated members of personnel. In addition: benchmarking of diversity and inclusion related conditions. 5YR will be concluded end of 2021 → implementation in 2022

Council agreed that **CERN 2017-2018 Environment Report is made public** (first time ever)

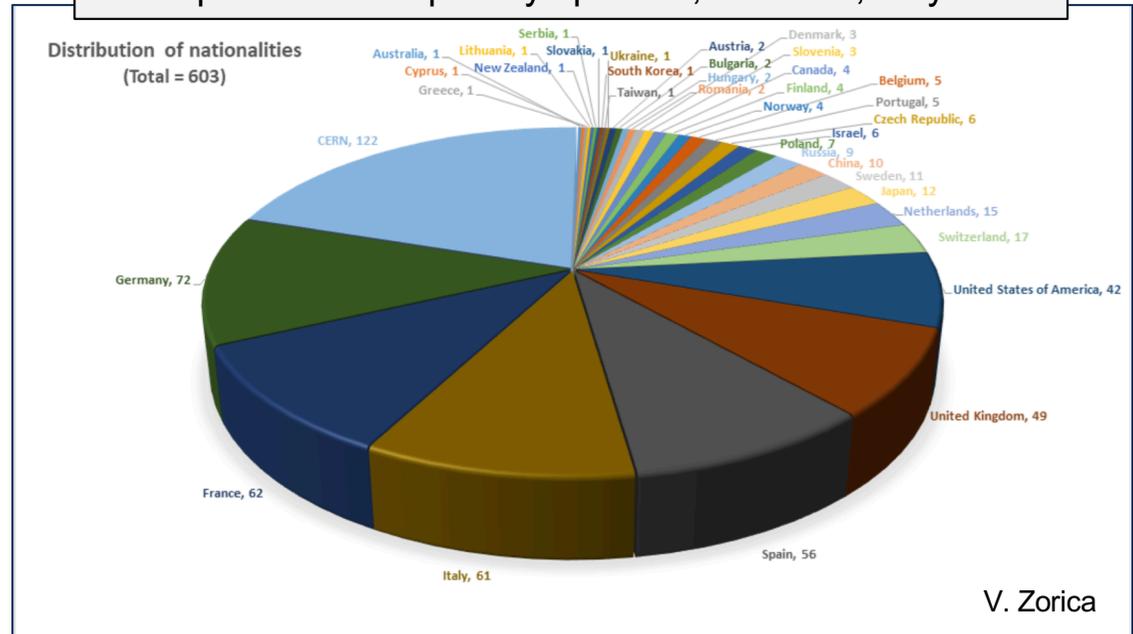
**88% of financial contributions of Member and Associate Member States for 2020 received**

(91% in June 2019) → **we thank them for their continued, strong support to CERN despite difficult times**

Update is the result of two years of intense and successful efforts of the community to prepare and discuss excellent scientific and other input.

Many thanks to ALL, in particular the Strategy Secretariat chaired by Halina Abramowicz, the Physics Preparatory Group and (my colleagues of) the European Strategy Group.

Participants of the Open Symposium, Granada, May 2019



The updated Strategy is visionary and ambitious, but also realistic and prudent. It lays the foundations for a bright future for particle physics in Europe, within the global context of the field, and should be implemented in collaboration with worldwide partners



# Strategy provides 20 “recommendations” (statements)

Detailed presentation by H. Abramowicz to Council’s Open Session on 19 June  
→ here only a few remarks

From Halina’s talk

## Guide through the statements

### 2 statements on **Major developments from the 2013 Strategy**

- a) Focus on successful completion of HL-LHC upgrade remains a priority
- b) Continued support for long-baseline experiments in Japan and US and the Neutrino Platform

### 3 statements on **General considerations for the 2020 update**

- a) Preserve the leading role of CERN for success of European PP community
- b) Strengthen the European PP ecosystem of research centres
- c) Acknowledge the global nature of PP research

### 2 statements on **High-priority future initiatives**

- a) Higgs factory as the highest-priority next collider and investigation of the technical and financial feasibility of a future hadron collider at CERN
- b) Vigorous R&D on innovative accelerator technologies

Letters for itemizing the statements are introduced for identification, do not imply prioritization

### 4 statements on **Other essential scientific activities**

- a) Support for high-impact, financially implementable, experimental initiatives world-wide
- b) Acknowledge the essential role of theory
- c) Support for instrumentation R&D
- d) Support for computing and software infrastructure

### 2 statements on **Synergies with neighbouring fields**

- a) Nuclear physics - cooperation with NuPECC
- b) Astroparticle - cooperation with APPEC

### 3 statements on **Organisational issues**

- a) Global collaboration on projects in and out of Europe
- b) Relations with European Commission
- c) Open science

### 4 statements on **Environmental and societal impact**

- a) Mitigate environmental impact of particle physics
- b) Investment in next generation of researchers
- c) Knowledge and technology transfer
- d) Cultural heritage: public engagement, education and communication



## Scientific priorities include

- ❑ Full exploitation of LHC physics potential → successful completion of the high-luminosity upgrade of accelerators and experiments
- ❑  $e^+e^-$  Higgs factory as the highest-priority next collider
- ❑ Increased R&D on accelerator technologies: high-field superconducting magnets, high-gradient accelerating structures, plasma wakefield, muon colliders, ERL, etc. Development of Accelerator R&D roadmap.
- ❑ Investigation of the technical and financial feasibility of a future  $\geq 100$  TeV hadron collider at CERN, with  $e^+e^-$  Higgs and electroweak factory as a possible first stage.  
To be completed by next Strategy update (~ 2026).
- ❑ Support to long-baseline neutrino projects in Japan and US. Support to high-impact scientific diversity programme complementary to high-energy colliders (role of national labs emphasised)

(My) remarks:

- ❑ Strategy gives a direction for future collider(s) at CERN (FCC). Prudent: feasibility study first.
- ❑ Intensified accelerator R&D to prepare alternatives if FCC feasibility study fails
- ❑ No consensus in European community on which type of Higgs factory (linear or circular)  
If FCC feasibility study successful and project approved → FCC-ee is natural choice at CERN
- ❑ ILC: - compatible with ESPP if timely (otherwise conflict of resources with next collider at CERN)  
- are ILC and FCC-ee complementary enough in terms of physics? No consensus
- ❑ Chinese colliders (CepC, SppC): direct competition → if CepC goes ahead, Europe would go directly to FCC-hh (if feasible)



# Why a future collider at CERN?

## Physics case is very strong

- ❑ Higgs boson is a guaranteed deliverable: related to the most obscure and problematic sector of the Standard Model; it carries special quantum numbers and a new type of interaction  
→ unique door into new physics, which can only be studied at colliders
  
- ❑ Unprecedented direct/indirect reach for new physics: up to ~100 TeV.  
Note: no guarantee of discovery of new particles.
  
- ❑ Precise measurements and exclusion of unfounded theoretical scenarios are as crucial as discoveries to make progress and redirect our theoretical thoughts<sup>(\*)</sup> and experimental exploration towards the most promising directions.  
(\*): *“When theorists are more confused, it’s time for more, not less, experiments”*, Nima Arkani-Hamed.

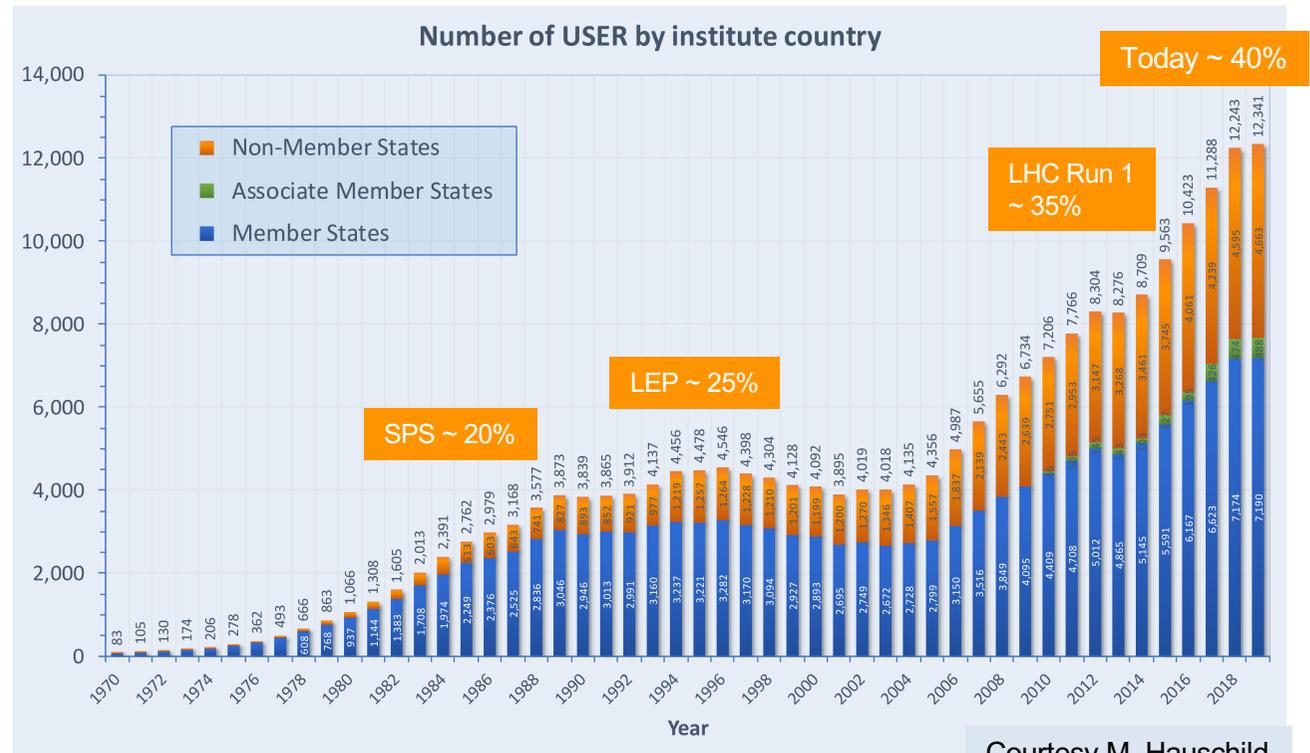
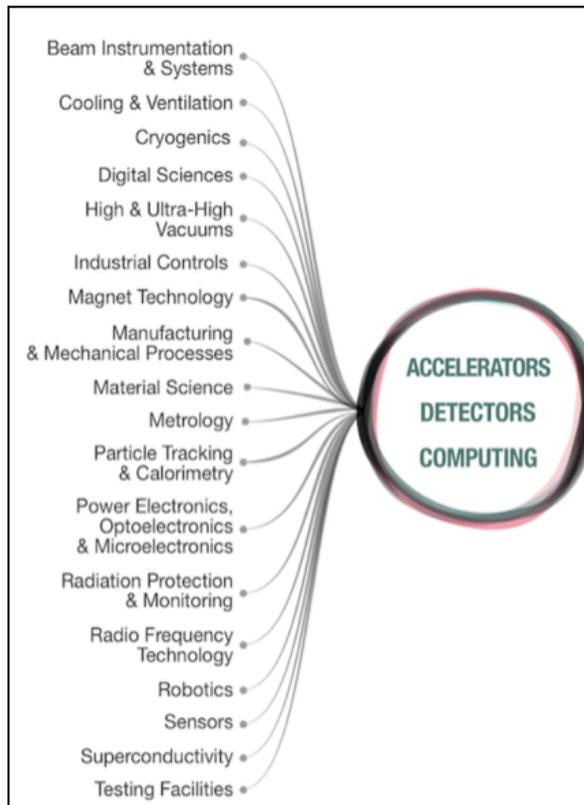
## CERN should host an ambitious future collider

- ❑ strong scientific case for it (see above)
  - ❑ to maintain Europe’s leading role in fundamental physics and related technologies
  - ❑ CERN has unique assets:
    - powerful infrastructure and outstanding personnel expertise, built over several decades
    - commitment of Member States → long-term budget stability
    - mission and tradition of international cooperation and open science (from founding Convention)
- essential pre-requisites for a large, global project



# Why a future collider at CERN?

CERN's scientific achievements, its innovative wide-ranging technologies, and its large community (~ 18000 people) are linked primarily to its "flagship" project: **LHC**.



Courtesy M. Hauschild

These scientific advances, technological innovation capability and large community **cannot be maintained without a flagship project** (strongly motivated by physics) **starting operation within a short time from the end of HL-LHC (<10 years, in order to keep the community motivated and engaged)**



# FCC's main challenges

## Financial feasibility

Cost of tunnel: ~5.5 BCHF; FCC-ee: ~5-6 BCHF; FCC-hh: ~17 BCHF (if after FCC-ee)

→ cannot be funded only from CERN's (constant) budget + additional "ad hoc" contributions from Member and other States → need innovative mechanisms: EC? private funds? donations?

First priority of feasibility study: find funds for the tunnel

## Governance model for an unprecedented, global project

To be developed with international partners from the outset

## Technical and administrative feasibility of tunnel

- highly-populated area; two countries with different legislative frameworks
- land expropriation and reclassification
- need to gain support of local populations (with a view to public surveys and debates)
- environmental aspects

First priority of feasibility study: no show-stoppers for ~100 km tunnel in Geneva region

## Technologies of machine and experiments

- huge challenges, but under control of our scientific community → "easier"
- environmental aspects (aim at "green collider"): power, energy, cooling, gases, etc.

First priority of feasibility study: magnet technology; how to minimise environmental impact

## Gathering political and societal support

→ requires "political work" and vast communication campaign for "consensus building" with governments and other authorities, scientists from other fields, general public (Science Gateway,...)

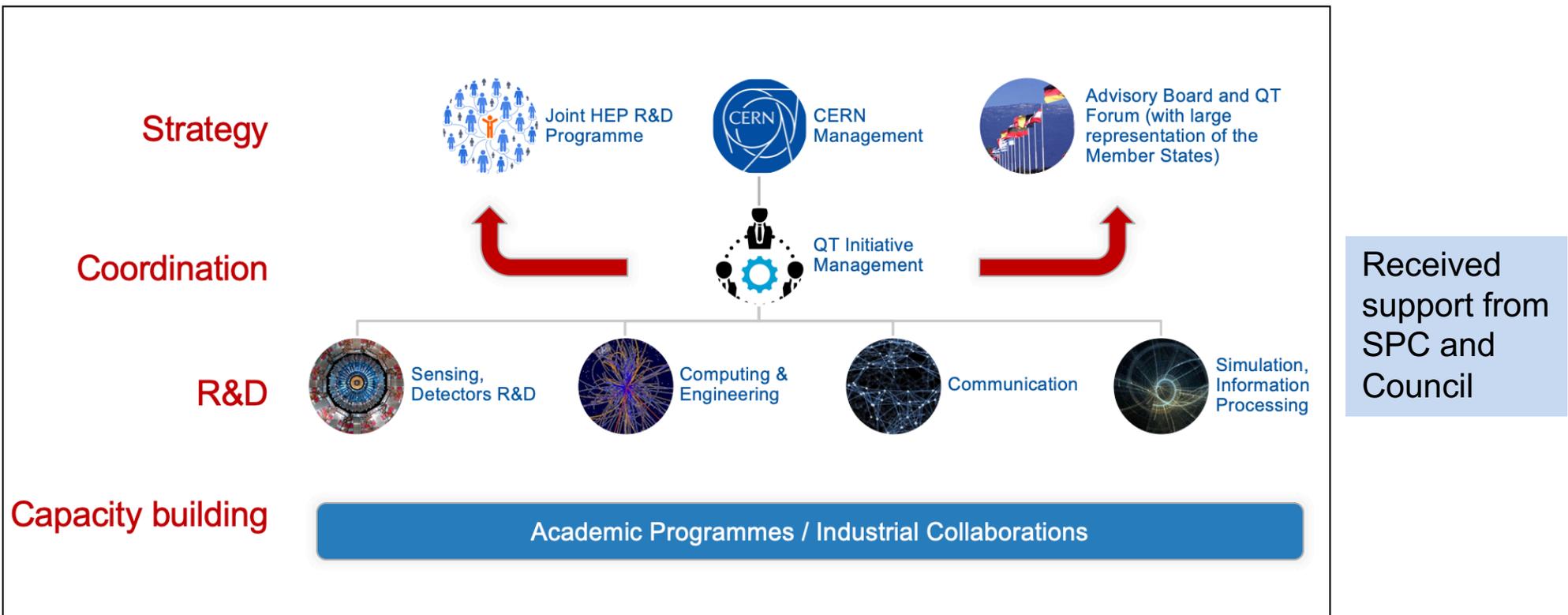


# CERN Quantum Technology Initiative

Quantum technologies developing fast, with high-potential impact on science and society  
→ significant resources invested in CERN's Member States and beyond.

CERN and its community are in a unique position to make significant contributions:

- ❑ diverse set of skills and technologies: SW, computing, theory, engineering, cryogenics, electronics, etc.
- ❑ compelling use cases from our scientific work that are attractive to industry and other stakeholders
- ❑ rich network of academy and industry relations and collaboration models like Openlab (<https://openlab.cern>)



Initiative discussed with LHC experiments, WLCG, Scientific Computing Forum, HEP Software Foundation and representatives of similar projects in Member States and beyond.



## CERN's "family"

### **23** Member States:

Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Serbia, Spain, Sweden, Switzerland, United Kingdom

### **8** Associate Member States:

Croatia, Cyprus\*, India, Lithuania, Pakistan, Slovenia\*, Turkey, Ukraine  
\* in the pre-stage to Membership

### **6** Observers:

Japan, Russia, USA, European Union, JINR, UNESCO

### **~50** ICA (International Cooperation Agreements):

with non-Member States, some with countries with developing particle physics communities (CERN mission is also to help build capacity and foster growth of particle physics worldwide).

Brazil and Latvia applied for Associate Memberships; Estonia applied for Membership

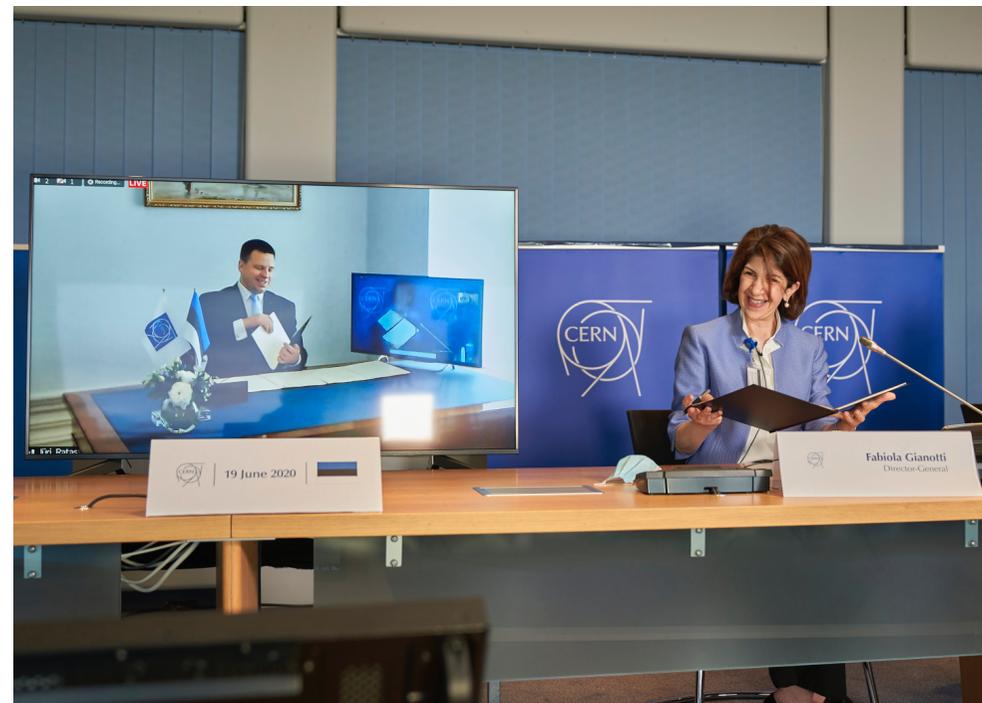


# Signature of agreement with Estonia

Agreement admitting Estonia as Associate Member in the pre-stage to Membership signed on 19 June → will entry into force as soon as ratification procedure in Estonia completed.

Remote ceremony for the first time in CERN's history.

Agreement signed for Estonia by Prime Minister, Mr Jüri Ratas





# Conclusions

Very successful June Council week, in particular with the update of the European Strategy  
→ a crucial milestone for the future of CERN and European particle physics.

The updated Strategy is visionary and ambitious, but also realistic and prudent.  
It lays the foundations for a bright future for particle physics at CERN and in Europe, within the global context.  
It will allow Europe to maintain scientific and technical leading role in particle physics.

Now we have to implement it!

Activities on site and through teleworking have continued at very intense pace over past months, supported very efficiently by CERN's services → see F. Bordry's talk  
**Many thanks** to all of you for your hard work, dedication, commitment, and patience in these difficult times !

