ePIC Collaboration Status and Plans for New Members

John Lajoie and Silvia Dalla Torre

Electron-Ion Collider (EIC) Resource Review Board (RRB) Meeting
EIC RRB meeting, April 3-4, 2023

OUTLOOK

- Formation and composition of the ePIC Collaboration
- The structure of the ePIC Collaboration
- Collaboration enlargement

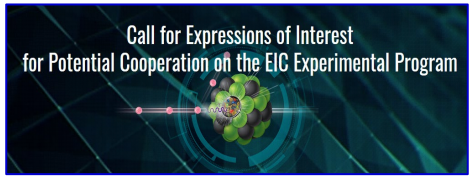
PATH to ePIC, the Project Detector

- Essential for the present status, the **whole development of EIC**
  - White paper (2012, 2014)
    the NAS assessment (2018)
    Long range plan for Nuclear Science (2015)
    CD0 and site selection (Dec 2019/Jan 2020)

- 2020: the EIC User Group (EICUG) elaborates the **EIC Yellow Report**
  - Science Requirements and Detector Concepts for the Electron-Ion Collider

Now published in Nuclear Physics A

- 2021: **Call for Collaboration Proposals** for Detectors at the EIC
  - **3 proto-collaborations** (ATHENA, CORE, ECCE) at work for proposals
  - At the end of the process: ECCE reference detector, ATHENA and ECCE recognized "a solid basis" for "a successful Detector 1", stronger collaborations needed
    → start an **optimization process integrating experimental concepts and communities**



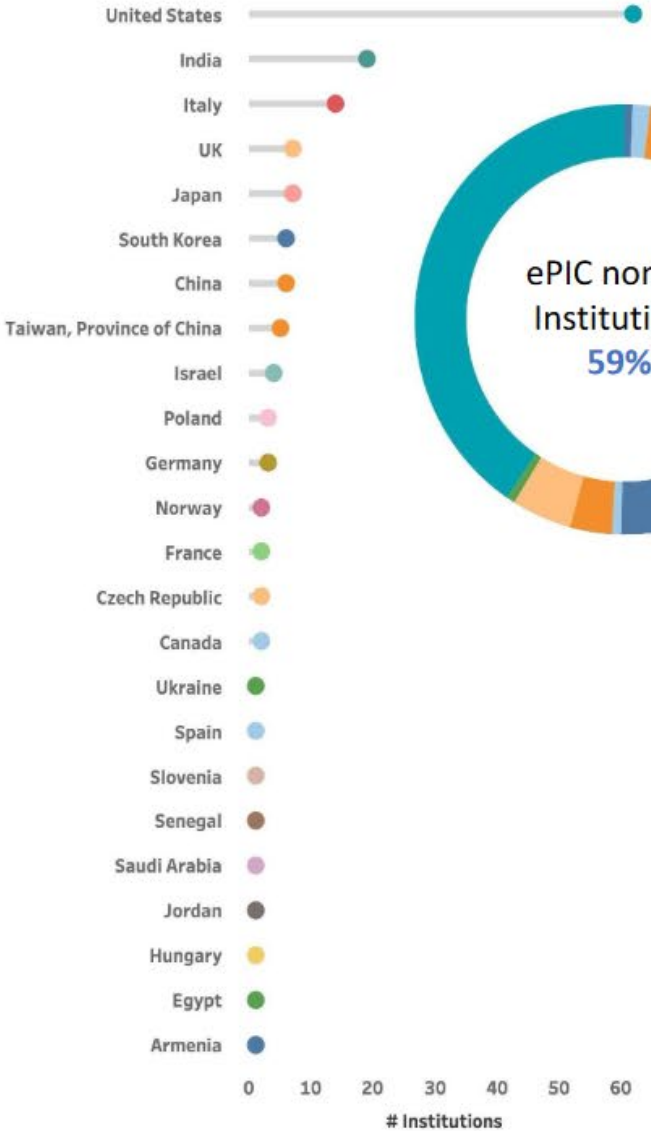
- 2022: Merging of the ECCE and ATHENA Collaborations **forming a stronger collaboration for the Project Detector @ IP6 → ePIC**
  - Transition period by a **Steering Committee**: *Silvia Dalla Torre, Or Hen, Tanja Horn, John Lajoie, Bernd Surrow*
  - The process of **formation** of the new collaboration is **now successfully completed**

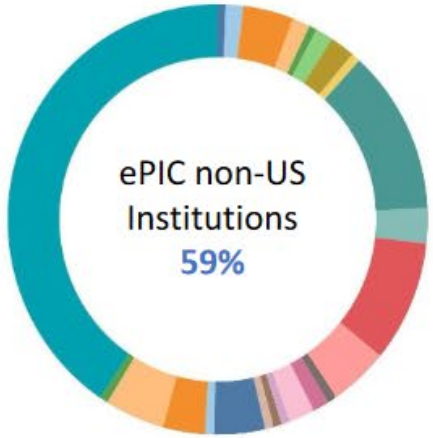
COLLABORATION ORGANIZATION TIMELINE

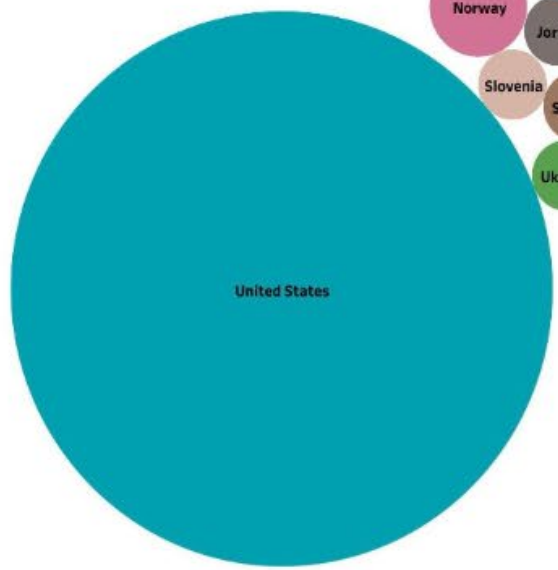
Snapshot of collaboration activities towards structuring the COLLABORATION:

- June 2022: Collaboration roster established via institutional survey
- July 26th-28th: Collaboration formation meeting @ Stony Brook University
- August-December 2022: Collaboration Charter
  - December 14: **adoption of charter**
- December 2022 - February 2023: Nomination process & Collaboration leadership election
  - Mid February: **announcement of election results**
- April 2022- March 2023: forming the collaboration community
  - **Biweekly general meetings**, alternating meeting time to account for **a world-wide collaboration including 4 time-areas**: East Cost, West Cost, Europe, Asia
  - **Second Collaboration Meeting**: January 9-11 2023 @ JLab
  - **Third Collaboration Meeting:** July 25-27, 2023 in Warsaw

The ePIC Collaboration







160+ institutions
24 countries

500+ participants

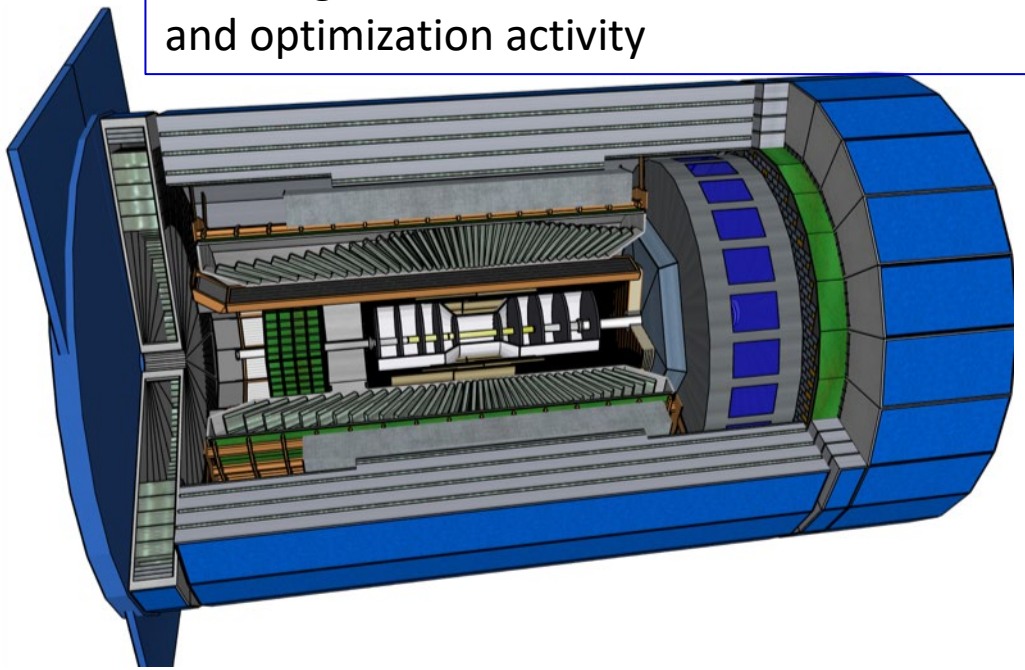
A truly global pursuit for a new experiment at the EIC!

COLLABORATION ORGANIZATION TIMELINE

Snapshot of collaboration activities towards detector consolidation and optimization:

- April 2022: Formation of Working Groups and start of technological consolidation process, following EIC detector proposal closeout in March 2022
- April 2022 – March 2023: intense WG activity
  - Weekly/biweekly WG meetings
  - Biweekly meetings WG conveners- Collaboration Management
  - WG "Global Detector and Integration" acting as a proto-technical board, including review processes when appropriate
    - Recent reviews for optimization:
      Barrel EM Calorimeter, backward RICH
- The activity is continuing within **an upgraded structure of the collaboration scientific bodies**

The design of the ePIC Central Detector now, resulting from the consolidation and optimization activity



OUTLOOK

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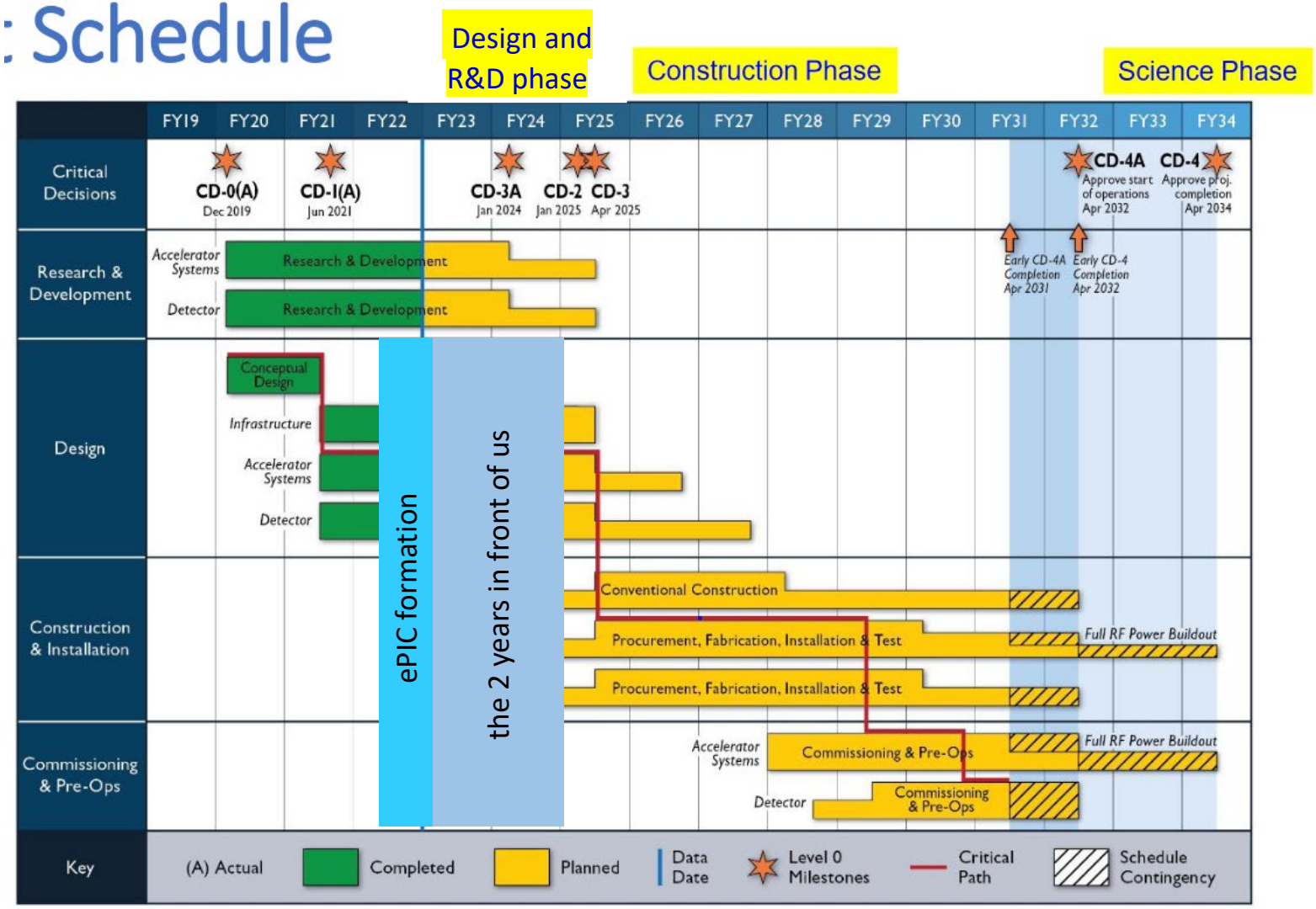
PROJECT TIMELINES and COLLABORATION TIMELINES

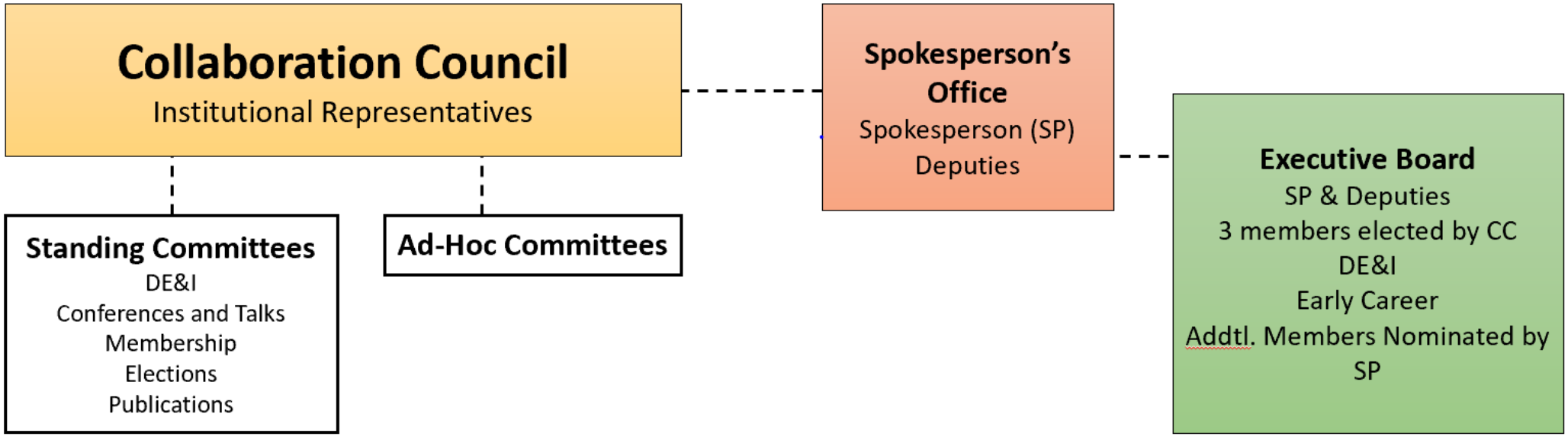
: Schedule



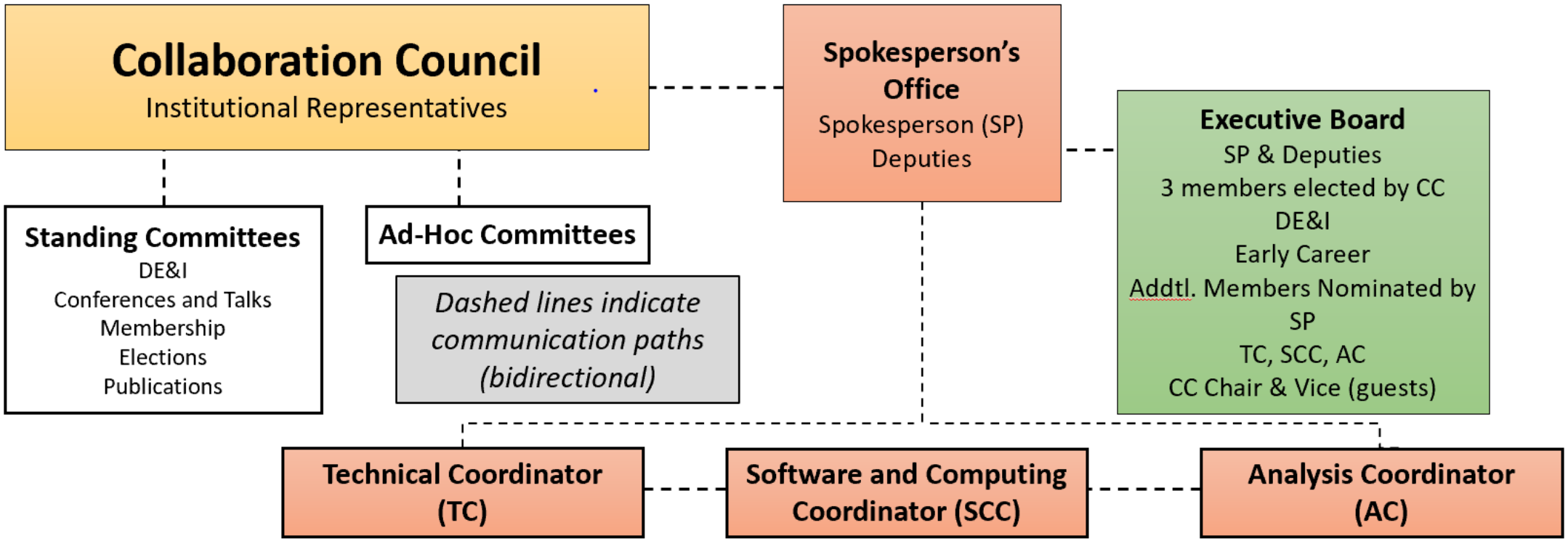
- The ePIC goal for the next two-years is to prepare the Technical Design Report (TDR) to get CD3 approval and organize the Collaboration so to be ready to start the construction phase at the beginning of 2025.

- The ePIC management plan by the SP–office is focused on the next tow-years

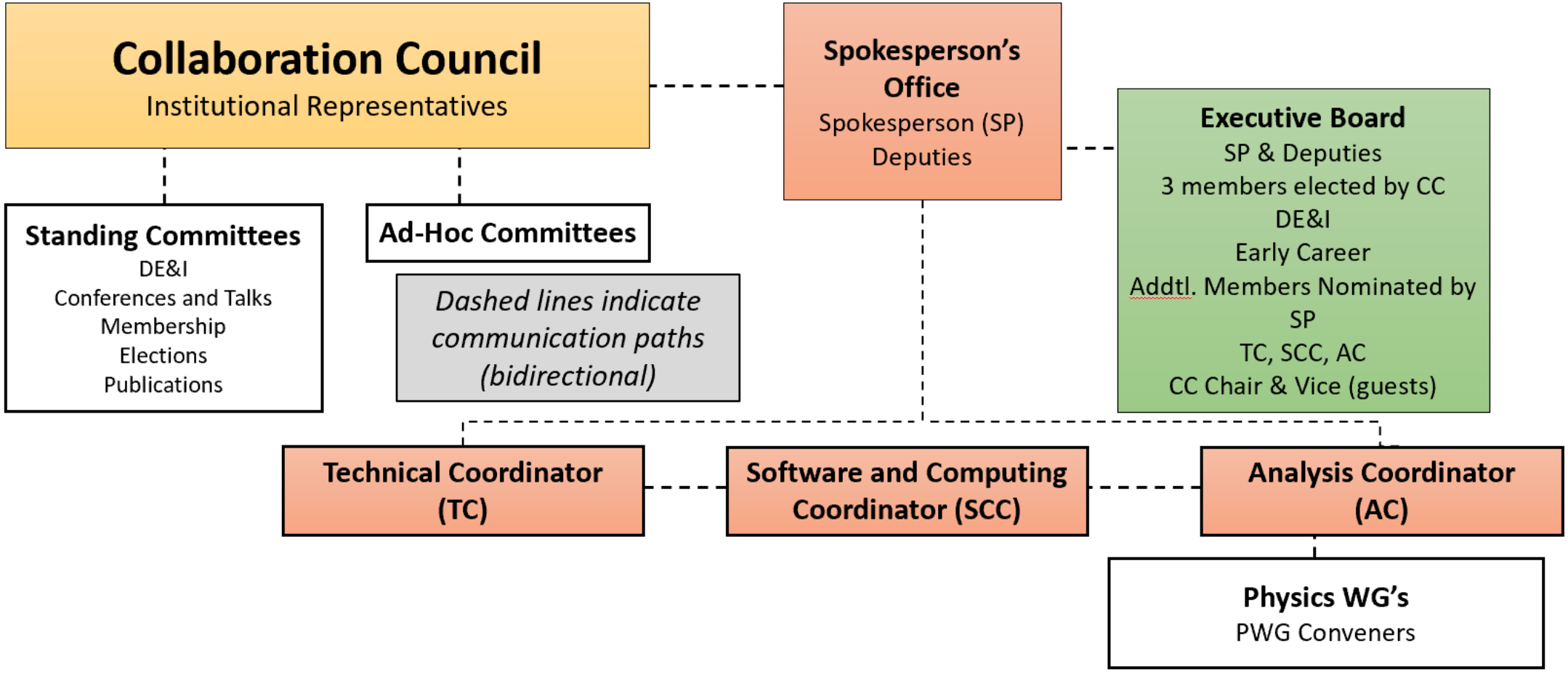
Collaboration structure from the Charter



Introducing the Scientific Coordinators



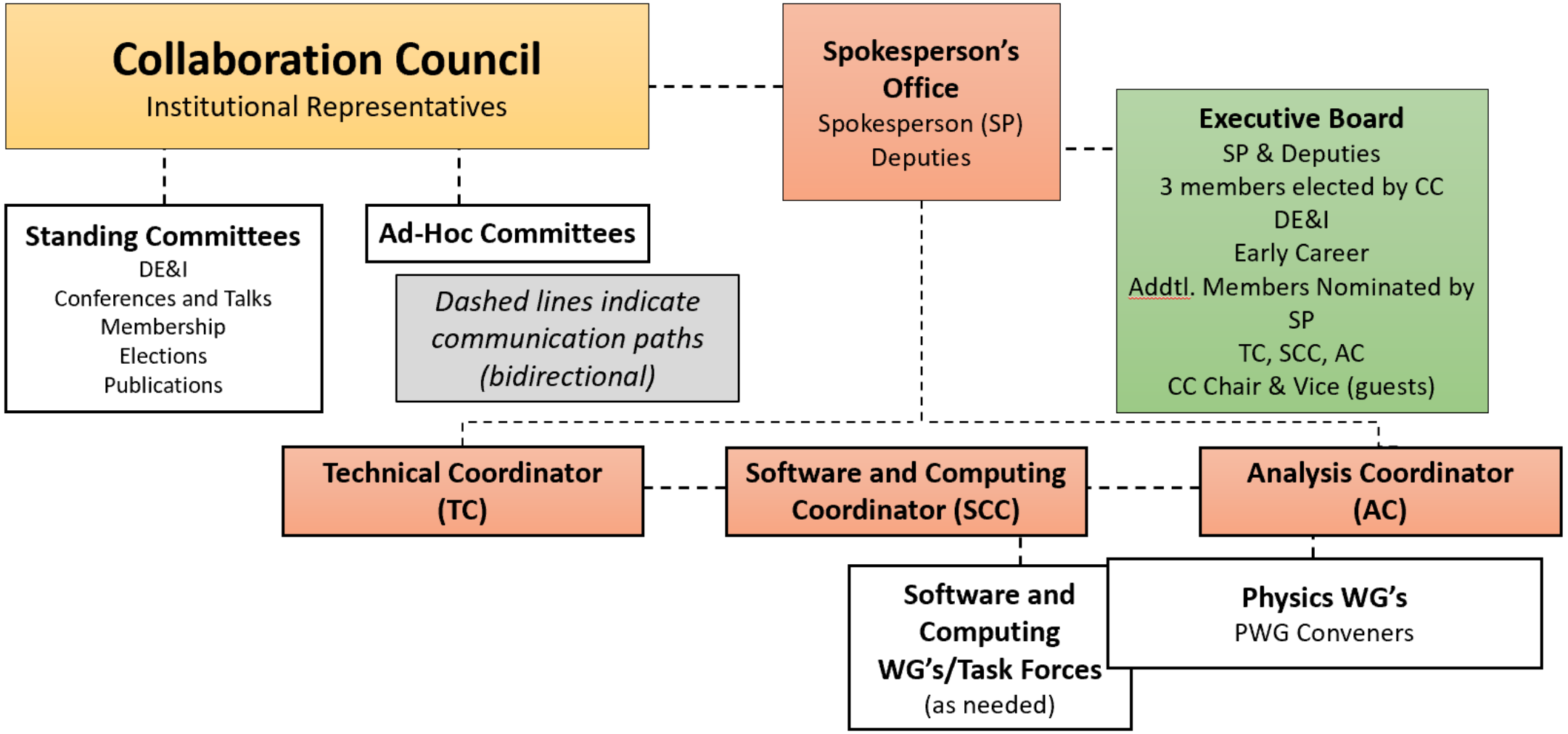
Physics addressed by dedicated Working Groups



CURRENT PWGS:

- **Inclusive Physics**
- **Jets and Heavy Flavor**
- **Exclusive, Diffraction, & Tagging**
- **Semi-Inclusive Physics**
- **BSM & precision EW**

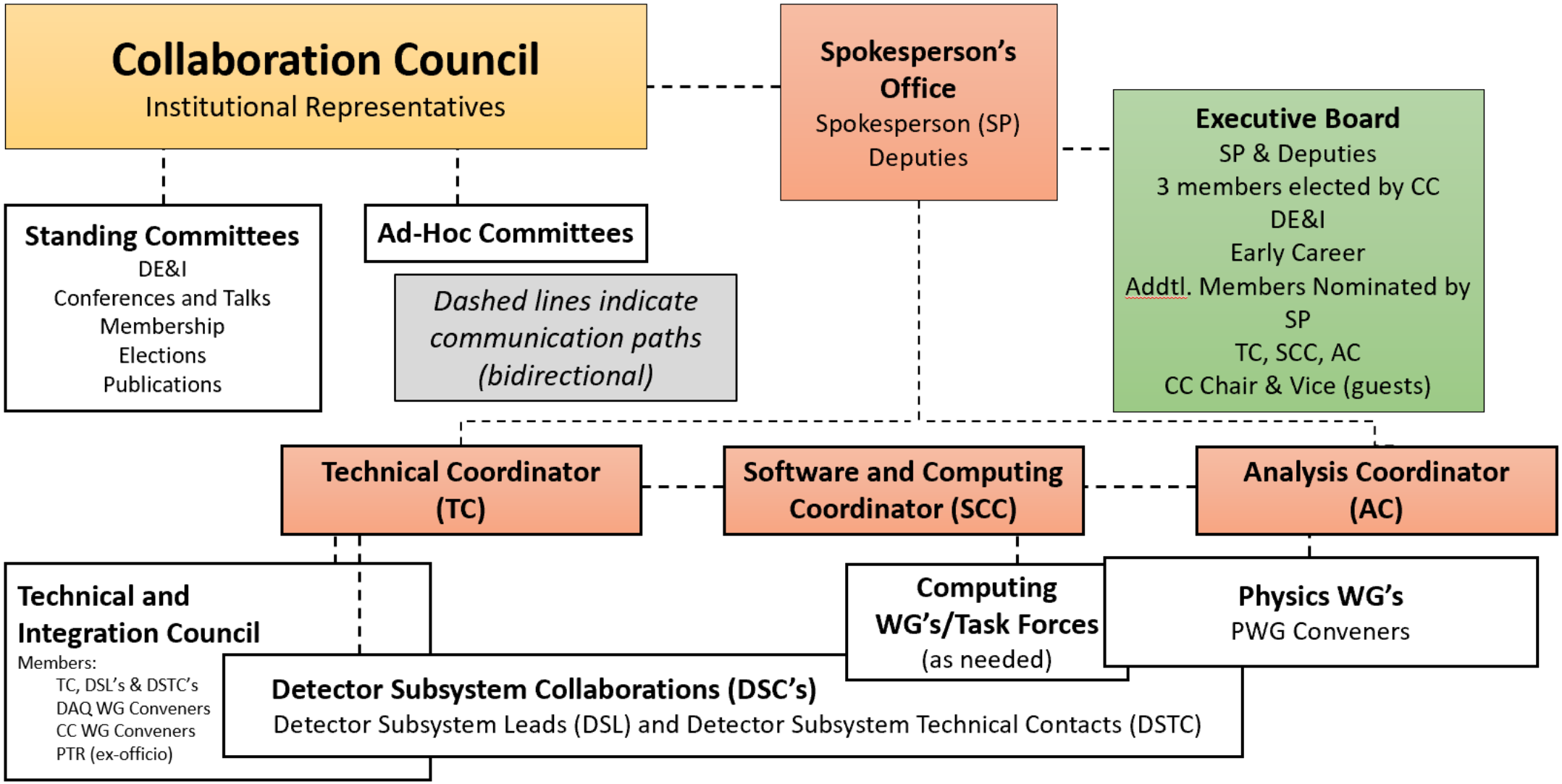
Software and Computing addressed with WGs and TFs



SSC activity includes

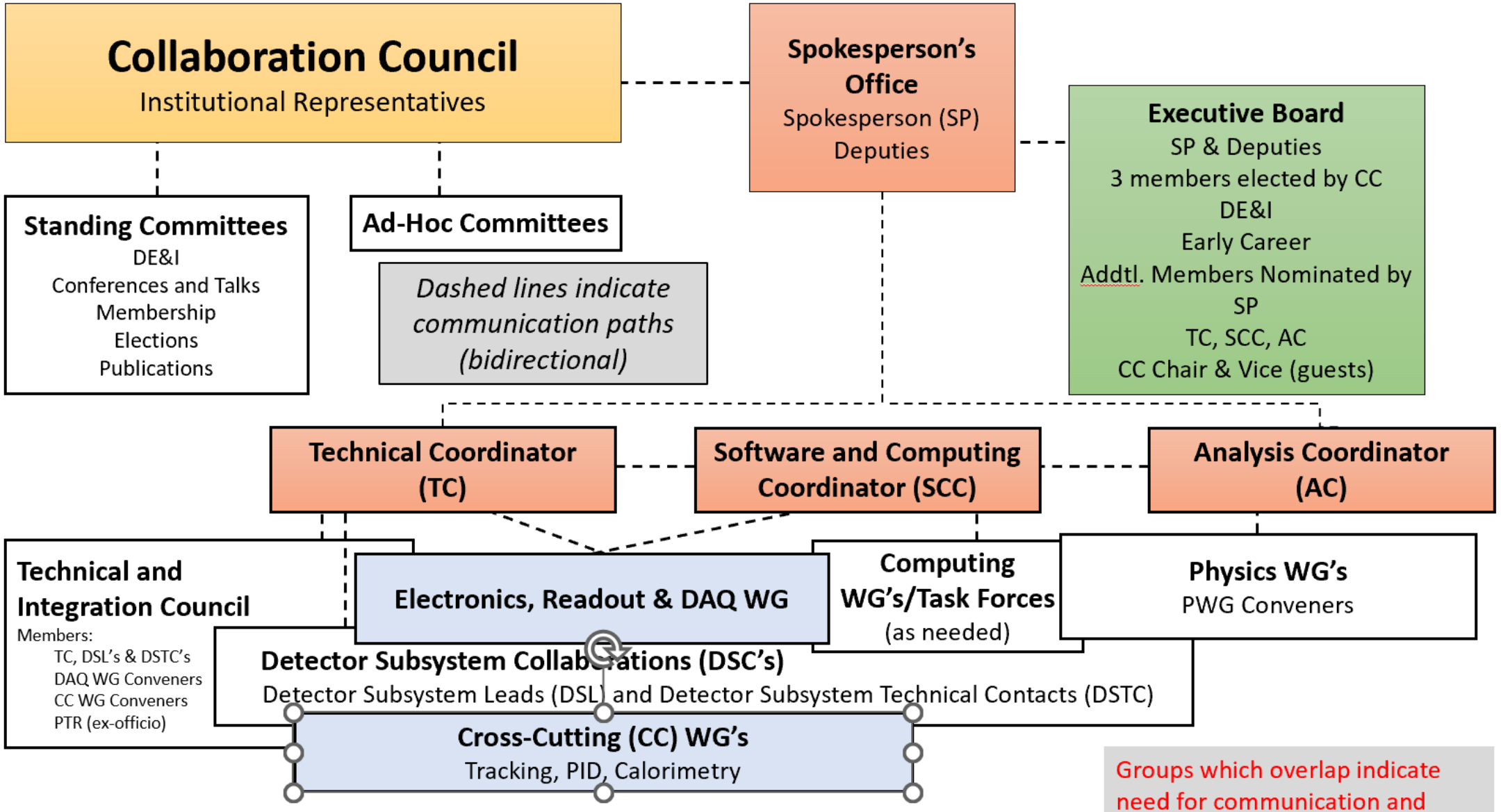
- **Operations and production**
- **Software development and reconstruction**
- **Infrastructure**

Technical and Integration Council and Detector Subsystem Collaborations



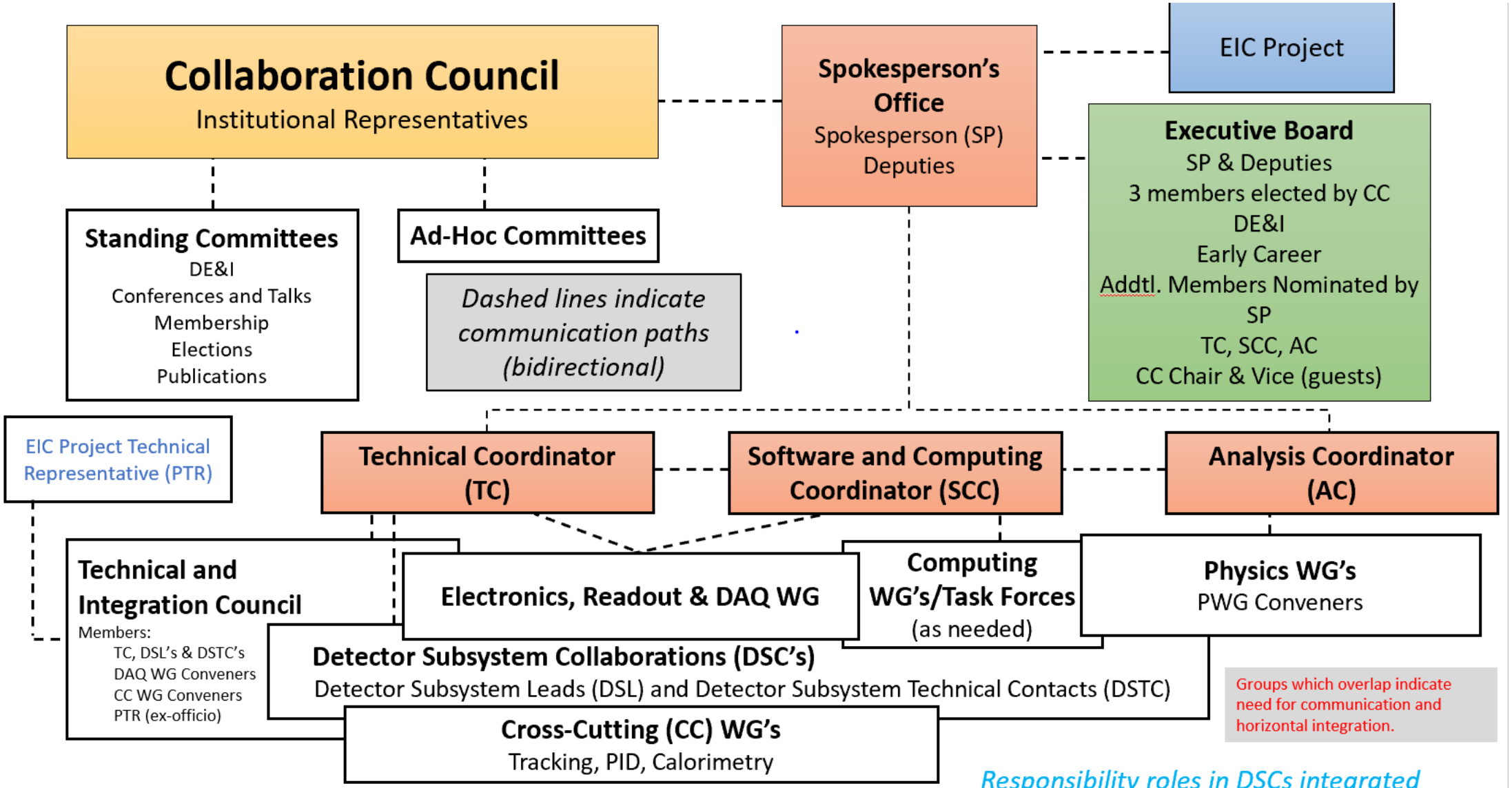
*Each subsystem is built by a **Detector Subsystem Collaboration (DSC)** formed by the groups and institutions contributing to it*

The cross-cutting effort



Groups which overlap indicate need for communication and horizontal integration.

Effective collaboration between the PROJECT and ePIC



Responsibility roles in DSCs integrated in the Project at L4/L5 level

OUTLOOK

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Collaboration enlargement
Where are we?

Presently:

- **160 Institutions**
- **500 + collaborators**

Considering the scientific effort in front of ePIC, a substantial enlargement over the next 2-3 years is needed:

- A great opportunity to increase the size of the participating groups and to welcome new groups and institutions:

  room for key contributions and responsibility roles

Enlarging the collaboration
A strategy with a multiple approaches

- Facilitating the inclusion of new groups
- Scientific dissemination and contacts with regional/national communities
- Arising engagement and enthusiasm of groups and collaborators

In all this the synergies and cooperation with the Project and EICUG are key!

Entry point to join ePIC

Please, reach out to Spokesperson Office:

- **Lajoie@iastate.edu**
- **Silvia.DallaTorre@ts.infn.it**

- We are ready to answer your questions
- We can address you to the Detector Subsystem Collaborations and Working Groups of your interest
- We can help you in preparing the path to join the ePIC Collaboration

Facilitating the inclusion of new groups

- ePIC **physics studies** organized in form of dedicated **Working Groups** (WG), ideal entry points for newcomers
- **General meetings alternating time** so to make possible the attendance of colleagues from all over the world (4 time zones!)
- Effective **connection with the EIC User Group** (EICUG), which is an obvious link to the community with interest in EIC physics
  - One of the two ePIC annual meetings in the same venue and in time continuity with the EICUG annual meeting
- **Venues of the two annual meetings**:
  - A meeting is US, a meeting abroad
  - In 2023: January meeting at Jlab, July meeting in Warsaw

Scientific dissemination and Contacts with regional/national communities

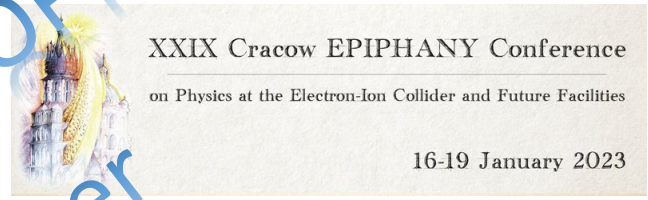
A flavor about recent and coming events

- **APCTP Workshop on the Physics of Electron Ion Collider,** Seoul (Korea) Nov 2 – 4, 2022
  - Scientists from France, Korea, India, Japan, Taiwan, US
- **QCD with Electron Ion Collider (EIC) II, Delhi (India),** Dec 18 – 20, 2022
  - Scientists from India, Slovenia, US
- **EIC Asia Workshop, Riken (Japan), March 16-19, 2023**
  - Scientists from Korea, India, Japan, Taiwan, US
- **Synergies between the Electron-Ion Collider and the Large Hadron Collider**, CERN (Switzerland), 19-21 June 2022
  - Scientists from European Nations and US
- **XIII CPAN days**, Huelva (Spain), 21-23 March 2022
  - Spanish community, invited talk "Pushing the QCD frontier and more at the future Electron-Ion Collider"
- **Day with Particle and Astroparticle Research Infrastructure**, Prague (Czechia), October 17, 2022
  - Scientists from Czechia, invited talk "Electron Ion Collider and ePIC"
- **XXIX Cracow Epiphany Conference, Cracow (Poland),** January 16-19, 2023
  - Scientists from European Nations and US, invited talk "The ePIC detector"
- **1st European School on the Physics of the Electron-Ion Collider , Corigliano-Rossano (Italy), June 18-22, 2023**
  - Students from France, India and Italy

ASIA

CERN

EUROPE



Early career

Recognizing the contributions by groups and collaborators

DETECTOR SECTOR

- Detector Subsystem Collaborations (DSC), an opportunity to engage in the ePIC detector with clear and recognized detector responsibilities in a context of up-to-date frontier detector technologies;
  Among the motivations for the DSC structure, the direct-link format is proposed as an attractive context to raise the internal enthusiasm and to represent an attractive option for new groups

PHYSICS STUDIES and **SIMULATION** SECTOR

- All the work in this sector conducted in a context of frontier physics making use of up-to-date simulation and computing tools; these activities regarded as key for the progress of ePIC with opportunities to recognized the individual and group contributions

Short-form summary

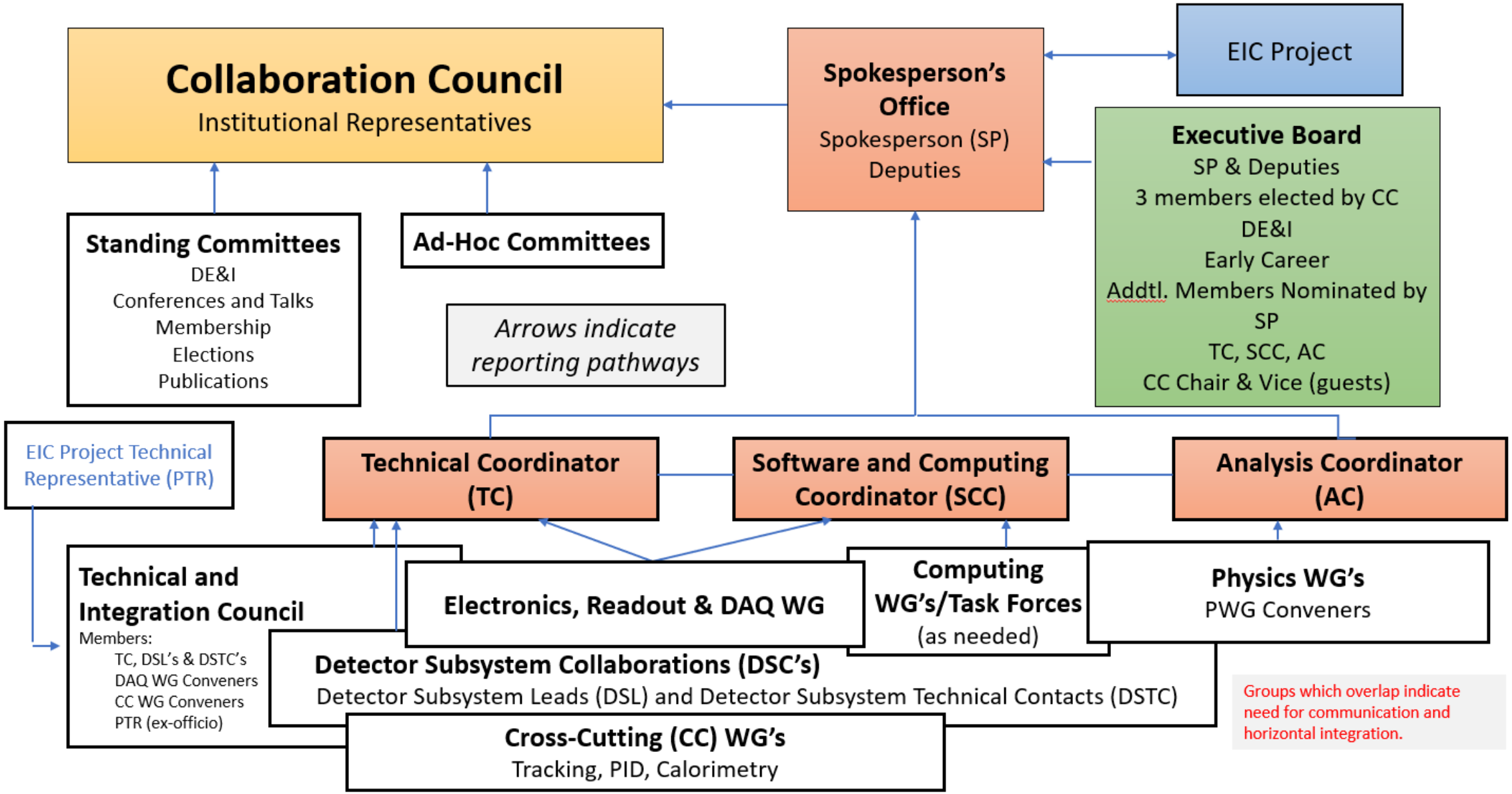
It has been shown that ePIC is in full swing

- With a structured Collaboration organization
- Implementing a clear planning for a scientific frame capable of delivering TDR in due time ready to start constructions as soon as CD3 is approved
- Aligned with the EIC Project scope and timelines
- ePIC is excited to welcome new international collaborators

Thank you

Backup

ADDING THE SCIENTIFIC STRUCTUE BY THE SP-OFFICE (for completeness with reporting pathways)



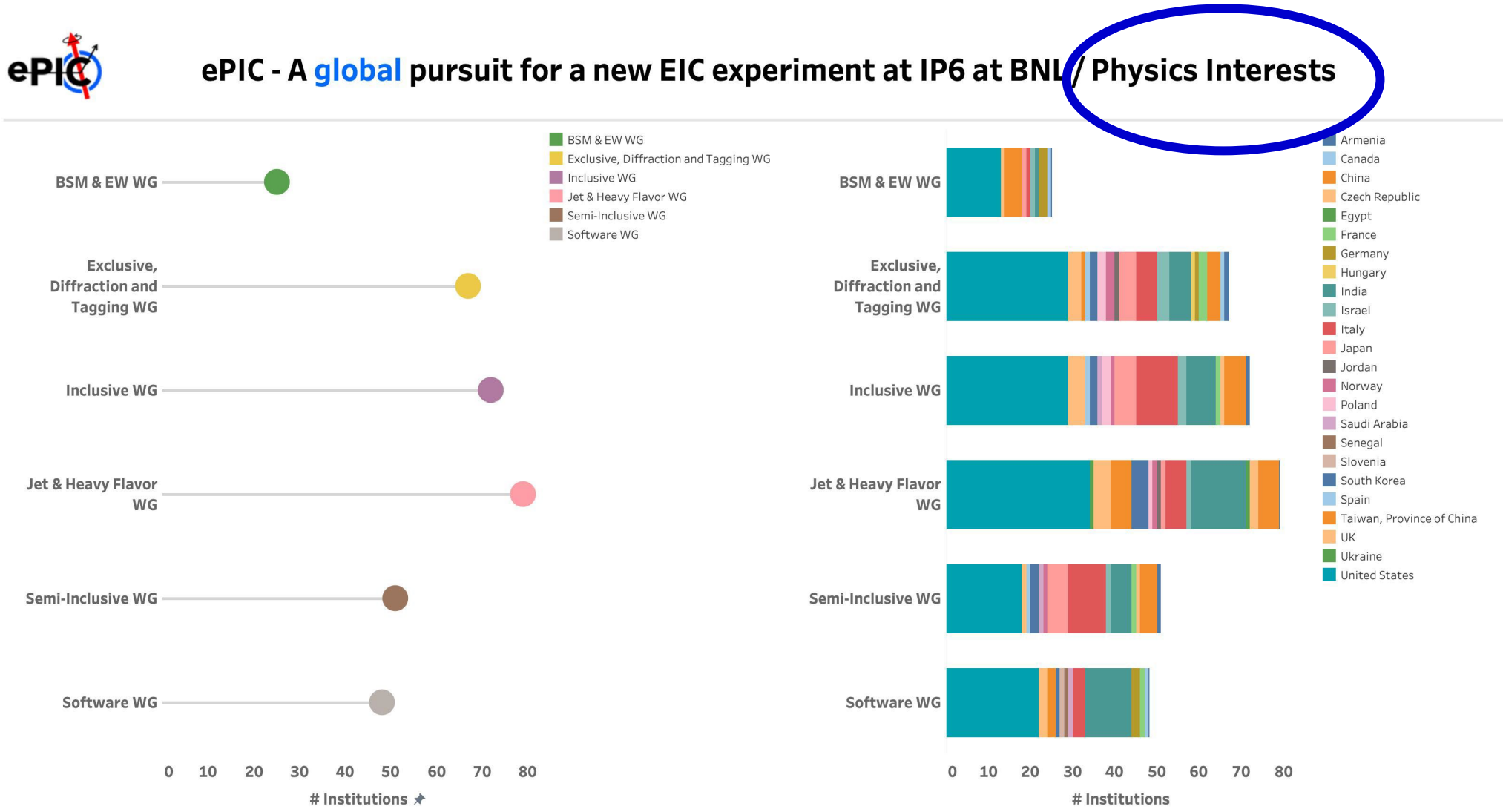
The Detector Subsystems Collaborations (DSC) are under formation:

a preliminary list as illustrative example;

evolution while finalizing the technical design foreseen

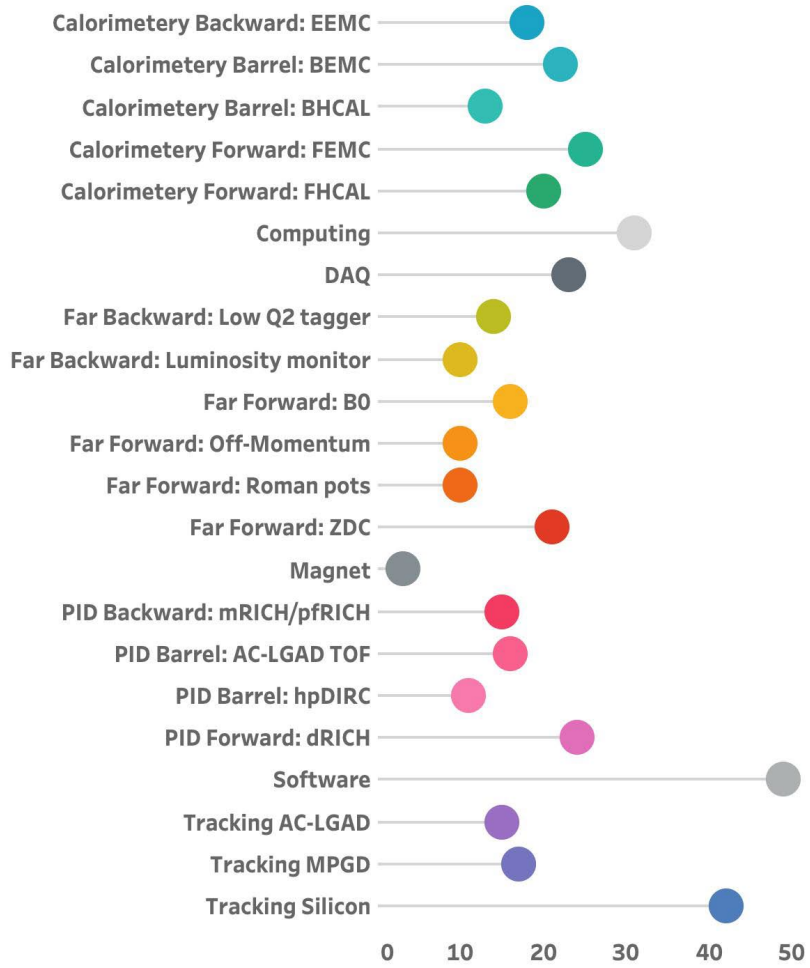
Sector	DSC
Tracking	Si Tracker (barrel and discs) Gaseous Trackers
Calorimetry	Backwards ECAL Backwards HCAL Barrel ECAL Barrel HCAL Forward ECAL Forward HCAL For. HCAL insert
Cherenkov PID	Backward RICH hpDIRC dRICH
TOF	Barrel AC-LGAD Forward AC-LGAD
FFWD	RP's + OMD B0 Tracker ZDC
FBKWD	Lumi. Monitor Low-Q^2 tagger

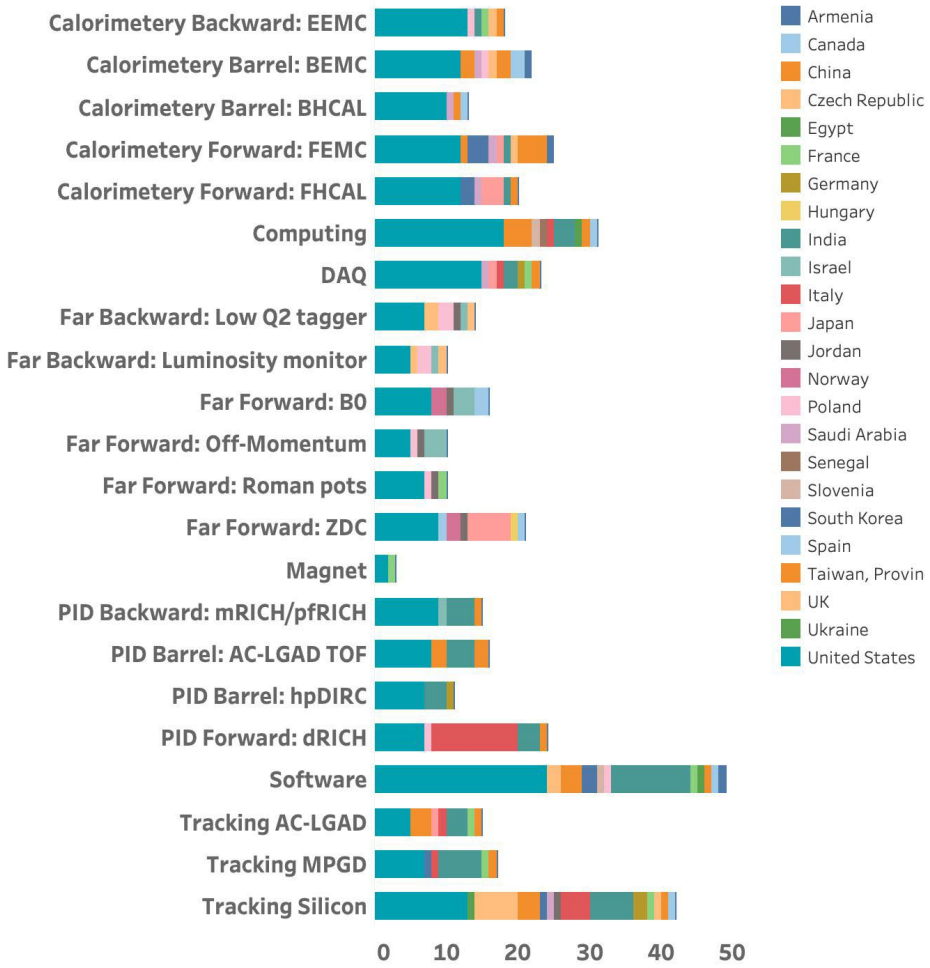
COLLABORATION SIZE AND PORTFOLIO



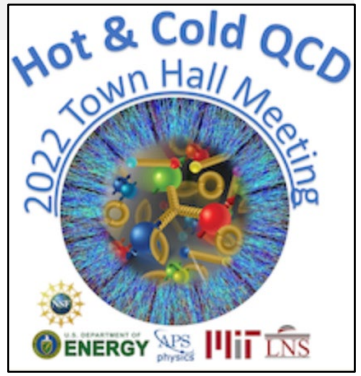
COLLABORATION SIZE AND PORTFOLIO

ePIC - A global pursuit for a new EIC experiment at IP6 at BNL / Sub-System Interests





World-wide recognition of the EIC scientific value

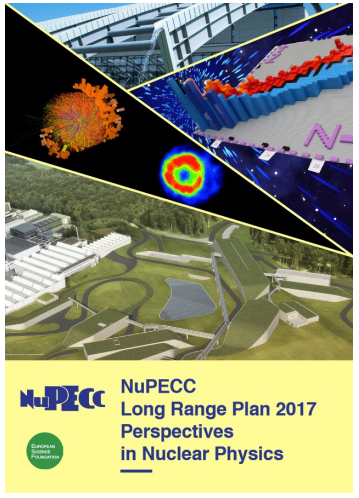


Confirmation of EIC priority in the **NSAC Long-Range Plan 2023**

- A section dedicated to EIC with an ePIC-dedicated talk at the **2022 Town Hall Meeting on Hot and Cold QCD**

European Particle Physics Strategy Upgrade 2020

- EIC recognized within other essential particle physics activities

The Nuclear Physics European Collaboration Committee (NuPECC) Long-range plans

- **2017** - EIC fundamental contribution to hadron physics recognized
- **2024** – LPR in preparation, European ePIC scientists in pool-position in the process to facilitate EIC and ePIC recognition