ECFA

European Strategy Update

Report from Technical Board

G. Gaudio - INFN Pavia

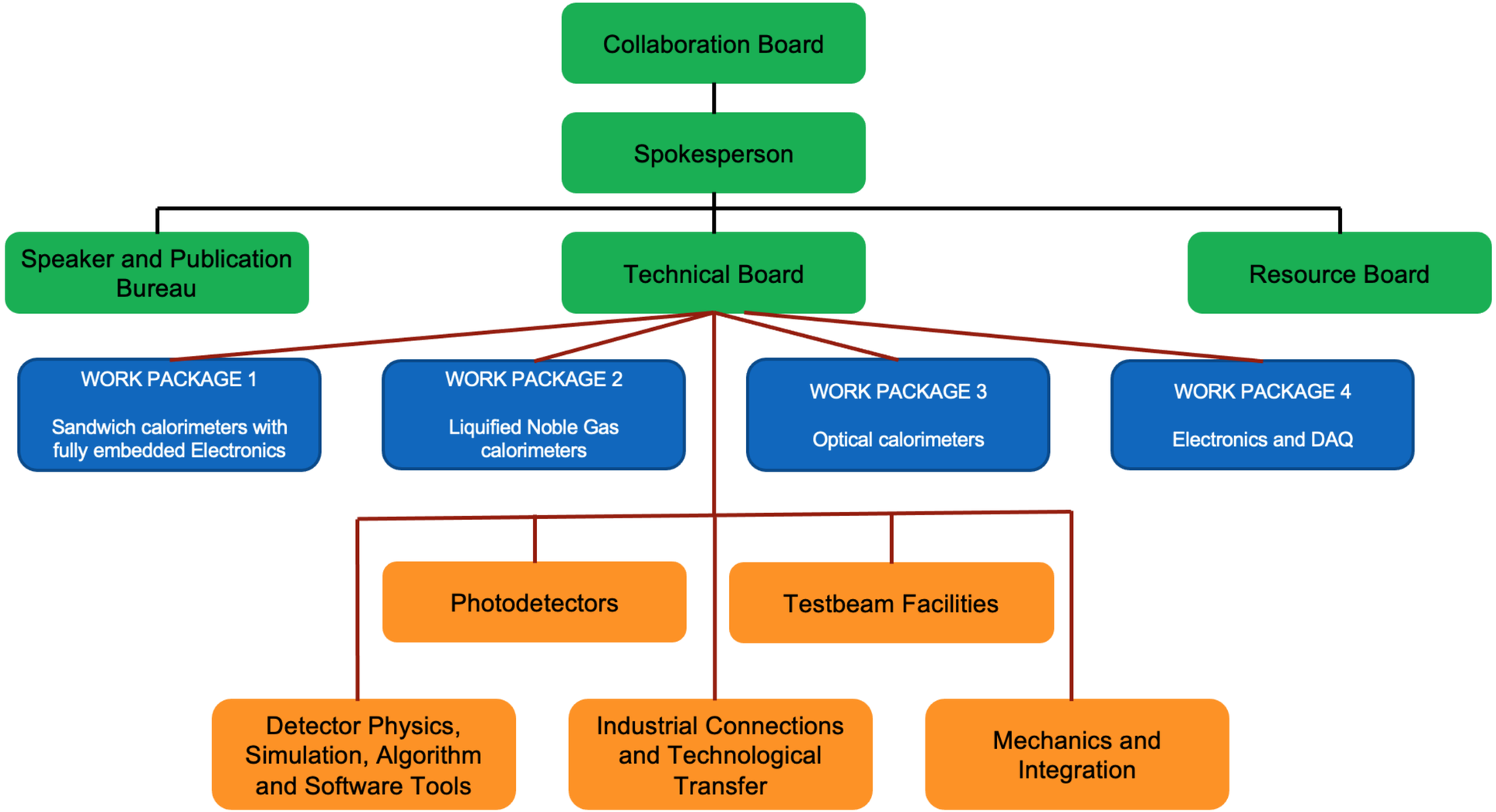
ECFA DRD6 management organization

European Strategy Update

MANAGEMENT:

WORK PACKAGES:

WORKING GROUPS:



ECFA Technical Board Mandate

The Technical Board is an executive body of the collaboration with the following roles:

- monitors all R&D activities and ensures coherence of the R&D activities within the Collaboration;
  - *coordinates also the development of common infrastructure, frameworks and tools*.
- follows the preparation of test beam campaigns and reviews their readiness;
  - coordinates the beam time requests to test facilities;
  - oversees run coordinators for common test beam campaigns;
- supports the Spokesperson in the preparation of reviews of the scientific results and plans, in particular technical realisations, of the Collaboration.

ECFA Technical Board Composition

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Members:

- **Tech. Board Chair:** G.G
- **Speaker & Pub Comm. Chair**: Wataru Otani
- **WP Coordinators**: *Lucia Masetti, Adrian Irles (WP1)* , Nicolas Morange (WP2), Michaela Mlynarikova , Marco Lucchini (WP3), *Christophe De La Taille (WP4)*
- WG representative:
  - WG1: Software
    - Detector Physics
    - Simulation
    - Algorithm
    - SW Tools
  - WG2: Photodetectors
  - WG3: Test beam
  - WG4: Industrial Connection and Tech. Transfer
  - WG5: Mechanics and Integration

Ex Officio Members:

- **Spokesperson**: Roman Poeschl
- **Deputy Spokespersons:** Marc-Andrè Pleier, Mari Cruz
- **CB Chair:** Roberto Ferrari

Invited: DRDx contacts

- **DRD1 (GAS)** : Imad Laktinen
- **DRD2 (LIQUID):** *Marina Artuso*
- **DRD3 (SOLID STATE):** *Nigel Watson*
- **DRD4 (PID and PhDet):** Alberto Gola
- **DRD5 (QUANTUM)** : Etiennette Auffray
- **DRD7 (ELX):** Frank Simon, Christophe De La Taille
- **DRD8 (MECH):** ?
- **TRAINING**: Roman, Bob, Gabri

ECFA Technical Board Organization

Main work at present: complete the scientific groups

⇒ Organization of the Working Groups

- Discussion already started at last Collaboration meeting with 2 dedicated sessions https://indico.cern.ch/event/1368231/timetable/ (Wed. April 10th afternoon)
- Continuing with Software and Testbeam as first priority

See dedicated sessions in this Collaboration Meeting (including WP4)

Working group bootstrap

- identify coordinator(s) among the involved community to start effective organization
- Internal structure of the WG proposed later
- asking endorsement at first available CB meeting

ECFA Technical Board Organization

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Wednesday 30 October

16:00 → 17:00 **Parallel WP4: Electronics and DAQ**

Convener: Dr Christophe De La Taille (OMEGA (FR))

- 16:00 **developments at AGH Krakow**
  Speaker: Marek Idzik (AGH University of Science and Technology (PL))
- 16:15 **AHCAL electronics requirements for CEPC**
  Speaker: Katja Kruger (Deutsches Elektronen-Synchrotron (DE))
- 16:30 **DRD6 ASIC development at Omega**
  Speaker: Dr Christophe De La Taille (OMEGA (FR))
- 16:45 **discussion on WP4**

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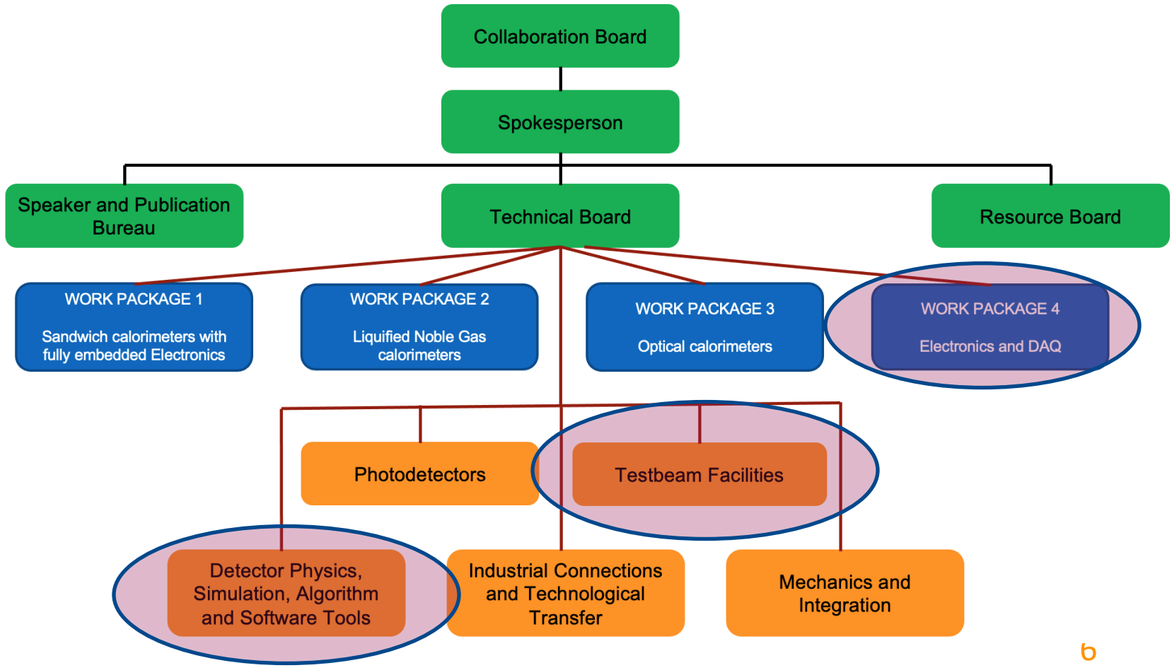

ECFA WGs session

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17:00 → 18:00 **Plenary: Software and Analysis** Wednesday October 30th

- 17:00 **Introduction**
  Speaker: Gabriella Gaudio (INFN-Pavia)
- 17:20 **Development of Particle Flow algorithm with DNN for Higgs factories**
  Speaker: Taikan Suehara (ICEPP, The University of Tokyo (JP))

09:00 → 10:30 **Plenary: Software and Analysis** Friday November 1st

Conveners: Gabriella Gaudio (INFN-Pavia), Gabriella Gaudio (Dipartimento di Fisica Nucleare e Teorica)

- 09:00 **New Geant4 model with crystal orientation effect**
  Speaker: Alexei Sytov (Universita e INFN, Ferrara (IT))
- 09:15 **Machine Learning in calorimetry**
  Speaker: Tommaso Dorigo (Universita e INFN, Padova (IT))
- 09:25 **Particle ID performance in granular calorimeters**
  Speaker: Andrea De Vita (Universita e INFN, Padova (IT))
- 09:40 **Neuromorphic computing readout for calorimeters**
  Speaker: Enrico Lupi
- 09:55 **Detector layout optimization for task Highly Compact Calo**
  Speaker: Aleksander Zarnecki (University of Warsaw (PL))

13:45 → 15:15 **Testbeam and tools: Testbeams and tools** 503/1-001

Conveners: Gabriella Gaudio (Dipartimento di Fisica Nucleare e Teorica), Gabriella Gaudio (INFN-Pavia)

Thursday October 31st

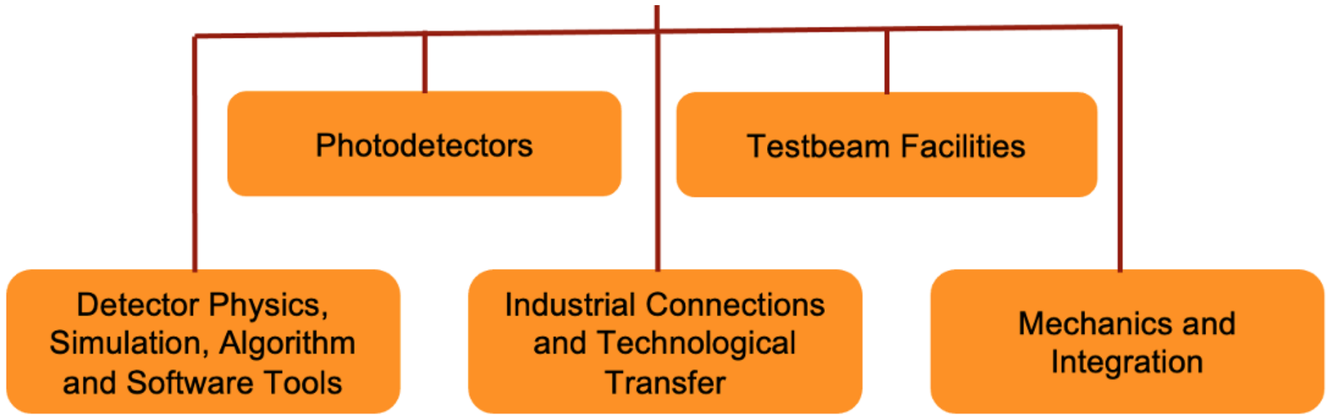
- 13:45 **Introduction**
  Speaker: Gabriella Gaudio (INFN-Pavia)
- 13:55 **Test beam availability at cern**
  Speaker: Martin R. Jaekel (CERN)
- 14:15 **Experience from recent TB**
  - Test-beam measurements of instrumented sensor planes for a higly compact and granular electromagnetic calorimeter
    Speaker: Michal Elad
  - Experience with recent beam tests at CERN and DESY
    Speaker: Yong Liu (Institute of High Energy Physics, Chinese Academy of Sciences)
  - RadiCAL experience in H6
    Speaker: James William Wetzel (University of Iowa (US))
  - OREO 2024 testbeam experience
    Speaker: Alessia Selmi (Universita & INFN, Milano-Bicocca (IT))
  - Dual Readout calorimeter testbeam experience
    Speaker: Seo Yun Jang (Yonsei University (KR))

Working Groups

Our (DRD6) definition:

transversal activities needed by all the sub-tasks in the DRD6 collaboration

- Avoid duplications (=> Save time and money)
- Share experience (=> Progress faster and better)
- Built the collaboration (=> connect people from different groups, projects, institutes)



ECFA WG1: Detector Physics, Simulation, Algorithm and SW Tools

- Some common software tools can be prepared and shared among the community
- Aims of this Working Group is to create a pool of experts
  - Help in the core development of the different tools
  - Can assist newcomers from the particular project to develop the detector-specific part.
- Software items
  - Data models and data management
  - DAQ software
  - Simulation
  - Particle flow algorithms
  - Machine learning approach

ECFA WG1: Detector Physics, Simulation, Algorithm and SW Tools

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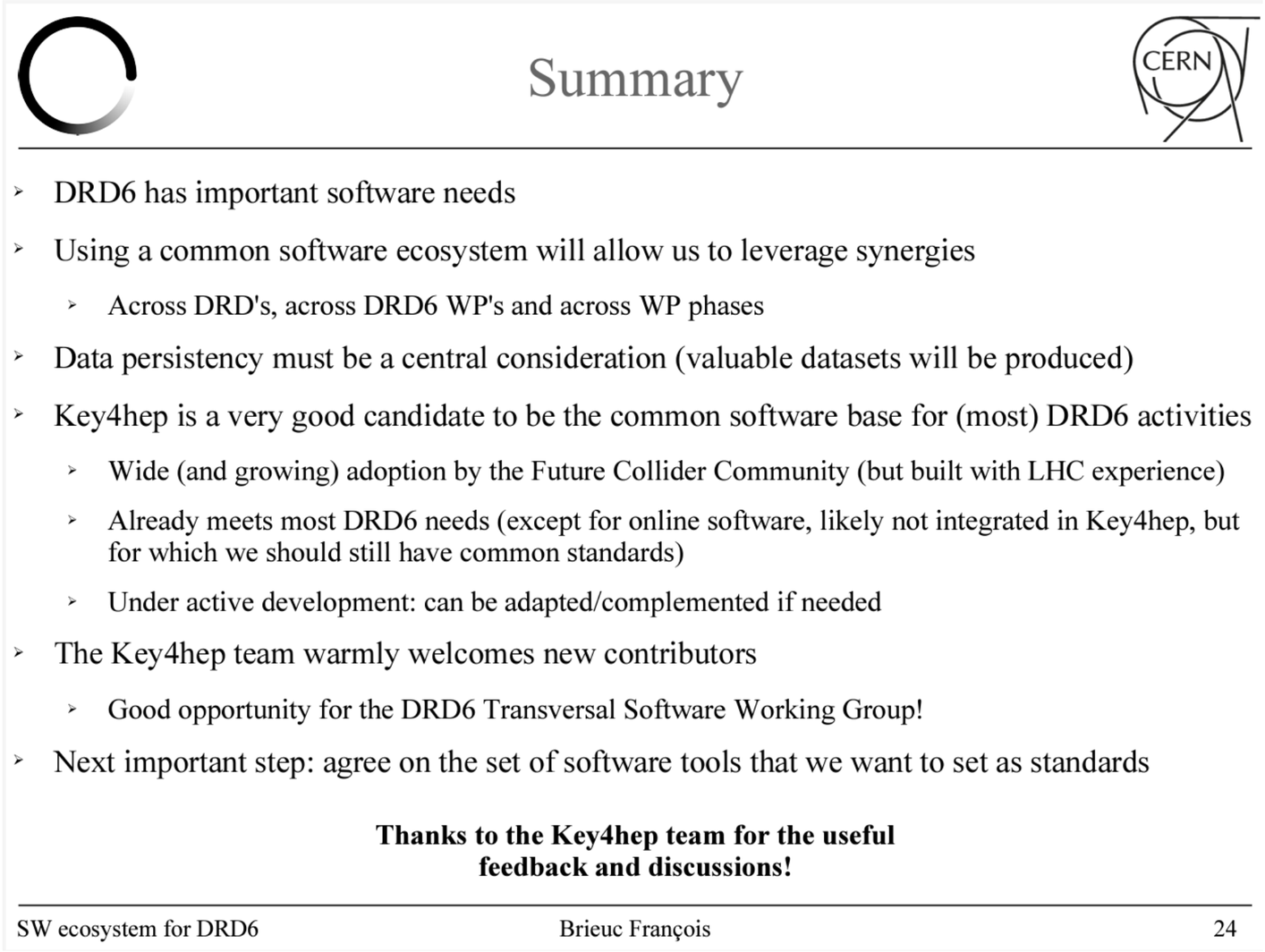
Complete overview of the Software ecosystem by Brieuc Francois at April Collaboration Meeting

https://indico.cern.ch/event/1368231/contributions/5885955/attachments/2831323/4954790/20240411_SW_ecosystem_Brieuc_Francois_DRD6.pdf

Good starting point for the WG building up



Summary

- DRD6 has important software needs
- Using a common software ecosystem will allow us to leverage synergies
  - Across DRD's, across DRD6 WP's and across WP phases
- Data persistency must be a central consideration (valuable datasets will be produced)
- Key4hep is a very good candidate to be the common software base for (most) DRD6 activities
  - Wide (and growing) adoption by the Future Collider Community (but built with LHC experience)
  - Already meets most DRD6 needs (except for online software, likely not integrated in Key4hep, but for which we should still have common standards)
  - Under active development: can be adapted/complemented if needed
- The Key4hep team warmly welcomes new contributors
  - Good opportunity for the DRD6 Transversal Software Working Group!
- Next important step: agree on the set of software tools that we want to set as standards

Thanks to the Key4hep team for the useful feedback and discussions!

SW ecosystem for DRD6 Brieuc François 24

ECFA Testbeam Facilities Working Group

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- Testbeams play a crucial role in the development cycle of a calorimeter
- Needed characteristics
  - A large energy range from a few GeV to hundreds of GeV, electrons, pions, muons + other particles
  - Enough space to host a ~1 m^3 device
  - Moving tables that can carry devices of several tons
  - Beam telescope to determine impact point and reference time
  - Threshold Cherenkov counters to distinguish particle species
  - Magnets to measure the performance in magnetic fields
- See dedicated parallel session on Wednesday afternoon

To be shared and handled as a community

ECFA Testbeam 2025

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- Request for CERN beamtime closed
  - 7 requests connected to DRD6
  - GG ad-iterim DRD6 testbeam coordinator

- Request for DESY (first half 2025) ongoing – close on Nov. 4th
  - please keep TB and WP coordinators involved

ECFA Technical Board and the community

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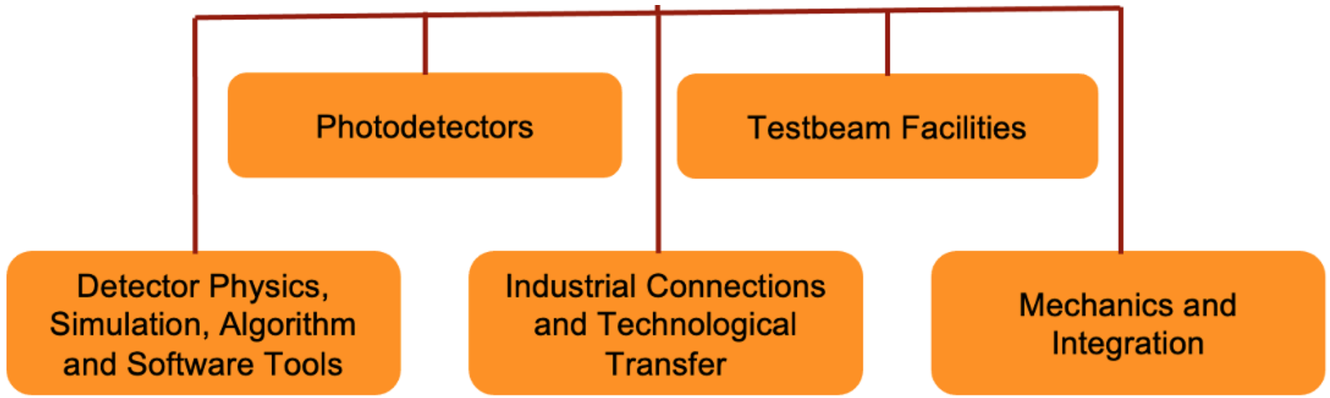
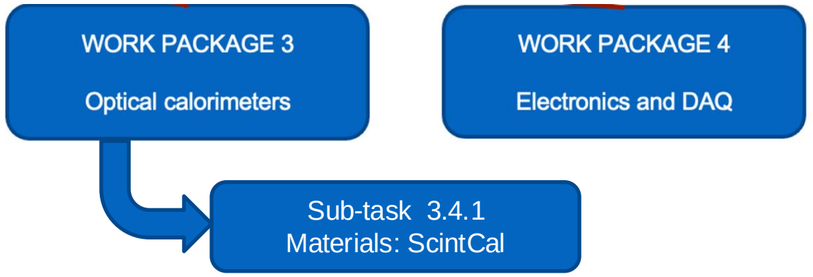
- Learning to work together as a community
- Invitation to participate in the WGs
- Stay tuned on DRD6 communication
  - Through the WPs coordinator => Project Contacts
  - Through the Institute Representative
  - Direclty through drdcalo-general@cern.ch
    - if your institute doesn't have a drdcalo-xxxx@cern.ch egroup, please create it!

Backup

ECFA Working Groups: which one?





- In the DRD organization Working Groups cannot be resource loaded
  - No funds required for the activities
  - Promote “Material” and “Electronics &DAQ” WGs to Work Package (see previous talks in this session)
- Internal organization of the WG under discussion
  - “Testbeam Facilities” and “Detector Physics, Simulation, Algorithm and SW Tools” have a dedicated parallel session this week, to start brainstorming on the activities and organization
  - Others will follow.

ECFA Photodetector Working Group

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- Mainly connected to WP3-Optical Calorimeter and WP1- Sandwich Calorimeters (for optical based sandwich calorimeters)
- Radiation hardness, time resolution and extended sensitivity, in both the UV and infrared regions, over a large, and linear, dynamic range are the main characteristics the projects are seeking for
- Mainly SiPM and MCP-PMT
- Digital SiPMs are an interesting option
- Aim of the WG
  - Understand our needs to provide calorimeters requirements
  - Recollect information from available (or under development) photosensor

In close connection with DRD4

ECFA Industrial Connections and Technological Transfer WG

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- Material and electronics we use require close connection between scientific community and industrial world
- Three main types of collaborations
  - Market survey : check what is already developed by industries, and what trends influence the industry production
  - Knowledge-transfer from our lab to companies
  - Synergic R&D: exploit the technical industrial capability for production addressing the needed developments
- Aims of the WG:
  - Create a pool of industrial partner of DRD6 interest
  - Address Intellectual Properties Protection issues according to different institute and countries regulations

ECFA Mechanics and Integration Working Group

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- Calorimeters are, in general, large detectors, with a sizeable weight
- Mechanical supports cannot be neglected
- 4π detector design need to be addressed
- Services connections become more and more important as number of channels tends to grow more and more

- DRD8 was supposed to address this.
  - At present the idea is to develop withing each DRD