UNIVERSITY OF BIRMINGHAM

Example models for R&D Organisation: CERN & INFN

L. Gonella, University of Birmingham

with inputs from Federico Faccio (CERN) and Angelo Rivetti (INFN Torino)

INFN (Italy)

- INFN yearly budget split roughly 50:50 between salaries of INFN employees and research budget

- The research budget is shared by five committees: particle physics, astroparticle physics, nuclear physics, theoretical physics, technology R&D

- Technology R&D committee
  - Experiment specific projects, financed with the budget of the relevant committee (for instance, an ASIC for ALICE would be paid out of the budget of the the nuclear physics committee)
  - Three funding streams for generic technology R&D, paid out of the budget of the technology R&D committee; annual call for each one

INFN (Italy)

1. Standard projects (“Progetti ordinari”)
   - €150-300k for 3 years
   - Research + lab infrastructure (for example clean rooms maintenance)
2. Grants for young scientists
   - Requirements on time since end of PhD
   - €80k for 2 years + salary of the scientist
   - Typically around 6 per year awarded
3. Calls
   - Can be thematic (for example, quantum detectors) or free (anyone can present the project they want)
   - €1M for 3 years (of which 20% can be used to hire post docs)
   - 2-5 awarded per year, depending on how much money is available vs requested

INFN (Italy)

- Typically start with 1. to do a proof of concept/feasibility and then move to 3.
- 3. requires a certain critical mass and typically a group of INFN institutes applies for one call
  - Aim of these calls is to add a specific expertise in INFN
- Example: SEED project followed by ARCADIA
  - Development of MAPS sensors (with LFoundry)
  - INFN Bologna, Milano, Padova, Perugia, Pavia, Torino, TIFPA (Trento Institute for Fundamental Physics and Applications)
  - Allowed INFN to develop expertise in a new technology that has been identified as key for future developments so that they do not need to rely on CERN or others for the design of MAPS

- The INFN budget (core funding) is complemented by external funding, such as EU grants

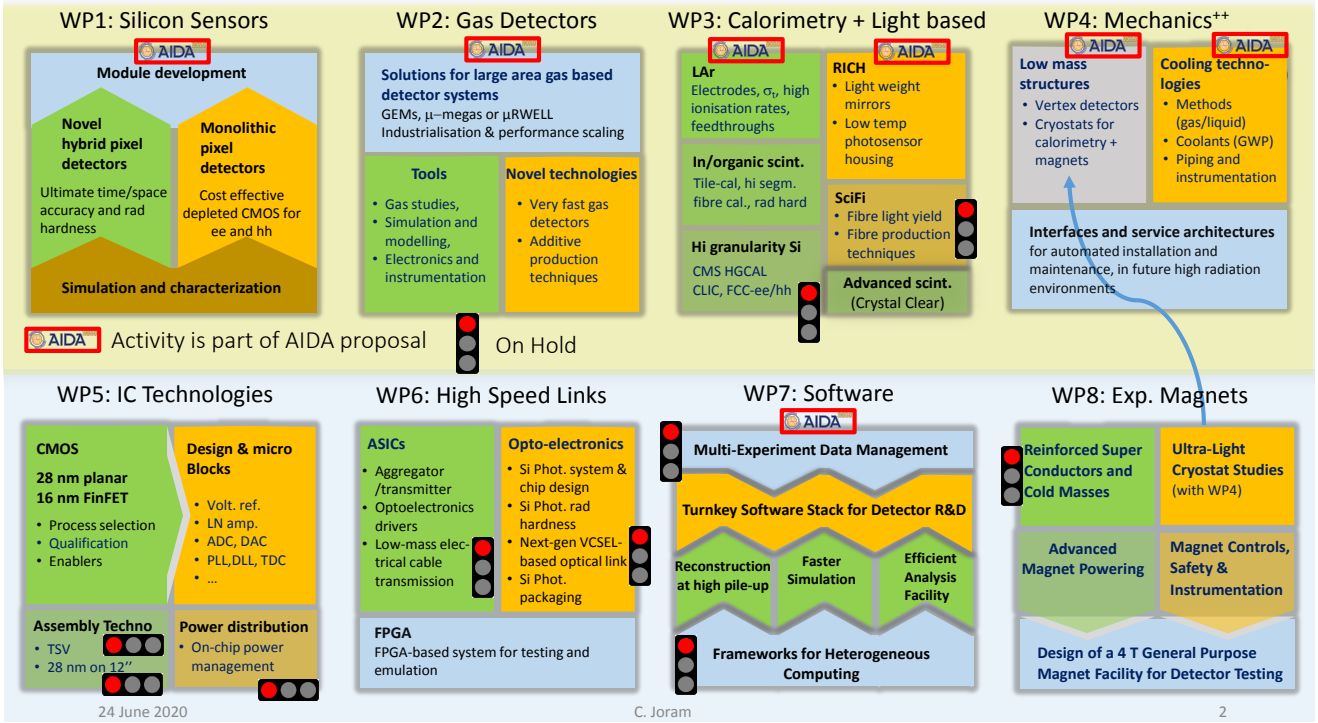
CERN: mature programmes

- RD# (50, 53, …)
  - Approved by LHCC, reporting to LHCC
  - Funds from CERN and external

- Microelectronics group: common projects
  - Approximately 2008 – 2018
  - Started following a reorganisation of the electronics group at CERN
  - Three R&D topics were identified based on needs of future experiments
    - Technology development: radiation hardness studies, design kit & design flow development, etc.
    - Optoelectronics: GBT → lpGBT
    - Power distribution: FEAST → linPOL, bPOL,…
  - Mix of funding from EP and EU
  - Launched with a white paper

CERN: new programme

- CERN EP R&D programme: Strategic R&D Programme on Technologies for future Experiments
  - Recently established (2020), 5 years programme
  - Large consultation exercise converging into 8 WPs



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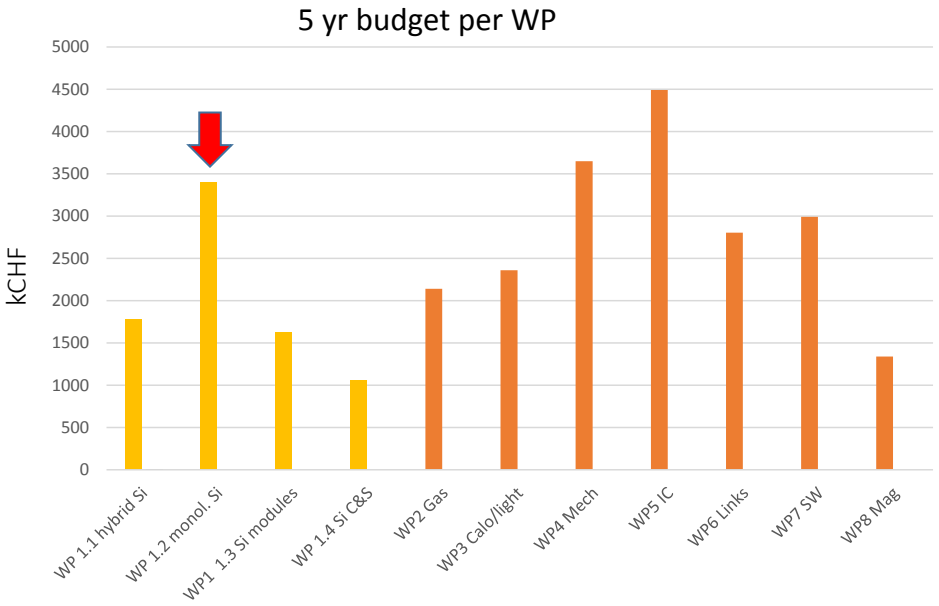
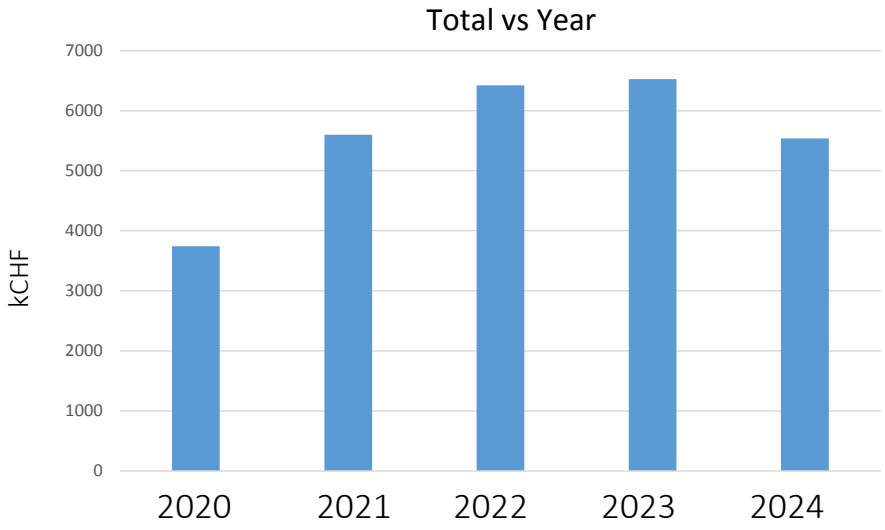
CERN: new programme

- ~29 MCHF (material, investment, students and fellows)
- For each WP: existing staff at 10% + fellows and students
  - For WP1.2: 3 fellows + 2 students

Budget Plan (5 yerars)

$\Sigma_{\text{all WP}}$ = 28723 kCHF (material, investment, students and fellows)





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