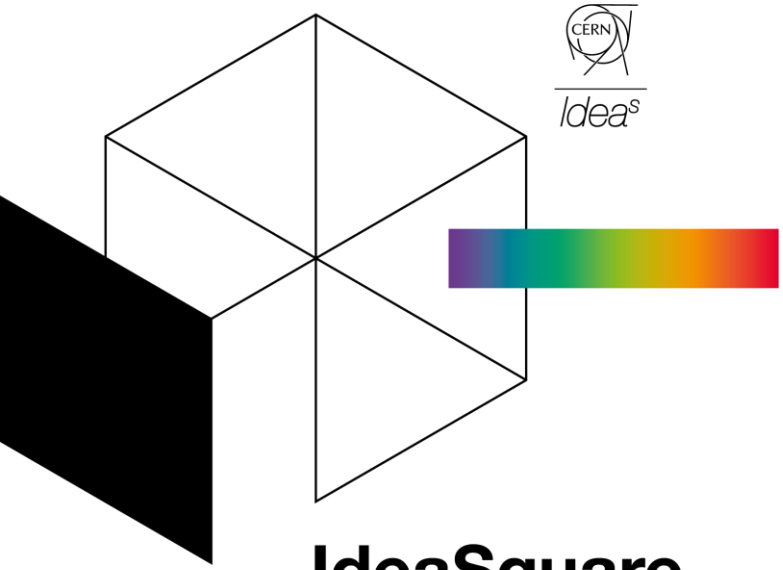


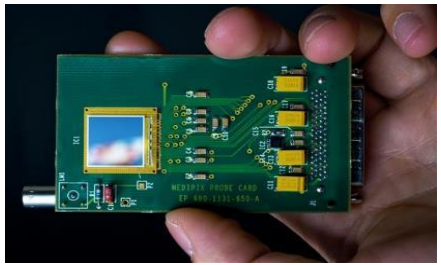
IdeaSquare
The innovation space at CERN

Status of GRADE Programme (Generic pre-R&D at IdeaSquare)

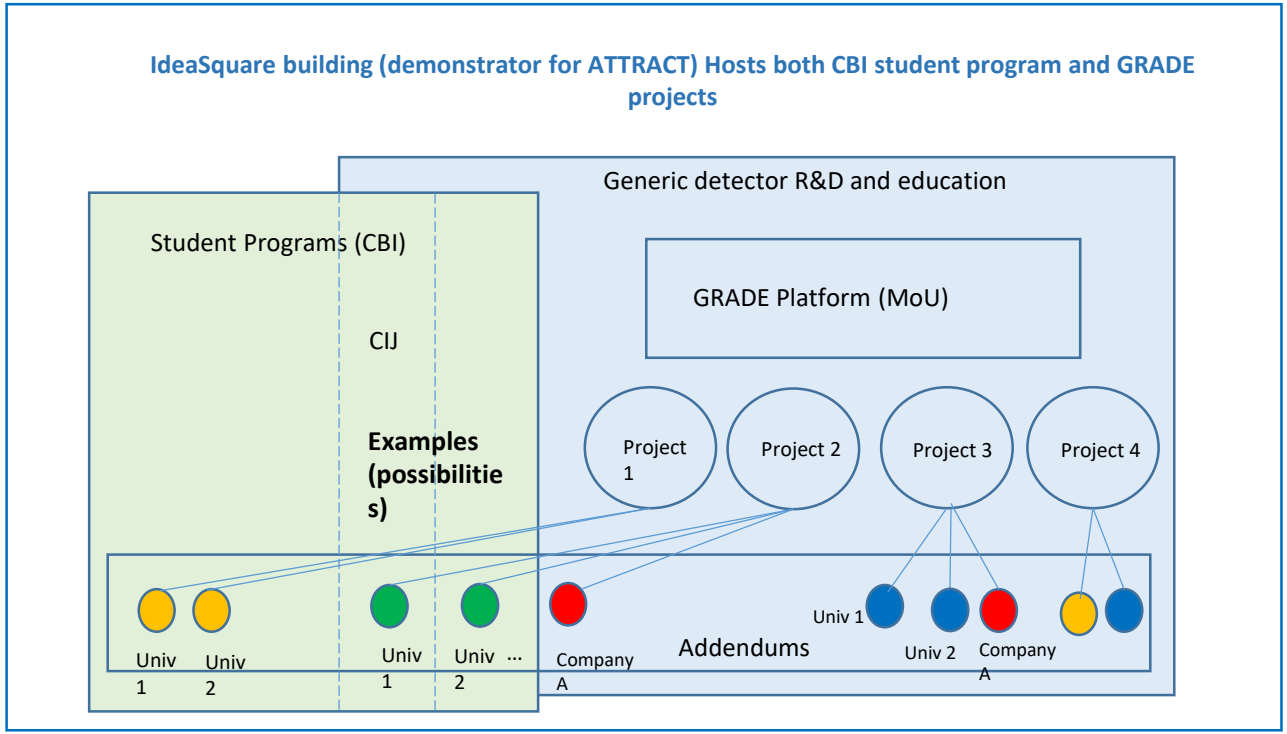
Markus Nordberg (CERN)
ISAB Meeting
February 24, 2023

GRADE MoU: Short Intro

- Approved by the CERN Research Board in December 2015 for (very) early-stage R&D efforts on new promising detector concepts and technologies for possible use in future experiments (hi-lumi LHC, ILC, FCC...).
- Includes strong educational involvement to explore potential future use also outside HEP, e.g. in society, including industry and cross-disciplinary students.
- Participating institutes (also from outside HEP) contribute as in-kind. It requires institutes to spend time at IdeaSquare to design, build prototypes, test, integrate, prepare TDRs, EU-grants like ATTRACT etc.).
- Recognized status in Gray Book.



Design of the GRADE and CBI Framework in 2016 (reporting to ISAB)



How GRADE differs from active experiments like e.g. ATLAS?

Parameter	Typical GRADE Proj	ATLAS
Nature	(Pre) R&D	Active
Status	Preparation	Data taking (2009)
Institutes	6	221
Authors (incl. CIJ)	~ 20	1785
Reporting to	TC/RC	Collaboration Board
CORE value (MCHF)	0	475
Tech Report available at MoU	No	Yes

TC= Technical Coordinator

RC= Resources Coordinator

GRADE: Developments in 2022 (informal)

Collaborations:

- Neutrino platform (Dune) for the development of a smart and fast readout system for large tracking systems
- Members are part of the ATLAS collaboration and lead the LHC Phase-2 upgrade project of the muon barrel trigger.

Recent activities (see separate presentations):

- Development of a new generations of detectors and related electronics for the LHC-phase 2 upgrade, the dark matter particle searches and for the next generation colliders
- Detector prototype design and test
- Chip design and bench-test
- Development of a new type of low power neuromorphic analog electronics, capable to support ns-level inference and correlation on large and sparse data sets, for a new approach to green computing.

GRADE: Examples of new eligible projects

- Recycable materials for calorimeters (scintillators)?
- Use of TIP avalanche diodes (red wavelength) in physics??
- “Green Village” initiatives that could potentially evolve into future EU-funded projects (see P. Tello’s presentation)
- Next round of ATTRACT projects (e.g. environmental, wearable Detection & Imaging techs)?

Thank You