

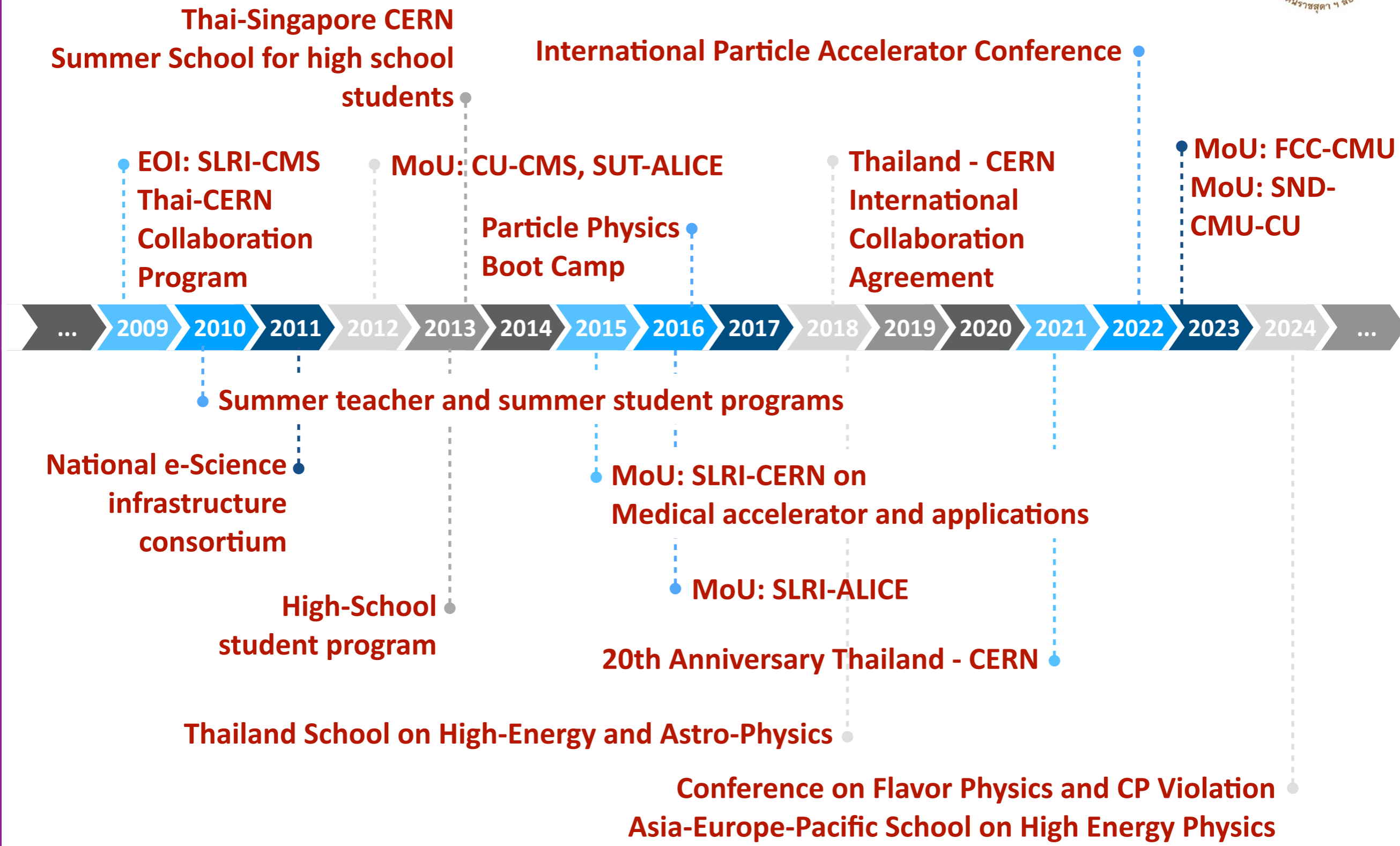


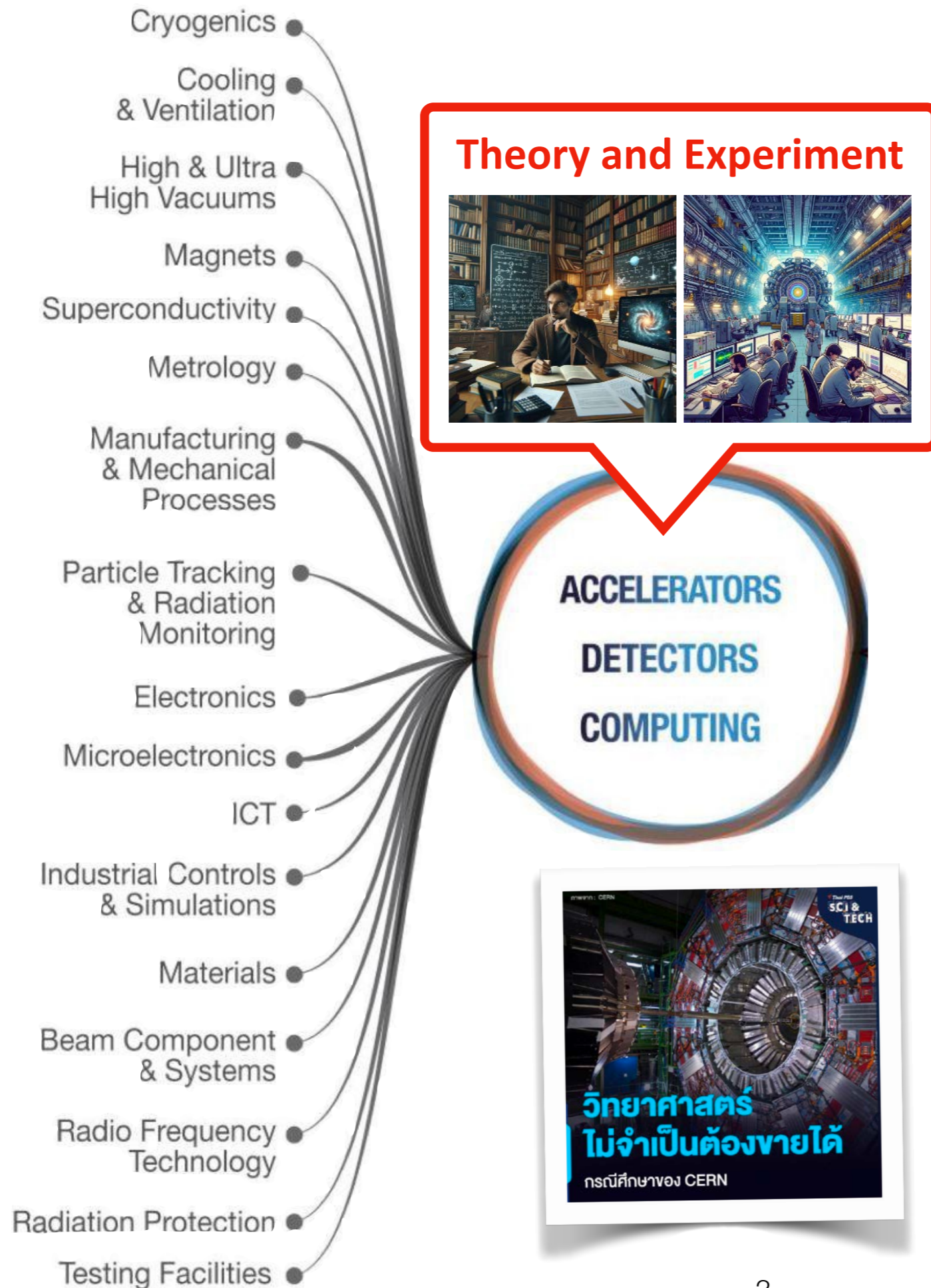
Thai-CERN activities 2024

Based on Thai High Energy Physics Roadmap & HEPP proposal
Program-1: Physics Beyond the Standard Model

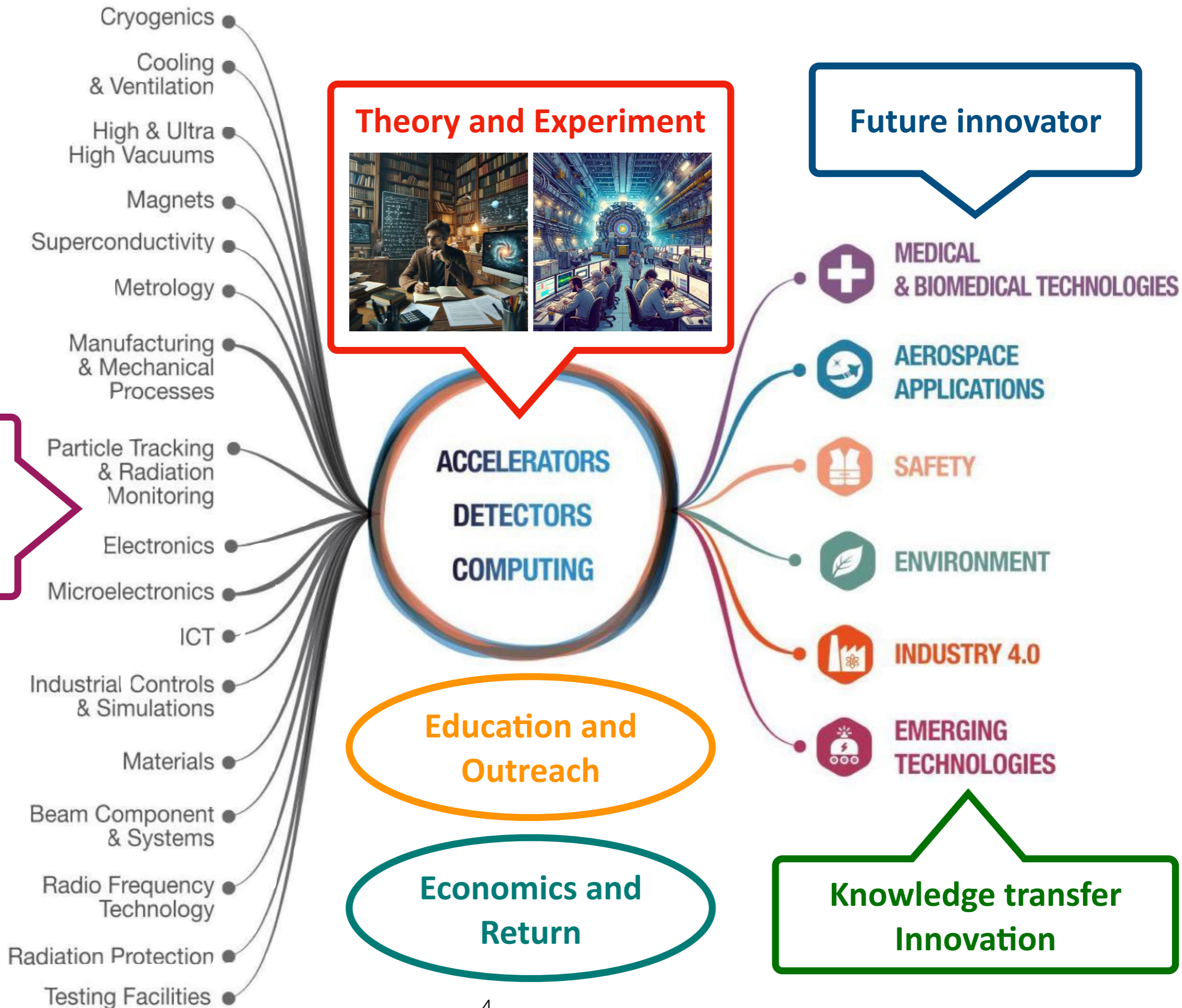
Phat SRIMANOBHAS
17 November 2023







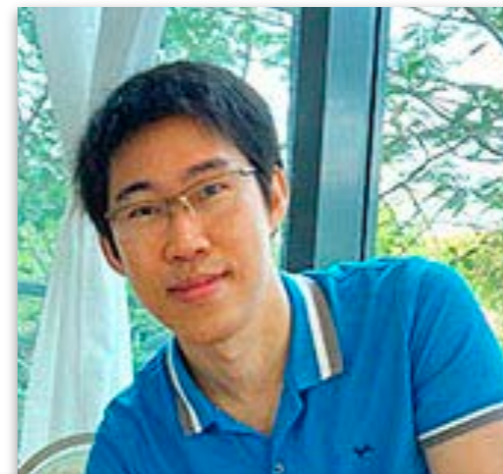
- **"Wasting Money"**: Large budgets allocated to particle accelerators and detectors which does not have immediate practical applications
- **"Only for Scientists"**: Many people may not realize that the knowledge gained in this field contributes to a broader understanding of the universe and can indirectly impact various aspects of society.
- **"No Real-World Benefits"**: No tangible benefits for society and that the knowledge gained from these experiments has no practical applications.
- **"Not Addressing Real-World Problems"**: Like climate change, poverty, or healthcare. Overlooks the role of basic research in advancing our understanding of the physical world, which can, in turn, inform solutions to real-world problems



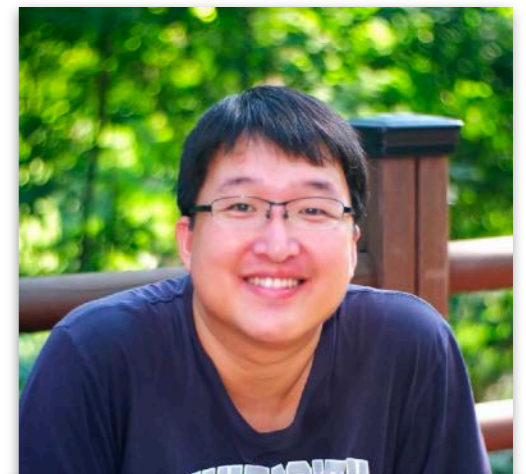
- **CERN Summer Students:** 4 students
- **CERN Summer Teachers:** 2 "science" teachers
- **Thai-Singapore high school students at CERN**
16 students (from 12) + 2 teachers
- **Particle Physics Boot Camps**
 - Department of Physics, Faculty of Science and Technology, Thammasat University**
Contact person: Dr. Ruchipas Bavontaweepanya
 - Physics, Division of Physical Science, Faculty of Science, Prince of Songkla University**
Contact person: Dr. Saroch Leedumrongwatthanakun (CERN Summer student 2013)
- **Thailand School on High-Energy and Astro-Physics (SHEAP 2024)**
Physics of the early universe
Department of Physics, Faculty of Science, Silpakorn University
Contact person: Dr. Supakchai Ponglertsakul



S. Leedumrongwatthanakun



R. Bavontaweepanya



S. Ponglertsakul

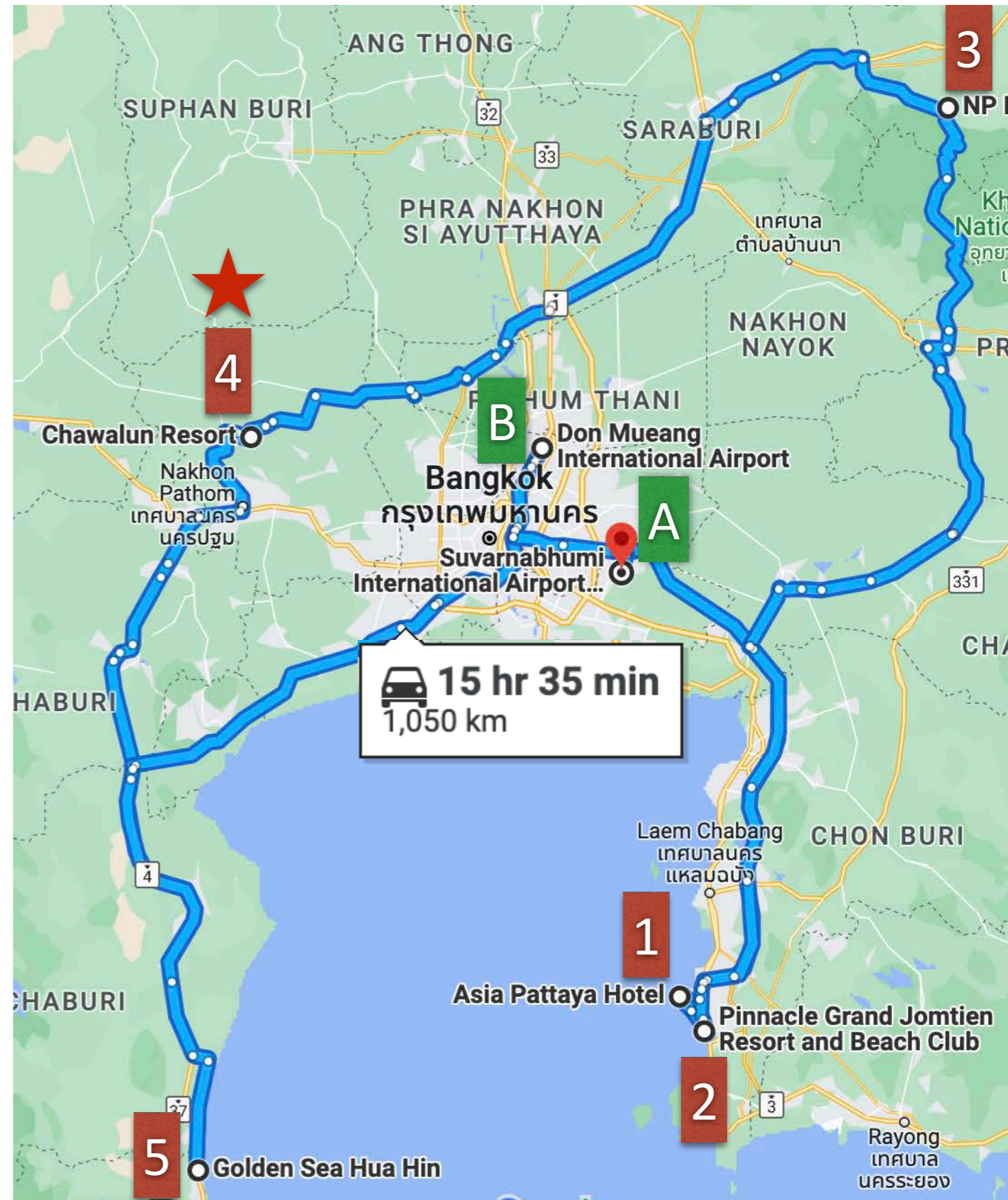
FPCP 2024: Conference on Flavor Physics and CP Violation

- 27-31 May 2024 @ Chulalongkorn University
- Co-organization: CU, SUT, SWU, KKU, CMU
 - Co-chairs: Patipan (SWU), Phat (CU)
- To exchange of new ideas, for presentation of the latest experimental and theoretical results on Flavor physics and CP violation
- Speakers: Mostly by invitation. A (3/4) day of parallel talks (~40 parallel talks)
- Topics:
 - Heavy quark decays and CKM metrology
 - Rare decays of hadrons and leptons
 - Kaon
 - Neutrino physics and Pontecorvo–Maki–Nakagawa–Sakata metrology
 - Exotic quarkonium-like states and pentaquarks
 - Higgs-flavour
 - CP violation in hadrons and leptons
 - Future facilities
 - Muon $g-2$
 - Dark matter and flavour
 - Interplay between flavor and high- p_T physics at the LHC
- Registration fee: Still working on it: 7,000 - 12,000 THB

AEPSHEP 2024: Asia-Europe-Pacific School of High-Energy Physics

- To provide young physicists with an opportunity to learn about recent advances in elementary-particle physics from world-leading researchers
 - Every two years, in even-numbered years.
 - Same level as CERN-JINR European School of HEP (annual), CERN Latin-American School of HEP (Every two years, in odd-numbered years)
 - Past schools: Japan, India, China, Vietnam, Korea
- 100 students: Target group is PhD students in the field of experimental particle physics.
- **12-25 June 2024 @ Chawalun Resort, HERE!!**
 - Your feedbacks are very welcome
- Co-organization: CERN school committee, CU, SUT, SWU, KKU, CMU
 - CERN school committee: Physics programs, speakers, student selection
 - Local committee: local programs, logistics, venue, security, accommodation, visa, ...
 - Co-chairs: Patipan (SWU), Phat (CU)
- Registration fee: 1200 USD / student
 - To cover everything from landing to departure
 - Sponsored by CERN, China, France, Germany (DESY), India, Japan, Pakistan, Korea, Russia and Taiwan, in form of registration fee
 - Part of the budget in the proposal to PMU-B (67)

- A** Suvarnabhumi Airport (BKK)
↓
- 1** Asia Pattaya Hotel
↓
- 2** Pinnacle Grand Jomtien Hotel
↓
- 3** NP Mandarin Khao Yai
↓
- 4** Chawalun Resort ★
↓
- 5** Golden Sea Hua Hin
↓
- B** Don Mueang Airport (DMK)
↓
- Suvarnabhumi Airport (BKK)

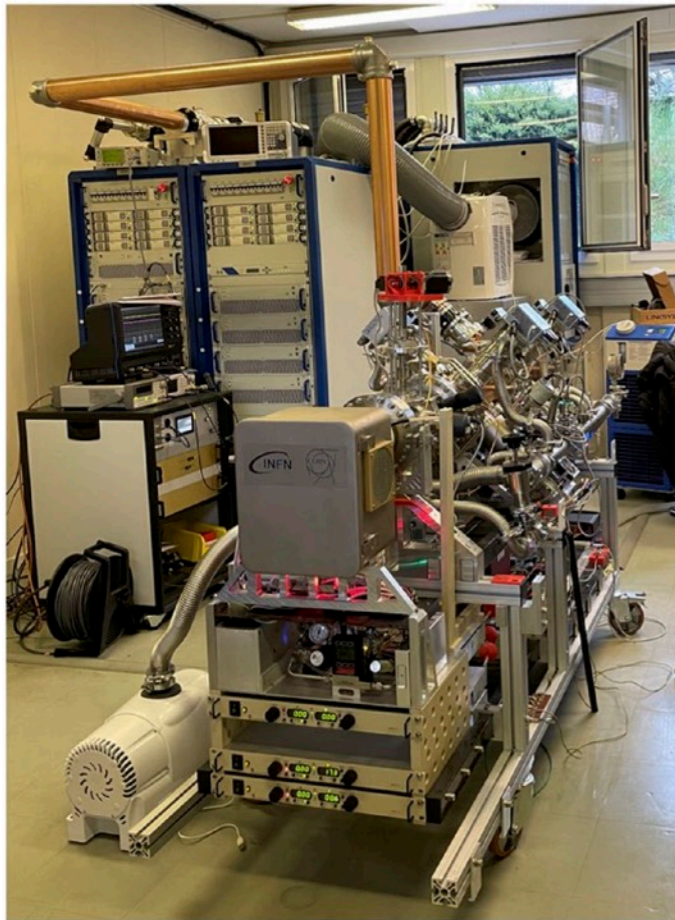


AEPSHEP 2024: Asia-Europe-Pacific School of High-Energy Physics

- Topics and speakers (finalized, but not public yet. ETA: Beginning of Dec.):
 - Statistical Techniques including Machine Learning - Harrison Prosper (FSU)
 - Question and Answer Session - Fabiola Gianotti (CERN, TBC)
 - Field Theory and the EW Standard Model - Anna Kulesza (Münster)
 - Instrumentation - Maxim Titov (Saclay)
 - Flavour Physics and CP Violation - Gino Isidori (Zurich)
 - Neutrino Physics - Stéphane Lavignac (Saclay)
 - LHC and Beyond - Joao Guimaraes da Costa (IHEP)
 - Particle Physics Outlook for Asia & globally - Tatsuya Nakada (EPFL)
 - Higgs and Beyond - John Ellis (King's College)
 - Heavy-Ion Physics - Xin-Nian Wang (LBNL)
 - Cosmology - include dark matter, axion physics, gravitational wave results - Jing Shu (PKU)
 - QCD - Xu Feng (PKU)
 - Hadron Spectroscopy - Chengping Shen (Fudan U.)
- It is a great chance for Thai students to participate the program
 - Very limit seats (as the room can accept only 110 persons)
- Public events (?)



How to move next?



New compact accelerator to help preserve heritage artworks

2017 - Present

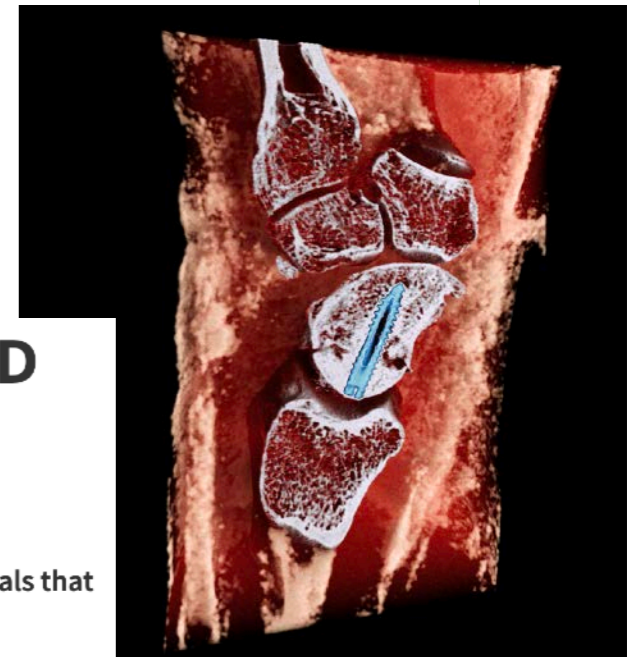
CERN and INFN have developed a compact, transportable accelerator for the non-destructive analysis of historical artifacts and artworks, providing a cheaper, more accessible method of analysing large or fragile items of this nature

2007 - present

Current status: Clinical trials

First European hospital receives 3D colour X-ray scanner using CERN technology

MARS Bioimaging's 3D colour X-ray scanner has arrived in Europe for clinical trials that will lead to medical use of a CERN technology



Airbus and CERN to partner on superconducting technologies for future clean aviation

Two European pioneers at the heart of disruptive technology

2022 - Present

Super-Conductor for Aviation with Low Emissions (SCALE)

Innovation

SuperNode and Cern combine to improve renewable power transmission

Alliance could help establish an efficient supergrid using superconductor technology

2023: To develop a novel type of insulation for superconducting cables, in an effort to improve energy transmission and accelerate the transition to renewable energy.



From physics to finance: how can CERN tools help to uncover market manipulation?

2023

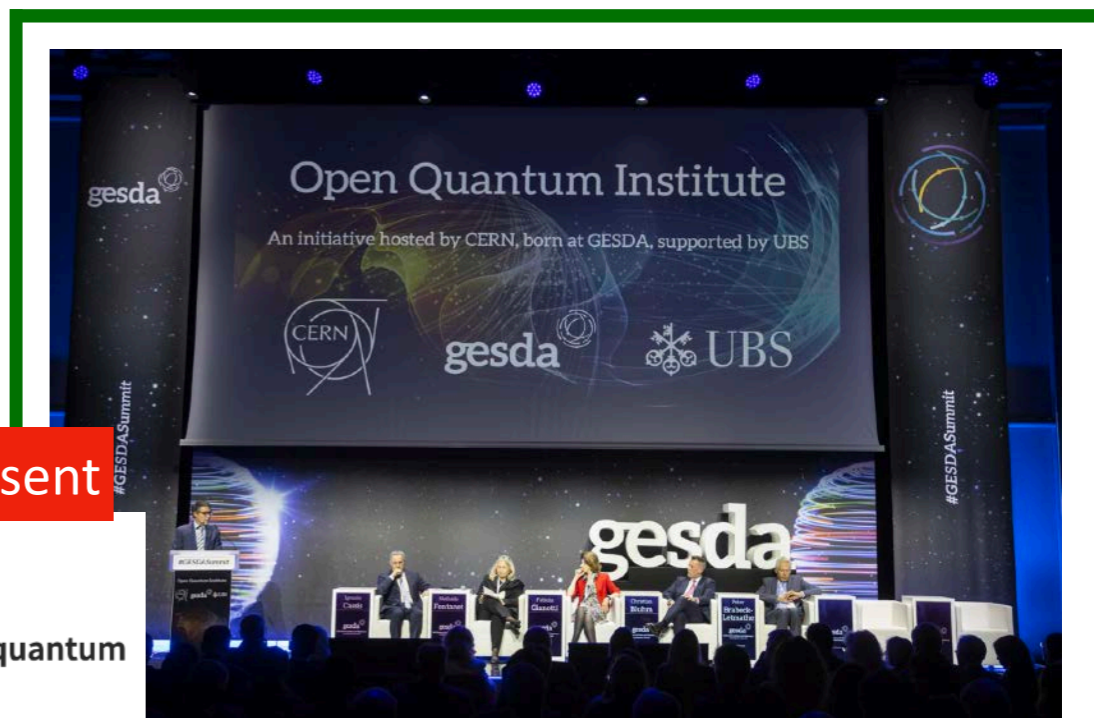
With its world-renowned expertise in the analysis of massive volumes of data, CERN has started a unique collaboration with leading market-surveillance experts to explore how particle physics could help to build future manipulation-detection techniques

2024: No clear plan yet on how to move. Plan to start discussions with NIA.

2018 - present

Bringing quantum computing to society

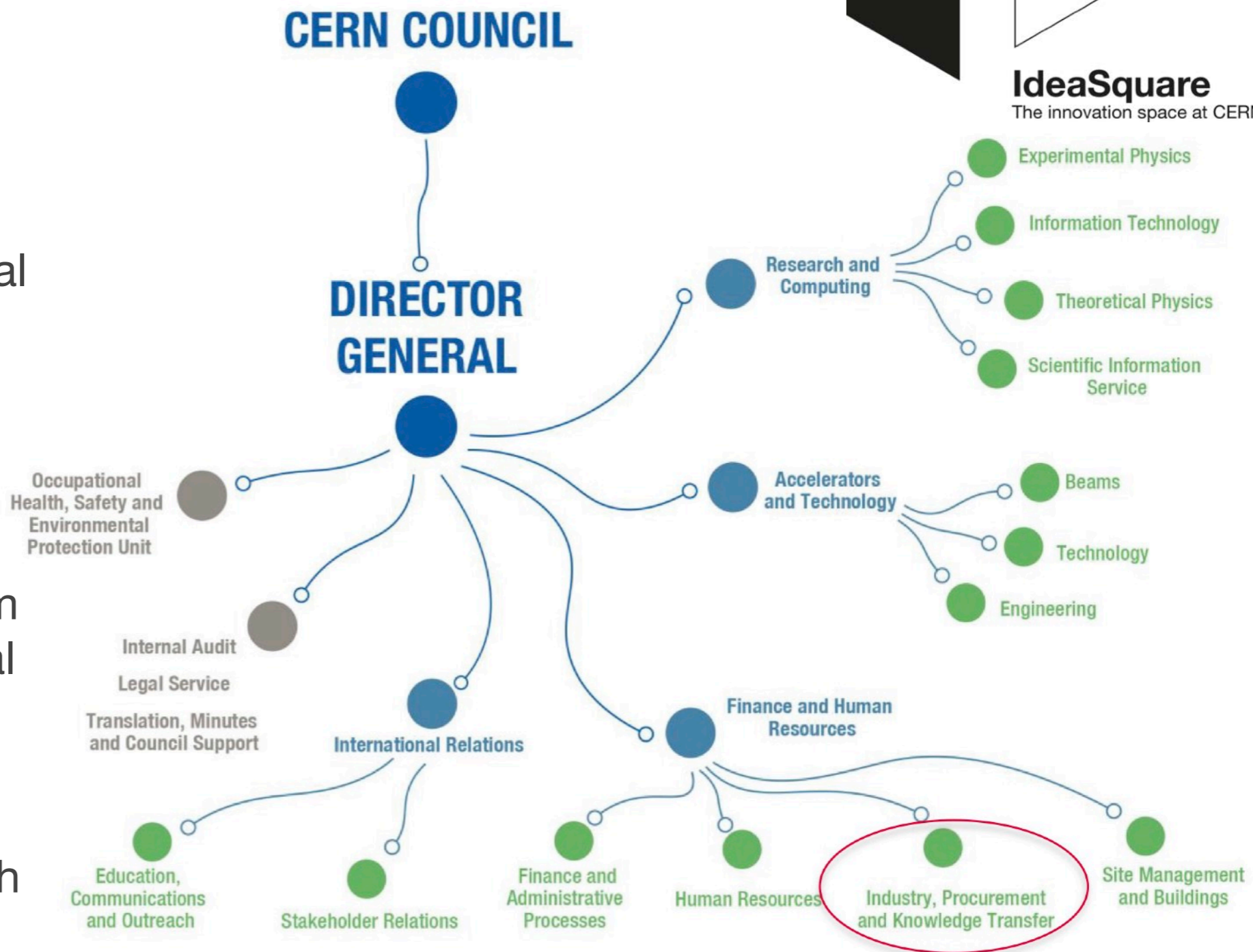
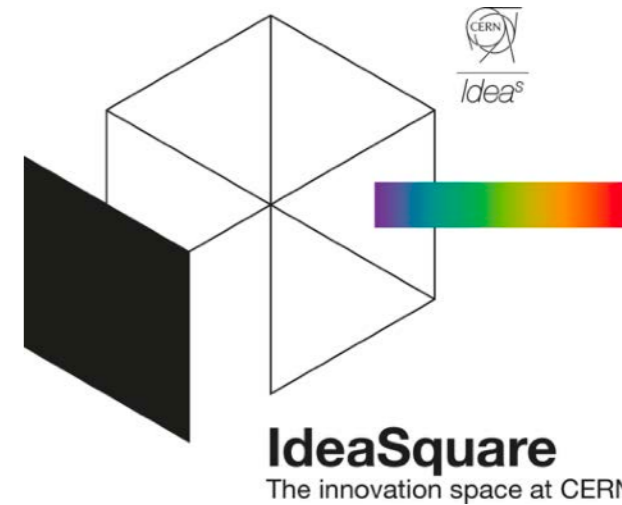
A new, three-year CERN-based programme called the Open Quantum Institute seeks to make quantum computing resources and technical expertise widely available



- **IdeaSquare** is a part of CERN's Industry, Procurement and Knowledge Transfer Department
- Unique position to bridge (and examine relationships between) fundamental science and other sectors of society

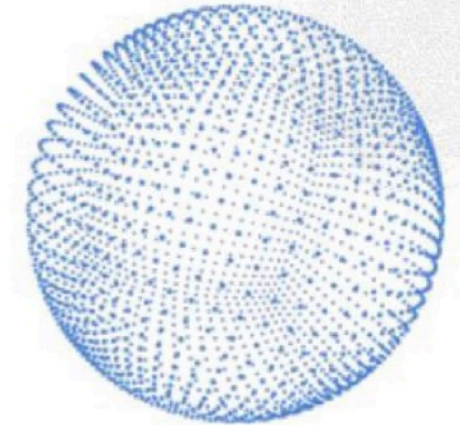


- Create a co-innovation ecosystem between fundamental research and industrial communities to develop breakthrough detection and imaging technologies for scientific and commercial uses.





Developing breakthrough technologies
for science and society



Absorbing and reducing the risk to the market

Public funding

Private investment



TRL 3

TRL 6

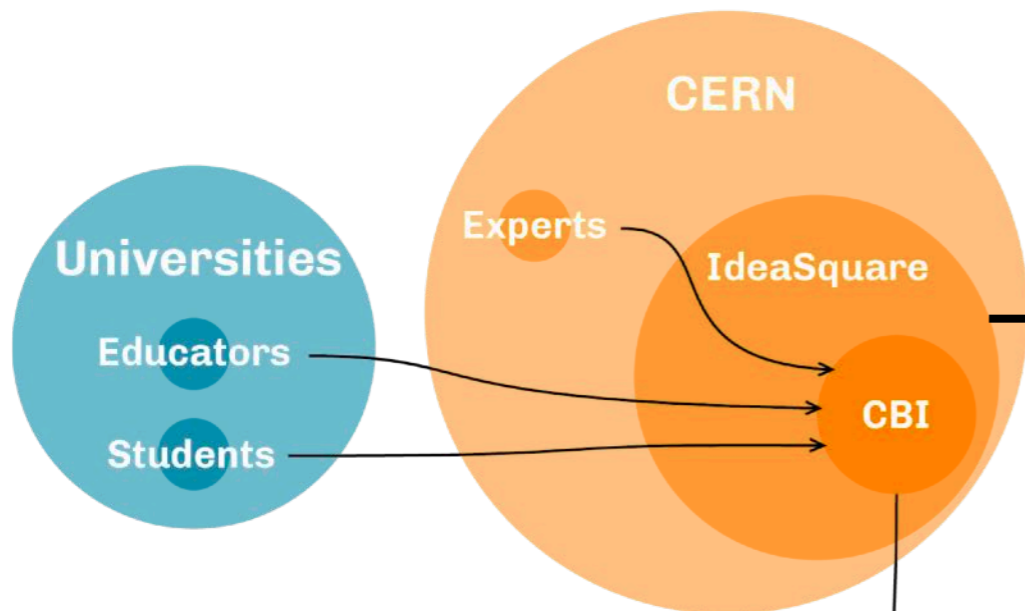
From ideas to
prototypes

ATTRACT phase 1
Risk absorption

From prototypes to pre-market products

ATTRACT phase 2
Risk mitigation

From pre-market
products to solutions



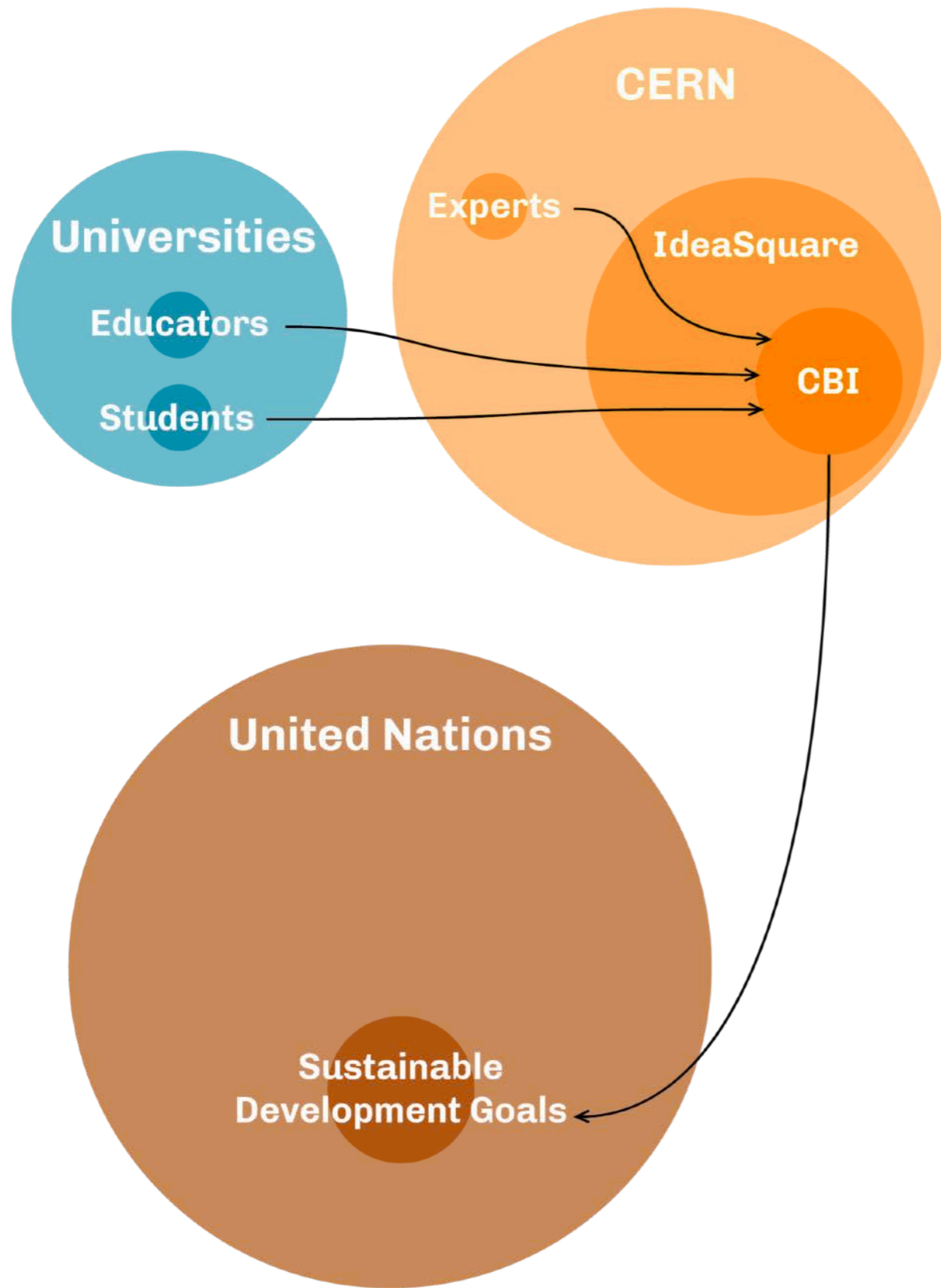
Design factories around the world

DFGN DESIGN FACTORY GLOBAL NETWORK

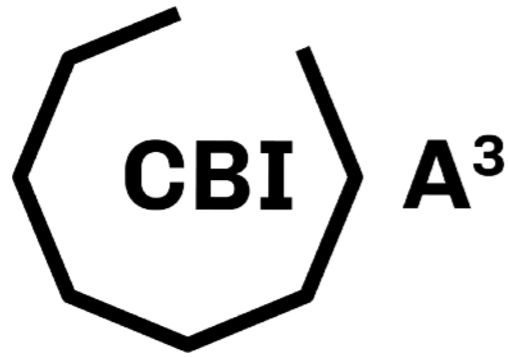
DESIGN FACTORIES LISTED BY YEAR OF FOUNDING

01 AALTO UNIVERSITY DESIGN FACTORY Aalto University, Helsinki, Finland (2009)	09 FRISIAN DESIGN FACTORY NHL Stenden University of Applied Sciences, Leeuwarden, the Netherlands (2015)	16 DESIGN FACTORY NEW ZEALAND Wintec, Hamilton, New Zealand (2017)	24 HAMK DESIGN FACTORY Häme University of Applied Sciences Hämeenlinna, Finland (2019)
02 SINO-FINNISH CENTRE Tongji University, Shanghai, China (2010)	10 METU DESIGN FACTORY Middle East Technical University, Ankara, Turkey (2016)	17 WARSAW DESIGN FACTORY Warsaw University of Technology, Warsaw, Poland (2017)	25 ST. JOHN'S UNIVERSITY DESIGN FACTORY St. John's University, New York City, USA (2019)
03 DESIGN FACTORY MELBOURNE Swinburne University of Technology, Melbourne, Australia (2011)	11 DESIGN FACTORY JAVERIANA BOGOTÁ PUC Javeriana, Bogotá, Colombia (2016)	18 FUSION POINT ESADE, Universidad Politècnica de Catalunya and IED, Barcelona, Barcelona, Spain (2017)	26 HANNAM DESIGN FACTORY Hannam University, Daejeon, South Korea (2019)
04 DUOC DESIGN FACTORY Duoc UC, Santiago de Chile, Chile (2012)	12 NYC DESIGN FACTORY Pace University, New York City, USA (2016)	19 KYOTO DESIGN LAB Kyoto Institute of Technology, Kyoto, Japan (2017)	27 SHENKAR DESIGN FACTORY Shenkar College, Tel Aviv, Israel (2019)
05 IDEASQUARE @CERN CERN, Geneva, Switzerland (2014)	13 RTU DESIGN FACTORY Riga Technical University, Riga, Latvia (Oct 2016)	20 CALI DESIGN FACTORY PUC Javeriana, Cali, Colombia (2017)	28 OPER.SPACE University of Bologna, Bologna, Italy (2019)
06 DESIGN FACTORY KOREA Yonsei University, Seoul, South Korea (2015)	14 UPV DESIGN FACTORY Universidad Politècnica de València, Valencia, Spain (2017)	21 INNO.SPACE Hochschule Mannheim, Mannheim, Germany (2018)	29 TECHNOVATION HUB KU Leuven, Leuven, Belgium (2020)
07 PORTO DESIGN FACTORY Porto Polytechnic, Porto, Portugal (2015)	15 DESIGN FACTORY SÃO PAULO, Universidade São Paulo, São Paulo, Brazil (2017)	22 UNIVERSITY OF TARTU DELTA SANDBOX University of Tartu, Tartu, Estonia (2018)	30 DESIGN FACTORY LONDON Brunel University London, UK (2020)
08 NEXUS DESIGN FACTORY Thomas Jefferson University, Philadelphia, USA (2015)		23 SIT DESIGN FACTORY Singapore Institute of Technology, Singapore (2018)	31 NANDIN ANSTO, Sydney, Australia (2020)

Lorem ipsum

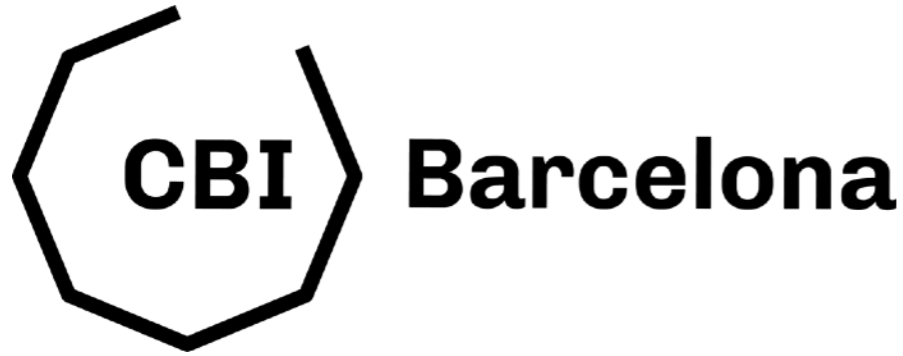


- **Challenge Based Innovation** is a 4-6 months programme where teams of university students develop projects that solve complex societal problems, inspired by technological ideas that come from instrumentation development or basic research at CERN.
 - The challenges are framed by the UN SDGs
 - For 4-6 months, students study design thinking at University, and visit CERN in the beginning / at the end for prototyping.
 - Also have variations in course.
 - They are happy to discuss and to explore the format which would work for us.
- Student work in a **multidisciplinary team (finance, architect, engineer)**, develop their critical thinking and get hands-on to make their ideas real through prototyping and testing.



6.5 month program of guided curriculum for tertiary student teams around the globe to take a UN SDG, and explore it in relation to their local context (e.g. Melbourne, Victoria).

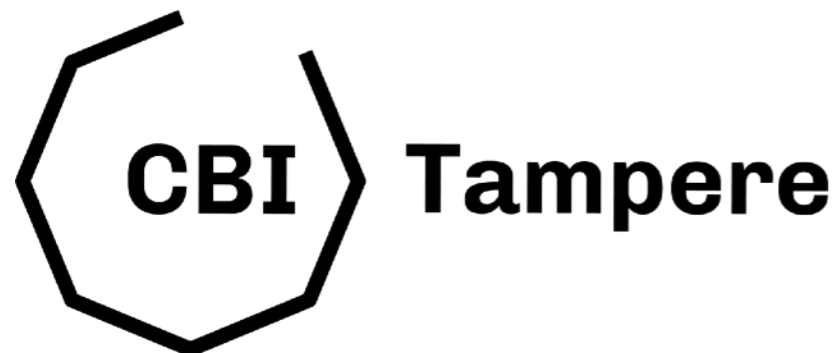
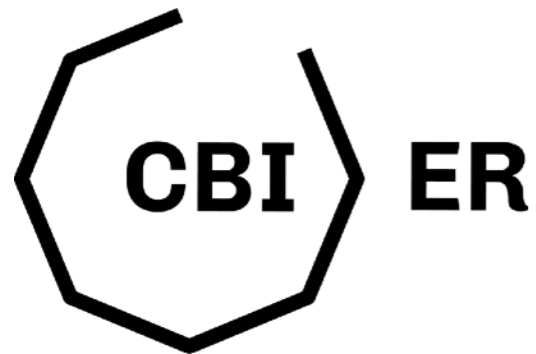
Projects: <https://cbi.dfm.org.au/projects/> **Main program**



2024: Finding if Thai universities are interested in the program, and in which form. Then discuss with ideasquare.



Design the Future (DTF) is a 1-2 week workshop that takes place at CERN IdeaSquare. The workshop is open to students from all backgrounds (e.g. Science, Engineering, business, Humanities, Design etc.). Not organized since 2019.



An intensive 3-month project course where student teams tackle societal problems. The UN SDGs act as a basis for defining the problem.



2020-2021

Helios

bushfires | drones | detection

The flying response team to detect and extinguish rural bush fires.

2019-2020

Halo

airports | biohazards | detection

A check point that ensures no negligence or human error at the Australian border airports.



2018-2019

ReTire

microplastics | water | melbourne

Collection and awareness of microplastics in urban areas.

2017-2018

Metaflora

food waste | hospitals | farm

Elimination of food wastage in hospitals entirely.

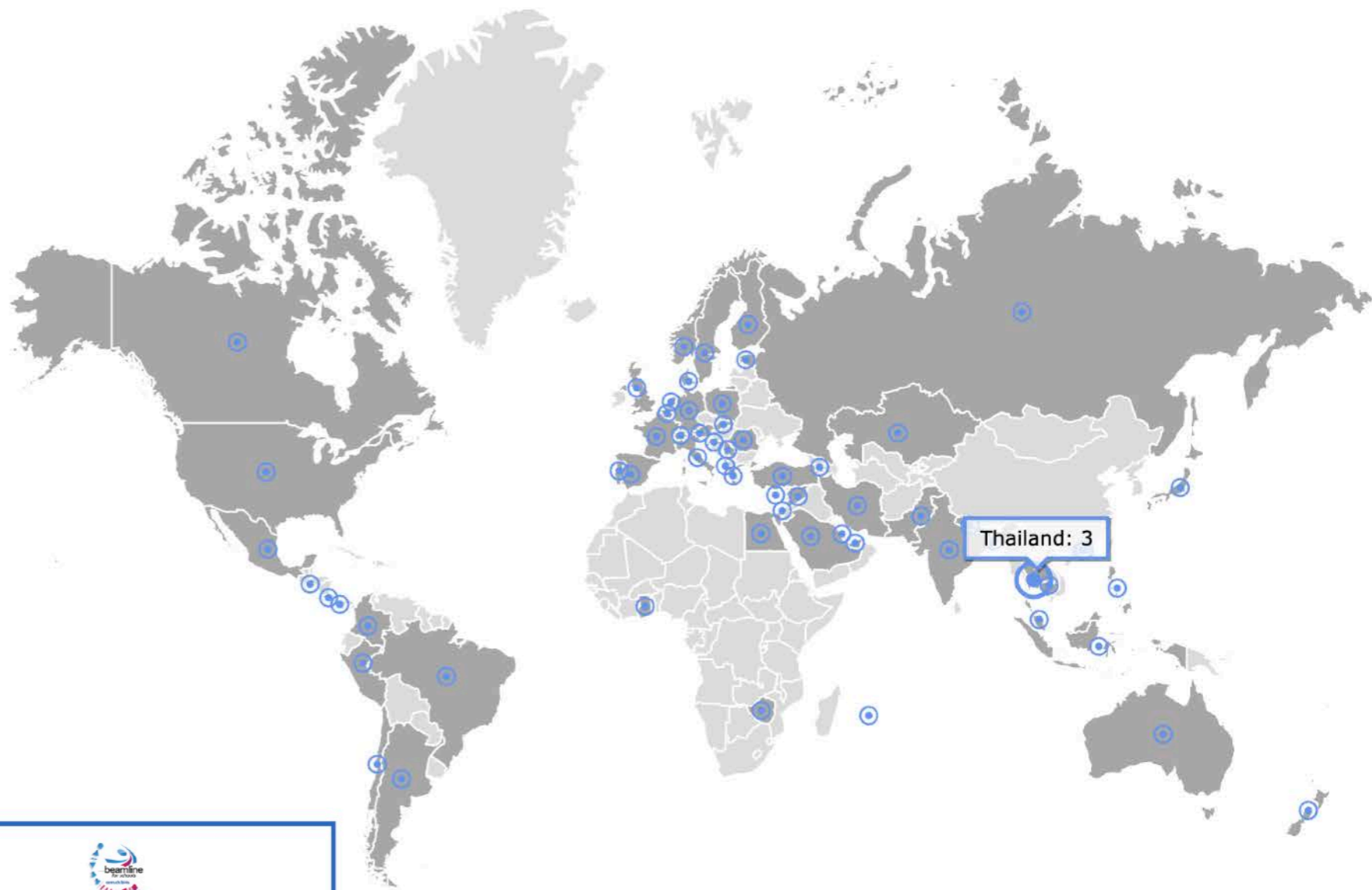


More project at <https://cbi.dfm.org.au/projects/>

The BL4S competition is intended for students around the 16-19 age bracket who, at the time of submitting their entry to the competition, are attending a secondary/high school.

CERN and DESY will select three winning proposals from the submissions.

2023	3
2022	1
2021	0
2020	1
2019	2



BL4S 2022 shortlist
 This year 25 teams have been selected to be part of the shortlist. Out of them, two teams will be invited to CERN and one to DESY in September to perform their experiments. All the others will receive special prizes including a kit to build a do-it-yourself particle detector.

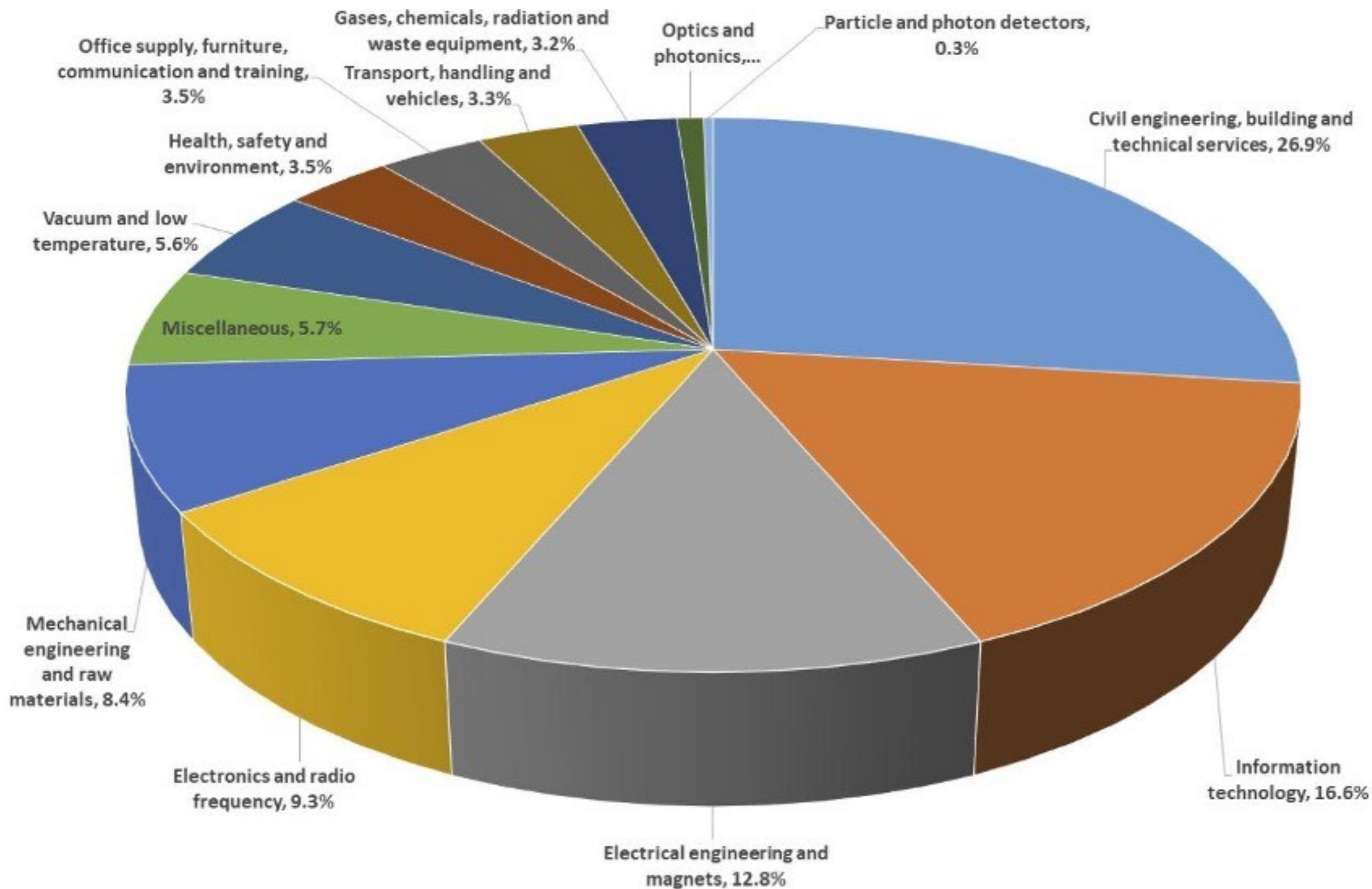
Team Name	Countries
Allurophilics	Mexico
Atomic Friends	Romania
Beamline Bandits	India
Black-Pink Crystals	Congo – Kinshasa, South – Africa & Zimbabwe
CHERENS	Japan
Chronos	United States
CLONS OF ATATÜRK	Turkey
Coherent Peers	India
Cougar Colliders	Canada
Dawson Technicolor	Canada
EMH Kiwi	New Zealand
IEL Physics	Turkey
InTheory	Italy
NAIA Na Lang 2.0	Philippines
Scintillator Afterglow Effect due to Nuclear Transmutation (SAENTs)	India & United States
TCO-ASA-22	Italy
Team Cappadocia	Turkey
Team Neinstein (9)	Romania
Team Offline	Thailand
Team OPTOCRASM	United States
Volcanoes	Japan

Winners – Team name	Countries
Club de Física Enrico Fermi	Spain
Egyptian STA students	Egypt
Supercooling-Team	France

In 2022, Team Offline from Thailand was in the shortlist (25 from total 204 teams). They got special prizes including a kit to build a do-it-yourself particle detector.

2024: Phat (CU) and Thakonwat (SLRI) will be national contact persons, and start to promote the program to schools (with information about beam, experiment, CERN)

Supplies (235MCHF spent in 2020 – CERN budget only)



Industry

What have been done:

- Collect all information related to Associate Members
- The only way that Thai industry can work with CERN is Thailand becomes associate members (~100 MTHB/year).
 - Thai industry can, of course, participate in ALICE and CMS programs if procurements are done directly from experiment (not through CERN budget). This also include R&D programs of experiments, but not CERN.

What should be done:

- Correct the understanding about return. We **can't** make financial profit from CERN. Member fee will return in form of services, person power, procurements from Thailand. The ceiling is the member fee we pay.
- What industry has to do is to develop:



Doing business with CERN: the facts

supplier survey (669 suppliers in 33 countries, 2017):



Comments from economists on Social Rate of Return

(สรุปจากการหารือกับรองศาสตราจารย์ดร. คมสัน สุริยะ)

การจะวัด Social Rate of Return ก็เป็นแนวคิดที่ดี แต่มีเรื่องที่ต้องช่วยกัน

1. การทำงานร่วมกันระหว่างประเทศไทยกับ CERN ที่ผ่านมา ได้รับประโยชน์ที่เป็นรูปธรรม ที่เกิดขึ้นแล้วอะไรบ้าง
 - เรื่องนี้อาจจะนำเสนอในแบบสารคดี คือมีนักวิทยาศาสตร์ชั้นนำของประเทศมาให้สัมภาษณ์เชิงลึก มีภาคเอกชนมาร่วมให้สัมภาษณ์สนับสนุน มีผู้หลักผู้ใหญ่ในบ้านเมืองมาพูดสนับสนุน
2. ถ้าคำนวณตัวเลขตามข้อ 1 ได้ ก็จะดีมาก เอาแบบมีหลักฐานที่เห็นเป็นจริงเป็นจัง เรียกว่าการประเมินแบบ Ex-post เอาไว้ใช้เป็นฐานเทียบกับค่าสมาชิก
3. การเป็นสมาชิกจะทำให้ไทยได้ประโยชน์มากขึ้นจากข้อ 1 ในเรื่องไหนบ้าง
 - ลักษณะเป็นสารคดี เอาสามฝ่ายตามข้อ 1 มาพูดอีกครั้ง และให้เน้นย้ำ ๆ ว่าต้องได้ประโยชน์มากขึ้นแน่นอน
4. ถ้าคาดการณ์ตัวเลขตามข้อ 3 ได้ก็จะดีมาก เรียกว่าการประเมินแบบ Ex-ante แล้วเทียบให้เห็นชัดไปเลยว่าค่าสมาชิกมีความคุ้มค่า
 - หัวใจของการประเมินอยู่ที่การโน้มน้าวผู้ฟัง ให้เห็นถึงประโยชน์ที่จะได้รับ
5. แต่คงความเป็นวิทยาศาสตร์อยู่ คือ ถ้าประเมินออกมาไม่คุ้มก็ต้องยอมรับตามนั้น ถ้าออกมาไม่คุ้มแล้วจะยอมรับได้ไหม ถ้าทำใจยอมรับไม่ได้ก็อย่าเพิ่งทำ
 - แต่ถ้าทำใจยอมรับได้ ก็เริ่มกระบวนการหาคนมาให้ข้อมูลตามข้อ 1

ข้อเสนอส่วนตัว: ข้อ 1 น่าจะต้องเกิดขึ้นไม่ว่าจะเข้าเป็นสมาชิกหรือไม่ เพื่อเชื่อมโยงสังคมเข้ากับงานทางวิทยาศาสตร์และเทคโนโลยี สร้าง public perception ที่เข้าใจ Frontier Science มากยิ่งขึ้น