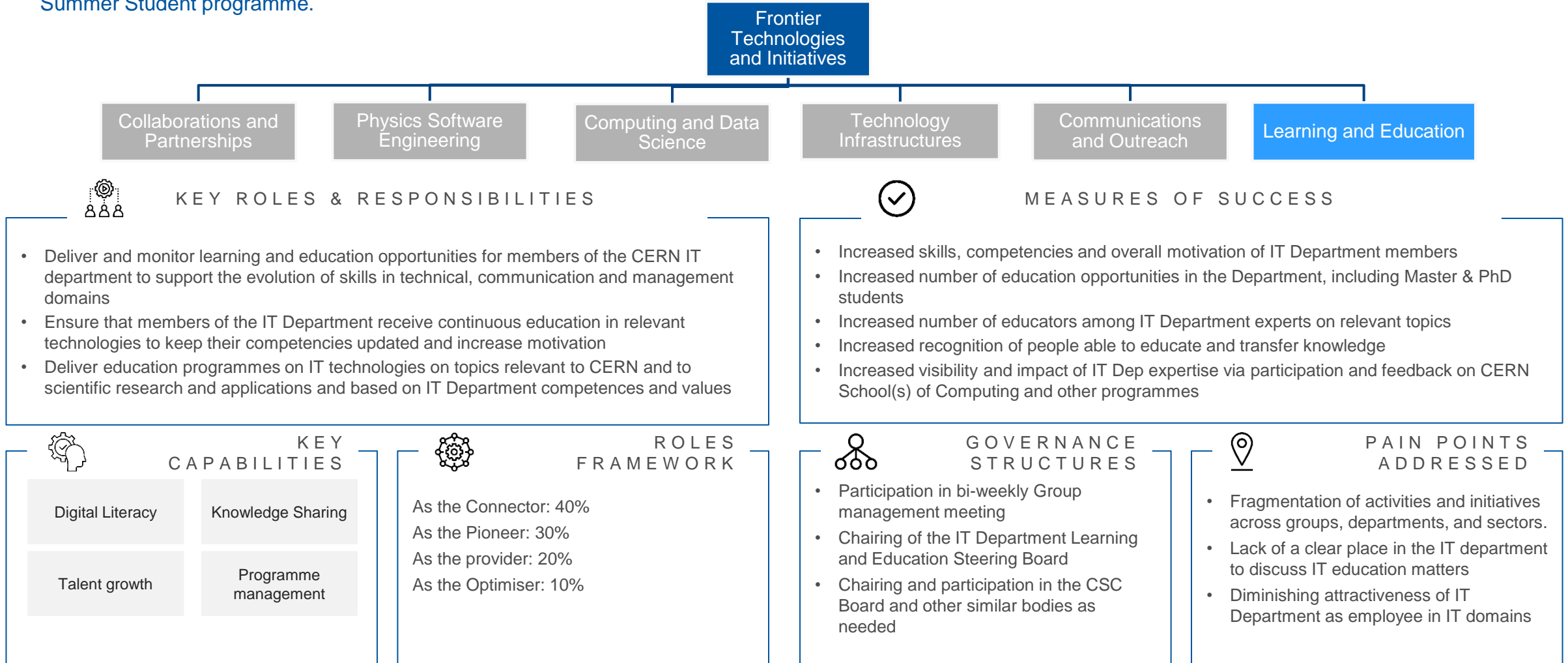# Education

Alberto Pace

Learning and Education: Functional overview

The Learning and Education team is responsible to define and execute the processes and mechanisms through which the IT Department builds and transmits knowledge to support its current and future strategic objectives. This includes supporting the internal evolution of skills and behaviours, collecting and organising learning resources, and contributing to wider knowledge creation for science and society via initiatives like the CERN School of Computing and the CERN openlab Summer Student programme.

Frontier Technologies and Initiatives

- Collaborations and Partnerships
- Physics Software Engineering
- Computing and Data Science
- Technology Infrastructures
- Communications and Outreach
- **Learning and Education**

KEY ROLES & RESPONSIBILITIES

- Deliver and monitor learning and education opportunities for members of the CERN IT department to support the evolution of skills in technical, communication and management domains
- Ensure that members of the IT Department receive continuous education in relevant technologies to keep their competencies updated and increase motivation
- Deliver education programmes on IT technologies on topics relevant to CERN and to scientific research and applications and based on IT Department competences and values

MEASURES OF SUCCESS

- Increased skills, competencies and overall motivation of IT Department members
- Increased number of education opportunities in the Department, including Master & PhD students
- Increased number of educators among IT Department experts on relevant topics
- Increased recognition of people able to educate and transfer knowledge
- Increased visibility and impact of IT Dep expertise via participation and feedback on CERN School(s) of Computing and other programmes

KEY CAPABILITIES

- Digital Literacy
- Knowledge Sharing
- Talent growth
- Programme management

ROLES FRAMEWORK

As the Connector: 40%
As the Pioneer: 30%
As the provider: 20%
As the Optimiser: 10%

GOVERNANCE STRUCTURES

- Participation in bi-weekly Group management meeting
- Chairing of the IT Department Learning and Education Steering Board
- Chairing and participation in the CSC Board and other similar bodies as needed

PAIN POINTS ADDRESSED

- Fragmentation of activities and initiatives across groups, departments, and sectors.
- Lack of a clear place in the IT department to discuss IT education matters
- Diminishing attractiveness of IT Department as employee in IT domains

Education in IT-FTI

- 3 activities
  - IT Education
  - CERN School of Computing
  - NextGen WP4

IT Education

Vision

◆ Ensure all CERN personnel maintain or enhance their IT competencies throughout their tenure.

◆ Deliver IT education relevant to CERN's research and CERN unique technologies.

◆ Promote mentorship and teaching within the IT department, recognizing contributors to education.

To be created (proposal):
Learning and Education Steering Committee

◆ Strategic oversight:

  ◆ Define/Implement the strategic vision and priorities for IT education within the department (or organization).

  ◆ Align educational initiatives with the department's mission and organizational goals.

◆ Educational offerings:

  ◆ Review and approve education and training programs for IT personnel.

  ◆ Evaluate the relevance and quality of new and existing initiatives (e.g., workshops, seminars, academic partnerships).

  ◆ Integrate emerging technologies and methodologies into educational programs.

◆ Establish policies for continuous learning, professional development requirements for staff involved in IT technologies

◆ Monitoring and Evaluation

  ◆ Define frameworks for assessing educational initiatives impact. Track the effectiveness and reach of educational initiatives.

IT education *may* include

- ◆ Technical training activities (DTO)
- ◆ Communication training activities (DTO)
- ◆ Leadership and Management training (DTO)
- ◆ Academic Training (https://academictraining.cern.ch/)
- ◆ Post-conferences workshops and support to workshop where IT technology is disseminated
- ◆ IT Seminars
- ◆ IT Education Catalogue (https://it-edu.web.cern.ch/)
- ◆ Online Training (Udemy, Linkedin Training, Youtube, …)
- ◆ Students programmes
  - ◆ Summet / Technical / Doctoral

Priorities for IT education (to be approved)

- ◆ Should focus on beginners and Intermediate education levels
  - ◆ Ensure onboarding of newcomers
  - ◆ Avoid leaving people behind at technology changes
  - ◆ Advanced training organized on-demand for specific cases
- ◆ Areas where improved education is needed
  - ◆ Technologies developed at CERN
  - ◆ Advanced technologies relevant to CERN research
- ◆ Increase the lecturers from the IT department
- ◆ Increase the level of projects offered to students by the IT department
  - ◆ Applies to both technical and doctoral students
  - ◆ Ensure that the investment is not lost when the student leaves

CERN School of Computing

Kristina Gunne, Andrzej Nowicki, Alberto Pace

CERN School of Computing

◆ 9 schools organized in 2023 - 24

  ◆ Inverted School (March 23), Heterogeneous Computing (June 23), Main school in Estonia (Aug 23), Computer Security (Oct 23), Inverted School (April 24), Heterogeneous Computing (June 24), Main school in Germany (Sep 24), Machine Learning (Oct 24), IT Services (Nov 24)

◆ Potential schools for 2025 - 26

  ◆ Inverted School (March 25), Computer Security (April 25), Machine Learning (June 25), Main school in Sweden (July 25), Heterogeneous Computing (Oct 25), IT Services (Nov 25), Regional School in Latin America (Chile, early 26), …
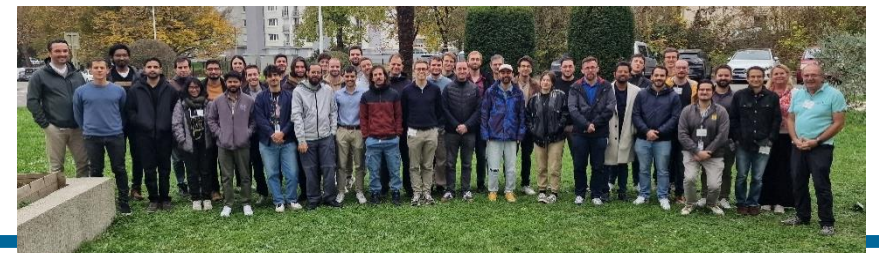
School vision, strategy, and plans

◆ Attract the best PhD and Master students worldwide

◆ Deliver education on Scientific Computing topics relevant to CERN research and on specific IT technologies developed at CERN

◆ Create a network of lifetime links of participants across all scientific research laboratories, institutes and universities

  ◆ Including those not directly involved in CERN research programs

◆ Tactical directions:

  ◆ Increase education on emerging and innovative technologies that will play majors roles in scientific research in future years (Machine Learning, Quantum Computing, AI, Heterogeneous Architectures, Datacenter technologies)

  ◆ Increase geographical coverage (schools in Latin America in 2026, Asia, Middle-East)

Overall Evaluation CSC 2024 (excerpts)

◆ *The school was excellent, **one of the best experiences of my** life. I learnt a lot of new things, or at least I have now the instruments to study them alone. I appreciated the heterogenous environment, and the networking possibilities. I met so many amazing people, both within the students and the lecturers.*

◆ *It has been the **best work-related event** I ever had in my life.*

◆ *One of the best, if not the best, two weeks of my life! And I'm not exaggerating. Thank you to all the organizers, instructors, and the attendees!*

◆ *Honestly **one of the best experiences I have ever had**, certainly in terms of academic events. The school itself was amazing, all the activities were perfect.*

◆ *Organisation was brilliant. Lectures were brilliant. Social events were brilliant. All-in-all I hope I can come back to another version of the CSC in the future*

Comparative advertisement

637 CHF for a full week + lodging, meals, excursions

560 CHF for 16 hours

School on IT services: 420 CHF for a full week

NextGen Work Package 4

4.1 Outreach, 4.2 Education

Outreach (WP 4.1) in 2024

- ◆ Articles and social media presence
- ◆ Web site
  - ◆ https://nextgentriggers.web.cern.ch/
- ◆ Events:
  - ◆ NextGen All Hands meeting, 24 September 2024 https://indico.cern.ch/event/1421591/
  - ◆ NextGen Technical Workshop, 25-27 November 2024 https://indico.cern.ch/event/1421629/
- ◆ Exchange programme
- ◆ Team:
  - ◆ Alex Lasa Lamarca and the IT-FTI Communication (Antonella del Rosso, Jana Fiserova)
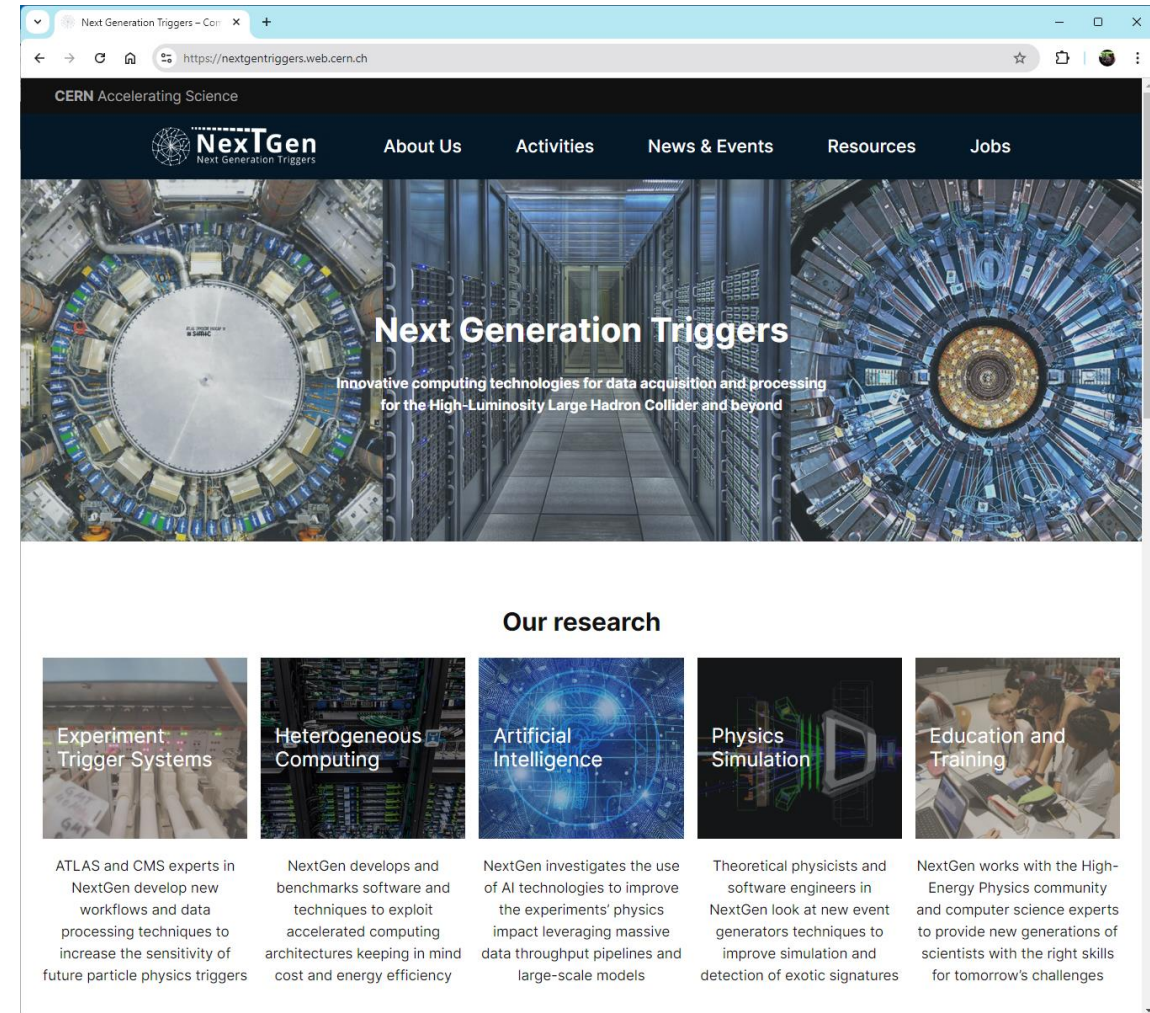
Education Programmes (WP 4.2) in 2024

- Participation in several schools
  - International School of Triggers and Data Acquisition (ISOTDAQ) – June
  - CERN School of Computing – September
  - Smarthep Edge Machine Learning School – September
  - School on "Artificial intelligence and modern physics" – Sep-Oct
  - Efficient Scientific School of INFN - October
  - Thematic School of Computing on Machine Learning – October
- Advanced training courses on various technologies (at CERN or in industry)
  - Parallel, High-performance, High-throughput Computing, C++, Python, Data handling, Machine Learning, CUDA, FPGA programming, VHDL, Networking, Neural Networks …
- Team:
  - Felice Pantaleo, Vicky Batsari

Conclusion: Your role

◆ Ensure you maintain or enhance your IT competencies through time.

◆ Be an expert in technologies necessary to CERN's research and the unique technologies developed at CERN
  ◆ Become an expert in a specific field
  ◆ Understand other fields

◆ Ensure that you mentor and teach within every opportunity available in the IT department and in CERN Schools.