

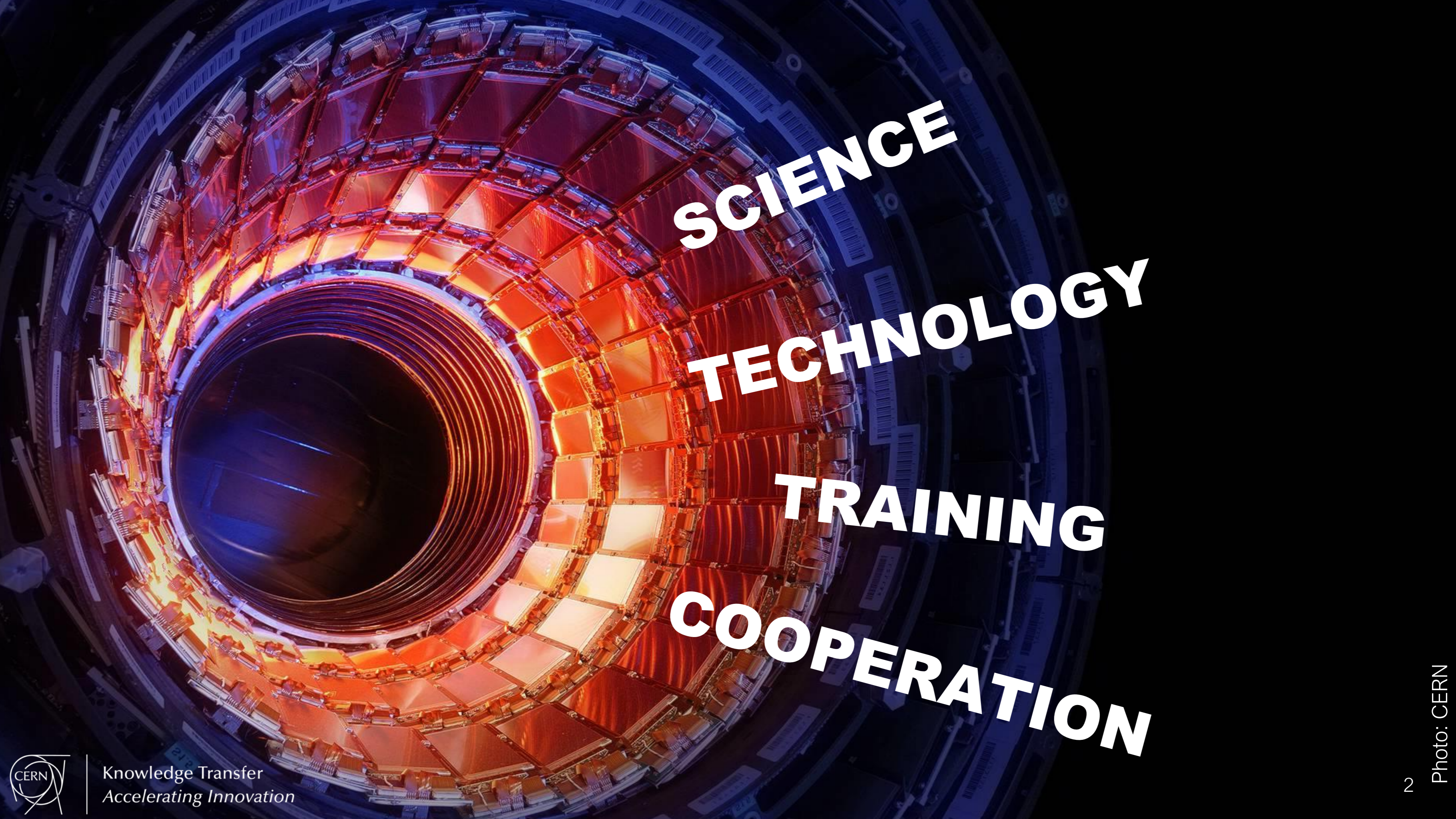


Knowledge Transfer at CERN

Giovanni Anelli

Knowledge Transfer Group Leader





SCIENCE

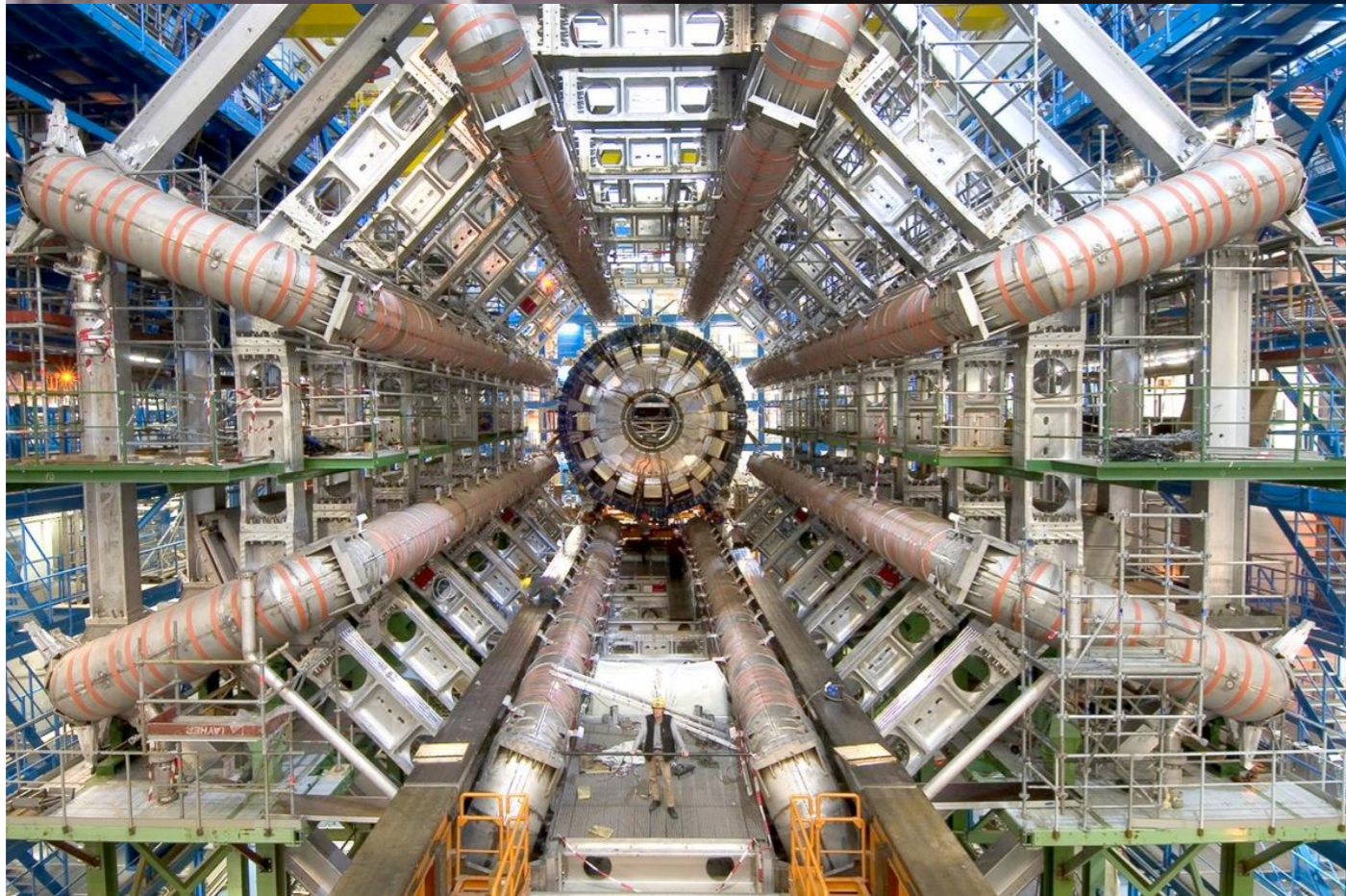
TECHNOLOGY

TRAINING

COOPERATION



The HEP toolbox



Manuela Cirilli
CERN Courier webinar 25 February 2021



WHERE THE WEB WAS BORN

In the office of the project director
Wide Web was invented

Started in 1980 from a project which was intended
was first funded when a letter from the
Networking Group (NG) was received
Computing for Physics (C4P)

In 1981 the first computer network was
I was computer for the first time
Robert Callan (CERN) was the first
A Computer network was

At the end of 1981 the network was
Computer network was
the first computer network
NGP, the first computer network
Accelerating Innovation

In 1985 the first computer network
NGP, the first computer network
Accelerating Innovation

This is what we call knowledge transfer

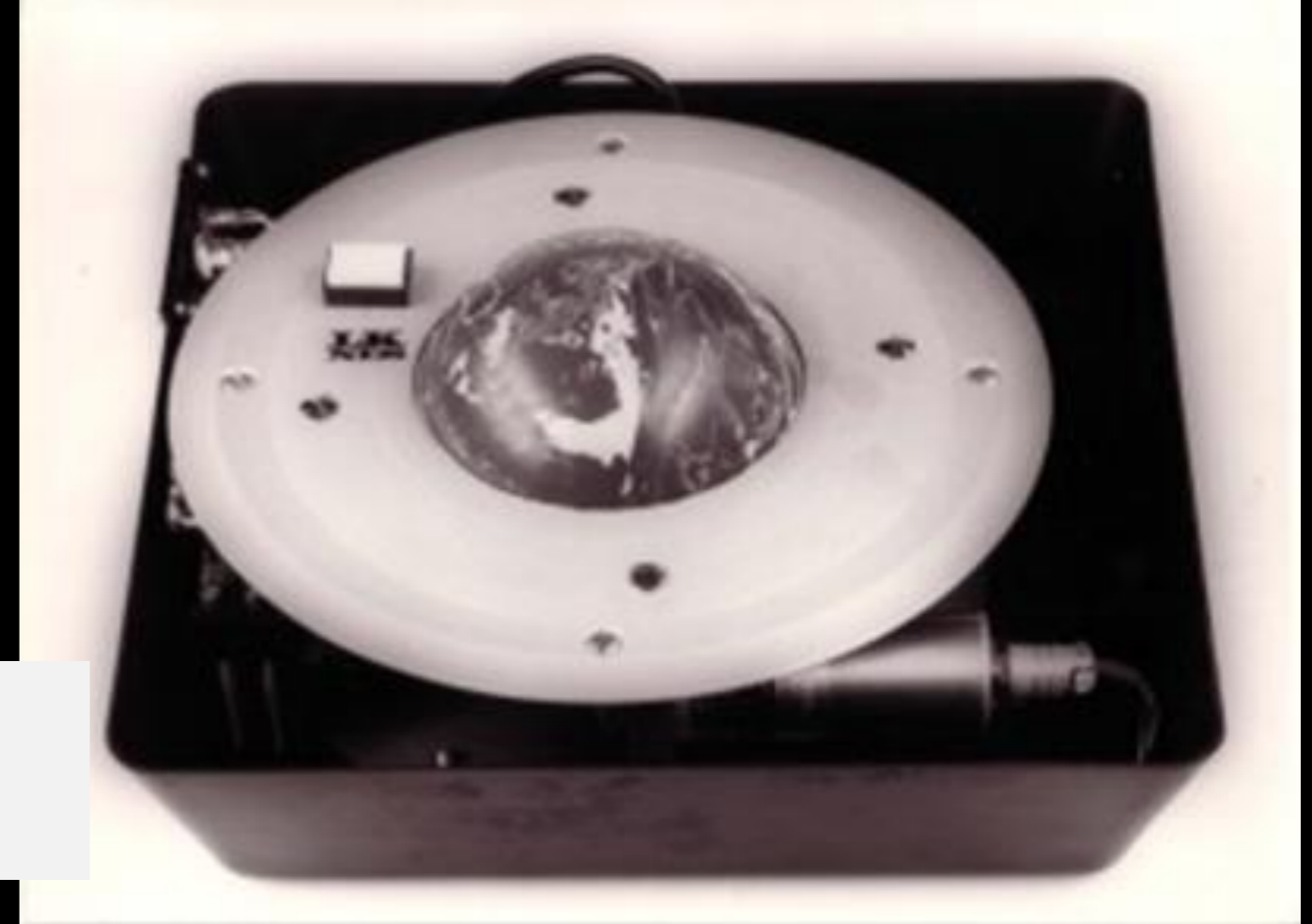
CERN's unique:
Technologies
Know-how
Infrastructures



How do we **MAXIMISE** **IMPACT?**



CERN, 1970s



Knowledge Transfer Channels

Dedicated actions to **foster the transfer of technologies and know-how** to other fields than particle physics
(very often with the involvement of industry)

Technology-intensive **procurement contracts**

People

(very hard to quantify but extremely impactful for particle physics)

CERN's Knowledge Transfer Group



ABOUT US ▾ ACTIVITIES & SERVICES ▾ TECHNOLOGIES COMPETENCES APPLICATIONS ▾ WHO ARE YOU? ▾ NEWS EVENTS ▾

Accelerating your innovation



<http://kt.cern>

KT's Mission

- **Maximise** the technological and knowledge return to society, in particular through Member States industry
- **Promote** CERN as a centre of excellence for technology and innovation
- **Demonstrate** the importance and impact of fundamental research investments

Competences

Machine Learning and Deep Learning

Industrial Controls and Automation

Data Analytics

Metrology

High and Ultra High Vacuum Systems

Health, Safety and Environment Management

Cryogenics

Optoelectronics and Microelectronics

High Volume Data Management & Storage

Superconducting Magnets

Particle Acceleration and Control

Radiation Protection and Monitoring

Particle Tracking and Calorimetry

Robotics

Sensors

Material Science

Cooling and Ventilation

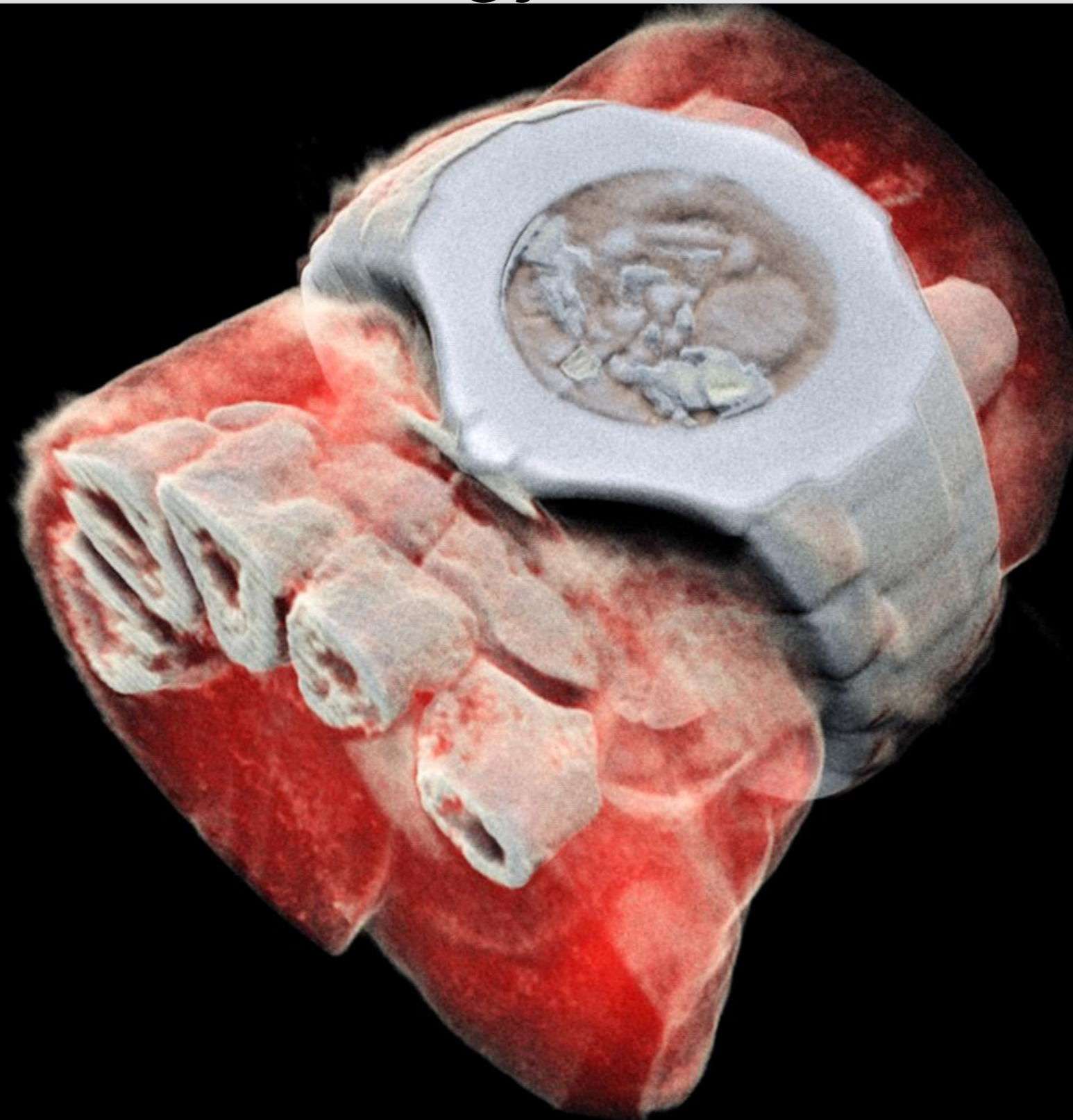
Collaboration Tools

Radio Frequency Technology

Manufacturing and Mechanical Processes

First 3D colour X-ray images of a human – using Medipix3 technology

July 2018



Timepix on the ISS



Courtesy of NASA, photo ref. no. iss036e006175



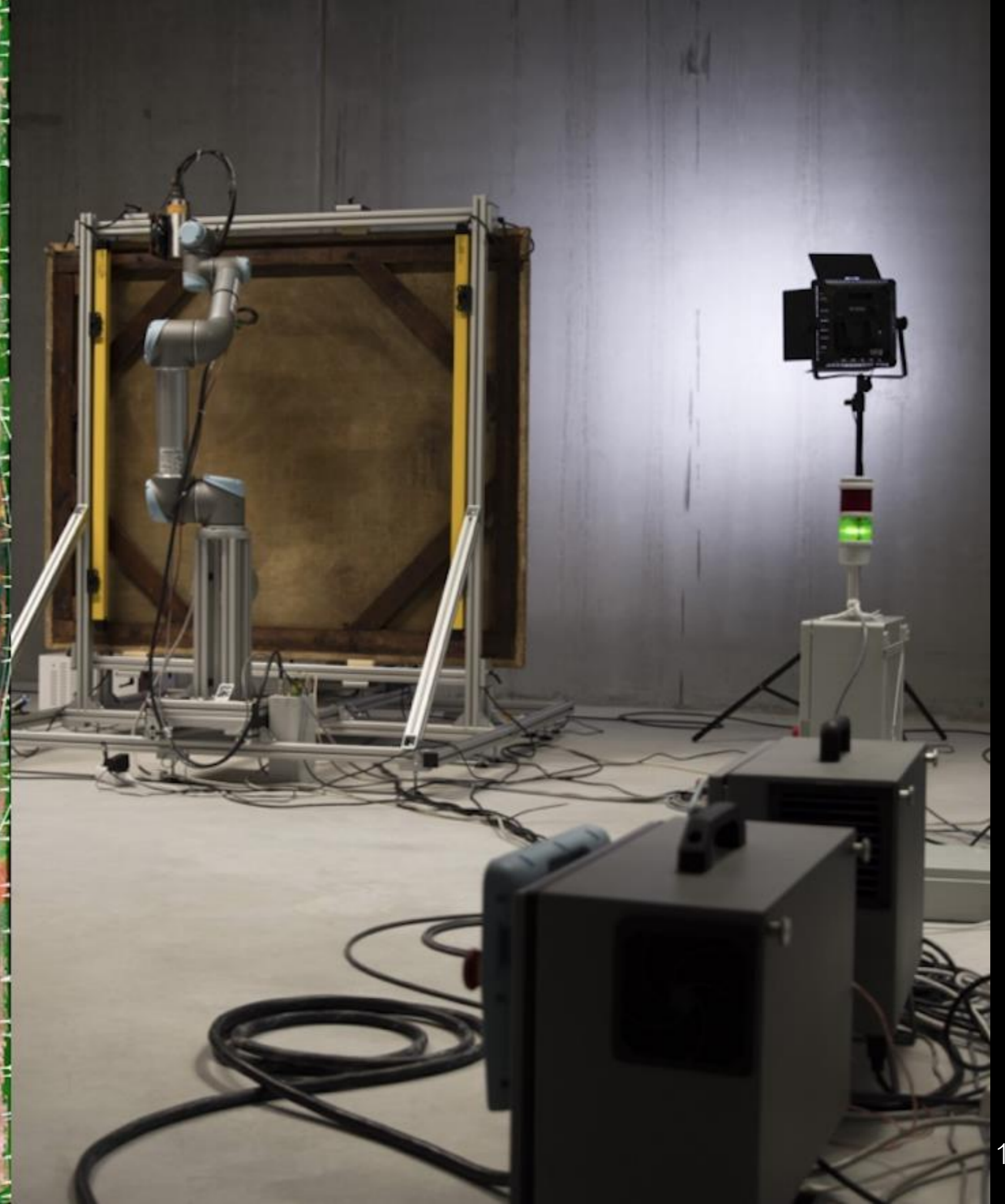
Knowledge Transfer
Accelerating Innovation



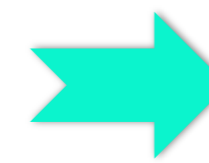


InsightArt

Start-up using Medipix
X-ray eyes for cultural heritage



From the PIMMS Study @



EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
CERN - PS DIVISION

CERN/PS 2000-007 (DR)

PROTON-ION MEDICAL MACHINE STUDY (PIMMS) PART II

Accelerator Complex Study Group*
supported by the Med-AUSTRON, Onkologie-2000 and the TERA Foundation
and hosted by CERN

ABSTRACT

The Proton-Ion Medical Machine Study (PIMMS) group was formed following an agreement between the Med-AUSTRON (Austria) and the TERA Foundation (Italy) to combine their efforts in the design of a cancer therapy synchrotron capable of accelerating either light ions or protons. CERN agreed to support and host this study in its PS Division. A close collaboration was also set up with GSI (Germany). The study group was later joined by Onkologie-2000 (Czech Republic). Effort was first focused on the theoretical understanding of slow extraction and the techniques required to produce a smooth beam spill for the conformal treatment of complex-shaped tumours with a sub-millimetre accuracy by active scanning with proton and carbon ion beams. Considerations for passive beam spreading were also included for protons. The study has been written in two parts. The more general and theoretical aspects are recorded in Part I and the specific technical design considerations are presented in the present volume, Part II. An accompanying CD-ROM contains supporting publications made by the team and data files for calculations. The PIMMS team started its work in January 1996 in the PS Division and continued for a period of four years.

*Full-time members: L. Badano¹⁾, M. Benedikt²⁾, P.J. Bryant²⁾ (Study Leader), M. Crescenti¹⁾, P. Holy³⁾, A. Maier²⁾⁺⁴⁾, M. Pullia¹⁾, S. Reimoser²⁾⁺⁴⁾, S. Rossi¹⁾,
Part-time members: G. Borri¹⁾, P. Knaus¹⁾⁺²⁾
Contributors: F. Gramatica¹⁾, M. Pavlovic⁴⁾, L. Weisser⁵⁾
1) TERA Foundation, via Puccini, 11, I-28100 Novara.
2) CERN, CH 1211 Geneva-23.
3) Oncology-2000 Foundation, Na Morani 4, CZ-12808 Prague 2.
4) Med-AUSTRON, c/o RIZ, Prof. Dr. Stephan Korenstr.10, A-2700 Wr. Neustadt.
5) Sommer & Partner Architects Berlin (SPB), Hardenbergplatz 2, D-10623 Berlin.

Geneva, Switzerland
May 2000

PIMMS

August 2000



Mandela Cirilli
CERN Courier webinar 25 February 2021

ebg MedAustron

Make

hadron therapy machines smaller

Photo: CERN



Movable Accelerator for
Cultural Heritage In-situ
Non-destructive Analysis

Construction of a
compact, transportable
accelerator

based on the HF-RFQ
developed at CERN

In collaboration with
INFN-CHNet (Cultural
Heritage Network)




Photo: INFN

Digital Preservation

TIND:

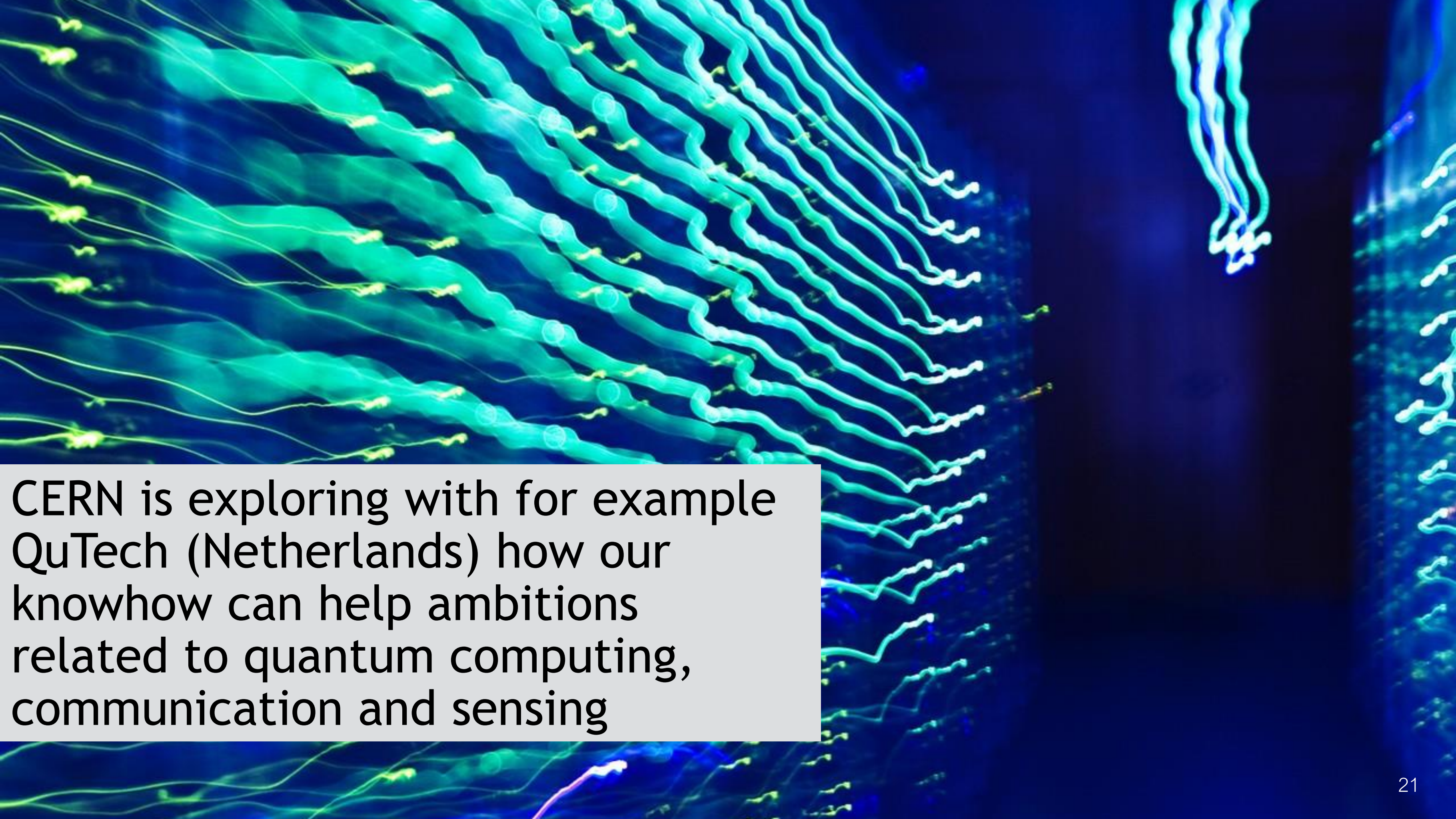
a CERN spin-off providing solutions for library management and data preservation based on the CERN open source software Invenio

The background of the slide is a complex digital network. It features a dark blue background with numerous glowing white and light blue nodes connected by thin, white lines. Some nodes are larger and more prominent, while others are smaller and more distant. Several human icons, represented by simple white figures, are placed within circular frames that are connected to the network. The overall aesthetic is high-tech and futuristic, suggesting themes of data, connectivity, and digital identity.

Bundesdruckerei (BDR; state-owned company in Germany) works with CERN on next generation ideas for identity management (passports) and cryptography to protect data

ZENSEACT (Volvo Cars Company Sweden) teams up with CERN on ultra fast and efficient machine learning using FPGAs



The background of the slide is an abstract visualization consisting of numerous glowing, wavy lines in shades of cyan, teal, and light blue. These lines are set against a dark blue background and appear to flow from the left side towards the right, creating a sense of movement and depth. Some lines are thicker and more prominent, while others are thinner and more delicate. The overall effect is reminiscent of a complex network or a visualization of particle paths in a high-energy physics experiment.

CERN is exploring with for example QuTech (Netherlands) how our knowhow can help ambitions related to quantum computing, communication and sensing

Funding Opportunities for CERN Projects

CERN Knowledge Transfer Fund
CERN Medical Applications Budget

Collaborations and Networks

Knowledge transfer networks
Strengthening links with Member States (KT Forum)
Relations with International Organisations
Knowledge transfer in EC co-funded projects

Open Source

Open Source Software
Open Hardware Licence

Entrepreneurship

Start-ups & Spin-offs
Entrepreneurship Meet-Ups
Business Incubation Centres
Entrepreneurship Programmes

Support for CERN Personnel

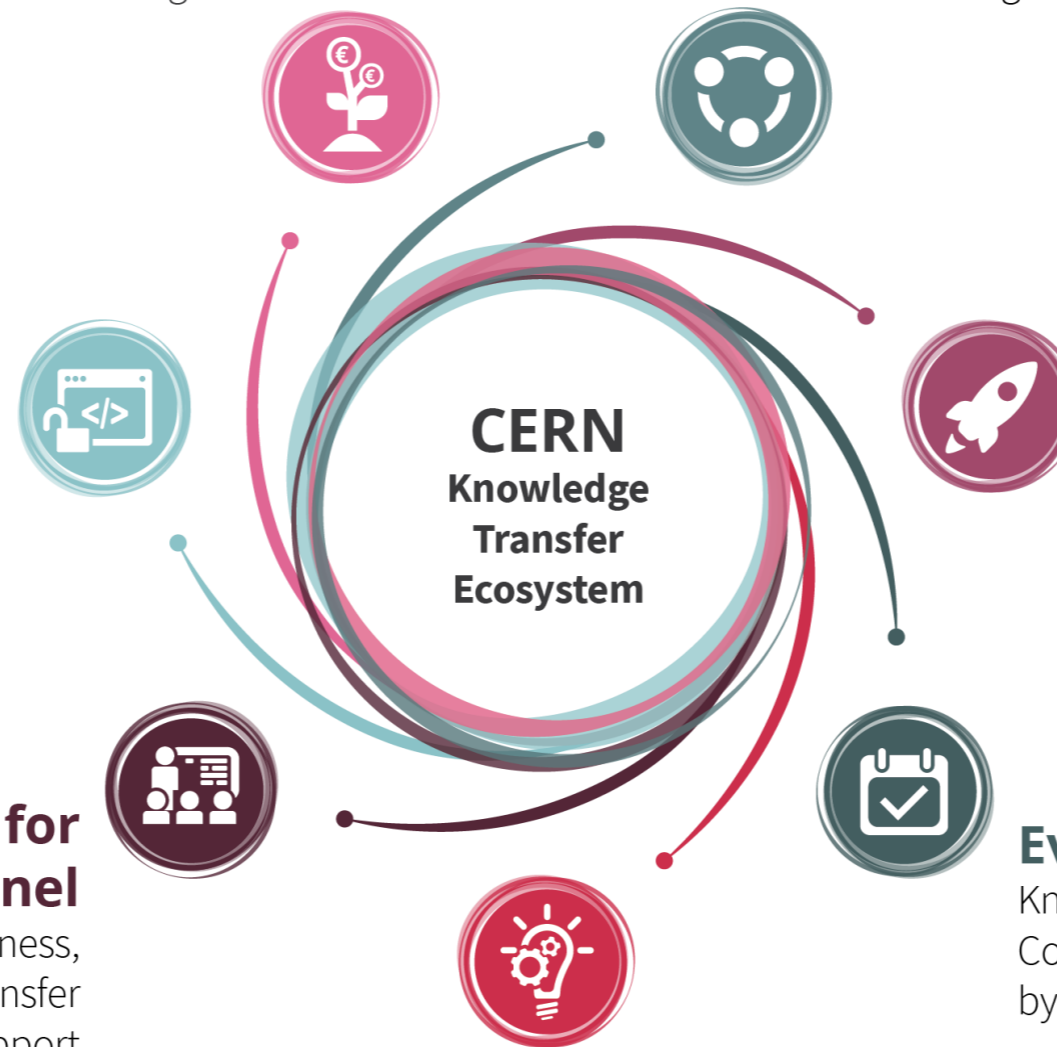
Formal and practical training in business, entrepreneurship & knowledge transfer
Legal, business & intellectual property support

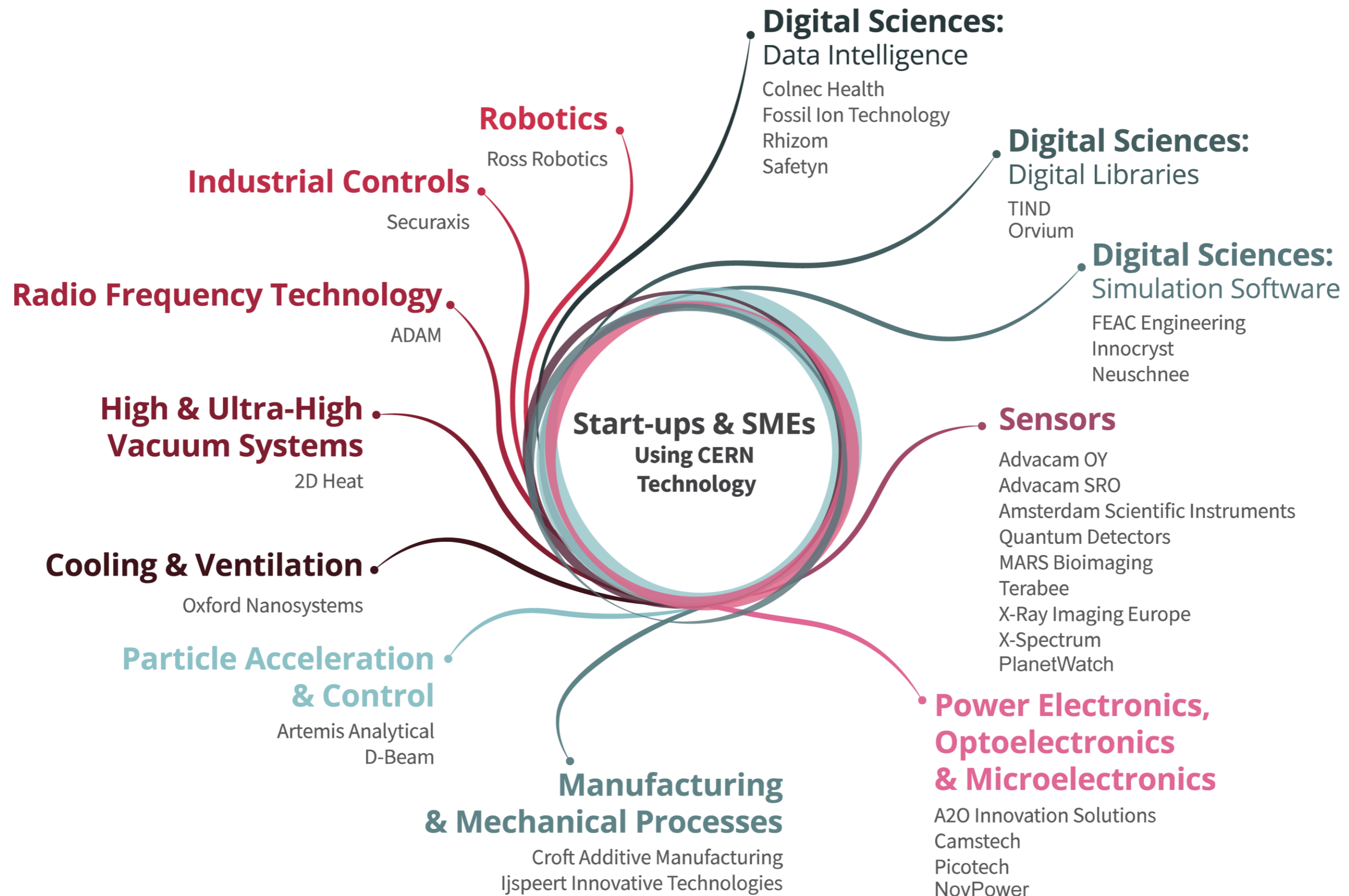
Events

Knowledge Transfer Seminars
Conferences with a significant contribution by the Knowledge Transfer group

Intellectual Property Management

R&D collaborations
Patent portfolio
Licence, service & consultancy agreements





Entrepreneurship

Meet-Ups



Entrepreneurship Programmes

The background consists of several overlapping, crumpled pieces of brightly colored paper in shades of yellow, green, orange, blue, purple, and pink. Each piece of paper has a large, hand-drawn black question mark on it. The papers are layered, with some appearing more prominent than others.

Want to know more?

Visit <http://kt.cern>

Sign-up to our newsletter
<http://kt.cern/newsletter>

Contact us at kt@cern.ch

giovanni.anelli@cern.ch