

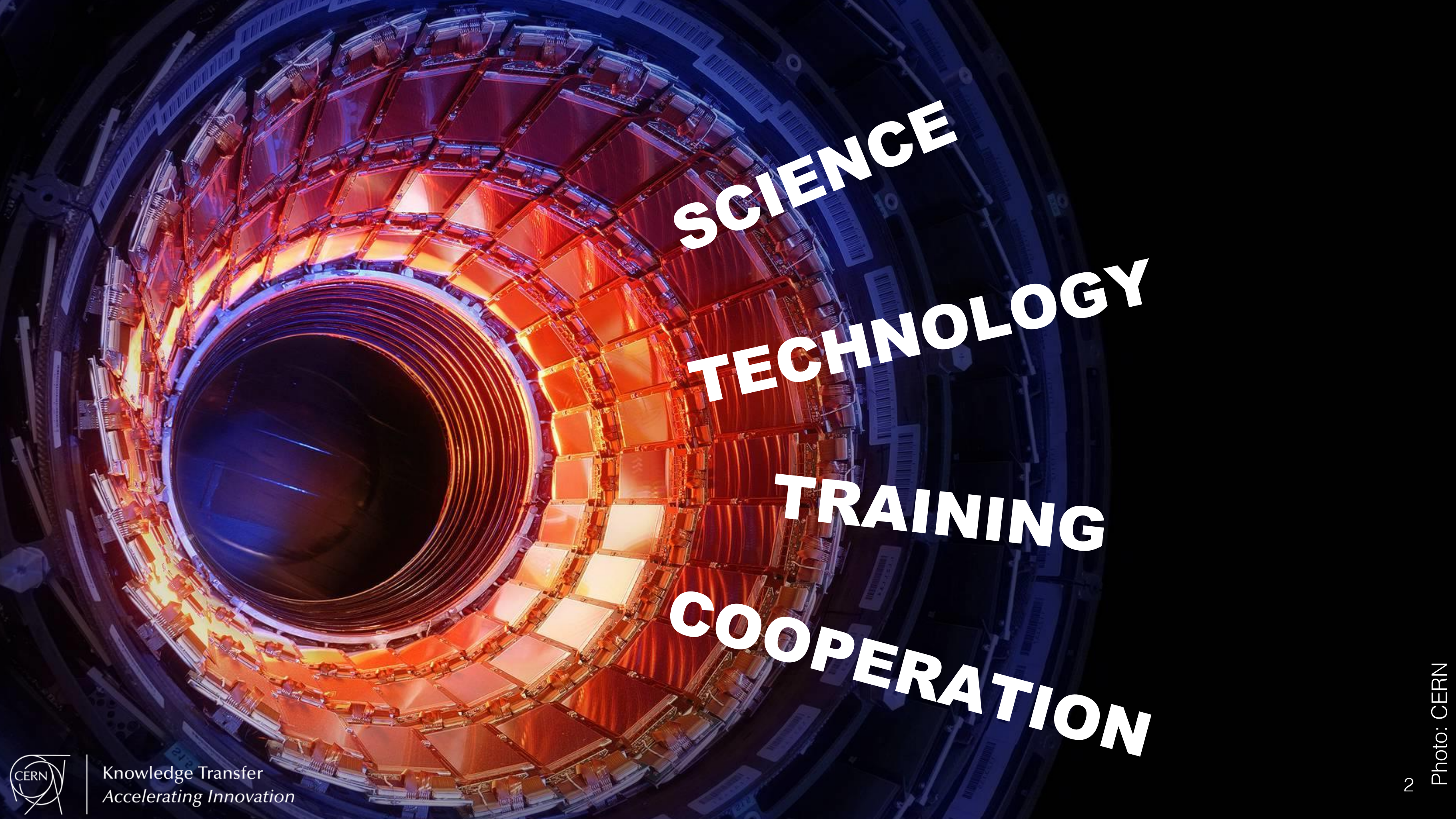
# Trasferimento di conoscenze: dal CERN alla Società

**Giovanni Anelli**

Knowledge Transfer Group Leader  
CERN



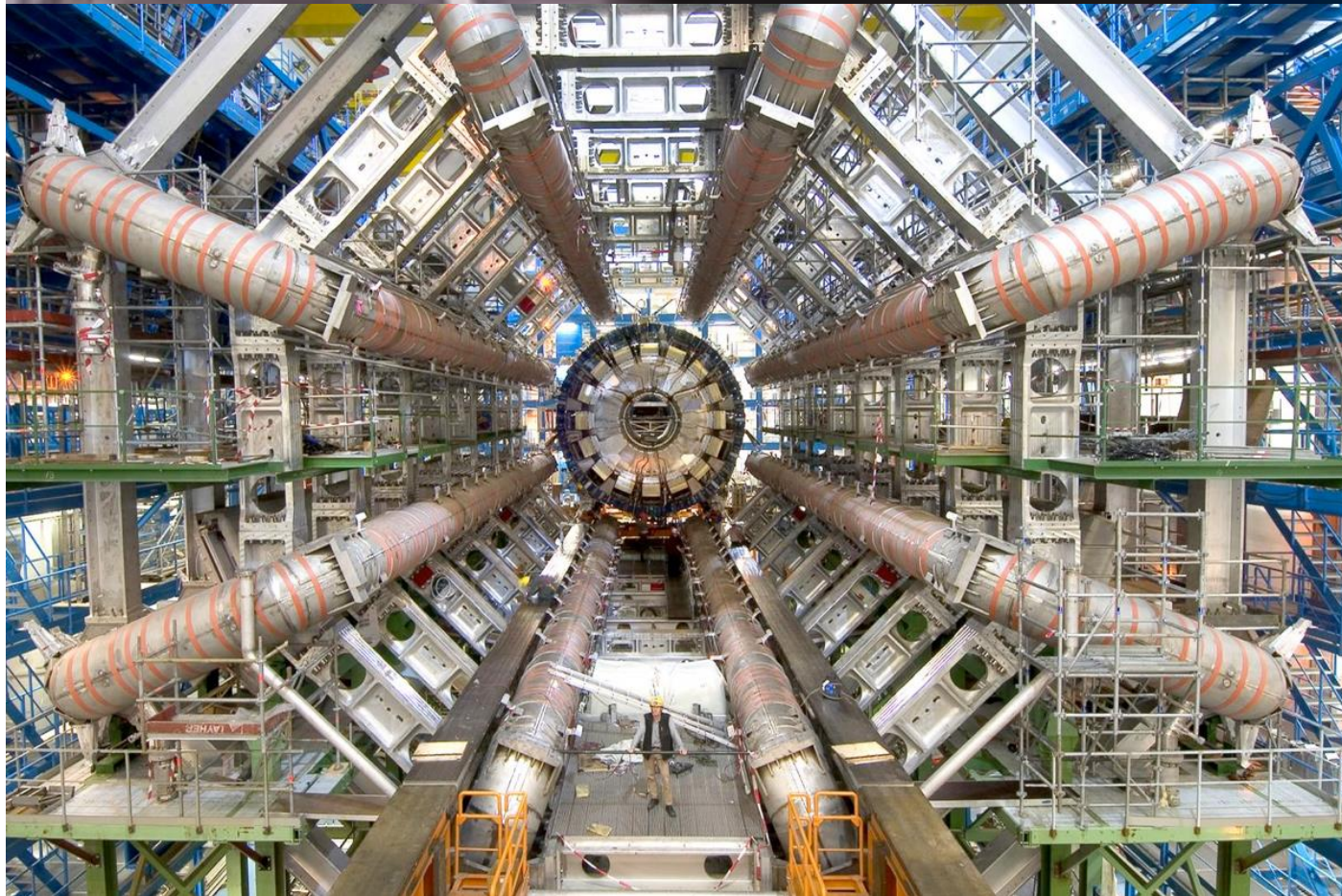




**SCIENCE**  
**TECHNOLOGY**  
**TRAINING**  
**COOPERATION**



# The HEP toolbox



Manuela Cirilli  
CERN Courier webinar 25 February 2021





# This is what we call knowledge transfer

CERN's unique:  
Technologies  
Know-how  
Infrastructures

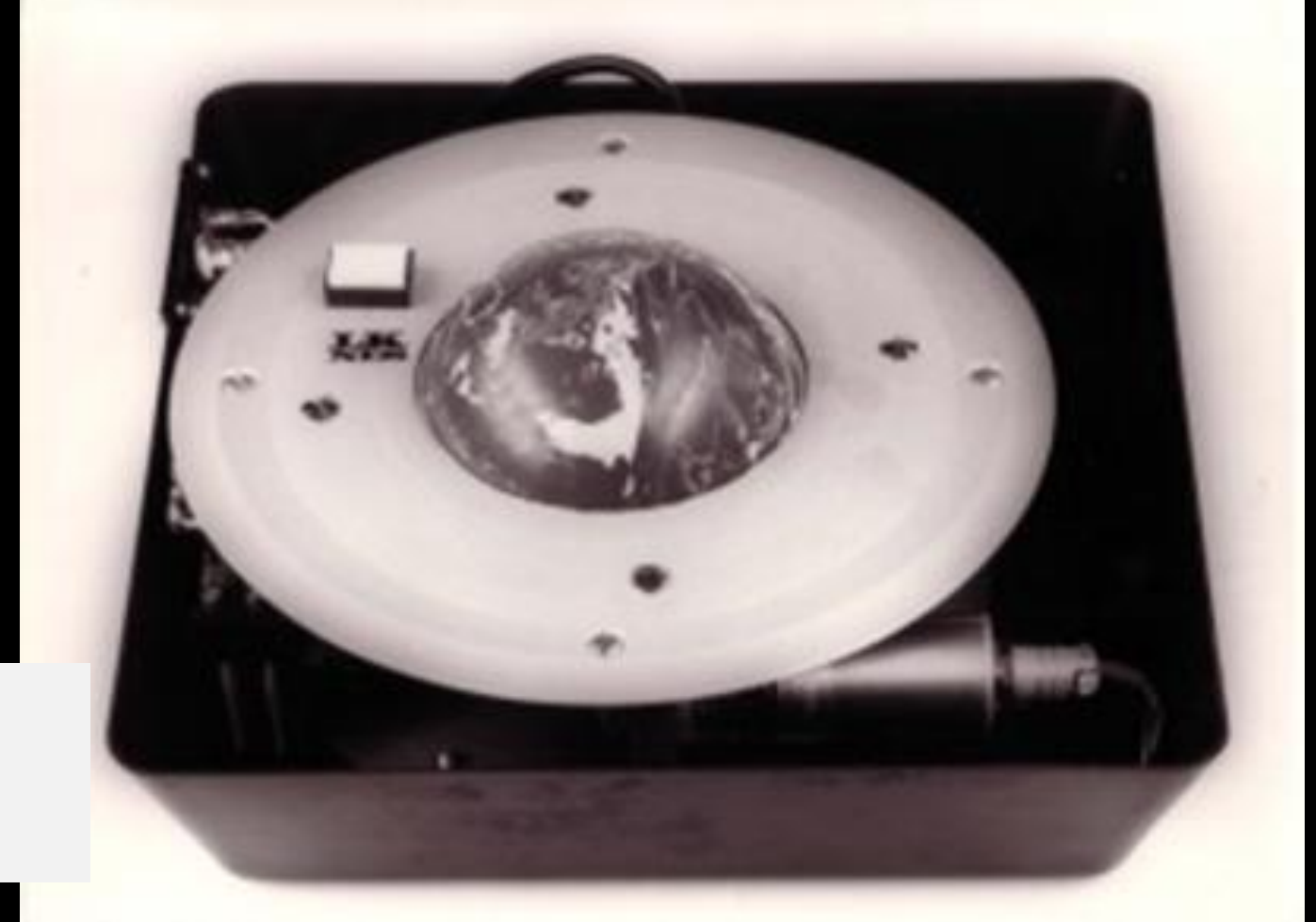




# How do we **MAXIMISE IMPACT?**



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)



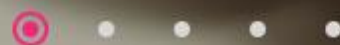
# CERN's Knowledge Transfer Group



Knowledge Transfer  
*Accelerating Innovation*

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

Accelerating your innovation



<http://kt.cern>



Knowledge Transfer  
*Accelerating Innovation*



# 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

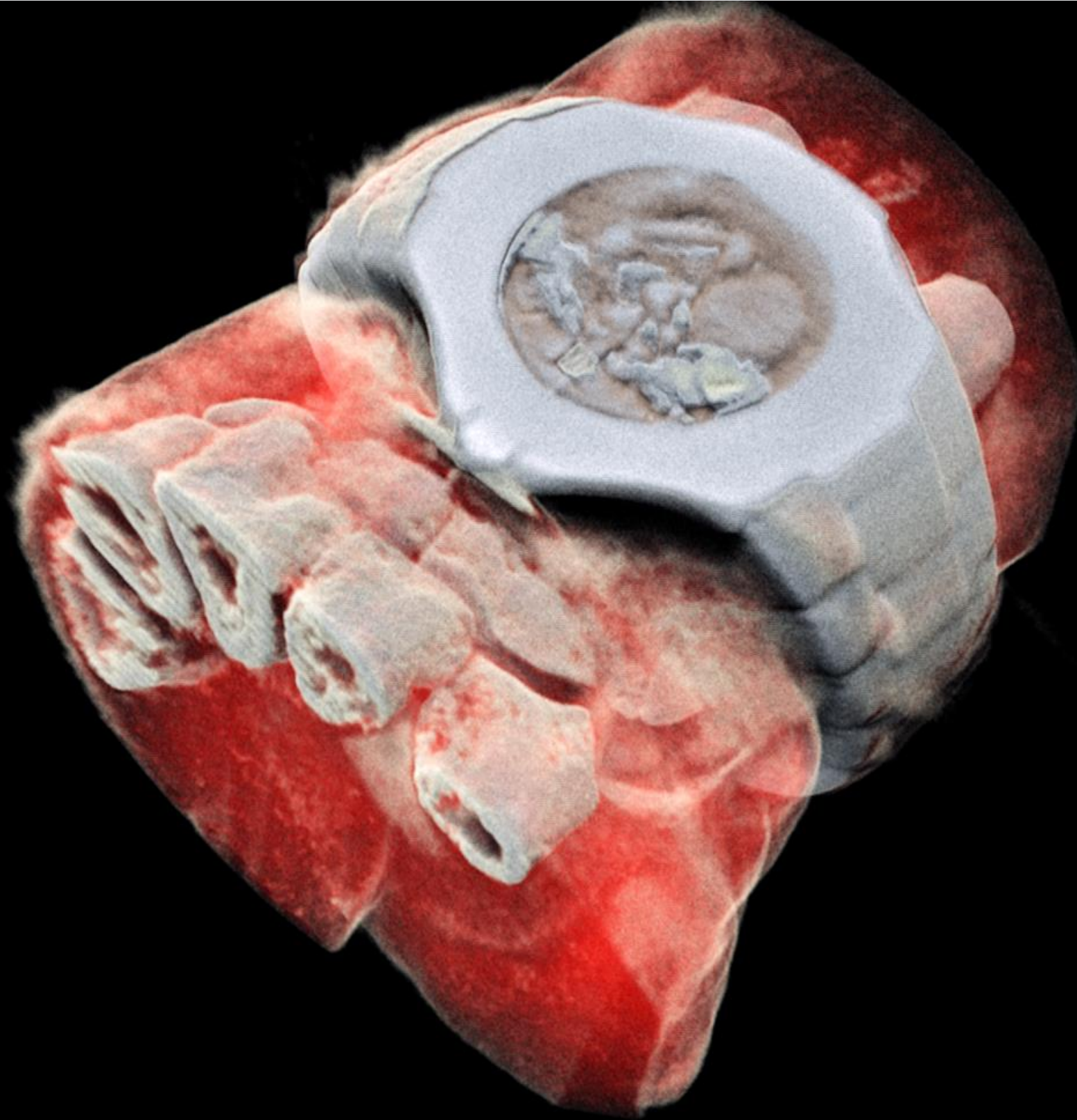
Collaboration Tools    Radio Frequency Technology

Manufacturing and Mechanical Processes



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

July 2018





# Timepix on the ISS

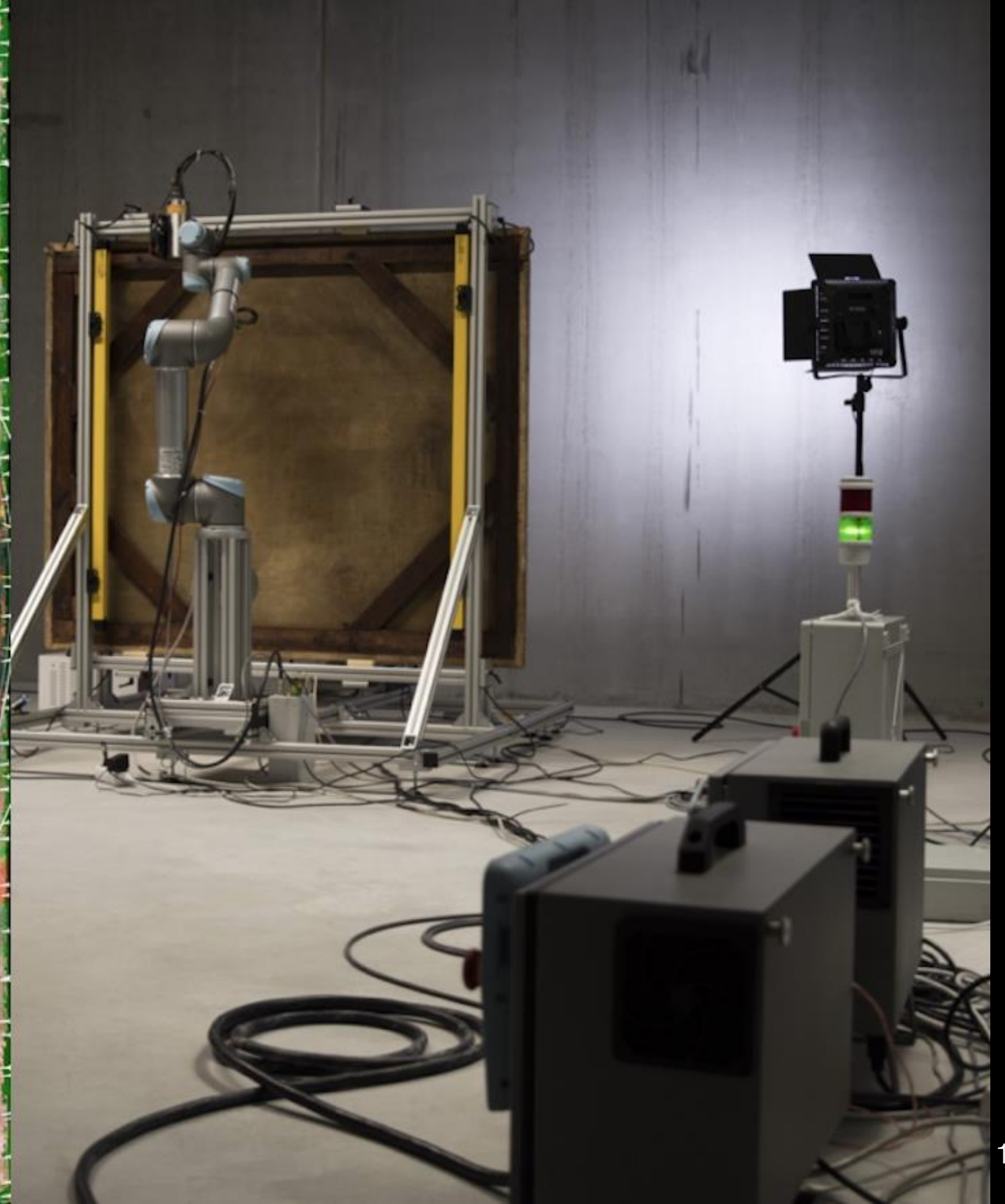






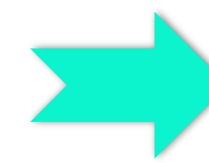
InsightArt

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. Badano<sup>1)</sup>, M. Benedikt<sup>2)</sup>, P.J. Bryant<sup>2)</sup> (Study Leader), M. Crescenti<sup>1)</sup>, P. Holy<sup>3)</sup>, A. Maier<sup>2)+4)</sup>, M. Pullia<sup>1)</sup>, S. Reimoser<sup>2)+4)</sup>, S. Rossi<sup>1)</sup>,  
Part-time members: G. Borri<sup>1)</sup>, P. Knaus<sup>1)+2)</sup>  
Contributors: F. Gramatica<sup>1)</sup>, M. Pavlovic<sup>4)</sup>, L. Weisser<sup>5)</sup>  
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



fondazione CNAO



Manuela Cirilli  
CERN Courier webinar 25 February 2021

ebg MedAustron





Collaborative R&D

MedAustron and CNAO offer  
hadron therapy using CERN  
technology.



# 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





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





A complex industrial system featuring numerous large, polished stainless steel pipes and elbows. Several blue electric pumps are connected to the network. The system is equipped with various valves, gauges, and sensors. Some components are labeled with numbers like 201, 202, 203, 204, and 205. Green and white striped tape is used for flow direction indicators. The background shows orange electrical cabinets and a wall covered in silver insulation.

Collaborative R&D

CERN and ABB team up on  
reducing electricity in cooling  
and ventilation.





Collaborative R&D

Collaboration with CORMEC and WUR to support national banks and regulators to detect trading anomalies in stock market.



# 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

# Entrepreneurship

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

# Events

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

# Intellectual Property Management

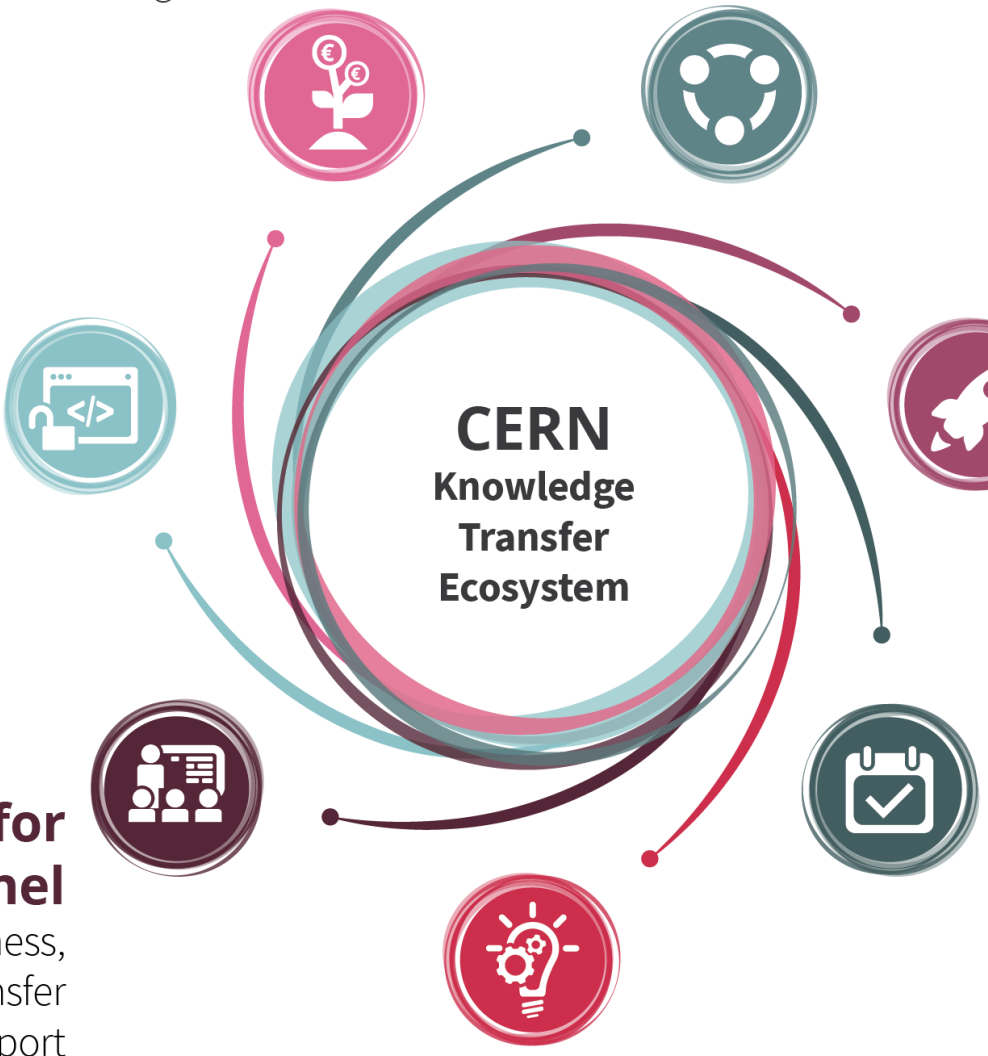
R&D collaborations  
Patent portfolio  
Licence, service & consultancy agreements

# Open Source

Open Source Software  
Open Hardware Licence

# Support for CERN Personnel

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





The background of the slide is a collage of various colored paper scraps, including yellow, green, orange, blue, purple, and pink. Each scrap features a large, hand-drawn black question mark, creating a visual theme of inquiry and questions.

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<http://kt.cern/newsletter>

Contact us at [kt@cern.ch](mailto:kt@cern.ch)

[giovanni.anelli@cern.ch](mailto:giovanni.anelli@cern.ch)