

Accelerating Medical Innovation

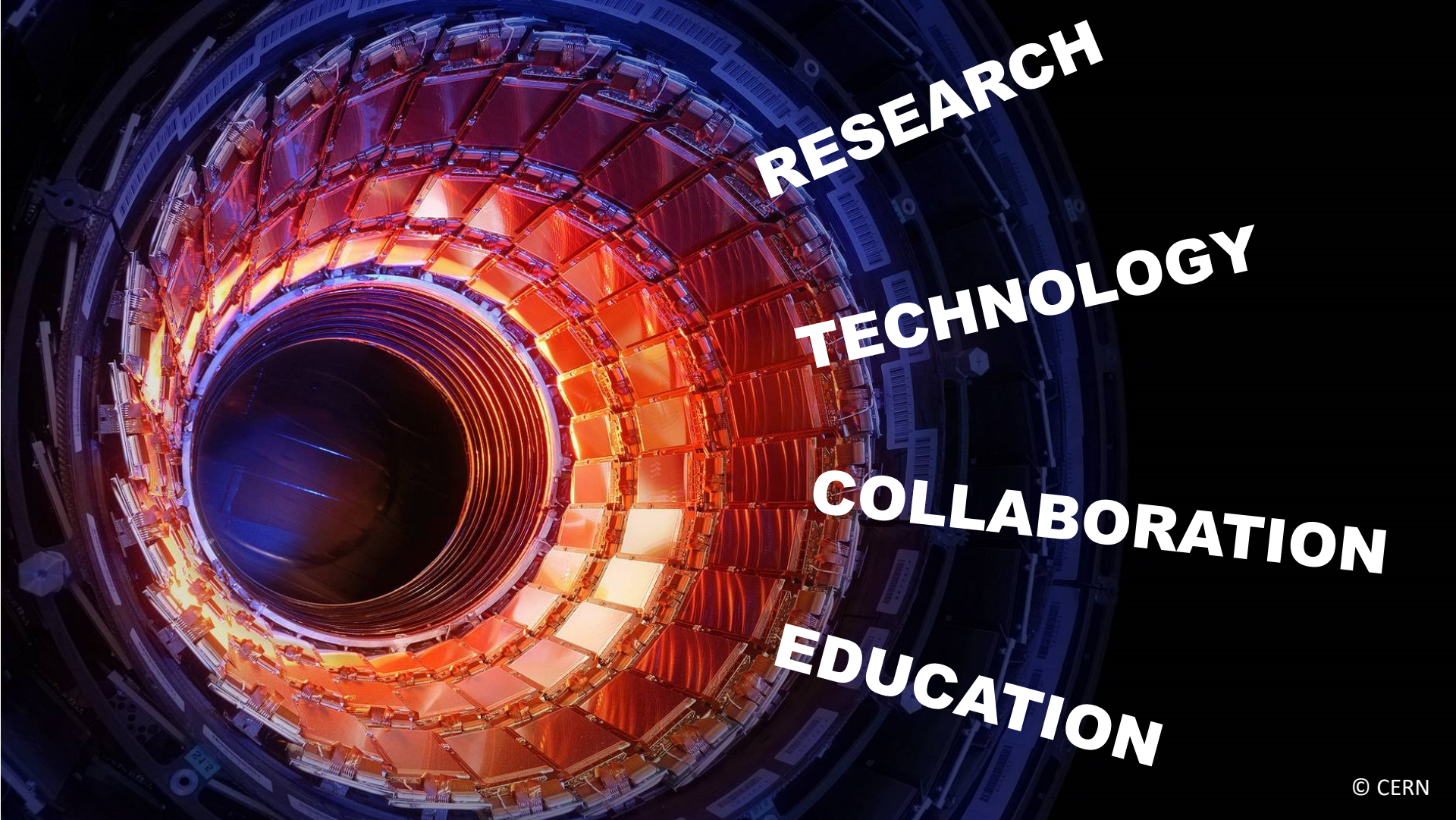
Swedish Teacher Programme

01 November 2018





The Large Hadron Collider (LHC)



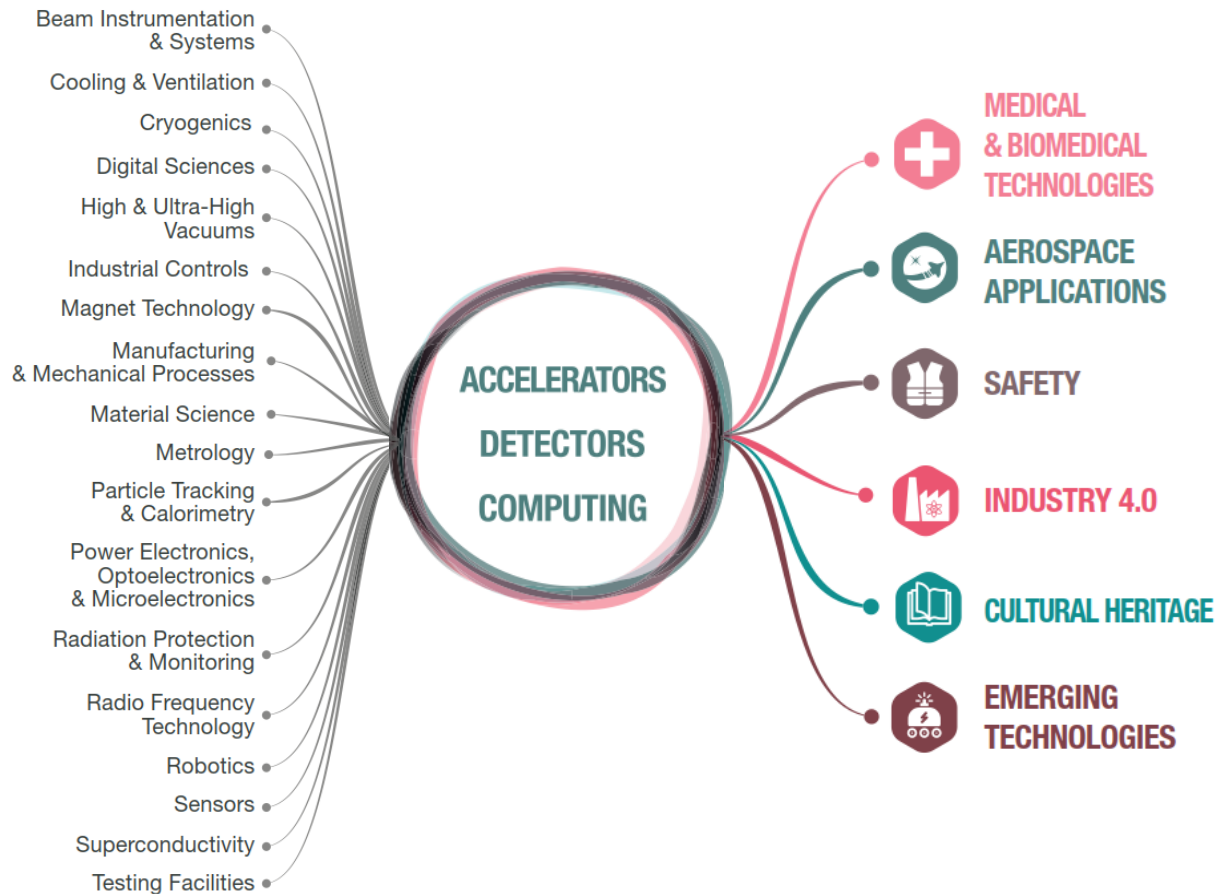
RESEARCH

TECHNOLOGY

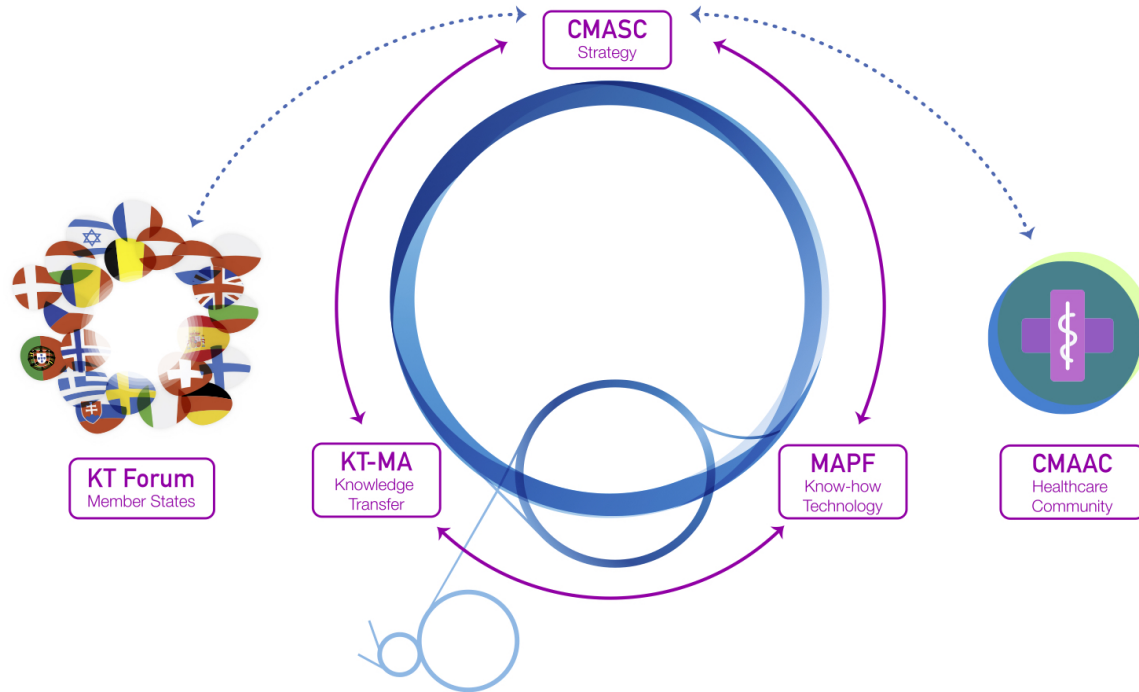
COLLABORATION

EDUCATION

The **mission** of CERN's Knowledge Transfer Group is to maximise the **dissemination** and **impact** of CERN technology and know-how in **society**, in particular through **industry** in the member states.



Strategy and Framework Applicable to Knowledge Transfer by CERN for the Benefit of Medical Applications



KT-MA = CERN Knowledge Transfer Group, Medical Applications Section
MAPF = Medical Applications Project Forum
CMASC = CERN Medical Applications Steering Committee
CMAAC = CERN Medical Applications Advisory Committee

Medical & Biomedical Technologies

MEDICAL & BIOMEDICAL PHYSICS RESEARCH

Medical researchers, clinicians & patients rely on novel particle **detectors** for radiation

Radiobiology studies and innovative radioisotope production can be performed in special **accelerator** facilities

Computing & big data challenges in particle physics can provide solutions for biomedical research

BIOMEDICAL TECHNOLOGIES

Tools and techniques for particle physics find applications in **biomedical technologies**

IMAGING & DIAGNOSIS

Medical **imaging** relies on particle **detectors**, some directly resulting from fundamental research

The analysis of medical images requires sophisticated **computing** tools

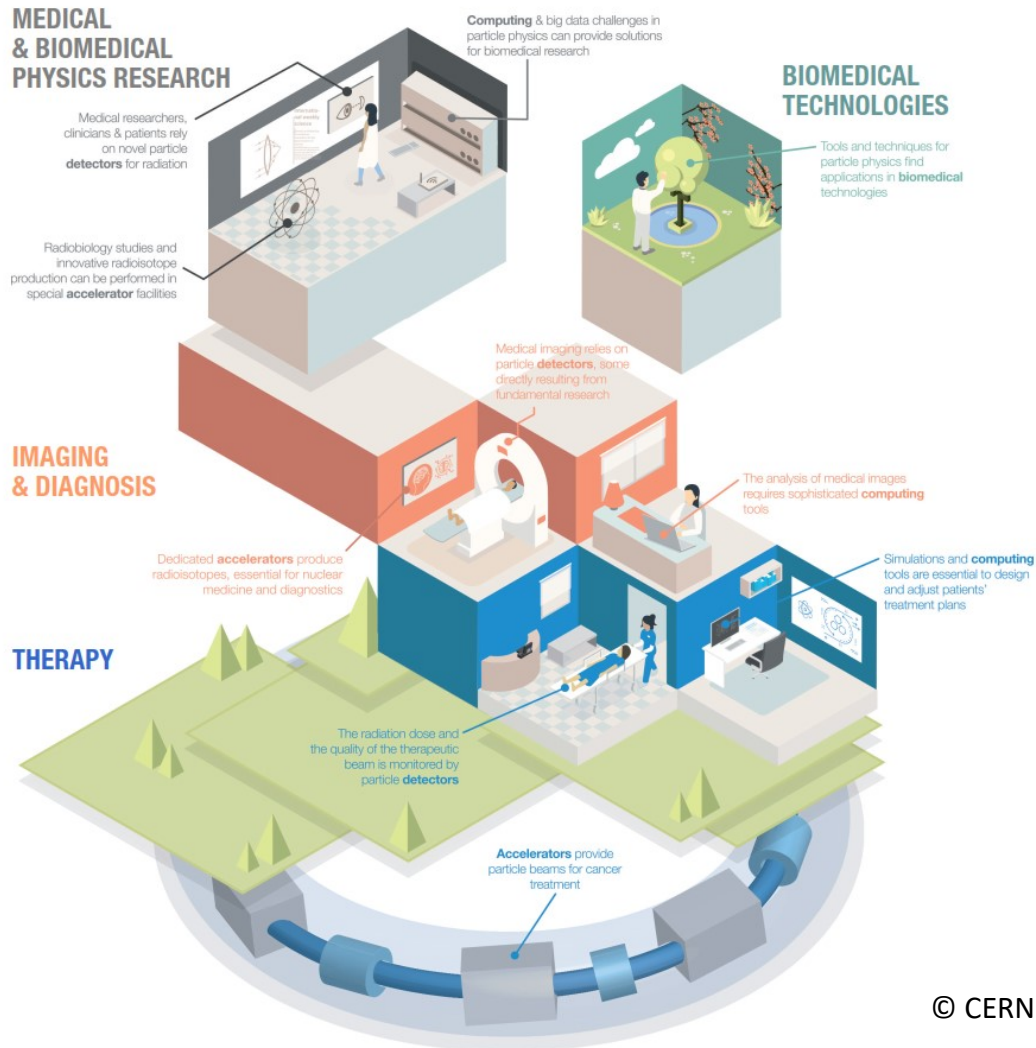
Dedicated **accelerators** produce radioisotopes, essential for nuclear medicine and diagnostics

Simulations and **computing** tools are essential to design and adjust patients' treatment plans

THERAPY

The radiation dose and the quality of the therapeutic beam is monitored by particle **detectors**

Accelerators provide particle beams for cancer treatment





PIMMS to MedAustron and CNAO

Particle accelerators for Hadron Therapy

Classification of isotopes for Medicine:

1. Established isotopes

^{99m}Tc , ^{18}F , $^{123,125,131}\text{I}$, ^{111}In , ^{90}Y

> Industrial suppliers

2. Emerging isotopes

^{68}Ga , ^{82}Rb , ^{89}Zr , ^{177}Lu , ^{188}Re

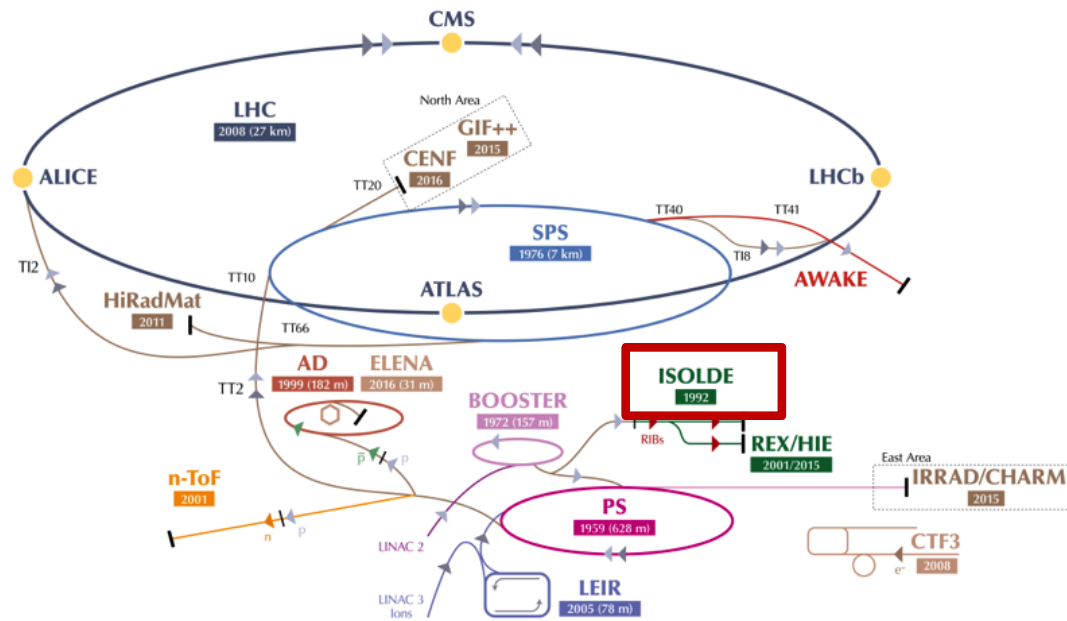
> Small innovative suppliers

3. R&D isotopes

$^{44,47}\text{Sc}$, $^{64,67}\text{Cu}$, ^{134}Ce , ^{140}Nd , 149 , 152 , 155 , ^{161}Tb , ^{110}Ag

^{211}At , 212 , ^{213}Bi , ^{223}Ra , ^{225}Ac ,...

> Research labs



MEDICIS

Radio-isotope production at CERN

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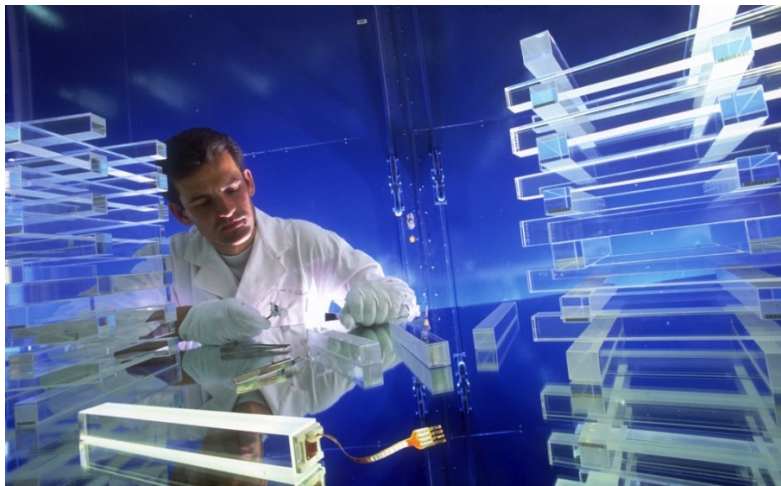
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MEDICIS

Radio-isotope production at CERN





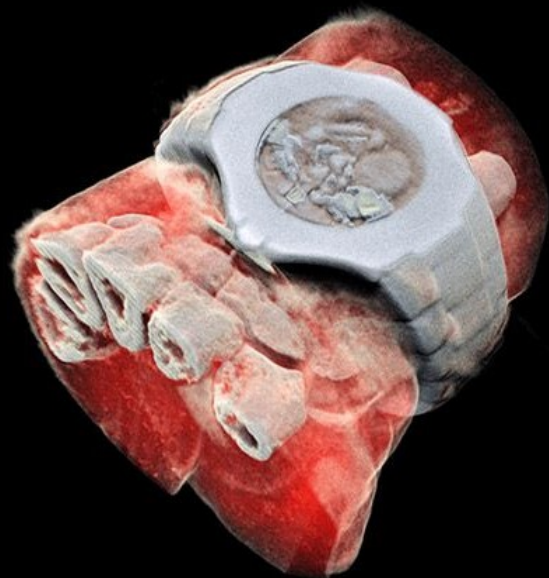
Crystal Clear Collaboration

From calorimetry to PET



Medipix

Medical imaging, space dosimetry, education, and material analysis



Colour CT X-ray based on Medipix3

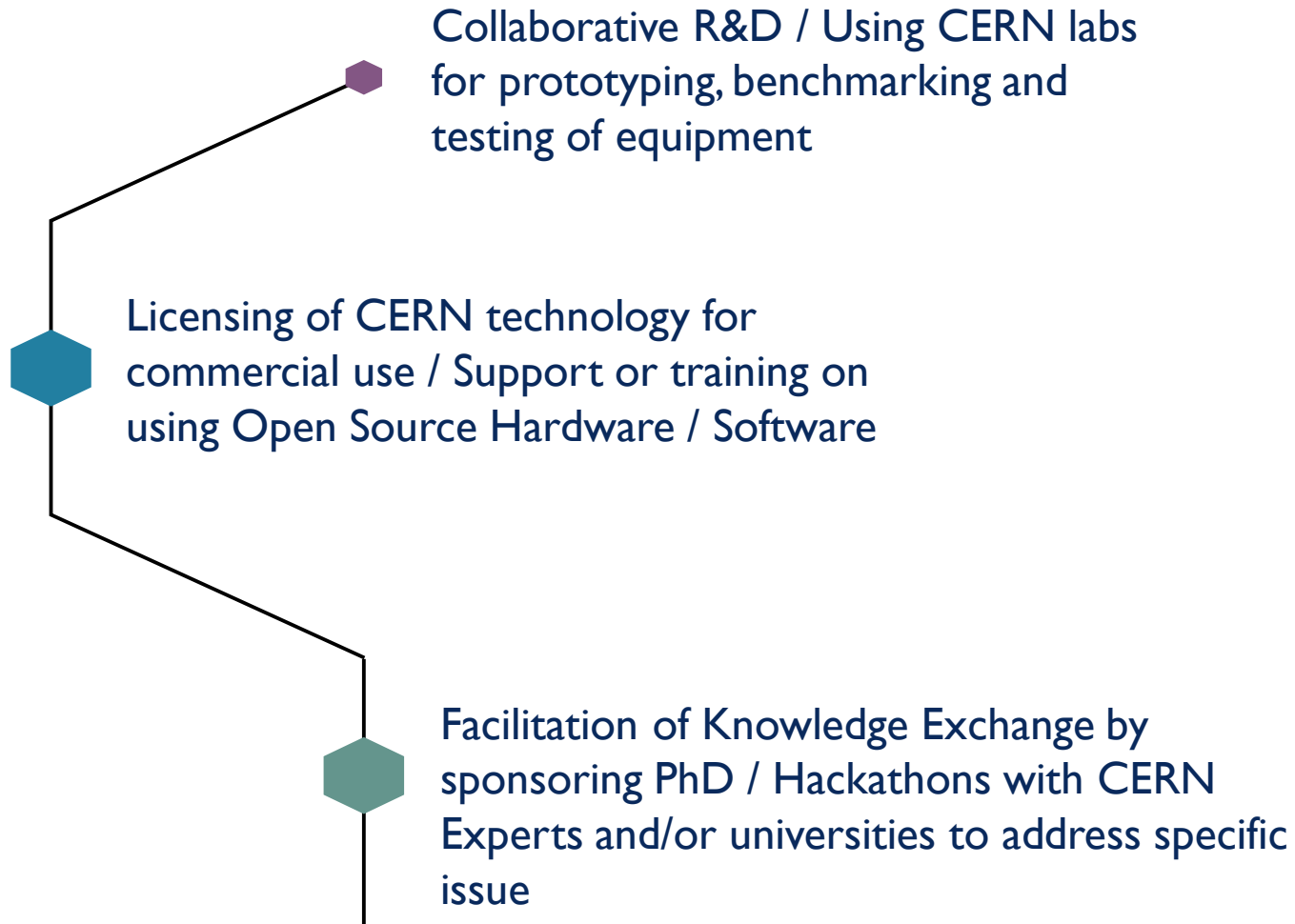
Cultural Heritage

InsightART

start-up with Medipix
X-ray eyes for cultural heritage



Paths to Collaboration with Industry

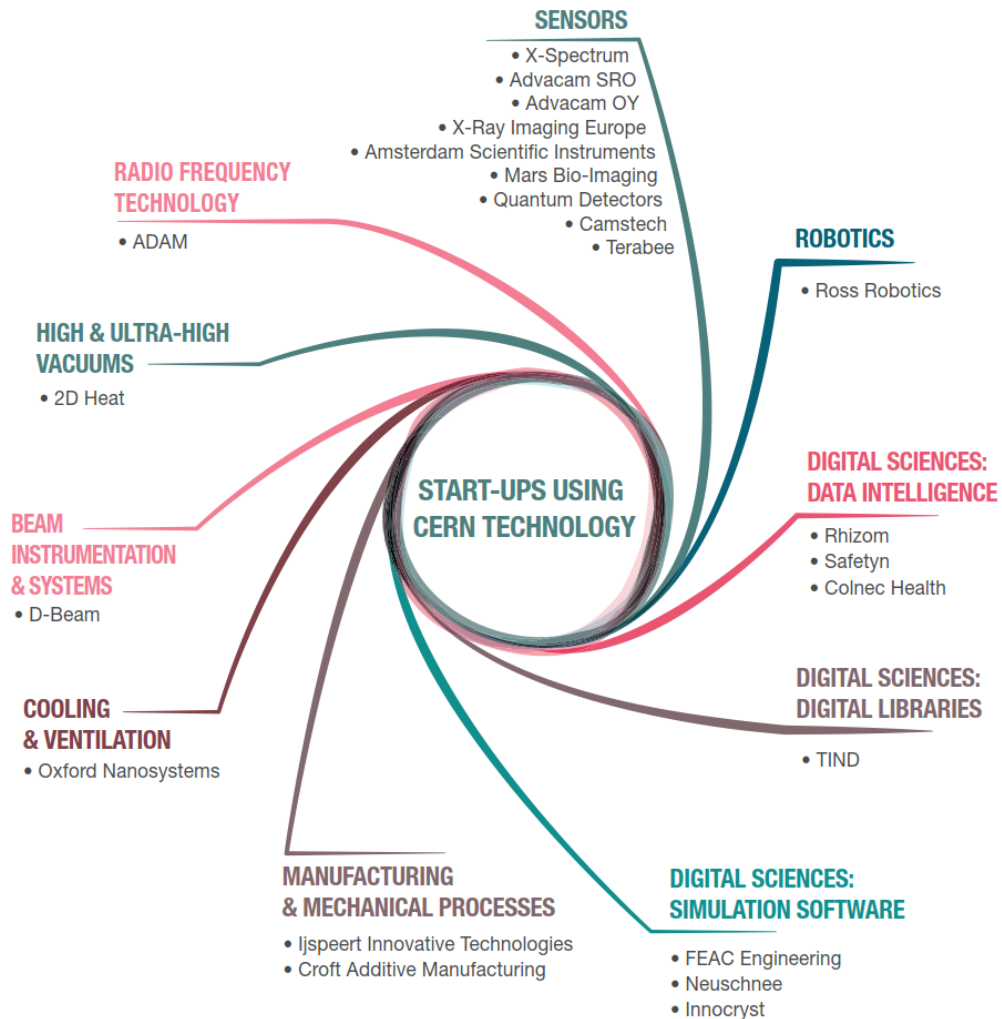




Building a culture of entrepreneurship



Ten Established Business Incubation Centres in the Member States





more information: kt.cern