Accelerating Innovation

Knowledge Transfer: from CERN to Society

Dr Ana Rita Pinho
Knowledge Transfer Officer, Business Development & Entrepreneurship, CERN

Education & Work Experience

Bioengineering Biomedical engineering
Univ. Porto
Faculty of Engineering

Undergrad Student
Brno University of Technology
Faculty of Electrical Engineering

- *Bachelor Thesis:* "Measurement of cell viability by image processing"

Master Student & Research Assistant
University of Twente, MIRA

- *Master thesis*: "The effect of 3D nanotopographical guidance cues on axonal outgrowth"
- Hybrid Polyester-Hydrogel Electrospun Scaffold for Tissue Engineering Applications

PhD Tissue Engineering
UCL, Inst. Ophthalmology

- *PhD thesis:* "Development of therapeutic applications for corneal stromal stem cells"
- PARSUK – Non-profit Board Member

2005 2010 2015 2020 2025

Policy Officer Scientific Advice Mechanism
RTD, European Commission

- Research & Innovation Policy
- Stakeholder Engagement
- Monitoring compliance (e.g. GDPR, EU Tissue Directive)

Research Manager Materials & Manufacturing
Institute of Making, UCL

- Finding new applications for different technologies
- Manage & promote interdisciplinary projects with industry, policy and social partners
- Facilitate new proposals & commercial contracts

Co-founder & Network Manager

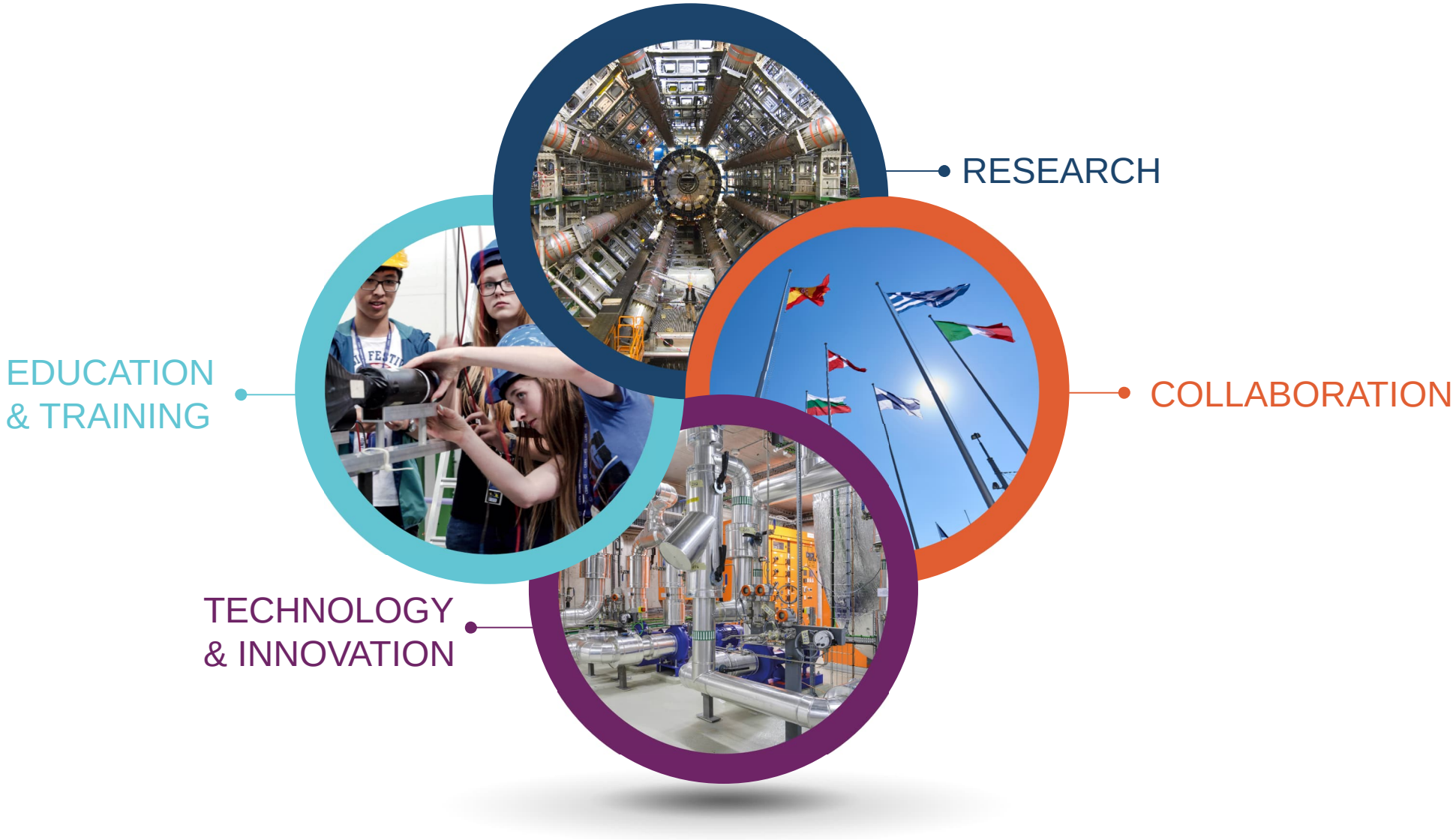
Policy Adviser
STEaPP Dep., UCL

- Work alongside researchers to maximize the impact of research on society
- Horizon scanning and matchmaking of research in engineering with needs of external stakeholders: industry, policy & 3rd sector

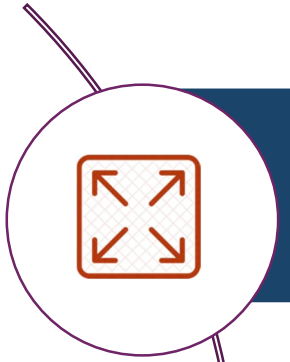
Senior Fellow, now Staff Medical Applications Officer, now KTO
CERN IPT-KT

- MA Budget Manager
- MAPF Scientific Secretary
- KTO: MA projects + Medipix Collaboration, now I oversee tech transfer in microelectronics & detectors

Four pillars underpin CERN's mission



KT’s Mission

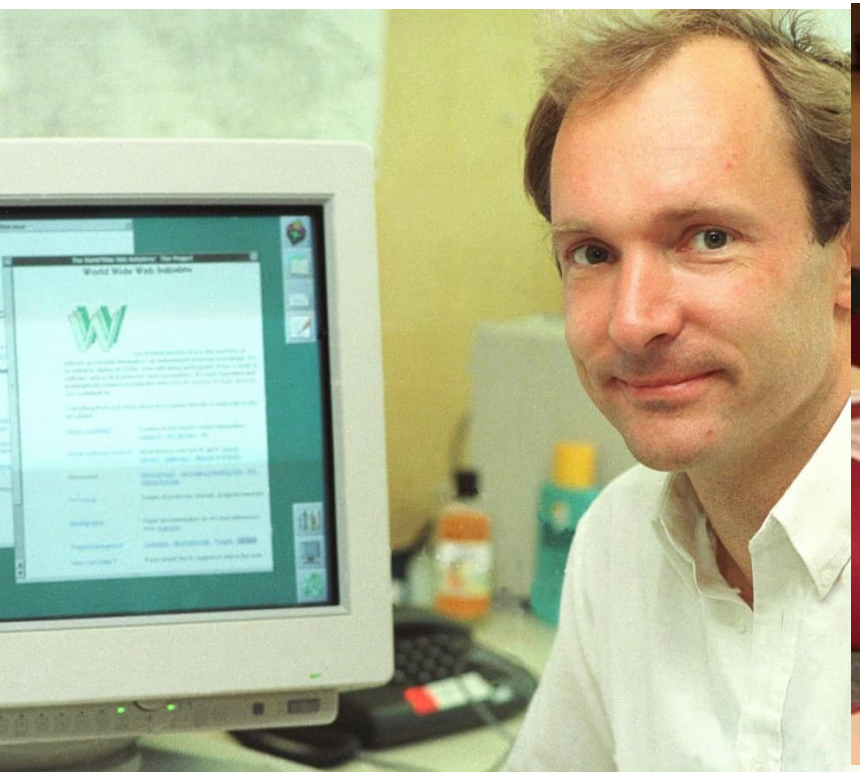


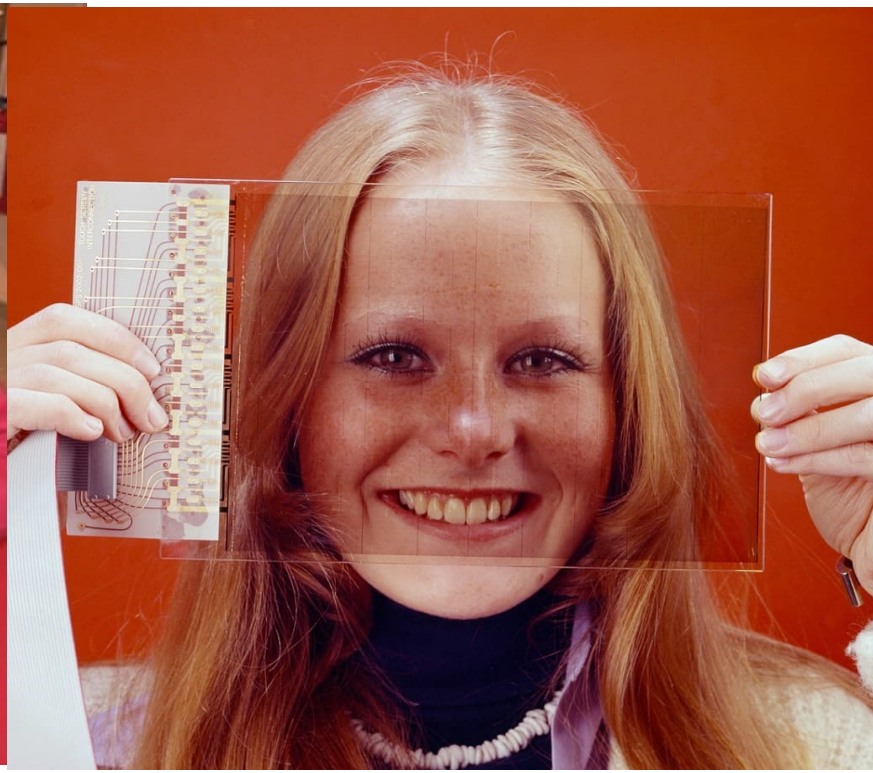
Maximise the technological and knowledge return to society, in particular through (Associate) Member States industry

Promote CERN as a centre of excellence for technology and innovation

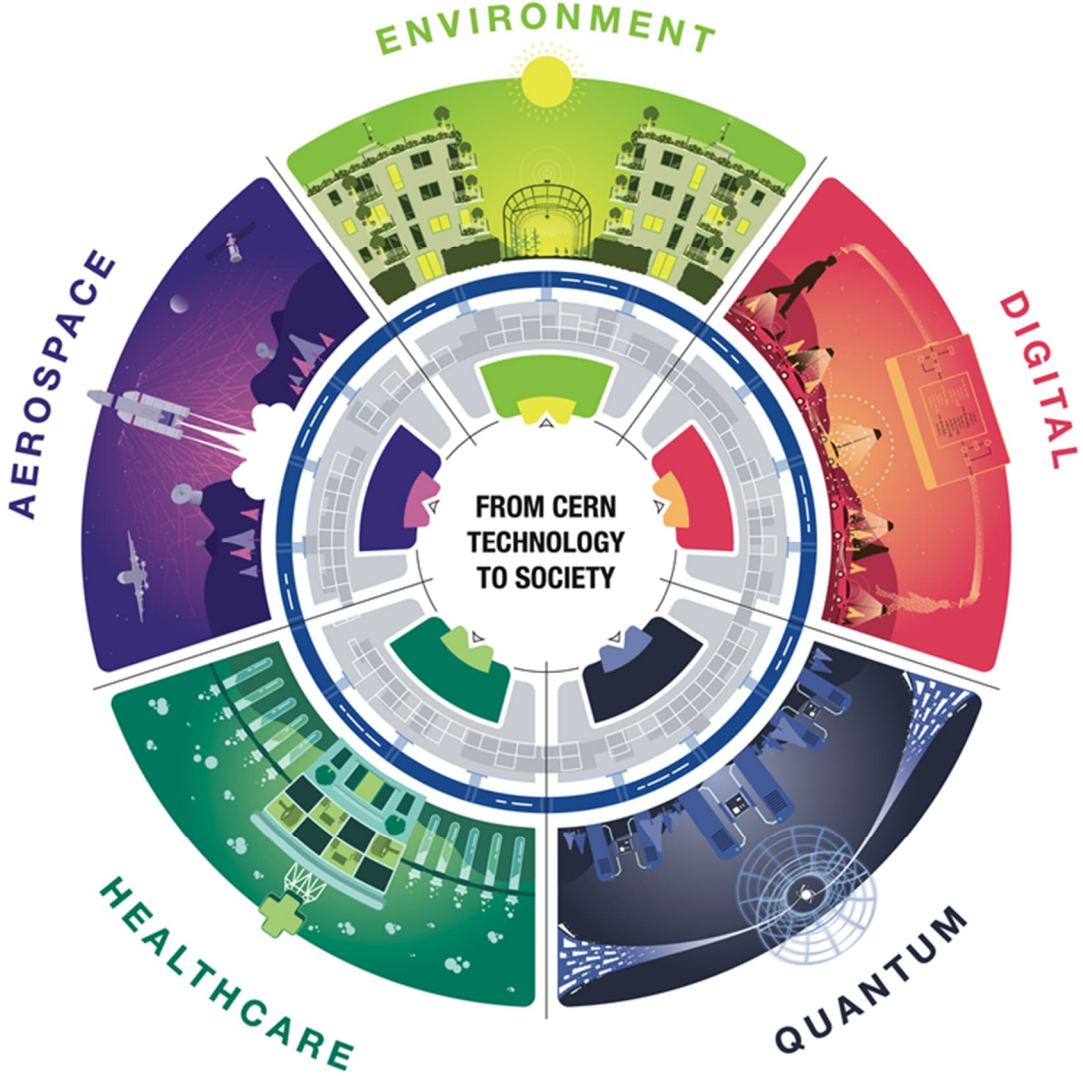
Demonstrate the importance and impact of fundamental research investments

Some historical examples





CERN as trusted non-commercial innovation partner




ACCELERATORS


DETECTORS


COMPUTING

Hybrid strategy
tech push & market pull

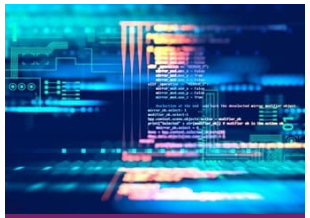
- Mobilize tech experts
- Create tech and IP dossiers
- Scout for technologies
- Mobilize innovation partners
- Create value propositions
- Search unmet needs


HEALTHCARE

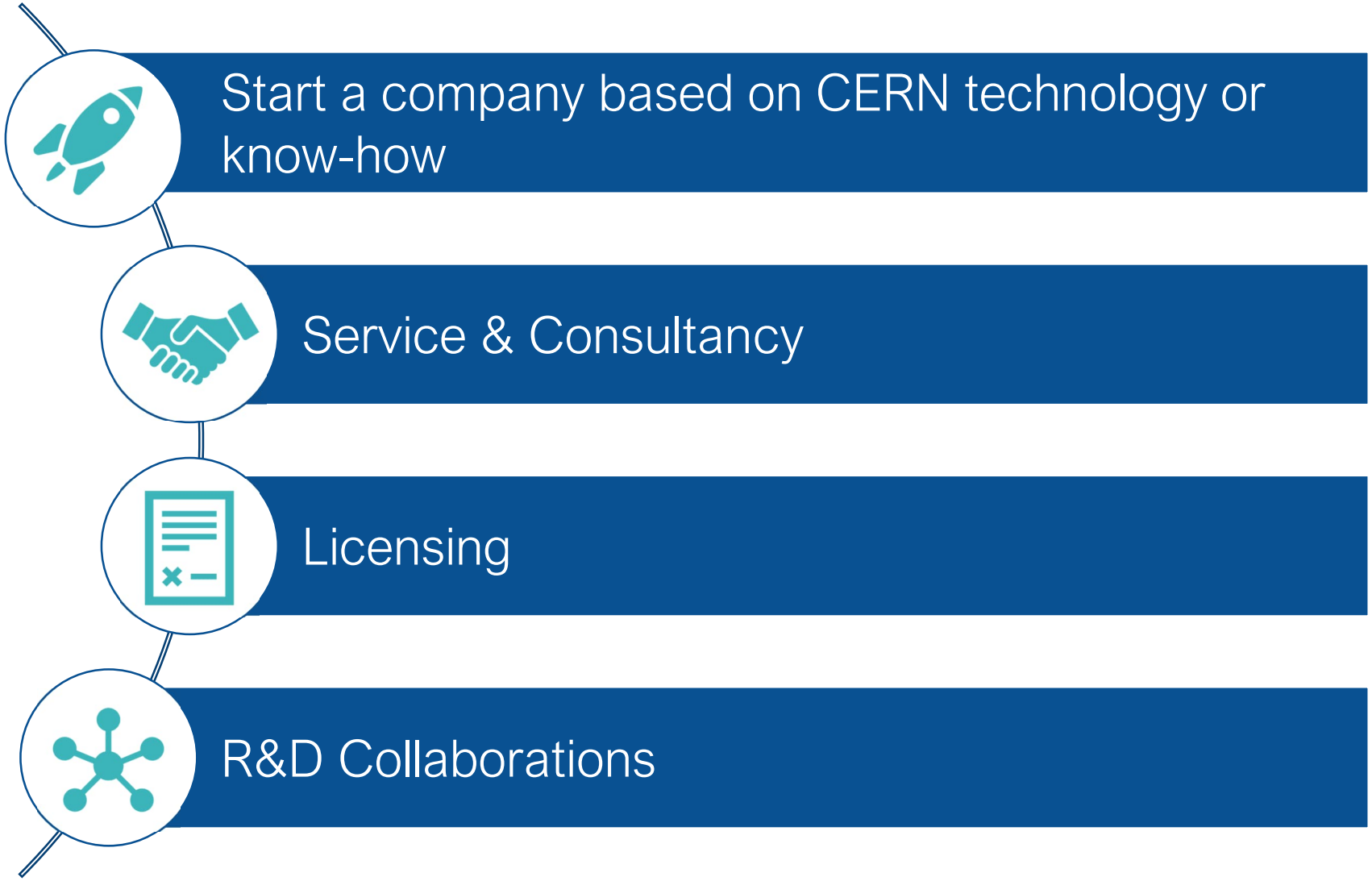

ENVIRONMENT

DIGITAL


AEROSPACE


QUANTUM

How to collaborate with CERN



The Medipix Collaborations

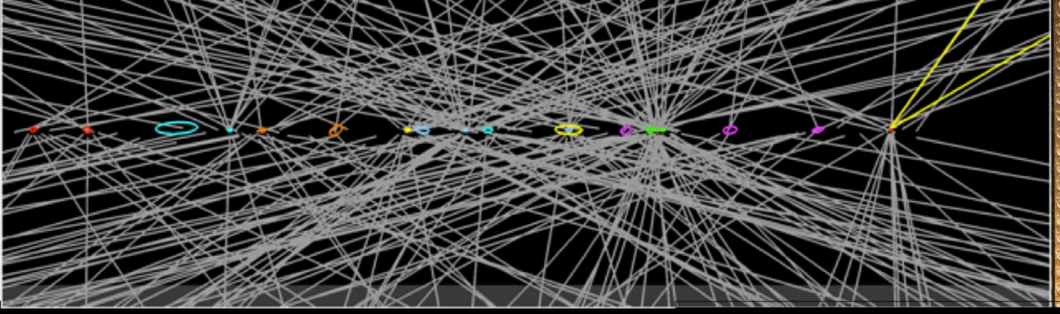
Almost three decades of turning technology into applications within various domains

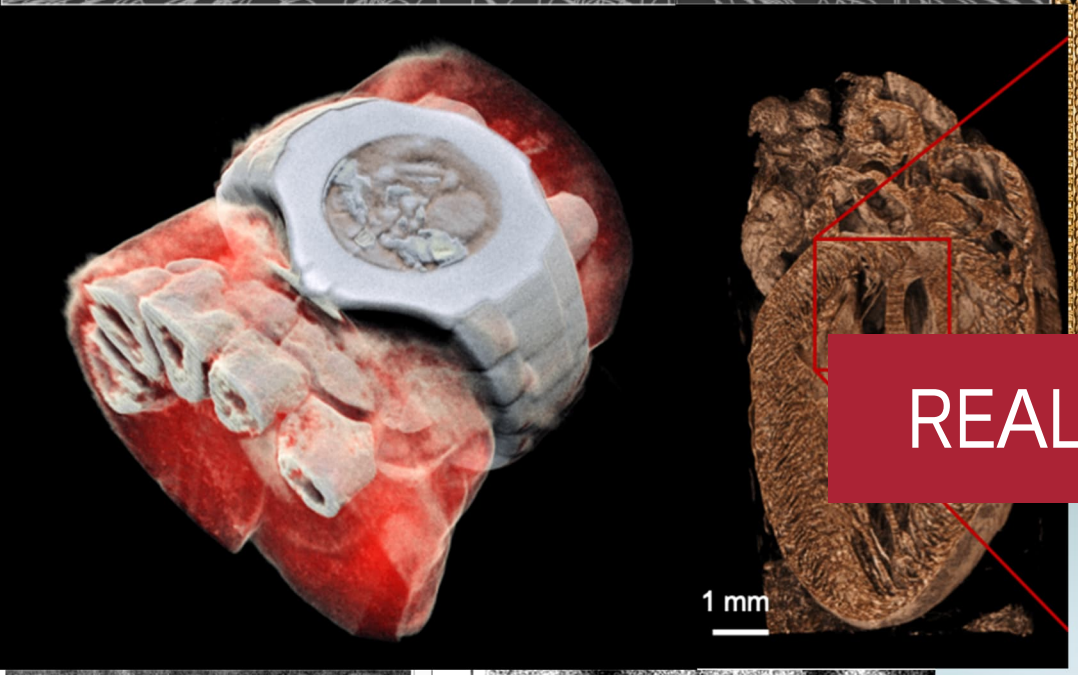
Medipix in a nutshell

- Hybrid pixel detectors were developed to respond to a need at the LHC: particle tracking in high rate environments.
- Single particle counting detectors have been widely used in education, space science, materials analysis and X-ray applications.
- <u>Collaborations:</u>
  - Medipix2: 17 members
  - Medipix3: 23 members
  - Medipix4: 20 members
- + 10 Medipix & Timepix Licencees

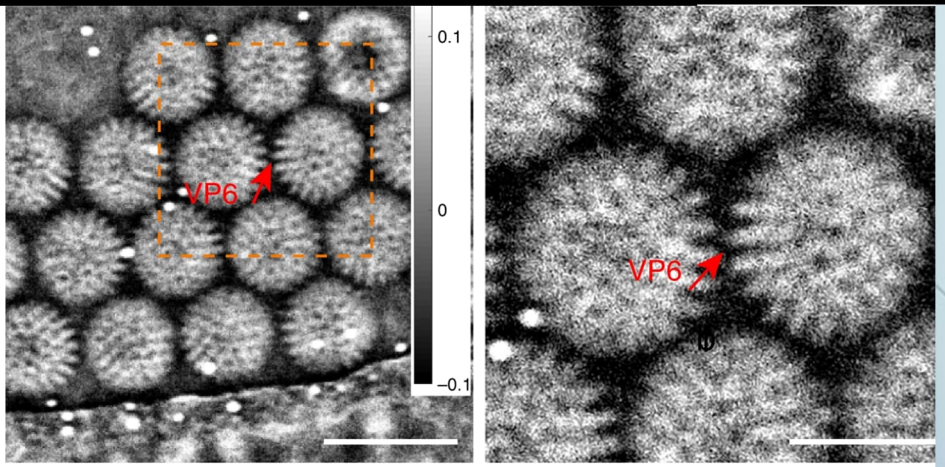
Medipix4 Collaboration is still open to new members!

AMSTERDAM SCIENTIFIC INSTRUMENTS · Quantum DETECTORS · ThermoFisher SCIENTIFIC · Malvern Panalytical a spectris company · mars · SYDOR TECHNOLOGIES COMPLEX MEASUREMENTS—CRITICAL RESULTS · ADVACAM Imaging the Unseen · XSPECTRUM · X-RAY IMAGING EUROPE · kromek detect image identify · πTEC PI-TECNOLOGIA





REAL WORLD APPLICATIONS



Aerospace Applications

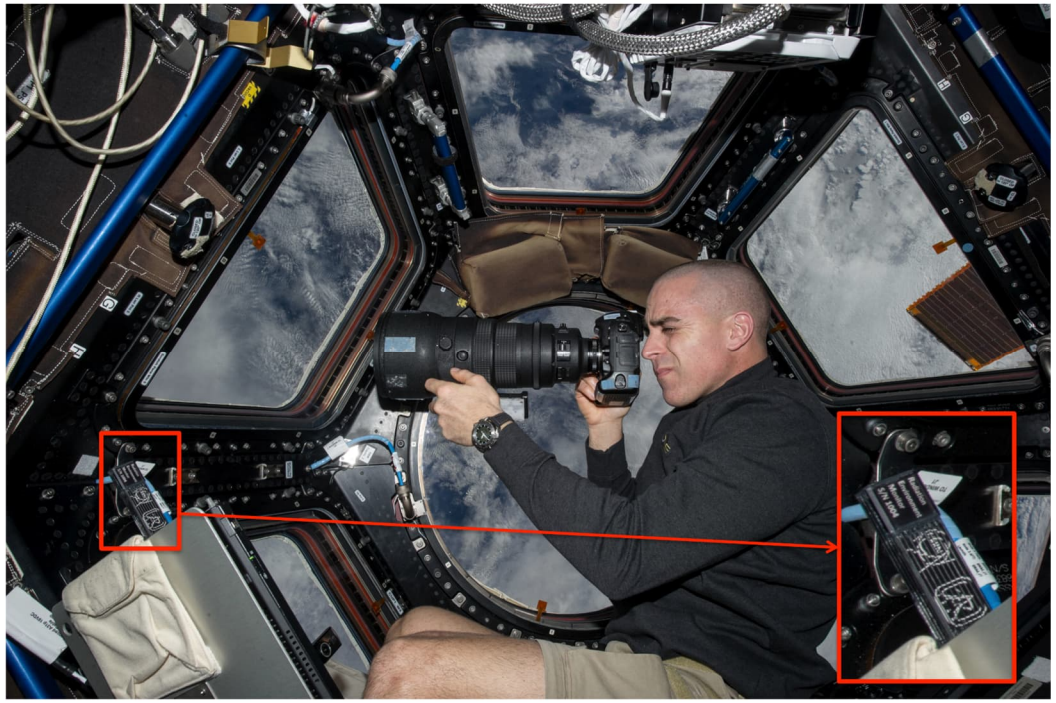


Image of the astronaut Chris Cassidy working near the Timepix USB on the International Space Station (Courtesy of NASA, photo ref. no. iss036e006175)

Image: NASA

Radiation monitoring in NASA's Orion vehicle and at the International Space Station

Cultural Heritage

InsightART

Measuring the
DNA of your art

Image: InsightART

Medical Applications

License

Clinical realisation for photon counting

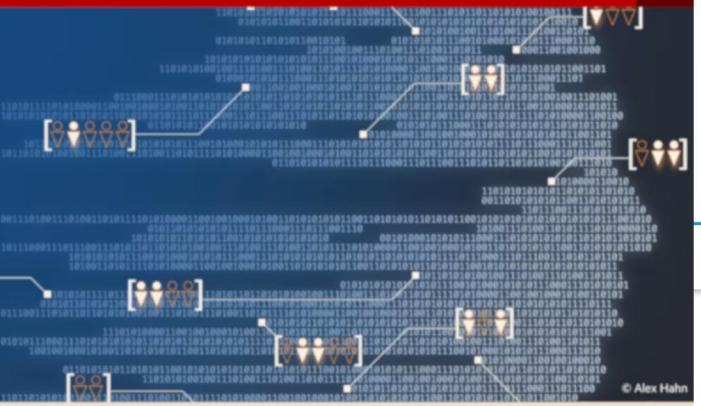
Vendor	Siemens	Samsung	AB-CT	MARS	GE	Philips	Canon
Clinical availability	FDA 510(k) CE Mark	FDA 510(k)	CE Mark	Pre-clinical	Advanced Research prototype	Advanced Research prototype	Advanced Research prototype

WHAT IF WE BUILD A STEM EDUCATION PROGRAM FOR HIGH SCHOOLS, USING OUR PIXELATED RADIATION DETECTORS?

4 QUALITY EDUCATION

FINANCIAL TIMES myFT

FT Tech for Growth Forum



Technology sector + Add to myFT

Technology and the Skills Shortage

Forbes

Workplaces Do It, So Can Schools: Real-World Relevance Keeps Girls In STEM

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‘More women and girls in science equals better science’, UN chief declares

THE TIMES
FRIDAY OCTOBER 27 2023

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Women are still under-represented in subject areas such as engineering
GETTY

EDUCATION

Female students ‘far less likely to get top degrees’

CHALLENGE

Le Monde ACTUALITÉS ÉCONOMIE VIDÉOS DÉBATS CULTURE LE GOÛT DU MONDE SERVICES

M CAMPUS · ÉCOLES D'INGÉNIEURS

Les jeunes femmes scientifiques à la conquête des « métiers d'hommes »

US News 90TH NEWS » News Best Countries Best States Healthiest Communities Opinion Elections Racial Equality in America Photos

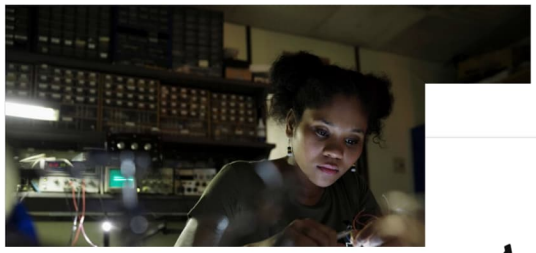
Home / News / Best Countries / Joann DiGennaro on Girls and ...

Around the World, Girls Still Face Challenges in STEM Education

Education expert Joann DiGennaro talks about the challenges and opportunities in improving learning in STEM fields.

By Sintia Radu | Oct. 11, 2018, at 6:00 a.m.

Save



BEST COUNTRIES IN PARTNERSHIP WITH BAV GROUP & Wharton

The New York Times

SUBSCRIBE FOR €0.5

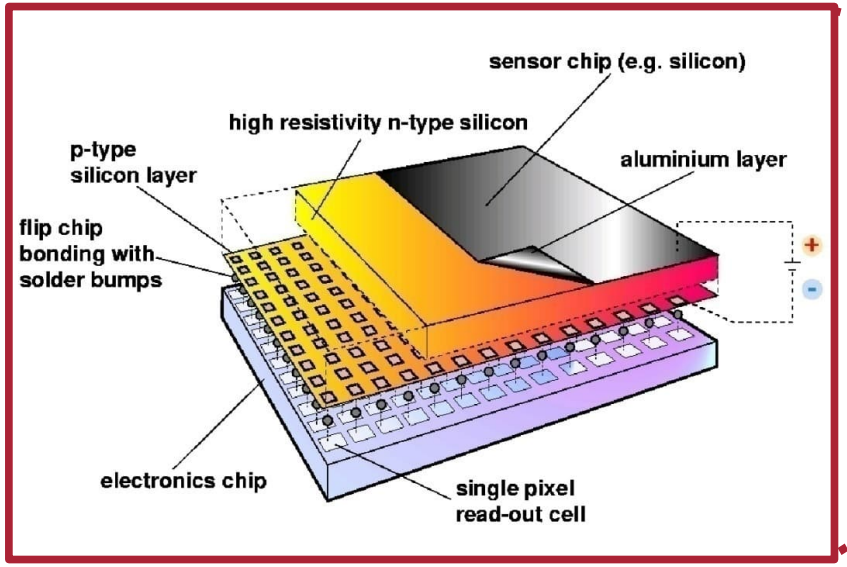
America's Semiconductor Boom Faces a Challenge: Not Enough Workers

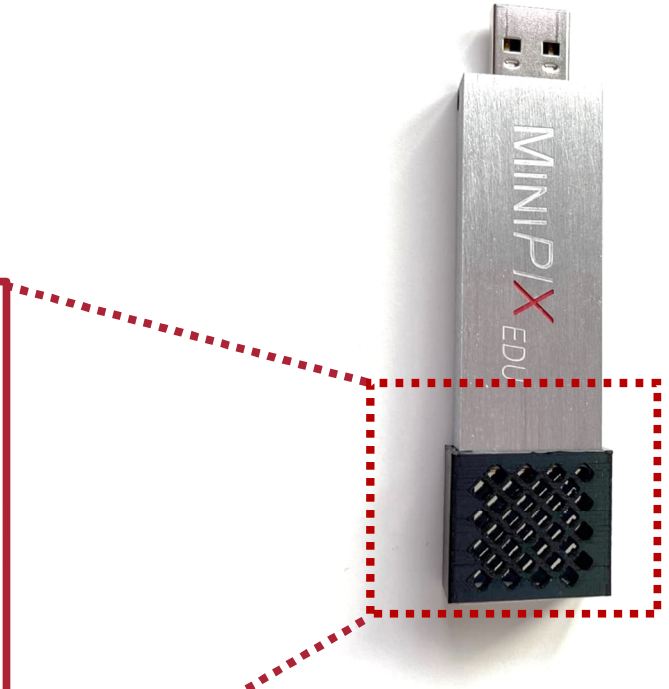
Commissioner Dalli: Women Still Underrepresented in STEM, EU Needs to Invest in Research

Belgium | Europe | Higher Education News | by Erudera News | Oct 23, 2023

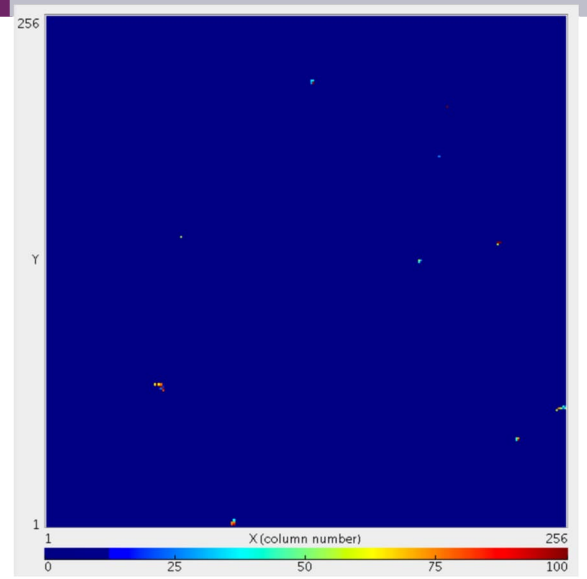
Hybrid Silicon Pixel Detectors:

developed originally for LHC

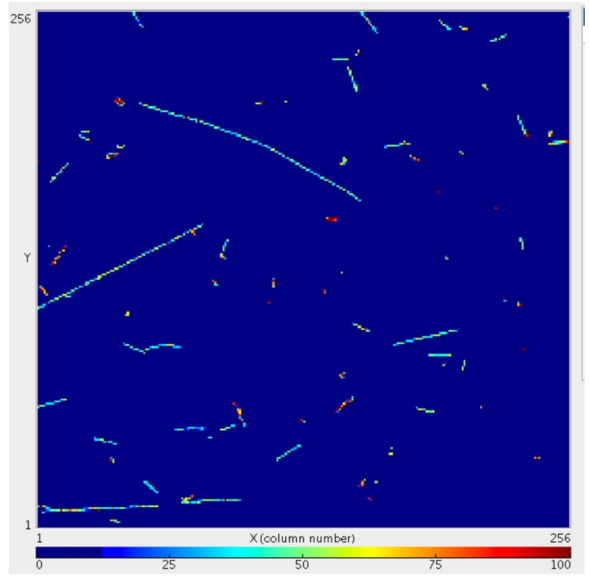




Near sea level



34 000 feet



Why Timepix? How Technology Makes the Difference?

trustroke

CAFEIN: Federated Learning Platform for Collaborative AI Training

European artificial intelligence project aimed to optimise stroke treatment.

1 2 90
UNIVERSIDADE D COIMBRA

Contract research

Development of high energy beam for testing radiation hardness with ESA.

ZENSEACT (Volvo Cars Company) teams up with CERN on extremely fast machine learning using FPGAs.

Collaborative R&D

Collaborative R&D

Collaboration with CORMEC and WUR to support national banks and regulators to detect trading anomalies in commodity and financial markets.

Extreme technologies for the planes of the future

- **Superconductivity:** electrical distribution systems of future hybrid and electric propulsion planes → reduce the weight of aircraft & increase efficiency (Airbus)

- **Cryogenic infrastructures:** material testing at extremely low temperatures →liquid hydrogen storage on aircrafts (Applus+)

"PARTNERING WITH CERN WILL HELP PUSH THE BOUNDARIES OF RESEARCH, AS WE WORK TO MAKE SUSTAINABLE AVIATION A REALITY."

Ludovic Ybanez, Head of superconducting technologies demonstrator at Airbus UpNext.

News › Press release › Topic: Knowledge sharing

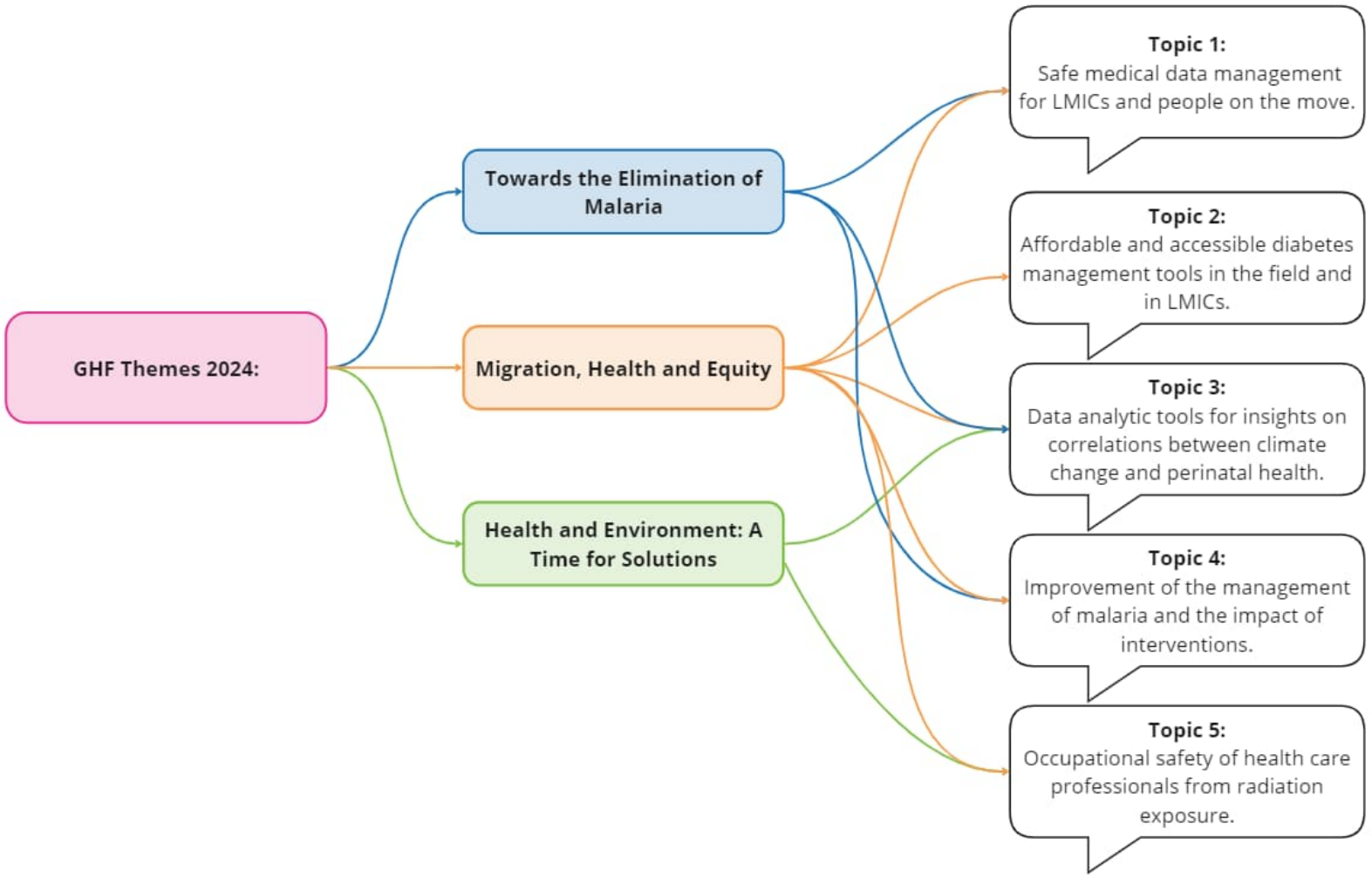
CERN and Airbus partnership on future clean aviation

CERN and Airbus UpNext sign a collaboration agreement to assess the use of superconducting technologies for future zero-emission aeroplanes.

1 DECEMBER, 2022

Global Health: Co-Development Workshop

Geneva Health Forum



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

Collaborative R&D

Smart sensors will transform traditional motors, pumps, etc into wirelessly connect devices → data will be used to create DIGITAL TWINS

CERN

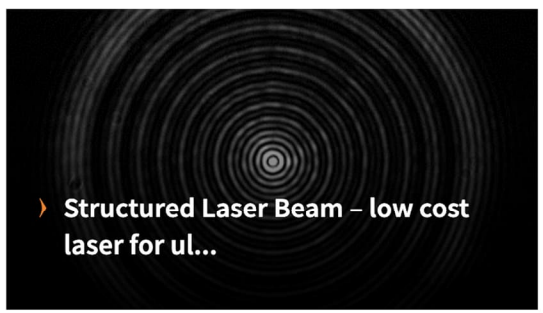
CERN
Venture Connect

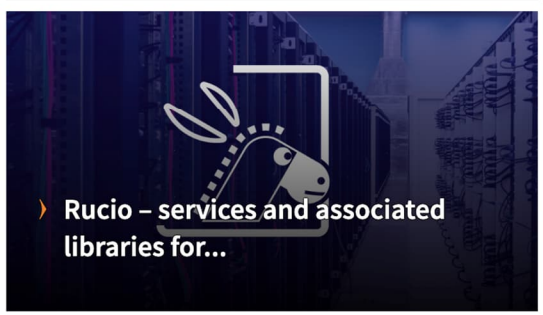
Access Breakthrough CERN technologies

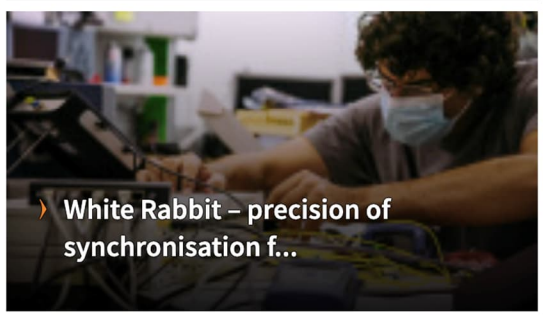
Connect to investors and venture startup economy

Get 0% Equity Express agreements

2% Royalty on ≥ 1MCHF







Key lessons learned

- CERN is strong in the ‘extremes’ of the technology scale;
- You need passionate experts on both sides to succeed;
- Start with a concrete project and clear business need;
- Mind the gap – in language, ‘clockspeed’ and culture;
- Driving deep tech innovation requires courage.

“To know that we **know what we know**, and to know that we do not **know what we do not know**, **that is true knowledge.**” *Nicolaus Copernicus*

Impact of CERN Technologies Brochure

Obrigada! Thank you

Get in touch!

ana.rita.pinho@cern.ch

With thanks to the CERN community for the daily support of the Organisation's KT mission!

Subscribe the KT newsletter

@cern-innovation-partnerships

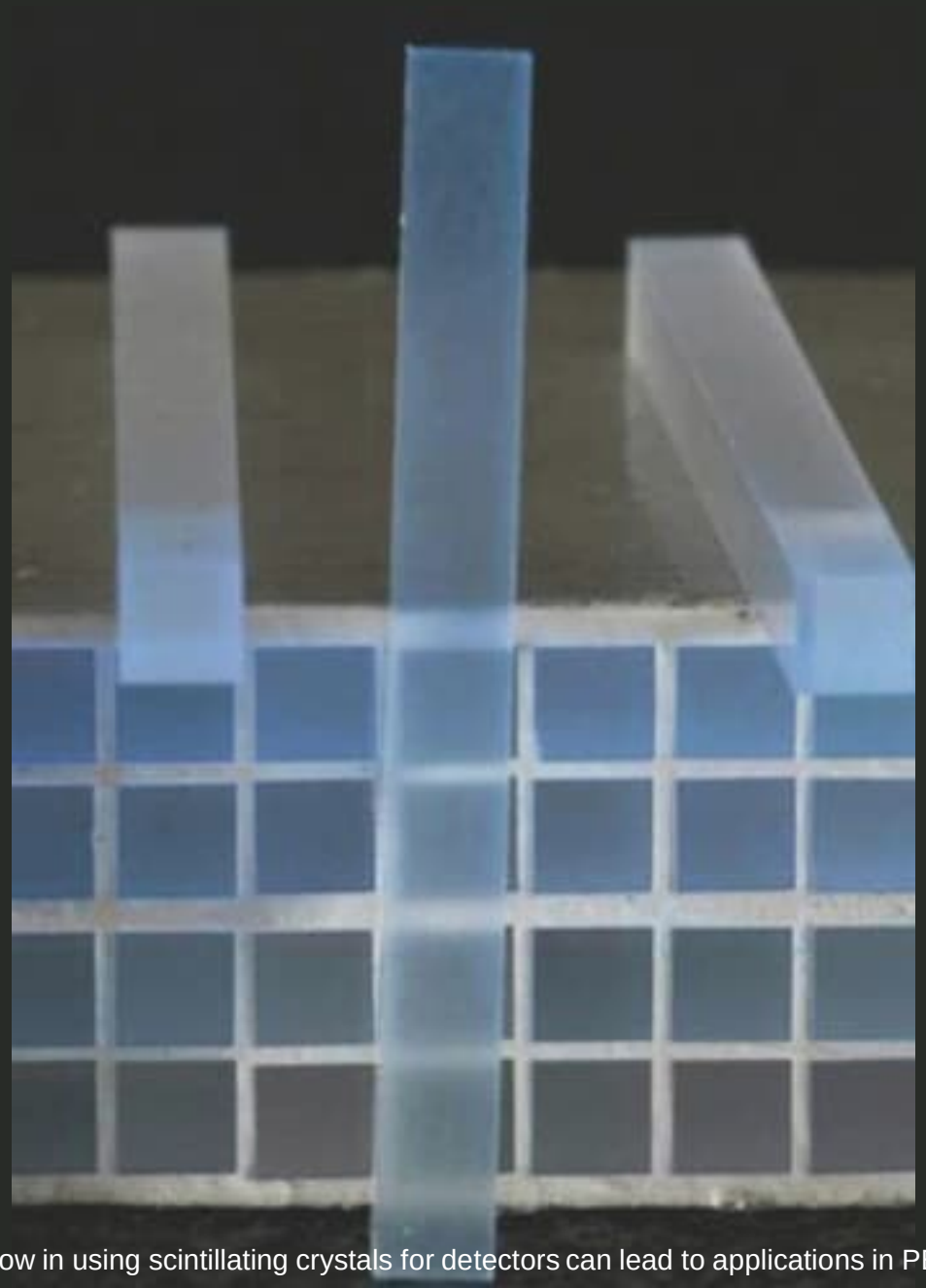
@CERNVenture

Find out more at kt.cern

Follow us on social media

#CERNKT

Scintillating detector for PET



CERN’s know-how in using scintillating crystals for detectors can lead to applications in PET and more

Collaborative R&D with and assignment of IP rights to ***PETsys Electronics.*** CERN and PETSys worked together on scintillating detectors readout by silicon photon multipliers.

PETsys Electronics was distinguished by CERN with CMS Industrial Award.

PETsys Electronics

MEDICIS for novel isotopes

CERN's facility designed to produce non-conventional radioisotopes for medical research. The goal is the active translation of emerging radionuclides into medical diagnosis and treatment.

Memorandum of Understanding **with IST (Instituto Superior Técnico)** to use the MEDICIS facility for the production of isotopes suited to fundamental and pre-clinical research in medicine.

MEDICIS robot for isotope production

EC co-funded projects with a KT component

Projects with strong KT component:

PRISMAP

PRISMAP is the European medical radionuclide programme on the production of high purity radionuclides (radioactive isotopes) by mass separation.

It federates a European consortium with leading biomedical and healthcare research institutes in the active translation of the emerging radionuclides into medical diagnosis and treatment.

[64Cu/67Cu]Radiolabeled exosomes as a theranostic tool for lung metastasis

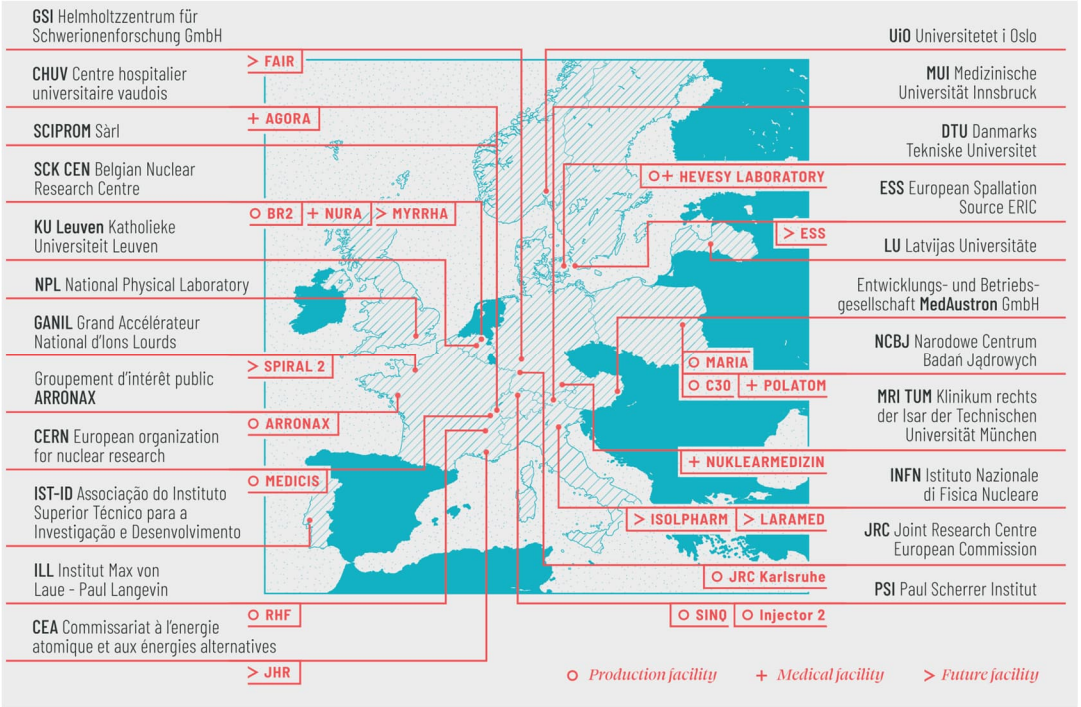
Prof. Antero Abrunhosa

Efficacy and Safety of [211At]At-Substance P as Adjuvant Therapy in Recurrent Glioblastoma Multiforme: A Pilot Study

Dr. Carla Domingos

IST-ID
Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento

- *IST-ID- Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento*



EC co-funded projects with a KT component

RADNEXT

RADNEXT is an infrastructure project with the objective of creating a network of facilities and related irradiation methodology for responding to the emerging needs of electronics component and system irradiation.

Project supporter

spin.works

HEARTS

Aims at providing access to high-energy heavy ion radiation testing facilities for space exploitation and space exploration by studying radiation effects in electronics, shielding and radiobiology.

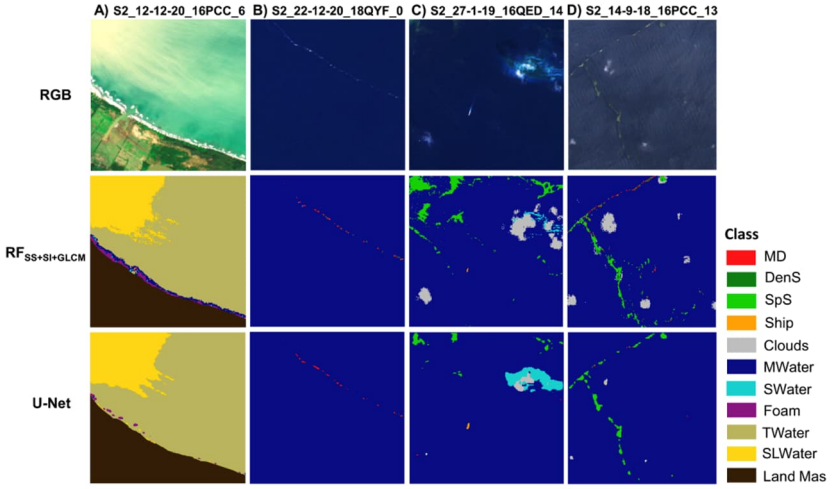
Advisory board

LIP LABORATÓRIO DE INSTRUMENTAÇÃO E FÍSICA EXPERIMENTAL DE PARTÍCULAS *partículas e tecnologia*

Edge SpAIce

Space AI monitoring marine plastic litter

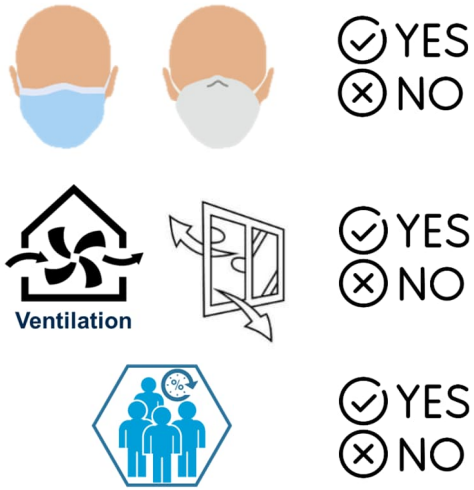
- Using hls4ml to monitor plastics pollution in the ocean onboard Earth Observation satellites.



CAiMIRA
CERN Airborne Model for Indoor Risk Assessment

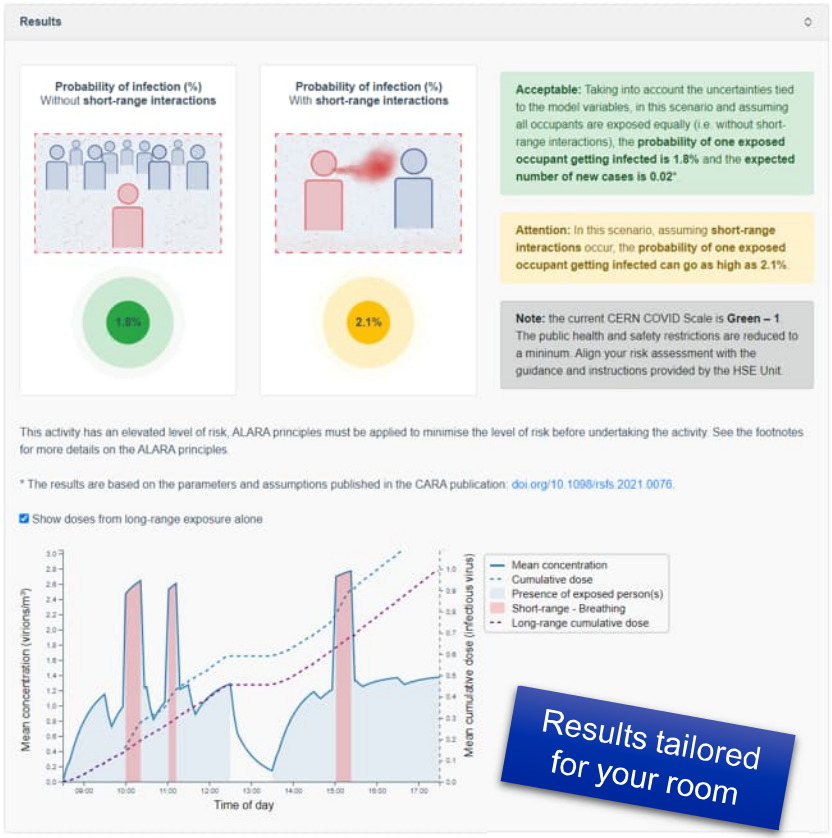
Ferramenta de auxilio para gerir o risco de riscos emergentes: transmissão de doenças respiratórias em sítios fechados

Abordagem prescritiva



Menos eficaz em relação a riscos emergentes
Alternativas?

Abordagem '*science-driven*' e '*risk-based*'



Results tailored for your room

Abordagem quantitativa sob medida, permitindo flexibilidade e **investimento direcionado**

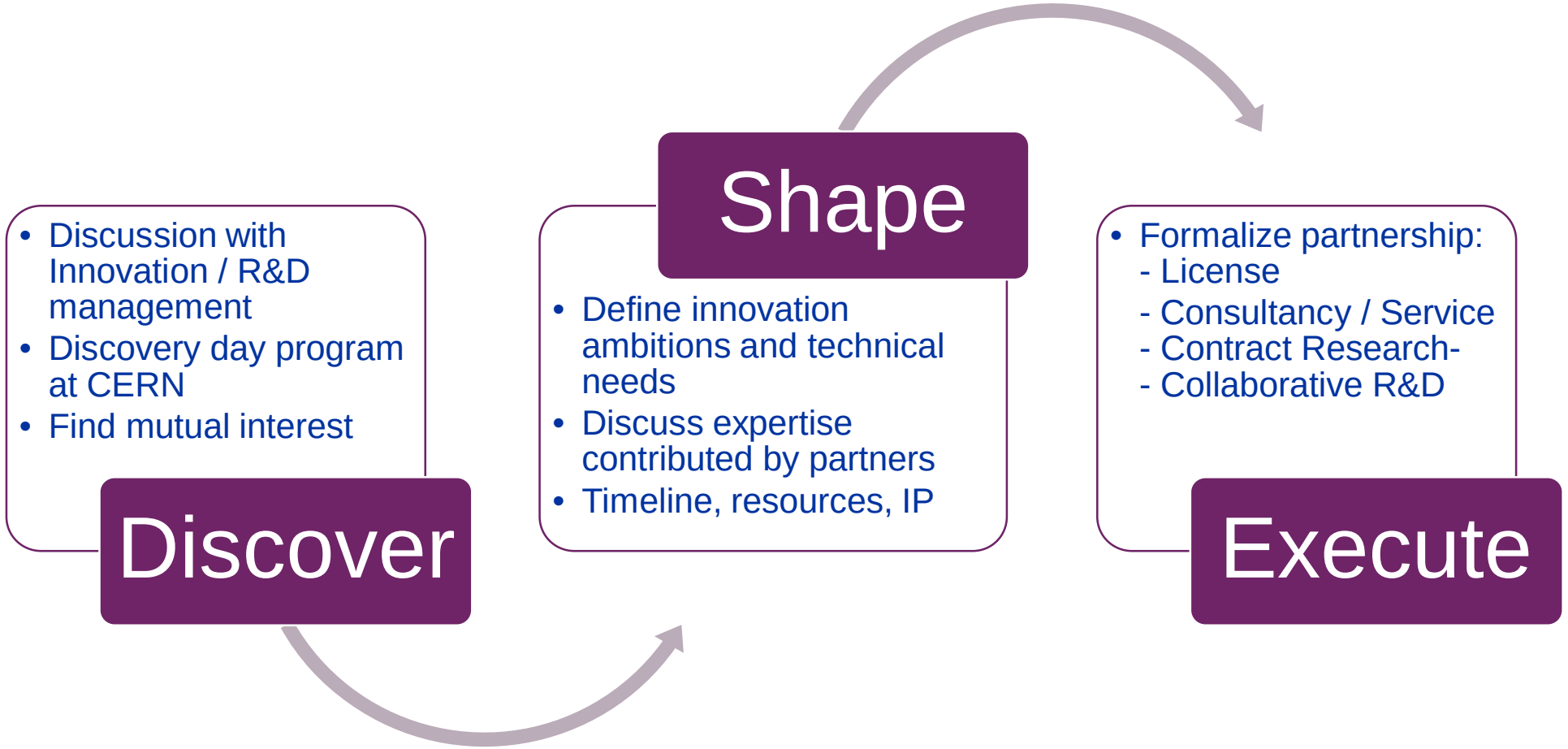

Research articles
Modelling airborne transmission of SARS-CoV-2 using CARA: risk assessment for enclosed spaces
Andre Henriques, Nicolas Mounet, Luis Aleixo, Philip Elson, James Devine, Gabriella Azzopardi, Marco Andreini, Markus Rognlien, Nicola Tarocco and Julian Tang
Published: 11 February 2022 https://doi.org/10.1098/rsfs.2021.0076

open source initiative

CAiMIRA git repository

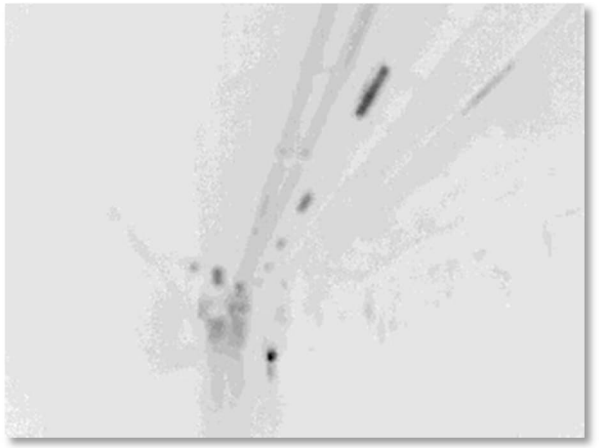
Thanks to A. Henriques for the slide

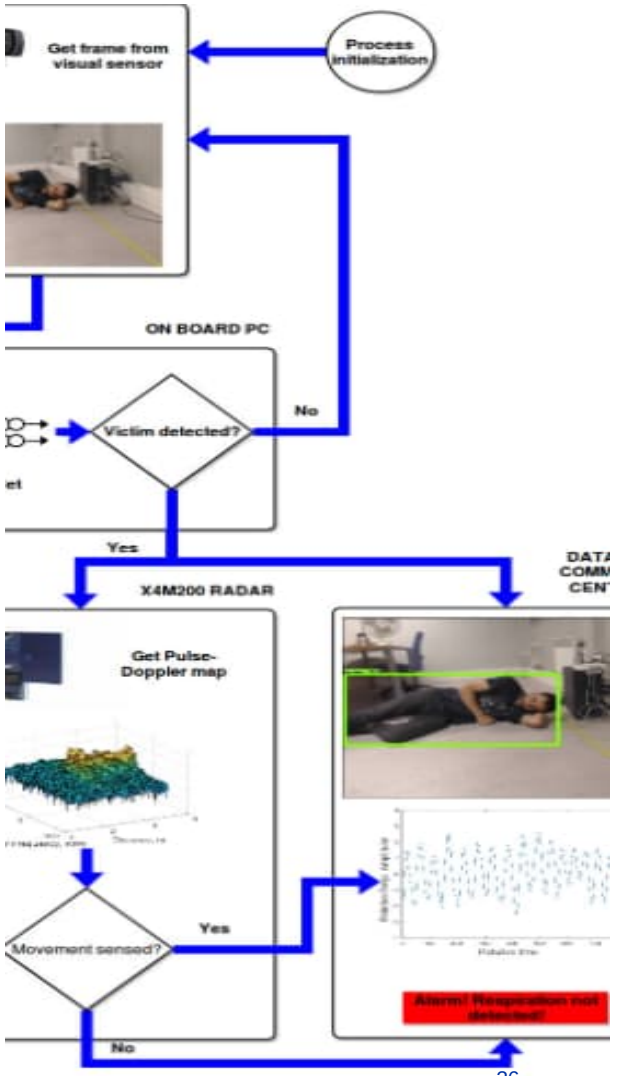
Shaping innovation partnerships

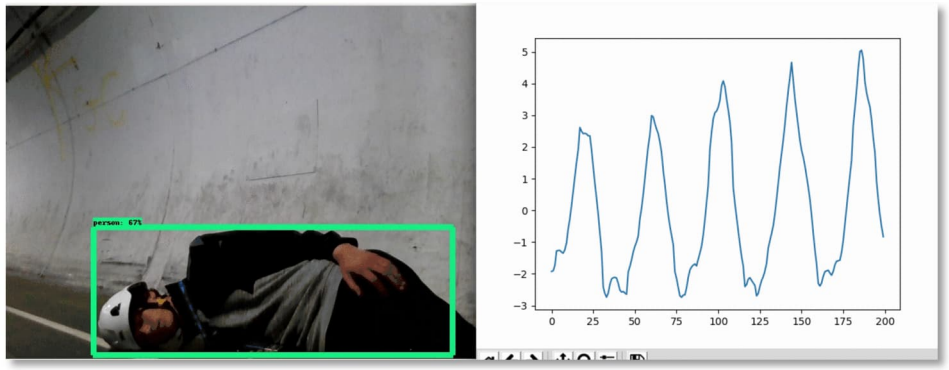


MARCHESE: Machine learning based human recognition and health monitoring system

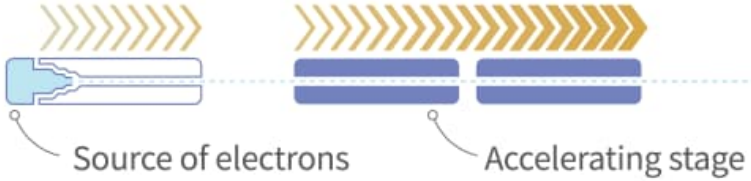
- Developed at CERN using the CERNBot mobile platform
- Spatial calibration method for sensor fusion of standard cameras, thermal cameras, radars and depth sensors
- Contactless human breathing and heartbeat monitoring

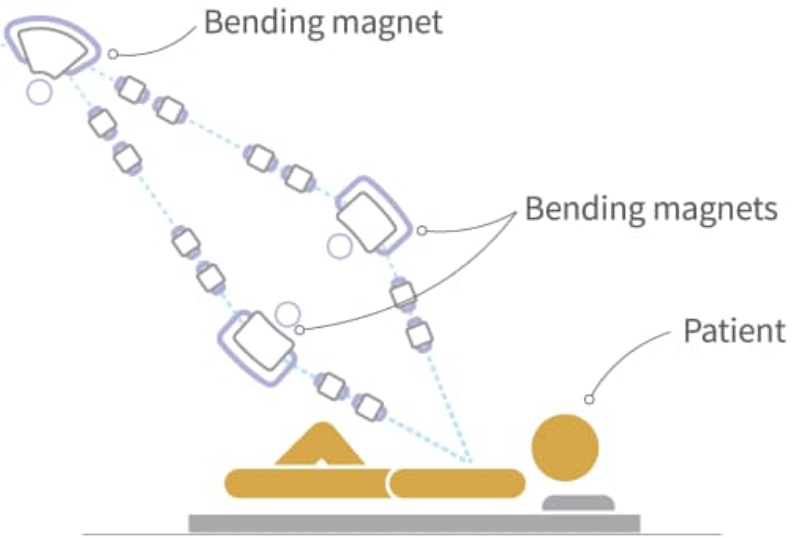


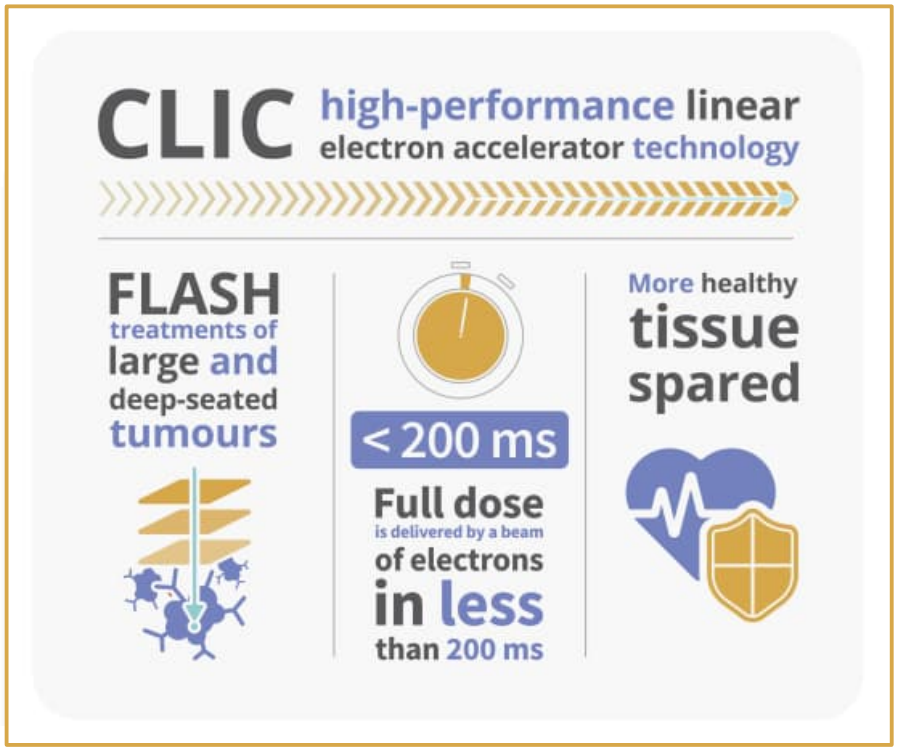




FLASH radiotherapy: very high-energy electrons (VHEE) to treat cancer resistant to conventional treatments → reduced side effects







Innovative Radiation Therapy with Electrons

PlanetWatch: a CERN Spinoff using the CERN technology C2MON, delivers an end-to-end solution to generate, validate, analyse and record air quality data.

A CERN spin-off

PlanetWatch®

Collaborative R&D

MedAustron and CNAO offer hadron therapy using CERN technology.

Collaborative R&D

MedAustron and CNAO offer hadron therapy using CERN technology.