

Particle accelerators are vital state-of-the-art instruments for research (fundamental and applied). They are also used in a huge variety of fields: Health and Medicine, Industry, Energy, Environment, Cultural heritage. Accelerator R&D and its applications lead to innovations with strong socio-economical impacts.

Accelerators for research

200 accelerators worldwide

Average yearly budget: 1000 M€

1/3 of Physics Nobel Prizes are rewarding work based on or carried out with accelerators in the past 50 years.

Particle accelerators, an asset for Society

Accelerators for applied fields

30 000 accelerators worldwide

Annual market: 3 000 M€

10% increase

TIARA: Test Infrastructure and Accelerator Research Area

TIARA's main objective is the **creation of a multi-field, coordinated pan-European distributed infrastructure**.

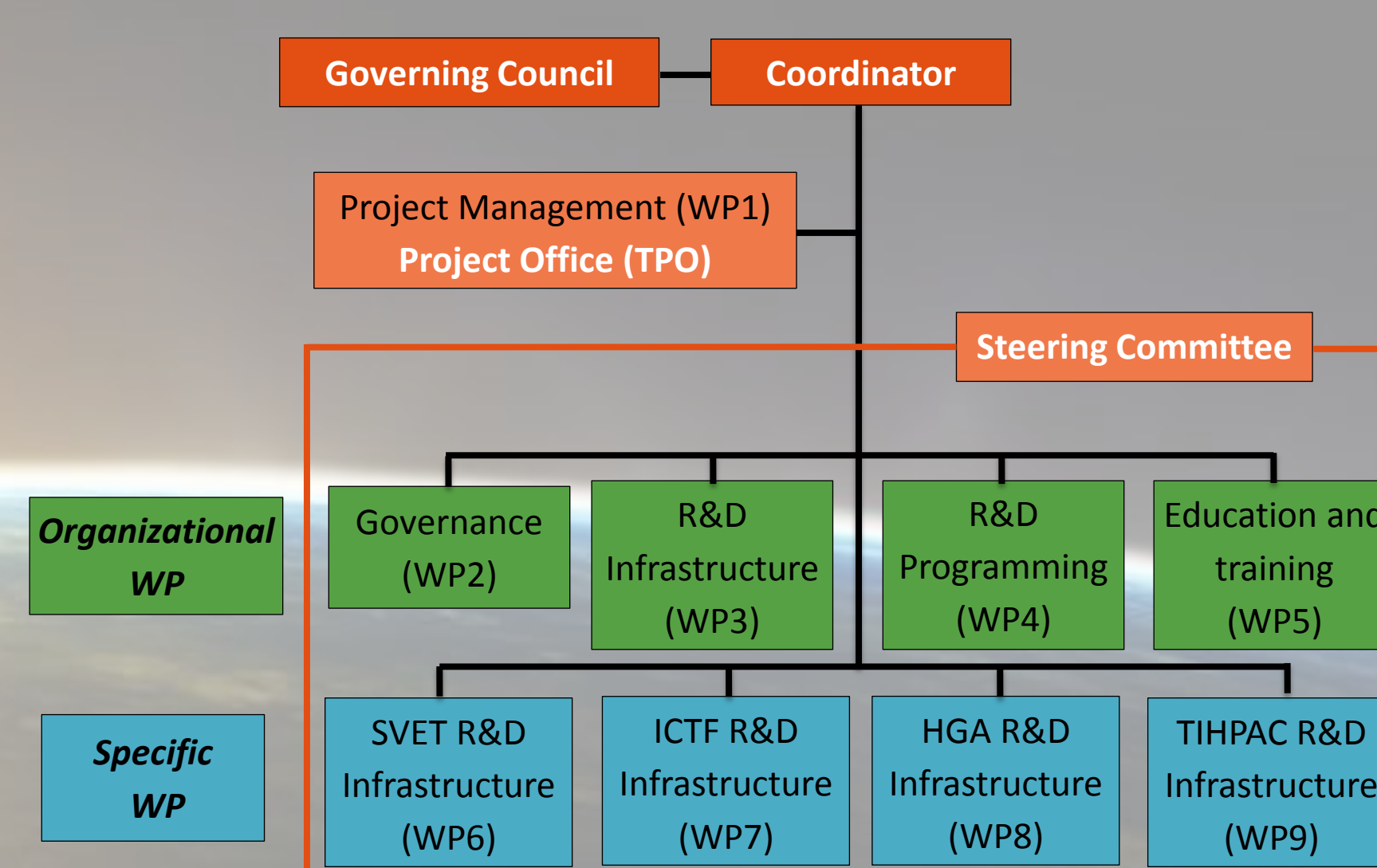
Using the implemented structure, TIARA will also coordinate:

- Joint Strategic Analysis of the accelerator needs and perspective for the development of R&D Research Infrastructures
- Joint R&D programming and launching of a set of consistent integrated accelerator R&D projects
- Promotion of the education and training for accelerator science
- Strengthening the collaboration with the industry to boost innovation.

More information on www.eu-tiara.eu

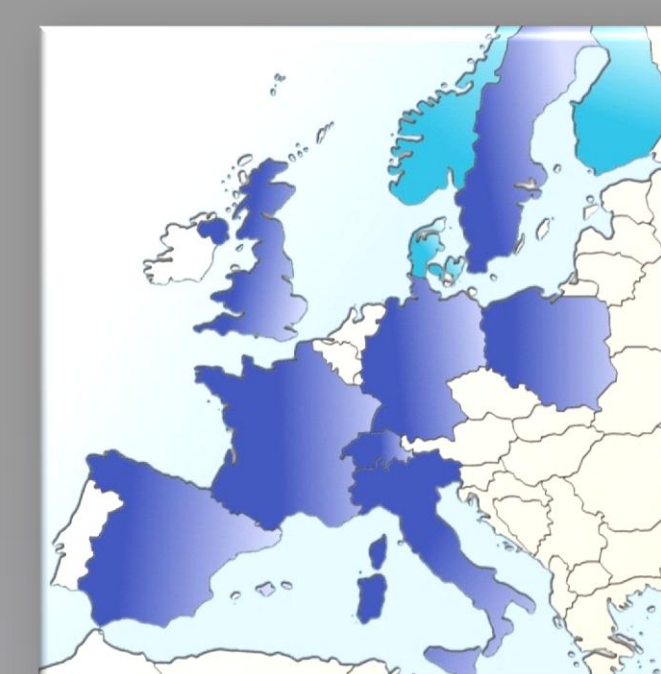
TIARA Preparatory Phase

TIARA-PP structure



Consortium

CEA, France
CERN, Switzerland
CNRS, France
CIEMAT, Spain
DESY, Germany
GSI, Germany
INFN, Italy
PSI, Switzerland
STFC, United Kingdom
Uppsala U., representing the Nordic Group (Denmark, Finland, Norway, Sweden)
IFJ PAN, representing the Polish group



Gantry, courtesy of PSI

Health & Medicine

Over the past 60 years, more than 11000 particle accelerators have been built for medical therapy with electrons, ions, neutrons or X-rays, which represents more than 1,8 B€ sales per year. Proton therapy is well suited for cancer tumours requiring to localize more precisely the radiation dosage e.g. eye, head and neck.



Electronics industry

Ion implantation into semiconductors enables to produce better and cheaper electronics. Cleaving of thin silicon wafer for the production of photovoltaic cells relies also on this process. Each year, around 500 ion implanters are sold, which represents a market of up to 0,8B€.



Sterilization and security

Using electron beams and X-rays is also an efficient and effective way to sterilize medical equipment and perishable commodities such as meat and tropical fruits or to inspect cargo containers.

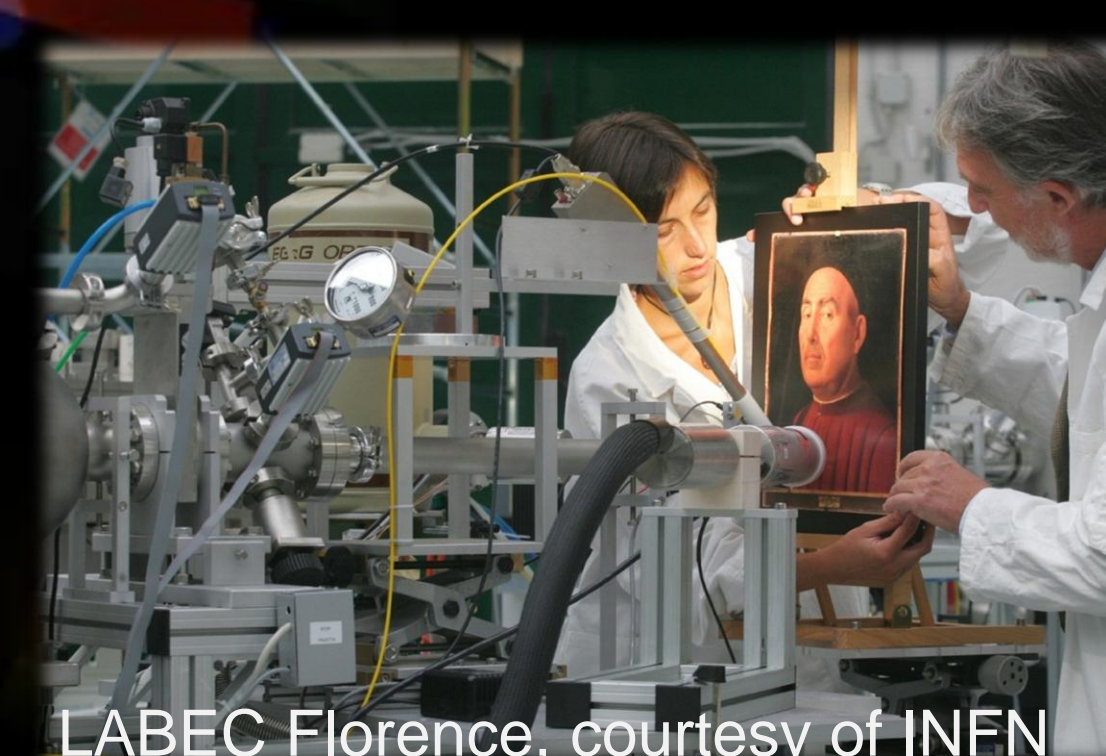


Automotive industry

More and more, car parts are produced using either electron beam irradiation (tyre rubber, foam, chassis) or electron beam processing (gears, camshafts, tie rod ends).

Energy & Environment

The Pomorzany power plant near Warsaw (Poland) was one of the first facilities to perform electron beam flue gas treatment leading to SO₂ and NO_x emission control.



LABEC Florence, courtesy of INFN

Cultural heritage

Investigations of works of art and archaeological artefacts such as paintings and statues with electron beams provide details on the sources of material used and optimal ways of preservation.

Research & development

Accelerators are used in many fields of research: particle physics, nuclear physics, biology, chemistry, condensed matter. The most impressive one is the Large Hadron Collider, at CERN, designed to understand the fundamental laws in particle physics.