



ADVANCED PARTICLE THERAPY CENTER FOR THE BALTIC STATES (APTCB)

Core idea of APTCB

Development of a **modern large-scale scientific research infrastructure** and **clinical treatment centre** in the **Baltic States** by **integrating CERN-designed particle accelerator** technology

Aims of APTCB

- To foster **multidisciplinary research**
- To contribute to the **breakthrough innovation development**
- To provide **cross-sectoral economic growth** in the Baltic States

Multi-functional facility

Scientific research institution

- Enabling **broad research programme** in domains of **clinical, natural and technological sciences**
- **Attracting highly skilled researchers** from all Baltic States and beyond

Clinical treatment center

- Providing the **established proton therapy** and contributing to **helium ion therapy research**
- Enabling novel **radioisotope production for modern nuclear medicine** approaches

Industry involvement infrastructure

- **Increasing the capacity and “know-how”** of local industries in particle accelerator technologies
- **Providing long-term R&D possibilities** for the establishment of a regional innovation ecosystem

Involved in APTCB initiative

CERN Baltic Group



Group of **14 scientific universities and research institutions in the Baltic States** - Estonia, Latvia and Lithuania - with the aim of coordination of scientific collaboration with CERN, and strengthening of local scientific communities in high-energy physics and accelerator sciences

Overall development of the initiative, stakeholder engagement activities

NIMMS

(Next Ion Medical Machine Study)

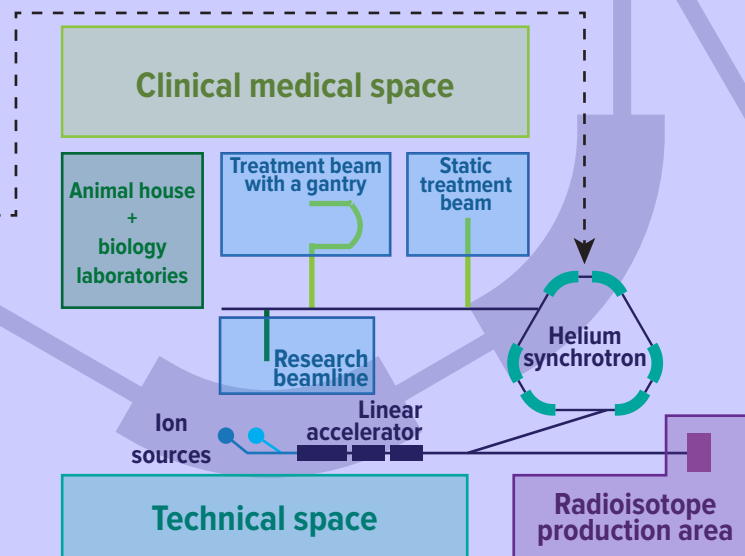
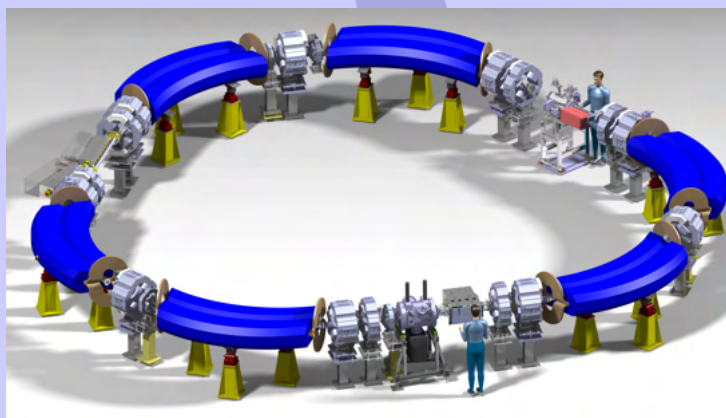


CERN-based initiative, working on cutting-edge particle accelerator technology development for a **new generation of compact and cost-effective ion-therapy facilities**

Central focus: **helium synchrotron technology**

Crucial collaborators as core of the APTCB facility is based upon technologies developed by NIMMS

Envisioned infrastructure



NIMMS developed helium synchrotron (HeLICS) as the base of APTCB facility

Multi-faceted motivation for APTCB initiative

Scientific research driven



Developing **high technology-driven research programmes** in clinical sciences, medical physics, high-energy physics, nuclear physics, material sciences, radiochemistry, accelerator physics and technologies and several other related fields

Attracting international expertise

Driving **competence development in early-stage researchers**

Encouraging **collaboration with high-tech industries and open science** communities, contributing to the creation of a **Baltic innovation ecosystem**

APTCB has significant potential of delivering **long-term socio-economic return as Big Science center**

Boosting local innovation ecosystems

Enhancing the capacity of national economies to generate, adopt, and commercialize advanced technologies

Providing environment for **highly-skilled workforce development**

Improving **career prospects for early-stage researchers, engineers and specialists**

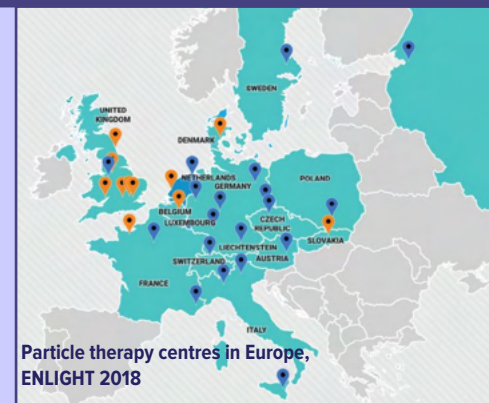
Delivering wide-ranging societal benefits, such as **public access to cutting-edge cancer treatment therapies**, cultural engagement and technological spillovers

Enabling **economies of scale in knowledge generation**

Incentivizing **innovation and product development** across industries

Economically driven

Clinically driven



Transformative clinical role by offering advanced cancer treatment modalities including: **clinically established proton therapy**, emerging **cutting-edge helium ion therapy**, production of **innovative radioisotopes for nuclear medicine**

Enabling pre-clinical, clinical and radiobiology research

Contributing to research necessary for **clinical translation of novel approaches**: helium ion therapy, FLASH therapy, etc.

Improving therapeutic outcomes, minimizing side effects and elevating the standard of care

Main milestones

Spring '22 Development of the **facility concept** and **dedicated working group**

Aug '22 Baltic Assembly support - addressing the prime ministers of the Baltics

Oct - Nov '22 Bi-lateral stakeholder discussions in the three Baltic States



May '23 NIMMS HeLICS implementation in the Baltic States presented at the International Particle Accelerator Conference

25th of May '23 Workshop at CERN:
“Particle therapy - future for the Baltic States?”

From the inception of the initiative:

several discussions with different scientific universities, medical professional societies, and political stakeholders in the Baltic States



Spring '24 Workshop findings published in *Health and Technology* special issue focused on innovations in particle therapy

Jan and Oct '24 Presentation of the initiative at **CERN Medical Applications Steering Committee** - CERN engagement at the highest level

Apr '24 Initial discussions with a potential collaborator - **Heidelberg Ion-Beam Therapy center** - currently the only institution globally with availability of helium ion therapy

Throughout 2024 Collaborative effort with local radiotherapy facilities, University of Oxford and the International Agency for Research on Cancer to assess current practices in the Baltic States

Dec '24 The **APTCB Feasibility Study Strategy Group** is established by the CERN Baltic Group

Oct '23 Report of the Workshop approved by the CERN Baltic Group

From the start of 2024
Work towards proposal of the Feasibility Study

Next significant milestone:

Feasibility Study

In order to proceed with this promising initiative, a full-scale **Feasibility Study** of the project is needed

Main aims of the Feasibility Study

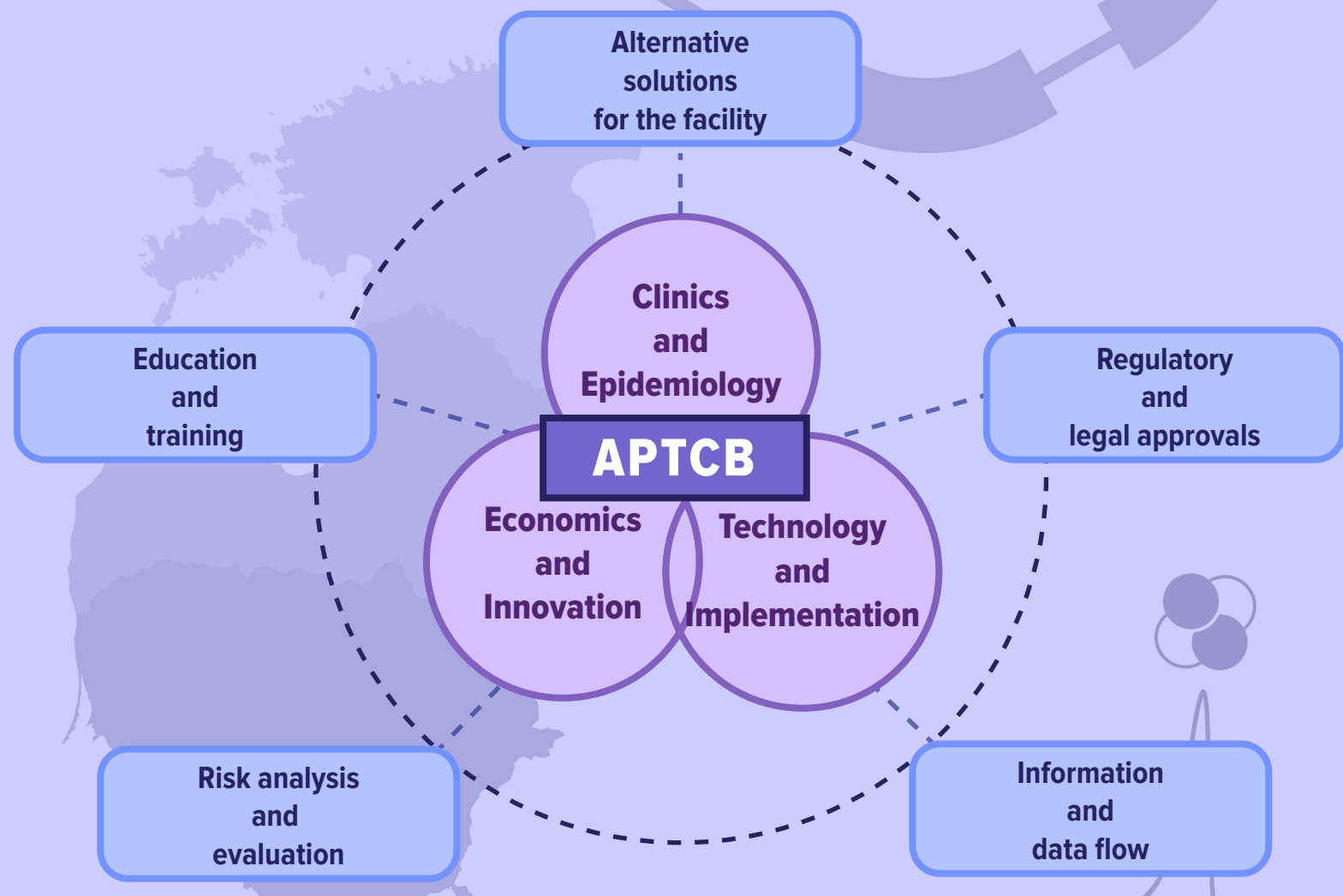
- To investigate the feasibility of APTCB facility implementation
- To identify and evaluate **potential alternative solutions**
- To provide a **fact-based Feasibility Study Report** to be used as **the decision-making tool** for the approval of APTCB facility

Involved institutions

Carried out by **Baltic States scientific institutions**, involving also **regional medical communities and organisations in relevant fields, researcher groups** and all other **relevant local and international stakeholders**, while consulting with **international experts**. **CERN NIMMS** - a close collaborator on the technology itself

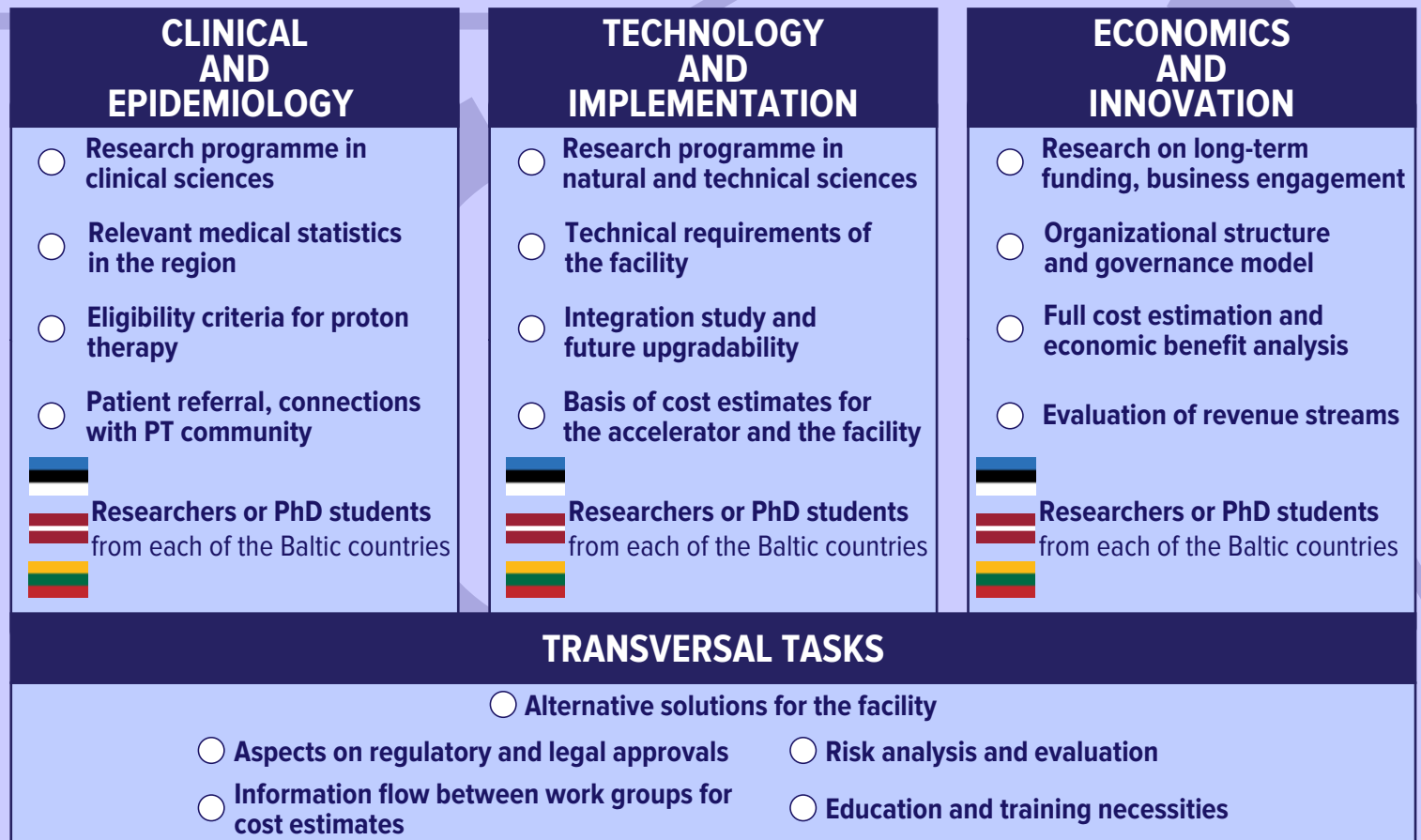
Expected duration

2 years

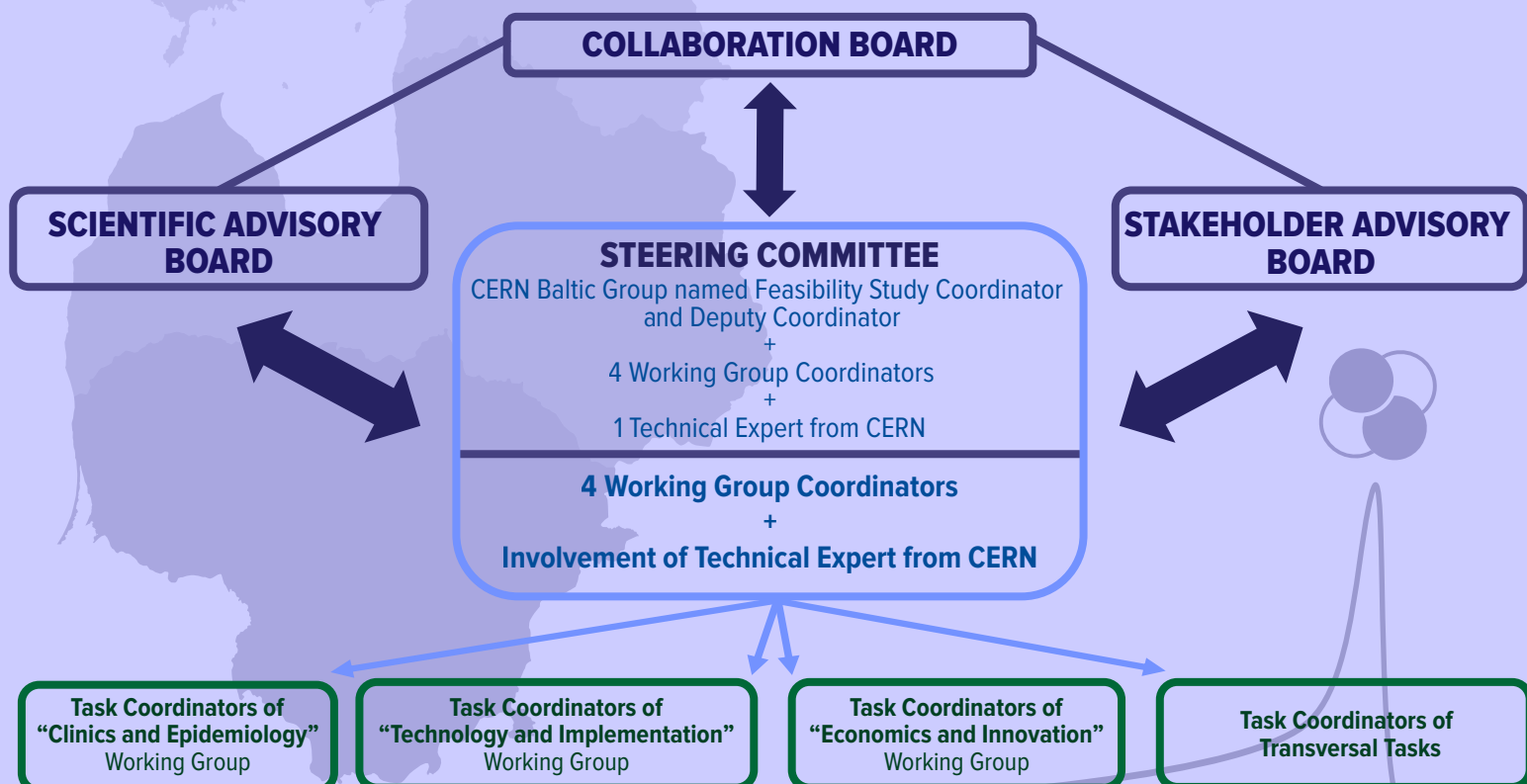


Centralized co-ordination and funding between the 3 Baltic States is necessary for the launch of the Feasibility Study

APTCB Feasibility Study: Work plan



APTCB Feasibility Study: Organizational structure



Feasibility Study Report

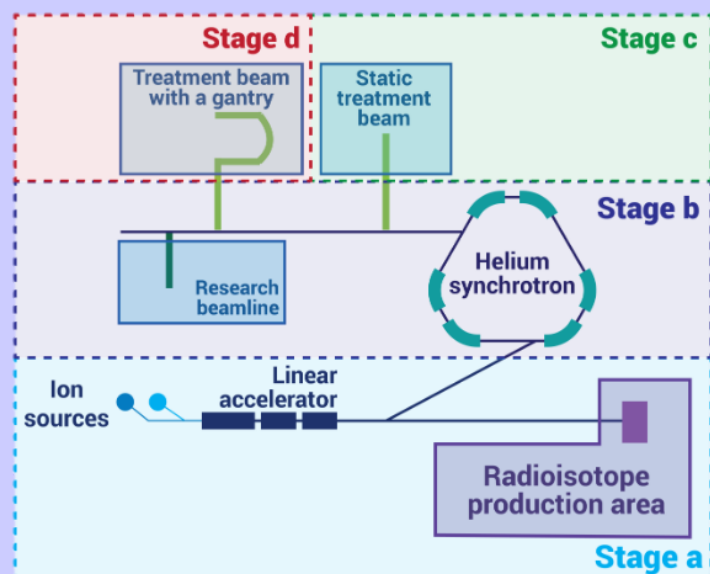
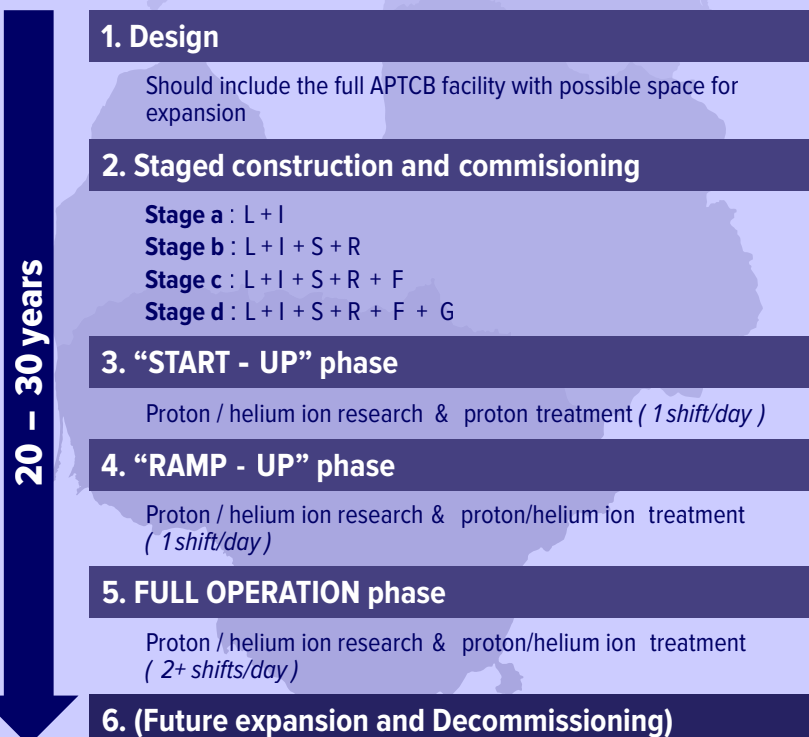
Summary of all the factual basis collected during the investigation

The Feasibility Study Report is to be used as a **decision making tool for the future of the APTCB project** : facility construction and implementation of the proposal

Reinforcement of the synergies between the different Baltic research groups and medical societies, while strengthening the collaboration between Baltic research groups and CERN

- Risk analysis and risk management strategy
- Finalized proposal for layout of the facility
- Finalized beam-time usage proposal
- Finalized list of selection criteria for the choice of the most suitable construction site
- Initial proposal for the expected staging during the development of the facility
- Initial basis for a business plan for the facility
- Roadmap for the innovation and industry collaboration strategy
- Roadmap for the regulatory compliance

Long-term timeline of APTCB



- L** - Low energy accelerator
- I** - Isotope production line and room
- S** - Synchrotron
- R** - Research beamline and room
- F** - Fixed line
- G** - Gantry treatment room



ADVANCED PARTICLE THERAPY CENTER FOR THE BALTIC STATES

**Anchored in research excellence, the initiative provides
an opportunity for transformative scientific and socio-economic
development in the Baltic States**

- **Establishing the Baltic States as one of the leaders in accelerator-driven biomedical research**
- **Expanding Europe's capacity for clinical translation of helium ion therapy**
- **Enabling regional access to high technology based cancer care**
- **Fostering a local high-tech innovation ecosystem with global relevance**

**UNIFYING OPPORTUNITY
WITH ENORMOUS POTENTIAL
FOR THE BALTIC STATES**

