

Beating Cancer with SEEIIST while shaping Science in South-East Europe Role of Montenegro

HITRI
Heavy Ion Therapy Research Integration

SEEIIST



South East European International
Institute for Sustainable Technologies
<https://seeiist.eu>

**Project Meeting and Hadron-therapy Workshop “From Innovation to Implementation” –
24 March 2025, Montenegro
Dr. Sanja Damjanovic, GSI Helmholtz Centrum for Nuclear Research, Darmstadt, Germany**

Opportunity to Develop Next-Generation Ion Therapy Facilities

Goal: Expand Access to Ion Therapy for a much larger number of patients

How: Leverage International Collaboration to advance accelerator technologies and new treatment techniques



HITRIplus is gifting SEEIIST the 2nd Development phase – Design Phase

SEEIIST and HITRIplus form a powerful alliance

- HITRIplus, driven by powerful international collaboration, is developing an advanced design and laying the groundwork for a next-generation facility in Europe to beat cancer with cutting-edge technologies.
- SEEIIST, as a catalyst for HITRIplus, has the chance to drive scientific growth in South East Europe and become a potential Reference user by embracing the modern Design delivered by the HITRIplus project



This collaboration could shape the future of the research and innovation in SEE - while also offering the most modern cancer treatment for patients in South-East Europe

**How did it
all started?**



Montenegro initiated SEEIIST in 2017

Official launch: Government of Montenegro initiated SEEIIST in March 2017

Background:

After 20 years working at CERN Minister of Science of Montenegro from Nov. 2016 to Dec.2020

Rapid convincing:

Secured Government support just in 3 months
Appointed as a political lead to setup SEEIIST's scientific framework.

Political Milestone - SEEIIST goes Regional

Declaration of Intent signed at CERN on October 25, 2017 by SEE Ministers responsible for research (8 countries)



Memorandum of Cooperation signed by SEE Prime Ministers at the 6th Summit of the Berlin Process, Poznan, Poland, 2019



In January 2018 the SEEIIST Steering Committee was formed - I was elected to be the first Chair (2018-2021)

The question arose: What should SEEIIST be to have a direct impact on society and easily attract political support ?

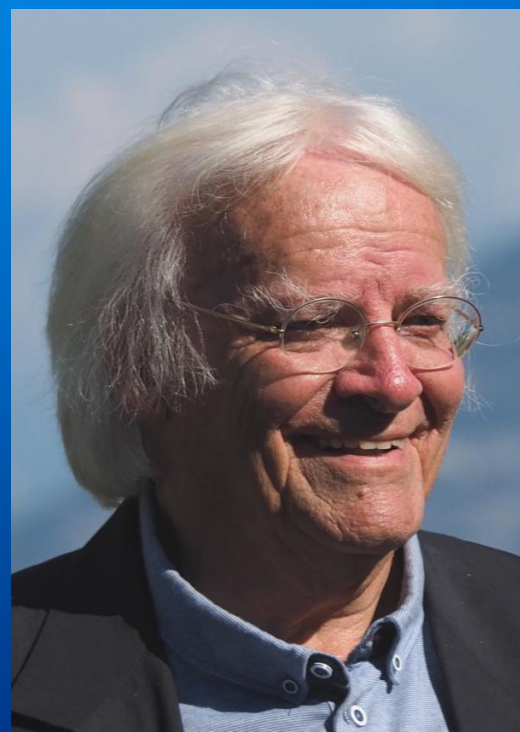
**How was
possible to
place SEEIIST
on the EU
agendas?**



Key figures in boosting SEEIIST

The proposal for SEEIIST to be an **Accelerator-based Research Infrastructure for Cancer Therapy and Biomedical Research with Ion Beams**

came **early 2017** from two key pioneers in the use of ion beams to treat cancer:



Prof. Hans J. Specht at Uni HD

- Pioneer of ultra-relativistic heavy ion physics at CERN
- Pioneer of Ion cancer therapy as Scientific Director of GSI Helmholtz Centre for Heavy Ion Research
- He pushed and led the establishment of a pilot project at GSI, where the first 450 patients in Europe were treated with ion-beams from 1997-2008.
- Instrumental in establishing Europe's first hadron cancer therapy clinic, HIT, in Heidelberg
- The true author of IAEA RER6309 project



Prof. Ugo Amaldi at CERN

- A pioneer in the design of particle accelerators for cancer treatment, who was instrumental in establishing Europe's second hadron cancer therapy clinic, CNAO, in Pavia, Italy
- President of TERA foundation
- Editor of the Concept Study and pre-TDR for SEEIIST

Juergen Debus: 'It is no exaggeration to say that, without Hans Specht, there would have been no ion beam therapy at the GSI, hence no HIT in Heidelberg.'



As DG of GSI Hans pushed and led the establishment of a pilot project and was instrumental in establishing, HIT, in Heidelberg

A Pilot Project using ^{12}C ions at GSI, Darmstadt First patient in Europe treated with Ion-Beams at GSI in 1997



1993-1997 setting up the Pilot project developing novel technology in 4 y

- Rasterscan with intensity modulation
- Treatment plan (Voxelplan + LEM)
- First in-situ PET monitoring for HI
- Fast and safe beam control system
- Hospital-like cave and control room
- Parallel beam operation for physics

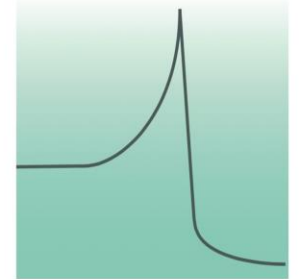
1997-2008 Treatment of ~450 Patients
Chordoma, Chondrosarcoma, Prostata...

Inauguration of the Therapy Project at GSI on 15.09.1998



Spectacular success, opening the way to the first Ion Clinic in Heidelberg

Construction of a Clinical Therapy Facility for Cancer Treatment with Ion Beams



Radiologische Universitätsklinik Heidelberg



Deutsches Krebsforschungszentrum Heidelberg



GSI Gesellschaft für Schwerionenforschung Darmstadt

Official Project Proposal for Heidelberg Clinic, handed to the German Gov. representatives at the inauguration ('98)

Hans Specht's words after the successful treatment of the first patient at GSI:

"That's when we understood why we do science."

Basic concepts for a
**SOUTH-EAST EUROPE
INTERNATIONAL INSTITUTE FOR
SUSTAINABLE TECHNOLOGIES
(SEEIIST)**



January 15, 2018

**FACILITY FOR TUMOUR HADRON THERAPY
AND BIOMEDICAL RESEARCH (HTR)**

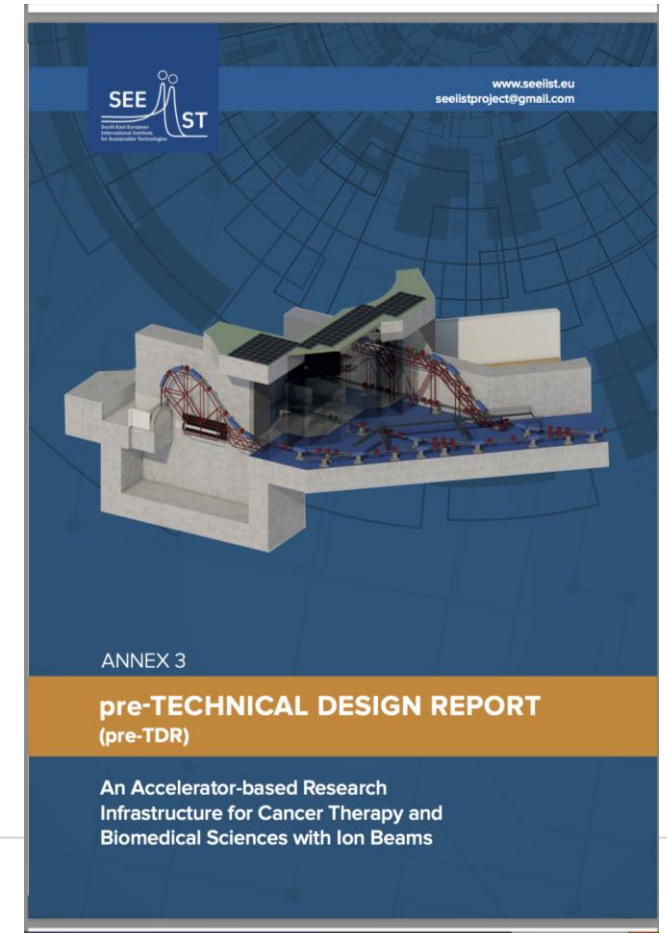
U. Amaldi, J. Balosso, M. Dosanjh, Ph. Lambin, J. Overgaard,
S. Rossi, M. Scholz and B. Singers Sørensen

Acknowledgements

The valuable advice by N. Sammut (University of Malta) and H. J. Specht (University of Heidelberg) during the development of the initiative is greatly appreciated.



- ***Prof. Ugo Amaldi at CERN***
- ***A pioneer in the design of particle accelerators for cancer treatment, instrumental in establishing Europe's 2nd hadron cancer therapy clinic, CNAO***
- ***Main author of the Concept Study and pre-TDR for SEEIIST***



**The next
important role of
Montenegro:
Organizing a
Forum in Trieste
together with ICTP**



First Development phase of SEEIIST – Concept Study presented at the Forum in Trieste in Jan 2018 - triggered support from EC and IAEA



EC: Robert Jan Smits
(DG of DG-RTD)



The multidimensional aspects of SEEIIST recognized by the EC, leading to its first financial support in 2019.

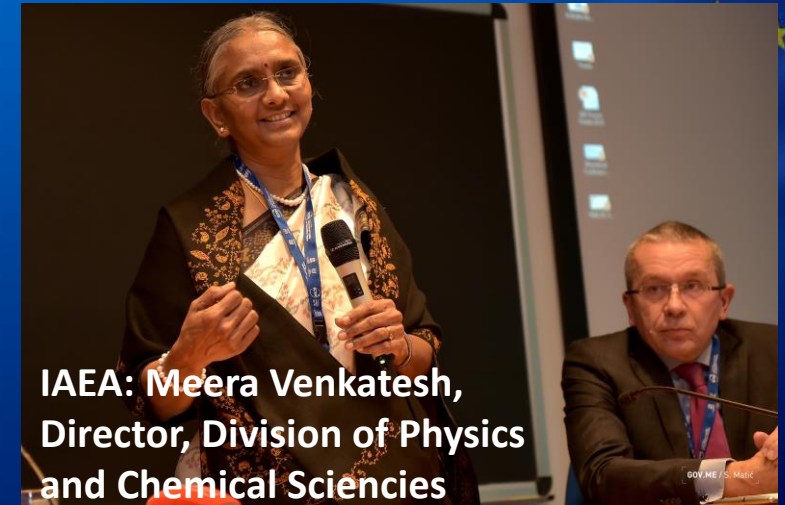
Basic concepts for a
**SOUTH-EAST EUROPE
INTERNATIONAL INSTITUTE FOR
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(SEEIIST)**

A map of South-East Europe showing the following countries: Austria, Slovakia Republic, Hungary, Romania, Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Montenegro, Kosovo, Albania, Macedonia, Bulgaria, Italy, Greece, and Ukraine. Major cities like Vienna, Bratislava, Budapest, Belgrade, Sofia, and Athens are marked. The Adriatic Sea, Tyrrhenian Sea, and Aegean Sea are also labeled.

January 15, 2018

**FACILITY FOR TUMOUR HADRON THERAPY
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IAEA: Meera Venkatesh,
Director, Division of Physics
and Chemical Sciences



IAEA: Martin Krause,
Director, Division for Europe

The IAEA encouraged us to apply for the TC Capacity Building Instr., leading to the successful RER6309 project.

Support by the European Commission EU H2020 HITRIplus funded by the EC

❖ EC – Directorate General for Research and Innovation (EC DG-RTD)

First direct financial support for the SEEIST Design Phase

- 1.5 MEUR for the 1st stage of Design Phase (2019)
- Additional 5 MEUR via a competitive **Call EU-H2020 INFRAIA – HITRIplus (2021-2025)**



SEEIST is one of the 6 Leading EU-WB projects in R&I in the Innovation Agenda for the WB

❖ EC - Directorate General for Neighbourhood and Enlargement (DG NEAR)

SEEIST became part of the Economic Investment Plan for Western Balkans (part of Global Gateway initiative) as the only Research Infrastructure – 9 billion EUR appointed for the WB 2021-2027, going up to 30 billion by 2030



**The backbone of
SEEIIST – Support
from the broader
European
Research and
Medical
Community**



Scientific Milestones – SEEIIST attracted support from the broader European Research Community

HITRIplus - 18 European Research Centers, Clinics and SMSs across 14 European countries

Collaborative partners in the HITRIplus project: CERN, GSI, HIT, CNAO, MedAustron, MIT, Bevatech GmbH, CEA, CIEMAT, COSYLAB, INFN, PSI, Uni Malta, Philipps Uni Marburg, Uppsala Uni, Wigner RC, Technical Uni Riga and SEEIIST

Opportunity to Develop Next-Generation Ion Therapy Facilities to Expand Access to Ion Therapy for a much larger number of patients

- *More Compact & Cost-Effective, and Higher Performance Designs*
- *Incorporating R&D Innovations for treatment, like FLASH Therapy*

Hadron therapy the most powerful, yet still a niche in cancer therapy

Main factors for limiting growing:
Cost and Size

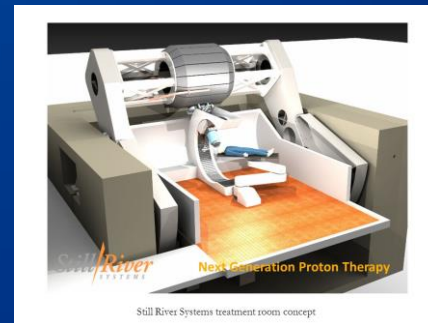
250 MEUR



Ion therapy
(protons + carbon ions)



Proton multi-room



Proton single-room

2 MEUR



X-ray linac

E.g. in 2018 world-wide 22,000 patients were treated with hadron therapy (p,C). In contrast, 25,000,000 patients were treated with conventional radiotherapy

New Growth Plan for the Western Balkans

Boosting the Western Balkans' socio-economic convergence with the EU & accelerating EU reforms



NOVEMBER 2023

#WesternBalkans
#EUEnlargement

€6 billion
€2 billion in grants
€4 billion in loans



SEE

IST

South East European
International Institute
for Sustainable Technologies

SEEIIST: A potential Flagship project for EU Enlargement



New Growth Plan for the Western Balkans

Boosting the Western Balkans' socio-economic convergence with the EU & accelerating EU reforms



NOVEMBER 2023

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€6 billion
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SEE
ST
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for Sustainable Technologies

New Growth Plan for the WB: 6 billion euro for 2024-2027

Only half of the total budget used so far



**With the support of HITRIplus –
Design Phase is getting finalized**

**SEEIIST is ready to start
construction**

Montenegro, as the leading EU Accession country, has the opportunity to mobilize funding and strengthen further regional collaboration.

Announcements

@CERN, 4th April 2025

**Symposium to
celebrate Ugo
Amaldi's 90th
birthday**



Symposium to celebrate Ugo Amaldi's 90th birthday

Online participation possible – Registration link here:

<https://indico.cern.ch/event/1513622/registrations/115000/>

Open Access Book on Hans J. Specht to be published by Springer in June

**‘Scientist and Visionary:
From a Fascination with Diversity
to a Lasting Impact on Society’**

**Foreword by Nobel Prize Laureate
Carlo Rubbia**

Springer Biographies



Hans Joachim Specht

Scientist and Visionary

Co-editors: Sanja Damjanovic, Volker Metag,
Jürgen Schukraft, and Hans J. Specht

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Springer Biographies

Acknowledgments

Many thanks to the **international research and medical community** for their support in making **SEEIST** a reality.



Special appreciation to **Sandro Rossi, HITRIplus Project Coordinator**.

Gratitude to **all members of HITRIplus** for their dedication and contributions.

Your collaboration has been instrumental in advancing this initiative.

Thank you!