

Kick-off Meeting of HFM R&D Line 4 Forum on Enabling Technologies

Introduction

Outline

- Main Objectives of HFM R&D Programme
- HFM R&D Consortium
- HFM R&D Programme Structure
- Main Challenges Facing the Development of Enabling Technologies for High-Field Accelerator Magnets

HFM Programme – broad goals

- The EU Accelerator R&D Roadmap identifies main objectives for the High Field Magnet Programme:
 - OBJECTIVE 1:
Design and demonstrate a full-size Nb₃Sn accelerator magnet to demonstrate the maturity of the most advanced technologies today, based on the HL-LHC design, i.e. 12 T magnets, and applying all the lessons learned from the US LHC Accelerator Research programme (LARP), the US High-Luminosity LHC Accelerator Upgrade project (AUP) and the HL-LHC project. The full-size demonstrator also aims to investigate at an early R&D stage the physical and technological effects associated with magnet length.
 - OBJECTIVE 2:
Explore the limitations of the LTS state-of-the-art technology and push Nb₃Sn magnet technology to its practical limits in terms of ultimate performance, towards the 16 T target targeted by the FCC-hh.
 - OBJECTIVE 3:
Explore the capabilities and limitations of state-of-the-art HTS and magnet technology based on these superconductors. Demonstrate the suitability of HTS superconductors for accelerator magnet applications by providing evidence of the use of HTS technology beyond the Nb₃Sn range, with a target in excess of 20 T.

HFM R&D consortium (present main contributors)

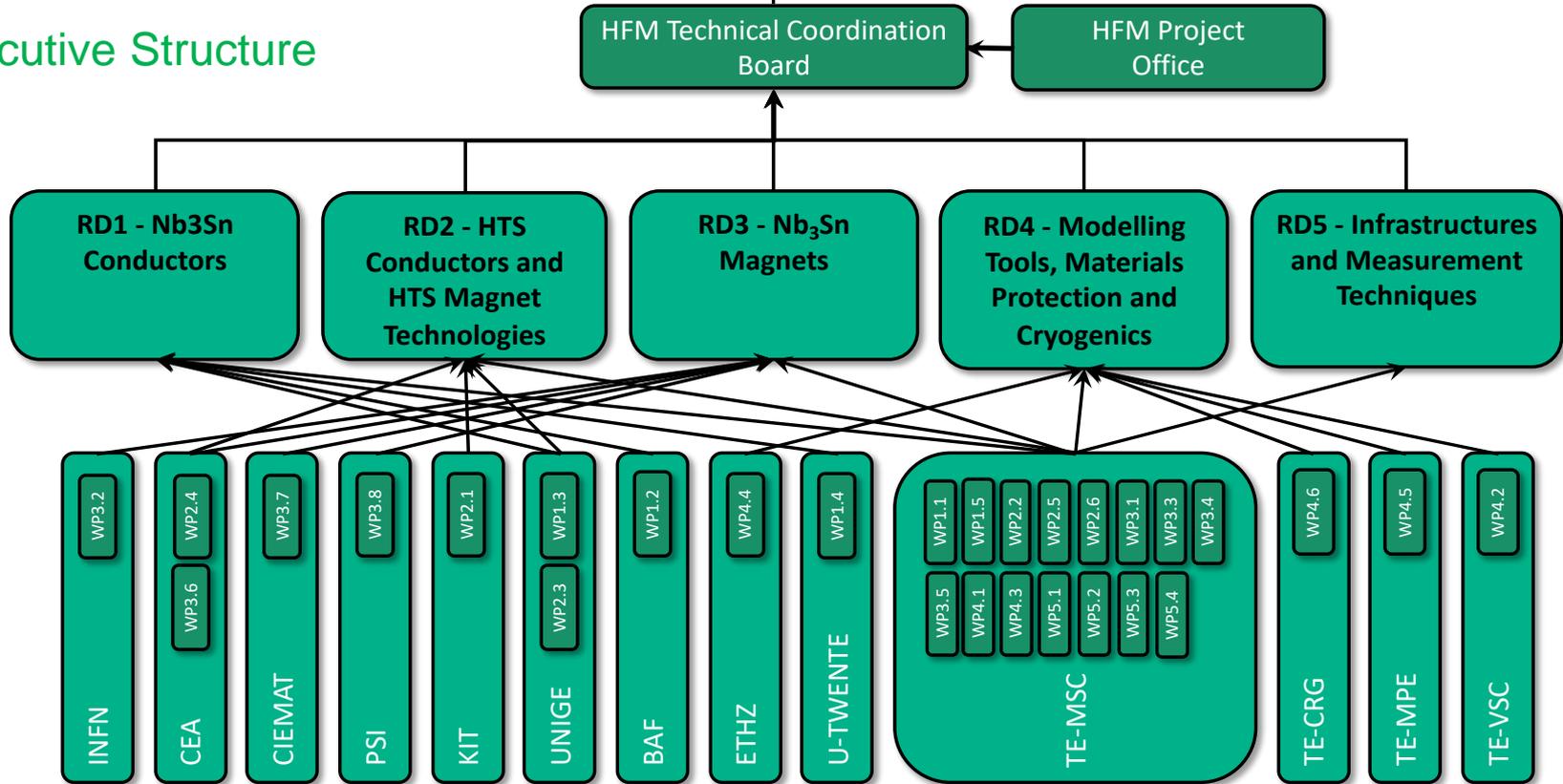


HFM Programme Executive Structure

Governance



Executive Structure



R&D Lines and Technical Coordination Board

- All established Work Packages shall coordinate their activities with other contributors in their respective R&D Lines at R&D-Line Fora.
- The R&D Line Coordinators keep an updated version of the integrated R&D Line Deliverable Plan.
- Any changes to the Deliverable Plan are discussed in the Fora and presented and decided in the Technical Coordination Board in a timely fashion.
 - Changes may occur, for example, as a consequence of R&D insights, new collaborations among HFM partners, or the required re-allocation of resources as a function of programme progress and needs.
- R&D Line 4 coordinators: [Stefania Farinon](#) and [Cedric Garion](#)

R&D strategy within the R&D Line 4

Enabling Technology R&D

- Present limitations of state-of-the-art HFM are often linked to enabling technologies that need to be further developed and advanced

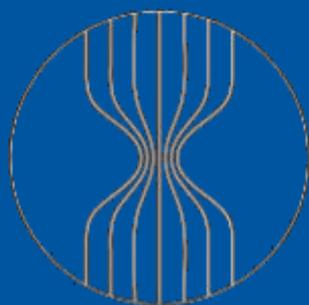
- Enhanced impregnation materials for HFM magnet coils
- Enhanced insulation materials for HFM conductors and coils
- New structural materials for HFM magnets with enhanced functionality through additive manufacturing
- Common modelling and simulation tools for HFM magnets
- Novel quench detection and protection methods for both Nb₃Sn and HTS high-field magnets
- Cryogenic and thermal management studies for HFM magnets



Enabling
Technologies

What is expected from the R&D Lines 4 Forum

- Coordination and harmonisation of the activities of all contributors to the R&D Line 4.
- Close collaboration with other R&D Lines, in particular R&D Line 2 and R&D Line 3.
- Triggering the discussions and driving innovations as part of the integrated R&D Line 4 delivery plan.
- Organisation of R&D Line 4 Forum meetings for experts, as well as regular "open" meetings for all members of the HFM community.



HFM
High Field Magnets