



Muon Production and Cooling Summary



Science & Technology Facilities Council

ISIS Neutron and Muon Source

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Goals

- Goals
 - Establish single baseline to take forwards to ESPPU 2025/6
 - Integrate the various concepts
 - Provide a bit of optimisation (depends on resource)
 - Get started on long lead-time items (e.g. target hardware tests)
- Jobs
 - Discussed on next slides
 - Resource estimates are **very preliminary**
 - Starting point for discussion, not an end
 - As usual resource estimates are strongly dependent on who is doing it





Beam Physics Design

- Beam physics design
 - 6D cooling system start-to-end baseline - 1 or 2 FTEs
 - HFoFo/initial cooling and Rectilinear A and B
 - Optimisation if possible
 - Study of RF gradient availability/impact if possible (RF WG)
 - Final cooling system optimisation - 1 or more FTEs
 - High field solenoid lattice
 - Magnet availability (magnet WG)
 - Alternatives - ?
 - Ancillary system optimisation - 1 or 2 FTEs
 - Chicane and front end
 - Charge separation
 - Bunch merge optimisation
- General studies - 2 FTEs
 - Impact of material physics processes
 - Impact of collective effects
 - Alignment and tolerances
 - Develop experimental validation of collective effects



Target Design

- Target magnet hardware design – 1 or 2 FTEs
 - Target magnet to end of chicane - magnet WG?
 - Shielding studies/heat load studies
 - Optimisation if time
- Target material study – 1 or more FTEs
 - Heat load/dynamic effects on graphite
 - Moving targets/novel geometries
- Horn backup option – 1 or 2 FTEs
- Radiation management in the target → chicane area – 1 FTE
 - Cooling system
 - Remote handling/etc concepts





Technology/prototypes

- Target prototypes - ?
 - Prototype targets – graphite, other
 - Beam tests on prototype target
 - Beam tests on superconductor
 - High power prototype solenoid target
 - Potentially long lead time for proton facility development
- Cooling hardware
 - RF cavities design, prototyping (RF WG)
 - Magnets design, prototyping (magnet WG)
 - Absorber design, especially liquid hydrogen absorber
 - 0.5 or more FTEs
 - Engineering integration studies and integrated prototype
 - 0.5 or more FTEs
 - Test facility (Test facility WG)

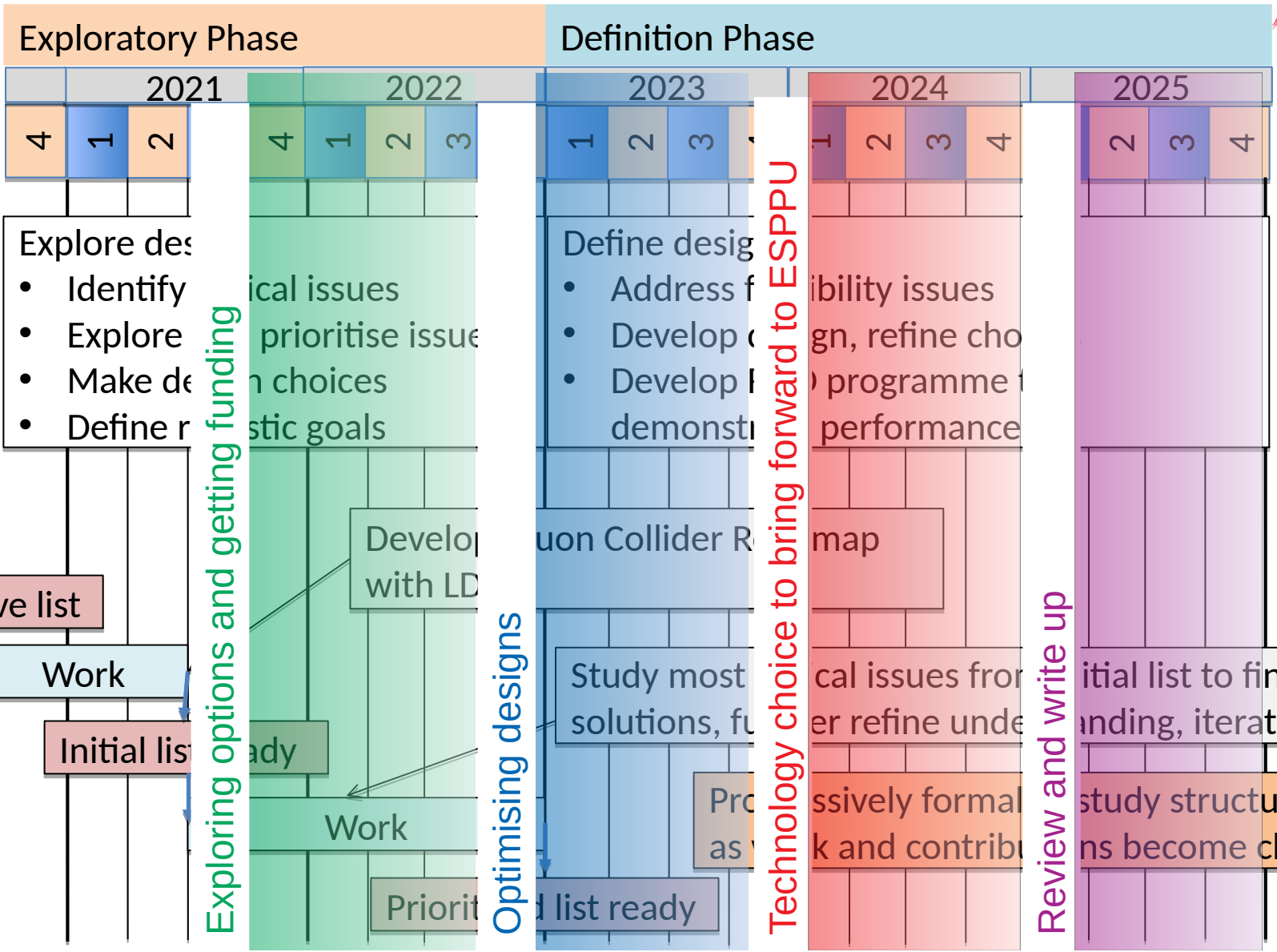


Technology Decision points

- Design has some lead time
 - Technology decisions need to be made early
- Target technology
 - Horn or solenoid
 - Fixed graphite or other
- Cooling technology
 - Gas-filled or Be window RF (RF WG)
 - Room temperature or IN2 RF (RF WG)
 - RF frequency (RF WG)
 - Peak solenoid field in final cooling (Magnet WG)
 - HFoFo → rectilinear interface point
- Technology decisions need to be made early
 - Or we follow multiple baselines (at what cost?)



Timeline until next ESPPU



Timeline until next ESPPU

