IDT-WG2-SRF report

Shin MICHIZONO (KEK/IDT-WG2)

(Jan.12, 2021)

Accelerator activities at ILC Pre-Lab phase

Technical preparations /performance & cost R&D [shared across regions]

- SRF performance R&D, quality testing of a large number of cavities (~100), fabrication and shipping of cryomodu validating shipping)
- Positron source final design and verification
- Nanobeams (ATF3 and related): Interaction region: beam focus, control; and Damping ring: fast kicker, feedback
- Beam dump: system design, beam window, cooling water circulation
- Other technical developments considered performance critical

Technical preparation (18 WPs)
(Technical_preparation_Ver2B.docx)

Final technical design and documentation [central project office in Japan and possibly regional project offices]

- Engineering design and documentation, WBS
- Cost confirmation/estimates, tender and purchase preparation, transport planning, mass-production planning and QA plans, schedule follow up and construction schedule preparation
- Site planning including environmental studies, CE, safety and infrastructure (see below for details)
- Review office
- Resource follow up and planning (including human resources)

Engineering Design Report (EDR)
(EDR_Ver2.docx)

Preparation and planning of deliverables [distributed across regions, liaising with the central project office and/or its satellites]

- Prototyping and qualification in local industries and laboratories, from SRF production lines to individual WBS items
- Local infrastructure development including preparation for the construction phase (including Hub.Lab)
- Financial follow up, planning and strategies for these activities

Planning and preparation of Hub lab.

Civil engineering, local infrastructure and site [host country assisted by selected partners]

- Engineering design including cost confirmation/estimate
- Environmental impact assessment and land access
- Specification update of the underground areas including the experimental hall
- Specification update for the surface building for technical scientific and administrative needs

Civil engineering

ILC Pre-Lab

Real cavity and cryomodule production

ML&SRF

- WP-1 Cavity production
- WP-2 Cryomodule transfer
- WP-3 Crab cavity

Sources

Electron source

- WP-4 Electron source

Positron sources

Undulator scheme

- WP-5 Undulator
- WP-6 Rotating target
- WP-7 Magnetic focusing

E-driven scheme

- WP-8 Rotating target
- WP-9 Magnetic focusing
- WP-10 Capture cavity
- WP-11 Target replacement

DR

- WP-12 System design
- WP-13 Collective effect
- WP-14 Injection/extraction

BDS

- WP-15 Final focus
- WP-16 Final doublet

Dump

- WP-17 Main dump
- WP-18 Photon dump

Review in February (or March) 2021.
Three reviewers from each region (US, Europe, Asia).
3 days * 2 hours each? (maybe 1day for SRF sub-group)

Mandate of the review committee:
-Are there any omissions as an international technical issue to be addressed during the ILC's four-year preparation period?
-Is the content of each WP reasonable (about the content, not the cost or number of people)?

Proposal of Pre-lab timeline

Shin MICHIZONO (KEK/IDT-WG2)

(Jan.08, 2021)

If all (IDT-EB/IDT-WG2/Sources subgroup) agree, I would like to change the timing of positron selection so that we can receive global support.

Assumed Pre-lab timeline (current version)

For Engineering design

1st year: Work on TDR-based cost-estimate confirmation, started by an international team centered on the Pre-lab.

2nd year: Complete the cost-estimate confirmation, and an internal review in the latter half of the 2nd year.
The review also reports on the progress of technical issues during the preparation period.

3rd year: Conduct an external review and completed scrutiny of costs and risks.
Complete the draft of Engineering Design Report (EDR).

4th year: Publish EDR (in first half yr), report progress on technical issues,and prepare each large bid.

For technical preparation (example of SRF and positron)

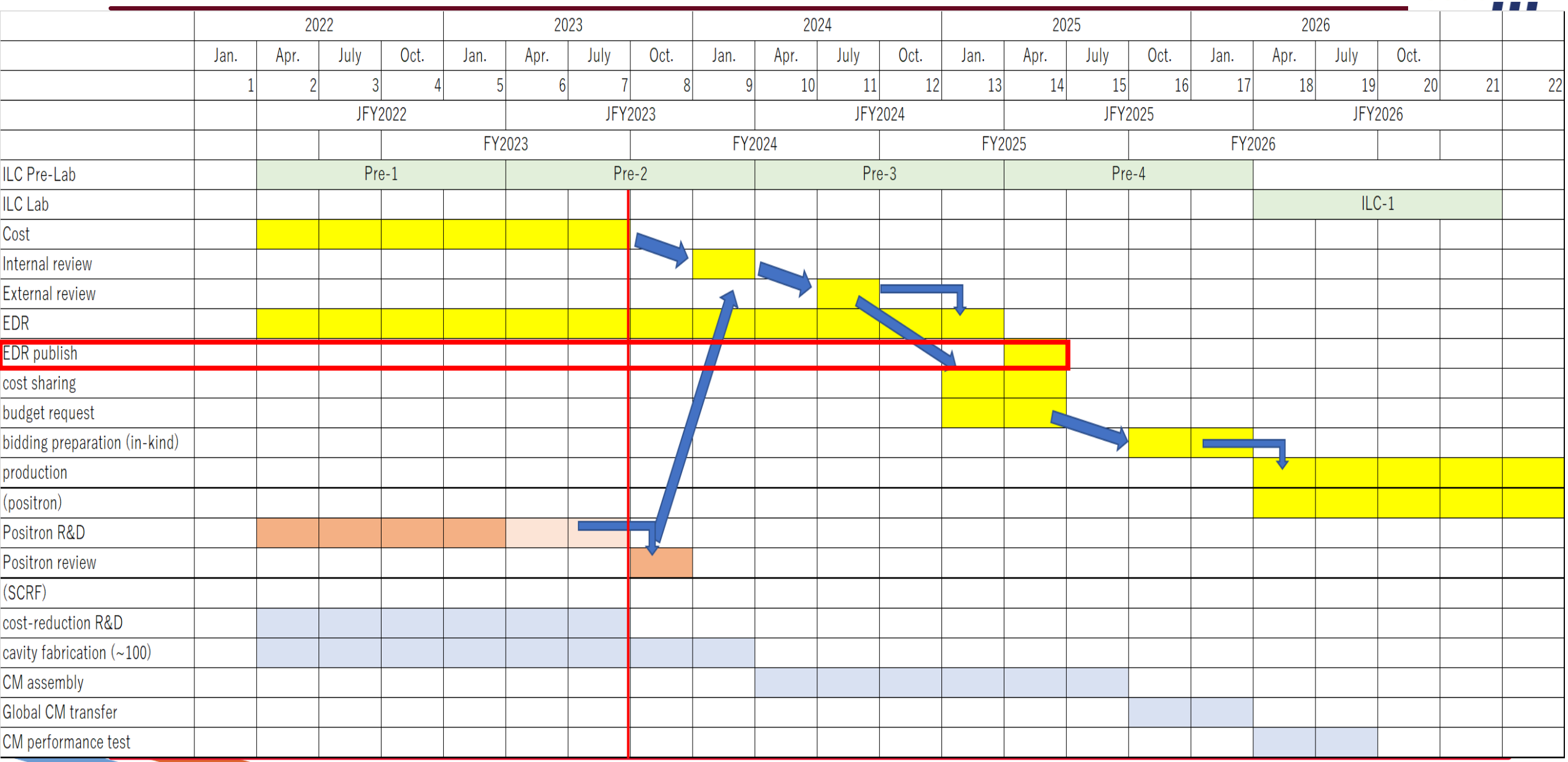
1st year: Extend SRF cost reduction R&D, Start a pre-series SRF cavities production preparing for industrialization
Continue positron survey

2nd year: Complete SRF cost-reduction R&D, and extend the work to assemble the cavities with cryomodule (CM),
Select positron scheme

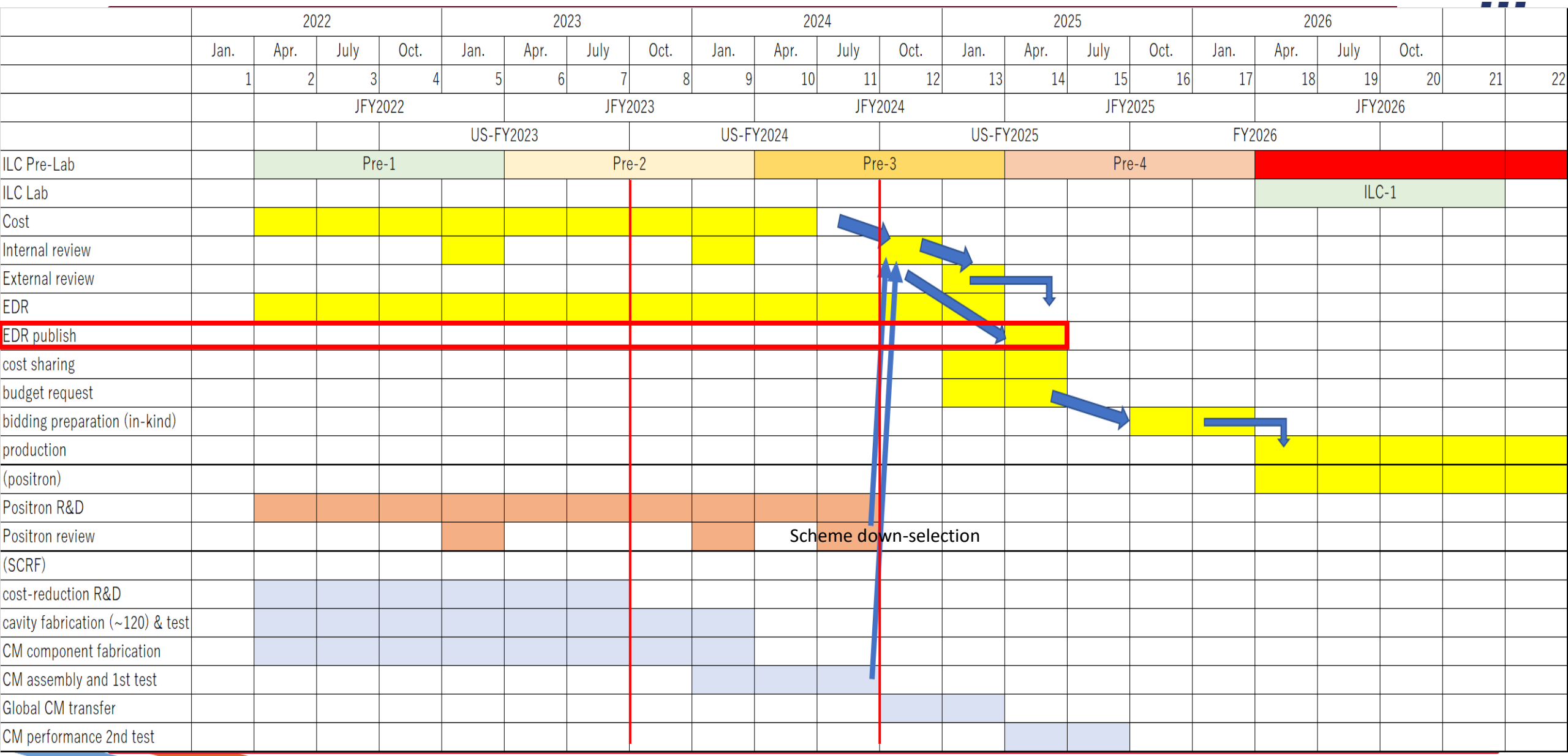
3rd year: Demonstrate "Cryomodule Global transfer, aiming at HPG legal-process, shipment, and SRF QA test after transport
Mature Lab. planning and preparation
Prototyping of critical items (such as positron target)

4th year: Evaluate CM performance after CM shipment, and prepare for Hub Lab. functioning
Progress prototyping of critical items (such as positron target)

(current version)



(revised version)



TDR experience/ advantages

- Nov., 2012 Internal Cost Review (FNAL)
- Dec.,2012 Program Advisory Committee (TDR review)
- Feb.,2013 External Cost Review (Windsor, UK)
- June,2013 TDR publishing

- Moved positron decision from 2nd year to mid 3rd year
- Moved Cost's Internal Review from the end of the second year to the middle of the third year
- External Review 3 months late
- EDR publishing remains unchanged at the beginning of the fourth year

Consistent with TDR schedule

Merit:

- Americas/Europe are interested in positrons, but the FY2023 budget will not be enough.
- It will be possible to make contributions on FY2024.
- It is also possible to include the results of the yield of superconducting cavities.

Demerit:

- Internal Review is delayed by 6 months. (Moved from the end of the second year to the middle of the third year)

Engineering design schedule

For Engineering design

1st year: Work on TDR-based cost-estimate confirmation, started by an international team centered on the Pre-lab.

2nd year: Complete the cost-estimate confirmation, and an internal review in the latter half of the 2nd year.
The review also reports on the progress of technical issues during the preparation period.

3rd year: Conduct an external review and completed scrutiny of costs and risks.
Complete the draft of Engineering Design Report (EDR).

4th year: Publish EDR (in first half yr), report progress on technical issues,and prepare each large bid.

(revised)

For Engineering design

1st year: Work on TDR-based cost-estimate confirmation, started by an international team centered on the Pre-lab.

2nd year: Conduct internal Program Advisory Panel on the progress in technical and cost-confirmation issues.

3rd year: Complete the cost-estimate confirmation.
Conduct internal and external Cost-confirmation Reviews and completed scrutiny of costs and risks.
Complete the draft of Engineering Design Report (EDR).

4th year: Publish EDR (in first half yr), report progress on technical issues,and prepare each large bid.

Technical preparation schedule

For technical preparation (example of SRF and positron)

1st year: Extend SRF cost reduction R&D, Start a pre-series SRF cavities production preparing for industrialization
Continue positron survey

2nd year: Complete SRF cost-reduction R&D, and extend the work to assemble the cavities with cryomodule (CM),
Select positron scheme

3rd year: Demonstrate "Cryomodule Global transfer, aiming at HPG legal-process, shipment, and SRF QA test after transport
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(revised)

For technical preparation (example of SRF and positron)

1st year: Extend SRF cost reduction R&D, Start a pre-series SRF cavities production preparing for industrialization
Continue positron survey, positron review

2nd year: Complete SRF cost-reduction R&D, and extend the work to assemble the cavities with cryomodule (CM),
Positron review

3rd year: Demonstrate "Cryomodule Global transfer, aiming at HPG legal-process, shipment, and SRF QA test after transport
Mature Lab. planning and preparation
Establish positron scheme down-select, prototyping of critical items (such as positron target)

4th year: Evaluate CM performance after CM shipment, and prepare for Hub Lab. functioning
Progress prototyping of critical items (such as positron target)