IMPORTANT ELEMENTS FOR A FUTURE COLLIDER

ESPP-NL WG#2

- Clara Nellist
- Gerhard Raven
- Tristan du Pree

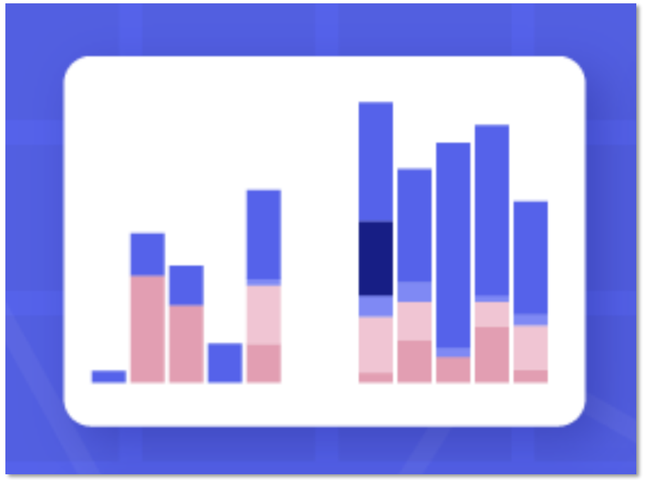
ELEMENTS

Question from ECFA

- “What are important elements for next major project at CERN?”

List of elements

- ECFA:
  - Timing, finances, sustainability..
- Nikhef SWOT:
  - Readiness, innovation, outreach…



Goal today: score the various elements

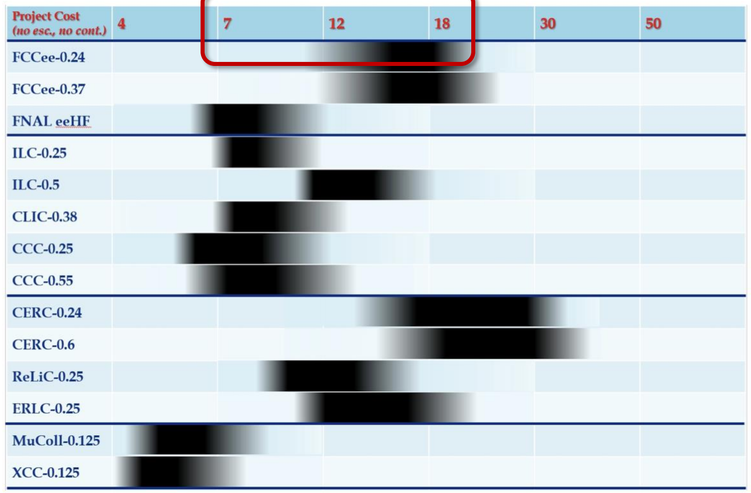
- Next slides: some background info to illustrate differences

MONEY

Figure from Snowmass

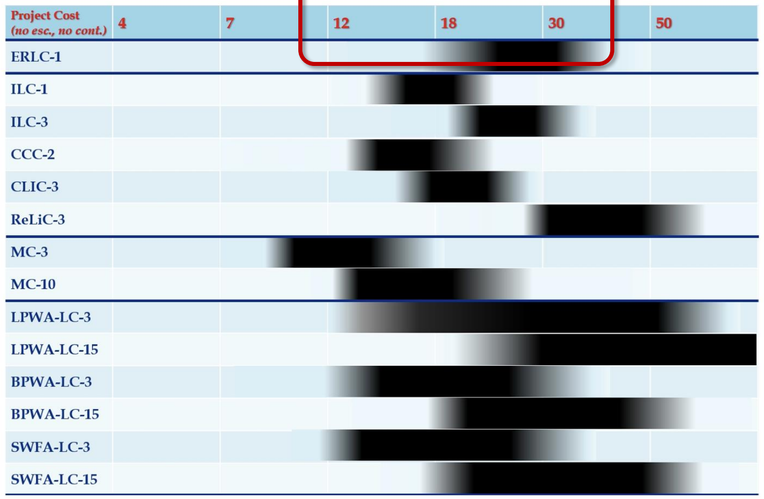
Variety in costs:

5-20B$



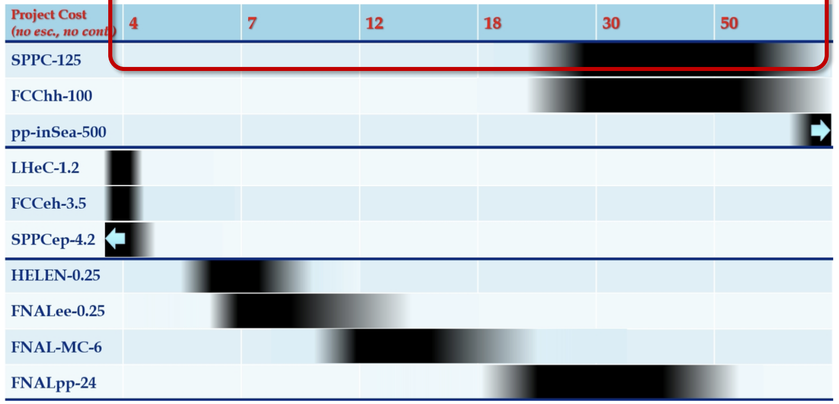
Higgs factories

10-30B$



Lepton upgrades

1-100B$



Hadron upgrades

MONEY

Figure from Snowmass

Example: Higgs factories

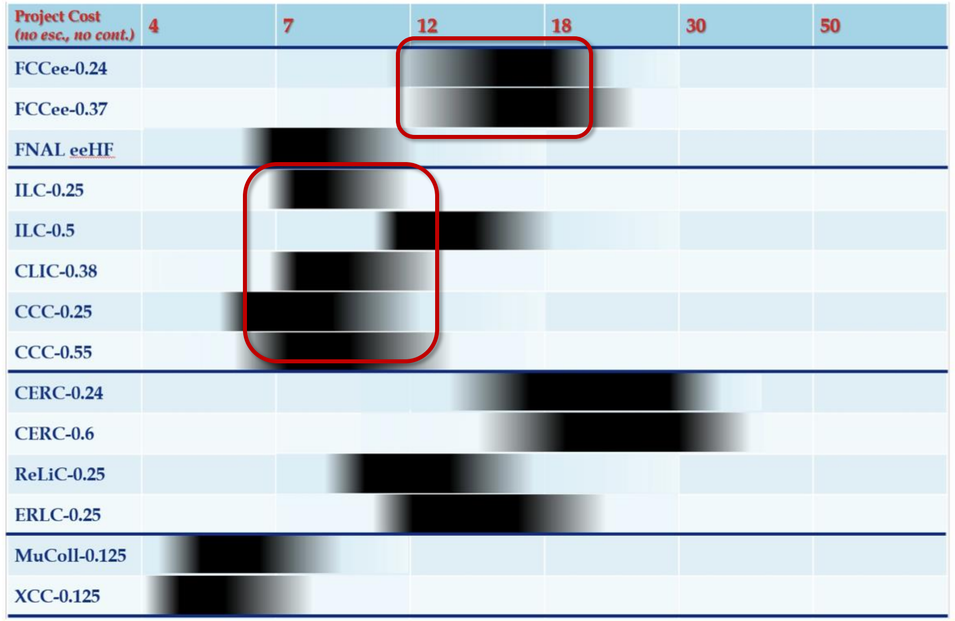


Figure 8. The ITF cost model for the EW/Higgs factory proposals. Horizontal scale is approximately logarithmic for the project total cost in 2021 B$ without contingency and escalation. Black horizontal bars with smeared ends indicate the cost estimate range for each machine.

FCC-ee: 12-20 B$

LC: 7-12 B$

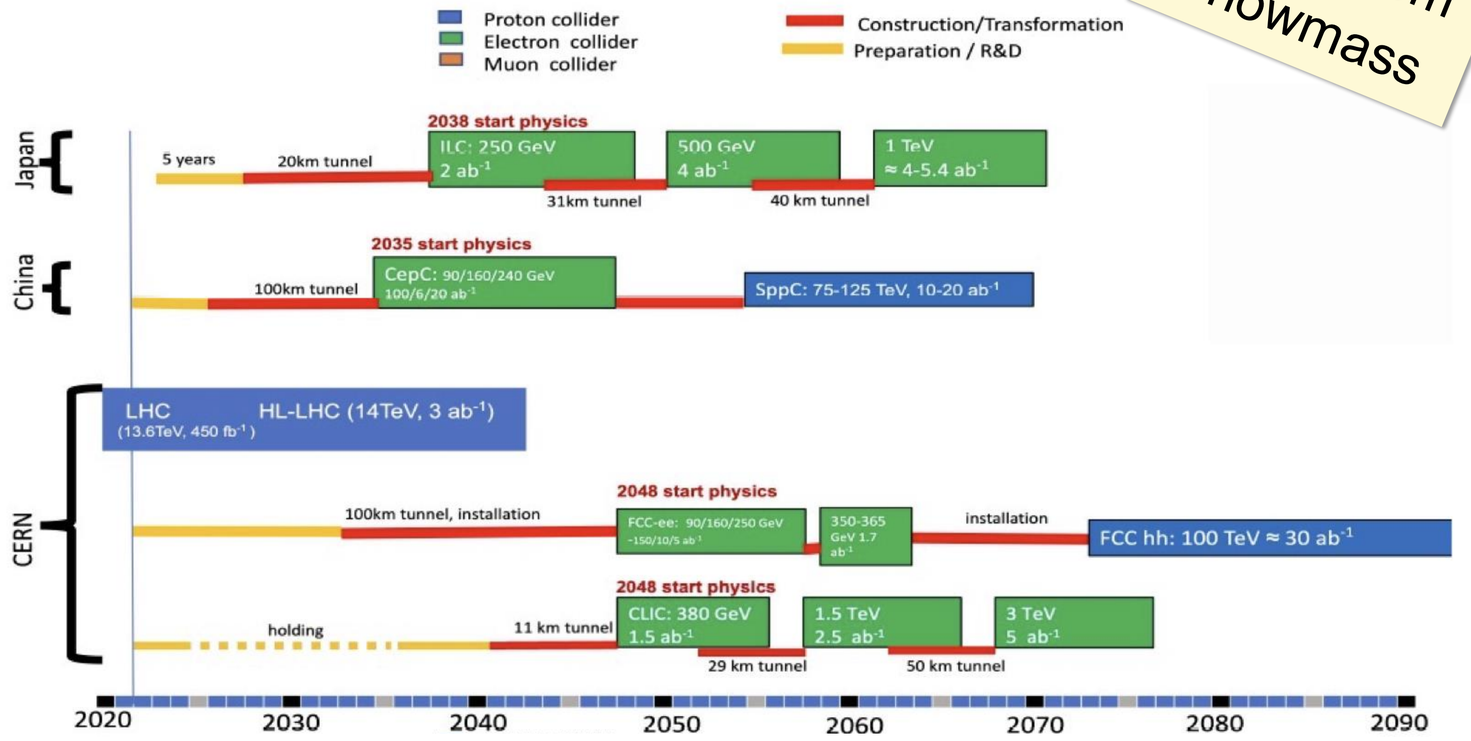
Cum grano salis

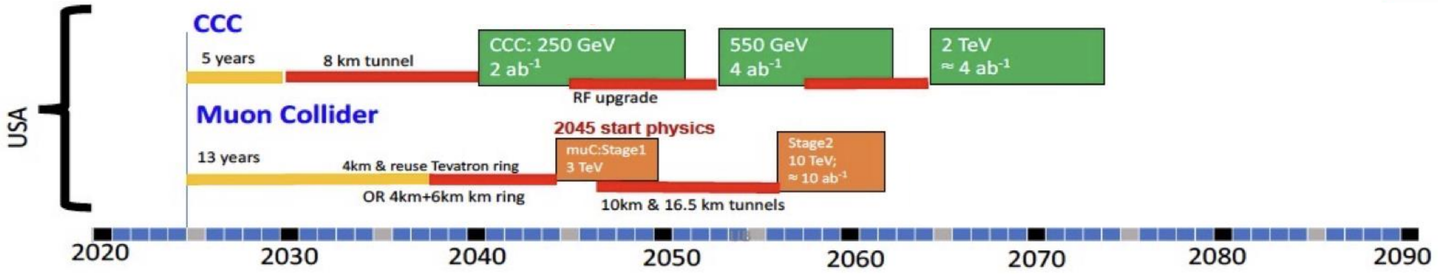
TIMELINES

Figure from Snowmass

Start dates:

- CepC: 2035
- ILC: 2038
- FCC: 2048
- MuCol: 2045-50





From 2030s to 2050

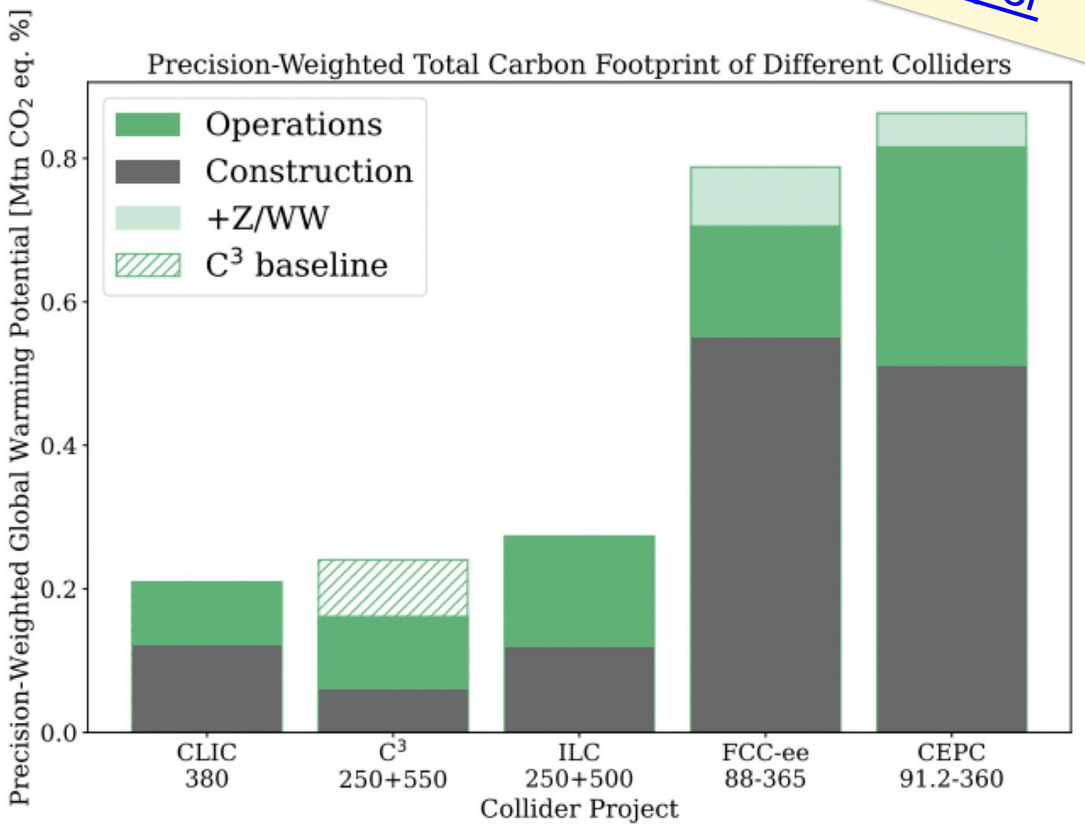
- Driven by politics & finances & technology

SUSTAINABILITY

C3 workshop at Nikhef
Link to paper

Variation in carbon footprint

- Construction and operation
  - Figure for illustration



Cum grano salis

QUESTIONNAIRE ELEMENTS

- Timing
  - Start date
- Schedule flexibility
  - Adapt to developments
- Prospects
  - Long-term planning
- Readiness
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- Resources feasibility
  - Human & Financial
- Careers & training
  - Young generation
- Environmental sustainability
  - Carbon footprint
- Other?
  - (fill+grade)

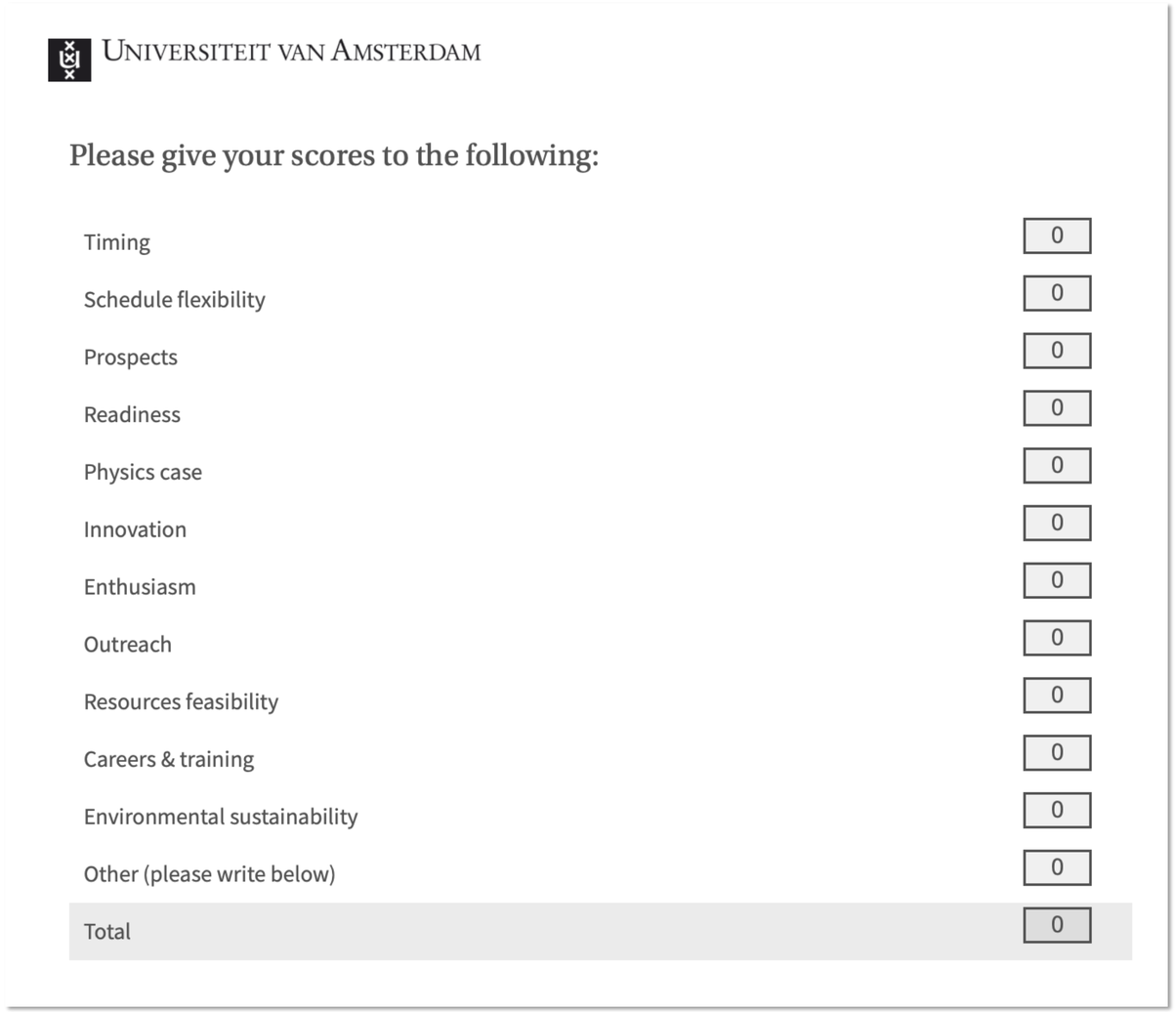
QUESTIONNAIRE

Fill in with groups:

- Zoom online
- In the room
  - Make a group with 5/6 people

Divide 100 points

- Use Qualtric
  - On your phone:
    - https://uva.fra1.qualtrics.com/jfe/form/SV_6lOCSbtRDWIJmZ0



QUESTIONNAIRE

Each group:

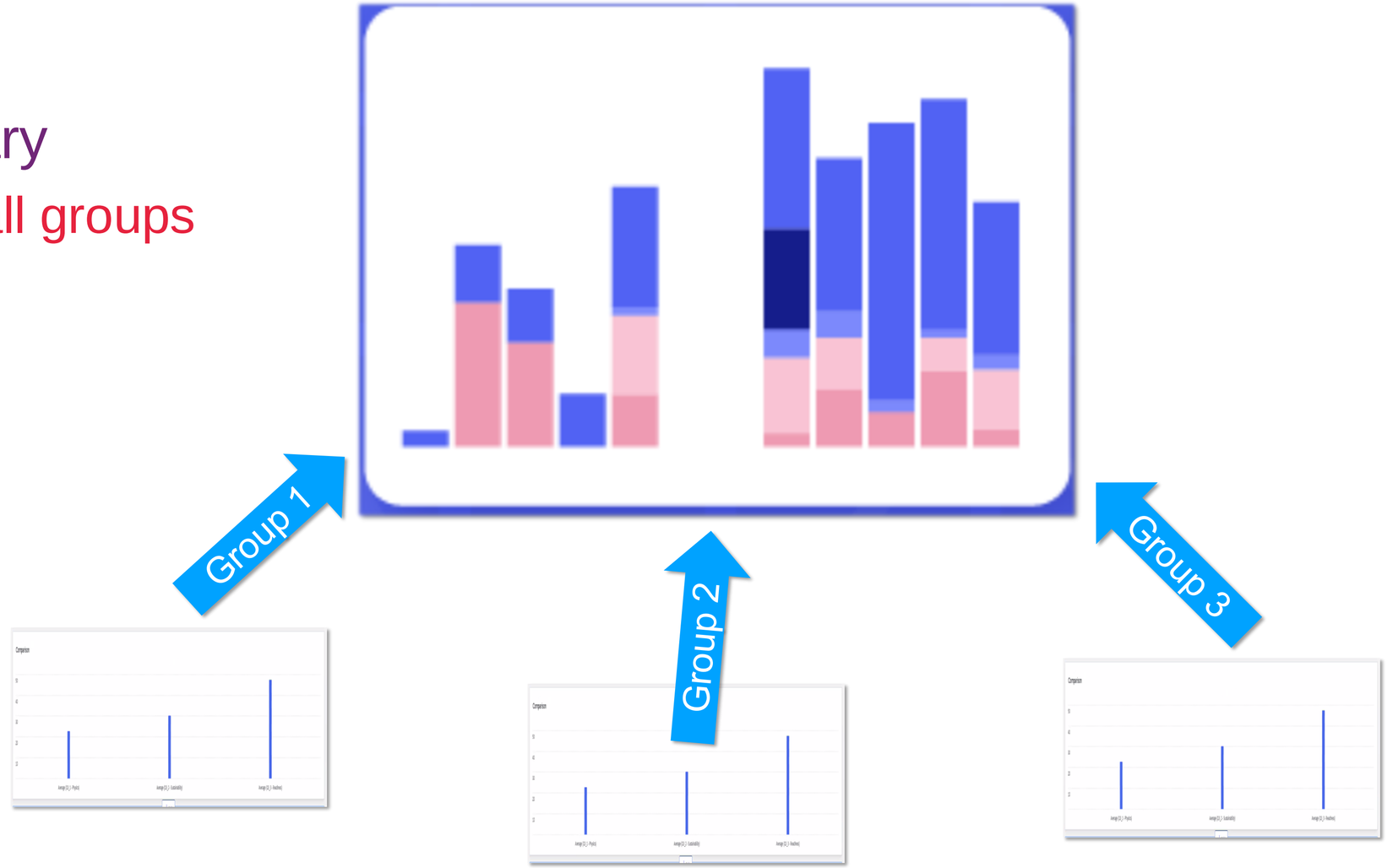
- Presentation at end of session
  - One representative for each team

Main conclusions and important observations

QUESTIONNAIRE

Summary of results

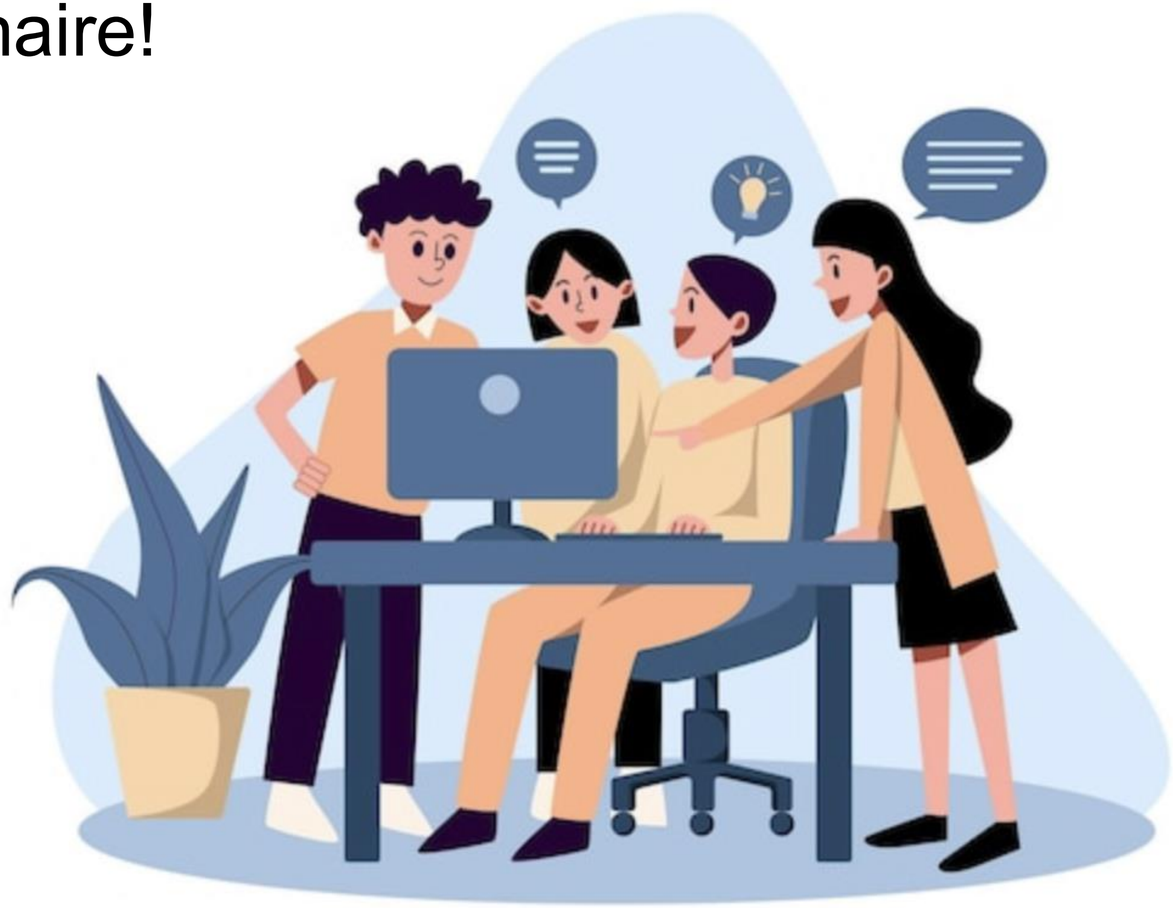
- Afternoon plenary
  - Average over all groups



LET’S GO!

Let’s make groups and fill in questionnaire!

- Scan QR code with your phone 📱
  - Back at ~13:50



BACKUP

ESUPP – WORKING GROUP #2

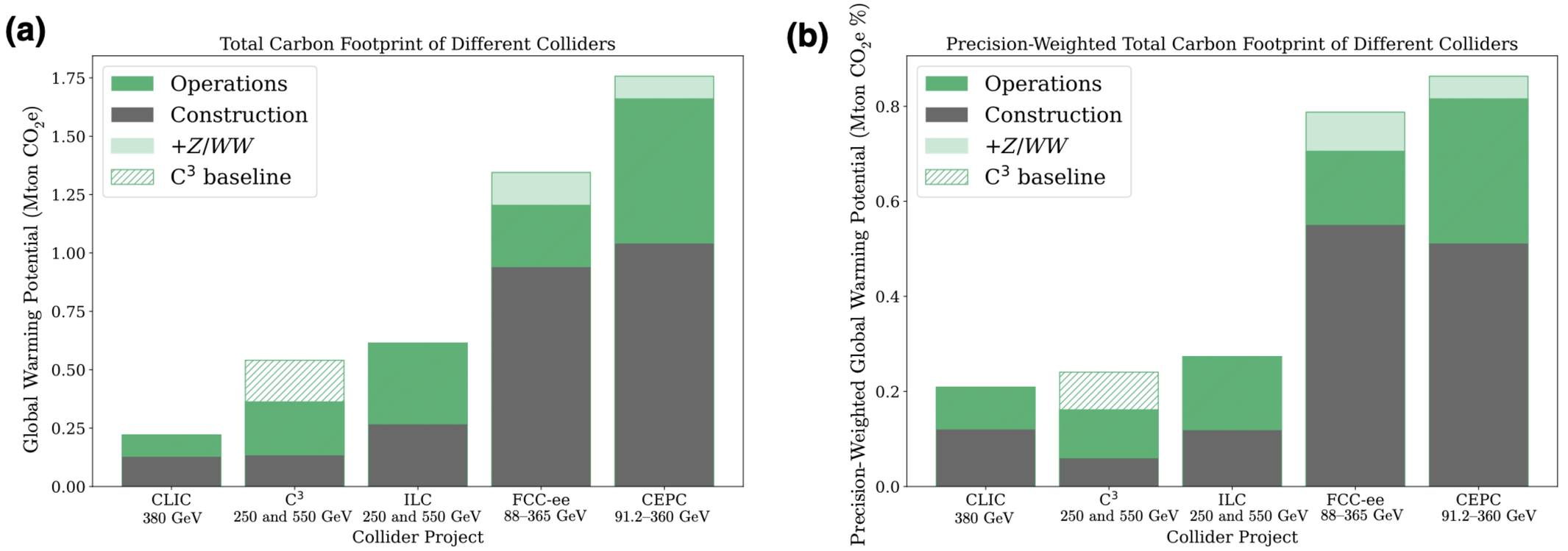
Subgroup on Priorities (Clara+Gerhard+Tristan)

- Goal: get a list of priorities
- Starting point:
  - The priorities list provided by ECFA
  - The outcome of the previous Nikhef SWOT analysis
- Approach (proposal)
  - Divide the people in smaller groups
  - Give groups the list of priorities from ECFA+SWOT
  - Let groups divide e.g. 100 points over the list of items
  - Have a plenary session to discuss/compare the output
- Before 15 October: first try-out will be done with a small group of students/postdocs

SUSTAINABILITY

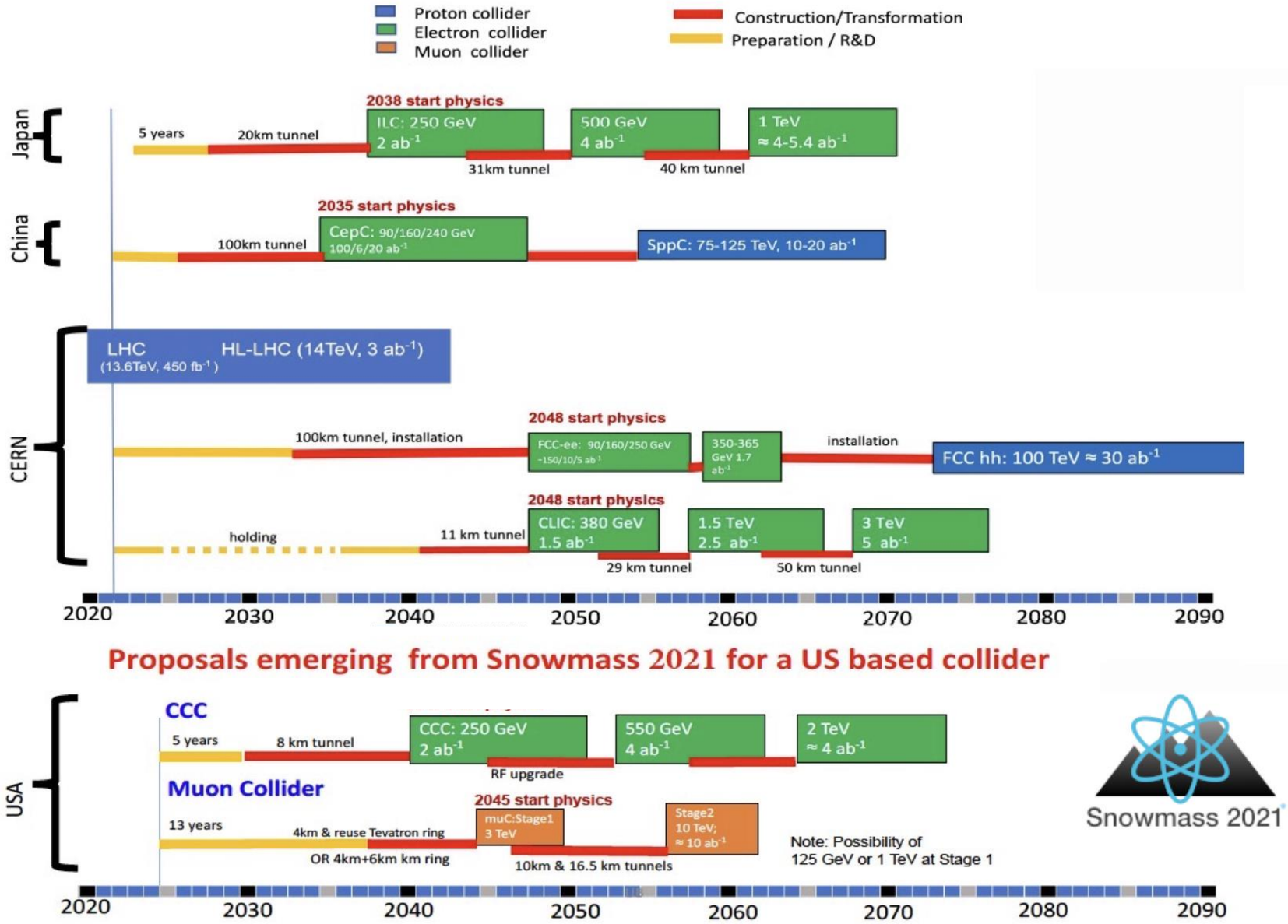
Presented during C3 workshop at Nikhef (7-8 October)

[Link to paper]



TIMELINES

From Snowmass:



LC VISION

Michael Peskin (SLAC)

The plan:

The first step is construction of the 250 GeV ILC at CERN.

This requires a 20 km tunnel in the plain near Lake Geneva, a plan already studied by CLIC. We envision 2 interaction regions sharing luminosity.

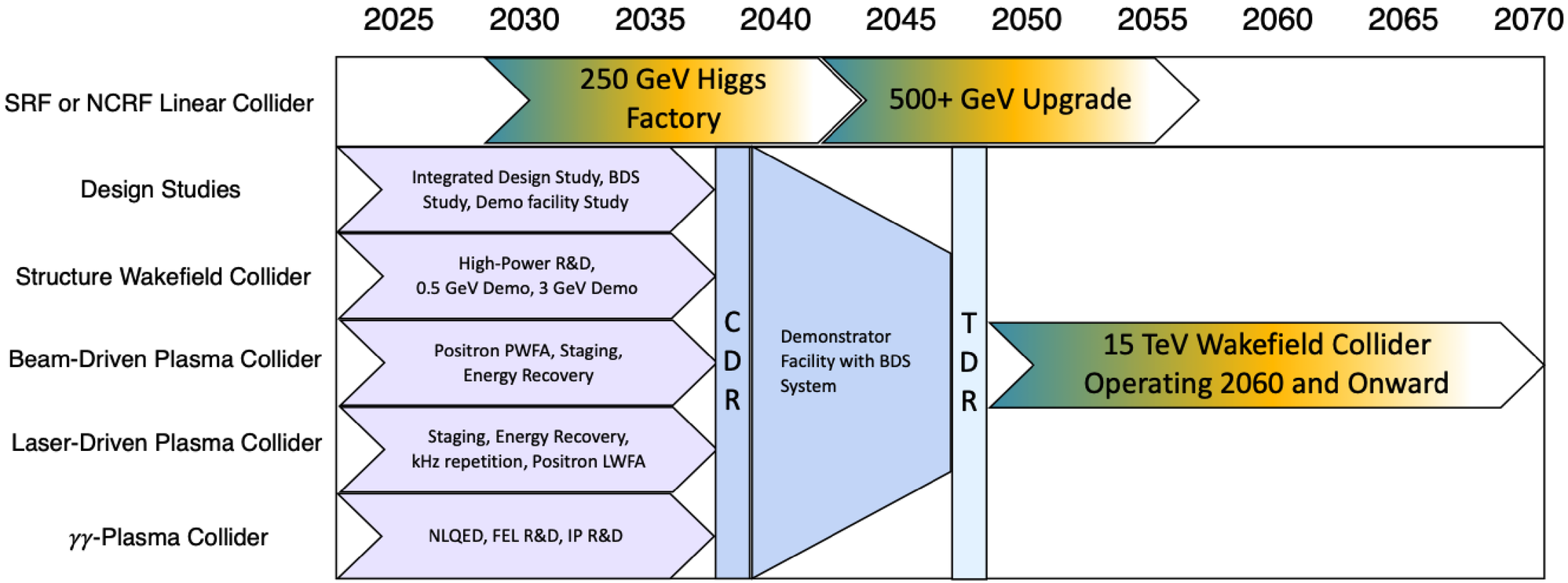
After 10 years construction and 10 years data-taking at 250 GeV (+ GigaZ ?), the accelerator will be upgraded in stages with different technologies to achieve higher energy and/or higher luminosity.

Many alternatives exist: higher gradient SRF, higher gradient copper, CLIC, energy recovery linac, gamma-gamma collider, plasma wakefield. We will ask, what is the best alternative at each stage.

In later stages, the 2 interaction regions can be used by sharing luminosity, by running parallel programs at higher and lower energy, or by using one as a testbed for technology development.

TIMELINE

Caterina Vernieri (SLAC)



Wakefield Accelerators can be developed in parallel with the operation of Linear Collider Higgs Factories to provide a staged upgrade path to the energy frontier.