SiD – Beyond Snowmass

Andy White
University of Texas at Arlington

for the SiD Concept

Snowmass 2013

- A major branch point for U.S. High Energy Physics

- A chance to review all possibilities for a future program

- Not setting priorities! But hopefully “guiding” the next P5 !

- We must provide input to meetings, papers!

- Not all options can be pursued/afforded

- A future Linear Collider *must* be a major choice!

- The U.S. must be part of the full exploration of the Higgs!

Beyond Snowmass

HEPAP will constitute a "P5'" to set priorities

Jim Siegrist has expressed the need for "options" for 2015-16 →

I believe that the essential point is:
The discovery of the (assumed) Higgs Boson is a truly fundamental event for all of science. While many aspects of Higgs physics can be explored at the LHC (eventually), this phenomenon is of such basic significance that we can not simply "leave it at that": we must fully explore the Higgs with a precision of a Linear Collider physics program that is able to clearly establish its nature beyond doubts of theoretical interpretation.

SiD Beyond Snowmass

We have a viable detector concept that we believe

a) can be built !

b) will deliver required performance to achieve physics goals

c) can evolve as technologies improve or innovations appear

Evolution towards a TDR:

- when to begin?
- is the formation of a collaboration needed first?
- from where will the engineering and other resources be found?

R&D: what must be continued/completed?

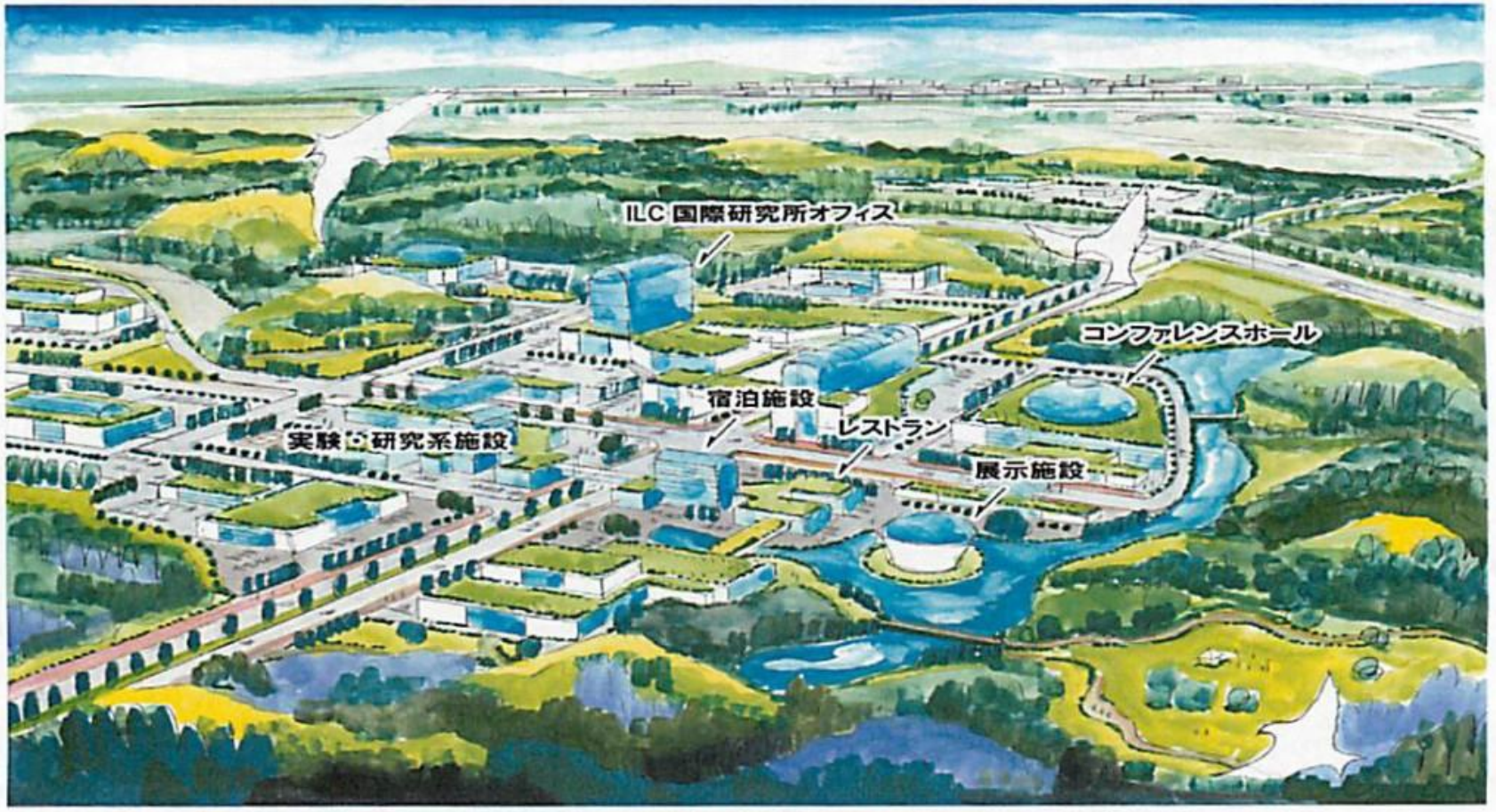
Future of SiD

(extract from a letter to Lyn Evans (July 2012))

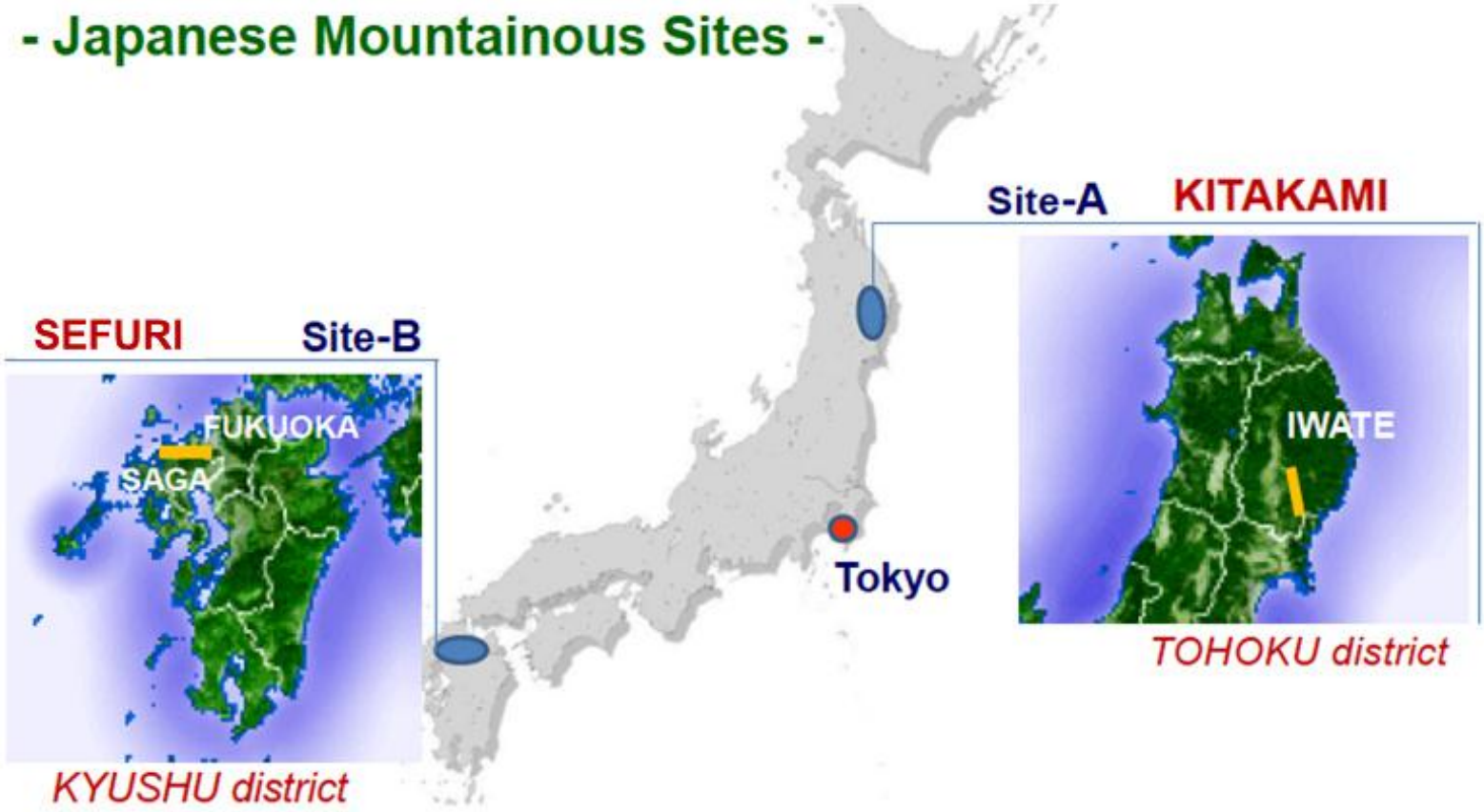
Given this successful program to develop the SiD Concept , we would like to express **how we see the future path for SiD**. There are several aspects to this from the detector, physics, organizational, and resource perspectives. As a detector concept we strongly believe that, while technologies and/or their implementations may evolve over time**, SiD will remain an excellent tool for exploration of physics at a linear collider**. We therefore propose to further study and develop SiD as new information emerges in the Higgs and possibly other new physics areas. There are many areas of detector R&D that must be further developed and completed, followed by studies of specific implementations in a full technical design. In parallel, while a limited number of physics processes will be studied for the SiD DBD, there are many other processes that should be addressed in continued studies. **The sum of all these detector and physics activities points towards a lively and sustained effort on SiD as a well identified concept moving forward into the next phase of linear collider development**. We therefore see SiD as a vital element of the future program and a major component of the "Physics and Detectors" section of the new organization.

→ We must move towards securing SiD's role in a future ILC

Destination Japan?



Destination Japan?



What is needed?

Hitoshi Yamamoto

- Japanese government is now willing to negotiate with other governments toward siting the ILC in Japan.
- If the negotiation fails, there will be no ILC in Japan (and probably anywhere).
- In order for the US government to commit substantial resources to the ILC in Japan, your support is essential.
- A critical step is the Snowmass Process.
- We will attend the snowmass workshops as much as possible.
  - Coordination with the US HEP people is neccesary.

SiD and Japan?

What can we do to help promote the ILC in Japan?

What can we do to sustain SiD as a central part of the future ILC program?

Connections have been/are being established for cooperation on the ILC accelerator…need to work with new AD for Physics and Detectors

Where does SiD fit in this picture? How/when do we establish SiD as an entity in the ILC Global Lab?

With Japanese overtures expected in the first part of 2013, we should be ready to keep SiD prominent in ILC planning.

FutureTimeline.net

Expectations for 2019

The International Linear Collider is completed

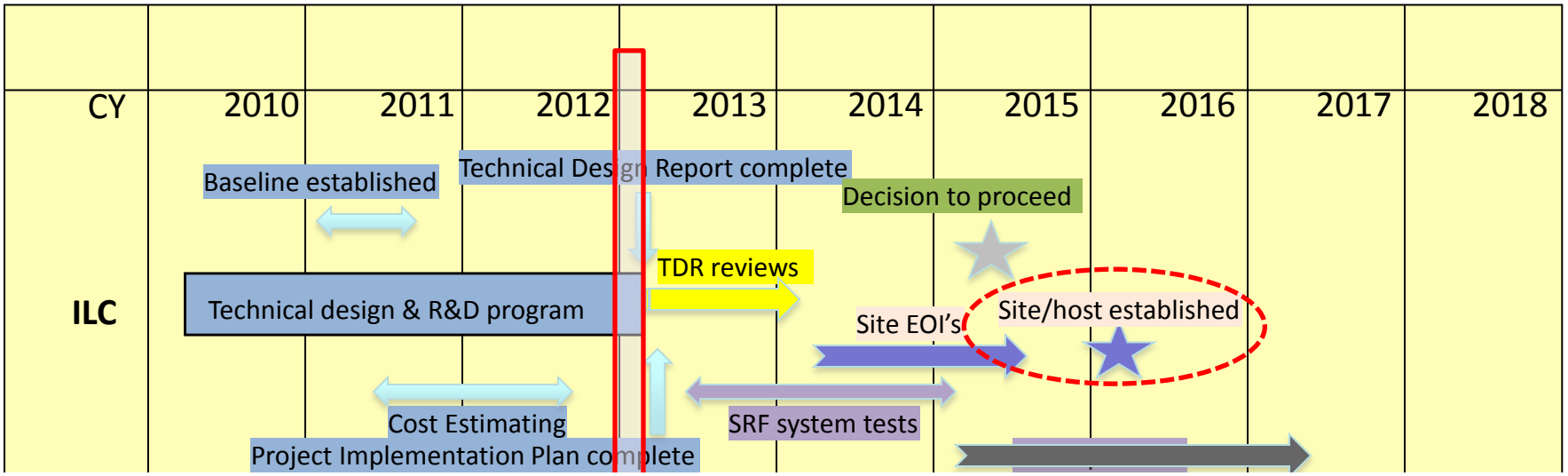
This project is the culmination of more than 20 years of concerted international effort, with funding and research from nations in Europe, Asia and the Americas. Over 300 universities and laboratories have taken part. It originated as a series of three separate collider proposals - the Next Linear Collider (NLC), the Global Linear Collider (GLC) and the Teraelectronvolt Energy Superconducting Linear Accelerator (TESLA), all of which were combined into the International Linear Collider (ILC).*

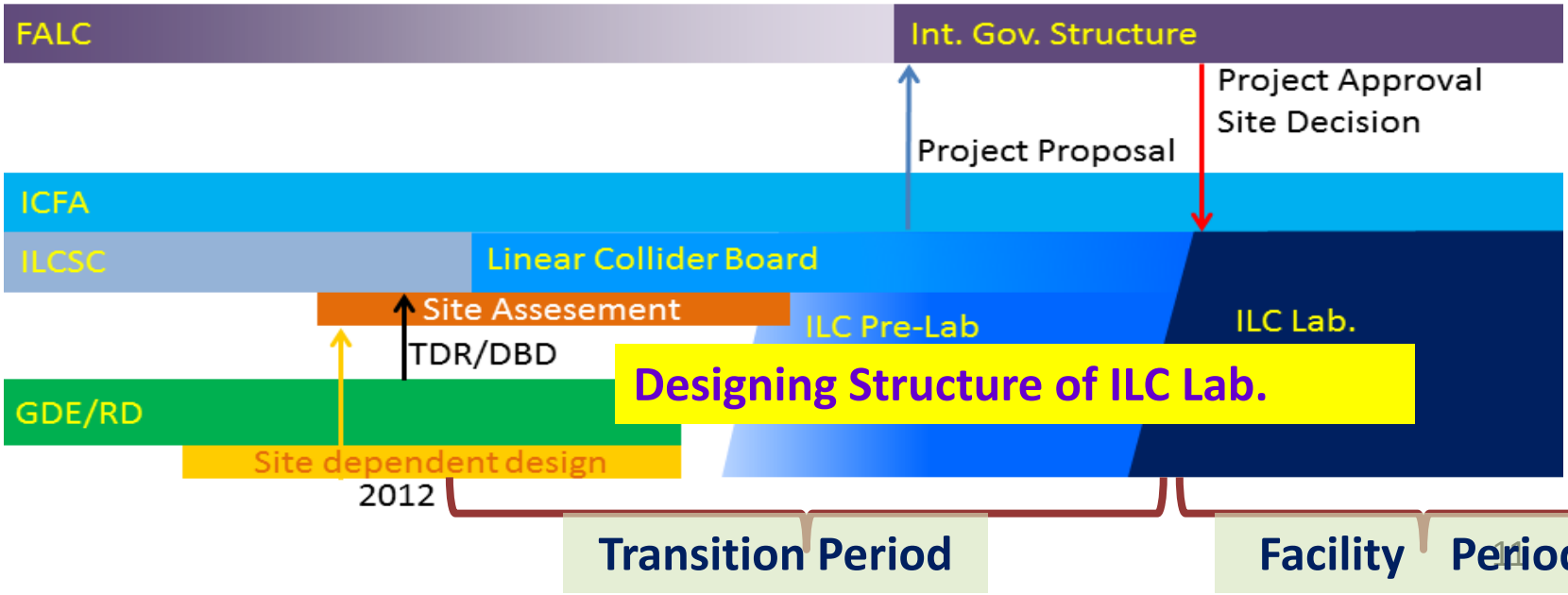
Located in Europe, the ILC is the successor to the Large Hadron Collider (LHC), building upon the work already done by that machine. Although its collisions are less powerful, it offers far more precise measurements. It also gives off less electromagnetic radiation.

The ILC consists of two opposite-facing linear accelerators, together stretching 31 kilometers (19.3 miles), that hurl particles and anti-particles towards each other at close to the speed of light.* Along with the linear accelerators, the facility contains two dampening rings, with a circumference of 6.7 kilometers (4.2 miles). Current energy levels of the collisions are 500 billion-electron-volts (GeV), but will soon be upgraded to a trillion-electron-volts (TeV).

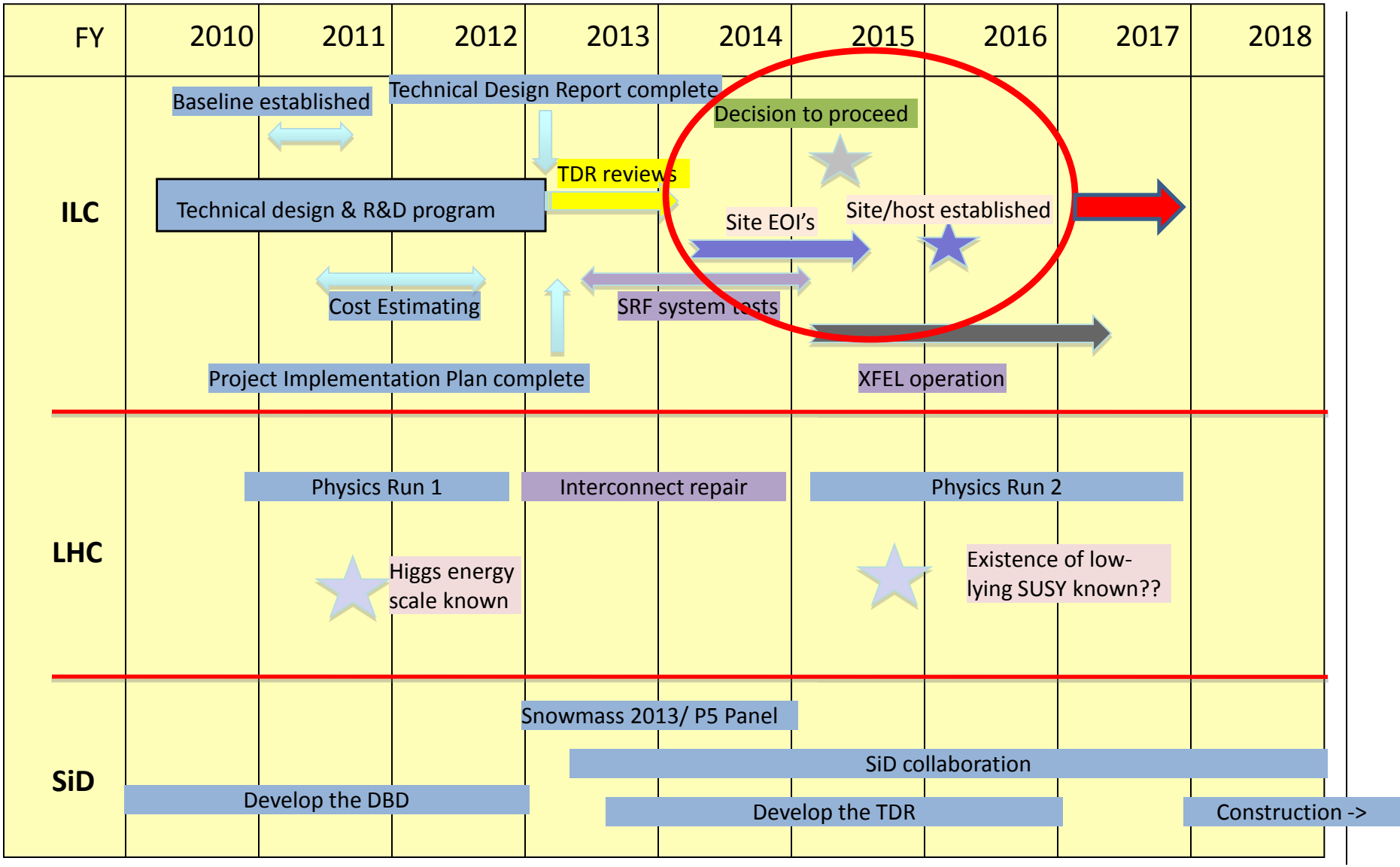
The extreme precision and exact recordings offered by the ILC help to reveal some of the deepest mysteries of the universe. Some of the experiments are concerned with extra-dimensional physics and supersymmetric particles, while others provide research into dark matter.*

Possible Timeline (by A. Suzuki)





ILC possible timeline



SiD Beyond Snowmass

QUESTIONS:

- Will the Higgs remain as the only new physics in the LHC range?
- If so, how does this affect the case for the ILC?

- If higher mass objects are discovered in the TeV range, how will that affect the ILC – is CLIC then more “natural”.

- How do we deal with the “wait for more LHC results” argument?

- How do we sustain/grow SiD before ILC becomes a real project?

SiD Collaboration

Define our role as a future partner in the ILC

A visible entity in the HEP community

A basis for attracting new colleagues

A platform for future funding

A detector design/organization ready to go for TDR/construction when the time is right

SiD Beyond Snowmass

A possible plan:

- Complete the DBD
- Secure DoE support for the interim
- Organize the SiD contributions to Snowmass
- Organize submissions to HEPAP/P5
- Expand SiD with more participation from other regions
- Pursue the US-Japan R&D possibility
- Form the SiD Collaboration
- Get SiD Collaboration recognized by the LCO, Japanese-ILC, KEK,…
- Establish an SiD base within the Global ILC Lab
- Work to support the ILC as a global project
- Create a plan for a Technical Design Report
- Obtain resources for TDR work
- Develop full TDR -> Full SiD design -> proposal -> construction

Thank you!

To SLAC for organizing the Workshop

To you for attending

We look forward to an interesting year for SiD!