



## Japanese Efforts towards ILC

The Most important and strong key feature of ILC for its realization is that ILC is the genuine International project (Global project)

**Global Governance of the project**

**Global Cooperation**

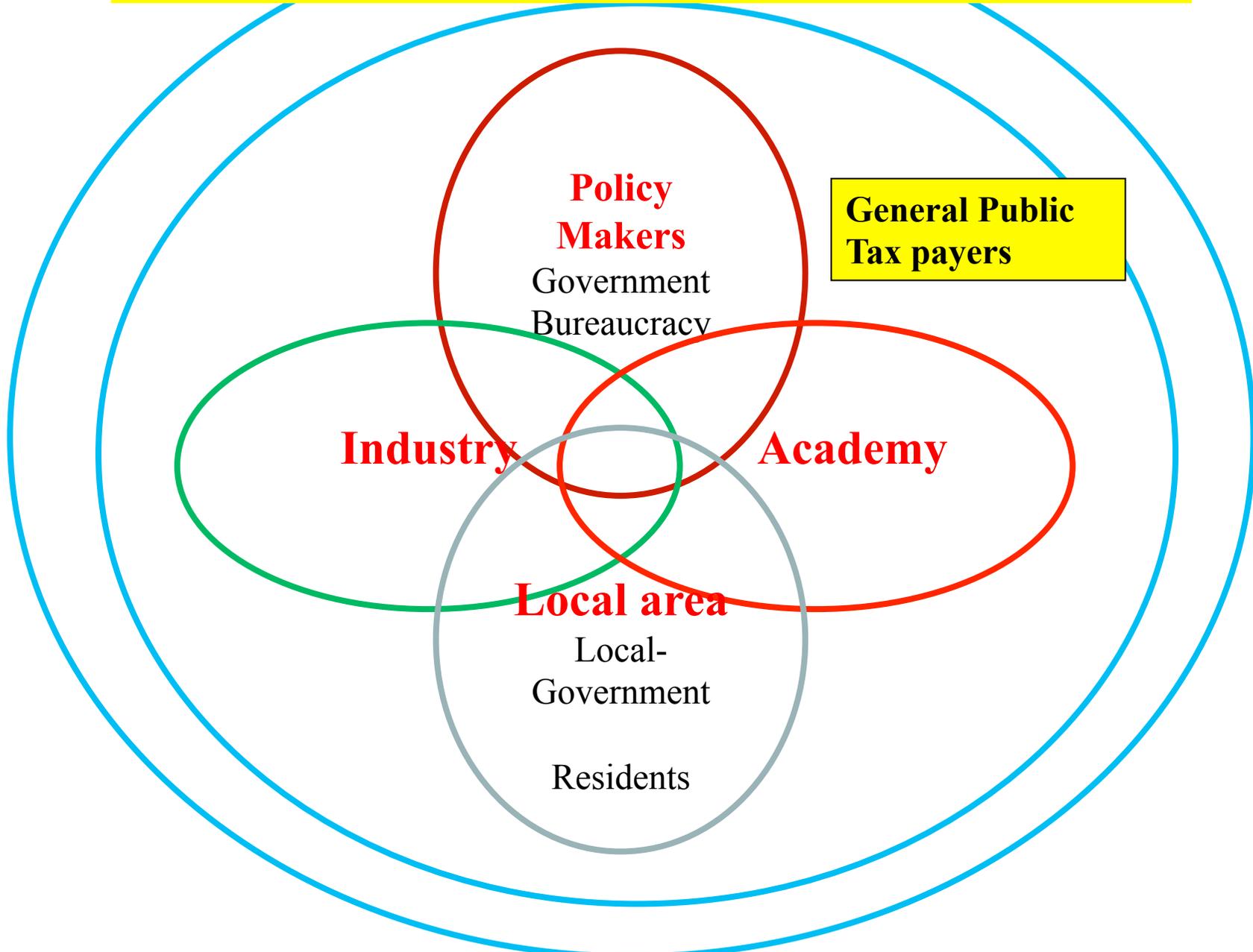
**Global Design, Construction and Operation**

In order to realize the ILC to be located somewhere in the world, needless to say **both International and Domestic** efforts are indispensable.

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1. Efforts in the academic sector
2. Efforts with political sector
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**Various Sectors necessary to cooperate in the domestic efforts**



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# ACADEMIA - Japanese HEP community

1. **Roadmap** of Japanese High energy physics (JHEP) (2007)

2. Science Council of Japan, Particle and Nuclear Physics symposium (2009)

3.



Science Council of Japan (日本学術会議)

Recommendation

**Japanese Master Plan of Large Research Projects**

A Table of **43 Selected Projects**

Mar. 2010

<http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-21-t90-e2.pdf>

<http://www.scj.go.jp/en/report/index.html>

for **All areas** including social science, economy, basic and applied science  
(5 from particle and nuclear physics: superKEKB, JPARC, ILC, hyperK, RIBF)

→ SuperKEKB budget approval 2010 Autumn

4. **JHEP future plan sub-committee** (2009-) chair: T. Mori (Univ of Tokyo)

→ Report (2012 Mar)

宇宙の創成・進化  
の謎の究明

国際リニアコライダー(ILC)



物質と力の究極像  
の探究

ニュートリノの  
CP非対称の検証

研究成果・技術開発・人材育成

小林・益川理論を超える  
クォーク理論の探求

J-PARC/T2Kの増強



J-PARC



LHC



KEK-B

Super-KEKB

クォークの  
CP非対称の検証



ニュートリノ  
の謎の探求



「物質の源」

「力の源」

ヒッグス粒子「質量の源」

6つのクォークの探求



Report of the sub-committee for future plan of Japan HEP (chair: T. Mori)  
received by **Japan HEP committee** (chair: S. Komamiya) in Mar. 2012

*- English version will appear soon -*

*tentative brief introduction*

Committee recommends future direction considering **physics situation 10 years later** (prospects of outcomes of LHC, J-PARC, superKEKB, so on..).

**Executive Summary** of the recommendation:

**two main stream** to realize both as **international** large scale projects  
to be located **somewhere in the world**.

- **Energy frontier – electron positron linear collider**
- Long-baseline Neutrino with large volume detector

**Energy Frontier**

- **if LHC find Higgs** or any other new particle with the mass range lower than 1 TeV, then we should go for **early realization of ILC** as a global project, with setting the **initial energy** optimizing for the production of the Higgs or any other new, and Japan should play a key role.
- **If LHC could not find anything new**, we should push hard **accelerator R&D** to cope with the higher energy as needed.

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## Federation of Diet Members for promoting ILC

In 2006, Ruling Party members (LDP at that time) established the Federation of Diet members for ILC

→ In 2008, expanded to “Joint federation”  
among the Ruling and Opposition parties  
(Democratic Party, LDP, New Komeito, so on)



The most important target of the Federation is

to realize **ILC as the GLOBAL PROJECT,**

**and strongly supporting the global R&D efforts.**

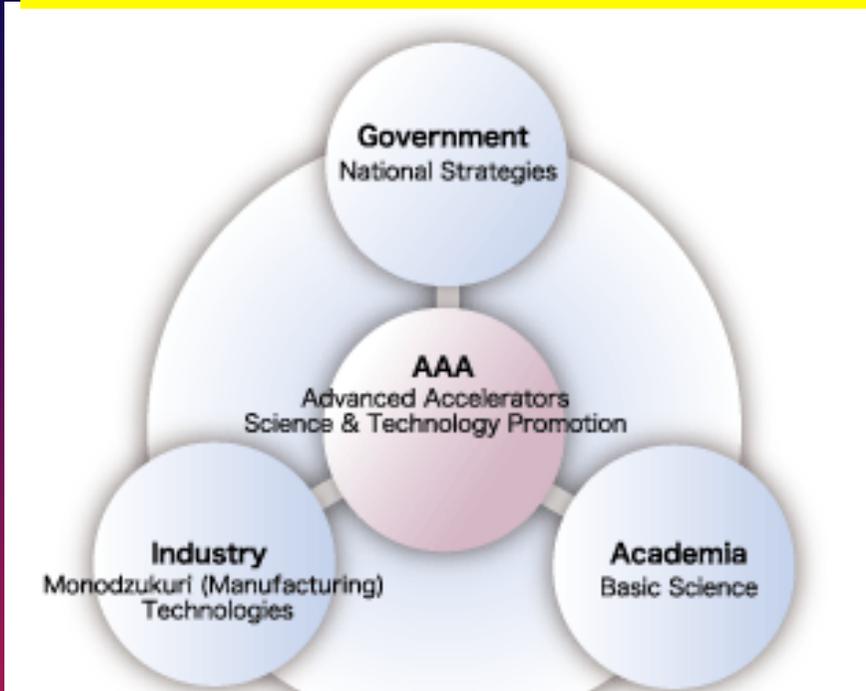
The Federation is seeking ways to promote ILC to be located somewhere in Asia,

and supporting domestic preparation processes and investigations

to prepare the case for **Japan as the host if global society wishes.**

# Close Cooperation between Academy sector and Industrial sector (**A**dvanced **A**ccelerator **A**ssociation)

**AAA** (Advanced Accelerator Association Promoting Science and Technology) consisting of **84 private companies** and **more than 30 public research institutions and Universities** in Japan (since 2008)



Promoting the wide area of Accelerator Science and Technology  
~ Central aim is **realization of ILC project** ~

<http://www.aaa-sentan.org>



Advanced Accelerator Association Promoting Science & Technology  
先端加速器科学技術推進協議会

[http://www.aaa-sentan.org/en/about\\_us.html](http://www.aaa-sentan.org/en/about_us.html)

[http://www.aaa-sentan.org/en/aaa\\_vision.html](http://www.aaa-sentan.org/en/aaa_vision.html)



**Honorary Chairman :**  
Masatoshi Koshiba  
Director General at  
Heisei Foundation for  
Basic Science

Former chair of Federation  
of Diet members



**Supreme Advisor**  
Kaoru Yosano



**Chairman:**  
Takashi Nishioka

**Advisory Meeting**

Deputy  
Secretary  
general



F. Takasaki

Secretary general  
Mr. Matsuoka (MHI)

**Secretariat**

**General Meeting**

**Board of Directors**



A. Suzuki

A. Noda (Kyoto U)  
S. Komamiya

**Technology Study  
Group**

**Outreach  
Group**

**Intellectual Property  
Study Group**

**Large Project  
Study Group**

Lead by Mitsubishi Electric, Hitachi,  
MHI, Kyocera, Toshiba



A. Yamamoto



H. Hayano



S. Yamashita  
(U. of Tokyo)



T. Ishikawa  
(KEK)

- Wide area of ILC related technologies have been being studied by **Technology Study Group**. It ranges from materials to manufacturing processes for the realization of ILC, as well as to innovate advanced accelerators.
- The Group also has been stimulating private companies how accelerator is useful to develop new products such as medicine, materials, so on.
- Tunnel structures has also been studied together with KEK and GDE to optimize for the Mountain region.
  
- **Large Project Study Group** has been studying how to realize large scale international projects by means of studying the processes and the organization of existing large scale projects worldwide such as ITER, ISS, XFEL and LHC.
- The Group also promotes cooperation with other sectors such as policy makers in order to arrange the environment to realize international large scale projects.
- Last year, working group (chaired by M. Yoshioka) has been formed to investigate issues to be solved mainly focused on the civil construction processes and domestic regulations in case ILC is built in Japan. Initial study has been completed and summarized in a report (English version for summary is available).
- New working group has been formed to look into ways how to promote industry-academia cooperation and to investigate the potential significance on economics and social life by various accelerator application.
  
- General public symposium were held by **Outreach Group** at various places in Japan from north to south, regularly 3~4 times per year.

## AAA directorates With Core Members of Federation of Diet Members (2011 Dec.)



### AAA public symposium

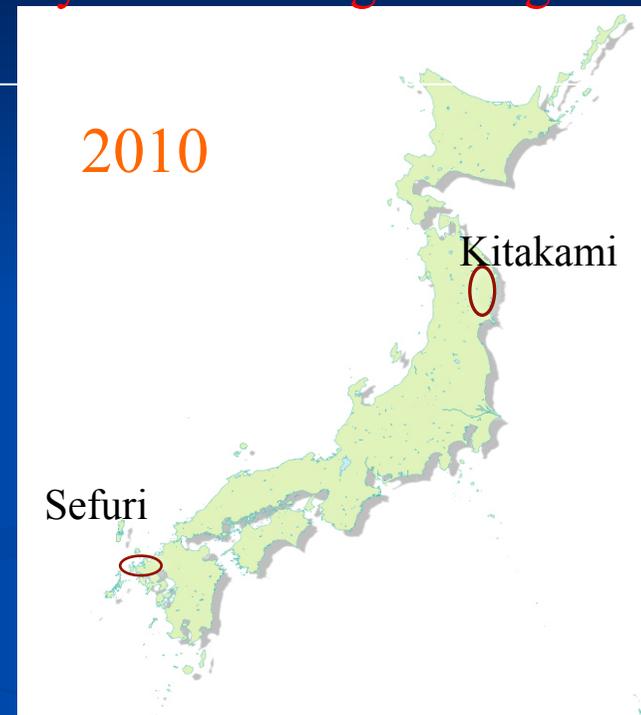
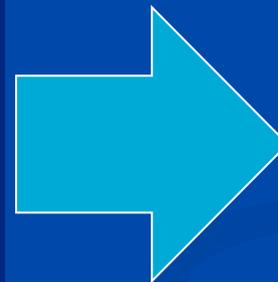
Promoting Accelerator world,  
basic science, and ILC

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# Site investigation, civil engineering

1. Survey of domestic candidate sites (1990s, 2000-2009)
2. Cooperation with experts of geology, **Japanese Society for Civil Engineering** (2006-)



3. Establishment of **local core-groups in two candidate areas** (2007-2009)
4. Start of the dedicated investigation of geology by **joint efforts by local governments and universities** in the area. (2010-)
5. New activity for ILC (standard guidance for civil engineering) by **Japanese Society for Civil Engineering (JSCE)** (2010-)
6. Detailed study in the various construction process by **KEK with AAA** (2010-2011).

**Kitakami**-mountain site in Tohoku area (northern Japan) promoted by

- Iwate and Miyagi prefectures
  - Iwate prefecture officially proposed ILC as a core of the earthquake disaster recovery project.
- Tohoku university
- Tohoku Economic Federation
- Joint efforts in Tohoku area

**Sefuri**-mountain site in Kyushu island (southwestern Japan) promoted by

- Fukuoka and Saga prefectures
- Kyushu and Saga universities
  - Joint organization is established
- Kyushu Economic Federation
- Expanded efforts in all Kyushu, and Yamaguchi, Okinawa



# Tunneling Study for Mountain Regions in Japan

Courtesy: Enomoto/Miyahara  
Study supported by KEK-DG

## 総括比較表

工事費凡例 ○標準より安価 △ほぼ同等 ×標準より高価

	CASE-1 D-T-R	CASE-2 S-T-R	CASE-3 JS-T-X	CASE-4 JS-T-K
概念図				
工事費	標準	○	△	×
工期	(74.1M)	(90.0M)	(83.6M)	(84.5M)
機能性	◎	△	△	△

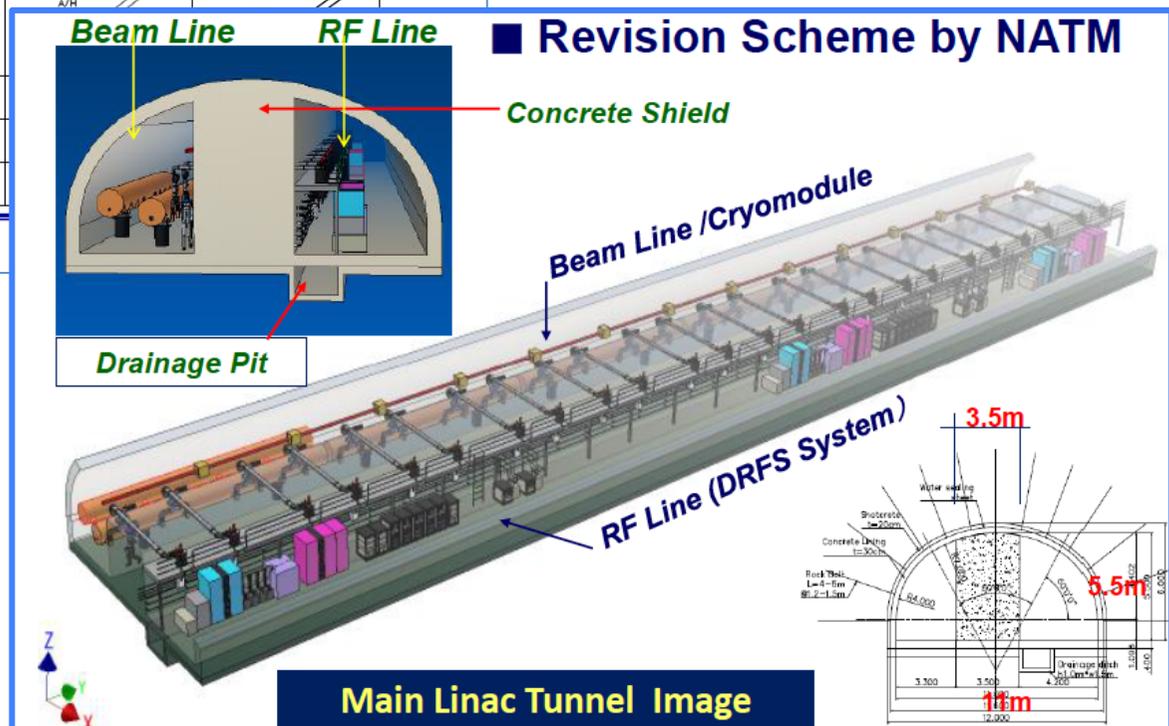
  

	CASE-5 JS-T-D	CASE-6 JS-N-D	CASE-7 S-N-D	CASE-8 wS-N-D
概念				
工事費	△	○		
工期	(79.9M)	(87.2M)		
機能性	○	○		

2011/9/9

土木学会・研究討論集会

Study Lead by  
**Miyahara and Enomoto (KEK)**



2012/04/23

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## After 2011.3.11 Tsunami

- **Iwate Prefecture officially proposed** the ILC project at Kitakami area as the statue of recovery from the disaster (May 2011).
- Recommendation by “Science-technology-innovation division” of **Democratic Party** to boost efforts to realize ILC in Tohoku (June 2011).
- Resolution to promote ILC realization by “Science and technology division” and “Special committee for space and marine” of **Liberty and Democratic Party** (Aug 2011).
- Official brief document on the ILC project given to **CSTP** (Council of Science and Technology Policy) documented by MEXT *et al.* (Sep. 2011)
- At several occasions, discussions at **Diet** on the issues of ILC.



**Budget is given by Japanese government for ILC to investigate geology at the candidate sites (Dec. 2011)**

# the 1<sup>st</sup> step at CSTP

## Council for Science and Technology Policy

Official brief document on the ILC project given to CSTP by MEXT et al (Sep. 2011)

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平成23年9月1日  
文部科学省 研究振興局  
基礎研究課 量子放射線研究推進室  
内閣府 政策統括官  
(科学技術政策・IT担当) 付  
総 括 G

**国際リニアコライダー計画について**

**1. 国際リニアコライダー (International Linear Collider : ILC) 計画とは**

(1) 概要  
直線の線形加速器(全長:約30km)で、電子と陽電子の衝突実験を実施する計画。これにより、質量の起源とされる「ヒッグス粒子」の性質の解明や「超対称性粒子」など未知の粒子が発見され、宇宙創成の謎の解明につながるかと期待されている。



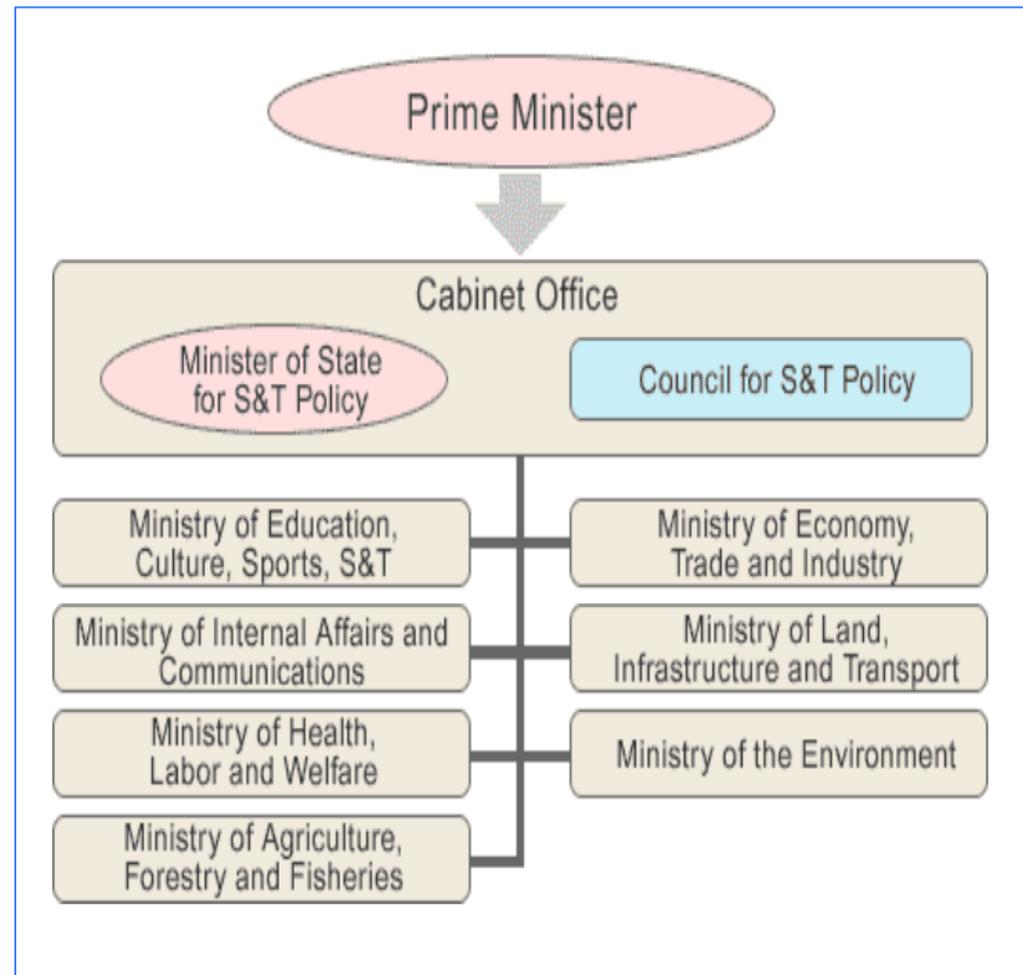
(2) 意義  
現在、欧州合同原子核研究機関 (CERN) は、円形加速器 (周長約27 km) の大型ハドロン衝突型加速器 (LHC) を用いて「ヒッグス粒子」の発見等を目指す実験を行っているが、そこで「ヒッグス粒子」が発見されても、その性質を解明しなければ、標準理論が正しいことについての物理的な証明ができないため、ILCによる実験が必要。

(3) 概念設計書  
○ 2007年8月、研究者グループより概念設計書と建設コストが発表された。  
○ 建設コスト約66億ドル (当時のレートで約7,700億円。運営費・土地取得等の経費は別)、建設期間7年、実験期間20~30年、年間運転経費1.5~2.7億ドル (約180~320億円)、必要電力約23万kW。

(4) 位置づけ  
○ 内外で広く利用されている小型汎用加速器や国内でも数台しかない先端大型加速器を凌ぐ世界最先端の超大型加速器であり、現在考えられている加速器の中で、ビッグバン (宇宙の始まり) にもっとも近い状態 (1兆分の1秒後) を再現できるもの。  
○ その成果は人類共通の財産となることが期待されるが、巨額の経費と長期間を要する計画であるため、1ヵ国だけでは実施できない計画であり、国際協力によって進めていく必要がある。

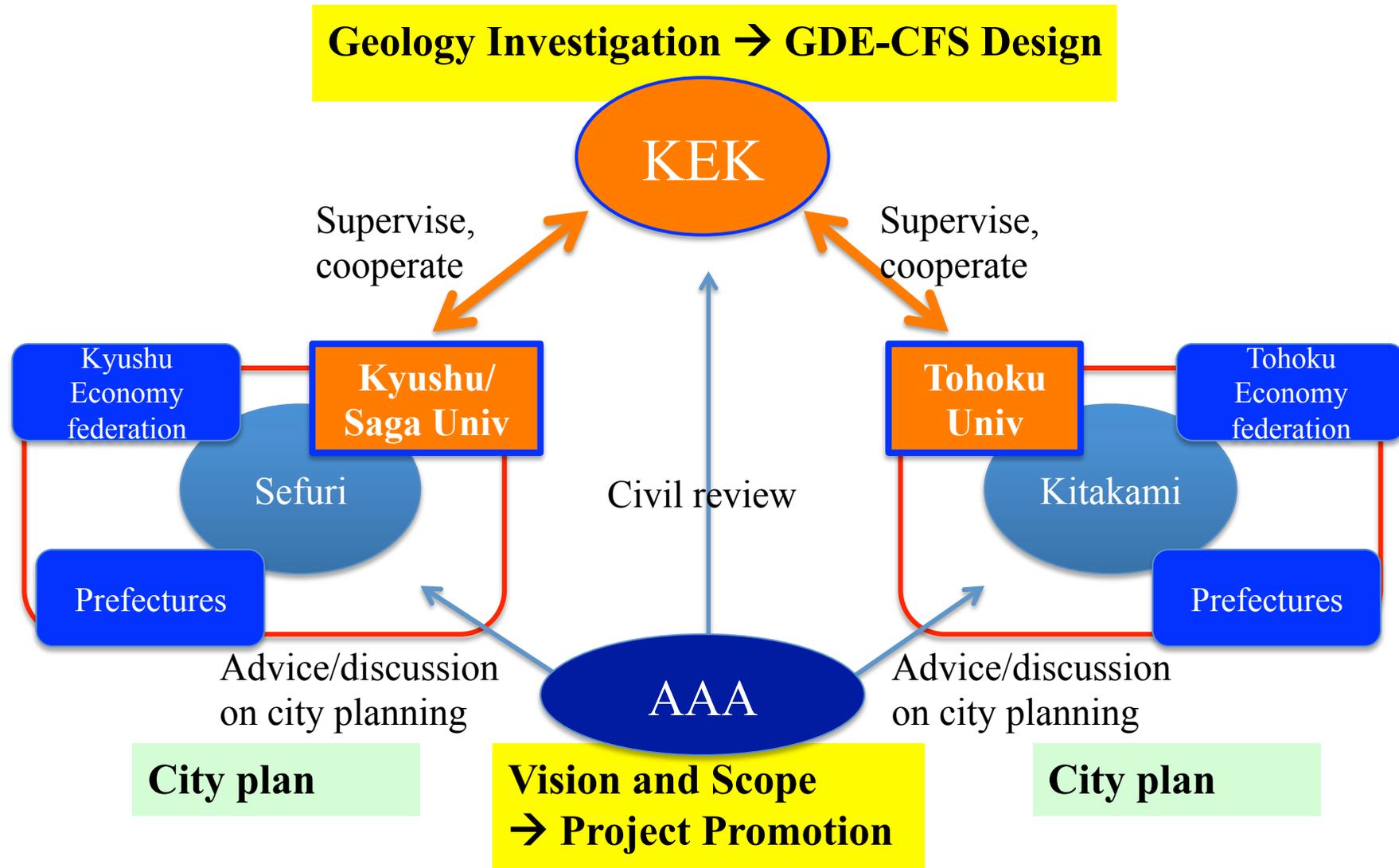
<大臣・総合科学技術会議有識者議員委員会資料 図5>

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**Kitakami** and **Sefuri** area: Each local team has been working on

1. **Geological surveys** including boring investigation
2. **City-planning** with the ILC as the core.



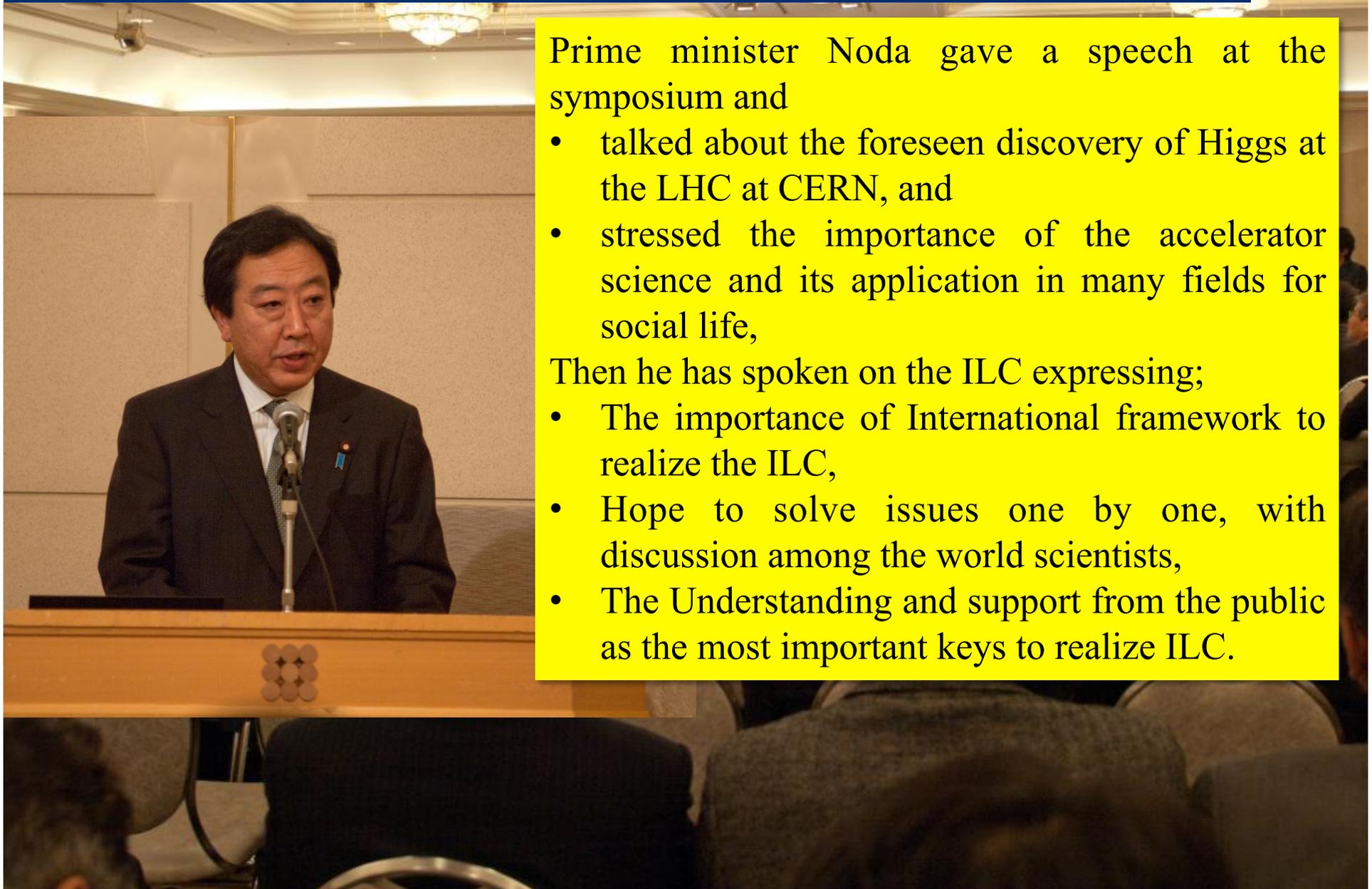
# Annual Symposium hosted by AAA jointly with the Federation of Diet Members (December 15, 2011)

Prime minister Noda gave a speech at the symposium and

- talked about the foreseen discovery of Higgs at the LHC at CERN, and
- stressed the importance of the accelerator science and its application in many fields for social life,

Then he has spoken on the ILC expressing;

- The importance of International framework to realize the ILC,
- Hope to solve issues one by one, with discussion among the world scientists,
- The Understanding and support from the public as the most important keys to realize ILC.





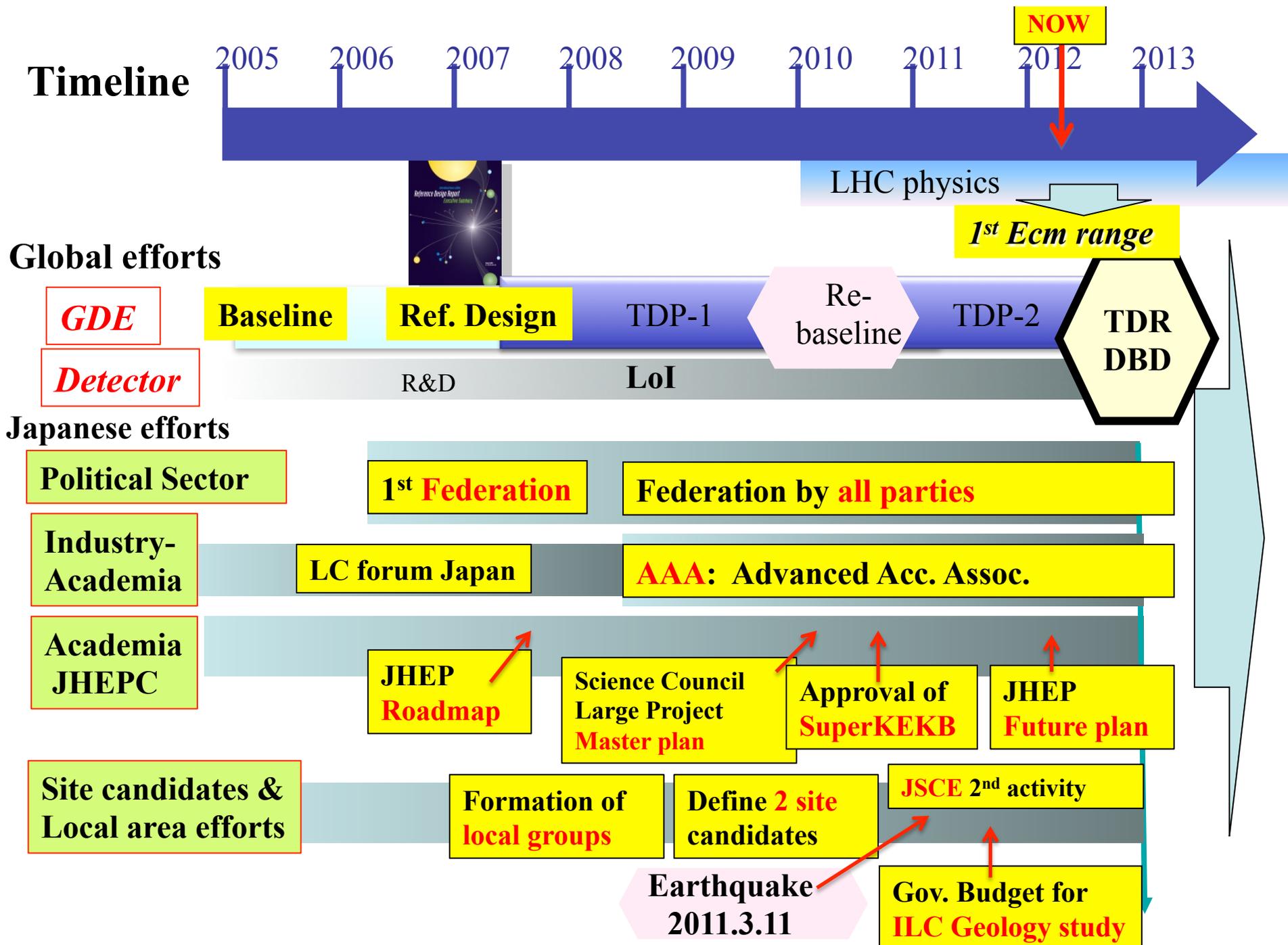
@Sefuri

GDE executives visited Japanese mountain candidate sites on January 17-18, 2012.

Their visit was nationally broadcasted as a five-minutes segment on the NHK TV morning news, reaching an estimated 30 million homes.



@Kitakami



# outlook

So much efforts have been made. Still more and more to go in international aspects and domestic issues. But road to make it happen is getting more and more solid.

Clear and timely voice of the world HEP community and the global proposal as solid as possible are the most essential to realize ILC in near future.