

# **Japanese activity in Industry-Academia cooperation towards ILC**

**April 30, 2012**

**Masanori Matsuoka**

**Secretary General, Advance accelerator association  
promoting science & technology**



- Outline of AAA
- Our Activities
- Accelerator industry in Japan
- Conclusion

# Outline of AAA

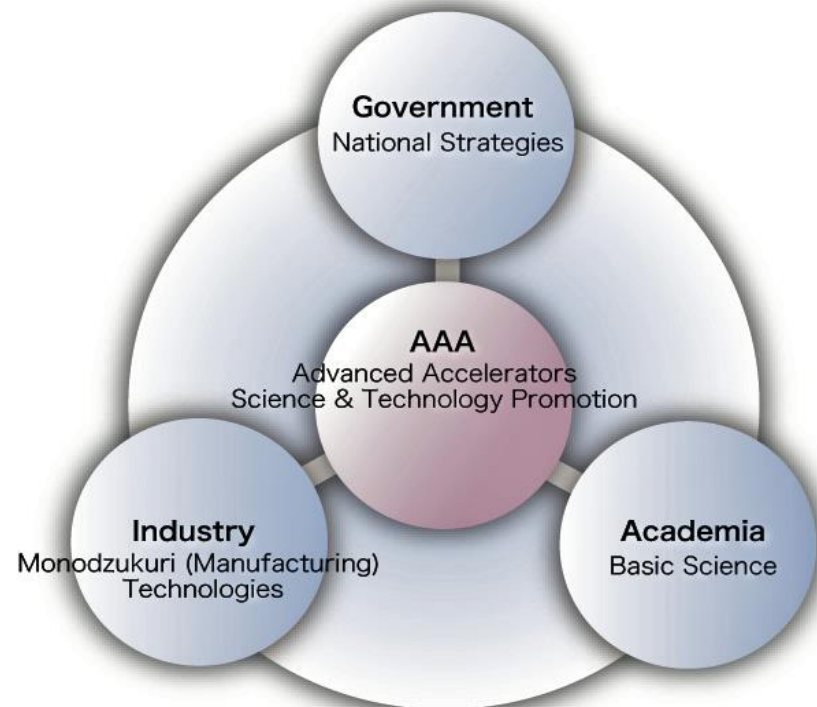


The Advanced Accelerator Association Promoting Science & Technology (AAA) was established in June 2008 with 76 member companies / institutes,

to study how to reach a consensus to realize **ILC** (*International Linear Collider*) in Japan, and

to promote and seek various industrial applications of advanced accelerators and technologies derived from R&D on such accelerators

with facilitating **Industry-Government-Academia collaboration**



# History of AAA



- Jun, 2008 AAA was established
- July, 2008 Nonpartisan Federation of Diet members for ILC was established
- Dec.,2008 Symposium was held by AAA & Federation



M. Koshiba



T. Nishioka



K. Yosano

Chief cabinet secretary **Takeo Kawamura** insisted,  
“Promoting of basic science can make people more happy.  
ILC is attractive project because it gives big dream  
to young people”



T. Kawamura

- April, 2010 2<sup>nd</sup> term of activity started
- Dec., 2011 Symposium was held by AAA & Federation

**Prime minister Yoshihiko Noda** addressed.



R. Heuer

- April, 2012 3<sup>rd</sup> term of activity started
- Oct., 2012 Symposium was held by AAA & JPC (Guest speaker : Prof. Rolf Heuer)

**Mr. Ryu Shionoya** joined symposium and addressed.

- Dec., 2012 TDR completion ceremony was held by AAA & GDE



# AAA Organization



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



2002 Nobel laureate

**Advisory Meeting**

**Chairman:**  
Takashi Nishioka



**Supreme Advisor :**  
Kaoru Yosano



**General Meeting**

**Board of Directors**

**Secretariat**

**Technology Study  
Group**

**Outreach  
Group**

**Intellectual Property  
Study Group**

**Large Project  
Study Group**

# Board Members



## Chairman

Takashi Nishioka :Former President, [Mitsubishi Heavy Industries, Ltd.](#)

## Director

Atsuto Suzuki :Director General,  
[High energy accelerator Research Organization\(KEK\)](#)

Yasuharu Igarashi :Executive Officer, [Toshiba Corporation](#)

Akira Maru :Senior Corporate officer, [Hitachi, Ltd.](#)

Yoshiaki Nakatani :Executive Officer, [Mitsubishi electric corporation](#)

Keijiro Minami :Senior Executive Officer, [Kyocera Corporation](#)

Akira Noda :Professor, [Kyoto University](#)

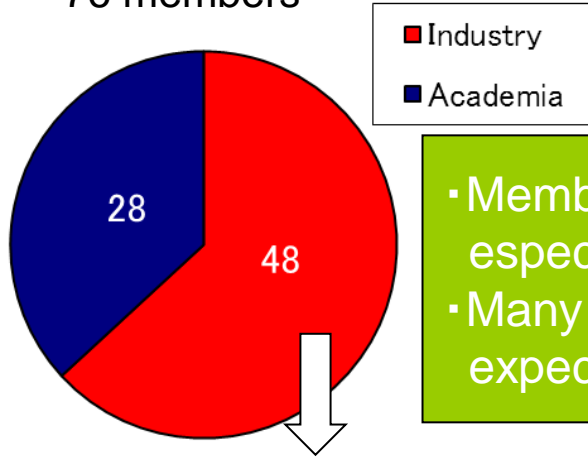
## Auditor

Sachio Komamiya :Professor, [University of Tokyo](#)

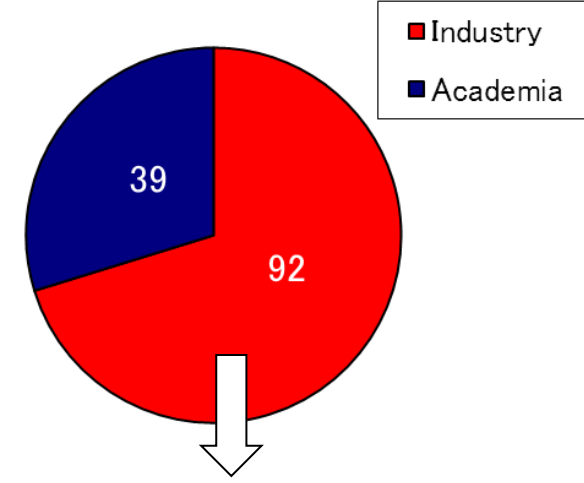
# Increasing of AAA Members



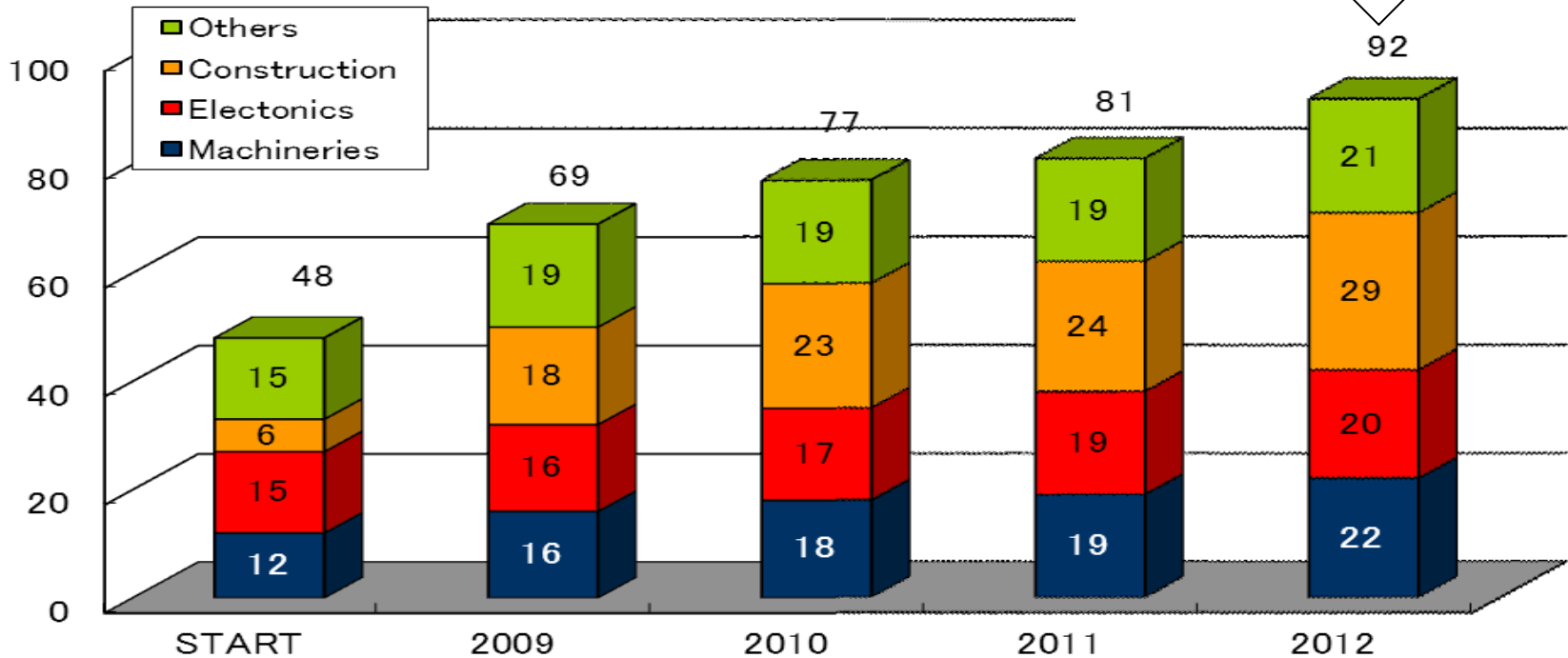
76 members



131 members



• Members continue to increase, especially construction industry  
 • Many Japanese companies expect to realize ILC in Japan



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## 【Technical Study Group】

- Seek directionalities on advanced accelerator with **ILC**
- Integrate “manufacturing technologies” from a variety of industrial fields to create innovative scientific technologies

## 【Outreach Group】

- Inform the public of possibilities and significance of advanced accelerator and **ILC**, through a variety events and media exposures.

## 【Large project Study Group】

- Study how to reach a consensus with understanding the site issue in order to realize **ILC** in Japan.
- Study proper organization for promoting **ILC**

## 【Intellectual Property Study Group】

- Study intellectual property with “**ILC** Project” as an underlying model



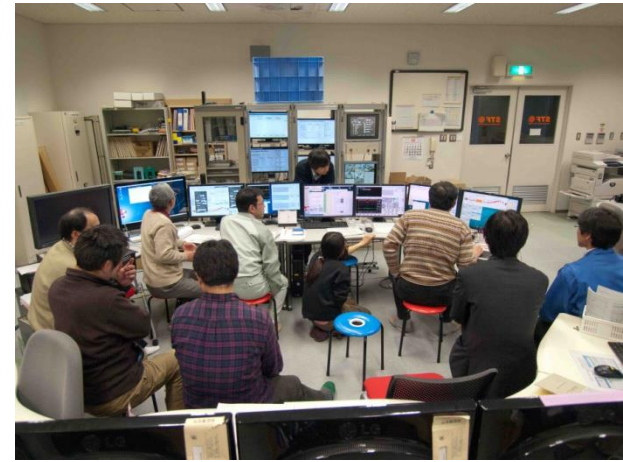
- 30 Seminars
- 14 working group (WG) meetings
  - Superconducting Accelerator WG
  - Civil engineering WG
- Visit to Accelerator Lab.(KEK STF)
- Operation training of superconducting accelerator



Seminar



Visit to Lab



Training

# Seminars by Technical Study Group



No.	Theme
1	Starting the technical study group
2	The status and challenges of SC accelerators
3	Accelerator and Civil Engineering
4	Superconducting RF Cavity Technologies
5	High power RF Technology
6	Advanced accelerators and Synchrotron Radiation Science
7	Advanced accelerators and Cryogenics
8	Advanced accelerators and Neutron Science
9	Advanced accelerators and Control Technologies
10	Industrial technologies, supporting advanced accelerators
11	Summary talks of technical study group and outreach group
12	Advanced accelerators and Medical applications
13	Advanced accelerators and Laser technologies
14	Summary of the first term activities
15	Report on IPAC and GDE meeting

No.	Theme
16	Refrigeration technologies
17	New applications of accelerators
18	Current and future of Medical accelerators
19	Status of ILC, Regulation of High Pressure Gases
20	Advanced accelerators and Muon Science
21	Measuring instruments and Simulation
22	Cutting-edge materials used in the accelerators
23	Superconducting technologies for the environment
24	Status and future of ILC
25	State-of-the-art accelerators for Synchrotron Radiation
26	The latest digital technologies for accelerators
27	Technologies and products of advanced accelerator components
28	Technologies of Ion accelerators
29	Operation training of superconducting accelerator
30	Superconducting magnet for neutrino beam line and neutron facility at J-PARC



## ● 15 symposiums in about 5 years

- Japanese Contribution to understanding the Universe using Asteroid explorer “HAYABUSA”, “SUBARU” telescope and such Accelerators “TRISTAN”, “KEKB”, “J-PARC”, ...
- Birth of the Universe and Life
- Understanding the Universe by using the advanced accelerator from KEBK to ILC
- The advanced accelerators saving life and creating the universe
- International Linear Collider and applications of advanced accelerators
- ...



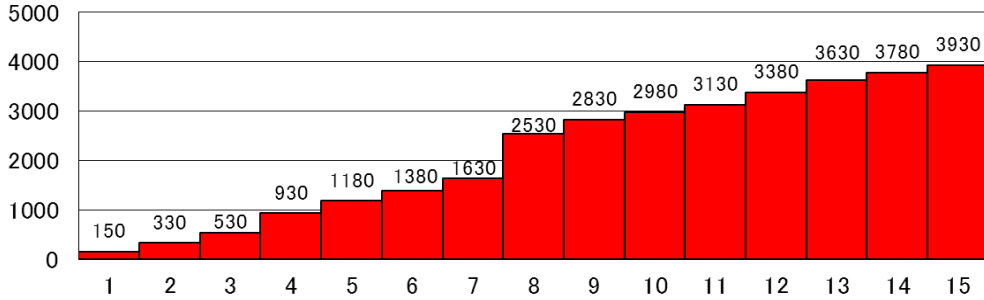
## ● AAA Home page (<http://www-sentan.org>)

- Introductory of AAA
- About ILC
- Applications of accelerators
- Event Information
- etc.

# Symposiums at the various cities in Japan



Total Number of Participants



No.4 Fukuoka  
No.9 Fukuoka  
No.13 Fukuoka

No.6 Kyoto

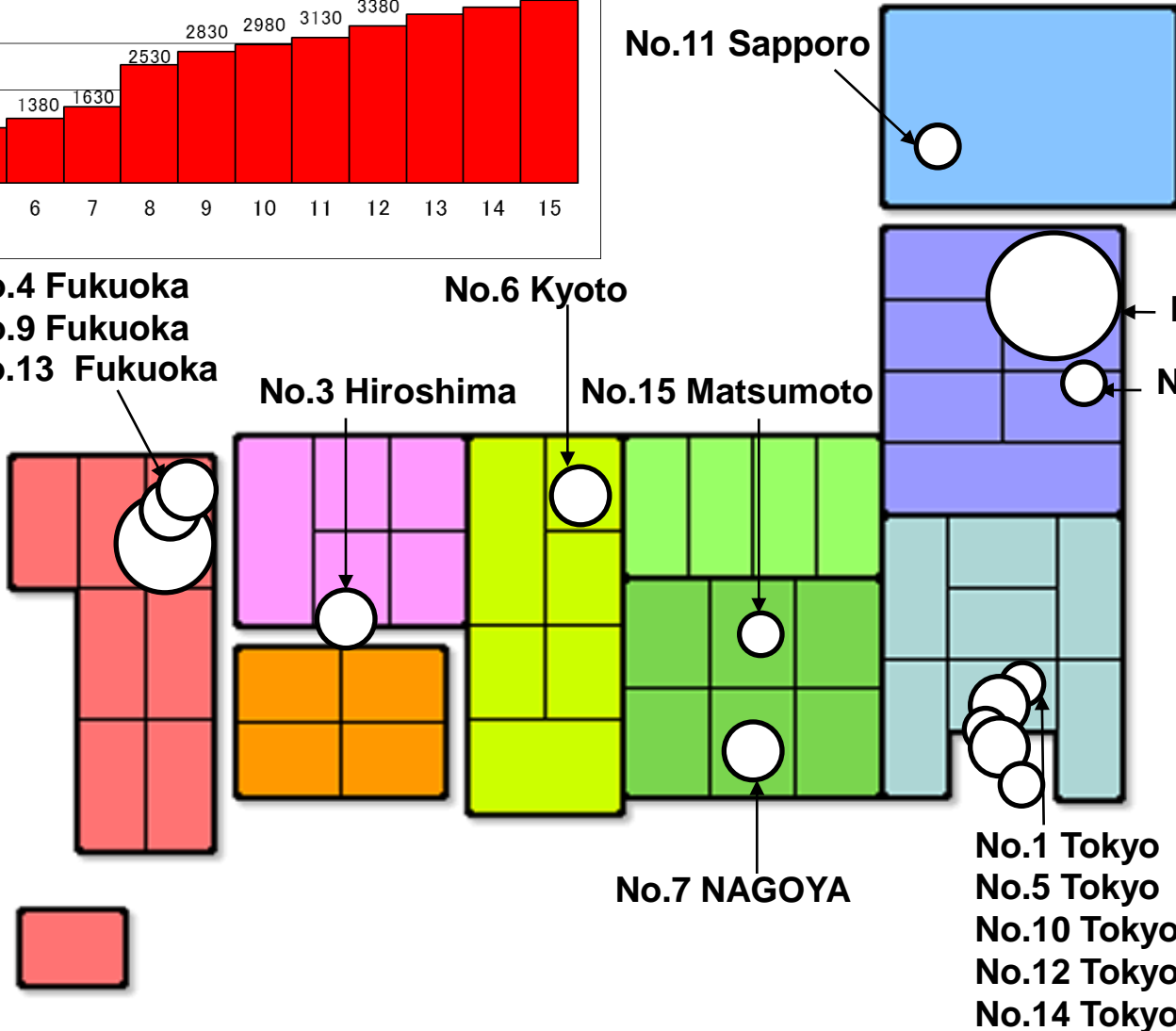
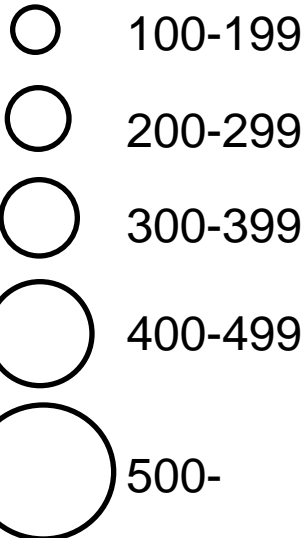
No.3 Hiroshima

No.15 Matsumoto

No.8 Oushu

No.2 Sendai

Participants



# Symposiums on Advanced Accelerator



**M. Yoshioka**



**R. D. Heuer**



**A. Suzuki**



**M. Tsujii**



**S. Komamiya**



**J. Kawaguchi**



**H. Yamamoto**



**M. Ie**



**H. Murayama**



**Y. Takayanagi**



**S. Yamashita**



**T. Masukawa**



(International organization)

- Investigate international organizations of large scale facilities for study of **ILC**

(Site issue)

- Study how to reach a consensus of site issue
- Investigate challenges for **ILC** construction in Japan
- Support two candidate local governments to research how to build a global city with **ILC**
- [Evaluate the Economic, Technical and Social effects of \*\*ILC\*\*](#)

(Proposal to Government)

- Propose the policy for promoting advanced accelerator to government

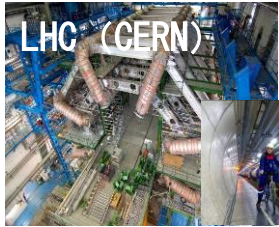
# Large project study Group



No.	Theme	No.	Theme
1	Starting Large project study group	14	Radiation Restriction of the accelerators
2	The history and current status of ITER	15	The status of ILC / WG on Study for challenges of ILC construction
3	Construction of J-PARC / International Collaboration at DESY	16	Intermediate report on Study for challenges of ILC construction
4	The history and current status of LHC / The experience of Spring-8	17	Intellectual property issues of ITER
5	Intellectual Issue for Large project / The experience of KEKB	18	Report on Study for challenges of ILC construction
6	Intellectual property Issues in conducting R&D with International collaboration	19	How to promote the accelerator industry / Intermediate report of Study for challenges of ILC construction
7	The experience of High performance computing infrastructure development / International large project of Astronomy	20	Activities at the candidate sites, Tohoku and Kyushu / WG on Promoting collaboration with industry, government and academia
8	Management of Big science project / The experience of the super express export to Taiwan	21	WG on Promoting collaboration with industry, government and academia WG on Study for ILC construction
9	International political aspect of International science project ,for example International Space Station	22	Spring-8 & SACLA contributing Drug Development / WG on Promoting collaboration with industry, government and academia
10	Innovative outreach; How do we publicize the future possibility?	23	Accelerators for industry and medical / WG on Promoting collaboration with industry, government and academia
11	Marketing research for the accelerators	24	Current status of ILC / WG on Promoting collaboration with industry, government and academia
12	Experience of HIMAC and the future of heavy particle therapy		
13	Policy of Atomic energy based on the energy and environmental issues		



# Accelerator- Pyramid



TEVATRON

【 Number in the world】

1 ~ 5



SNS LCLS

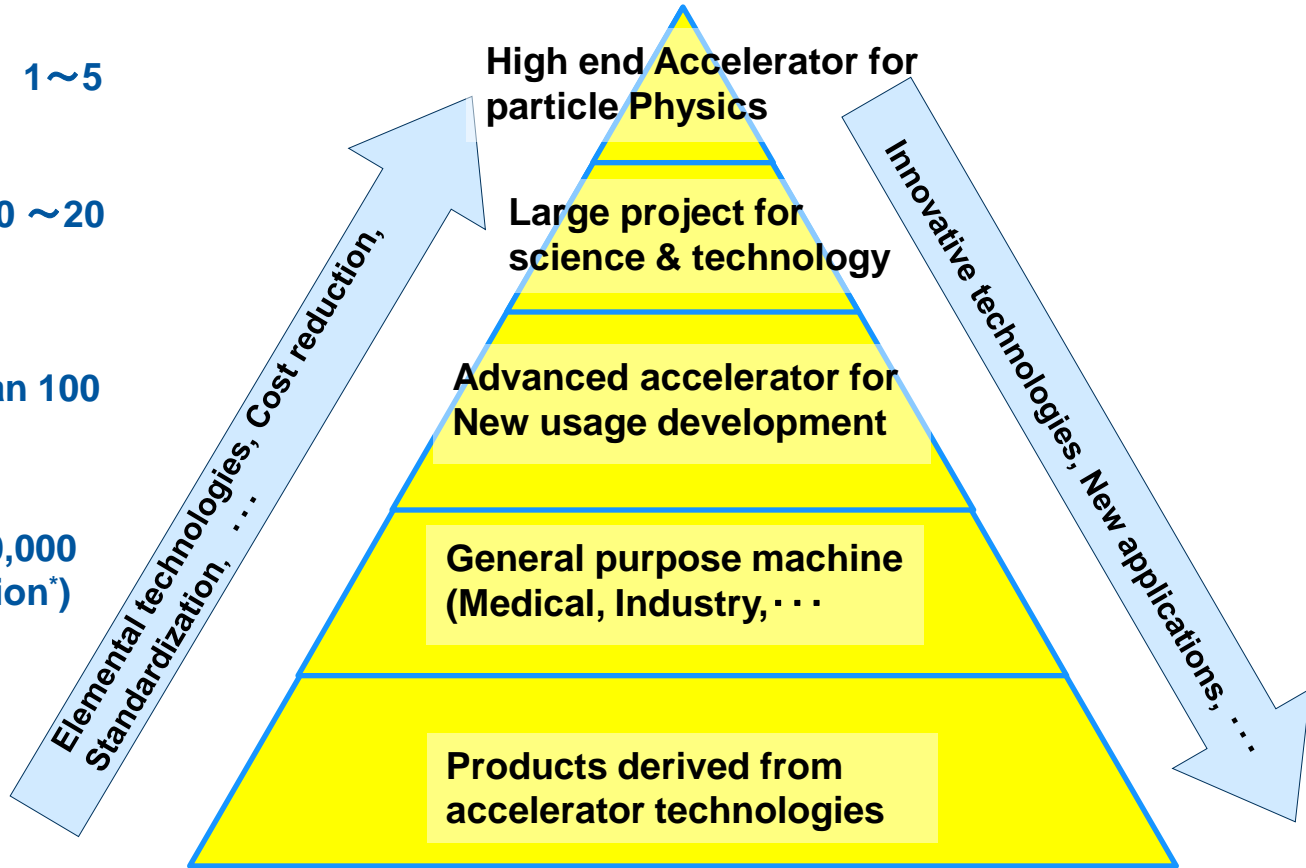
10 ~ 20

More than 100



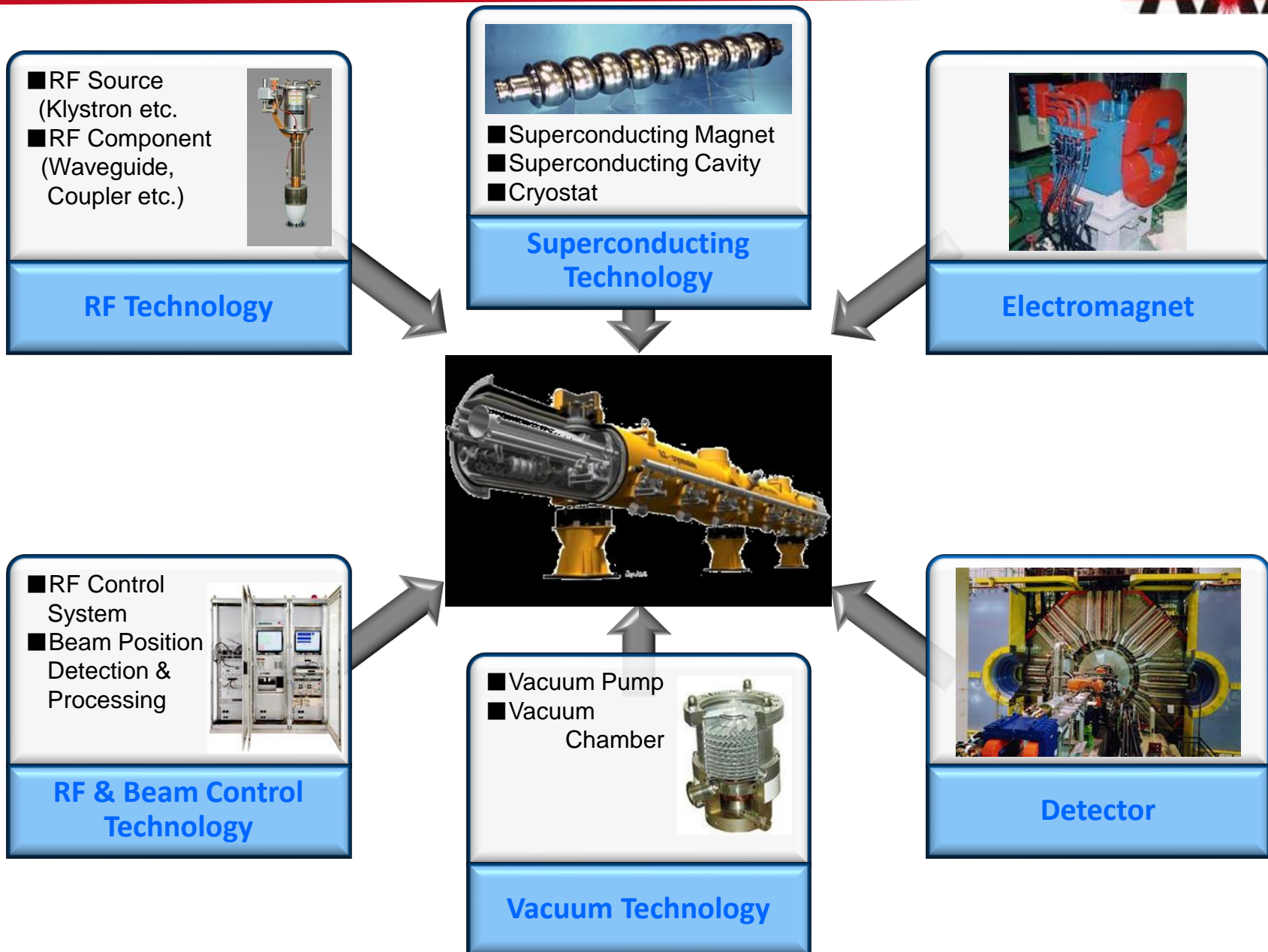
More than 10,000  
(USD 3.5Billion\*)

(USD 500Billion\*)

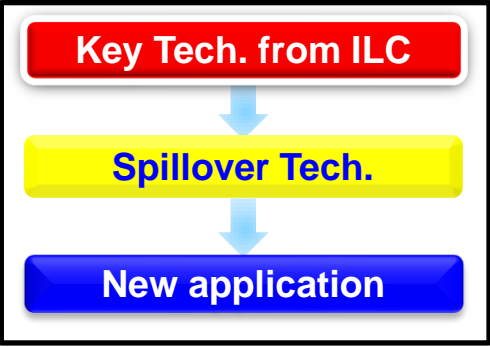


\*) " Accelerators for America' s Future" , 2010, Department of Energy, USA

# Accelerators Supported by Various Technologies 18



# Study of technology spillover effect of ILC



High performance Hard disk

RF technology

Superconducting technology

Ultra precise measurement method for magnetic material

Polarized electron

Ultra-short pulse beam

Ultra precise Lithography

High sensitivity sensor

Data analysis

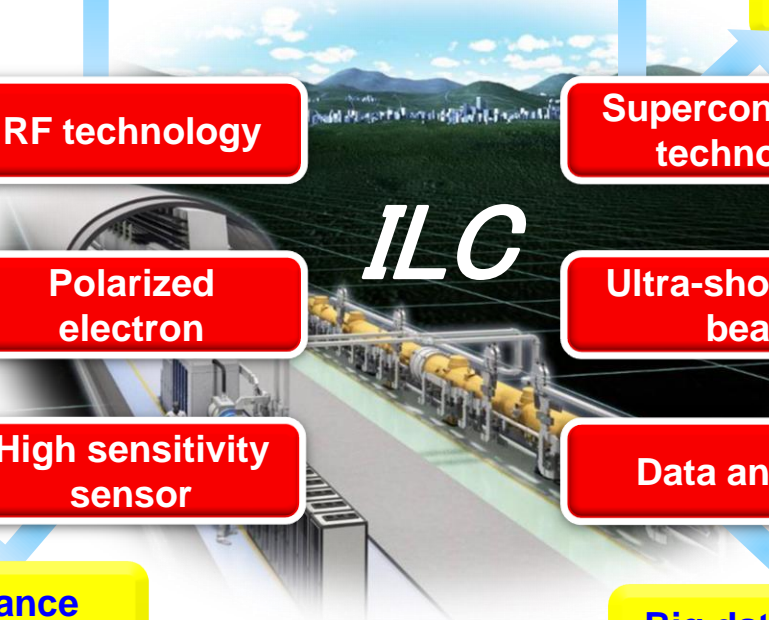
High performance inspection technology

Big data analysis Cloud computing

Early detection of cancer  
High reliability of industrial machines

Information & Communication Technology

*ILC*





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# Japanese companies contribute to the advanced accelerator projects in the world



## Companies which have contributed to LHC

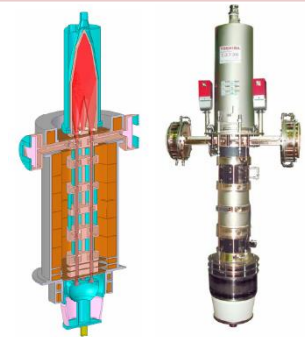
Company	Products
Toshiba corporation	Superconducting magnet, TDC chip
Furukawa, Ltd.	Superconducting cable
IHI corporation	1.8K refrigeration units
Nippon steel, Ltd.	Non-magnetic steel plate
JFE steel corporation	Non-magnetic steel plate
Kaneka corporation	Insulation film for SC wire
Hitachi Cable, Ltd.	Superconducting cable
Kawasaki Heavy Industries, Ltd.	Cryostat for Liquid-Ar, CMS end york
Sumitomo Chemical	Aluminum for SC Cable
Kyocera corporation	Ceramics duct
Fujikura, Ltd.	Rad-hard optical fibers
Hamamatsu photonics K. K.	Photo-tube, Silicon sensor, SCT module
Rinei Seiki, Co., Ltd.	TGC(Thin Gap Chamber) trigger chamber
Nippon Mektron, Ltd.	Cu/Polyimide flexible circuits
Arisawa Manufacturing Co., Ltd.	Polyimide film

# Japanese companies contribute to the advanced accelerator projects in the world



## Companies which have contributed to Euro-XFEL

Company	Products
Tokyo Denkai Co., Ltd.	Pure Niobium Sheet
Toshiba Electrical Tubes and Devices Co., Ltd.	L-band Klystron
Kyocera corporation	Feed through flange



## Companies which have contributed to other projects

Company	Products
Mitsubishi Heavy Industries	S-band accelerator Superconducting accelerator
Mitsubishi Electric	Superconducting accelerator Superconducting magnet
Toshiba corporation	Normal conducting cavity
Toyama	Beam line instruments

# R&D on Superconducting cavity



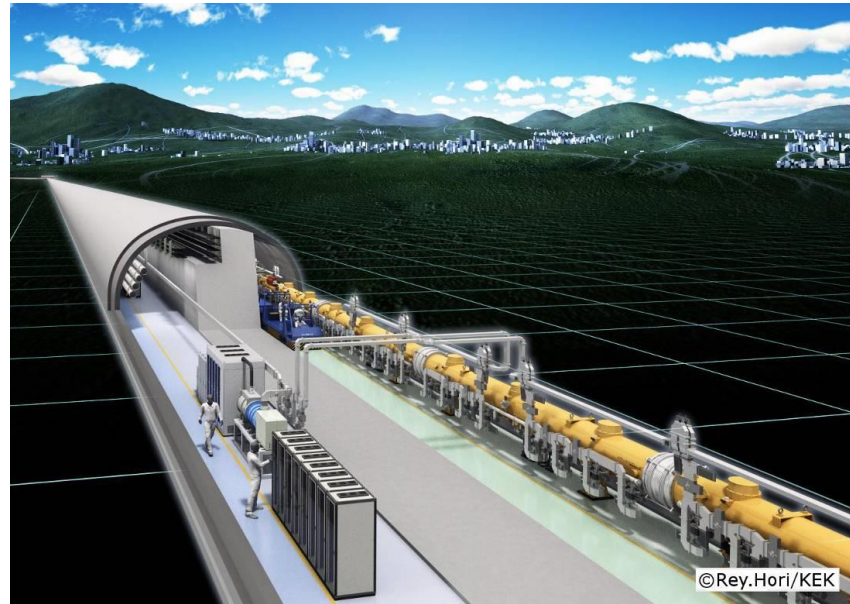
- ❑ MHI and Hitachi are reaching 35 MV/m of accelerating field by vertical test.
- ❑ Hitachi reached 41 MV/m with HOM coupler.
- ❑ Toshiba reached 35 MV/m without HOM coupler.
- ❑ MHI cavities were installed in the cryomodule in order to conduct the horizontal test called S1-Global.



year	# 9-cell cavities qualified	# of Labs reaching 35 MV/m processing	# of Industrial manufacturers reaching 35 MV/m fabrication
2006	10	1 DESY	2 ACCEL, ZANON
2011	41	4 DESY, JLAB, FNAL, KEK	4 RI, ZANON, AES, <b>MHI</b> ,
2012	(45)	5 DEY, JLAB, FNAL, KEK, Cornell	5 RI, ZANON, AES, <b>MHI</b> , <b>Hitachi</b>



- AAA have promoted the science and technology of the accelerators and **ILC** project.
- New ideas and products have been created through the activities of AAA.
- AAA conducted symposiums to publicize the **ILC** and the advantage of promoting accelerator industry.



*We will continue to strive for realizing ILC in Japan*