

# Industry-Academia cooperation for promoting Advanced Accelerator

Aug 6, 2016

Masanori Matsuoka

Secretary General, **A**dvance **A**ccelerator **A**ssociation  
promoting science and technology



Advanced Accelerator Association Promoting Science & Technology

- AAA activities
- Accelerator Science and Industry
- Toward realization of ILC

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# Outline of AAA

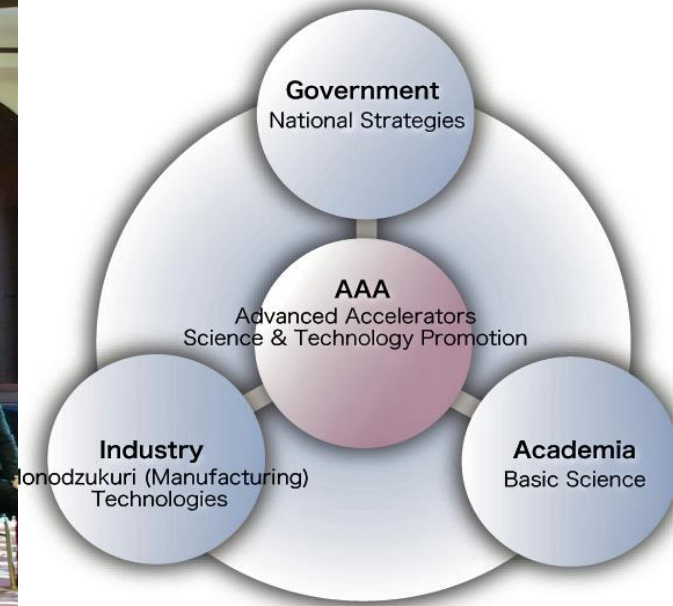


The Advanced Accelerator Association Promoting Science & Technology (AAA) was established in June 2008 with 76 member companies / institutes,  
→ **145(June,2016)**

In order to

- study how to reach a consensus to realize **ILC** (**I**nternational **L**inear **C**ollider) in Japan, and
- promote and seek various industrial applications of advanced accelerators and technologies derived from R&D on such accelerators

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



# AAA Organization



## Honorary Chairman :

Masatoshi Koshiha (2002 Nobel Laureate)



## Supreme Advisor :

Kaoru Yosano (Former Chief Cabinet Secretary,  
Former Minister of Finance, Economy, METI, MEXT)

## Chairman :

Takashi Nishioka (Former President, Mitsubishi Heavy  
Industries, Ltd.)

## Directors:

Atsuto Suzuki (President, Iwate Prefectural University)

Masanori Yamauchi (Director General, KEK)

Mamoru Hatazawa (Vice-President, Toshiba Corporation)

Hiroto Uozumi (Nuclear Energy Business Unit, COO, Hitachi, Ltd.)

Yasuyuki Ito (Executive Officer, Mitsubishi Electric Corporation)

Masahiro Inagaki (Executive Officer, Kyocera Corporation)

Yuzo Onishi (Professor, Kansai University)

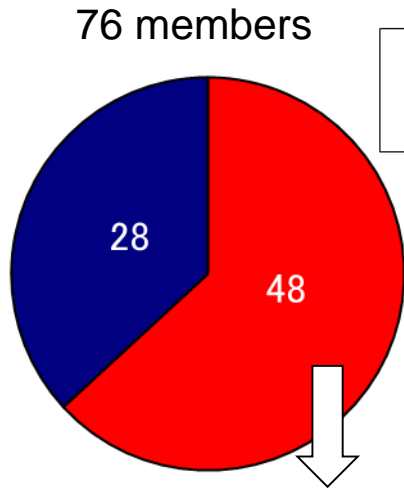
## Auditor:

Sachio Komamiya (University of Tokyo)

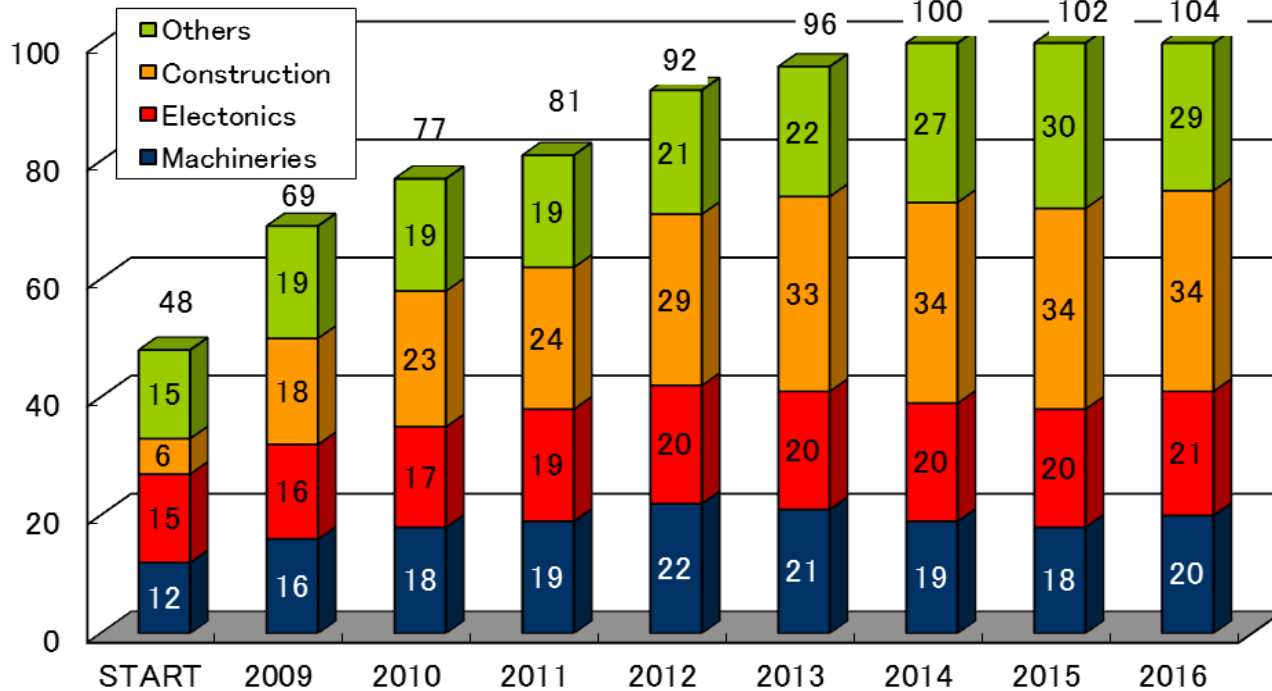
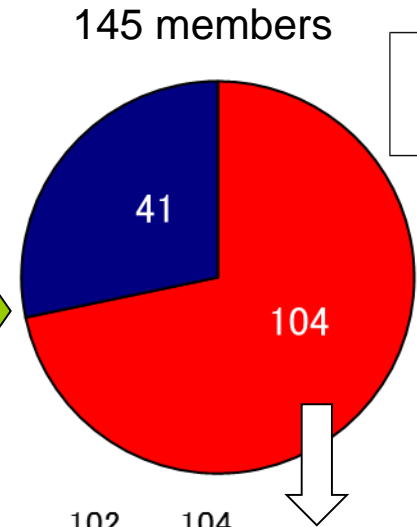
## Members (Company: 104, Institute: 41)

All major Heavy electric Machinery, all General Contractor  
Various manufacturing industry, and trading company .....

# Member of AAA



Members continue to increase.  
 Many Japanese companies expect to realize ILC in Japan



# Member List



| (General Members)                 |  | (Institutional Members)                   |   |
|-----------------------------------|--|---|---|
| AKITA FINE BLANKING               | KURARAY  | R&K                                       | Chiba University of Commerce  |
| Applied Metal R&D Co.             | Kuroki Kogyosho                                  | SAN-AI PLANT                              | High Energy Accelerator Research Organization                           |
| ATOX                              | KYOCERA  | Seibu Polymer                             | Hiroshima University  |
| azbil                             | KYUSHU ELECTRIC POWER                            | SEIKO EG&G                                | Hokkaido University   |
| AZUSA SEKKEI                      | MAEDA  | SH Copper Products                        | Institute for Future Engineering  |
| Canon                             | MAYEKAWA MYCOM                                   | SHIMADZU                                  | Iwete Medical University  |
| Central Japan Railway             | MEIDENSHA  | SHIMZ                                     | Iwate University  |
| CITIZEN WATCH                     | Metal Technology                                 | SHIN NIPPON AIR TECHNOLOGIES              | Japan Atomic Energy Agency  |
| COSMOTEC Corporation              | MIRAPRO  | SHINOHARA PRESS SERVICE                   | Japan Synchrotron Radiation Research Institute                          |
| Deloitte Touche Tohmatsu LLC      | Mitsubishi Electric                              | Sojitz                                    | Kindai University   |
| DIA CONSULTANTS                   | Mitsubishi Electric System & Service             | Sumitomo Heavy Industries                 | Kobe University   |
| Electric Power Development        | Mitsubishi Electric Tokki Systems                | SUMITOMO MITSUI CONSTRUCTION              | Kogakuin University   |
| Fujikura                          | Mitsubishi Heavy Industries                      | TAISEI                                    | Kyoto University  |
| Fujita                            | Mitsubishi Heavy Industries Mechatronics Systems | Taisei Research Institute                 | Kyushu Committee for the ILC Asia                                       |
| FUJITSU                           | MITSUI ENGINEERING & SHIPBUILDING                | TAIYO NIPPON SANSO                        | Kyushu University   |
| Fukken                            | NEC  | TAIYO, NAKAJIMA & KATO                    | LCC   |
| Fukuyama Consultants              | NEC-TOKIN  | TAKASAGO Thermal Engineering              | Meiji Gakuin University   |
| Gigaphoton                        | Net One Systems                                  | TAKENAKA                                  | Nagoya University   |
| HAZAMA ANDO                       | NICHICON CORPORATION                             | Takenaka Civil Engineering & Construction | Nara Women's University   |
| HITACHI                           | NIHON KOSHUHA                                    | TEKKEN                                    | National Institutes for Quantum and Radiological Science and Technology |
| Hitachi High-Technologies         | Nikken Sekkei                                    | TOBISHIMA                                 | National Institute of Advanced Industrial Science & Technology          |
| Hitachi Power Solutions           | Nippon Advanced Technology                       | Toda                                      | National Institutes of Natural Sciences                                 |
| Hitachi Technologies and Services | NIPPON CIVIC CONSULTING ENGINEERS                | Tohoku Electric Power                     |   |
| Hitachi Transport System          | NIPPON STEEL & SUMITOMO METAL                    | Tokyo Denkai                              |   |
| HITACHI ZOSEN                     | Nishimatsu Construction                          | Tokyo Electric Power Services             | Nihon University  |
| IBM Japan                         | NOMURA PLATING                                   | Tokyu Construction                        | Niigata University  |
| Iwatani                           | NTT FACILITIES                                   | TOSHIBA                                   | Ochanomizu University   |
| JFE Steel                         | OBAYASHI   | TOSHIBA ELECTRON TUBES & DEVICES          | Okayama Institute for Quantum Physics                                   |
| JPD                               | Okazaki Manufacturing Company                    | TOYAMA                                    | Osaka University  |
| KABUKI CONSTRUCTION               | OKUMURA  | TOYOTA TSUSHO                             | PSG   |
| Kajima                            | ORIENTAL CONSULTANTS                             | UBER                                      | RIKEN Nishina Center for Accelerator-Based Science                      |
| KANDENKO                          | OYO  | ULTRA FINISH TECHNOLOGY                   | Saga University   |
| KASHIYAMA INDUSTRIES              | PACIFIC CONSULTANTS                              | Urban Planning and Design Institute       | Seikei University   |
| Kawasaki Geological Engineering   | PASCO  | Yachiyo Engineering                       | Shinshu University  |
| KUMAGAI GUMI                      | PENTA-OCEAN CONSTRUCTION                         | (Total of 104)                            | The University of Tokyo   |
|                                   |  |   | Tohoku University   |
|                                   |  |   | (Total of 41)   |

# History of AAA



- Jun., 2008 AAA was established (76members)
- July, 2008 Nonpartisan Parliamentary Federation for ILC was established
- Dec.,2008 Symposium was held by AAA & Federation

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



T. Kawamura

- Dec., 2011 Symposium was held by AAA & Federation  
Prime minister **Yoshihiko Noda** addressed.



R. Heuer

- 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
- April, 2013 US-Japan Advanced Science & Technology Symposium
- Oct., 2013 International Symposium on ILC



- Dec., 2014 AAA restarted as a general incorporated association
- April, 2015 ILC Tokyo event (500 guests from many countries)



- Feb., 2016 **US-Japan Political Leader’s Forum on Advanced S & T**
- May&Jun.,2016 **Collaboration Opportunities on Fusion and Accelerator Technologies, and Projects, between Spanish and Japanese Organizations**

# Four Groups of AAA



**Technology Study Gr. (Leader: Hitoshi Hayano)**  
to seek directionalities on advanced accelerator with the ILC, and to integrate “manufacturing technologies” from a variety of industrial fields to create innovative scientific technologies.



**Outreach Gr. (Leader: Hiroyuki Yoshizumi)**  
to inform the public about possibilities and significance of advanced accelerator and the ILC, through a variety of events and media exposure.



**CIVIL Gr. (Leader: Yuzo Onishi)**  
to contribute to hosting the ILC smoothly in Japan with studying civil issue.



**Large Project Study Gr. (Leader: Satoru Yamashita)**  
to study how to reach a consensus with understanding the location issue in order to realize the ILC in Japan, and to study proper organization for realizing the ILC.





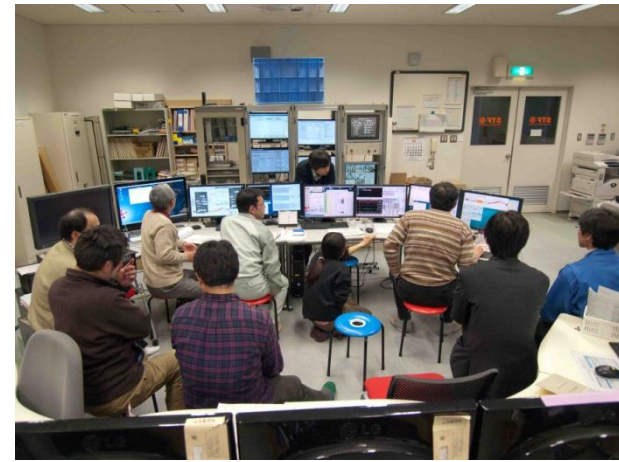
- 47 Seminars
- 17 working group (WG) meetings
  - Superconducting Accelerator WG
  - Green ILC WG
- Visit to Accelerator Lab.(KEK STF)
- Operation training of superconducting accelerator



Seminar



Visit to Lab



Training

# Symposiums on Advanced Accelerator



**M. Yoshioka**



**R. D. Heuer**



**A. Suzuki**



**M. Tsujii**



**S. Komamiya**



**H. Yamamoto**



**J. Kawaguchi**



**M. Ie**



**H. Murayama**



**S. Yamashita**



**H. Shimomura**



**D. P. Poneman**

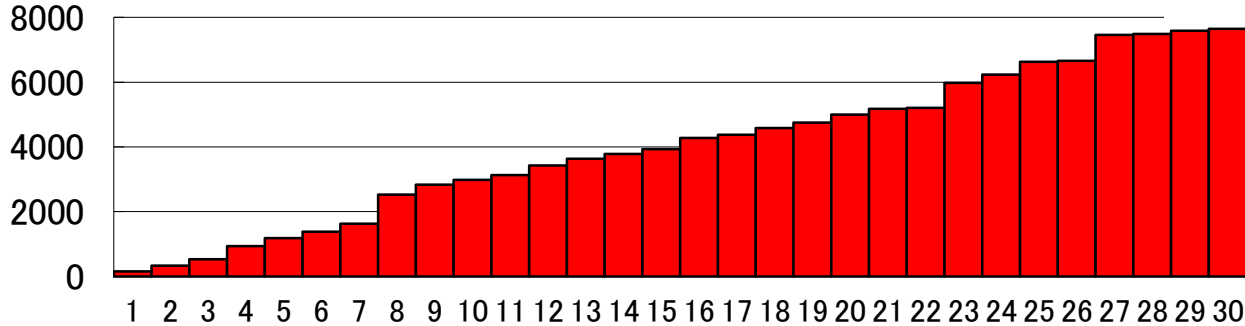


**T. Masukawa**

# Symposiums at the various cities in Japan



Total Number of Participants 7650



No.17 Washington, D.C.  
 No.22 Washington, D.C.  
 No.26 Washington, D.C.  
 No.28 Washington, D.C.  
 No.30 Spain

No.11 Sapporo

No.8 Oushu  
 No.23 Oushu  
 No.27 Oushu  
 No.2 Sendai  
 No.16 Sendai

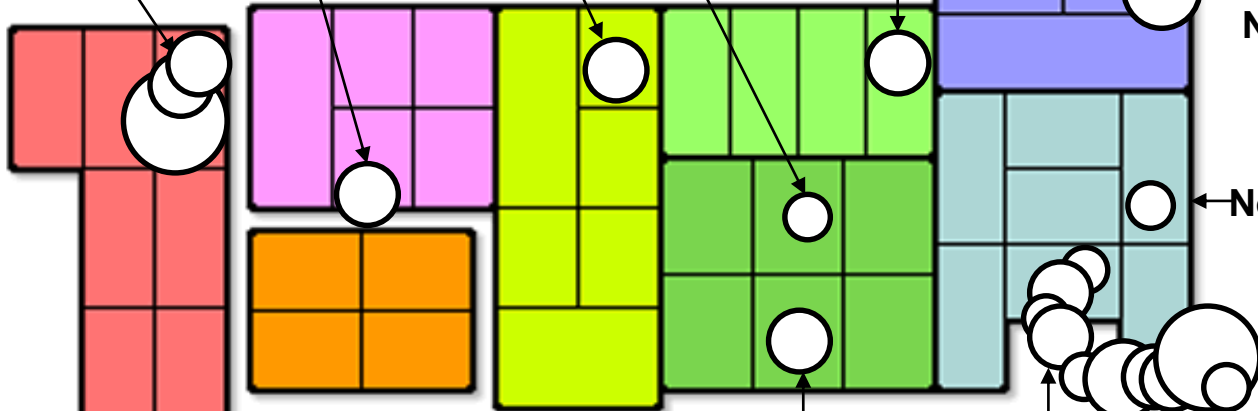
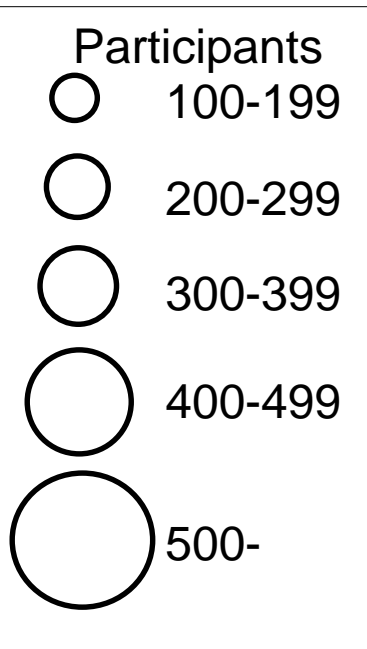
No.4 Fukuoka  
 No.9 Fukuoka  
 No.13 Fukuoka

No.3 Hiroshima

No.6 Kyoto

No.15 Matsumoto

No.18 Niigata



No.1 Tokyo  
 No.5 Tokyo  
 No.10 Tokyo  
 No.12 Tokyo  
 No.14 Tokyo  
 No.19 Tokyo  
 No.20 Tokyo  
 No.24 Tokyo  
 No.25 Tokyo  
 No.29 Tokyo

No.7 NAGOYA

No.21 Tsukuba



# The latest event - Science × HELLO KITTY-



**Date** July 27, 2016

**Place** Tokyo

**Lecturer** Lyn Evans & Hitoshi Murayama

**Audience** Executive of IT Company,  
Novelist, Space Designer, etc.

**We expect the influencers to understand ILC and distribute it widely.**





- AAA activities
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# Accelerator- Pyramid



Number in the world

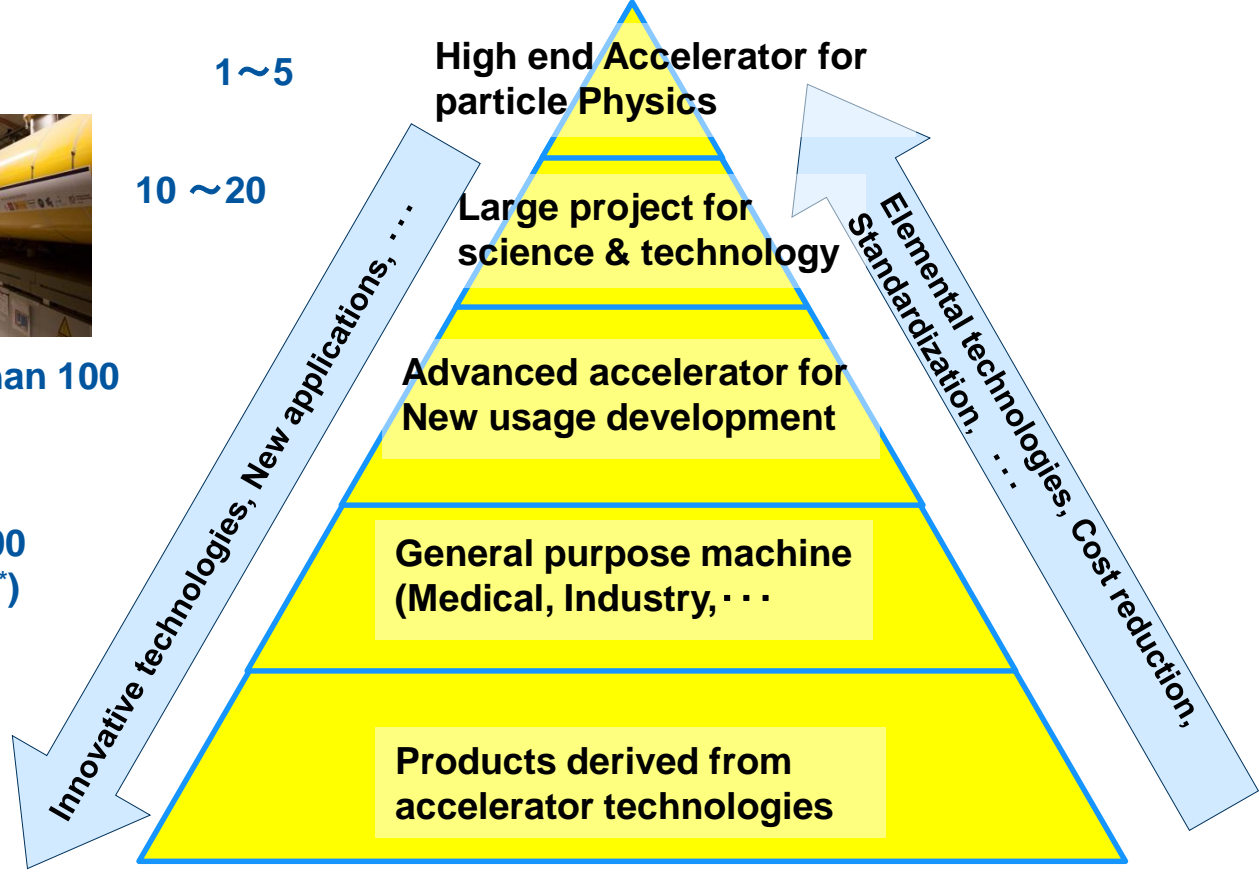
1~5

10~20

More than 100

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

(USD 500Billion\*)





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


# Accelerator industry in Japan



**LHC**






SC Solenoid coil (Toshiba)




Ceramics duct (Kyocera)


**SACLA**


RF control system (Mitsubishi Electric Tokki system)




Undulator (Hitachi)



Klystron (Toshiba Electron Tube and device)





Magnet (Hitachi & Toshiba)




Neutrino line (Melco)

Companies contributing to LHC  
Toshiba, Furukawa, IHI, Nippon Steel, JFE, Kaneka, Hitachi Cable, KHL, Sumitomo Chemical, Kyocera, Fujikura, Hamamatsu, Rinei-seiki, Mektec, Arisawa

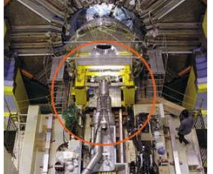
**KEKB**


Crab Cavity (MHI)




Llystron (Melco)




SC Magnet (Hitachi)




Particle Therapy System (Melco)




Proton Therapy System (Hitachi)




Particle Therapy System (Toshiba)




Proton Therapy System (SHI)




X-ray therapy system (MHI)



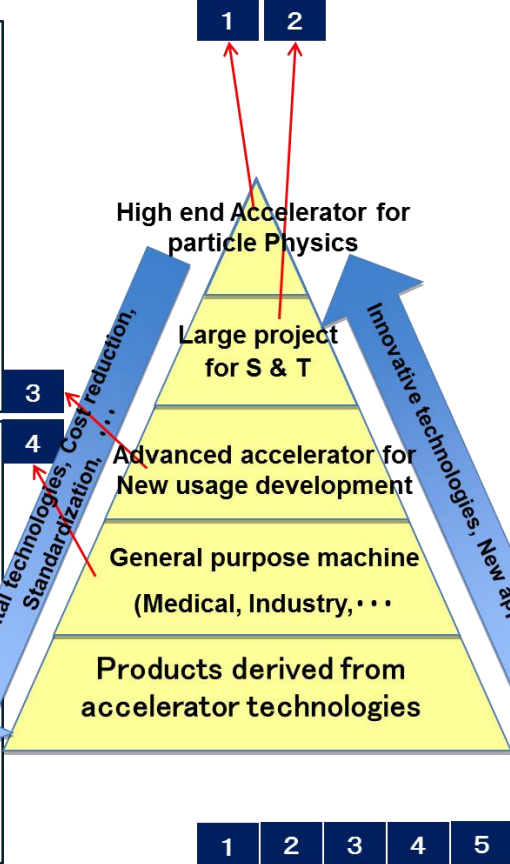
Electron beam sterilization equipment (NHV)




PET (SHI)




X-ray CT (Toshiba)







Niobium (Tokyo Denkai)



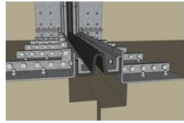
Radiation Resistance Fiber (Fujikura)




Chemical Polishing (Sanai)



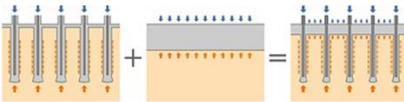
RF Waveguides (Furukawa)




Radiation Resistance rubber (Seibu Polymer)



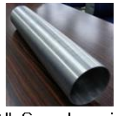
HV feed through (Kyocera)




Pile follower raft method (TAKENAKA)




Photomultiplier tube (HAMATSU)



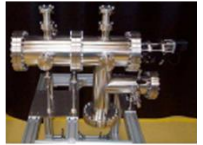
Nb Seamless pipe (ULVAC)



Heat removal anchor (TOBISHIMA)

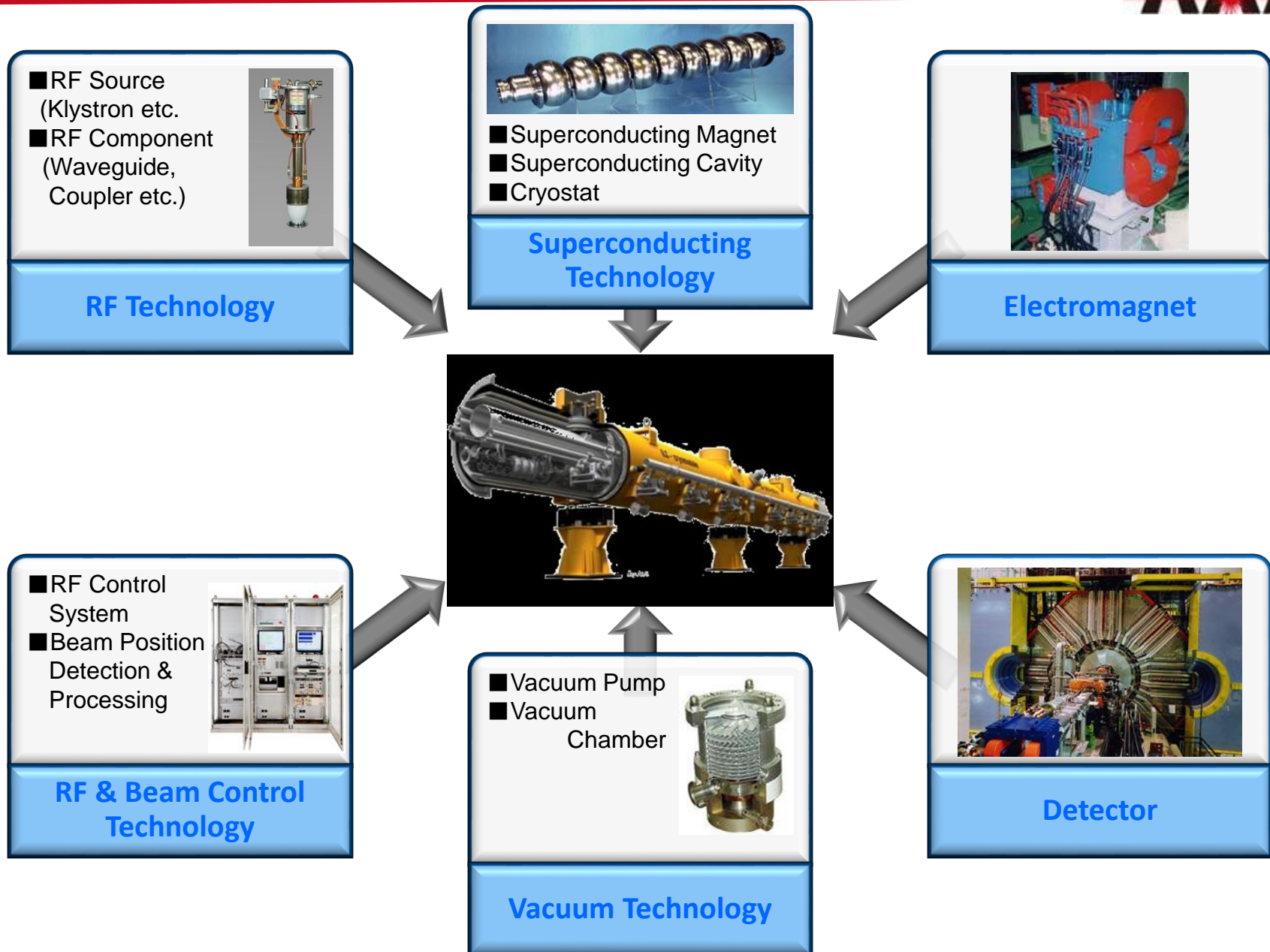


Helium liquefier (TAIYO NIPPON SANSO)



Gas Analyzer (MIRAPRO)

# ILC Supported by Various Technologies



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



## Companies which have contributed to LHC

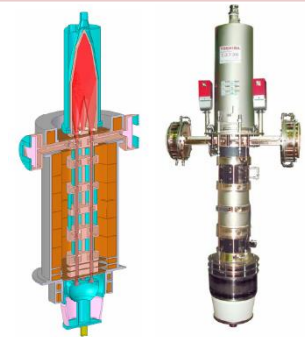
| Company                         | Products                               |
|---------------------------------|--|
| Toshiba corporation             | Superconducting magnet, TDC chip       |
| Furukawa, Ltd.                  | Superconducting cable                  |
| IHI corporation                 | 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 |



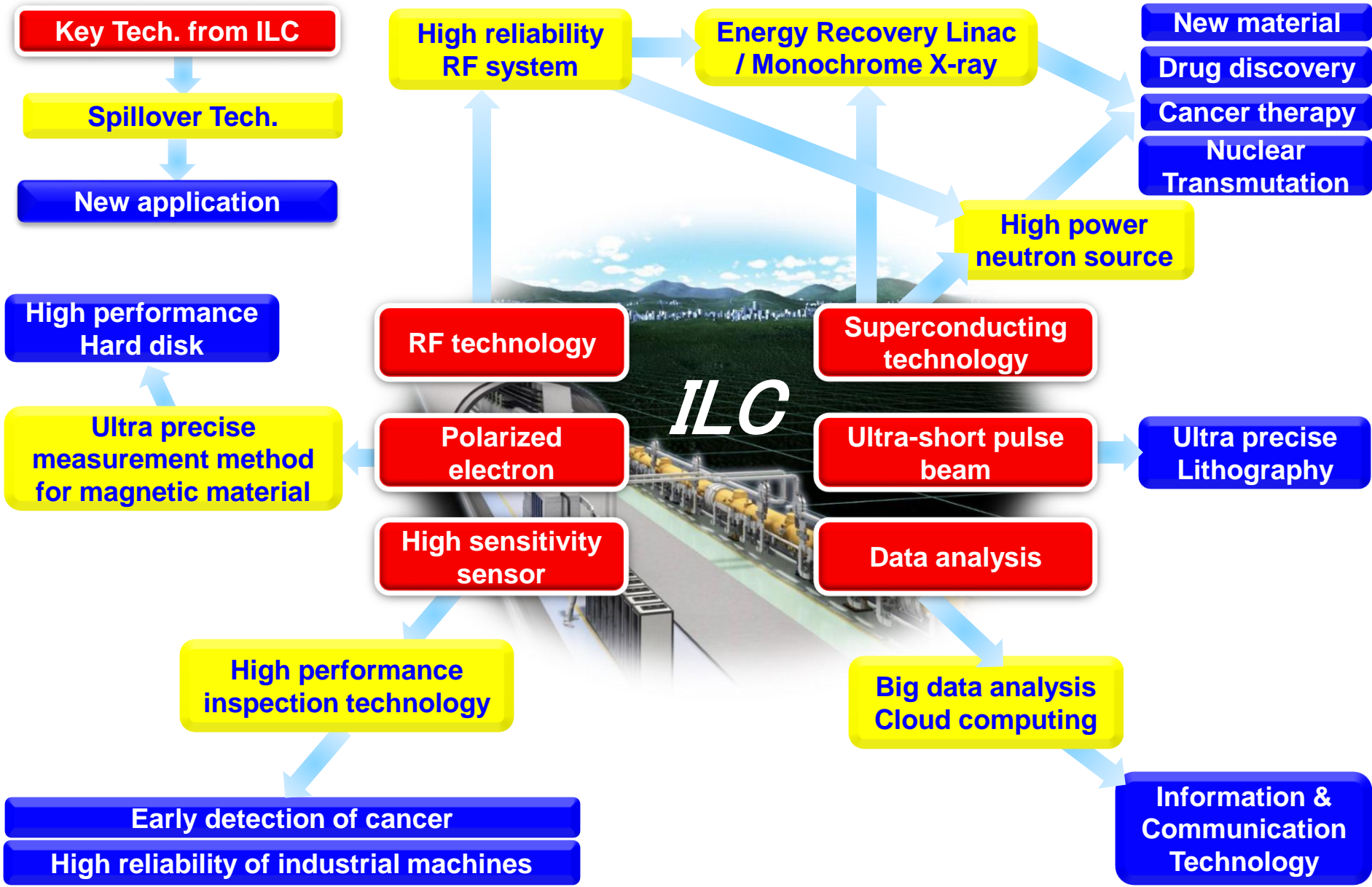
## Companies which have contributed to other projects

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



- AAA activities
- Accelerator Science and Industry
- **Toward realization of ILC**

# Study of technology spillover effect of ILC



# Economical Benefit of ILC



**Takashi Nishioka** (Chair of AAA, former President of MHI)

Two view points are significant regarding ILC. One is the cutting-edge manufacturing and the other is to make the model case to improve Japanese industry. In this several decades, the mass production has been our strong advantage, but in the future we need to create new fields.

New Intellect should become a core competence of Japan.

(24, Oct., 2012 「Forum on advanced science and industry」)

## Local economical Impact

Economical effect from International academic city

## Technology Improvement

technology improvement by tackling the cutting edge manufacturing

## Human Resource

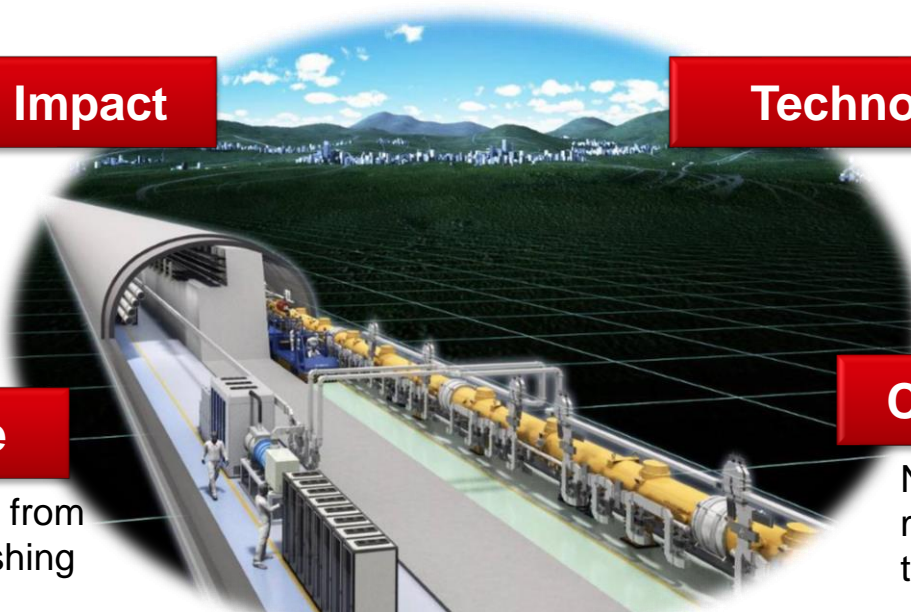
Gathering superior people from all over the world and pushing up our educational level, especially science field

## Creating New Market

New products and new market created from ILC technology

## Innovation

The new idea from ILC leading to innovation beyond our imagination





- AAA have promoted the science and technology of the accelerators and ILC project.
- Through the ILC promotion, AAA propose the good relationship between Industry and academia in order to create innovation.

## **To move forward the ILC, we will make efforts to**

- Promote the international cooperation.
- Win public support.