

Industrial Use Promotion Programs at SPring-8

Research Complex at SPring-8 & SACLA Campus

X-ray Free Electron Laser
SACLA

SPring-8
Storage Ring

QST(National Institutes for
Quantum and Radiological
Science and Technology)

JAEA(Japan Atomic
Energy Agency)

RIKEN
SPring-8 Center

1.5GeV SR
New SUBARU

University of
Hyogo

2017-10-25
Japan Synchrotron Radiation Res. Inst.
JASRI/SPring-8 Akira YAMAKAWA

Summary of SPring-8

- **Name**: Super Photon ring 8GeV
 - **Location**: Harima Science Garden City (Hyogo Pref.)
 - **Open to Public**: October 1997
 - **Construction Cost**: US\$ 1 Billion
 - **Owned by** RIKEN
 - **Operation, User Selection & Support**: JASRI
 - **Operation Budget**: US\$ 100 Million FY
 - **Campus Area**: 1.41 km² (donated by Hyogo-Pref.)
- User: 16,000 users/year
- User's Beam Time : 4500 Hrs (Operation : 5300 Hrs/year)

Measures for promoting Industrial Applications

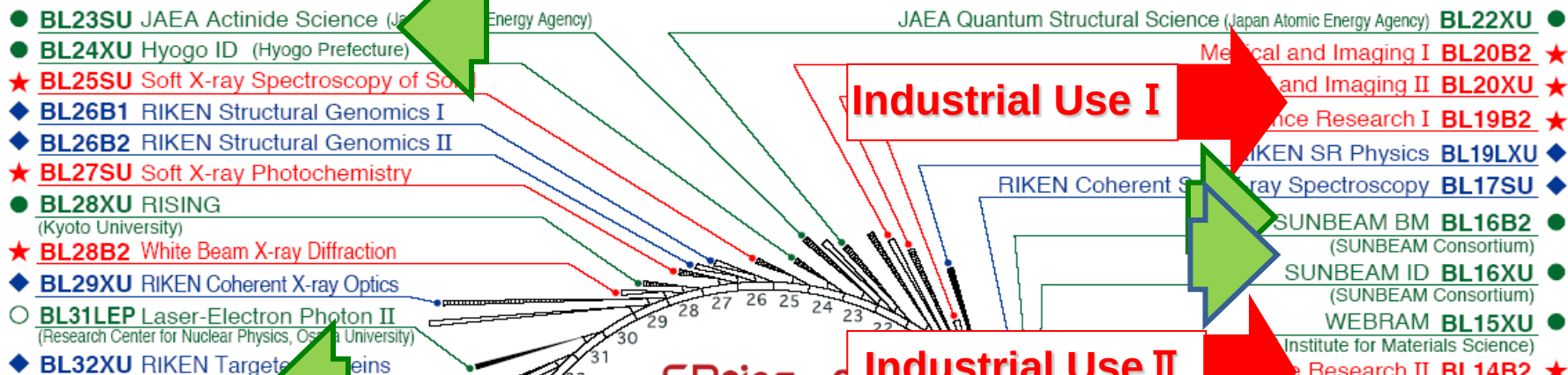
The Policy of MEXT toward industrial applications and their budgetary supports

Measure Title	Trial-Use Program	Strategic Use of Advanced Large-Scale Research Facilities Program	Priority Field Program <Industrial Application> New Ind. Area Proposal
Implementation Term	FY2001 and FY2003 - 2005	FY2005 - 2007	FY2007 – 2013 FY2014-
Purpose & Key points	Promotion of industrial applications at public beamlines ◆Prioritizing newcomers ◆Introducing user-friendly systems for experiments ◆Prioritizing novel subjects ◆Providing More staffs to assist experiments ◆Postponing the report due days		

Outcome

- ◆The number of industrial proposals increased from 60 to 300,
i.e., the ratio of industrial applications to the total applications from 5% to 20%,
the unique number of the companies utilized SPRing-8 from 50 to 150.
- ◆Field of industrial applications widened,
For example: organic materials, functional food, FMCG(Fast-Moving Consumer Goods) etc.

Beamlines for Industrial Use



BL in operation	BL Number	Industrial Use ratio	
		BL	Proposal
Public BL Industrial Use I, II, III	3/26	12%	20%
Contract BL Hyogo 2, SunBeam 2, Toyota 1, FSBL 1	6/19	32%	30%
RIKENBL	12	-	-
Total (57BL/available 62BL)	9/45	20%	25%

◆ **BL45XU** RIKEN Structural Biology

★ **BL46XU** Engineering Science Research

★ **BL47XU** HAXPES-μCT

Industrial Use III

Single Crystal Structure Analysis **BL02B1** ★

XAFS **BL01B1** ★

Organization of Industrial Application Division

Mission

Support Industrial Users effectively to promote use of the SPring-8

Industrial Application
Division

Dr.Hirosawa, Director

Industrial User
Support Group

Dr.Sato, GL

Coordinators

- Chief Scientist (staff)
- Eminent Scientist (4 days/week)
- Eminent Scientist (3 days/week)

Structure Analysis T

Dr.Koganezawa, TL

BL19B2:

Multi-axis X-ray diffraction,
Powder diffraction, X-ray imaging,
Small angle X-ray scattering,

BL46XU:

Multi-axis X-ray diffraction,
Hard X-ray photoemission spectroscopy

Materials Characterization T

Dr.Honma, TL

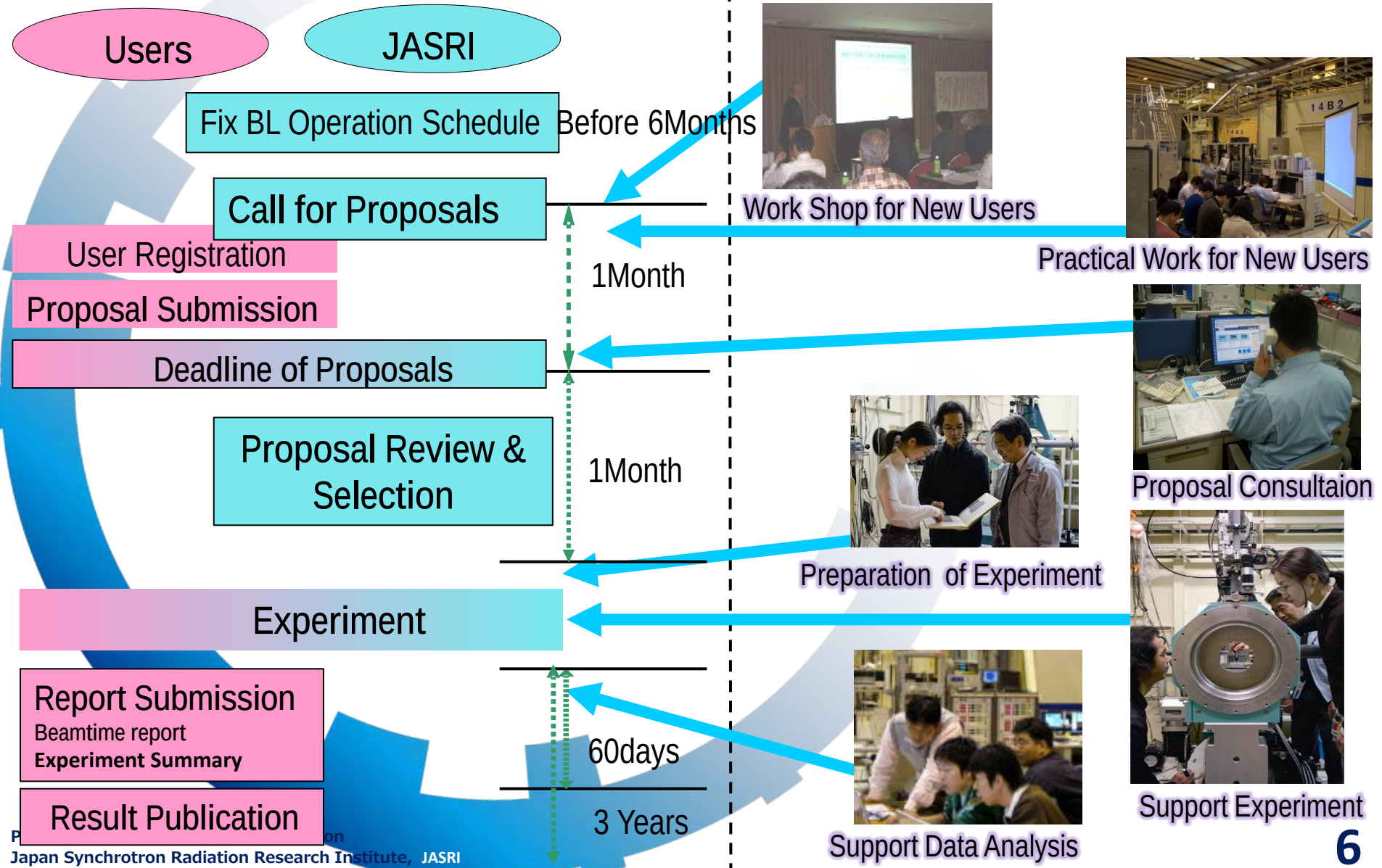
BL14B2:

XAFS
X-ray imaging

User Selection and Support Procedure(Public BL)

Utilization Process

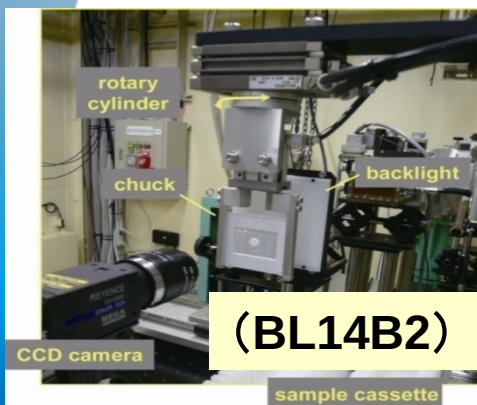
Technical & Information Support



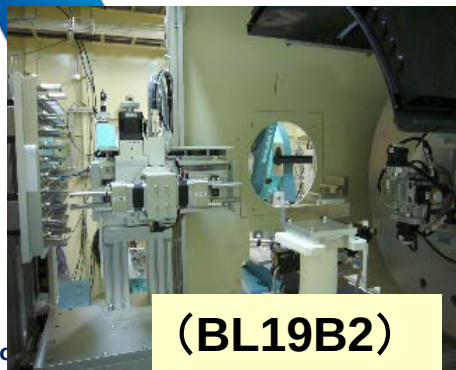
Advancement of industrial use BL Apparatus(Public BL)

- Full automated XAFS, XRD and SAXS/USAXS
- Measurement services (XAFS, XRD and SAXS/USAXS ,HAXPES)
- Remote Experiment of XAFS (XRD will be started soon)
- Additional Experimental Hutch of BL46XU (2 HAXPES Instruments)

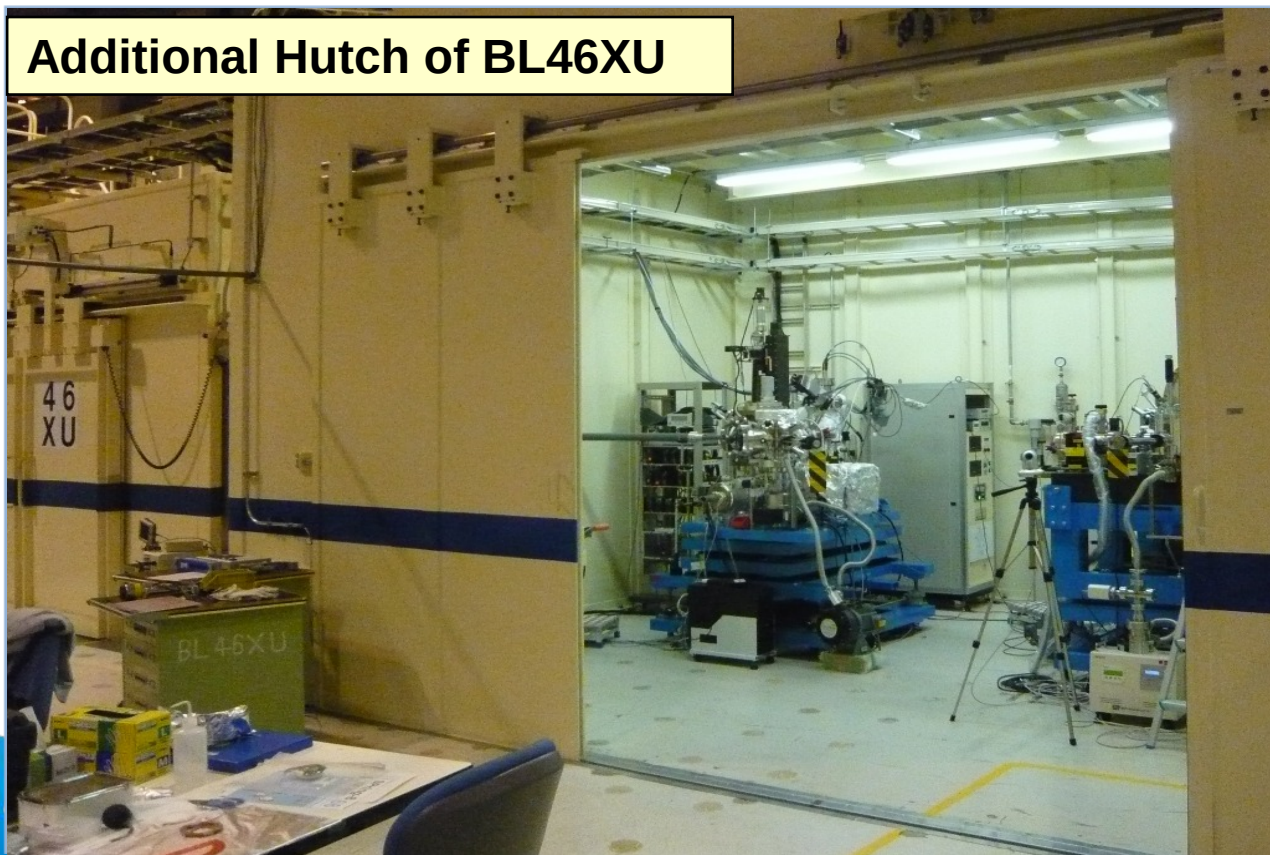
Full Automated XAFS



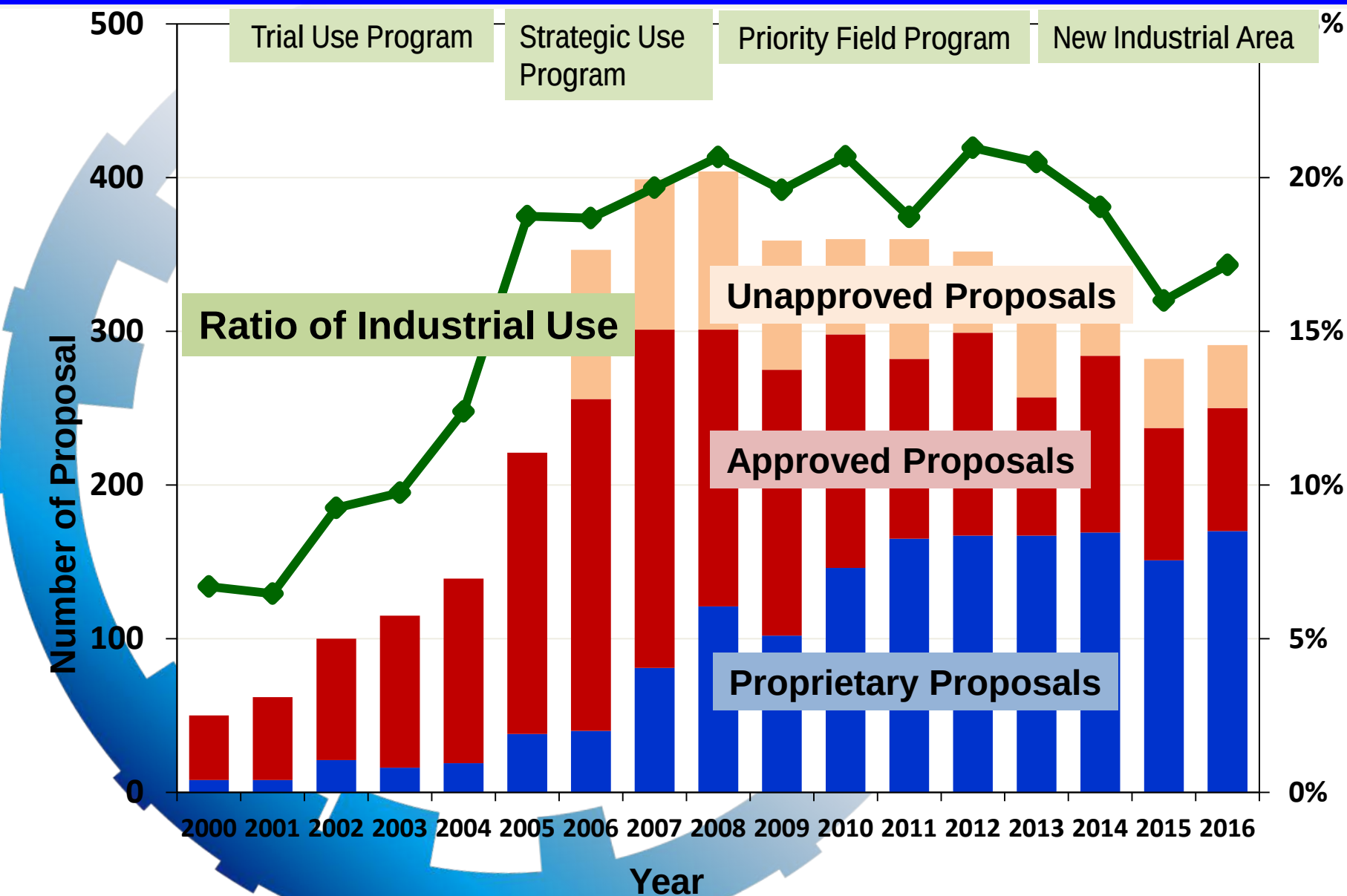
Full Automated XRD



Additional Hutch of BL46XU



Annual Trends of Proposals by Industry(Public BL)

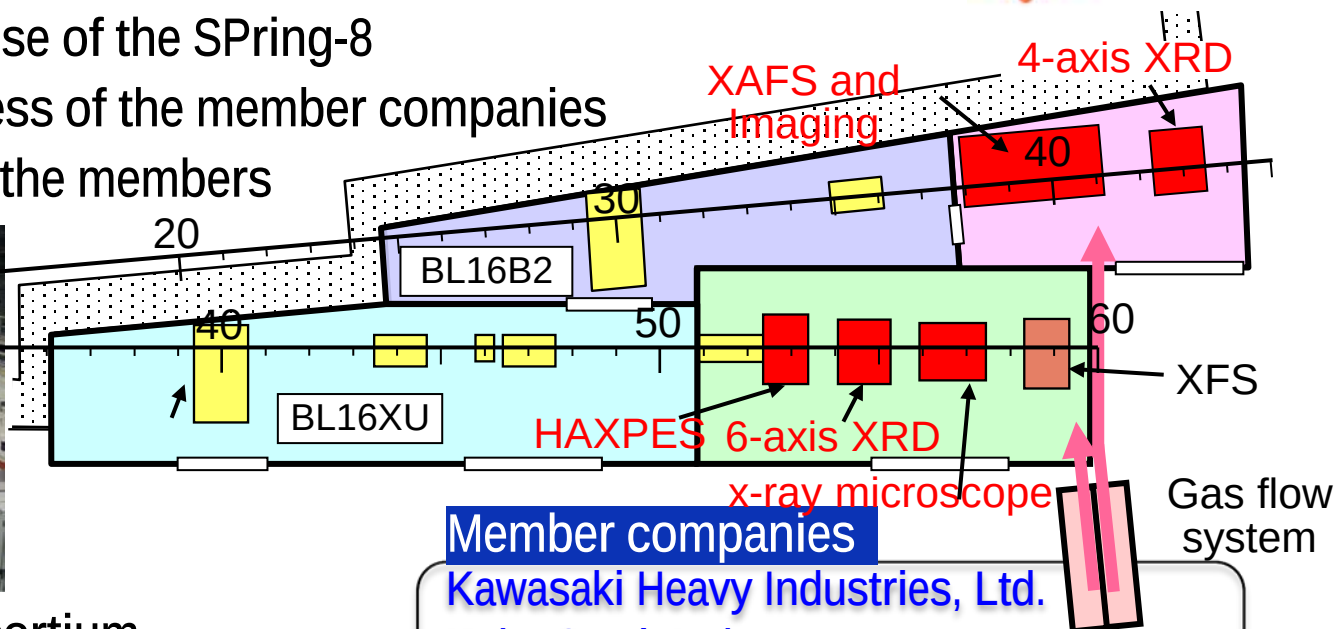


SUNBEAM Consortium: BL16B2/XU (Contract BL)



Mission

- Encouraging industrial use of the SPRING-8
- Improving competitiveness of the member companies
- Assuring beamtimes for the members



Progress of the Consortium

- | | |
|-----------|---|
| Dec, 1996 | Establish SUNBEAM Consortium |
| Apr, 1998 | Start constructing SUNBEAM beamlines (BL16XU; Undulator, BL16B2; Bending) |
| Aug, 1998 | Contract Conclusion with JASRI |
| Jul, 1999 | Launches of SUNBEAM beamlines |
| 2007~2008 | Renewals of apparatus & Contract |
| Mar, 2014 | Installation of HAXPES (BL16XU) |

Member companies

Kawasaki Heavy Industries, Ltd.
Kobe Steel, Ltd.
Sumitomo Electric Industries, Ltd.
Sony Corp. Electric Power Group*
Toshiba Corp.
Toyota Central R&D Labs., Inc.
Nichia Corp Nissan Motor Co., Ltd.
Panasonic Corp. Hitachi, Ltd.
Fujitsu Laboratories Ltd.
Mitsubishi Electric Corp.

TOYOTA Beamline:BL33XU (Contract BL)

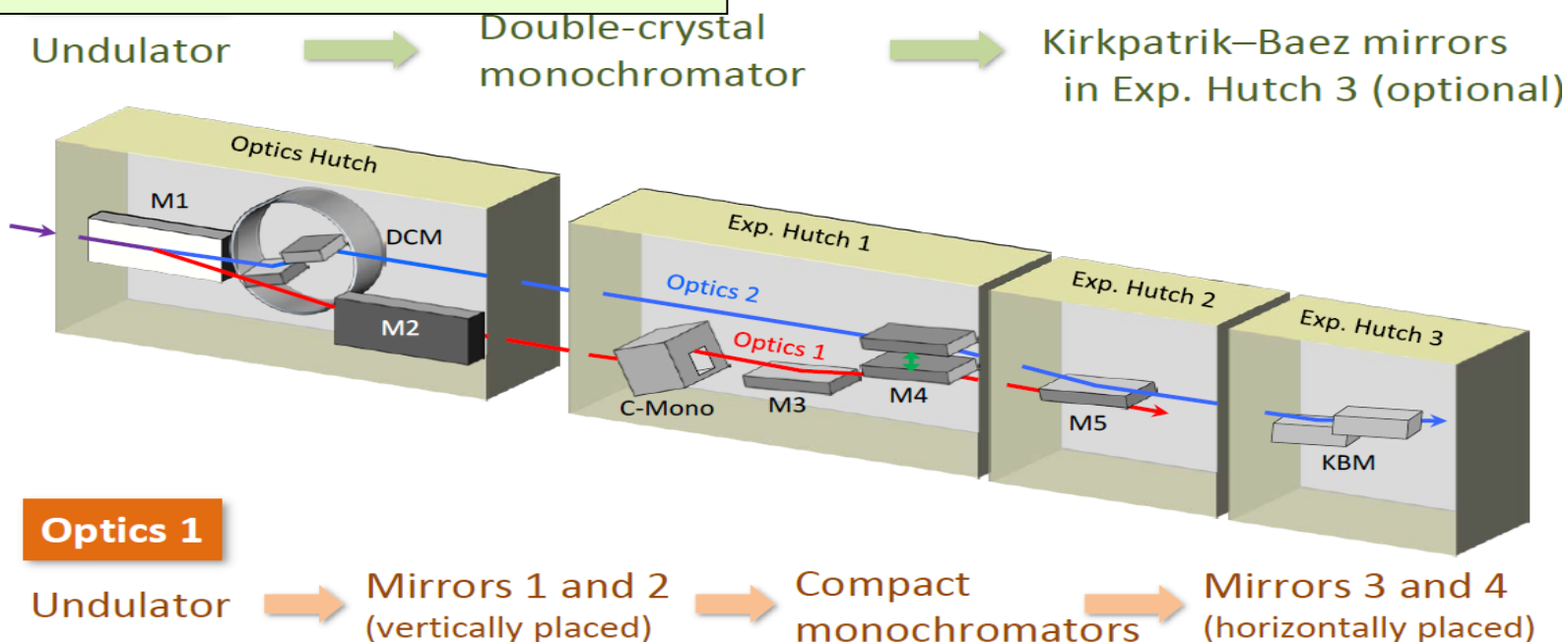


TOYOTA CENTRAL R&D LABS., INC.

Applications:

Analysis and evaluation of materials used in car industry(Battery, Fuel Cell, Catalyst)

- **High speed time-resolved Measurement**
several tens of millisecond
- **Operando Measurement**
under various kinds of atmospheres and temperatures

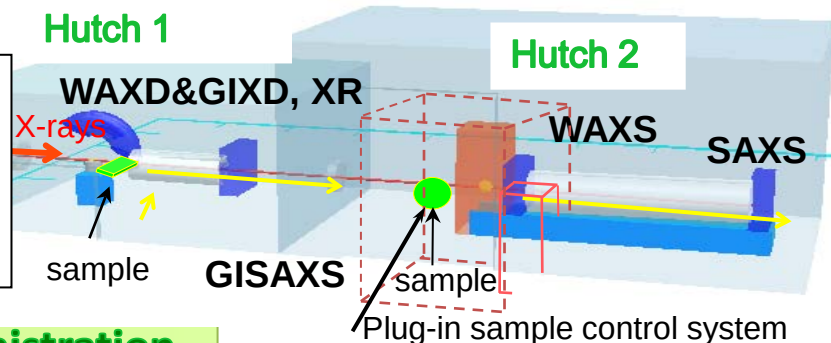


Frontier Softmaterial Beamline: (Contract

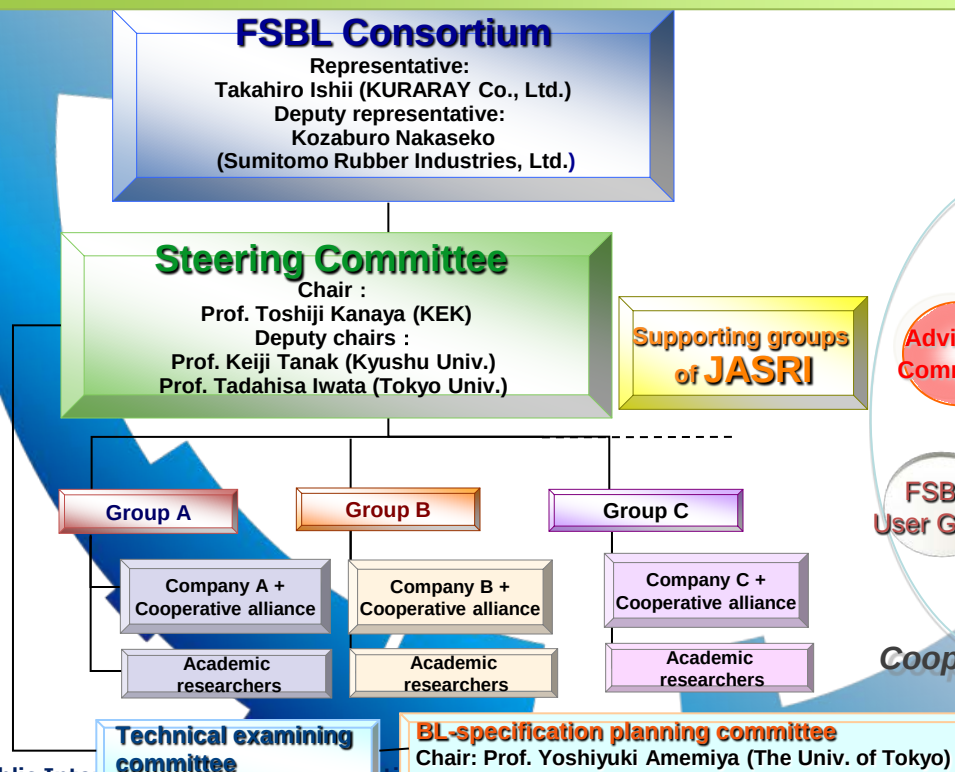
Construction : Apr. 2008 ~, Commissioning: Nov. 2009,
Opening to member's utilization: Apr. 2010

Mission :

- Tactical application of SR to the Softmaterial
- Building a bridge between Industry and Academic through SR Science



Organization Structure for BL Construction & Administration



FSBL Consortium

(Industry-academic joint consortium)

19 Industrial Members:

Asahi Kasei Corp. • Kwansei Gakuin Univ. • Canon Inc. • Kuraray Co., Ltd. • Showa Denko K. K. • Sumitomo Chemical Co., Ltd. • Sumitomo Rubber Industries, Ltd. • Sumitomo Bakelite Co., Ltd. • Denso Corp. • Toyobo Co. Ltd. • Toray Industries, Inc. • Nitto Denko Corp. • Bridgestone Corp. • Mitsui Chemicals, Inc. • Mitsubishi Chemical Corp. • Mitsubishi Rayon Co., Ltd. • The Yokohama Rubber Co., Ltd. • Teijin Ltd. • DIC Corp.

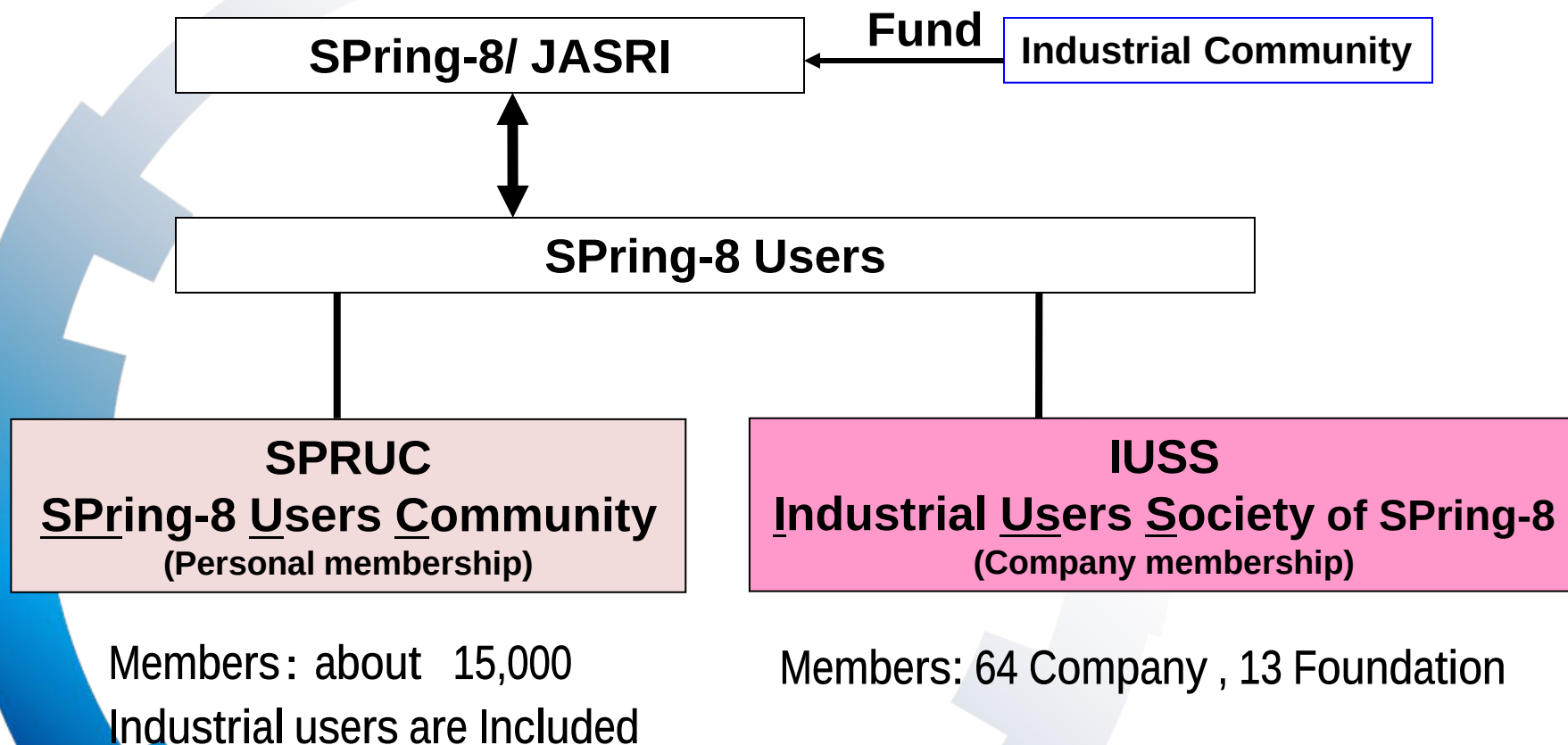
Academic Members :

Researchers of The Univ. of Tokyo, Nagoya Institute of Technology, Kyoto Univ., Kyoto Institute of Technology, The Univ. of Kitakyushu, Kyushu Univ., etc.



Cooperative network

Industrial Users Society



SPRING-8 Industrial Use Symposium

5 Contract Beam Lines

- Hyogo-Prefectural 2 BeamLines
- Sun-Beam(2 BeamLines)
- TOYOTA BeamLine

and 3 Public Beam Lines (JASRI Industrial Use)
 Annually Organize“ Industrial Use Symposium “
 14 th :Aug 31 and Sep 1, 2017 at Kawasaki-City
 Attendants :260 (mainly from Industry)



Poster (101 items)



Oral Session (21 items)



Net Working Event

Hyogo SPring-8 Award

Hyogo-prefectural governor annually honors Industrial User for achievements at SPring-8

Hair-Care Products (KAO+P&G)



3rd (2005)

Catalysts for Exhaust Gas
(Toyota)



6th (2008)



10th (2012)

Low-Fuel Consumption Tires
(Sumitomo Rubber)



11th (2013)

Recycling Technology for
Tungsten (Sumitomo Electric)



15th (2017)

Li-ion Battery (Toyota)



14th (2016)

High Strength Si-Rubber
(Sumitomo Bakelite)



13th (2015)

Li-ion Battery (Nissan-ARK)

Synchrotron Radiation Facilities in Japan

6SR-Facilities have set up PHOTON BEAM PLATFORM with government subsidies to Promote Industrial use by one-dimensional information service, consultations, standardization and facilities-cooperation



4 Working Group

- ① High-level Application (GL: JASRI, KEK)
- ② Tackle regional problem (GL: AichiSR)
- ③ Human Resource (GL: Osaka Univ.)
- ④ Plan & Operation (GL: KEK)

SPring-8/SACLA

New SUBARU:
Univ. of Hyogo

Aichi SR

**Next Generation
3GeV SR Facility**

**J-PARC, JRR-3
Neutron**

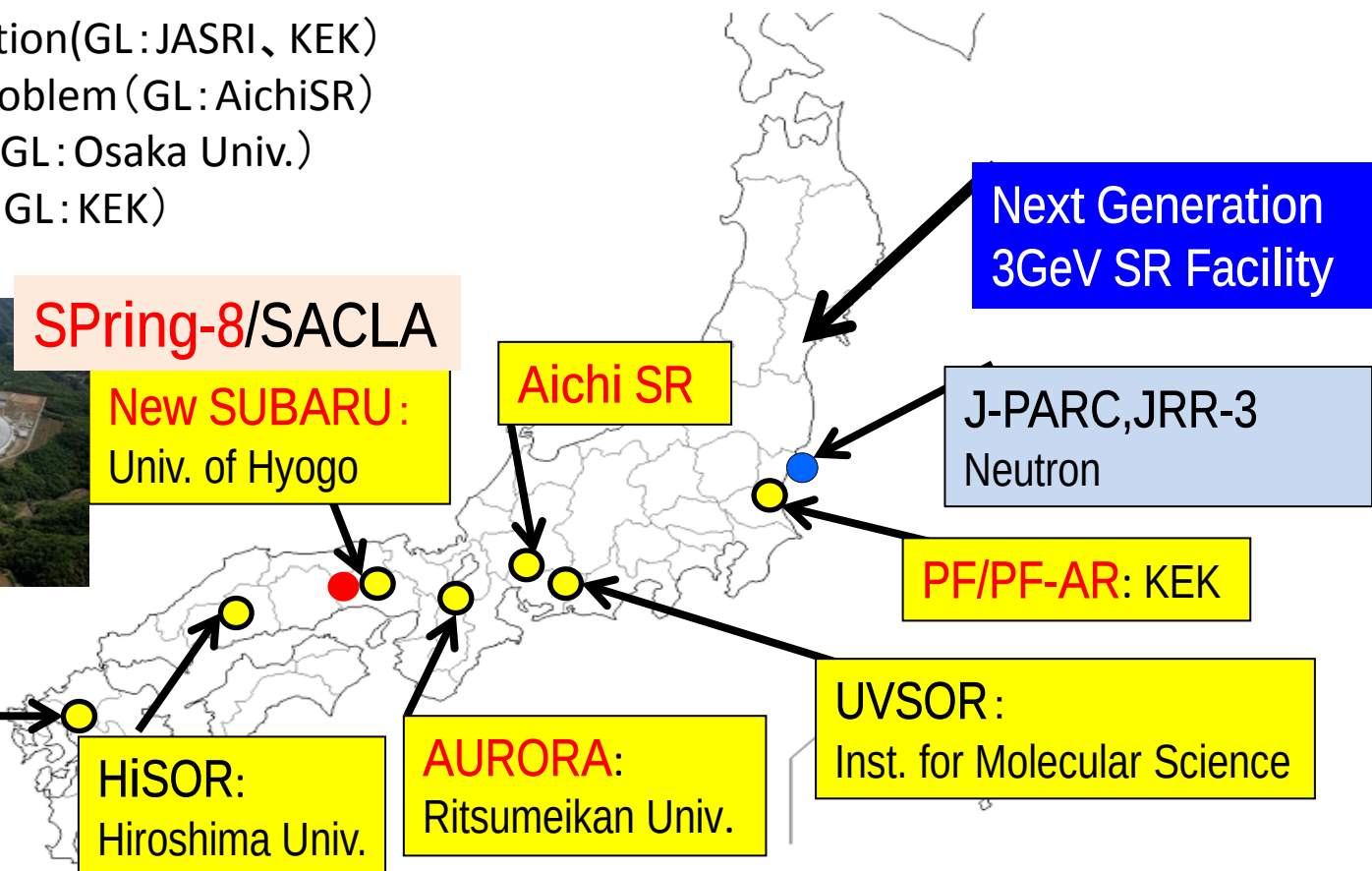
PF/PF-AR: KEK

UVSOR:
Inst. for Molecular Science

AURORA:
Ritsumeikan Univ.

HiSOR:
Hiroshima Univ.

SAGA-LS



Thanks for your Attention

