

IRID Annual Symposium 2014

Overview and Activities of International Research Institute for Nuclear Decommissioning (IRID)

July 18, 2014

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International Research Institute for Nuclear Decommissioning

Revision of Mid-and-Long-Term Roadmap and Background of Establishment of IRID

Overview of revised Mid-and-Long Term Roadmap

(Council for the Decommissioning on June 27, 2013)

1. Acceleration of the schedule for each unit corresponding to the respective condition.
 - ✓ Multiple plans were developed aiming at the fuel debris retrieval for initial unit to be conducted ten years later to be flexible with each unit.
2. Enhance communication with local community
 - ✓ Establish “Fukushima Advisory Board (tentative name)”
 - ✓ Provide opportunity to find the corporation in Fukushima in order to collaborate for decommissioning work, and revitalize regional economy by encouraging local corporations supplying equipment/tools.
3. Full scale maintenance of structure to gather knowledge and ideas from around the world.
 - ✓ Establish R&D organization and arrange system to receive advice from overseas experts.
 - ✓ Enhance collaboration with IAEA review mission, and proactive promotion of international joint research.

In addition to the above, following items will be stipulated and addressed in the Mid-and-Long Term Roadmap.

- ✓ Reports the countermeasures on control of groundwater inflow by “Contaminated Water Treatment Committee.”
- ✓ Secure safety of “Specified Reactor Facility” and measures on regulations, such as of arrangement of new standards. (improve reliability of equipment and facilities, and operation safety for operator and radiation safety etc.)

Process of Establishment and Role

Establishment

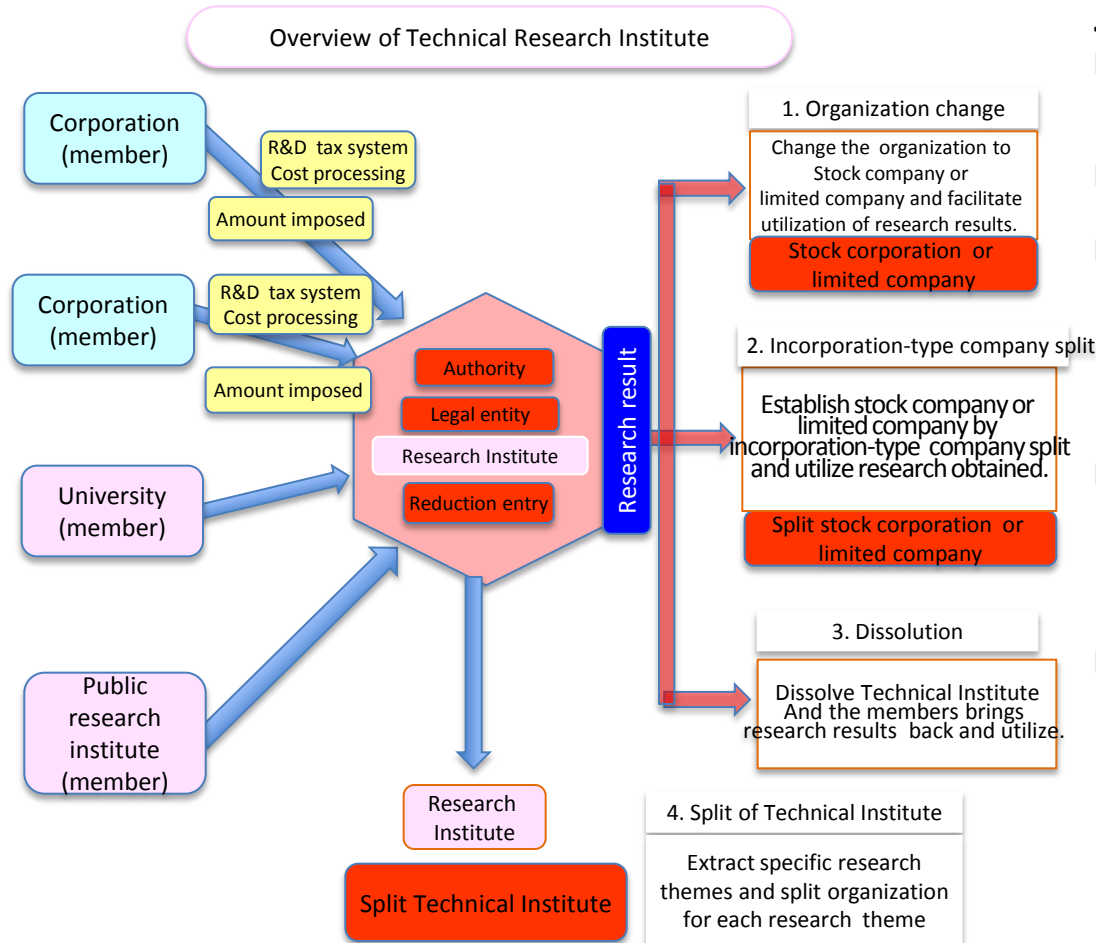
- August 1, 2013: Approved by Mr. Motegi, the Minister of Economy, Trade and Industry, according to the Research & Development Consortium Act of Japan.
- August 8, 2013: General Meeting and the Board of Directors were held to start the consortium. Launched as the International Research Institute for Nuclear Decommissioning.

Basic Role

- Fully committing to technology R&D that helps the decommissioning project of Fukushima Daiichi NPS as an urgent subject, based on which enhancing the technological basis for nuclear decommissioning for the future.

Technical Research Institute

Technical research association is an organization for mutual support where the members conduct joint research on the technologies used for the industrial activities for themselves (non-profitable mutual benefit corporation established in accordance with the Research & Development Consortium Act of Japan).



<Features of Technical Research Association>

- Each member provides researchers, research fund, facilities etc., and manage and utilize those result together.
- Joint research organization with legal personality, independent from the members.
- Improve transparency and reliability of organizational operation through the registration and application for authorization for establishment for the competent minister, and members' general conference and the board of directors.
- Person or party (including domestic corporation, individuals, foreign corporation and foreigner) that utilizes the results of joint research directly or indirectly can be a member of this organization.
- This organization can be utilized as a place of cooperation among government, industry and academia since the universities and independent administrative corporation of test research, technical college, local public body, foundation mainly aiming at the test research etc. members can take part in.

(Excerpts from METI)

Outline of IRID

1. Name

Research & Development Consortium,
“International Research Institute for Nuclear Decommissioning” (“IRID ” in brief)

2. Location of Main Office

6F, Parkplace, 5-27-1, Shimbashi, Minato-Ku, Tokyo, 105-0004, Japan
(<http://www.IRID.or.jp>)

3. Founding members (18)

- Incorporated administrative agencies:

Japan Atomic Energy Agency, National Institute of Advanced Industrial Science and Technology.

- Manufacturers:

Toshiba Corporation, Hitachi-GE Nuclear Energy, Ltd., Mitsubishi Heavy Industries, Ltd., ATOX (since May 29, 2014)

- Electric utilities etc :

Hokkaido Electric Power Company (hereinafter called as EPC), Tohoku EPC, Tokyo EPC, Chubu EPC, Hokuriku EPC, Kansai EPC, Chugoku EPC, Shikoku EPC, Kyushu EPC, The Japan Atomic Power Company, J-POWER, Japan Nuclear Fuel Limited.

4. Board of directors

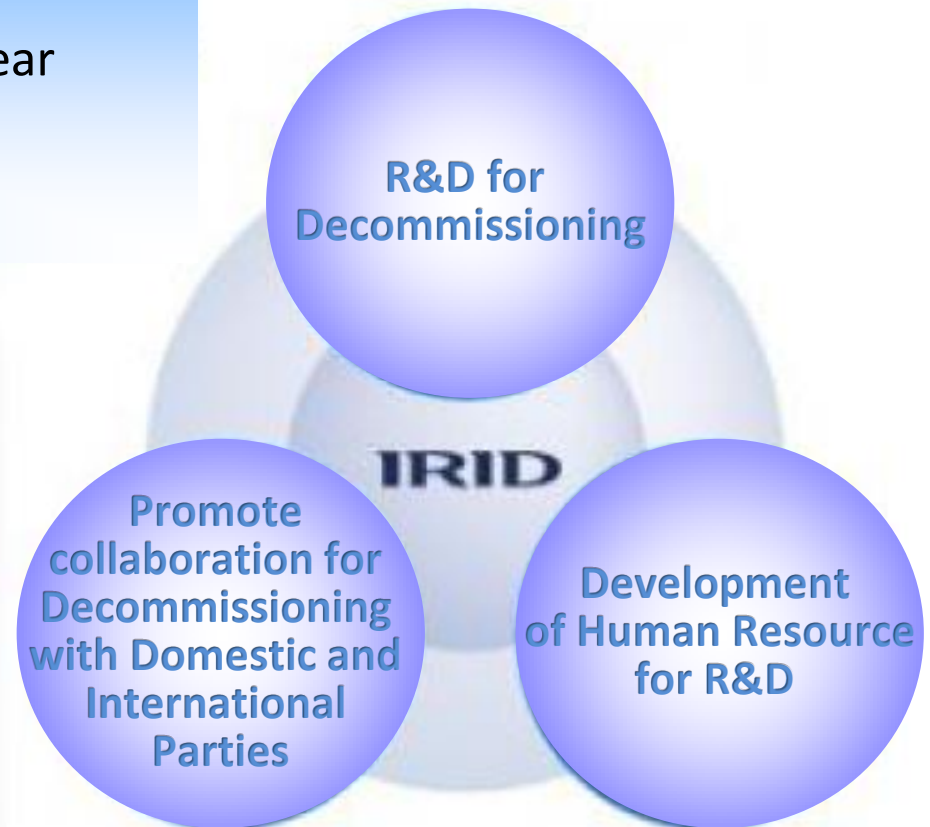
President: Dr. Yamana, Vice President: Dr. Arai, and Mr. Kenda, Executive Director: Mr. Suzuki
Director: Mr. Oikawa, Mr. Moriyama, Mr. Uozumi , Mr. Hatazawa, Mr. Seto
Mr. Fukuda and Mr. Kadokami
Auditor : Mr. Konashi

Projects of IRID

IRID gathers knowledge and ideas from around the world for the purpose of R&D in the area of nuclear decommissioning under the integrated management system.

R&D projects:

- Fuel assemblies removed from spent fuel pool
- Preparation for fuel debris retrieval
- Treatment and disposal of radioactive waste

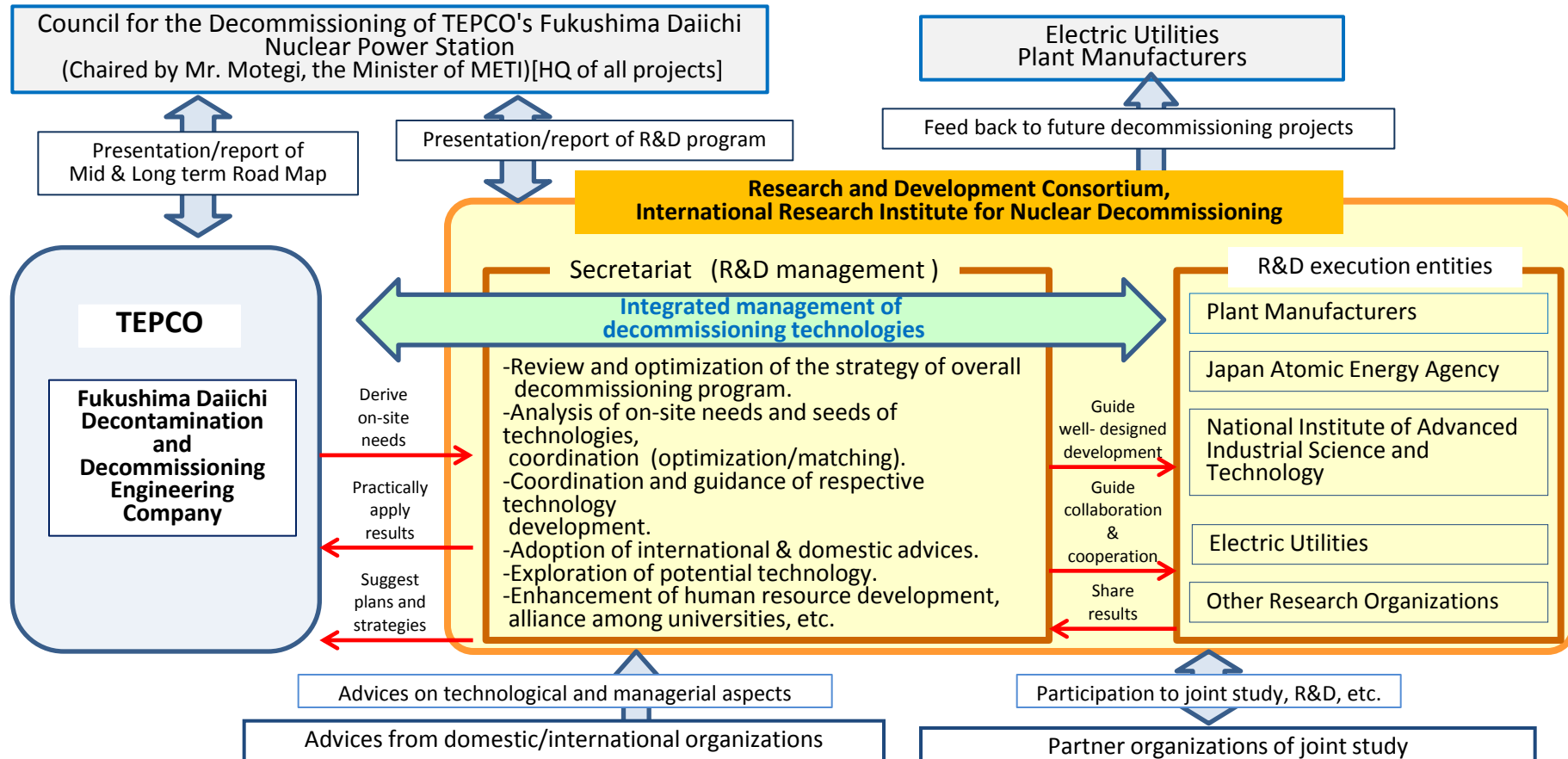


Schematic image of IRID's function

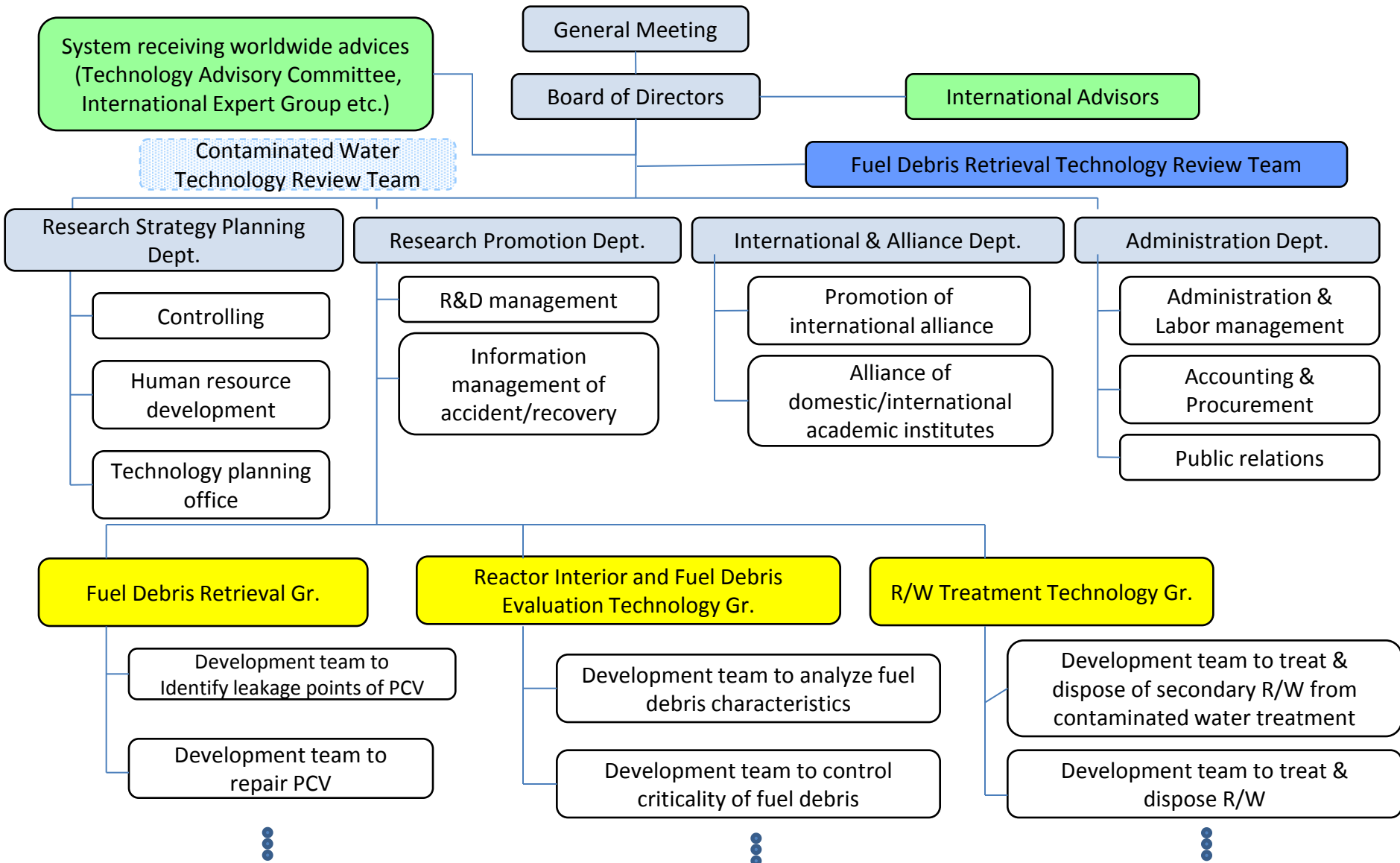
<With perspective of enhancing technological basis for reactor decommissioning, focusing on clear and present challenges of Fukushima Daiichi NPS decommissioning.>

- Accelerating the decommissioning of Fukushima Daiichi NPS, securing its safety and restoring its environment.
- Early recovery of the Fukushima area and the confidence building among the nation.

- Preparation for future decommissioning and enhancing its safety level.
- Incubating, accumulating and improving the related technologies.



Organizational chart



Present operation plan (R&D projects)

R&D to set up fuel debris retrieval

R&D for remote decontamination in reactor building

Development of technology for investigation of inside of PCV

Development of repair and stopping water leakage technology for leakage location of PCV

Development of technology for retrieval of fuel debris and in-core structures

Development of technology for investigation of inside of RPV

Development of technology for evaluation of soundness of RPV/PCV

Estimation of inside of reactor using severe accident analysis code

Development of technology for grasping of characteristics and treatment of fuel debris

Development of technology for detection of fuel debris in reactor

Development of technology for packing, transfer and storage of fuel debris

Development of repair and stopping water leakage technology for leakage location of PCV

Full-scale test for repair and stopping water leakage technology for leakage location of PCV

R&D for treatment & disposal of R/W

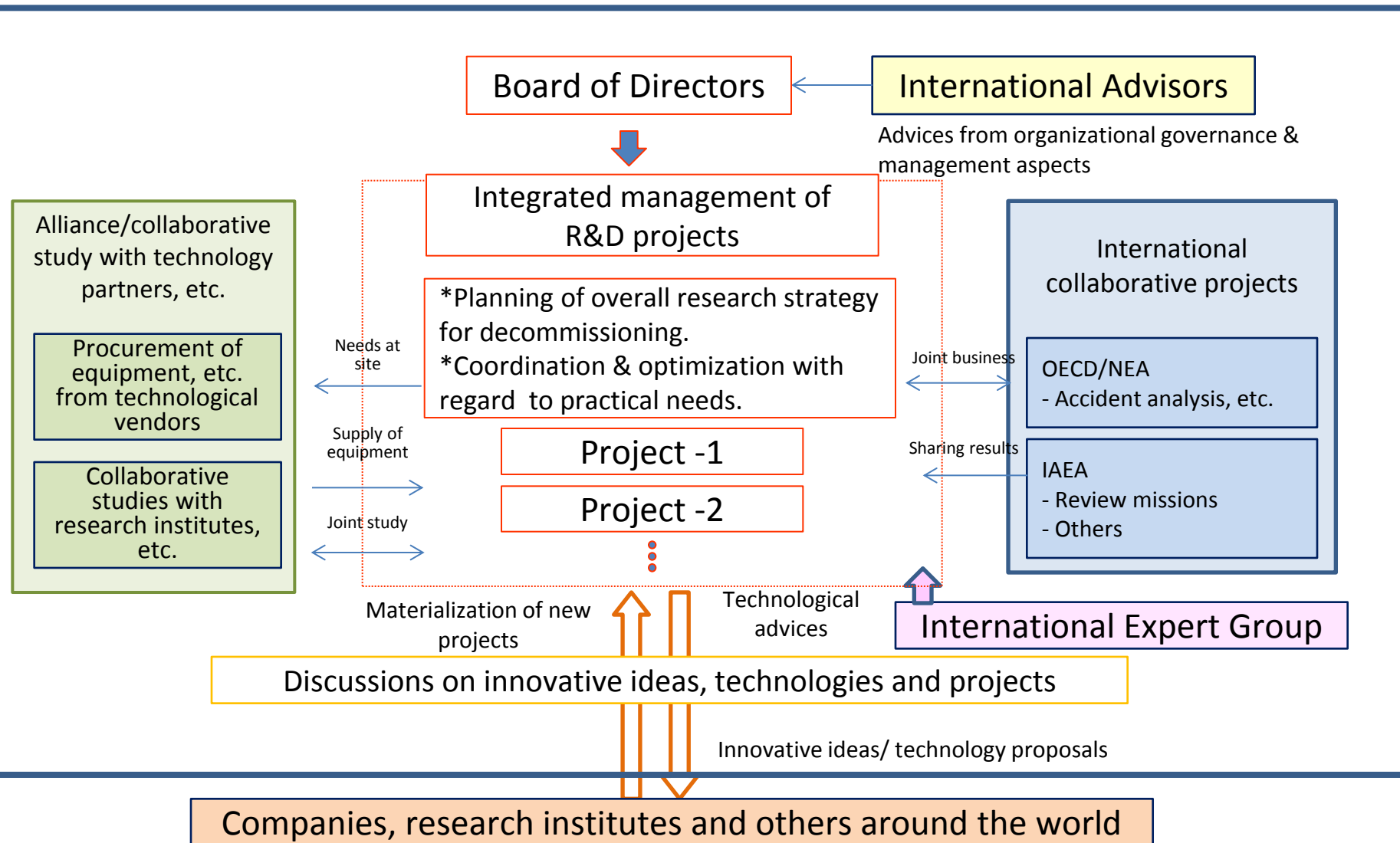
Development of technology for disposal of accident waste

R&D to retrieve SFs from SF pools

Evaluation of long-term soundness of fuel assembly, etc. retrieved from spent fuel pool

Consideration of treatment method of damaged fuel, etc. retrieved from spent fuel pool

“Open Platform” to integrate knowledge from all around the world



International Adviser and International Expert Group

Soliciting advices based upon findings & experiences of other countries

● **Advices from the International Advisors on overall management at IRID .**

- **Mr. Lake Barrett (US)** : Former NRC, Individual consultant. (Director of measures to contain the TMI accident.)
- **Dr. Adrian Simper (UK)** : Director of NDA
- **Mr. Luis E. Echavarri (Spain)** : Former OECD/NEA Director-General
- The 1st Meeting held on Jan. 9-10, 2014

● **Technological advices from the International Expert Group**

- **Douglas Chapin (USA)**: President of MPR (experienced in restoration from TMI accident and clean-up of the facilities.)
- **Dr. Rosa Yang (US)** : Electric Power Research Institute(EPRI) Senior Technical Executive
- **Dr. Adrian Simper (UK)** : Director of NDA
- **Dr. Joel Pijselman (France)**: Current Chairman of ETC (former Vice president of AREVA)
- **Mr. Nikolai Steinberg (Ukraine)**: individual consultant (involved in Decommissioning strategy of Chernobyl Nuclear Power Plant.)
- **Mr. Anton Leshchenko (Russia)**:Deputy Head of Research Department, Research and Development Company. “Sosny” (engaged in the retrieval work of damaged fuel at Paks Nuclear Power Plant)
- The 1st Meeting held on Sep. 23-27 (Tokyo/Fukushima)
- The 2nd Meeting held on Feb. 17-21, 2014 (Tokyo)
- The 3rd Meeting held on Jun. 24-27, 2014 (Tokyo)

IAEA Review Mission

- **IAEA International Peer Review on “TEPCO Mid-and-Long Term Roadmap for Decommissioning of Fukushima Daiichi Nuclear Power Station Unit 1-4” (Nov. 25 -Dec. 4, 2013)**

IRID , along with METI and TEPCO, discussed with IAEA inspection team consists of 19 members and obtained following evaluation results.

- A comprehensive structure was developed, such as establishing IRID so as to utilize technical knowledge and technological capability around the world in order to accelerate the decommissioning activities of Fukushima Daiichi Nuclear Power Station more safely.
- The intension to incorporate international experience and to seek international cooperation by having IRID participated was clearly confirmed.
- IAEA confirmed that TEPCO and IRID make contribution toward the development of remote control technologies to identify cooling water leakage in the PCV and repairing the leakage. Application of the equipment to identify the leakage points is a significant step for PCV isolation (leakage points closure)
- Establishing the working group (WG) for the development of remote control equipment will shorten the time between identifying specific needs and the handing over of the facilities assisted by each developed remote technology. For example, after the WG was established, the time it took for the device detecting the leakage inside the dry-well was 7-8 month. Participation of plant representative to the WG will contribute to successful development.

International Joint Project

IRID contributes to enhance the safety and decommissioning work of nuclear facilities around the world through the international joint work.

● OECD/NEA BSAF Phase I

- Joint benchmark research on accident status of Fukushima Daiichi and current condition of the core through the analysis codes including improved version for severe accident analysis codes.
- Sharing common data and information database

● Project for the next stage (plan)

- BSAF Phase II with expanded scope (Hydrogen, MCCI etc.)
- Sampling, analysis, and property identification of fuel debris
- Issues regarding the management of radioactive waste (methods of identifying and categorizing the properties and disposing the waste material)

Evaluation of R&D Project

Technical Advisory Committee (Experts of third parties)

Role : Evaluate and advice on overall R&D strategy and the activities of IRID .

Chairperson: Satoru Tanaka (Professor of School of Engineering, University of Tokyo)

Committee member :

Hajime Asama (Professor of School of Engineering, University of Tokyo)

Yutaka Watanabe (Professor of School of Engineering, Tohoku University)

Shinsuke Yamanaka (Professor of Graduate School of Engineering, Osaka University)

Osamu Tochiyama (Director, Radiation and Waste Safety Research Center, Nuclear Safety Research Association)

Subcommittees

(Evaluation of R&D project)

(1) Fuel debris retrieval equipment/remote operation technology*

Chairperson:
Hajime Asama

(2) Spent fuel · PCV/RPV soundness evaluation technology

Chairperson:
Yutaka Watanabe

(3) Technology of identifying internal conditions /fuel debris properties

Chairperson:
Shinsuke Yamanaka

(4) Treatment/disposal technology of radioactive waste

Chairperson:
Osamu Tochiyama

*Deliberate and propose solutions through integrating knowledge and experience of remote technology.

Measurements against the contaminated water issue

In response to the 1st Inter-Ministerial Council for Contaminated Water and Decommissioning Issues on September 10, a review team consisting of the related experts mainly from IRID has been established to implement concrete measures for contaminated water issues.

Solicitation for domestic/foreign technologies, gathering information and classification/sorting of the proposed technologies will be implemented. The results will be then reported to the governmental “Committee on Countermeasures for Contaminated Water Treatment.”

<Schedule>

Sep. 20: A website to solicit the technology proposals started. www.IRID.or.jp/cw

Oct. 2: An explanatory meeting on solicitation for the technology proposals
(at lino building, Tokyo).

Early Oct : Information exchange with the foreign organizations, etc.

Oct .23: Deadline for proposals.

Late October to early November: Classification/sorting of the technology proposals.

Nov.15: Report to the Committee on Countermeasures for Contaminated Water
Treatment

Dec.10: Summarize Report to the Committee on Countermeasures for Contaminated
Water Treatment

Gathering knowledge on contaminated water issue around the world

■ Call for technical proposal

◇ An expert team established mainly by the International Research Institute of Nuclear Decommissioning (IRID) to gather knowledge from experts around the world collected the technical proposal. (application period: Sep. 25-Oct. 23.)

◇ Ideas submitted were evaluated mainly by "contaminated water treatment committees" to reflect to the preventive and multilayered measurements on contaminated water.

■ Status of submitted idea

◇ Total number of proposals submitted was 780. Details are as follows.

| Field of proposal | No. of submitted ideas |
|---|------------------------|
| (1) Contaminated water storage (storage tank, small leak detection technology etc.) | 206 |
| (2) Contaminate water treatment (tritium separation technology, method of long-term stable storage of tritium etc.) | 182 |
| (3) Purification of seawater inside the bay (Removal technology for radioactive Cs, Sr in seawater etc.) | 151 |
| (4) Control of contaminated water inside the building (Indoor water stoppage technology, soil improvement construction technology etc.) | 107 |
| (5) Control of drainage flows into the site (water shielding wall construction technology, phasing technology etc.) | 174 |
| (6) Identify behavior of groundwater etc. (geological features, groundwater data measurement system, water quality analysis technology etc.) | 115 |
| Others (Items not subject to (1)- (6)) | 34 |



(Contaminated water treatment committees meeting)

◇ Large picture of countermeasure technology for contaminated water can be overlooked by the technical proposal from around the world, and all the proposals submitted are valuable data.

◇ Following technologies are extracted in reference to the level of technological maturity, urgency of measurement, and applicability to the site etc.

(1) Technology which should be utilized as soon as possible after confirming applicability to the actual site

- Large size tank with high credibility, like Double steel shell tank etc.
- Light-weight shielding sheet without lead
- Pollution preventing membrane (silt fence)
- Water stoppage technology (water stoppage inside the building, stoppage of the water around the building)
- Maintain geological condition, ground water investigation, observation network etc.

(2) Technology which should be utilized after selecting execution method in consideration of workability and cost effectiveness etc.

- Countermeasure technology water shielding (phasing, water shielding etc.)

(3) Technology whose that are expected to be effective but need confirmation and verification before utilization.

- Small leak detection technology (including dose rate)
- Tank decontamination technology without using water
- Tritiated water storage • separation technology
- Purification technology for seawater inside the bay
- Filter in the ground (capturing technology of strontium in soil)
- Unmanned boring technology etc.

(4) Items to be addressed based on the verification results of contaminated water treatment committees.

- General evaluation for tritiated water
- Examination(?) of problems regarding tanker, underground storage etc.

TEPCO's approach to utilize responses to RFI for contaminated water issues

■ In “Preventive and Multi-layered Measures for Contaminated Water of Fukushima Daiichi Nuclear Power Plant of Tokyo Electric Power Co. – Through Comprehensive and Through Risk Management”, technologies to be utilized based on compiled RFI responses are summarized as below.

■ Responses to respective items are as follows:

| No. | Items described in report by Secretariat of the Team for Decommissioning and Contaminated Water Countermeasures Cabinet Office | Status | Action / verification items |
|-----------------------------|--|--|---|
| 1 | Technique recommended to use immediately | ○ Reliability improvement and scaling up of tank(Double steel shell tank, etc.) | Adopted Reliable, large-size tanks |
| | | ○ Light-weight shielding sheet free from lead | Under verification Measures to prevent water leakage from tanks |
| | | ○ Pollution preventive membrane (silt fence, etc.) | Adopted Shielding sheet free from lead |
| | | ○ Water stop technique (building internal water stop, building peripheral water stop) | To be adopted Seawater purification using absorbent |
| | | ○ Survey of geological condition and underground water, improvement observation network | To be verified Water cutoff materials used in and around buildings |
| 2 | Technique recommended to use after selection of suitable method | ○ Technique of water-shielding (Facing of the site , peripheral water shielding measure) | To be adopted Water path detection layer and single-hole flow rate and direction measurement technologies |
| | | ○ Technique of water-shielding (Facing of the site , peripheral water shielding measure) | Under consideration Facing technologies of the slope |
| 3 | Technique to check/verify | ○ Microleakage detection technique (dye included) | Under verification As a result of comparative study, technological items other than responses to RFI (plastic scintillation fiber) are under verification. |
| | | ○ Decontamination technique free from water. | RFP for entities to implement with subsidies the “Validation of technologies for contaminated water management” project in the FY2013 is carried out. |
| | | ○ Purification of sea water in the harbor | |
| | | ○ Technique to collect strontium in the soil (near tank area) | To be adopted Capturing and collecting Sr in the soil (near tank area) |
| | | ○ Technique to collect strontium in the soil (near embankment area) | RFP for entities to implement with subsidies the “Validation of technologies for contaminated water management” project in the FY2013 is carried out. |
| ○ Unmanned boring technique | | | |
| 4 | Evaluation /Study | ○ Overall evaluation of handling of tritiated water | To be studied in the future in accordance with arrangements by tritiated water task force, etc. |
| | | ○ Study on the possibility of responses to the problems such as a floating tanker, underground storage | |

<Excerpts from “Situation of Use and Study of the result of RFI for addressing the contaminated water issue at Fukushima Daiichi Nuclear Power Station”, Document 6-2, the 12th Committee on Countermeasures for Contaminated Water Treatment >

Promoting fundamental studies and human resource development

- Promote the fundamental studies in alliance with universities, research institutes and so forth to secure human resource and its development from mid-to-long term perspective.
- Through hosting workshops in cooperation with the Ministry of Education, Culture, Sports, Science and Technology (MEXT), disseminate and share the information on R&D programs, as well as considering areas and tasks of any fundamental studies to be focused on that meet practical needs.

(Workshops hosted)

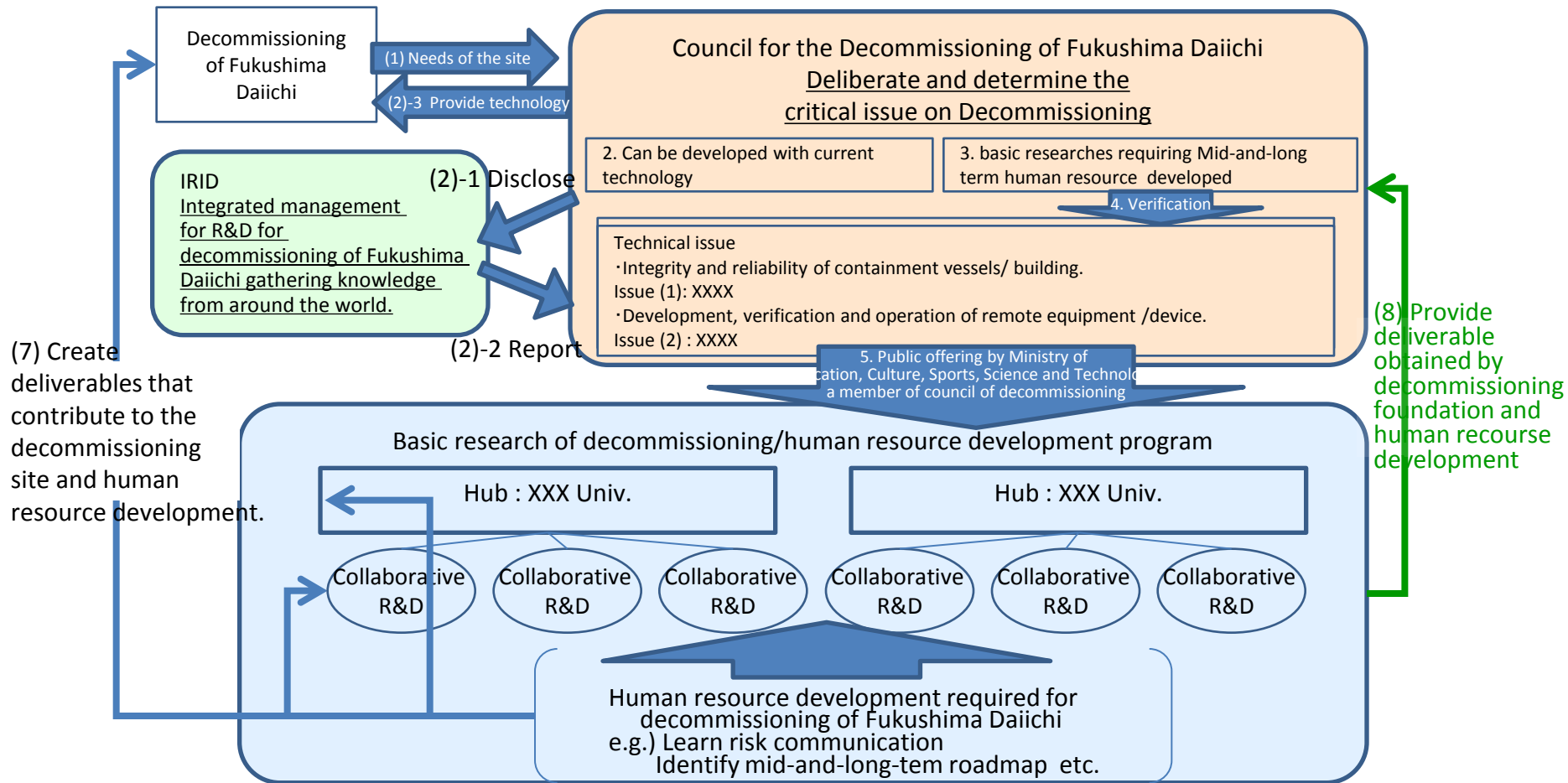
Hosted a series of workshops on R&D programs and fundamental studies.

- 1st (September 25, Kanto-1): R/W, Fuel debris.
- 2nd (October 8, Fukushima): Development of remote controlled equipment and device, Data visualization.
- 3rd (November 1, Kansai/Western Japan-1): R/W, Fuel debris.
- 4th (November 20, Tohoku/Hokkaido): Integrity of PCVs, etc., R/W.
- 5th (November 26, Kanto-2): Development of remote controlled equipment and device.
- 6th (Dec. 20, Kansai/West Japan-2): Development of remote controlled equipment and device.
- 7th (Dec. 25, Hokuriku-2): Integrity of PCVs, etc., Fuel debris.
Development of remote controlled equipment and device.
- 8th (Jan 18, Chubu): Integrity of PCVs, development of remote controlled equipment and device
Fuel debris, R/W.
- 9th (Jan. 22, Kanto-3): Fuel debris, material, R/W, and analysis-related issue.

Basic Research for Decommissioning etc. and Human Resource Program

Creation of new knowledge on mid-and-long-term decommissioning etc., and development and securing the human resource development are required through the countermeasures on TEPCO'S Fukushima Daiichi accident.

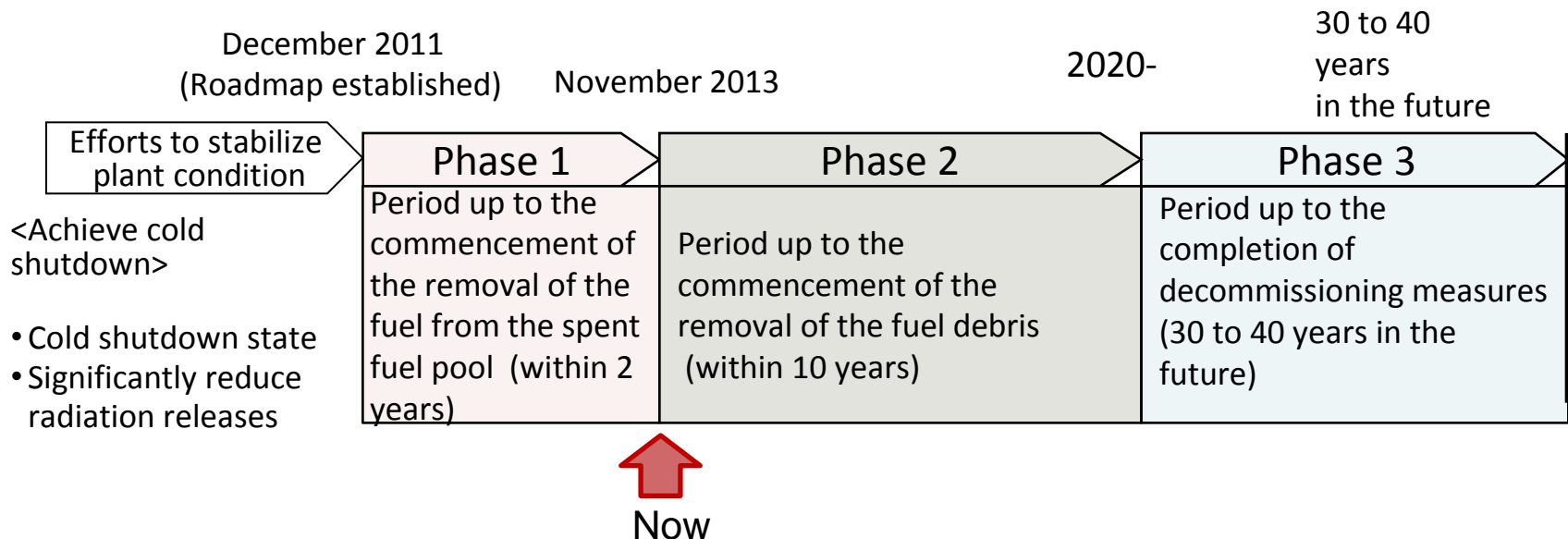
⇒ In collaboration with International Research Institute for Nuclear Decommissioning, implement basic research by gathering knowledge and ideas from various fields of research institute such as of universities for the priority area regarding human resource development defined by the Council for the Decommissioning from perspective of human resource of Mid-and-long term and create the deliverables which can contribute to the decommissioning site and human resource development.



R&D schedule

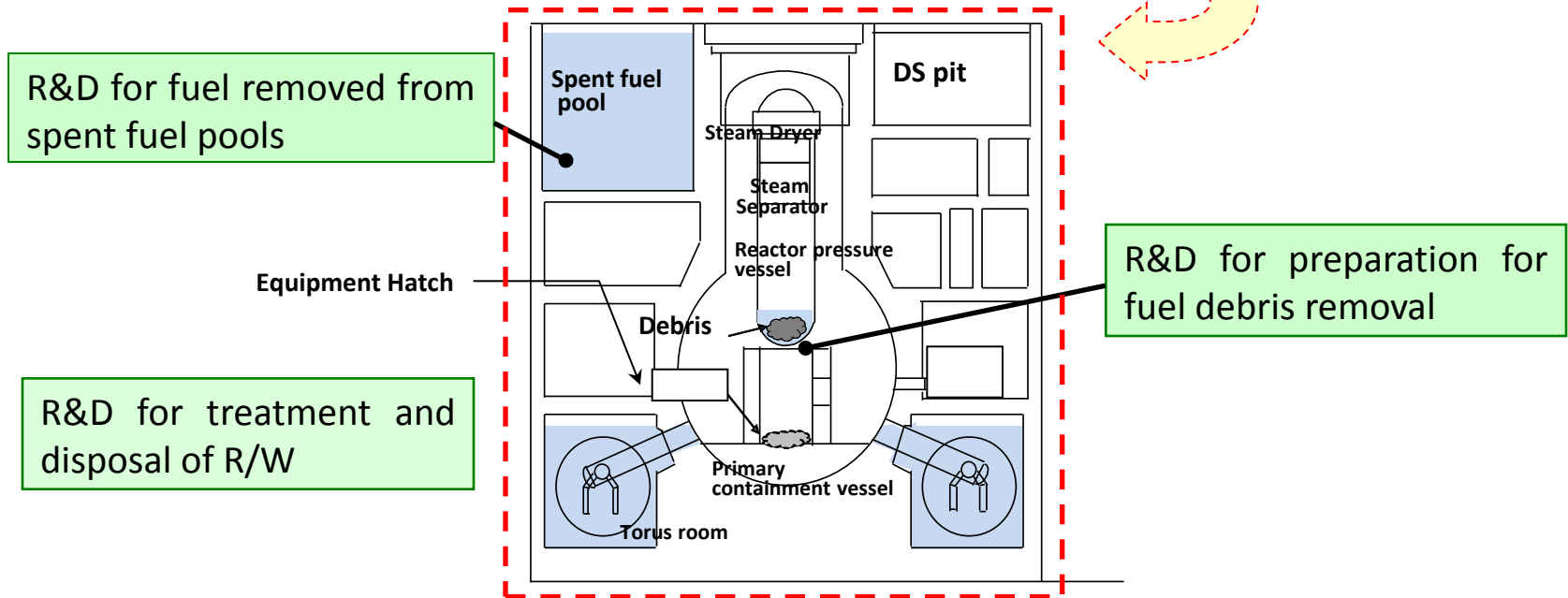
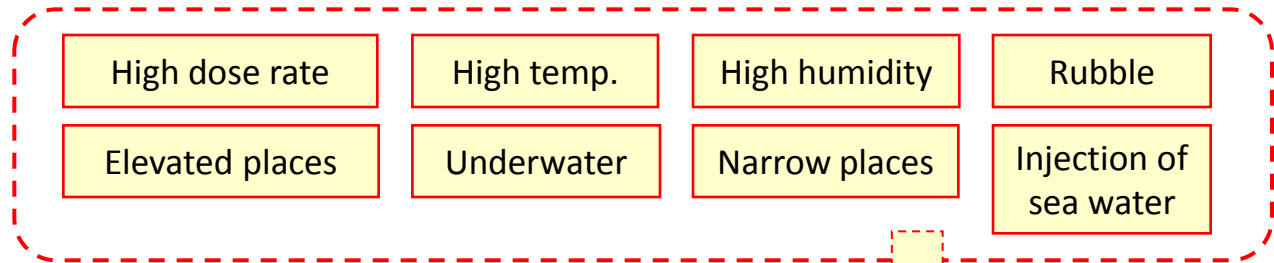
Having completed Phase 1 of Mid-and-Long-Term Roadmap, R&D will be addressed as follows from the Phase 2.

1. Promotion of long-term R&D in response to the start of fuel removal from spent fuel pool.
2. Development of multilateral • multilayered method and equipment for full scale preparation of fuel debris retrieval(1) - Submersion method-
3. Development of multilateral • multilayered method and equipment for full scale preparation of . fuel debris retrieval(2) - Alternative method-
4. Stable promotion of R&D inconsideration of treatment and disposal of radioactive waste, and decommissioning.



R&D Activities of IRID

■ R&D activities to be carried out in order to meet severe conditions of reactor buildings at Fukushima Daiichi.



1. Promotion of study from long-term perspective in response to the start of fuel removal from SFP

- Fuel removal from spent fuel pool at Unit 4 was started on Nov. 18, 2013.
- Soundness of transferring these fuels and storage was approved by TEPCO.
- IRID established evaluation method for soundness of long-term storage at the common pool (corrosion resistance etc.), regarding this as one of IRID's research targets, by obtaining verified data from the fuel at the actual unit. The results obtained from the research will be reflected to the actual evaluation.

< Major activities >

- Establish test conditions for the long-term soundness evaluation based on the result of trial examination within 2013
- Also, conduct corrosion test for fuel material, strength test, technology of water quality effect evaluation.
- In addition, a research on the index for judging the possibility of reprocessing the retrieved damaged fuel, while taking the adhesion of salt contained in the seawater and physical damage by the rubbles into consideration, is ongoing.

< Major activities >

- Aiming to obtain the research results in 2017, in order to determine the methods of the spent fuel management and storage based on the case study conducted overseas in 2013.

2. Method and equipment in preparation of implementation of fuel debris retrieval (1) -Submersion method-

(1) Acceleration of investigation and repair (water stoppage) technology development in repose to the case of water flowing around the lower part of containment vessel

- Water flow around the containment vessel at Unit 1 was confirmed from the research result obtained by the remotely operated boat developed through the task force of remote operation technology (Nov. 13-14, 2013) .
- Based on this result, aiming at accelerating the process including the investigation for other units in preparation of development of remote equipment for Investigation and repair of lower part of containment vessel (water stoppage) that IRID promote .

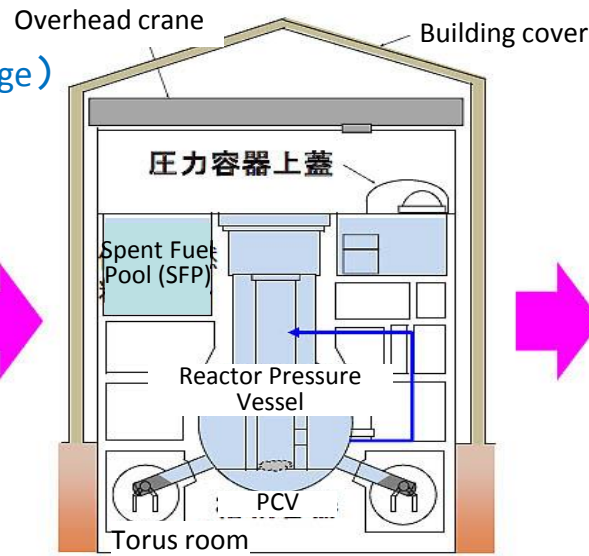
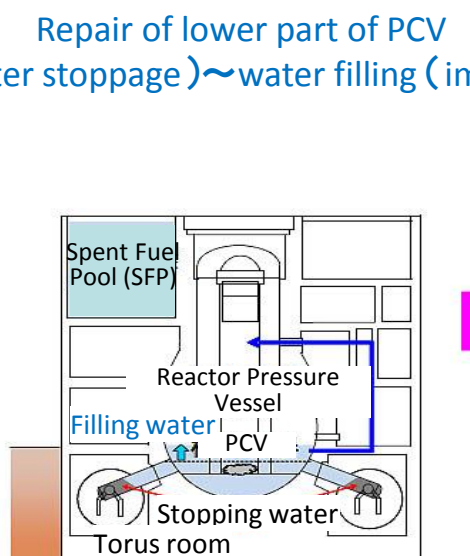
< Major activities >

- In FY 2013, continued development of investigation and repair (water stoppage)equipment, and aiming at conducting demonstrations this year while reviewing the development plan (target and process) based on the actual conditions.
- In FY 2015, aiming at conducting demonstrations at mock-up facilities and on site.
- Also, establishing remote operation subcommittees (tentative name) in IRID technical committees and build the structures to receive advice for the development and site operation as well as evaluating the research projects.

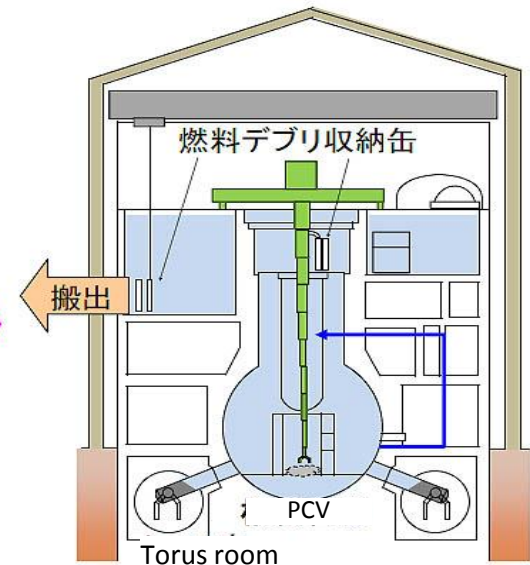
Work image of the fuel debris removal

- The approach of removing the fuel debris submerged in water is the safest approach from the standpoint of minimizing exposure of workers.
- The primary containment vessel (PCV) will be examined and repaired for filling the PCV with water. Furthermore, R&D for the fuel debris removal and storage will be implemented.

Repair of lower part of PCV
(water stoppage) ~ water filling (image)



removing the fuel debris (image)



3 . Development of multilateral and multilayered method and equipment in preparation of implementation of fuel debris retrieval (2) -Innovative approach-

(2) Innovative approach and Request for Information of technology for the identification of fuel debris condition and acceleration of retrieval

- Mid-and-long-Term Roadmap states that the innovative approach other than Submersion method shall be considered. Therefore started Request for Information (RFI) to seek information from overseas research institutes and corporations, aiming to conduct feasibility study (F / S , after 2015) of the technologies to identify the location and the condition of the fuel debris required for the methods of investigation and retrieval work.
- Information submitted will be utilized for Conceptual Study and Technical feasibility study (F / S).
- IRID expect this RFI to be an opportunity for collaboration with related parties around the world.

Contents of RFI

Topic A: Internal PCV/RPV investigation

A-1: Conceptual study of method (following are samples)

1. Method of inserting investigation device e.g. cameras inside.
 - a. Utilize current throughbore such as piping/penetration.
 - b. Create new throughbore .
 - c. Methods of shielding penetrations and of equipment operation in terms of reduction of radiation exposure.
2. Method of detecting fuel debris location by measuring from outside, etc.

A-2: Required technologies (following are samples)

1. Advanced measurement technology (e.g. camera, dosimeter, thermometer)
 - a. High performance optical equipment(e.g. camera), other measurement technology (e.g. ultrasonic, laser)
 - b. Control technology of measuring instrument, and information transmission technology .
2. Technology to detect whether the substance in the reactor is fuel debris or not.

Topic B: Fuel debris retrieval

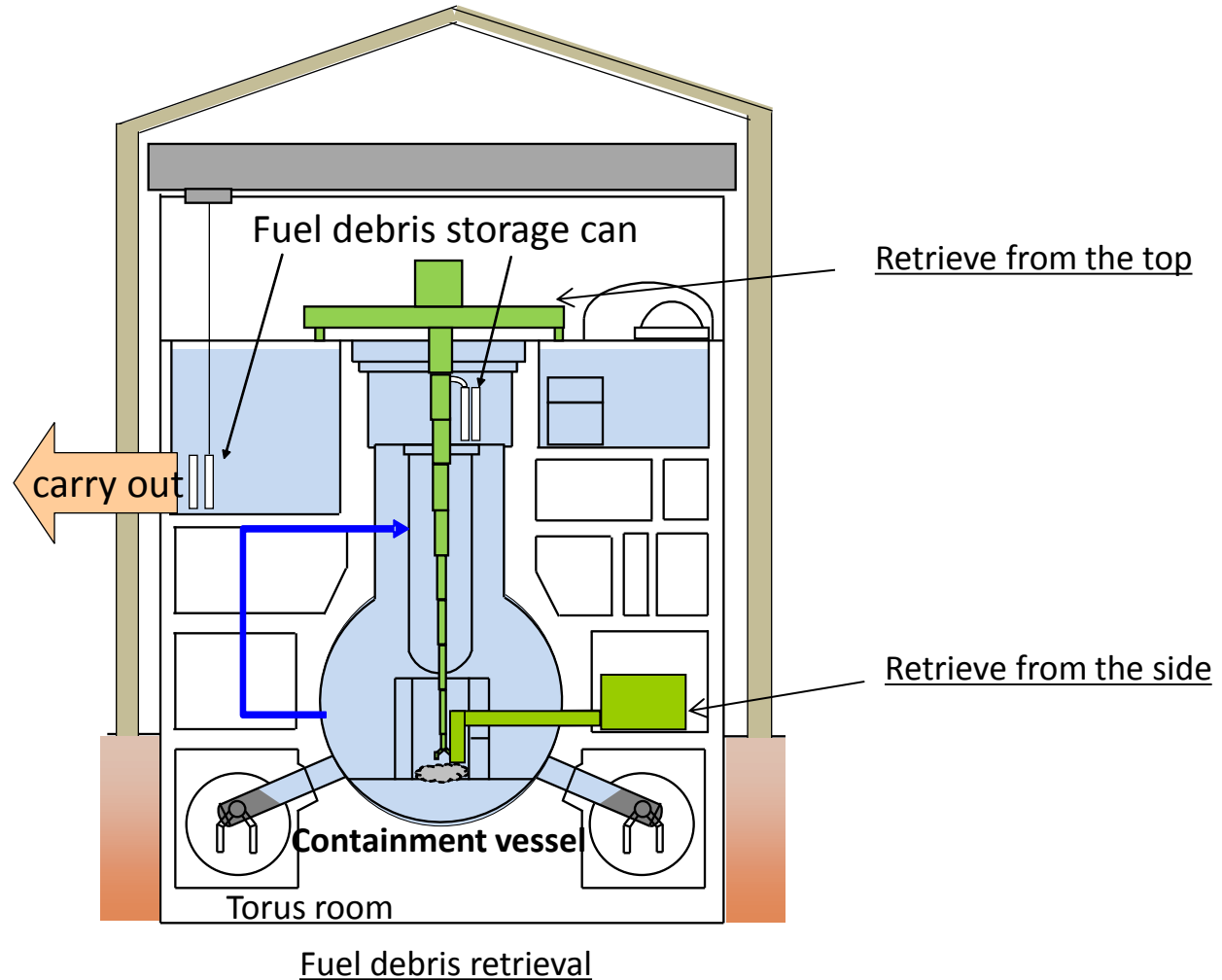
B-1: Conceptual study of method (following are samples)

1. Access to fuel debris from the top of PCV underwater
2. Access to fuel debris from the top of PCV in the air*¹
3. Access to fuel debris from the side of PCV in the air*¹
4. Access to fuel debris from the bottom of PCV in the air*¹
*¹ including partial submergence

B-2: Required technologies (following are samples)

1. Technology regarding fuel debris retrieval (cutting, suction).
2. Equipment/device such as remote control manipulator, with superior control capability from long distance.
3. Technology of shielding against fuel debris with high radiation.
4. Device and equipment capable of working under the high radiation environment.
5. Equipment/device to create a borehole on the building concrete and PCV to enable access from the side or bottom of the PCV.
6. Technology to store fuel debris safely in PCV/RPV before retrieving.

e.g. Fuel debris retrieval work (from top and side)



Results of RFI

About 60% and 40% of the proposal were submitted from Japan and overseas countries respectively

| •Field of proposal for RFI | | Total | Breakdown by country | | | | | | | |
|---|-------------------------------------|------------|----------------------|----|----|-----|-----|-----|-----|-----|
| | | | JPN | US | UK | GER | FRA | BEL | CAN | RUS |
| Internal PCV/RPV investigation Topic A | A-1:Conceptual study for the method | 33 | 20 | 7 | 3 | - | 2 | - | 1 | - |
| | A-2:Required technology | 58 | 32 | 6 | 10 | 6 | 2 | 2 | - | - |
| Fuel debris retrieval Topic B | B-1:Conceptual study for the method | 43 | 23 | 8 | 3 | 2 | 5 | - | 1 | 1 |
| | B-2:Required technology | 60 | 41 | 7 | 3 | 4 | 2 | 2 | - | 1 |
| Total (No. of items of information) | | 194 | 116 | 28 | 19 | 12 | 11 | 4 | 2 | 2 |

4. Stable promotion of R&D from the perspective of radioactive material treatment and disposal

- Conducted radionuclide analysis of sampled rubbles, felled tree and contaminated water among other specimens from the site. Currently working on inventory evaluation of waste material based on the results of these nuclide analysis.
- Further accumulation and evaluation of analysis data are planned. In addition, a prospect of the adsorption vessel of waste zeolite generated by contaminated water treatment maintaining its soundness at the salt concentration level in the storage condition has been already confirmed.

< Major activities >

- Continue studies on the technologies for storage, identifying the properties, waste forming and disposal to secure a prospect of maintaining the safety of the treatment and disposal of solid waste
- Examine and establish the decommissioning scenario by collecting and organizing the concepts of security control for the decommissioning from 2014.
- For the issues with relatively high risks which are required to be addressed promptly, according to the progress of decommissioning, promote studies flexibly while taking account of relations with R&D plans defined in the Mid-and-Long-Term Roadmap and the priorities

For example, stabilization of the watery waste material such as slurry coprecipitation with iron and slurry of settled carbonate, which are expected to be generated by ALPS as countermeasures for the contaminate water, shall be promoted forthwith.

Summary

1. **IRID** was established in Aug. 2013 as an integrated organization to conduct researches by gathering knowledge around the world according to the Mid-and-Long-Term Roadmap.
2. As for **R&D**, IRID conducts an integrated management to promote multiple R&D projects effectively. Fields of the R&D consists of following three. IRID also plans a total strategy of the technologies required for the decommissioning by optimizing the on-site needs and technological seeds.
 1. Removal of fuel from spent fuel pool
 2. Preparation of fuel debris removal
 3. Treatment and disposal of radioactive materials
3. **For the purpose of gathering knowledge around the world** , IRID advances the establishment of a structure to receive advise from the experienced experts around the world through “International Advisors”, “Technology Advisory Committee” and “International Expert Group”, as well as considering the involvement in the joint research project through OECD/NEA and responding to the IAEA review. Also, conduct Request for Information (RFI) internationally for the countermeasures on contaminated water and fuel debris retrieval.
4. Hold workshops to build a structure to promote basic researches in collaboration with research institutes and universities with **Mid-and-Long-Term human resource development** in consideration.