# *Human Resource Development Activities in Japan and Contribution to the Global Standards*

Mitsuru Uesaka
Nuclear Professional School ,
University of Tokyo,
Japan

IAEA International Conference on Human Resource Develment in
Vienna, Austria, 12-16 2013

# CONTENTS

- Japan Human Resource Development Network
- Discussion on Education, HRD, Degree, License, Research and Development in Japan
- HRD/Education/Research at University of Tokyo with collaboration with IAEA
- Roadmap this Decade in Japan

## Outline of the Japan Nuclear HRD Network

# Japan Nuclear Human Resource Development Network (JN-HRD Net)

An overall framework for nuclear human resource development, consisting of nuclear-related organizations from industries, academia and the government of Japan, founded in November, 2010.

Number of participant organizations: 71 (as of Sep. 30, 2013)

Network Steering Committee in Tokyo on March 25, 2013

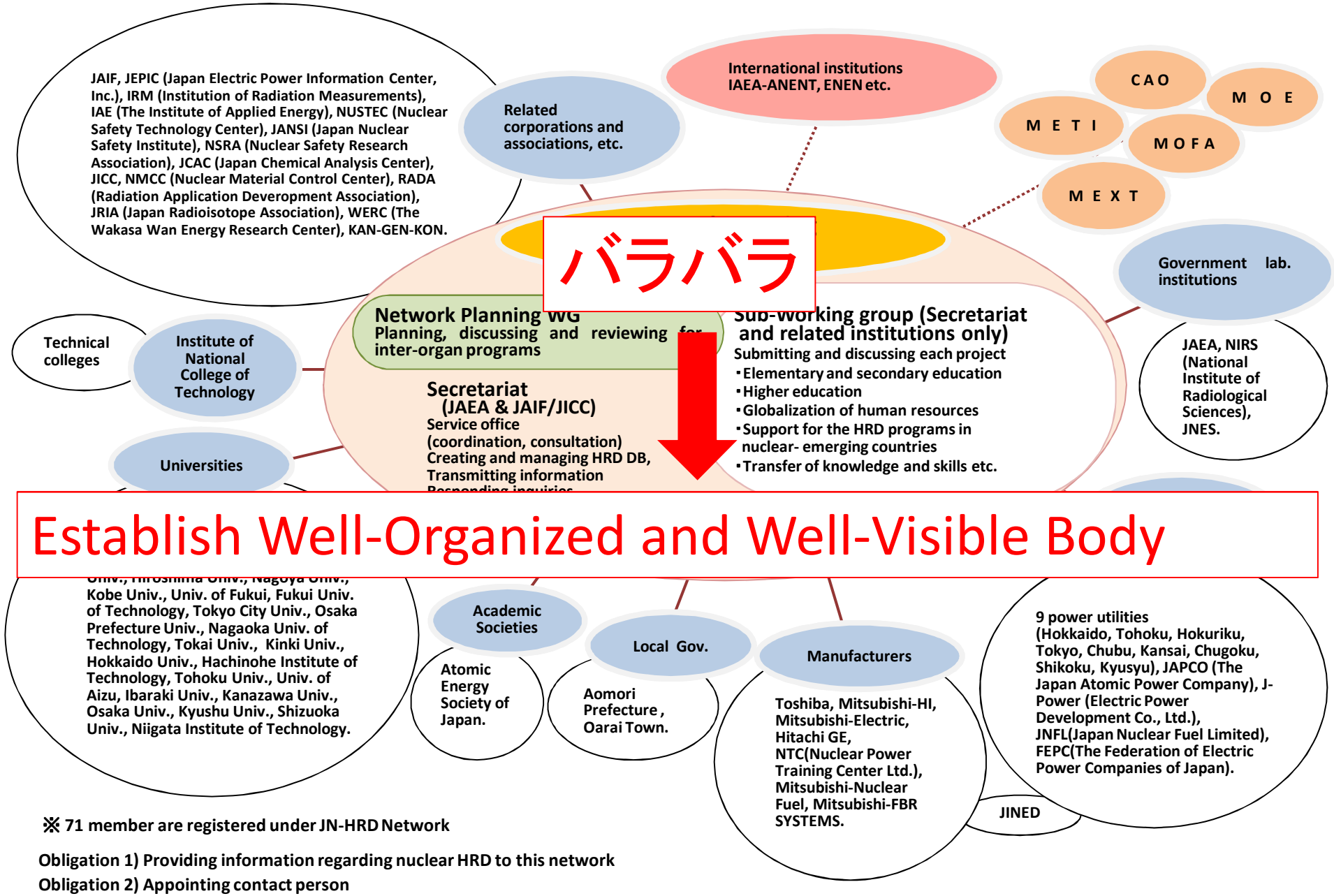
# Aims of JN-HRD Net

The Aims of JN-HRD Net are:

- To share information on Nuclear HRD and limited resources
- To promote national / international cooperation on Nuclear HRD
- To improve effectiveness and efficiency on nuclear HRD activities
- To establish a consistent HRD system or program

# Organizations of JN-HRD Net

(2013,9,30)

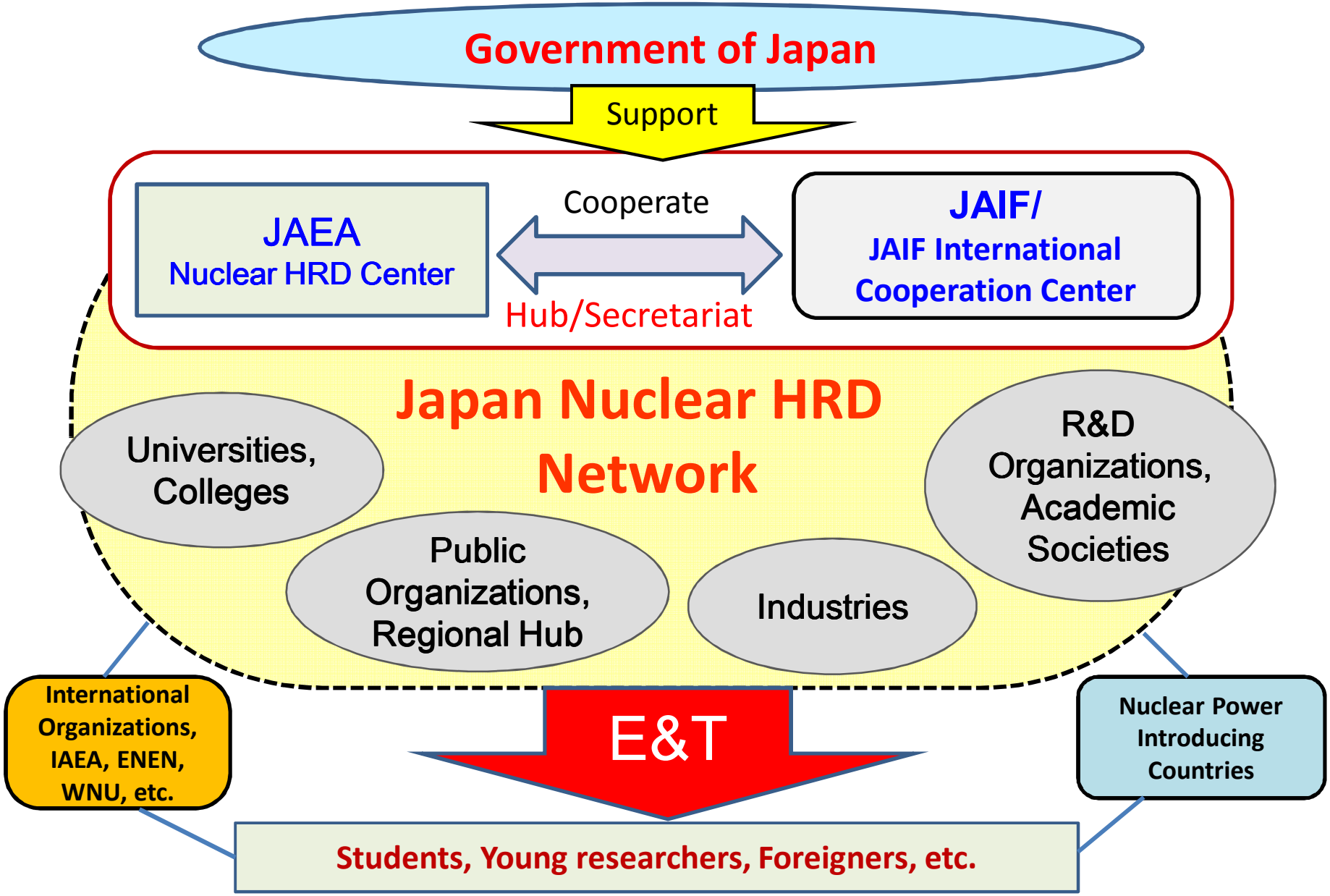



※ 71 member are registered under JN-HRD Network

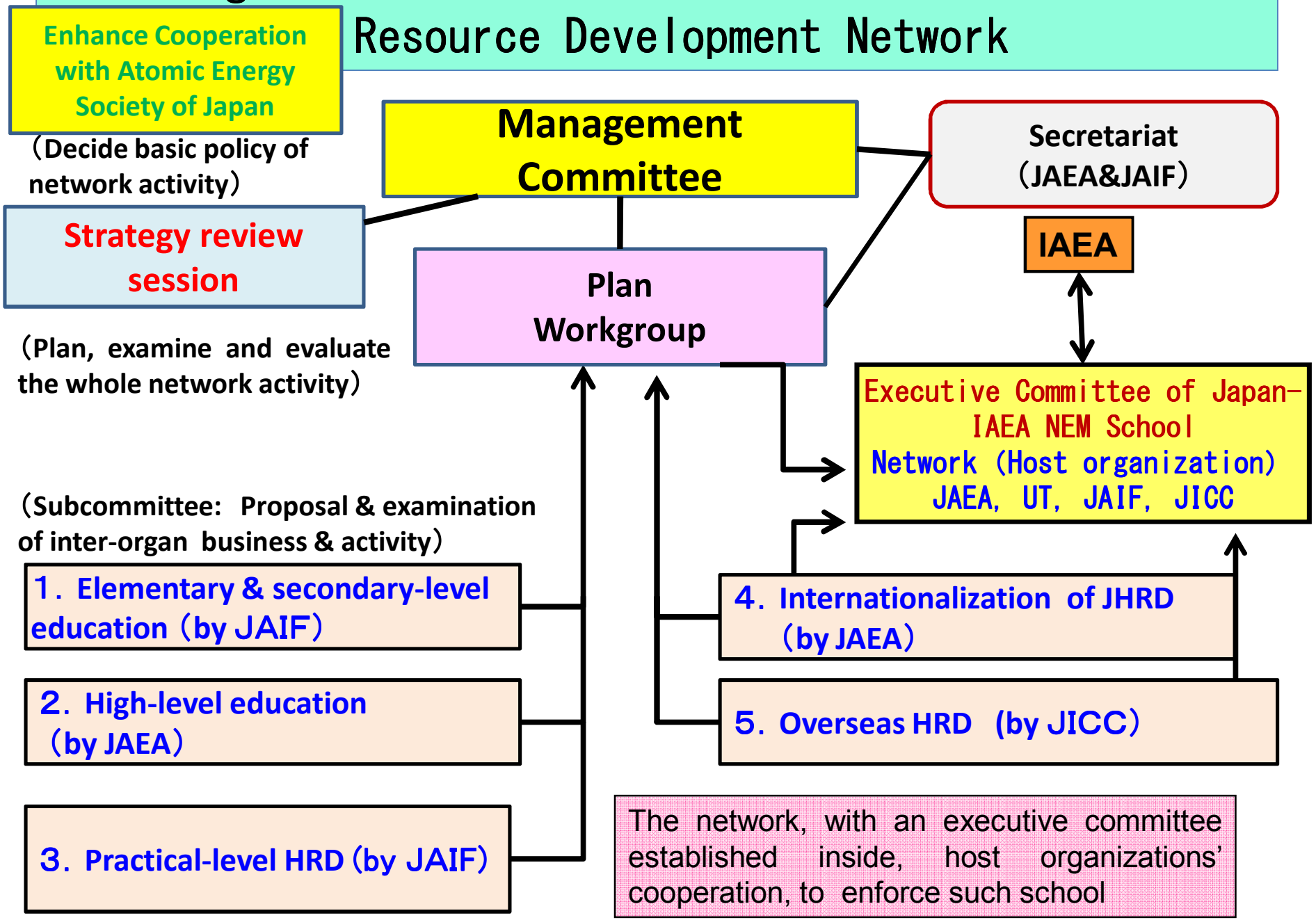
Obligation 1) Providing information regarding nuclear HRD to this network

Obligation 2) Appointing contact person

# Scheme of JN-HRD Net



# Host Organizations' Contribution to Nuclear Human Resource Development Network



# JN-HRD net.
# Web site

Japanese version

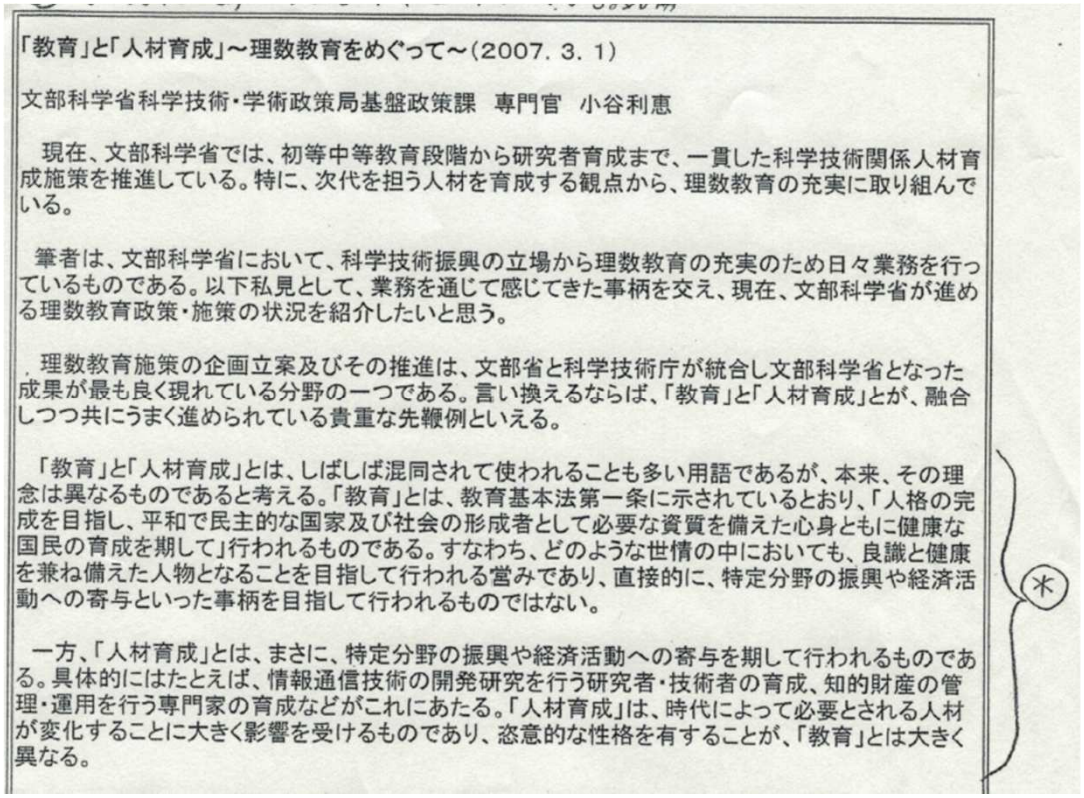

English version

# CONTENTS

- Japan Human Resource Development Network
- Discussion on Education, HRD, Degree, License, Research and Development in Japan
- HRD/Education/Research at University of Tokyo with collaboration with IAEA
- Roadmap this Decade in Japan

# Education（教育）and Human Resource Development（人材育成）
# (One discussion in Japan)

- HRD is training on knowledge and skills for a specified task (construction and safe operation/maintenance of nuclear power plant etc.) .
- Education should cover not only knowledge and skills but also humanity, health, culture, ethic, philosophy etc.



「教育」と「人材育成」～理数教育をめぐって～（2007. 3. 1）

文部科学省科学技術・学術政策局基盤政策課　専門官　小谷利恵

現在、文部科学省では、初等中等教育段階から研究者育成まで、一貫した科学技術関係人材育成施策を推進している。特に、次代を担う人材を育成する観点から、理数教育の充実に取り組んでいる。

筆者は、文部科学省において、科学技術振興の立場から理数教育の充実のため日々業務を行っているものである。以下私見として、業務を通じて感じてきた事柄を交え、現在、文部科学省が進める理数教育政策・施策の状況を紹介したいと思う。

理数教育施策の企画立案及びその推進は、文部省と科学技術庁が統合し文部科学省となった成果が最も良く現れている分野の一つである。言い換えるならば、「教育」と「人材育成」とが、融合しつつ共にうまく進められている貴重な先鞭例といえる。

「教育」と「人材育成」とは、しばしば混同されて使われることも多い用語であるが、本来、その理念は異なるものであると考える。「教育」とは、教育基本法第一条に示されているとおり、「人格の完成を目指し、平和で民主的な国家及び社会の形成者として必要な資質を備えた心身ともに健康な国民の育成を期して」行われるものである。すなわち、どのような世情の中においても、良識と健康を兼ね備えた人物となることを目指して行われる営みであり、直接的に、特定分野の振興や経済活動への寄与といった事柄を目指して行われるものではない。

一方、「人材育成」とは、まさに、特定分野の振興や経済活動への寄与を期して行われるものである。具体的にはたとえば、情報通信技術の開発研究を行う研究者・技術者の育成、知的財産の管理・運用を行う専門家の育成などがこれにあたる。「人材育成」は、時代によって必要とされる人材が変化することに大きく影響を受けるものであり、恣意的な性格を有することが、「教育」とは大きく異なる。

**Statement of Ms.Rie Kotani of Ministry of Education, Culture, Sports, Science and Technology (MEXT) on March 1st , 2007**

# Degree and License

- Degree (Bachelor, Master, Doctor) is based on Education.
- License is issued for specified task and HRD.
- University (undergraduate/graduate) issues the degrees.
- High quality HRD should be based on licenses.

University ⟺ Degree

HRD ⟺ License

# Research&Development and Education/HRD

- Major universities and institutes should perform top level research and development in the world.
- Large and costly experimental nuclear facilities (experimental reactor, critical assembly, nuclear fuel treatment, RI, accelerator etc.) can be constructed and operated mainly for research and development, partially for education and HRD.
- Nuclear facilities are getting older and need for upgrade and new construction in the world.
- Big budge for the purpose should be got by proposal for top level science and technology.
- Then, education and HRD with them can continue.

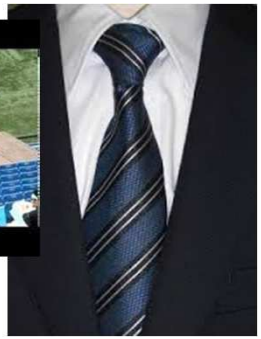
# CONTENTS

- Japan Human Resource Development Network
- Discussion on Education, HRD, Degree, License, Research and Development in Japan
- HRD/Education/Research at University of Tokyo with collaboration with IAEA
- Roadmap this Decade in Japan

# Symbol of University of Tokyo





**Leaf of Ginkgo**

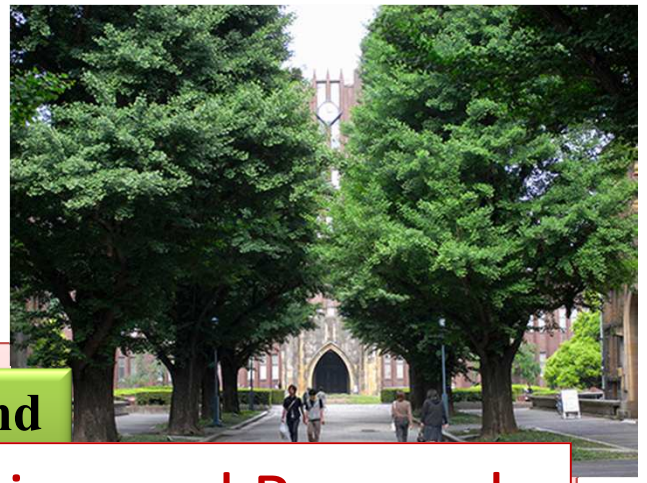
東京大学
THE UNIVERSITY OF TOKYO








# Two Nuclear Departments in Univ. of Tokyo



- The University of Tokyo
  - Graduate School of Engineering
    - Department of Nuclear Engineering and Management (in Tokyo) — Education and Research
    - Nuclear Professional School (in Tokai-mura) — HRD
      - Nuclear Engineering Research Laboratory(NERL)
        - Reactor Control Division
        - LINAC Control Division
        - HIT Control Division

Large Scale Research and Development

- taking the responsibility and converting Nuclear Engineering Research Laboratory (NERL) into the Nuclear Professional School

# Timetable of Department of Nuclear Engineering and Management

Summer Semester

| | 1) 8:40 – 10:20 | 2) 10:30 – 12:10 | 3) 13:00-14:40 | 4) 14:50-16:30 | 5) 16:40-18:20 | 6) 18:30-20:10 |
|---|---|---|---|---|---|---|
| Mon. | Overview of Energy System | Nuclear Reactor Theory and Radiation Physics | Nuclear Safety Engineering | Maintenance Engineering in Nuclear System | Special Lecture on Science, Technology, and Society | |
| Tue. | Nuclear Thermal-hydraulics and Structural Mechanics | Social Science Essentials | Nuclear Engineering Master's Course Seminar 1,3,5 | E-year: International Nuclear Policy<br>O-year: Advanced Lectures on Nuclear Fuel Cycle | E-year: Advanced Plasma and Laser Science<br>O-year: Advanced Radiation Measurement | |
| Wed. | Radiation Biology | Chemistry in Nuclear Engineering | Radiation Safety | E-year: Advanced Radiation Application<br>O-year: Advanced Lecture on Simulation Science | | |
| Thr. | Fundamentals in Nuclear Physics | English | Nuclear Engineering Master's Course Exercise 1,3 | | | |
| Fri. | | | | | | |

Winter Semester

| | 1) 8:40 – 10:20 | 2) 10:30 – 12:10 | 3) 13:00-14:40 | 4) 14:50-16:30 | 5) 16:40-18:20 | |
|---|---|---|---|---|---|---|
| Mon. | | Nuclear Plant Engineering | Nuclear Fuel Engineering | Nuclear Safety Engineering | E-year: Advanced Lecture on Next Generation Nuclear Energy Systems<br>O-year: Severe Accident (Advanced) | |
| Tue. | | Nuclear Nonproliferation and Security | Nuclear Engineering Master's Course Seminar 2,4,6 | Introduction to Nuclear Engineering | Advanced Nuclear Special Exercise 2 | |
| Wed. | | Applied Radiation Engineering | Management of Spent Fuel and Radioactive Waste | E-year: Quantum Beam Engineering | E-year: Energy System Analysis<br>O-year: Radiation and Risks | |
| Thr. | | English | Nuclear Engineering Master's Course Exercise 2,3 | | | |
| Fri. | | | | | | |

**Education for Master and Doctor Degrees**

Nuclear Engineering Core Course

Speciality Course

Advanced Course

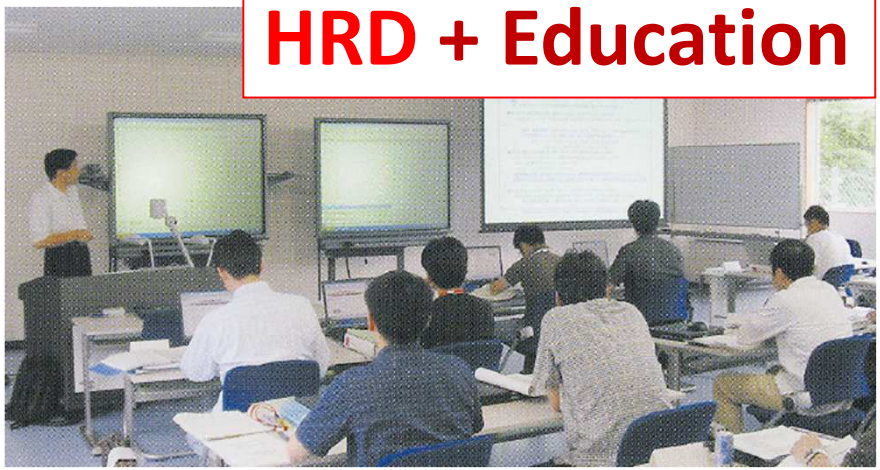
Seminars, Exercises, Labs

# Students and Professors/Lecturers of Nuclear Professional School

## Students

- Capacity:15
- Language: Japanese (at present)
- Most students from utilities, vendors, research institutes and governments
- A few students who are not the employees

**HRD + Education**



## Professors

- Professors (P5, AP5) of the University of Tokyo,
- 6 Visiting professors (5 from JAEA and 1 from CRIEPI), and
- 37 part-time lecturers, 17 special guest lecturers and many experimental instructors (~100 in total) from JAEA and Japanese industries

# Curriculum of Nuclear Professional School

**HRD + Education**

**Fundamentals of nuclear engineering:**
- reactor physics,
- thermal hydraulics,
- structural mechanics,
- fuels, and
- materials

**Practical subjects:**
- nuclear power plants,
- safety,
- maintenance, and
- waste

**Social science subjects:**
- law for engineers,
- communication,
- human management,
- ethics for engineers,
- risk and crisis management, etc.

**The first comprehensive nuclear education curriculum including socio-science aspects.**

# National Licensers

**Professional Master Degree is equivalent to the two licenses in Japan**

## Chief licensed reactor engineer 原子炉主任技術者

for the operation and management of nuclear power plants

## Chief licensed nuclear fuel engineer 核燃料取扱主任者

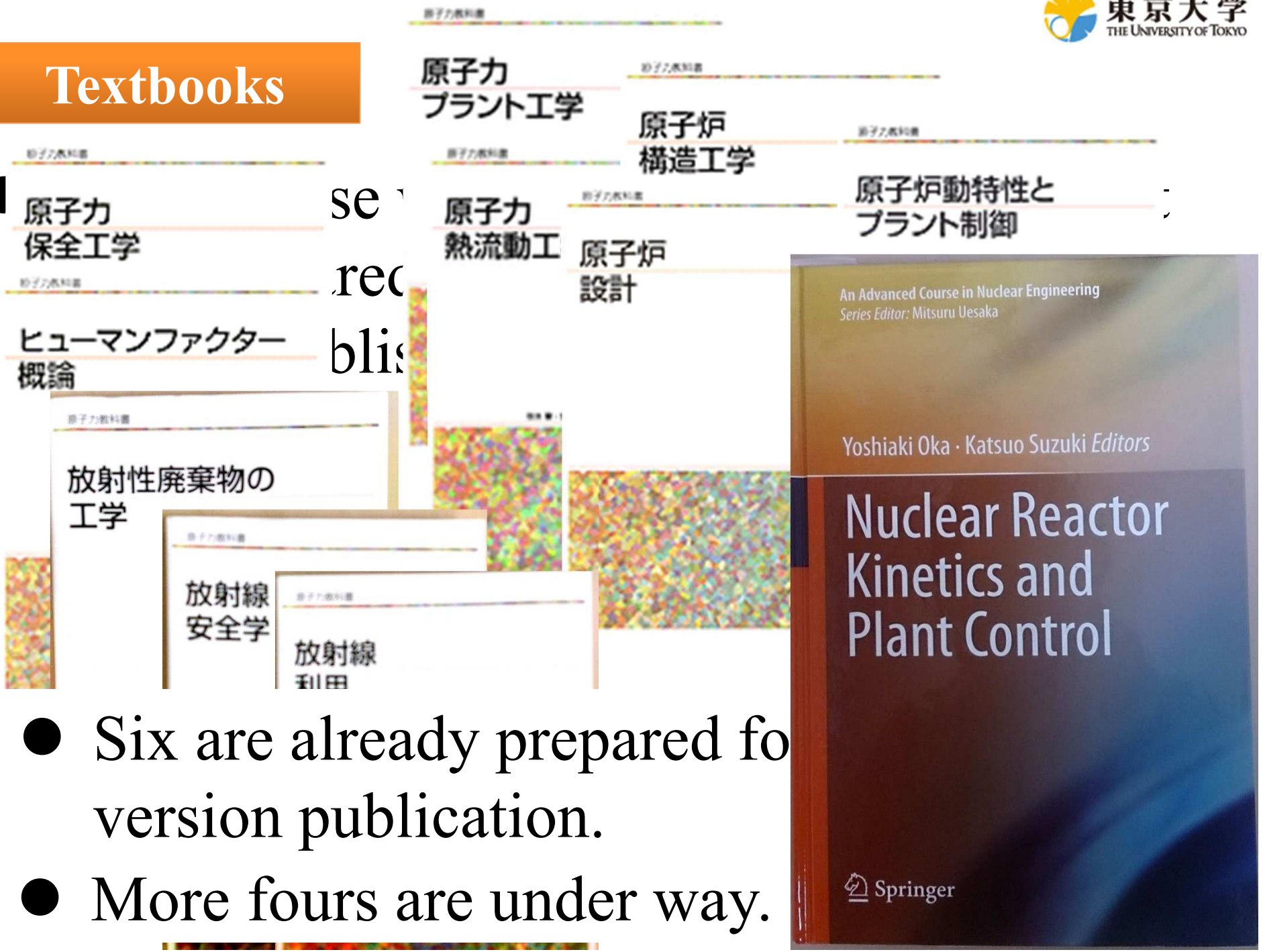
for the operation of nuclear fuel and fuel cycle facilities

| Fiscal | Total | UT-NPS | % |
|---|---|---|---|
| 2006 | 21 | 7 | 33 |
| 2007 | 18 | 4 | 22 |
| 2008 | 19 | 10 | 53 |
| 2009 | 22 | 9 | 41 |
| 2010 | 23 | 6 | 26 |
| 2011 | 19 | 12 | 63 |
| 2012 | 20 | 5 | 25 |
| 2013 | 26 | 8 | 31 |

| Fiscal | Total | UT-NPS | % |
|---|---|---|---|
| 2006 | 40 | 13 | 33 |
| 2007 | 27 | 12 | 44 |
| 2008 | 29 | 12 | 41 |
| 2009 | 17 | 14 | 82 |
| 2010 | 11 | 9 | 82 |
| 2011 | 24 | 14 | 58 |
| 2012 | 16 | 14 | 88 |
| 2013 | 13 | 7 | 54 |

**Graduates of Nuclear Professional School**, who are qualified with good achievements, **are exempted to take the national examination** of the licenses by MEXT and METI except the examination of nuclear law.

# Textbooks




- Six are already prepared fo
  version publication.
- More fours are under way.

University of Tokyo and IAEA Join Forces to Improve Nuclear Science Education - Microsoft Internet Explorer

ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

戻る 検索 お気に入り

アドレス(D) http://www.iaea.org/newscenter/news/2010/scienceeducation.html 移動 リンク

Google IAEA Uesaka 検索 ブックマーク 検索 チェック 翻訳 オートフィル ログイン



16 December 2010

# University of Tokyo and IAEA Join Forces to Improve Nuclear Science Education

Staff Report



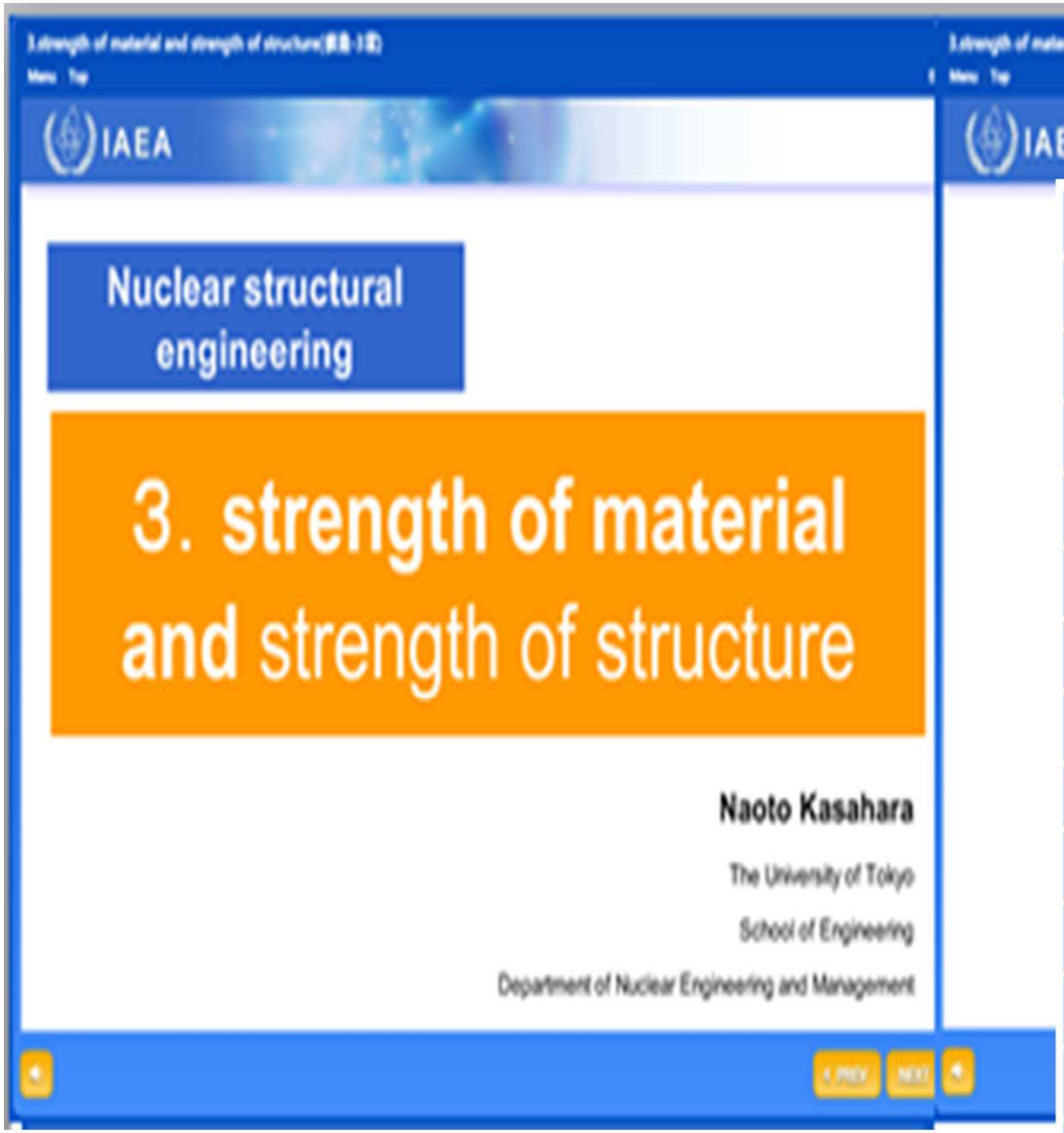
The IAEA and the University of Tokyo in Japan signed an agreement in Vienna, formalising their decision to work together to enhance nuclear engineering and management research, education and training.

The IAEA and the university will cooperate in the creation of e-learning materials on nuclear issues and will also jointly organize training courses for students and professionals in IAEA Member States.

Yury Sokolov, IAEA Deputy Director General and head of the Department of Nuclear Energy, expressed the desire to create even deeper ties with the university and other Japanese educational institutions in the coming years.

インターネット

スタート 2 Windo... 2 Micro... bアクセス... Universit... 無題 - ... CAPS KANA 19:07

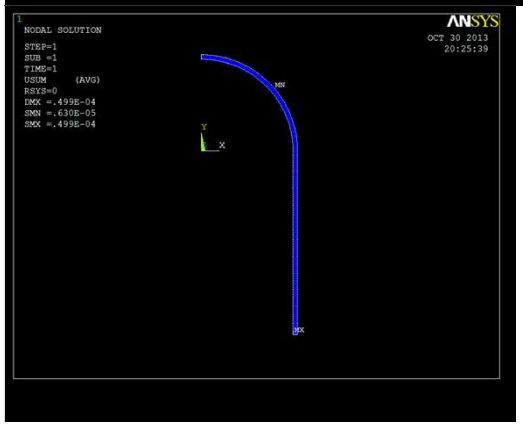


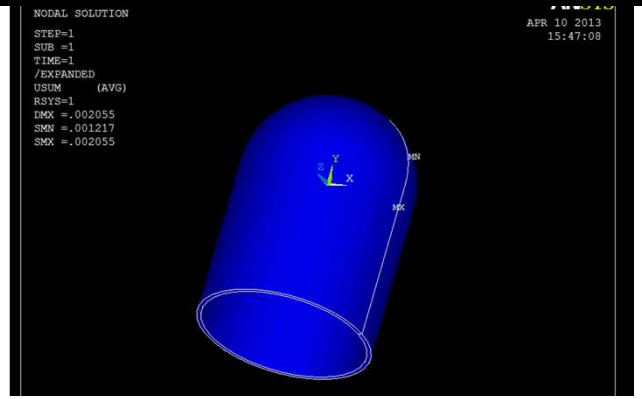


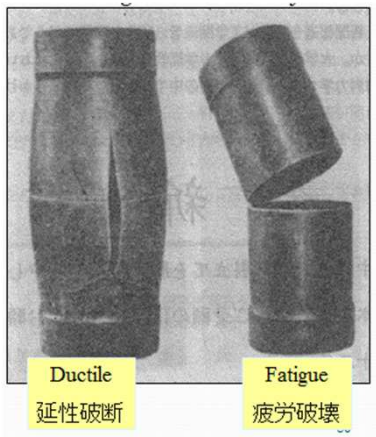

| | Subject of the courses | Number of slides |
|---|---|---|
| 1 | Radiation Application | 165 |
| 2 | Radiation Shielding | 269 |
| 3 | Radiation Measurement | 436 |
| 4 | Radiation Safety | 465 |
| 5 | Radioactive Waste Management | 199 |
| 6 | Nuclear Reactor Thermal-hydraulics | 829 |
| 7 | Nuclear Structural Engineering | 399 |
| 8 | Maintenance Technology for Nuclear Power Plant | 603 |
| 9 | Nuclear Fuel Cycle Engineering | 431 |
| 10 | Nuclear Reactor Physics | 599 |
| 11 | Nuclear Plant Engineering | 320 |
| 12 | Nuclear Reactor Design | 445 |
| 13 | Nuclear Safety Engineering | 464 |
| 14 | Nuclear Fuel Materials | 625 |
| 15 | Emergency Control Engineering | 468 |

TOTAL 6717 slides

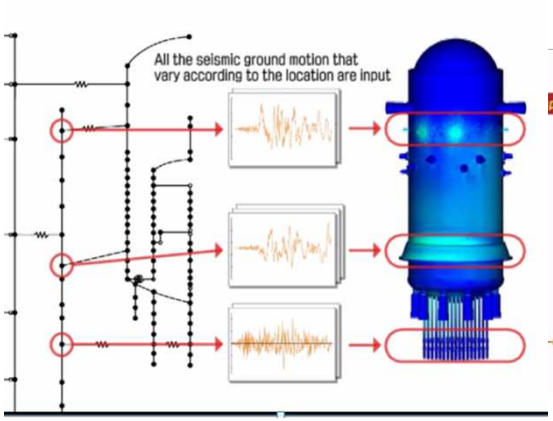
# IAEA assisted DVD Textbooks

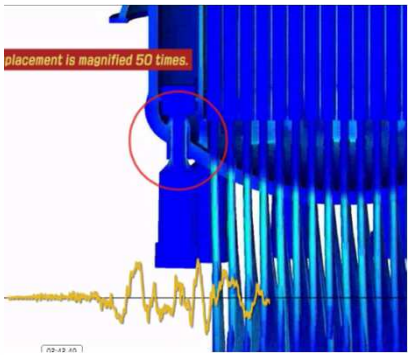


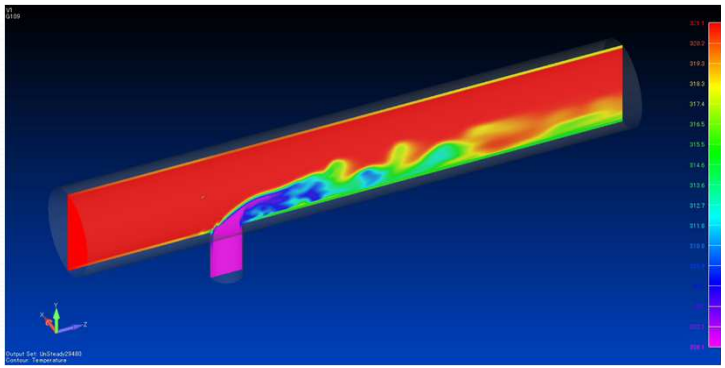




## 1. Nuclear Structural Engineering

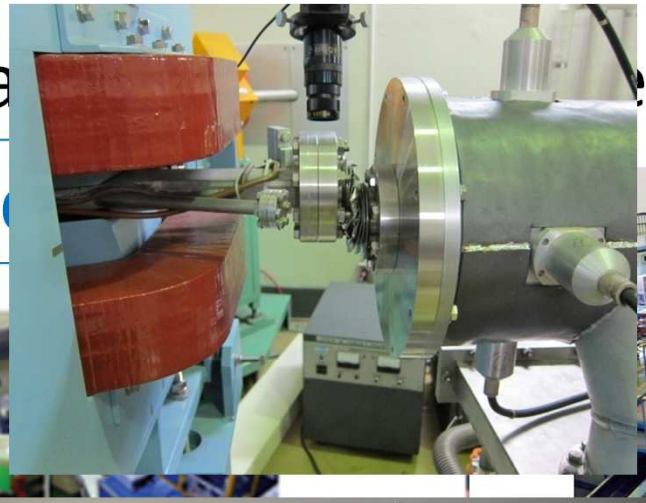


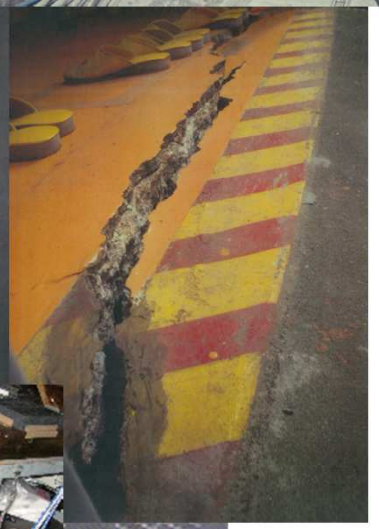
## 2. Nuclear Thermal Hydraulics

# U.Tokyo e-learning server is going to be connected to IAEA Cyber Platform this year

0-2



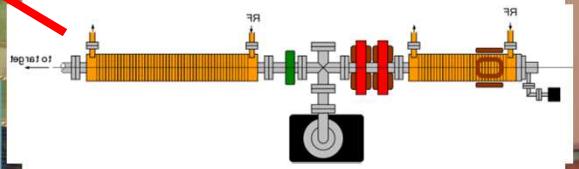


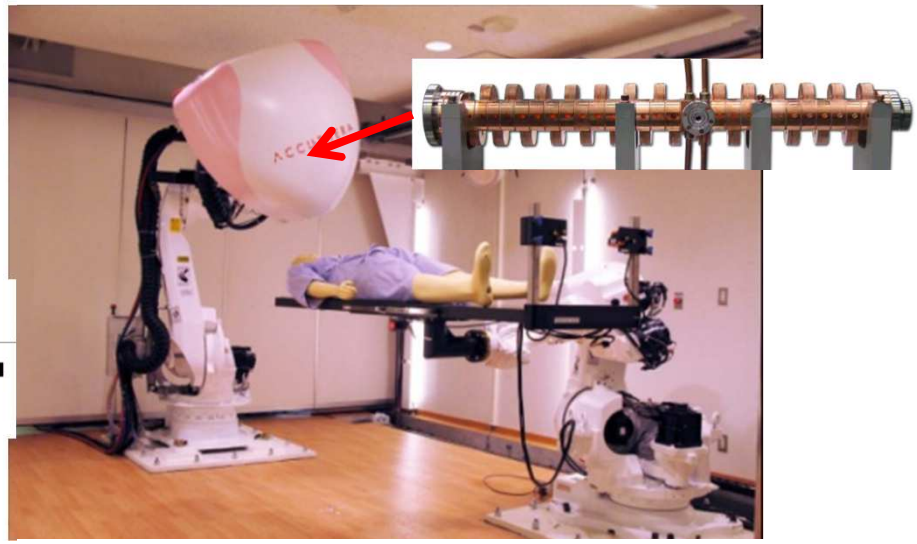




# Nuclear Renovation Project and Outreach to Social/Industrial Infrastructure Inspection

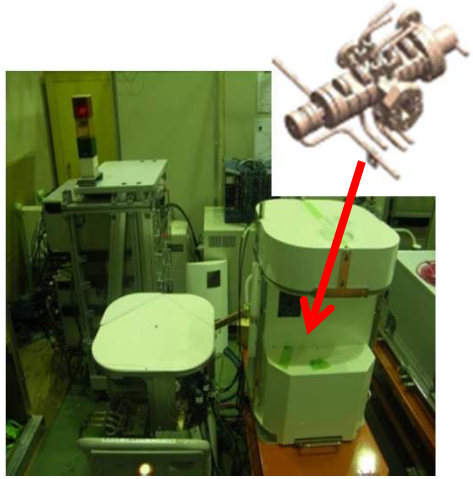

## Research and Development

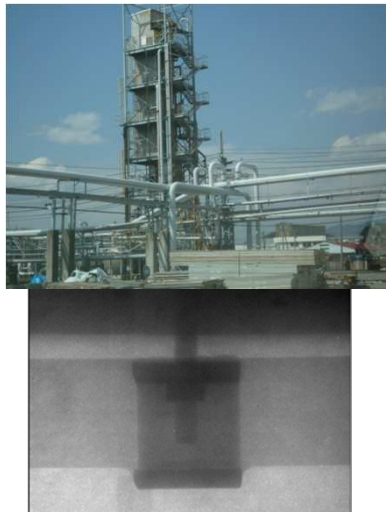




**Compact 30 MeV Electron Linac based Neutron Source in Decommissioned Reactor**

**6MeV Dynamic Tracking X-ray Cancer Therapy System**




**On-site Inspection of Social and Industrial Infrastructures by 950 keV/3.95 MeV Linac X-ray sources**






# Japan-IAEA Nuclear Energy Management School is operating annually in Japan hosted by IAEA/JHRDNet/U.Tokyo/JAEA/JAIF/JICC in June 10-29, 2012, May 27-June 10, 2013, June 9-24, 2014




# VNMU

# Virtual Nuclear Management University

John de Grosbois, Section Head,
Nuclear Knowledge Management Section, IAEA



Department of Nuclear Energy

- Nuclear Power
- » Nuclear Power Engineering
- » Nuclear Power Technology Development
- Nuclear Power Infrastructure
- International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO)
- Nuclear Fuel Cycle & Waste Technology
- » Fuel Cycle & Materials

## IAEA Virtual Nuclear Management University initiative aimed at enhancing nuclear safety and economics

**29 November 2013** – Leading nuclear engineering universities from across the world have started work on developing an IAEA-endorsed curricula for a Master's programme on management for nuclear energy professionals. The goal is to have universities implement such programmes through the Virtual Nuclear Management University (VNMU), a mutual cooperation and collaboration platform facilitated by the IAEA.


Twenty experts from across the world joined hands to launch the IAEA's Virtual Nuclear Management University initiative. (Photo: P.Hodorogea/IAEA)

Twenty representatives from Belgium, China, France, Germany, Ghana, Italy, Japan, the Russian Federation, South Africa, Spain, the United Arab Emirates, the United Kingdom, the United States of America, European Nuclear Education Network (ENEN) and the World Nuclear University met at the

# Discussion at IAEA VNMU Initiative

Licensed Nuclear Facilities

Competency Area

Design/Build Projects (new build or refurb) ・・・

| WORKING DRAFT REVISION 1 | | SUGGESTED REQUIREMENTS FOR REFERENCE EXAMPLE LEVEL 2 MASTER'S PROGRAMME THEMES | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Licensed Nuclear Facilities | | | | | | | | Design/Build Projects (new build or | | | | Nuclear Technology Development | | | | | | | | Decom, Waste Mgmt, Envi | | | | | |
| | | *Nuclearizing Managers** | | | | *Managerizing Engineers** | | | | *Nuclearizing* | | | | *Managerizing Engineers** | | | | *Nuclearizing* | | | | *Managerizing Engineers** | | | | *Nuclearizing* | | | | *Managerizing* | |
| Competency Area (CA) | Aspect | Stat | Type | Depth | Hours | Statu | Type | Depth | Hours | Statu | Type | Dept | Hours | Stat | Type | Dept | Hours | Stat | Type | Dept | Hours | Stat | Type | Dept | Hours | Stat | Type | Dept | Hours | Stat | Type |
| Cost accounting and cost control in nuclear organizations | A | Q | B | W | 30 | R | B | H | 45 | Q | B | H | 45 | R | B | H | 45 | Q | B | W | 30 | R | B | H | 45 | Q | B | W | 30 | R | B |
| Nuclear asset management (plant life management) | T | R | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | R | B | W | 30 | R | B |
| Organizational behaviour in nuclear organizations | M | Q | C | W | 30 | R | C | W | 30 | Q | C | W | 30 | R | C | H | 45 | Q | C | W | 30 | R | C | H | 45 | Q | C | I | 15 | R | C |
| Nuclear reactivity theory, reactivity management concepts | T | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C |
| International nuclear security and safeguards programmes | E | R | B | W | 30 | R | C | W | 30 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | B | H | 45 | R | B |
| Nuclear procurement and supplier management | M | Q | B | W | 30 | R | B | W | 30 | Q | B | H | 45 | R | B | H | 45 | Q | C | I | 15 | R | C | I | 15 | Q | C | W | 30 | R | C |
| Nuclear quality assurance programmes | M | R | B | W | 30 | R | B | W | 30 | R | B | H | 45 | R | B | H | 45 | R | C | W | 30 | R | C | W | 30 | R | C | W | 30 | R | C |
| International nuclear standards | E | R | B | W | 30 | R | B | W | 30 | R | B | H | 45 | R | B | H | 45 | R | B | H | 45 | R | B | H | 45 | R | C | I | 15 | R | C |
| Systems engineering concepts applied to nuclear energy | T | R | C | I | 15 | R | C | I | 15 | R | B | H | 45 | Q | B | H | 45 | R | B | H | 45 | R | B | H | 45 | R | C | I | 15 | R | C |
| Financial management and accounting in nuclear organizations | A | Q | B | W | 30 | R | B | W | 30 | Q | B | W | 30 | R | B | W | 30 | Q | B | W | 30 | R | B | W | 30 | Q | B | W | 30 | R | B |
| Nuclear facility maintenance processes and programmes | T | R | B | W | 30 | R | B | W | 30 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | R | B | W | 30 | R | B |
| Nuclear operations and production management | T | R | B | W | 30 | R | B | W | 30 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | R | B | W | 30 | R | B |
| Nuclear equipment reliability program management | T | R | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | R | C |
| Global nuclear energy sector, energy distribution systems etc. | E | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C |
| Nuclear project management, engineering management | M | R | B | W | 30 | R | B | W | 30 | R | B | H | 45 | R | B | H | 45 | R | C | I | 15 | R | C | I | 15 | R | B | H | 45 | R | B |
| National nuclear technology policy and planning | E | R | C | I | 15 | R | C | I | 15 | R | C | W | 30 | R | C | W | 30 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C |
| Nuclear R&D and innovation management | T | Q | C | I | 15 | Q | C | I | 15 | Q | C | i | 15 | Q | C | I | 15 | R | B | H | 45 | R | B | H | 45 | Q | C | I | 15 | Q | C |
| Nuclear ethics and values | L | R | B | I | 15 | R | B | I | 15 | R | B | I | 15 | R | B | I | 15 | R | B | I | 15 | R | B | I | 15 | R | B | I | 15 | R | B |
| International nuclear organizations | E | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | R | C |
| Business law and contract management | M | Q | C | W | 30 | R | C | W | 30 | Q | B | H | 45 | R | B | H | 45 | Q | C | W | 30 | R | C | W | 30 | Q | C | W | 30 | R | C |
| Intellectual property management | T | Q | C | I | 15 | Q | C | I | 15 | Q | B | I | 15 | R | B | I | 15 | R | B | W | 30 | R | B | W | 30 | Q | C | I | 15 | Q | C |
| Nuclear law | E | R | C | W | 30 | R | C | W | 30 | R | C | W | 30 | R | C | W | 30 | R | C | I | 15 | R | C | I | 15 | R | C | W | 30 | R | C |
| Nuclear licensing, licensing basis, and regulatory processes | E | R | B | W | 30 | R | B | W | 30 | R | B | H | 45 | R | B | H | 45 | R | B | W | 30 | R | B | W | 30 | R | C | W | 30 | R | C |
| Nuclear site security programme management | M | R | B | H | 45 | R | B | H | 45 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | Q | C | I | 15 | R | B | H | 45 | R | B |
| Int'l regulation of trade or transport of nuclear goods/materials | E | R | C | I | 15 | R | C | I | 15 | R | B | H | 45 | R | B | H | 45 | Q | C | I | 15 | Q | C | I | 15 | R | B | H | 45 | R | B |
| Nuclear facility life cycle issues and aging management | T | R | B | W | 30 | R | B | W | 30 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | B | W | 30 | R | B |
| Nuclear plant design principles (technology aspects) | T | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C |
| Nuclear plant decommissioning, environmental remediation | T | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | H | 45 | R | C |
| Nuclear plant systems (technology aspects) | T | R | C | W | 30 | Q | C | W | 30 | R | C | W | 30 | Q | C | W | 30 | R | C | W | 30 | Q | C | W | 30 | R | C | I | 15 | Q | C |
| Management of labour relations in nuclear | M | Q | B | H | 45 | R | B | H | 45 | Q | B | H | 45 | R | B | H | 45 | Q | B | H | 45 | R | B | H | 45 | Q | B | H | 45 | R | B |
| Nuclear fuel cycle (technology aspects and issues) | T | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | R | C | I | 15 | Q | C | I | 15 | R | C | W | 30 | Q | C |
| Nuclear waste management and disposal | T | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | B | H | 45 | R | B |
| Nuclear environmental protection, monitoring and compliance | T | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | C | I | 15 | R | B | H | 45 | R | B |

Nuclearizing Managers

Managerizing Engineers

We expect that IAEA forms “Global Standards of Competency Areas for Nuclear and Management” , and degrees and licenses can be comprehensively related to them for specified purposes in the world.

# Lectures of Dep. of Nuclear Engineering and Management

## Nuclear Management Elements

| | |
|---|---|
| Advanced Nuclear Energy | Radiation Safety |
| Quantum Beam Engineering | Nuclear and Radiation Detection |
| Medical Radiation Technology | Nuclear Law |
| Advanced Radiation Applications | Reactor Physics |
| Beam Analysis | Nuclear Thermal hydraulics |
| Advanced Radiation Physical Chemistry | Nuclear Fuel and Materials |
| Advanced Nuclear Materials | Nuclear Structural Mechanicals |
| Advanced Modeling | Nuclear Fuel Cycle |
| Advanced Simulation | Nuclear Safety |
| Radiation and Risks | Nuclear Power Plants |
| Advanced Nuclear Engineering | Maintenance of Nuclear Plants |
| Scientific Presentation | Radioactive Waste |
| International safeguards | Risk Perception and Communication |
| International Nuclear Projects | Law for Engineers |
| Nuclear Policy | Human Management |
| Nuclear Management | Special Lecture on Nuclear Issues |
| Nuclear Engineering Internship | Reactor Design |
| Quantum Beam Laboratory | Radiation Shielding |
| Nuclear Engineering Workshop | Radiation Application |
| Special Seminars | Nuclear Crisis Management |
| Advanced Nuclear Engineering Project | Exercise of Ethics for Enigineers |

# Lectures, Exercises and Experiments of Nuclear Professional School

## Nuclear Management Elements

| | |
|---|---|
| Radiation Safety | Nuclear Crisis Management |
| Nuclear and Radiation Detection | Exercise of Nuclear Law |
| Nuclear Law | Ethics for Engineers |
| Reactor Physics | Exercise of Radiation Safety and Radiation Detection |
| Nuclear Thermal Hydraulics | Exercise of Reactor Physics |
| Nuclear Fuel and Materials | Exercise of Nuclear Thermal Hydraulics and Nuclear Plants |
| Nuclear Structural Mechanicals | Exercise of Structural Mechanics |
| Nuclear Fuel Cycle | Exercise of Nuclear Fuel, Materials and Fuel Cycle |
| Nuclear Safety | Exercise of Nuclear Safety and Analysis |
| Nuclear Power Plants | Exercise of Core Design |
| Maintenance of Nuclear Plants | Exercise of Maintenance Engineering |
| Radioactive Waste | Exercise of Radiation Shielding |
| Risk Perception and Communication | Exercise of Radioactive Waste |
| Law for Engineers | Exercise of Communication, Risk and Human Management |
| Human Management | Exercise of Special Nuclear Subjects |
| Special Lecture on Nuclear Issues | Nuclear Experiments.1 |
| Reactor Design | Nuclear Experiments.2 |
| Radiation Shielding | Exercise of Reactor Operation, Inspection and Testing |
| Radiation Application | Internship |

# First IAEA Peer Review for VNMU at University of Tokyo on June 9-12, 2014

| | 1) 8:40 – 10:20 | 2) 10:30 – 12:10 | 3) 13:00-14:40 | 4) 14:50-16:30 | 5) 16:40-18:20 | 6) 18:30-20:10 |
|---|---|---|---|---|---|---|
| 9 June Mon. | 1. Method & Schedule of Peer Review<br>2. IAEA-NEM school opening ceremony<br>3. Explain NEM school programme | | Nuclear Safety Engineering by Okamoto | Maintenance Engineering in Nuclear System by Sekimura | Special Lecture on Science, Technology, and Society | Join to Reception of NEM school |
| 10 June Tue. | NEM School: Energy Strategy planning by Fujii | Social Science Essentials by Komiyama | Nuclear Engineering Master's Course Seminar 1,3,5 | Meeting by Peer Review Group | | |
| 11 June Wed. | Discussion on management programmes with professors of Department of NEM and Nuclear Professional School | | | | | |
| 12 June Thr. | Visiting Hamaoka NPP | | | | | |
| 13 June Fri. | Moving to Tokai | Nuclear Plant Engineering | Experiment @ JAEA | R&D Facilities @ Nuclear Professional School | Summary of week | Moving Back to Tokyo |

**Manchester University, Texas A&M University and MEPhI are scheduled in 2014 and others later.**

# CONTENTS

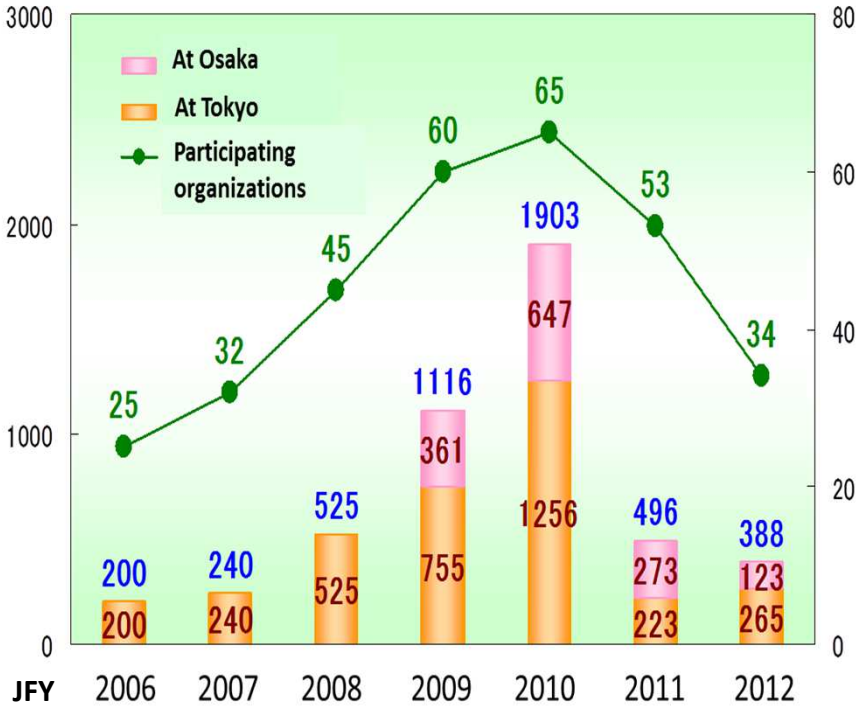
- Japan Human Resource Development Network
- Discussion on Education, HRD, Degree, License, Research and Development in Japan
- HRD/Education/Research at University of Tokyo with collaboration with IAEA
- Roadmap this Decade in Japan

# Some aspects of nuclear HRD in Japan

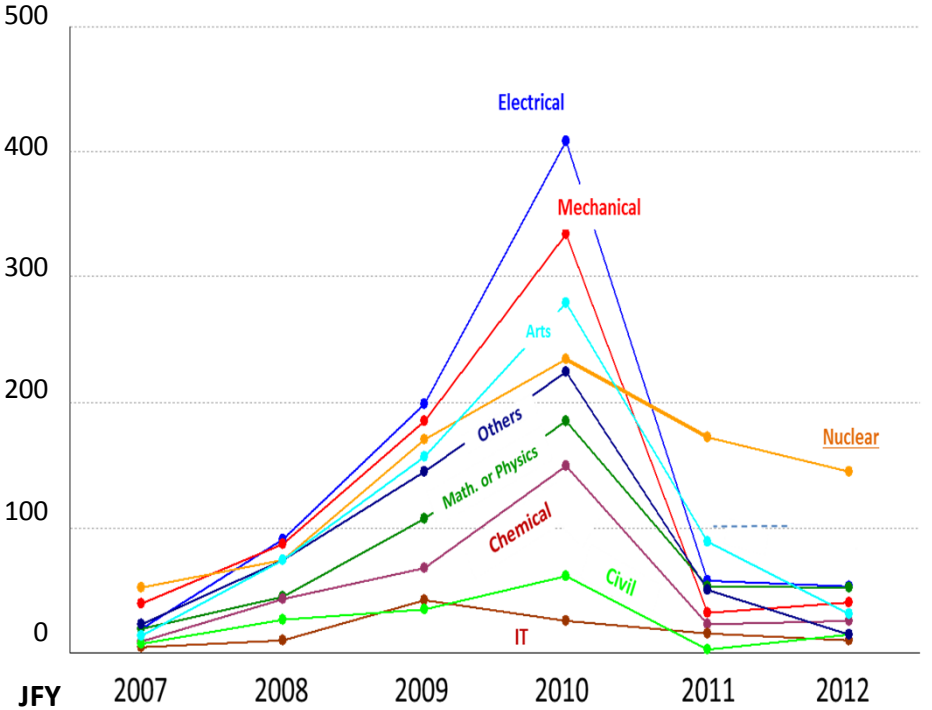
## Students minds for nuclear field

**After Fukushima Accident, it is obvious that students seeking a job in the nuclear field are getting smaller (see figures below).**
**Thus, the JN-HRD net has been conducting some activities for enrolling students into nuclear field (industries and R&D organizations).**

***Seminars on nuclear-related technologies & site visit of nuclear facilities for students**
***Trend search cooperated with academic society on course selection of students etc.**




No. of participating students and nuclear organizations




No. of participating students classified by *their specialty*

**Number of Students participating in the Recruiting Party organized by Nuclear Industries**

NUCLEAR HUMAN RESOURCE DEVELOPMENT NETWORK

# Introduction of Training Programs Being provided by Japan for New Comer Countries

## Message

Here I would like to extend a greeting in completion of the pamphlet.
It has been three years since the accident at the Fukushima Daiichi NPS occurred. Despite after the accident, I believe there is still great trust and expectation towards Japanese nuclear technology from overseas especially focusing on contributions to improvement in safety.
In order to correspond to various demands, we have discussed under Sub-Working Group of Japan Nuclear Human Resource Development Network (JN-HRD Net) with cooperation among nuclear-related organization from industries, academia and the government. We grasped HRD programs in Japan comprehensively and organized them into the data base systematically for the purpose of visualization of HRD programs which being provided by Japan.
This time, the pamphlet has completed to introduce them to overseas. In Japan, extensive training programs are being offered from academic content such as basic science to practical contents such as operator training. We hope this pamphlet can be an entrance for you to take advantage of Japanese resources effectively.
It is our responsibility to share the lessons learned from the accident at the Fukushima Daiichi NPS and to utilize them to improve the safety of nuclear power plants around the world. So, we will continue to carry out multifaceted efforts to foster nuclear human resources not only in Japan but also every country seeking to benefit for the use of nuclear power.

Takuya HATTORI,

President, Japan Atomic Industrial Forum (JAIF)
Represent at Sub-Working Group for supporting nuclear HRD programs in new comer countries,
Japan Nuclear Human Resource Development Network (JN-HRD Net)

We are operating the Sub-Working Group for supporting nuclear HRD programs in new comer countries, Japan Nuclear Human Resource Development Network (JN-HRD Net
March, 2011,
necessary in
nuclear facilit
including lessons learned from
collecting all Japan related HRD
base and web site in Japanese
engineering/management subje

[Planning, Engineering and Construction / Operation of Nuclear Power Plant / Fuel Relation]

| Major Items | Objects | NEPIO- Administrative or Governmental Staff | Regulatory Staff | R&D Organizations, Academics | Nuclear Power Operators |
|---|---|---|---|---|---|
| Planning, Engineering and Construction | - Geology, Environment, etc.<br>- Financial Arrangements, Bid/Processing<br>- Project Management, Commissioning<br>- Construction Permit Application<br>- Site Area in relation to Nuclear Power Plant<br>- Financing Arrangement | ID:45 Nuclear Human Resource Development Center, JAEA, Japan, English, 5 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | | ID:13 Global Nuclear Human Resource Development (Hitachi-GE Nuclear Energy), Tokyo Institute of Technology, Each Country, English, 5 days<br>ID:45 Nuclear Human Resource Development Center, JAEA, Japan, English, 5 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | ID:31 JAIF International Cooperation Center (JICC), Japan, English (Partly Interpretation), 12 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days |
| Operation of Nuclear Power Plant | - Operation and Maintenance<br>- Training against Nuclear Accident | ID:30 Nuclear Safety Research Association (NSRA), Japan, English, 3-6 months<br>ID:47 Nuclear Human Resource Development Center, JAEA, Each Country, English and local language, 1-2 weeks<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | ID:30 Nuclear Safety Research Association (NSRA), Japan, English, 3-6 months | ID:30 Nuclear Safety Research Association (NSRA), Japan, English, 3-6 months<br>ID:47 Nuclear Human Resource Development Center, JAEA, Each Country, English and local language, 1-2 weeks<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | ID:31 JAIF International Cooperation Center (JICC), Japan, English (Partly Interpretation), 12 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days |
| Fuel Relation | - Nuclear Fuel<br>- Nuclear Fuel Cycle | ID:30 Nuclear Safety Research Association (NSRA), Japan, English, 3-6 months<br>ID:48 Nuclear Human Resource Development Center, JAEA, Each Country, English and local language, 2 weeks<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | ID:30 Nuclear Safety Research Association (NSRA), Japan, English, 3-6 months | ID:30 Nuclear Safety Research Association (NSRA), Japan, English, 3-6 months<br>ID:48 Nuclear Human Resource Development Center, JAEA, Each Country, English and local language, 2 weeks<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | ID:31 JAIF International Cooperation Center (JICC), Japan, English (Partly Interpretation), 12 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days |

[Safety]

| Major Items | Objects | NEPIO- Administrative or Governmental Staff | Regulatory Staff |
|---|---|---|---|
| Safety | - Nuclear Safety<br>- Radiation Safety<br>- Industrial Safety (Fires, Hazardous Materials)<br>- Safety Measurements and Site Evaluations for Nuclear Power Plant<br>- Fukushima Nuclear Accident<br>- Accident Analysis | ID:2 Department of Nuclear Engineering and Management / Nuclear Professional School, The University of Tokyo, Japan, English, 15 days<br>ID:41 Nuclear Human Resource Development Center, JAEA, Japan, English, 54 days<br>ID:42 Nuclear Human Resource Development Center, JAEA, Japan, English, 54 days<br>ID:43 Nuclear Human Resource Development Center, JAEA, Japan, English, 54 days<br>ID:44 Nuclear Human Resource Development Center, JAEA, Japan, English, 12 days<br>ID:45 Nuclear Human Resource Development Center, JAEA, Japan, English, 5 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 26 days<br>ID:52 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Japan, English (Interpretation), 19 days<br>ID:54 Fukui International Human Resources Development Center for Atomic Energy, The Wakasa Wan Energy Research Center, Each Country, English (Interpretation), 5 days<br>ID:55 The Japan Atomic Power Company, Japan, Local Language (Interpretation), 2 times (13 days, 13 days) | |

### Nuclear Safety Research Association (NSRA)

Address : 5-18-7, Minato-ku, Shimbashi, Tokyo, 105-0004, JAPAN
TEL : +81-3-5470-1982
FAX : +81-3-5470-1911
e-mail : iard@nsra.or.jp
URL : http://www.nsra.or.jp/index-e.html

NSRA is an independent and non-profit organization on nuclear safety. The area of its activity is very wide covering both national and international matters from the neutral viewpoint scientifically.

### JAIF International Cooperation Center (JICC)

Address : 17th floor, NBF Hibiya Building, 1-1-7 Uchisaiwaicho, Chiyoda-ku, Tokyo, 100-0011, JAPAN
TEL : +81-3-3591-2210
FAX : +81-3-3591-2215
e-mail : info@jaif-icc.com
URL : http://www.jaif-icc.com/english/index.html

Providing cooperation for nuclear energy development for newcomers as a contact window and facilitator to promote activities, such as dispatching nuclear experts, inviting trainees, hosting seminars, etc.

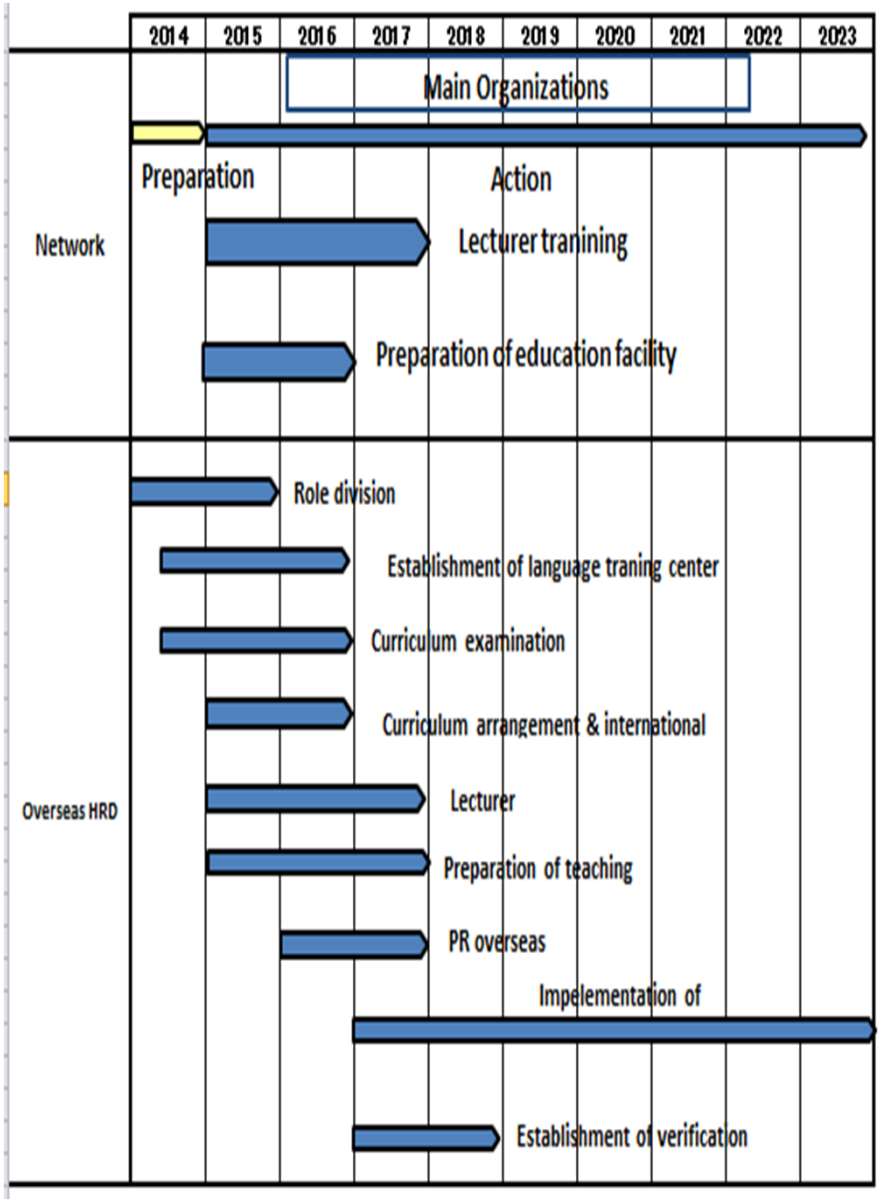
### Japan Atomic Energy Agency (JAEA)

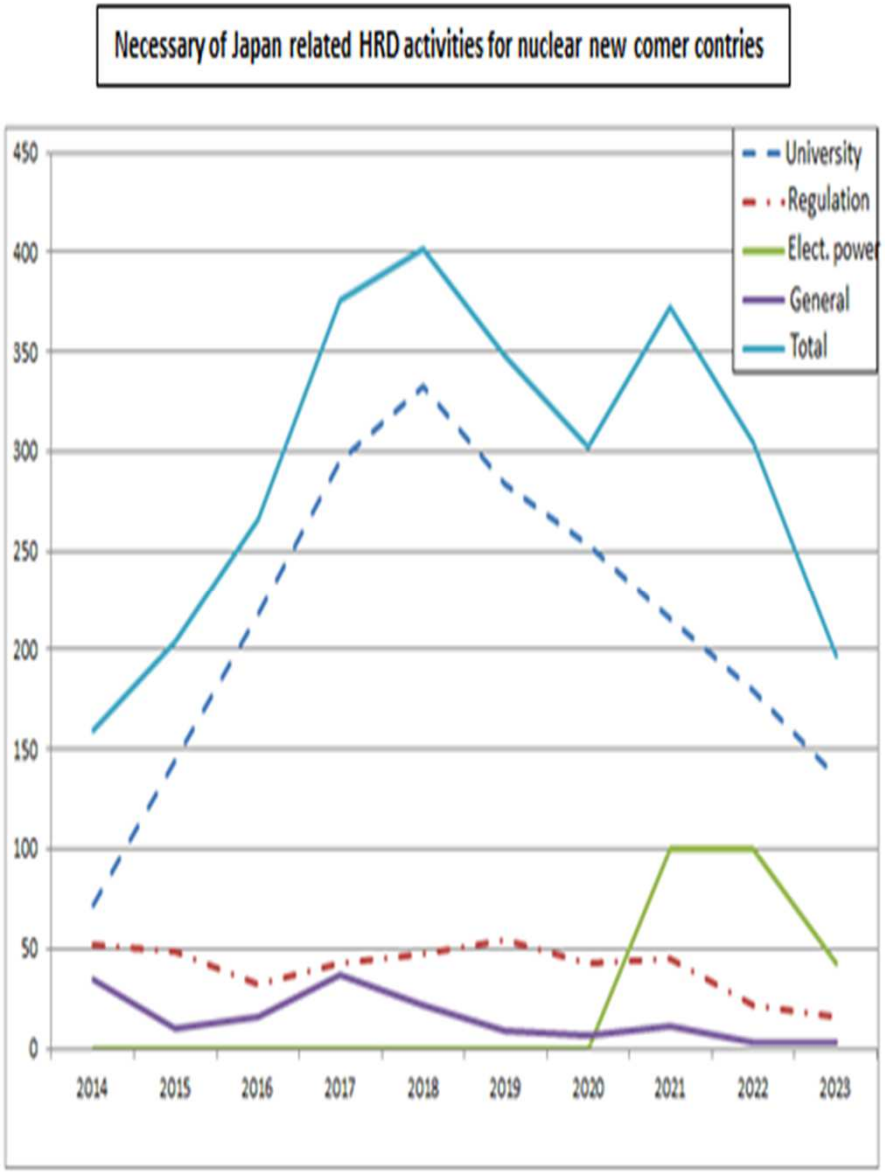
**Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN)**

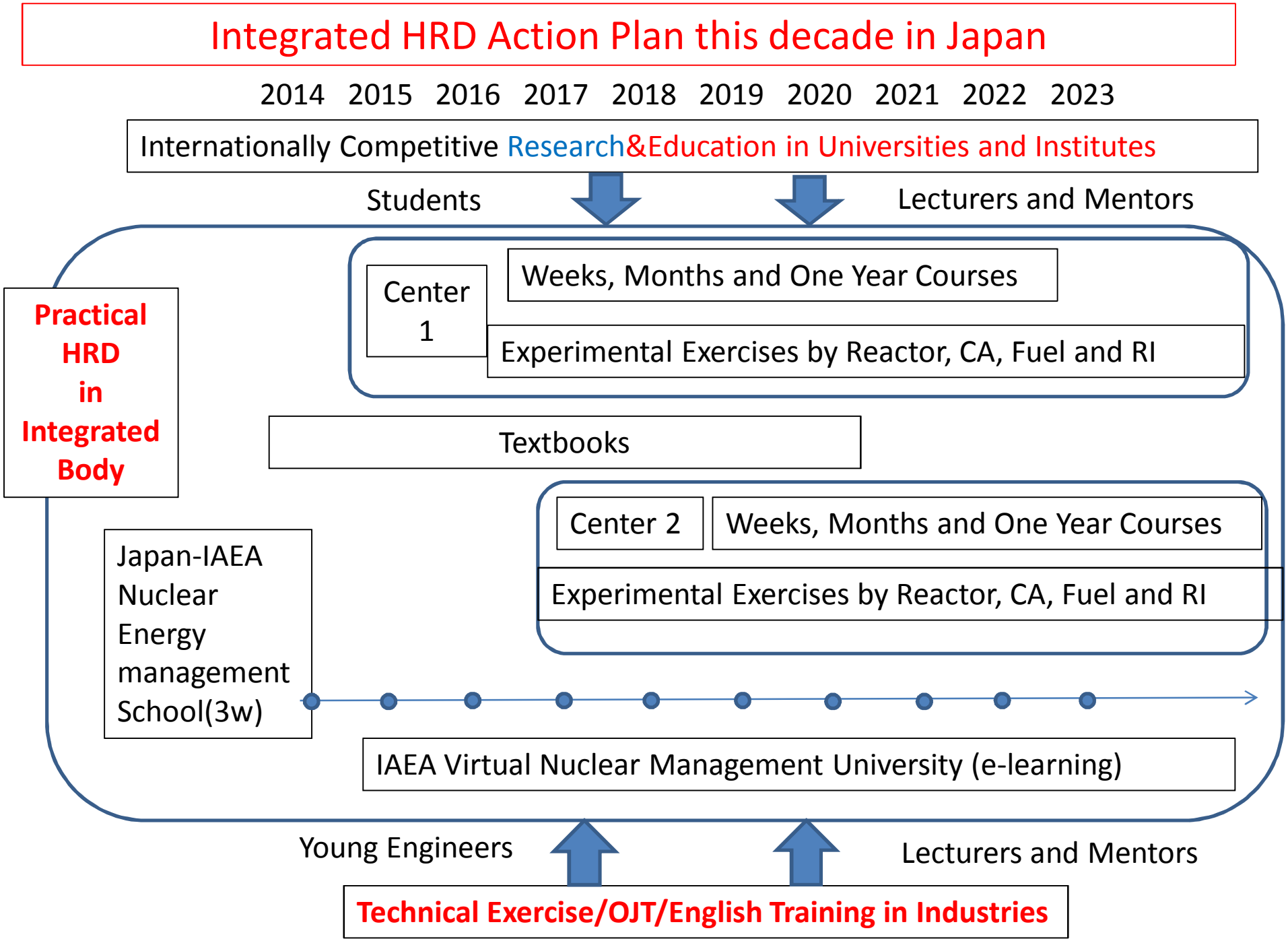
Address : 3-1-1 Funaishikawaekihigashi, Tokai-mura, Naka-gun, Ibaraki, 319-1518, JAPAN
TEL : +81-29-283-4115
FAX : +81-29-283-4115
e-mail : iscn-info@jaea.go.jp
URL : http://www.jaea.go.jp/04/iscn/index_en.html

ISCN holds three visions for its activities: (1) support human resource development for future leaders and infrastructure development such as legal systems; (2) foster nuclear nonproliferation and nuclear security culture by providing relevant information, and (3) strengthen nuclear nonproliferation and nuclear security through the development of measurement and detection technologies of nuclear material.

# Roadmap of HDR for New Comer Countries in Japan




Integrated HRD Action Plan this decade in Japan
2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Internationally Competitive Research&Education in Universities and Institutes
Students
Lecturers and Mentors
Practical HRD in Integrated Body
Center 1
Weeks, Months and One Year Courses
Experimental Exercises by Reactor, CA, Fuel and RI
Textbooks
Center 2
Weeks, Months and One Year Courses
Experimental Exercises by Reactor, CA, Fuel and RI
Japan-IAEA Nuclear Energy management School(3w)
IAEA Virtual Nuclear Management University (e-learning)
Young Engineers
Lecturers and Mentors
Technical Exercise/OJT/English Training in Industries

# Summary

- Japan HRD Network has worked effectively for 4 years and is expected to be upgraded under the collaboration with IAEA.
- Education and degrees, HRD and linceses, research&development should be always carefully discussed depending on countries and regions.
- We are making and upgrading the HRD roadmap and actions in Japan.

**Please, come over to Japan.**

# Thank you for your kind attention


IAEA
International Atomic Energy Agency

JN-HRD.net

JAEA

東京大学
THE UNIVERSITY OF TOKYO

JAIF