Human Resource Development solution for partner countries

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Agenda

• Introduction to ROSATOM global activities

• ROSATOM education and training system
  • The structure and the key elements of the Education and Training system of ROSATOM
  • Innovative training tools
  • Training facilities

• ROSATOM HR development product for foreign partners
  • Application of IAEA approach in ROSATOM educational product concept
  • Integrated solution on partner country Human Resources development

• Technical solution for Human Resources development
INTRODUCTION TO ROSATOM GLOBAL ACTIVITIES
ROSATOM offers complete solution from uranium supplies to NPP construction operation and decommissioning

**Key Activities of ROSATOM***

- Mining
- Gas centrifuges manufacturing
- Fuel fabrication
- Spent nuclear fuel treatment
- Power generation and conversion and enrichment
- NPPs engineering & construction
- Power equipment and services
- Research and development
- Science & Innovation

* Boxes include names of key Rosatom’s subsidiaries in the relevant sector

**Rosatom Global Operations №1 in key segments**

**№1** in uranium enrichment

**№1** in new NPPs construction

**№1** Russian electricity generation company 26,2 GWe installed capacity

**Over 258 000 people**

**Yearly recruitment 30 000-40 000 people**

**Yearly graduate recruitment about 1700 people**

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International cooperation in Human Resources Development

Intergovernmental agreements in the nuclear sphere

Over 40 countries

Memorandums of understanding in the field of human resources

- Turkey
- Hungary
- Mongolia
- Vietnam
- Bangladesh
ROSATOM EDUCATION AND TRAINING SYSTEM
The structure and the key elements of the Education and Training system of ROSATOM

ROSATOM Education and training system

- **Education of personnel in educational entities**
  - Basic school education
  - Vocational education
  - Higher Education (over 230 programs)

- **In-company training (over 120 programs)**
  - Concern Rosenergoatom (leader of the Consortium)
  - Atomtechenenergo (42 programs)
  - ROSATOM Corporate Academy (22 programs)

**Outcomes**

- **Identifying Talents in schools and attracting them to nuclear industry**
  - Over 100 educational organizations that provide applicants to Universities

- **Over 100 technical and classic universities**
  - Consortium of 14 leading universities that provide 2/3 of Rosatom yearly employment

- **Other Universities - partners**
  - National Research Nuclear University (MEPhI) and the consortium of key universities

- **Over 100 educational organizations that provide applicants to Universities**

**Training**

- **On-the-Job Training**
  - Practical training using mockup of NPP system
  - Managerial skills

- **Theoretical courses, safety**
  - Design and installation of Full Scope Simulators

**Consortium of ROSATOM Subsidiaries to Train NPP Personnel**
Identifying Talents in schools and attracting them to nuclear industry

ROSATOM key contests for schools:

• All-Russian Industrial physics and mathematics Olympiad for school-children
• «Junior» – all-Russian competition of scientific papers for school-children
• Engineering Olympiad of school-children
• «Energy of future generations» – a contest of research projects of school-children from the cities with nuclear industry facilities (NPPs, fuel fabrication plants, research centres etc)

• 37 cities
• over 15 000 participants every year

Outcomes:

• Increasing the competition to enter technical universities (nuclear faculties)
• Increasing the quality of applicants to Universities
• Building public acceptance
Consortium of ROSATOM supporting universities

- 60 years of experience in Nuclear Education
- Over 300,000 students and 50,000 lecturers
- Universities in 23 cities of 19 regions of Russia
- 56 scientific and educational centers
- 6 Nobel prize winners worked and taught in Russian universities
- Cooperation with international organizations: ENEN, IAEA, WNU, EAEC
- Cooperation council

NRNU MEPhI – our strategic partner

Provides about 30% of Rosatom yearly employment
Inviting international students to study in Russia

Number of international students studying nuclear sciences in Russian universities:

In 2015

- **37 countries**
- Over **300 students**

Universities

- Mexico
- Cuba
- Peru
- Brazil
- Argentina
- Bolivia
- Namibia
- Ghana
- Bangladesh
- Vietnam
- Thailand
- Malaysia
- Indonesia

 Universities

Number of international students studying:

- **46** in 2010
- **168** in 2011
- **316** in 2012
- **481** in 2013
- **709** in 2014
- **1063** in 2015
- **1400** in 2016

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Developing international cooperation between universities

Ways of cooperation:

1. Joint educational programs
2. Academic exchanges (professors, students, interns)
3. Translation and publication of study materials
4. Development of laboratory facilities
5. Joint scientific projects
6. Conferences, seminars and other events

April 2015 MEPHI signed the agreements of cooperation and joint master degree programs with 3 universities of Turkey

Nuclear reactors

- Graduates will work in the scientific centers, institutes, will work as the teachers in the universities.

Systems of control and safety operation of NPP

- Graduates will work at the NPP and training centers

236 higher education programs

52 – in English
184 – in Russian

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Training professionals for nuclear infrastructure, NPP and scientific projects

Consortium of 5 ROSATOM Subsidiaries to Train NPP Personnel to support Global Expansion of WWER Technology

- Concern Rosenergoatom – on-the-Job Training
- Atomtechenergo – practical training using mockup of NPP system
- Rosatom-CICET – theoretical courses
- VNNAES – design and installation of Full Scope Simulator
- Rosatom Corporate Academy – managerial skills

ROSATOM has developed 121 training programs for training personnel of international partners

- Programs in English: Rosatom Corporate Academy 11, CICE&T 26, VNNAES 31
- Programs in Russian: Atomtechenergo 42

Cooperation with the Consortium in the following areas:

- Training with the use of Full Scope Simulators (WWER NPP)
- Training in the area of Small & Medium Reactors (SVBR, Floating NPP)
- Training in the area of Fuel Cycle Development (fuel fabrication for current and advanced reactors)
- More than 100 training programs
Innovative training tools: the «Tournament of Young Professionals» TEMP

Aim ➢ To prepare engineering talented students for further work in the nuclear industry

Goals:
• To attract most talented students to the industry;
• Popularization of work in the nuclear industry among students and graduates of specialized universities;
• Nuclear experts involvement in work process with youth;
• The development solution project of real nuclear company’s tasks.

3 970 registered participants

450 cities, 9 countries

280 universities

40 Rosatom enterprises

42 cases of 6 sectors

Professional awards of TEMP:
Winner, HR-project of the Year, 2012
Winner, HR-brand – 2012
Winner, Eventiada - 2013
Working to attract talented students to nuclear

**2014**
- Vietnam – 1 team - 5 participants (get till final)
- Turkey - 1 team - 7 participants (get till final)
- Check Republic: 1 team - 5 participants (guests of the final)

**TOTAL:** 21 people, 3 teams in final.

**2015**
- Vietnam – 2 teams – 16 participants (1 team of 6 people got to final)
- Hungary – 1 team – 17 participants (1 team of 4 people got to final)

**TOTAL:** 33 people, 3 teams, 2 teams in final

From what countries international students come from:

- other countries
- Jordan
- Mongolia
- Turkey
- Vietnam

**2010**  **2011**  **2012**  **2013**  **2014**  **2015**  **2016**
Innovative training tools:
MEPHI virtual laboratories
Training facilities: Laboratories and practical education

Ural Federal University: traditions of nuclear safety
Educational-training complex – the most effective part of nuclear education

Detailed theoretical study of all actual reactor types in Russia and in the world

Employment on a training apparatus of a block control panel

Practical courses on the demonstrative scale-model of reactors

Laboratory of the Ural Federal University where the students from the specialization Nuclear Power Stations: Exploitation and Engineering have practice.
Training facilities: Education and Science

Accelerators of Ural Federal University

Interaction with industry – Nizhny Novgorod Polytech

Nuclear Research Center of NRNU MEPhI
Training facilities for NPP personnel: Full scope and computer simulators
ROSATOM HR DEVELOPMENT PRODUCT FOR FOREIGN PARTNERS
Questions of partner countries about HR development:

- How many specialists to prepare?
- What programs?...
- How long will it take?...
- How to manage?...
- How to assure the competence?...
- How expensive?...
- How to see the risks?...

and many more…
### Application of IAEA approach in ROSATOM educational product concept

#### Description

**IAEA principles**

<table>
<thead>
<tr>
<th>Description*</th>
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<tbody>
<tr>
<td>Systematic approach to constant development of governmental, organizational and personal competencies and opportunities that are necessary in order to achieve safe, secure and stable nuclear energy program.</td>
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<tr>
<td>Development of effective workforce on national level and on the level of organization using a well structured approach that will allow member-countries to estimate demand in human resources for their nuclear programmes.</td>
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<tr>
<td>Providing the involved personnel with complex and systematic knowledge.</td>
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<td>Complex systematic approach to revelation, obtaining, transformation, development, distribution, usage, exchange and preservation of knowledge that is necessary to achieve certain goals.</td>
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<td>Development of networks to unite, analyze and exchange knowledge and experience in technical area and the area of safety in nuclear energy on national, regional and international level.</td>
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#### IAEA regulations

<table>
<thead>
<tr>
<th>IAEA regulations</th>
<th>Function</th>
<th>ROSATOM</th>
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<tbody>
<tr>
<td>HRD</td>
<td>Planning</td>
<td>HR Department</td>
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<td>E&amp;T</td>
<td>Education and personnel preparation</td>
<td>HR Department</td>
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<td>Knowledge Management (KM)</td>
<td>Methodology</td>
<td>Science and Innovation Department</td>
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<tr>
<td>Knowledge Network (KN)</td>
<td>Methodology</td>
<td>Science and Innovation Department</td>
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</table>

*Источники:*

IAEA. Methodology for Self-assessment of Capacity Building in Member States with Nuclear Power Programmes and Those Planning to Embark on Such a Programme, 2012
IAEA Capacity Building for Nuclear Safety and Security, Initiatives for Member States
Managing Nuclear Knowledge - proceedings of a workshop on managing nuclear knowledge, Trieste 2005
ROSATOM Integrated solution on partner country Human Resources development

5 Personnel Categories – 5 CP

1. NPP personnel (operating & maintenance personnel, managers etc.)
   - Technical skills development for all professional groups of personnel
   - Training Tools & On-the job training at referenced and own NPP
   - Theory, Facility Visit, Practical Training (& cross-cultural communication)
   - Training of specialists for national nuclear infrastructure

2. Construction-Engineering personnel
   - Management of the NPP in construction

3. Personnel for non-energy and scientific projects
   - Science and innovation Cyclotron and research reactor, Science & Technology Centre

4. Nuclear Infrastructure personnel (NEPIO, regulatory body, local Technical Support Organizations etc.)
   - Higher Education programs in Russia
   - International cooperation between universities and Joint degree programs

5. Young specialists and professors

ROSATOM Integrated solution on partner country Human Resources development
### Typical Human Resources Development plan for a partner-country

<table>
<thead>
<tr>
<th>PERSONNEL CATEGORIES</th>
<th>Training organization</th>
<th>-12</th>
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<tbody>
<tr>
<td>1. NPP personnel</td>
<td>Training consortium</td>
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<td>2. Construction-engineering personnel</td>
<td>Universities and training organizations</td>
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<td>3. Personnel for non-energy and scientific projects</td>
<td>Consortium of Rosatom supporting Universities</td>
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<td>4. Nuclear Infrastructure personnel</td>
<td>CICE&amp;T</td>
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<td>5. Young specialists and professors</td>
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- **Directorate of construction**: NPP operating personnel training ~700 (NPP, 2 Units)
- **Training NPP builders**: ~250 (NPP constructors)
- **Personnel for the project of non-energy sector (agriculture, nuclear medicine etc.)**: ~250-300 specialists for a new-comer country
- **Teaching PhD, researchers etc.**
- **Training of the regulator personnel (NEPIO etc.)**: ~250-300 specialists for a new-comer country
- **Teaching of young professionals in Russian universities**: ~800-1200 graduates for a new-comer country

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**Universities consortium**: 14 Russian technical universities  
**Training consortium**: Rosenergoatom, Atomtechenergo, VNIIAES, CICE&T

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Working group developing Human Resources Development plan

3 main steps:

➢ **First**, the responsible officials should be nominated for each category from both sides (from Russian side and from partner-country side).

➢ **Second**, the partner country should set main parameters of the project. If that is not possible – an assumption (or scenarios) should be made.

➢ **Third**, the partner country should work on self assessment. It is important to analyze what kind of resources (educational, human etc.) the country already has.
Lessons learned by working group participants:

For a partner country:

- To create the E&T and HRD country plan for all nuclear projects and for all stakeholders in the country
- To start self-assessment, to see the current status of the HRD activities in the country
- To follow on time the HRD schedule and see the risks of deviations
- To improve the efficiency of cooperation with ROSATOM

For ROSATOM:

- To define actual needs in HRD area for supporting nuclear projects of a partner country
- To provide most beneficial assistance for a partner country in E&T and HRD
- To raise effectiveness of cooperation with partner country and planning
  and more..
IT Solutions for HRD Planning:

**OCTOPUS** overview

**Aim:**
- To provide IT-support of all HR&WF Planning activities for nuclear sector

**Goals:**
- To define actual needs in HRD for supporting nuclear projects
- To provide planning of HRD activities for all stakeholders
- To ensure monitoring of current status of the HRD activities online, including budgeting
- To evaluate risks of deviations from the HRD schedule
- To support all managerial solutions in terms of carrier development of the personnel

**IS Solutions (8D-management):**
- Country
- Personnel category
- Number of staff
- Training duration
- Training Program
- Training Entity
- Budget source
- Rosatom’ project

**Integrated HR Schedule**
IS Octopus: a solution for integrated HR planning for Rosatom projects (1)

- **Goal:** to promote Russian nuclear technologies through HRD product

- **Functions:**
  - Comprehensive HRD planning
  - Support of activities to ensure operation personnel readiness prior to start-up operations
  - Support for NI personnel development
  - Database of E&T providers, courses and programs
  - Short-term and long-term cost estimation
  - Ensuring and monitoring replication of HRD solutions
  - Support to partners in national NEP implementation
  - Remote access to IS

8-D HR Management for Rosatom:
- Country
- HRD projects
- Categories of personnel
- Amount of personnel
- Duration of training
- Training programs
- Training providers
- Sources of financing

www.vniiaes.ru
IS Octopus: a solution for integrated HR planning for Rosatom projects

- HR country plan for up to 12 yrs
- Database of all training providers
- Over 260 training programs (higher and professional education)
- Short-term and long-term planning of HRD
- Joint work with foreign partners
- Integrated HR plan for all Rosatom partner countries
- Maintaining of training records
Case: promotion of HRD solution for Republic of Bangladesh with IS Octopus

- Finding IT solution for HRD (IS Octopus)
  - Vietnam, 2013 (pilot country HRD plan)
- Draft of HRD solution template
- HRD Country plan template
- Joint working groups on HRD
  - JWG on NI: November 2014
  - JWG on HR: February 2015
- Tailoring of HRD country plan
- 24-26.03.2015 Russian-Bangladesh JWG meeting at VNIIAES
- Finalization of Bangladesh HRD plan
- Support and further development of HRD country plan

www.vniiaes.ru
To sum up:

HRD Planning Challenges

- Human resources development
- Complexity of the training programs (milestones)
- A significant amount of nuclear regulations to be issued/implemented (safety, security, …)
- Long term programming (project management, strategies,…)
- Localization (high standards, national companies,…)
- HRD Planning activities (short- and long-term)

An approach suggested:

- Be systematic- define ‘big picture’ for the Nuclear Program
- Use constructor to create your own HR&WR plan
- Use typical cases to create your own HR&WR plan
- Use Octopus as a supportive and collaborative IT tool
Thank you for your attention!