



РОСАТОМ

ГОСУДАРСТВЕННАЯ КОРПОРАЦИЯ ПО АТОМНОЙ ЭНЕРГИИ «РОСАТОМ»

Human Resource Development solution for partner countries

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02.06.2015

- 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



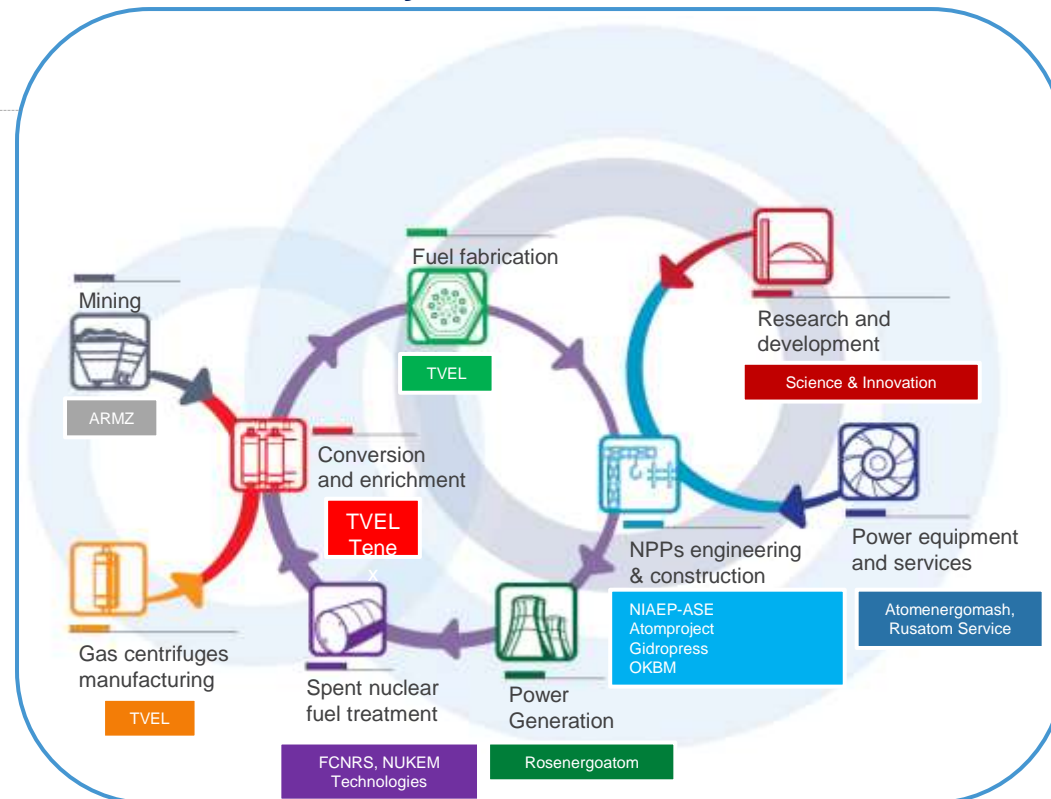
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INTRODUCTION TO ROSATOM GLOBAL ACTIVITIES

ROSATOM offers complete solution from uranium supplies to NPP construction operation and decommissioning



Key Activities of ROSATOM*



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

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

Intergovernmental agreements in the nuclear sphere

Over 40 countries



Memorandums of understanding in the field of human resources

- Turkey
- Hungary
- Mongolia
- Vietnam
- Bangladesh





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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

Identifying Talents in schools and attracting them to nuclear industry

Vocational education

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

Higher Education (over 230 programs)

National Research Nuclear University (MEPhI) and the consortium of key universities

Consortium of **14 leading universities** that provide **2/3** of Rosatom yearly **employment**

Other Universities - partners

Over **100** technical and classic **universities**

In-company training (over 120 programs)

Concern Rosenergoatom (leader of the Consortium)

On-the-Job Training

ROSATOM Central Institute for continuing education and training (SCICET) (26 programs)

Theoretical courses, safety

Atomtechenergo (42 programs)

Practical training using mockup of NPP system

VNIIAES (31 programs)

Design and installation of Full Scope Simulators

ROSATOM Corporate Academy (22 programs)

Managerial skills

Consortium of ROSATOM Subsidiaries to Train NPP Personnel

Identifying Talents in schools and attracting them to nuclear industry



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ROSATOM key contests for schools:

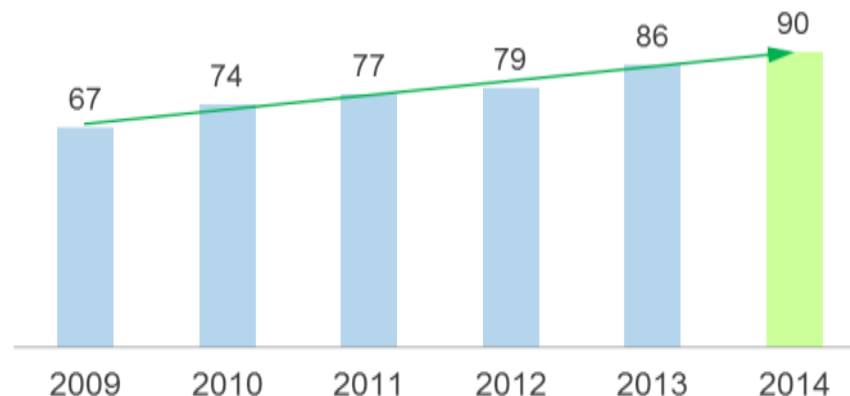
- All-Russian Industrial **physics and mathematics Olympiad** for school-children
- «**Junior**» – all-Russian competition of scientific papers for school-children
- **Engineering Olympiad** of school-children
- «**Energy of future generations**» – a contest of research projects of school-children from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

- 37 cities
- over 15 000 participants every year

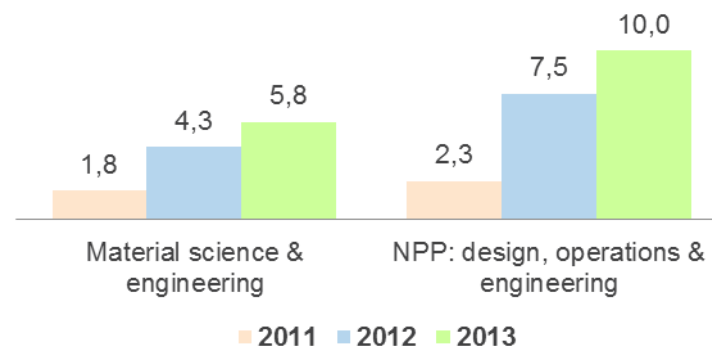
Outcomes:

- Increasing the competition to enter technical universities (nuclear faculties)
- Increasing the quality of applicants to Universities
- Building public acceptance

GPA dynamics of National Research Nuclear University “MEPhI applicants (based on Unified National Exam data)



MEPhI competitive examination data for target degree programs (person per place)



Consortium universities
graduates' share in Rosatom
yearly employment – 60%



NRNU MEPhI – our strategic partner

Provides about **30%** of Rosatom yearly employment

- **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

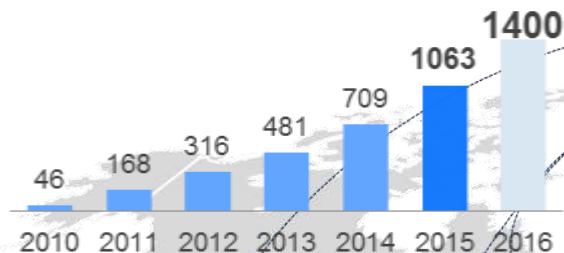


Inviting international students to study in Russia

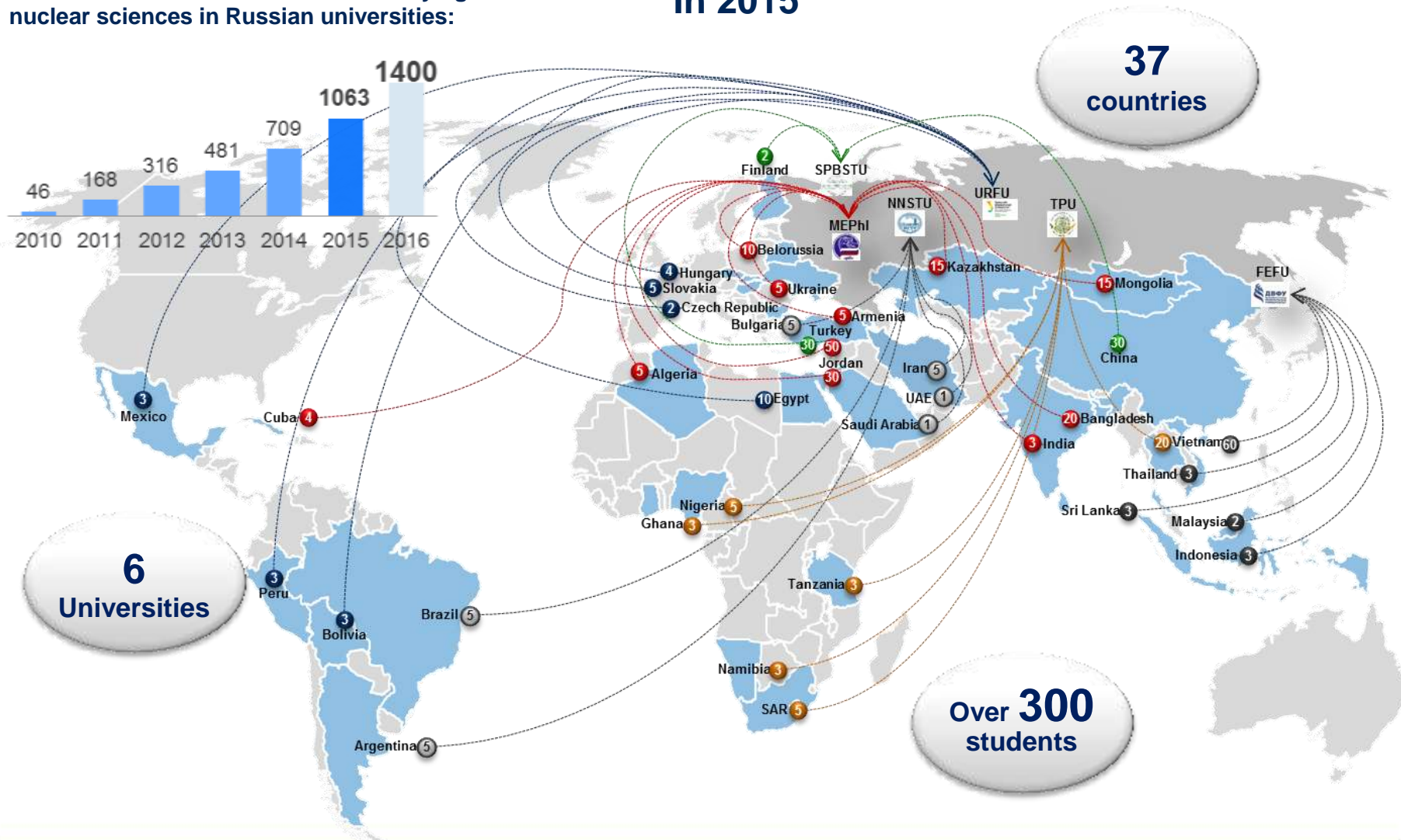


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Number of international students studying nuclear sciences in Russian universities:



In 2015



Developing international cooperation between universities



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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

236 higher education programs

52 – in English

184 – in Russian



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



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

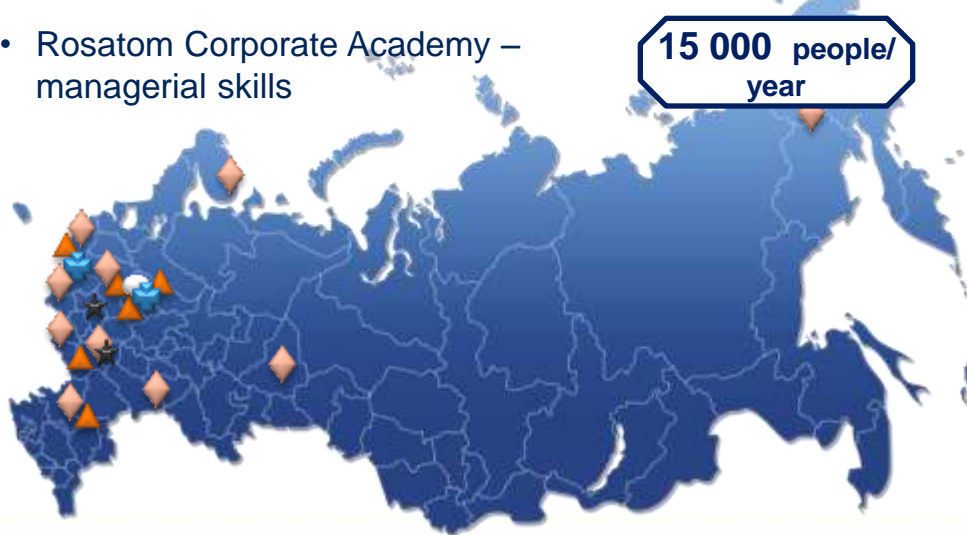
- ◆ Concern Rosenergoatom – on-the-Job Training
- ★ Atomtechenergo – practical training using mockup of NPP system
- 📦 Rosatom-CICET – theoretical courses
- ▲ VNNAES – design and installation of Full Scope Simulator
- 🌐 Rosatom Corporate Academy – managerial skills

1 500-3 000
people/ year

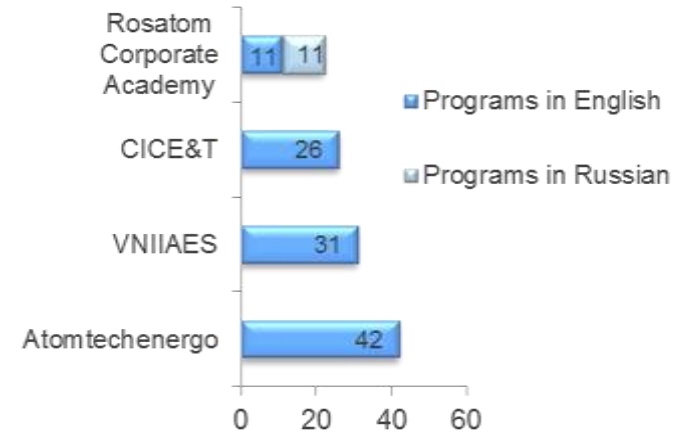
12 000 people/
year

650 people/ year

15 000 people/
year



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



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

2015

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 participant (get till final)
Check Republic: 1 team - 5 participants (guests of the final)

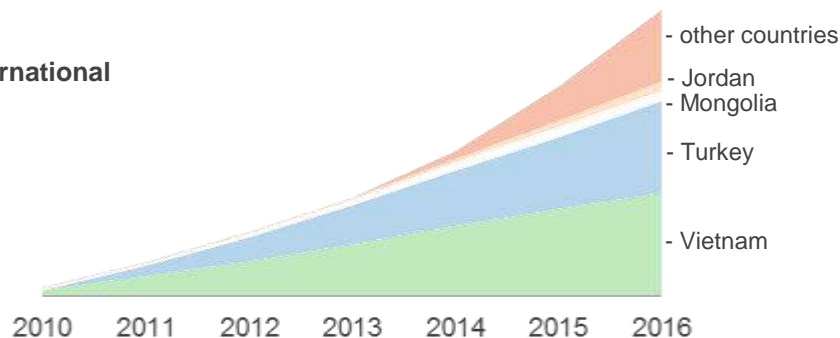
TOTAL: 21 people, 3 teams in final.

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:




Innovative training tools: MEPHI virtual laboratories



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Set the installation parameters



Before you get started you must set up the initial parameters of the installation (lattice pitch, fuel enrichment, diameter of fuel blocks, measurement time), OR you can load saved table of results (the parameters of the installation will be loaded automatically)

Lattice pitch, cm:

15

20

25

Fuel enrichment, %:

0.71

1.2

Welcome



**Model of the laboratory work:
Experimental determination of material parameters depending on the uranium-water lattice pitch**

Before you get started it is necessary to read the description of the experiment, which are on the [web site](#) (Russian), or you can get it from your instructor.

This version of the modeling program of the experiment supports the following functions:

1. Measurement of the neutron counting rate with boron counter in the experimental channels of the uranium-graphite subcritical installation with/without the source of neutrons and without a cadmium cover;
2. Measurement of the neutron counting rate with boron counter in the experimental channels of the installation with the cadmium cover.

[Change the language](#)

Modeling of the Experiment based on the Monte-Carlo Method MEMOM



СИСТЕМА ПОДДЕРЖКИ ЛАБОРАТОРНЫХ РАБОТ НА УНИКАЛЬНОМ ЭКСПЕРИМЕНТАЛЬНОМ ОБОРУДОВАНИИ В ОБЛАСТИ ЯДЕРНОЙ ЭНЕРГЕТИЧЕСКИХ УСТАНОВОК

Information:

- [Goal](#)
- [Theory](#)
- [Order of the experiment](#)
- [Order of the processing and preparing results](#)

Installation parameters:

Lattice pitch: 20 cm

Fuel enrichment: 0.71%

Diameter of an uranium rod: 35 mm



View of the installation




Scheme of the installation

Measurement time: 15 sec

[Back](#)

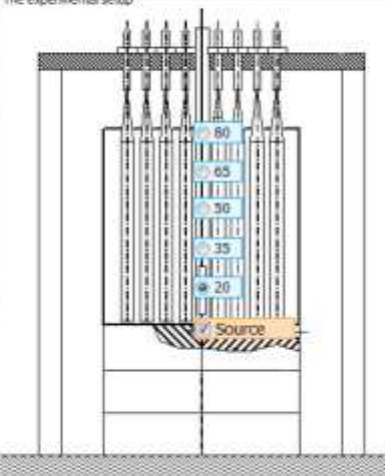
Virtual lab



СИСТЕМА ПОДДЕРЖКИ ЛАБОРАТОРНЫХ РАБОТ НА УНИКАЛЬНОМ ЭКСПЕРИМЕНТАЛЬНОМ ОБОРУДОВАНИИ В ОБЛАСТИ ЯДЕРНОЙ ЭНЕРГЕТИЧЕСКИХ УСТАНОВОК

Experimental determination of material parameters depending on the spacing of the uranium-water lattice

The experimental setup



1. Indicate the location of the detector circuit to the source of neutrons in uranium-water subcritical assembly.

2. Place or remove a source of neutrons at the bottom of the installation;

3. If necessary, install a cadmium filter on the detector;

4. Click the "Start" to start a measurement; Make the measurement of the neutron count with / without cadmium filter, and the measurement of the background (no source) for each pitch.

Lattice pitch, cm:

4.5 5.0 5.5 6.0

Status: Neutrons from the source

Set the cadmium filter

[Stop](#)

Measurement time: 15 sec.

Time (sec): 1

Neutron counter

000328

Fuel: U (metal) (19 g/cm³)

Fuel Enrichment: 0,72 %

[Back](#) [Save the result](#) [Results Table](#) [Close the program](#)

[Start the experiment](#)

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



Accelerators of Ural Federal University



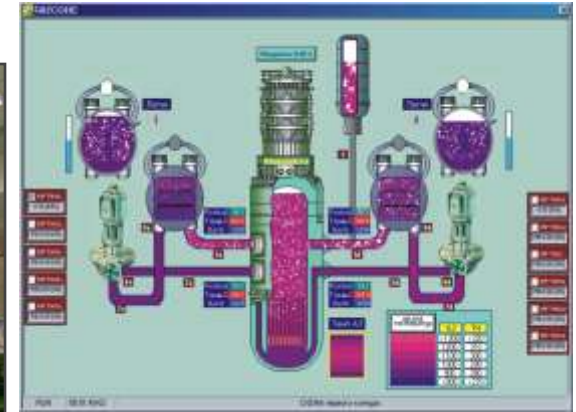
Interaction with industry – Nizhny Novgorod Polytech



Nuclear Research Center of NRNU MEPhI



Training facilities for NPP personnel: Full scope and computer simulators





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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



IAEA regulations	Function	ROSATOM
HRD	Planning	HR Department
E&T	Education and personnel preparation	HR Department
Knowledge Management (KM)	Methodology	Science and Innovation Department
Knowledge Network (KN)	Methodology	Science and Innovation Department

IAEA principles	Description*
Capacity Building	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.
HRD	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.
Education and Training programmes	Providing the involved personnel with complex and systematic knowledge.
Nuclear Knowledge Management	Complex systematic approach to revelation, obtaining, transformation, development, distribution, usage, exchange and preservation of knowledge that is necessary to achieve certain goals.
Nuclear Knowledge Networks	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.

*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

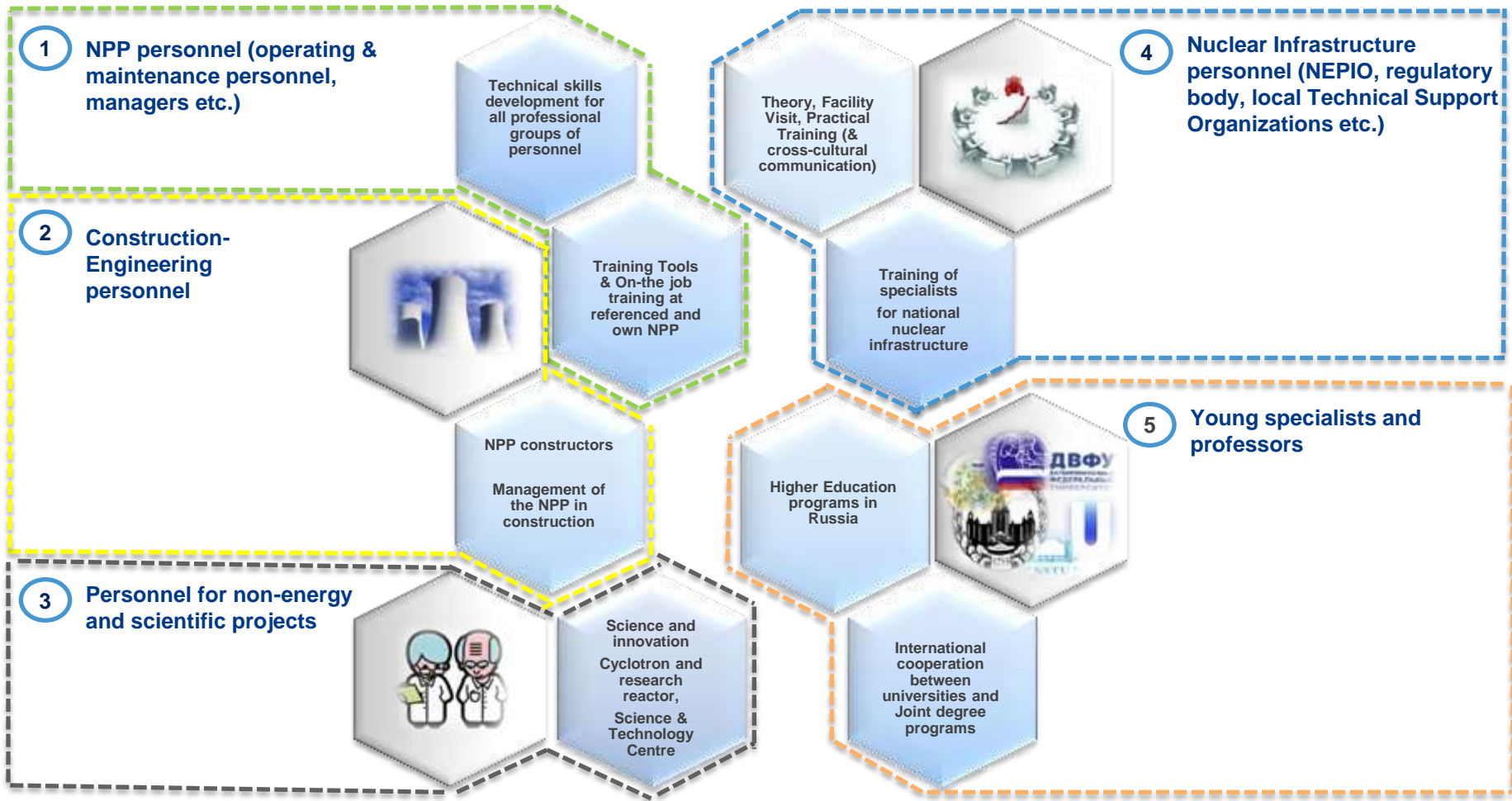
IAEA Capacity Building for Nuclear Safety and Security, Initiatives for Member States

Managing Nuclear Knowledge - proceedings of a workshop on managing nuclear knowledge, Trieste 2005

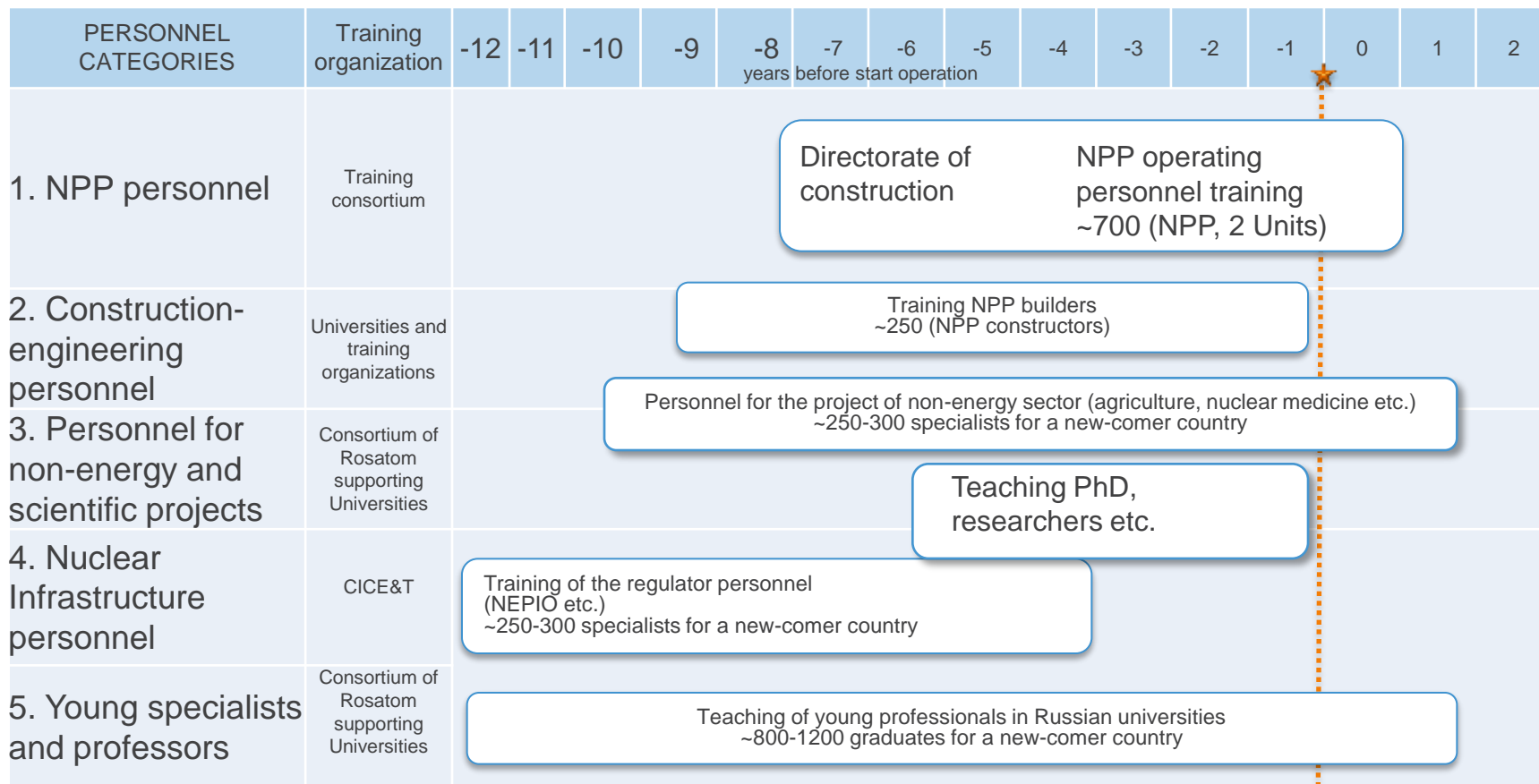
ROSATOM Integrated solution on partner country Human Resources development



5 Personnel Categories – 5 CP



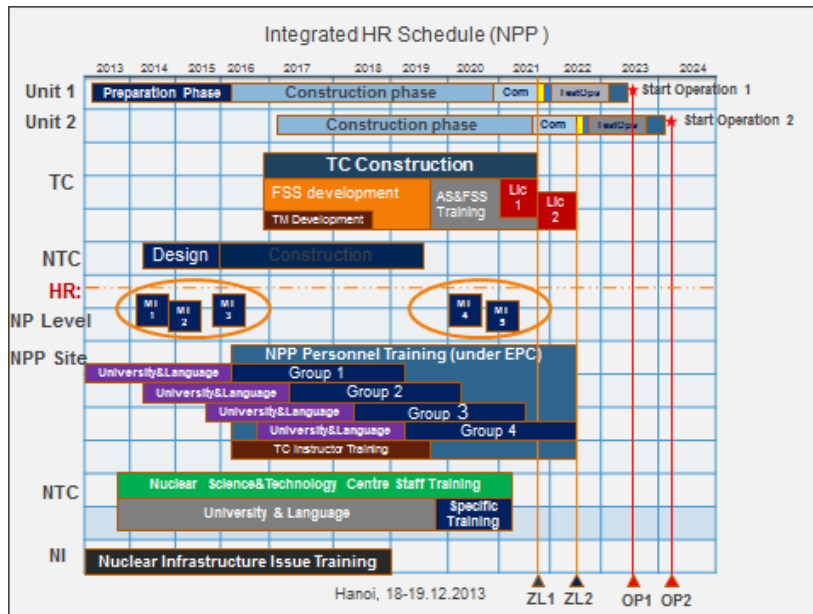
Typical Human Resources Development plan for a partner-country



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

NPP start
Center of nuclear science and technology start

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 recourses (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..



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TECHNICAL SOLUTION FOR HUMAN RESOURCES DEVELOPMENT

IT Solutions for HRD Planning: **OCTOPUS** overview

Integrated HR Schedule



Aim:

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

Goals:

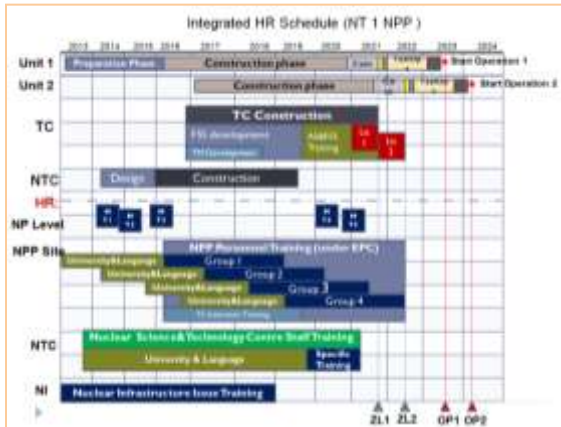
- ✓To define actual needs in HRD for supporting nuclear projects
- ✓To provide planning of HRD activities for all stakeholders
- ✓To ensure monitoring of current status of the HRD activities online, including budgeting
- ✓To evaluate risks of deviations from the HRD schedule
- ✓To support all managerial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



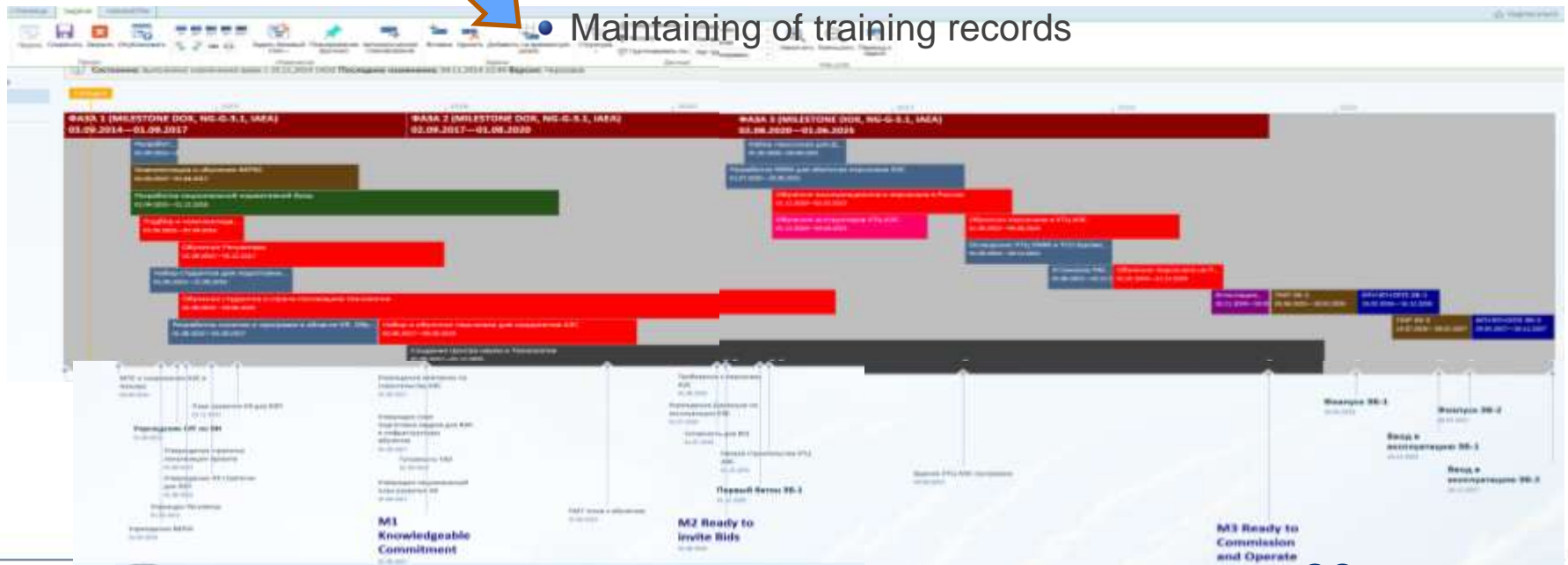
IS Solutions (8D-management)

- Country
- Personnel category
 - Number of staff
 - Training duration
 - Training Program
 - Training Entity
 - Budget source
 - Rosatom' project

IS Octopus: a solution for integrated HR planning for Rosatom projects (2)



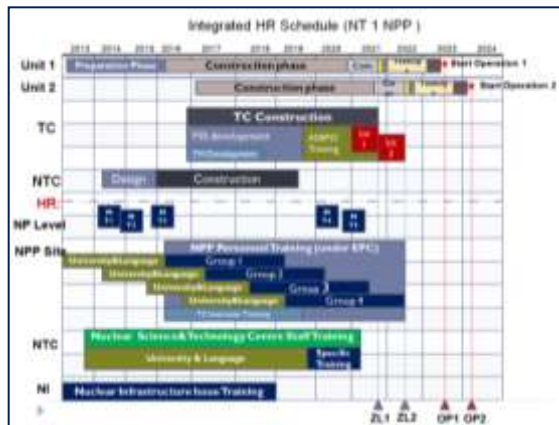
- HR country plan for up to 12 yrs
- Database of all training providers
- Over 260 training programs (higher and professional education)
- Short-term and long-term planning of HRD
- Joint work with foreign partners
- Integrated HR plan for all Rosatom partner countries
- Maintaining of training records



Case: promotion of HRD solution for Republic of Bangladesh with IS Octopus

Russian Federation and the People's Republic of Bangladesh in principle, has agreed to Cooperate in implementing RNPP

A bilateral agreement on the co-operation in the field of peaceful usage of atomic energy was signed on 21 May, 2010 between Bangladesh and the Russian Federation



- 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



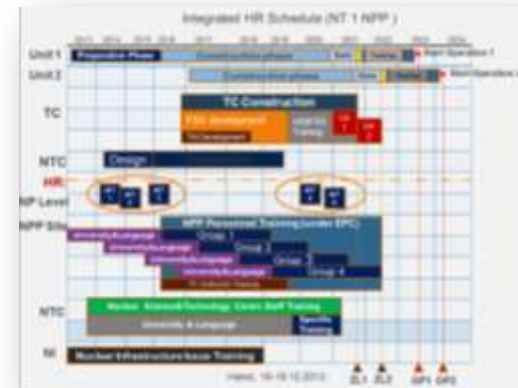
To sum up:

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!
