



National Research Nuclear University “MEPhI” – Russian National Center for Nuclear Education and Training



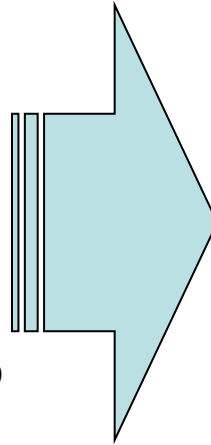
E. Kryuchkov, vice rector



Nuclear Education in Russia

Main challenges:

- human resource development for Russian nuclear renaissance (engineering, technology, research)
- human resource development to support Rosatom international activity
- integration into the world system of nuclear education
- restructuring of higher education system in the Russian Federation: two level study (master and bachelor degrees), new national educational standards for higher education
- negative demographic trends and unpopularity of technical education among young people
- graduates from Moscow Universities stay in Moscow and do not go to regional enterprises



Presidential Decision:

To create National Research Nuclear University MEPhI as a educational and research holding for nuclear industry inside and outside of the Russian Federation

- ◆ 2 National Universities – Moscow State University and S-Petersburg State University.
- ◆ 29 National Research Universities were organized in 2008-2010.
- ◆ 7 Federal Universities were organized in 2006-2010.

MEPhI mission is to provide together with Rosatom the high level human resources for national nuclear industry inside and outside the Russian Federation.

National Research Nuclear University «MEPhI» - territorially dispersed educational and research holding for Russian nuclear industry inside and outside the Russian Federation

MEPhI combines of 11 Higher Education Institutions and 15 colleges:

Over 34 thousand students;
over 1500 professors and associated professors,
60 main directions in Higher Professional Education
45 main directions in Secondary Professional Education

North-Eastern Federal District

Central Federal District

Volga Federal District

Urals Federal District

Southern Federal District

Siberian Federal District

MEPhI priority is staff training and retraining for:

- Nuclear Energy Complex (10 NPP, 25 facilities),
- Nuclear Defense Complex (VNIIEF, VNIITF, more than 20 facilities)
- Nuclear Research Complex (NRC «Kurchatov Institute», 46 Research Institutes)
- Nuclear and Radiation Safety Complex (Production Plant «Mayak», Siberian Chemical Plant, 17 facilities).

Integration of science and education is a must for HR efficient training and retraining

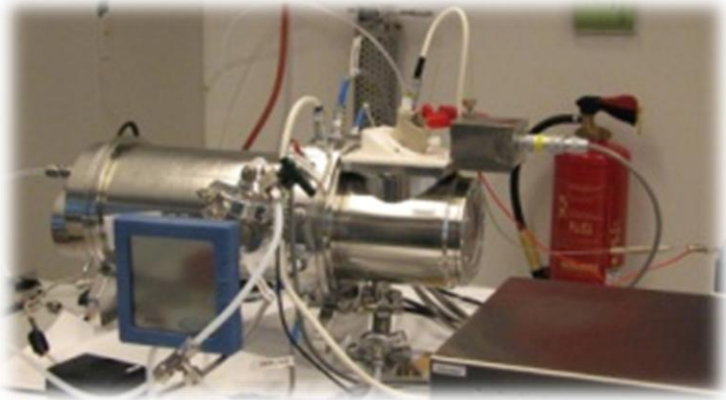


High quality of education

Integration of science and education in higher professional education



Introduction of developments into production process



MEPhI is Russian Nuclear Education Center

(education, postgraduate education, training & retraining)

Educational Programmes (more than 40)

- Nuclear reactors and power installations
- Nuclear power plants
- Radiation safety of human and the environment
- Security and non-proliferation of nuclear materials
- Physical protection, control and accounting of nuclear materials
- Material science and technology of new materials
- Nuclear and particle physics
- Theoretical physics
- Plasma physics
- Physics of kinetic phenomena
- Applied mathematics
- Medical physics
- Electronics and automation in physical facilities
- Device and methods of for quality control and diagnostics
- Ecology and others

Directions of postgraduate education (more than 30)

- Nuclear power installations (design, exploitation and decommission)
- Radiation safety of human and the environment
- Thermal physics
- High energy physics
- Plasma physics
- Laser physics
- Semiconductor physics
- Nuclear and particle physics
- Solid state electronics
- Micro- and nanoelectronics
- Theoretical physics
- Mathematical physics
- Medical physics
- Ecology etc.

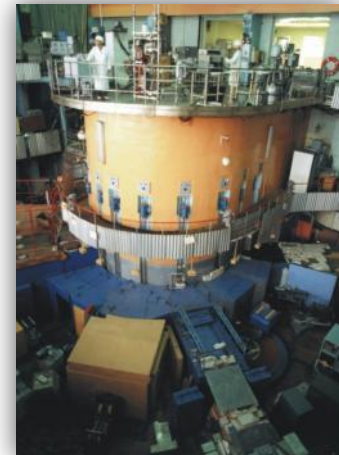
More than training & retraining 200 programs.
Retraining at 25 MEPhI regional branches near enterprises.

Modern MEPhI Research & Educational Centers and Laboratories.

- Nuclear reactor center
- Radiation material science and radiation protection center
- Physical protection, control and accounting of nuclear materials center
- Radiation accelerator center
- Neutrino Lab
- Nuclear electronics center
- Carbon fiber and carbon-composite material center
- Superconductivity center
- Nanosystems, nanomaterials and nanotechnologies center
- Laser technological center etc.



No	Higher educational institution	Number of publications	Number of citation	Average citation	H -index
1	MSU	9525	19578	2,06	37
2	SPtSU	9800	40978	4,18	56
3	NRNU MEPhI	5782	34816	6,02	67



«Nuclear Center» of NRNU MEPhI



Research directions at the IRT MEPhI :

- Neutron studies of matter;
- Nuclear physics;
- Radiation physics;
- Radiation materials science;
- Solid state physics;
- Reactor physics and engineering;
- Applied spectrometry;
- Radiobiology;
- Medical physics

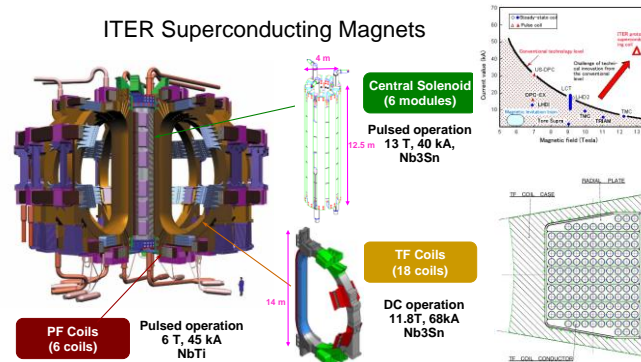
Design of a Clinical Neutron Capture Therapy Channel with Use of Thermal and Epithermal Neutrons



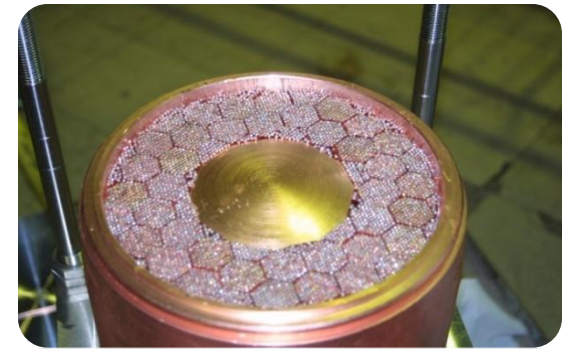
Educational – Research Center «Superconductivity»

Nanostructured

Low temperature superconductors are used in magnetic systems of plasma holding in Tokamak assemblies, acceleration machines, synchrotron radiation sources, magnet systems ITER



Superconductor for magnet system ITER



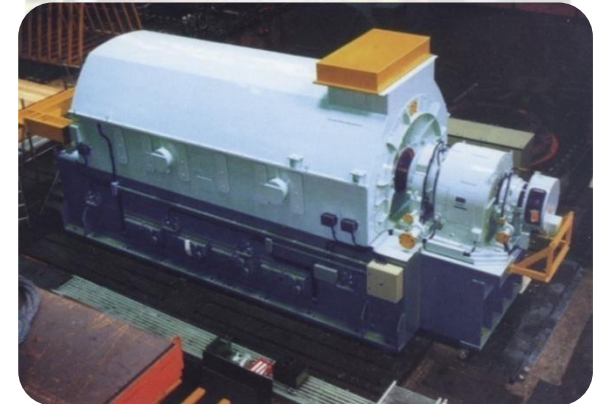
Conventional turbogenerator ▶

Nanstructured hightemperature superconductors of the 1-st generation: used in

hightemperature superconductor current feedthrough, current regulators, power lines, kinetic energy accumulators

Superconductive turbogenerator with capacity 20 MB·A ▶

Volume 2.5 times less



Nanstructured hightemperature superconductors of the 2-nd generation: used in hightemperature superconductor current feedthrough, current regulators, power lines, kinetic energy accumulators, vehicles on magnetic cushion (levitation)



International laboratory of strong magnetic fields and low temperatures, Wroclaw Poland.

▶ Superconductive solenoid 15T

Educational – Research Center «Nanocenter»

Basic scientific research, applied research and developments and specialists training in the sphere of heterostructure nanoelectronics, extremal and power electronics, solid-state super- high frequency electronics and optical electronics in the related sciences and science of materials.

Partners from industry:

- Institute of SHF RAN
- PLC «RIT-systems»
- 3AO «Svetlana»
- Federal Government Unitary Research & Development Production Enterprise «Pulsar»

Embodied technologies:

- Nanolithograph and electronic microscopy
- Scanning probe microscopy,
- nanocharacterization and nanometrology
- Contact photolithograph and laser lithograph
- metalization



Electron-beam lithograph
Raith 150-Two



Kurt Lesker PVD 75 and PVD 250 devices



C3M
Omicron XMS Complex



Photolithograph
installation
Suss MJB4



Laser imagery
generator Heidelberg
DWL66FS

“Skolkovo”

National Research Nuclear University MEPhI is one of the 11 leading higher educational institutions involved in cooperation with the Foundation “Skolkovo”



The expertise of the innovative potential of National Research Nuclear University MEPhI was carried out by the Massachusetts Technological Institute (MIT)



Memorandum of cooperation between the Foundation “Skolkovo” (The Centre of development and commercialization of new technologies) and National Research Nuclear University MEPhI

Objectives of join activities:

1. Development of implementation techniques for innovative projects; setting the pool of technological start-ups;
2. Creation of the infrastructure and the bulk of researchers, future residents of “Skolkovo”;
3. Involvement of talented students, post-graduate students and young scientists in innovative environment of “Skolkovo”

Directions of cooperation:

1. Technological development trends analysis;
2. Sharing of scientific and technological knowledge;
3. Involvement of talented youth in research environment;
4. Development of infrastructure; advanced research;
5. Commercialization of the research results.

Фонд «Сколково»:

Виктор Вексельберг,
Президент, сопредседатель Совета Фонда

Национальный исследовательский ядерный университет «МИФИ»

Михаил Стриханов, ректор

International collaboration

Research:

- Participation at the major international experiments in nuclear physics and high energy physics (STAR, ATLAS, ALICE, PAMELA etc.)
- Participation at the international programs of IAEA, ISTC, CERN, ITER, DESY etc., conferences and workshops
- Hosting of 34 international conferences and workshops (89 foreign delegations from 28 countries visited MEPhI in 2010).
- Face to face research collaboration with the 21 foreign universities and 19 research centers and laboratories.

Nuclear Education and Knowledge Management Activities:

- Participation at the IAEA technical documents development activity (“NKM in research organizations”, “NKM in academic organizations”, “NKM in national programs”, “Methodological background for nuclear nonproliferation and security education”, “Reference curricula in nuclear security”, “Reference curricula in nuclear engineering” and others)
- Participation at the IAEA activity “Nuclear nonproliferation. Responsible science”. (ISTC Grant №-WS01-SB159-10).
- Participation at IAEA Technical Cooperation Programs of nuclear infrastructure development for Armenia and Belorussia.
- Participation at the IAEA NKM Missions.
- Preparation of the international reference multimedia course “Nuclear Reactor Physics” in Russian language.
- Participation at the EU-Russian Project «Cooperation in Nuclear Education, Training and Knowledge Management».
- Fact to face cooperation with the 37 foreign universities (from the USA and Europe in the field of nuclear education – educational program enhancement, students internship etc.)

The first NKM IAEA Mission at the universities visited MEPhI and gave a very high evaluation MEPhI as international center of nuclear education (12 experts from 8 countries).

Nuclear education at the National Research Nuclear University. “Long Live Learning”

Moscow Engineering
Physics Institute

Obninsk Institute for
Nuclear Power Engineering



Center for International
Education and Training
(CIET)

Preparatory Department
(Russian language,
physics, mathematics,
chemistry) – 1 year.

- 4 specialists from Mongolia passed 3 months training.
- 12 students from the USA passed two weeks internship.
- 6 postgraduates students from Europe passed one month internship.
- 8 professors from Belorussia passed one week training.

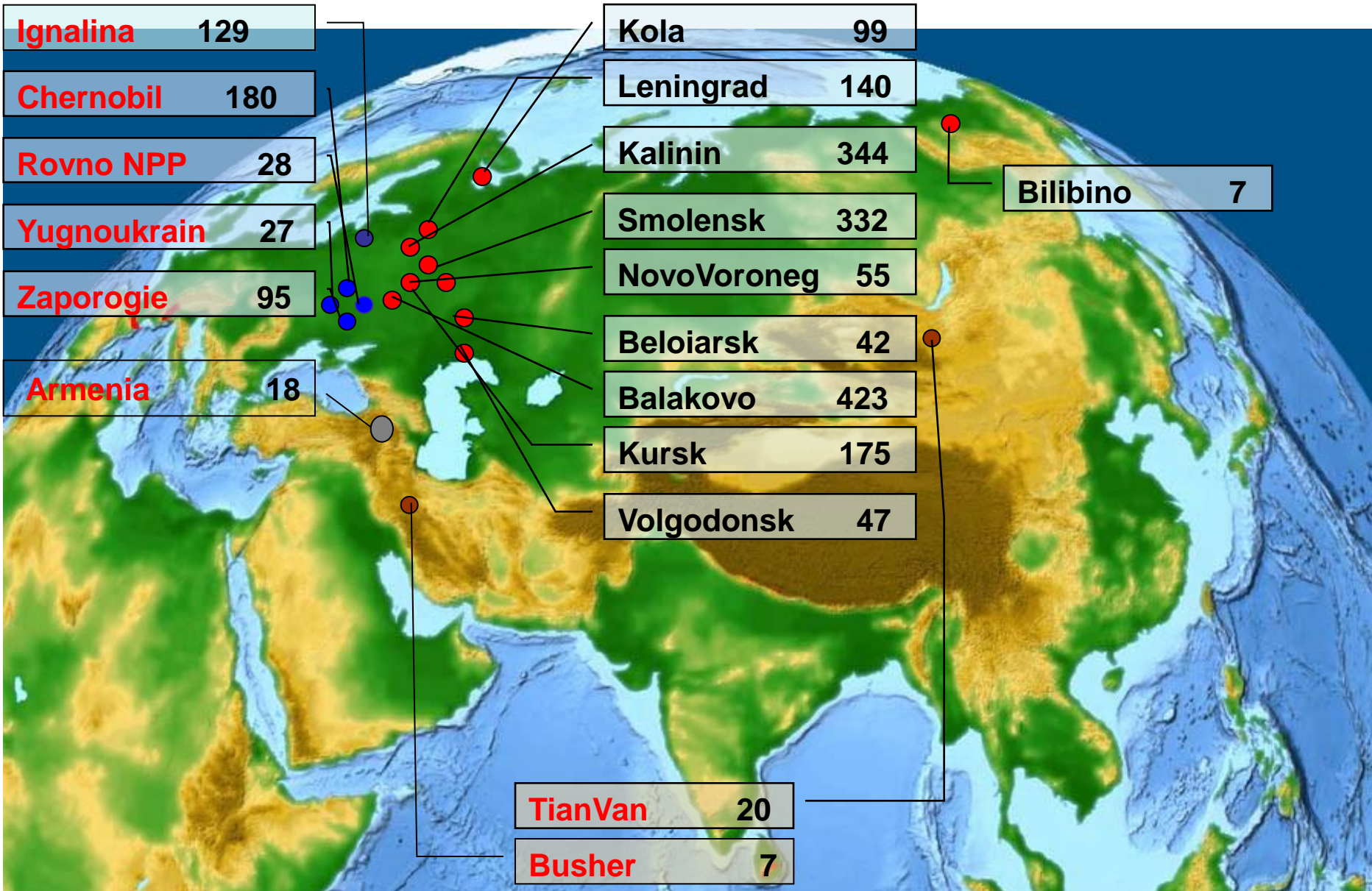
Education:
Bachelor - 4 years
Master – 2 years
Specialist – 5.6 years
Postgraduate – 3(4) years

More than 300 foreign students in 2010
(Vietnam, Jordan, Belorussia, Kazakhstan,
Ukraine, Latvia, Armenia etc.)
Enrolment in 2011:
~80 students from Vietnam,
~50 students from Turkey,
~20 students from Jordan etc.
Enrolment in 2012-2014 : ~ 300 students
per year.

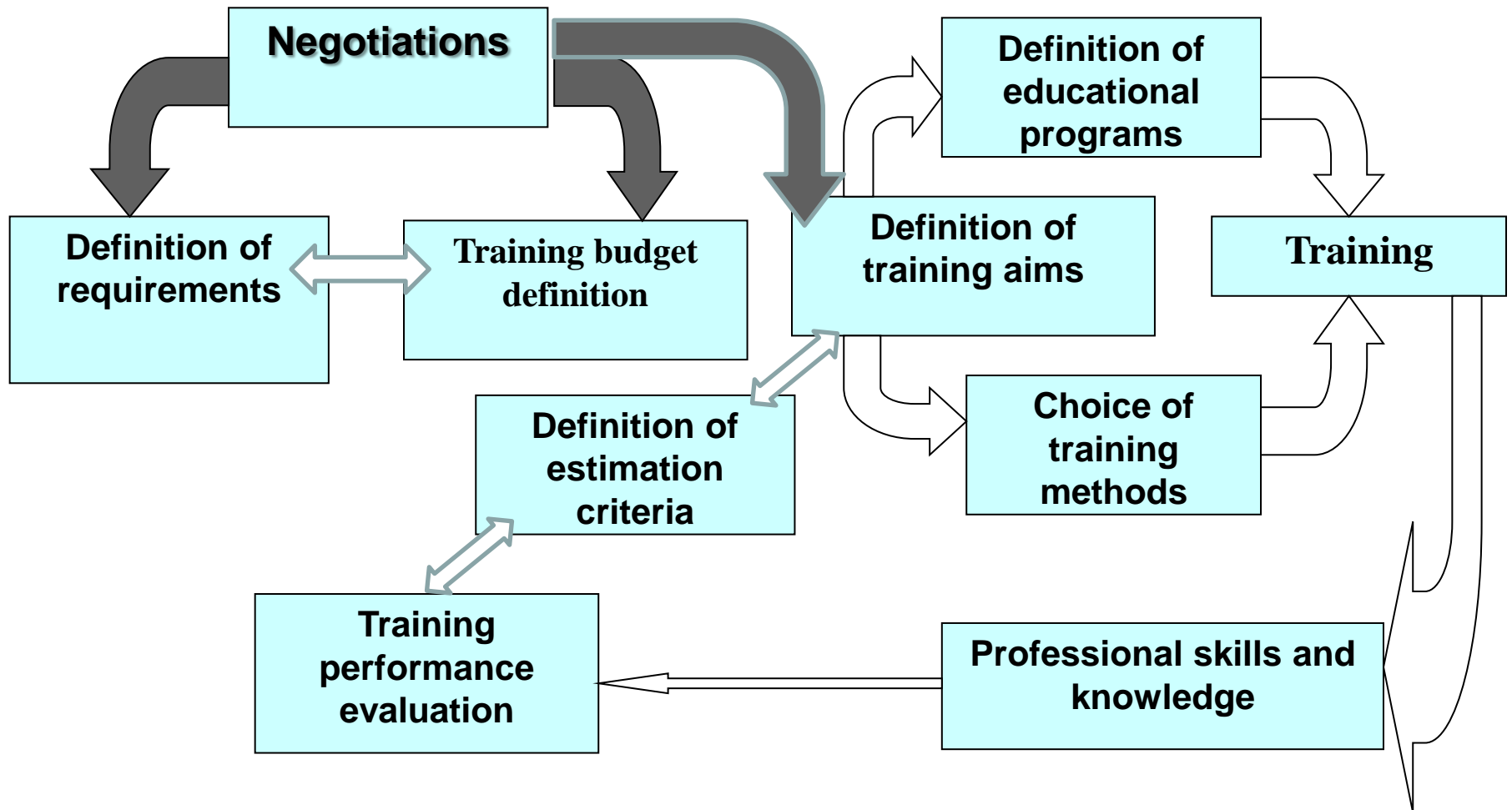
Training:
From 1 week to 6 months

More than 400 specialists graduated from MEPHI work at the foreign NPPs,
and more that 1100 - at the nuclear research centers and authority bodies
in more than 25 countries.

Graduated specialists on Nuclear Power Plants



Management of foreign students training



Thank you!

