The World Nuclear University

INTER-INSTITUTIONAL COOPERATION
FOR THE ENHANCEMENT
OF NUCLEAR COURSEWORK
AND
FOR THE INSPIRATION OF FUTURE
LEADERS IN NUCLEAR TECHNOLOGY

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Chief Coordinator
WNU Working Groups
Comments

WHY the WNU?
What are the needs?

1- Some aspects of nuclear activities are of worldwide nature:
Safety, security, non pacific use of nuclear energy, do actually concern everyone;
and nuclear energy generation is one answer to the huge energy need of the coming
decades, which doesn’t threaten our environment.

2- If perfection is a dream, continuous improvement is a must:
Quality, safety, security, are domains of continuous increasing demand from the
public opinion; sharing the best practices among industry, operators and all
concerned organizations is one way to achieve improvement at the lowest possible
cost.

3- Anyone has to increase one’s awareness of nuclear specificities:
The interaction among all aspects of nuclear activities, public acceptance being
included, requires proper education at every level: students, professionals,
educators, policy and opinion makers…and the public at large.

World Nuclear University
MISSION

To build worldwide knowledge
and strong stewardship
of the peaceful uses of atomic energy,
and thereby to support
global sustainable development
What is the WNU?

Essentially:

A Network of educational & research institutions with strong programmes in nuclear science & engineering either directly or through existing regional networks

A Summer Institute for talented students, and an extended Education Programme for teachers, opinion makers, and industry managers

Value-added from:

WNU Coordinating Centre

Affiliations:

Independent but closely linked to its national, intergovernmental and corporate sponsors
What is the WNU?

A detailed description is given on

www.world-nuclear-university.org

The WNU: a network of networks
Comments

WHY a Network of Networks?

1- “Regional” inter-university cooperation doesn’t require a central coordination. Some needs are local: language issue (translation from and to English), and most of the faculty and facility sharing.

2- Local customers: people, country authorities... need a WNU local antenna. The coordination centre alone would not be heard, nor believed from anywhere. Regional relays have to propagate the information to be shared, and to centralize the local findings, developments, or request to be addressed to the WNU-CC.

3- The WNU-CC staff may remain limited to some persons… provided that the coordination centre only adds value of worldwide importance, and provides the regional networks with the necessary assistance for inter-regional exchanges. It is also the place where specific education programmes, such as the WNU Summer Institute, are designed.

The WNU Working Groups

3 WGs on CORE FUNCTIONS: Knowledge, Education, Professional Credentials

1- Inter-University Collaboration
2- Curriculum
3- Knowledge Management (not limited to education)

5 WGs on KEY NUCLEAR DISCIPLINES: Teaching the Nuclear Profession

4- Global Nuclear Safety Culture
5- Nuclear Reactor and Isotope Technology
6- Nuclear Law
7- Nuclear Safeguards and Security
8- Society and Nuclear Technology

2 WGs on the WNU ANALYSIS: The Future of Nuclear Technology

9- Global Use of Nuclear Power
10- Nuclear Energy and Sustainable Development
The WNU Working Groups

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2 WGs on the WNU ANALYSIS: The Future of Nuclear Technology
- 9-Society and Nuclear Technology
- 10-Global Use of Nuclear Technology and Sustainable Development

How to add value from a Coordination Centre?

The Coordination Centre will be a small team with world-class expertise.

It will introduce a global dimension to nuclear studies by:
- Facilitating development of standard curricula
- Designing courses with strong international content:
  - Highly specialized scientific courses
  - Innovation oriented courses
  - Economy
  - Safety
  - Energy related environmental issues
  - Non-energetic applications
  - International Regimes
The WNU Education Programme and the Summer Institute

The purpose of the annual WNU Summer Institute is to provide a unique educational experience aimed at building future global leadership in the fields of nuclear science and technology.

The WNU-Education Programme will be aimed at 4 Classes of Participants:
1. Leading students (the Fellows)
2. Teachers
3. Policy and opinion makers
4. Industry and Operators Top Managers

The Summer Institute will consist of series of courses and seminars to be held annually in various locations.

The first one – in 2005 – will be a six-week summer school for talented students and young professionals, held in Idaho.

Working Group 1

COOPERATION among Participating Institutions
- Facility Sharing
- Faculty Exchange
- Student Exchange
- Distance Learning

1- EXCHANGE PROGRAMMES
- Experience Feedback from regional programmes
- Cost / Benefit Evaluation of Enlargement
- Criteria & Priorities
- Action Plan (Regional Networks)

2- DISTANCE LEARNING
- Existing material
- Criteria for large scale actions
- List of most urgent needs (IAEA?)
Working Group 2

The WNU CURRICULUM DESIGN
- For Summer Institute (Summer Schools)
- For Incorporation in Member’s Curricula
- For the Design of a WNU-Certified Degree

1- SUMMER INSTITUTE // Summer Schools
- 2005 IDAHO WNU-SI
- Russian Summer Schools
- next 2006 and beyond WNU-SI
- Summer sessions for policy and opinion makers, and for industry managers

2- EXISTING COURSES
- Nuclear law: Link with WG6
- Natural Circulation: Link with IAEA and WG4
- Proliferation Resistance: Link with MIT and WG7
- Etc…

Working Group 3

EXPLICIT AND TACIT KNOWLEDGE PRESERVATION
- Existing experience and skills from seniors
- Develop knowledge basis in all nuclear areas
- Succession Planning Recommendations
- Define strategies for nuclear KM

1- WG3 led by IAEA and WANO
- Explicit the 3 year Action Plan
- Other potential

2- EXPRESSION OF INDUSTRIAL NEEDS
- Operational safety
- Decommissioning
- Other main issues?
Working Group 4

GLOBAL NUCLEAR SAFETY CULTURE
• Heighten the efficiency and strength of the Nuclear Safety Culture
• Technology,
  • Education,
  • Training

CLOSE COOPERATION WITH ENEN
Who already is planning to design a “Safety Education Body” dedicated to senior management

CLOSE COOPERATION WITH IAEA, and with standard development organizations
• Consider the 4 aspects of Safety:
  • Transport
  • Radiation Protection
  • Waste Management
  • Nuclear Installations; Design, Operation, and Dismantling

Working Group 5

NUCLEAR REACTOR, ISOTOPE, AND FUEL CYCLE TECHNOLOGY
• Closely linked to WG1 & 2, this WG is to identify best practices in a supposed “traditional area” of nuclear education,
• Identify potential useful partnerships
• Suggest courses for non traditional audiences: non technical professionals (finance, policy and opinion makers, …)
• Support high level education through research: Docs and Post-Docs through appropriate links with Research Institutes

PARTNERSHIP WITH: Operators (NPPs, Research Reactors, Fuel Cycle Facilities, Isotope Production Facilities,…), Designers and Vendors, Research Institutions, Governemental Bodies,…etc.
• Expression of their needs
• Advanced preparation of future systems: teaching promising technologies

LANGUAGE ISSUE:
• Many stakeholders don’t speak English (and don’t need it)
• Share best practices in several usual languages
Working Group 6

NUCLEAR LAW
• Based on one existing specific course, the WG should promote the worldwide access to such a high level education,

SPREAD THE INFORMATION about the OECD/NEA - Montpellier University Course
• Suggest a even wider access to this;
• Consider translation in other languages?

SHARE TECHNICAL KNOWLEDGE WITH LAW EXPERTS
• Take the opportunity of a non technical WG for elaboration of strategies in teaching technical matters to those nuclear concerned, who are not technical experts

Working Group 7

NUCLEAR SAFEGUARDS AND SECURITY
although Proliferation (Safeguards) and Security are two different issues, they share many common aspects and technologies. A clear distinction has to be done when teaching these matters.
• Through training material, specialized lectures, short-term and full-term courses, provide information for governments and industry in the realm of regimes, and available techniques as well: accounting of nuclear material, detection, measurement, …
• Through the diffusion and publication of such information, contribute to the development of the necessary confidence of the public in a safe nuclear world.

PROLIFERATION RESISTANCE
• Suggest a worldwide diffusion of existing course taught in MIT
• Complete, as much as required, by contribution from various countries

TERRORISM and SECURITY
• Teach Forensics Science, and appropriate techniques and methodologies
• Foster education of evaluation methodologies (criteria definition and use), applied to terrorist risk evaluation
Working Group 8

SOCIETIES AND NUCLEAR TECHNOLOGIES
• There is a need for a better knowledge and better understanding of “how public attitude have been shaped in various regions”, and “what lessons have to be learned from this”
• The WG has to recommend which courses in sociology, psychology, and other disciplines should be incorporated into a “nuclear education”

IDENTIFICATION OF PRIORITIES
• Safety as it is perceived by the public
• Mental representation of waste
• Perception of energy needs
• Security related to nuclear energy
• Proliferation concerns in the various societies of the world

DEVELOPMENT OF EDUCATIVE MATERIAL AND COURSES
• For nuclear students
• For Teachers (at all school levels)
• For Policy and Opinion Makers
• For Managers

Working Group 9

GLOBAL USE OF NUCLEAR POWER
• To provide a context for future nuclear education, this WG will marshal a team of experts, who will assess future prospects of Nuclear Power uses: electricity generation, hydrogen production, desalination,…
• Recent studies conducted by MIT and Harvard, and by the UK’s Royal Institute of International Affairs, will serve as basis. Others should be identified.

BUILT A TEAM OF ENERGY AND NUCLEAR POWER EXPERTS
• From most of world countries,
• Cooperating closely with WNA Working Group on Industry Economics
• Closely linked to the other WNU WGs

IDENTIFY THE KEY PARAMETERS WHICH COULD PREVENT NUCLEAR ENERGY FROM ITS NECESSARY DEVELOPMENT
• Technological difficulties,
• Socio-political blockages,
• Nuclear Professionals shortfall…

ACT AS A THINK TANK and COMMUNICATE
Working Group 10

NUCLEAR ENERGY AND SUSTAINABLE DEVELOPMENT
• Recognising that carbon-emitting energy sources must rapidly give way to clean, low-emission energy sources,
• And that nuclear has a significant share to take in future energy generation,
• This WG will seek to design a feasible long-term global emission-reduction regime

EVALUATE AND SUGGEST
• Political and Economical Incentives for participation by every country, either developed or under development, to such a regime;
• Economical Solutions for the Financing of this;
• Review periodically the relevance of the "low-emission" target

ACT AS A THINK TANK and COMMUNICATE

The 2005 Summer Institute (1)

GLOBAL SETTINGS
• Global environmental Crisis
• World Energy Demand and Supply
• Nuclear Technology in Sustainable Development
• Survey of Nuclear Policies

INTERNATIONAL REGIMES
• International Safety Standards and Global Safety Culture
• Radiological Protection
• Nuclear Waste Management
• Nuclear Waste Management and Decommissioning
• Nuclear Law
• Transport of Nuclear materials
• Global Regimes for Emission Control
• Non-Proliferation and Security
The 2005 Summer Institute (2)

NUCLEAR INDUSTRY OPERATIONS
- Nuclear Fuel Market
- Comparative Risk Assessment
- Industry Economics
- Excellence in Management and Operation
- Knowledge Management
- Public Understanding and Acceptance, …and Social Ethics

TECHNOLOGY INNOVATION
- Next Generation Nuclear Reactors
- Advanced Nuclear Fuel Cycle
- Hydrogen Economy
- Global Water Crisis and Desalination
- Controlled Fusion

The 2005 Summer Institute (3)

PROGRAMME (cont’d)
Most presentations will be in the mornings –
allowing for a variety of other activities in the afternoons.

On-Site Work:
- Self-directed study groups
- Discussions of case studies
- Question and answer sessions
- Individual and group work on culminating projects to be presented to the entire Institute during the final week of the programme

Lectures on Nuclear Leadership:
- Weekly late afternoon presentations will feature internationally known figures who have made significant contributions to the development, politics and peaceful uses of nuclear science and technology.

Field Trips:
- A field trip to Yucca Mountain Geological Waste Repository with overnight stays in Las Vegas, Nevada
- Visits to several laboratories of the Idaho National Laboratory

Social and Recreational Activities
The 2005 Summer Institute (4)

STATISTICS:
• 133 final applicants
  from 46 countries and 103 organizations
• Out of them 95% are good candidates;
• 30% are female

SELECTION:
• Finalized: invitation of 74 Fellows from 34 Countries
• Criteria for selection:
  Excellence in education or profession, English,
  Expression of motivation, and support letters,
  Balance among the countries of origin, Financing

Further Summer Institutes

A SUMMER INSTITUTE will be held every year
• Western Europe, Russia, USA…
  are already candidates for hosting them.
• South Korea might well be candidate.
• 2005 SI experience feedback will be thoroughly used.

FUTURE APPLICANTS have to be aware of requirements
• WNU-SI Fellows have to be proficient in English,
• They also have to master nuclear fundamentals,
• Academic or professional excellence shall be demonstrated,
• Desire for leadership is a must
Future Developments

WNU Coordination Centre
• As of January 2005, 3 persons: 2 from US, 1 from France and a part-time Swedish contribution
• One Chinese is expected to join the team quite soon
• Another (or others) Asian participation(s) highly desired

Working Groups
• Inter-university cooperation aiming at “curriculum harmonization”
• Listing and sharing criteria for the definition of a “WNU label”
Which requires
  • to assume translation from and to English,
  • to set up the compendium of existing courses,
  • to address local and global needs