



# University Outreach and the Next Generation Safeguards Initiative

Edward Wonder  
Office of International Regimes and Agreements/QNA  
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# Outline

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- Human Resources Development Challenge and NNGSI
- Why University Outreach
- What NNGSI Is Doing Now
- Potential Future University Outreach Actions
- Need for University Engagement in the NNGSI University Outreach Effort





# Human Resources Challenge is Widely Recognized

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- “[T]he recruitment of staff members, particularly in the scientific and technical areas, is becoming increasingly difficult. The aging workforce in the nuclear field and pending retirements of current Secretariat staff will exacerbate the situation. It is only through the active participation of Member States in identifying suitable well qualified candidates and the concerted efforts of the Secretariat that it can be assured that the Agency is adequately and appropriately staffed with individuals of the highest competence, managerial capability and integrity.”  
Report by the Director General to the 49<sup>th</sup> IAEA GC, August 19, 2005
- “We must ensure that the IAEA has all of the tools that it needs to fulfill its essential mandate”  
President George W. Bush, February 11, 2004
- Through the NGSF program, “we seek to ensure that modern technology, the best scientific expertise, and adequate resources are available to keep pace with expanding IAEA responsibilities.”  
DOE Secretary Bodman, September 17, 2007, IAEA General Conference



# Core Issues in United States

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- The U.S. safeguards human capital & technology base – the technologies and community of experts available to support international safeguards – has eroded due to:
  - The long hiatus in the growth of the civil nuclear industry
  - Shifting national security priorities since the end of the Cold War
  - Resources redirected to Homeland Security and other non-safeguards missions as a result of the 9/11 Attacks
- The rapid decline in safeguards expertise in the U.S. national laboratories threatens the viability of not only the U.S. resource base, but our support to the international safeguards system



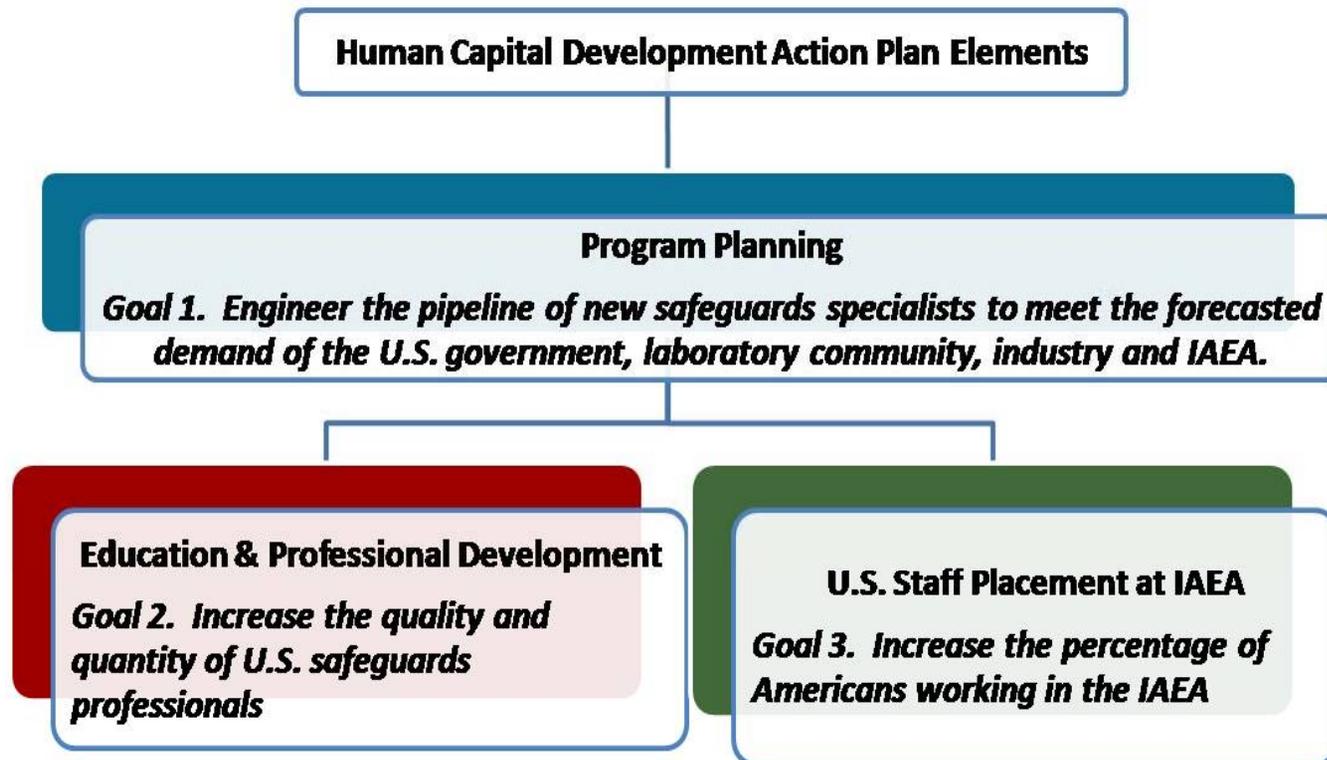
# Challenges for United States

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- An increasing supply of well-trained and highly-skilled safeguards specialists will be required to deal with the challenges of the anticipated nuclear renaissance.
- Currently, the next generation of safeguards experts and specialists is not available to replace the aging and retiring workforce.
- Despite increased attention from academe
  - Graduate programs in nuclear engineering are concentrated in a very limited number of schools
  - Few of these programs provide technical training or even exposure to nuclear safeguards technology and nonproliferation policy issues
- There will be intense competition for the very limited supply of nuclear technology trained graduates over the next decade
  - The International Safeguards Community will be challenged to match the salaries offered by industry



# Human Resources Development and NGSI





# Next Generation Safeguards Specialist

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- The fundamental role and function of safeguards are evolving
  - Historically a primary emphasis on material accountancy of declared materials
  - The future is information driven safeguards with an increased emphasis on conducting state-level evaluations in order to detect undeclared activities
- New emphasis on state-level, information-driven safeguards is changing human resource requirements at the IAEA
  - The IAEA 20/20 Vision Background Report projected that by 2030, *the IAEA may need to increase its HQ desk “evaluation activities by up to 50%.”*
- The new international safeguards professionals require training across a much broader range of safeguards-relevant disciplines
  - Open source information management and analysis
  - Additional Protocol goals, approaches and conclusions – nuclear commerce, fuel cycle planning, manufacturing capabilities
  - Commercial satellite imagery management and analysis
  - Environmental sampling



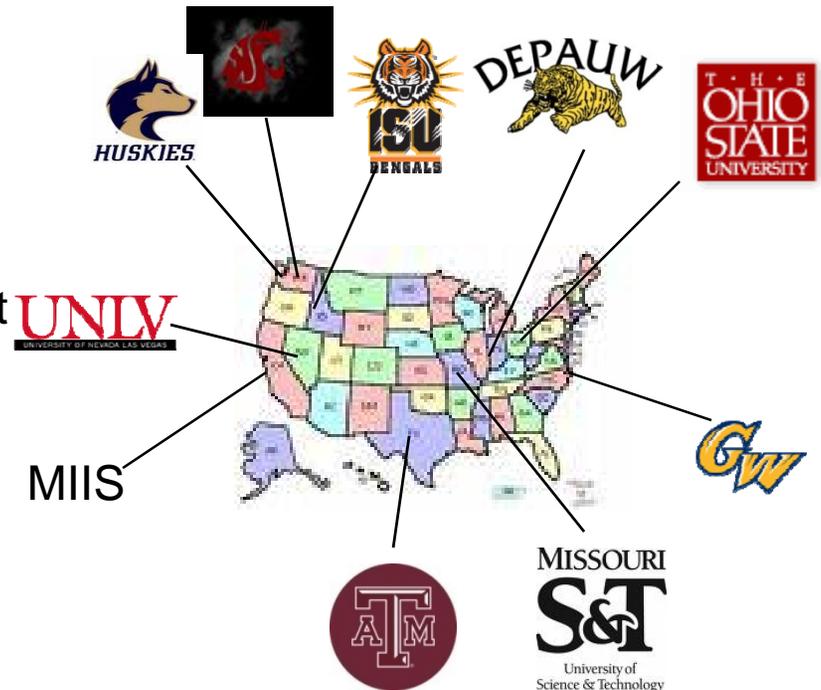
# Why University Outreach?

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- Revitalized university nuclear engineering programs
  - Escalating demand for nuclear engineering grads
  - NRC awarded nearly \$20 million in August 08 for scholarships, faculty grants, curriculum/program development for university nuclear engineering programs
- Upper-level undergraduate and grad students are making career decisions
- NNGSI interest in incorporating international safeguards in nuclear engineering curriculum and finding ways to incorporate information analysis to meet evolving verification challenges
- Need to establish pathway for top performers who want to work in international safeguards in the national labs, USG agencies, IAEA
- Initial steps already taken by NNSA

# Summer Interns

- The ~fifty student interns represent universities from across the United States, just a few shown here
- They come from diverse backgrounds and areas of study
- The interns included undergraduate, post bachelors, graduate, post masters, and doctoral students.
- Their areas of study encompass:
  - Chemistry and Radiochemistry
  - Nuclear Science & Engineering
  - Mechanical Engineering
  - Computer Science
  - Health Physics & Nuclear Physics
  - International Studies
  - Public Policy and Political Science





# University Outreach and Pilot Programs

- University engagement is crucial to developing sustainable safeguards expertise
- Safeguards lectures were given by lab experts at several universities (MIT, Princeton, Oregon State, Washington State, others)
- Two university pilot programs were initiated in 2008 – one technically focused, one policy focused
  - Involved 44 students, LANL, LLNL, Texas A&M University, and Monterey Institute for International Studies
- The Safeguards and Nuclear Material Management pilot program
  - Based in Texas A&M's Nuclear Engineering Department
- The International Nuclear Safeguards Policy and Information Analysis pilot program
  - Based in Monterey Institute for International Studies



Students and experts discuss safeguards issues during the course at Monterey Institute



## FY09 Commitments

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- Year Two of the LANL/TAMU and LLNL/MIIS “pilots”
- Initial BNL safeguards course, summer 2008
- Expanded NA support for summer interns—75 internships at BNL, INL, SNL/SRNL, LLNL, LANL, PNNL, ORNL
- 4-5 new Post Docs at labs (pathway into safeguards career in labs)
- Support for lab lecturers in existing university courses



# Potential Future Steps

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- NNSA is in the advanced stages of developing a detailed multi-year, program plan for HR development, including university outreach. Elements of the plan will include:
  - Precise needs and structure for more robust mechanisms to support student engagement in safeguards research and studies (e.g., enhanced internship programs)
  - Faculty research and collaboration options with labs
  - Curriculum development needs and implementation strategy
- A survey of existing, planned university safeguards and nonproliferation programs is planned to obtain “ground truth” on what exists and how it is working
- Build on previous personnel needs assessment, mapping of current lab-university collaborative networks
- Program has to be well-targeted, multi-year, sustainable, measurable, well-coordinated with other NA and DOE university outreach programs, and have stakeholder buy-in.



# Future Outlook

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- The NNGSI University Outreach effort depends on partnerships – scientific and engineering community, policy and national security staff at laboratories, universities, professional associations, and industry
- We benefit from cooperation and coordination with the universities, the labs, the international community, and IAEA to share materials, resources, and best practices
- Possible topics for reflection during the rest of the morning:
  - What are good models for university programs that could incorporate safeguards education—organization, courses, curriculum modules, etc.?
  - What does university experience in other areas tell us about the most effective and cost-efficient ways to leverage resources in support of strengthening safeguards education?
  - What are the critical elements of a career path(s) that would be attractive to students?
  - Future NA-lab-University engagement approaches?