

Working Outside of the Box: Understanding Ourselves as Instruments of Change

A summary of the inaugural 2009 Young Professionals Congress embedded topical



2009 Young Professionals Congress

Working Outside of the Box
Understanding Ourselves As Instruments of Change

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Sponsored by the American Nuclear Society and
the North American Young Generation in Nuclear

On behalf of North American Young Generation in Nuclear and the Young Members Group of American Nuclear Society, we kindly thank all of the dedicated volunteers and organizations that helped make this event successful!

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Introduction

At the 2009 American Nuclear Society Winter Meeting, the North American Young Generation in Nuclear (NA-YGN), in cooperation with the Young Members Group of the American Nuclear Society (ANS), organized the Young Professionals Congress 2009 which was series of sessions to discuss the challenges facing the next generation of nuclear professionals. Within this venue, young professionals had the opportunity to develop non-technical professional skills, network among their peers and explore the roles and functions of industry organizations, such as ANS and NA-YGN.

One of the goals of the sessions was to identify the challenges that young professionals in the nuclear science and technology industries feel that they must address and discuss specific actions to begin to address these challenges. It was also designed to encourage creativity and “out of the box” thinking to overcome such challenges. Innovative practices during this topical included performance by Playing by Air during the Opening Plenary, inspirational videos and the usage of Twitter. Tweets by conference attendees were used to help communicate speakers’ nuggets of wisdom, session updates and even reminders to participants.

This report provides a summary of the conference proceedings including proposed actions to be taken by young professionals, their employers and the technical professional societies to which they belong in order to enable young professionals to be more effective in their interactions with their employers, their co-workers and their communities.

Young Professionals Congress 2009 Opening Plenary

Introductory speech - Amy Buu, General Co-Chair

- Service is about results, no matter what.
- We need to have a passion to provide safe, clean, reliable technology
 - Choose to make an impact
 - Connect with each other
 - Make every moment count
 - Service is about results, no matter what. Remember that what we do affects our families and communities
 - Learn, teach, inspire... smile more!
 - [Smile and Move Video](#)
- The small things we do will make a difference
- Together...we can drive change!

Presentation - Jacques Besnainou, President and CEO of Areva NC, Inc:

Nuclear energy will play a key role in the energy revolution

- WE play a key role in the next 30 years
- Areva has two assets: the customer and the employees (~75K worldwide, ~7,500 in US)

Reasons why nuclear energy has a future:

- Well proven past and a dynamic, promising future
- New world facing crises: climate, financial, power, and economic. The challenges are met by energy choices – for independence and security.
 - France chose nuclear energy because of their desire to be independent
- Nuclear energy is local and provides jobs to the country
 - Contrast this to clothes shopping – there are almost no clothes made in the US!
- Projected world population growth up to 9 billion implies more energy need worldwide and especially an increased need for emerging countries.
- Nuclear energy is not the enemy, CARBON IS.
- There is no silver bullet to solve world energy needs and challenges (this point was reiterated multiple times throughout the conference).
- Renewable and energy and nuclear energy are complimentary and we do need this energy mix.
- There is no solution without nuclear energy!
- “Whoever says there is [a solution without nuclear energy] is a liar!”
 - Not expensive!
 - A nuclear energy future means plenty of JOB OPPORTUNITIES:
 - New plant builds, new enrichment plants
 - Areva has been hiring...approximately 12000 worldwide last year, with 700 in North America

What is our path forward?

- Current administration is for it because of focus on renewables and energy efficiency
- Renewables are not a stand-alone choice for energy, they need to be backed up by other sources
- We need both nuclear and renewable energy
- Use the facts when promoting nuclear energy because “THE FACTS ARE ON OUR SIDE!”

Matthew Bennett – Vice President of Public Affairs for Third Way:

The political aftermath of Chernobyl disaster

- Mr. Bennett traveled with then Vice President Al Gore to Chernobyl. What the former Vice President saw shaped his view of nuclear power
- Al Gore is the remaining challenge to convert to pro-nuclear power

Why politics is so critical to moving the nuclear renaissance forward:

- Our charge is to make clear to congress that nuclear power is all that it can be
- Acceptance of nuclear power is not enough, it has to be embraced
- House speaker Nancy Pelosi is softening her position on nuclear power, as are Boxer, Waxman, Webb, and Alexander.

What can we do to move this along?

- It’s slowed down due to worries about either safety or cost

- We should get government subsidies (loan guarantees)
- Our congressmen and women will believe us when we talk
- The saying “all politics is local” is true when dealing with nuclear energy
- Keep your speech simple so that the lay person can understand; use anecdotes when possible
- Current energy secretary Steven Chu is a Nobel prize-winning nuclear scientist

What advocacy is most effective back home?

- Email or mail your representatives...email is best
- Engage your colleagues to talk to their representatives

Tips for advocating nuclear energy on Capitol Hill:

- 3 best talking points: jobs, jobs, and more jobs
 - A picture of people working on building a reactor can be very effective since there may be hundreds of people in such a picture
- Guys like Al Gore are “tough to crack” because he’s established himself as a technophile
- CAUTION: do not suggest that Chernobyl was not serious. However, need to explain how it cannot happen here in the US
- Don’t combine the topics of nuclear energy and healthcare unless discussing nuclear medicine

Eugene Shwageraus – Technical Program Chair for IYNC 2010 and Associate Professor at MIT

Reasons for going international with the young professionals in the nuclear industry:

- Global nature of industry
 - R&D, HR services, manufacturing, and products
- Global environment and safety
 - Climate change
- Global security

About the IYNC:

- A global network of young professionals
- Established in 1998
- Formally defined by-laws
- Non-profit organization
- Sustainable budget
- A series of highly successful congresses were held
- High level of industry & governmental support

IYNC Goal:

Transfer knowledge from the current generation of leading scientists and engineers to the next generation.

How to get involved:

- Grant program
- National network start-up
- National projects
- International projects
- Website: www.iync.org
- Biennial congress
 - Help organize
 - Present your work
 - Meet people

IYNC abstracts and papers:

- Drafts need to be submitted by January 25, 2010
- Final papers due on May 3, 2010
- Early registration date – June 6, 2010
- Send email to hans.korteweg@iync.org for sponsorship information

Industry Involvement Panel from www.walkthetalk.com

This session provided young professionals with the information needed to get involved in the industry beyond their day-to-day work responsibilities. Panelists gave an overview of some nuclear-related technical societies and groups, outline steps on how to get involved in these organizations, and highlight the benefits of participation. Panelists represented leadership from several industry groups as well as some of the industry's most vocal supporters for young professional involvement in these groups. Presentations were followed by an open question-and-answer period.

- [Teamwork Inspired by the Blue Angels](#)
 - Shared values
 - Put team first, a 24/7 commitment
 - What is the team's level of trust?
 - Communicate openly and honestly
 - Capitalize on synergy
 - Know procedures and follow a dedicated script
 - Confront failures to reach perfection

Nils Diaz - Managing Director of NDZ Group

The big ten roadblocks to nuclear energy renaissance, or is it just one?

- 1) Safety – done by the industry, not regulators
 - a. Most significant recent accomplishment is leak before break
 - b. We're doing great in this area
 - c. Not a roadblock
- 2) Environment...and global warming
 - a. We're doing very good here and improving daily
 - b. Not a roadblock

- 3) Security – to retain our quality of life
 - a. Not a roadblock
- 4) Lifecycle economics
 - a. Not a roadblock
- 5) Regulatory framework
 - a. We are “more concerned about state level than federal”
 - b. Not a roadblock
- 6) Socio-political climate – “relatively balanced”
 - a. Not a roadblock
- 7) Public confidence
 - a. Very good
 - b. Not a roadblock
- 8) Used fuel disposition
 - a. Roadblock in minds of a few people
 - b. The “vampire gorilla” in the room (by media influence)
 - c. Not really a roadblock
- 9) Non-proliferation – global issue
 - a. More nuclear plants implies less proliferation
 - b. Not a roadblock
- 10) Plant cost and financing
 - a. This is the one potential roadblock
 - b. Absolute and relative cost of single or dual nuclear power station
 - c. Infrastructure and management of plant construction
 - d. Financing of plant construction
 - e. Financial incentive, or lack thereof
 - f. Cost of interest
 - g. Price escalation during construction
 - h. HOWEVER...this can all be managed

Marvin Fertel – President and CEO of NEI

Opportunities for Nuclear Professionals

- Need to have broader perspective on energy need
 - 25% of the world (1.6 billion people) has no electricity!
 - Current world population is 6.4 billion; estimated to be 9.2 billion in 2050
 - 1/2 world population lives in urban centers
 - By 2050, this will increase to almost 70%!
 - Therefore, more mass transit, more electricity is needed
- Nuclear is part of a diversified energy portfolio
 - Nuclear energy will be a major part for some countries
- 100 million lab tests have been performed with nuclear materials
- About 80% of drugs available have been nuclear treated
- Water is a critical need!
 - Desalination may be most important for nuclear
 - Nuclear technology can be used to reduce process heat
- Irradiation of food can be used for survival

- Nuclear technology is used to fill beer cans!
- Nuclear technology is used for sterilization

Spreading the word about nuclear technologies and power

- The lack of nuclear knowledge [in congress] is frightening!
- We can have a bigger impact on politicians when we talk at home
 - They are interested in voters coming in and talking about issues
- We need to get involved in schools
- If you are working in a nuclear plant, “you have a job for life”
 - Do not send emails or twitter because “that’s anti-social communication” (*note that this comment drew some smiles from other panel members who may not necessarily agree with this opinion*)
 - Talking face to face will help your voice be heard
 - However, emails and twitter are good for quick information release

The easier problems were solved earlier on, but the harder problem remains – nuclear waste.

Mike Kurzeja – President of NA-YGN

- Take opportunities to learn from the more experienced people
- NA-YGN is an opportunity to try something different from everyday life
 - Mike shared that he is not a natural public speaker, but his experiences as NA-YGN VP and now as President have greatly benefited him in this area
 - “The process of putting this [conference] together is project management”
- ANS is for technical professional development, NA-YGN is for non-technical professional development
- NA-YGN should lead public awareness of the nuclear industry
 - There is too much fear and misinformation out there
 - Explain in a basic level of understanding, e.g. the smokestack is a “giant cloud maker”
 - Changing one person will change another like a chain reaction
 - Obama’s staff listens to young people
- Knowledge transfer
 - We need to stem the tide of knowledge loss
 - We have to drive knowledge transfer so that it works for us!
- Benefits of NA-YGN involvement
 - Gain life-long friends
 - Gain a different skill set from your usual job
 - Connect to others in industry and establish a broad network

Tom Sanders – ANS President

- ANS, the American Nuclear Society
 - 10000 dues paying members, another 10000 that don’t pay dues
 - Comprised of people from utilities, researchers, universities, and medicine industries
 - Approach it like it’s fun. ANS doesn’t have lawyers, bankers, etc...
 - NA-YGN gives an opportunity to talk with those from other industries

- Relevant to all aspects of the nuclear field
 - Industry
 - Government, national labs
 - Universities
 - Utilities
- Divisions of ANS encompass every area of the industry
- Areas where you can be involved in the nuclear industry
 - Public policy, by being a congressional fellow
 - Outreach and workforce development
 - Development and maintenance of standards
 - Go to local rotary clubs and explain what nuclear is
 - Explain what you are passionate about!
 - Attend local ANS section meetings and get involved
- The world is changing:
 - Interest in nuclear power and technology is surging!
 - Attitudes are changing:
 - Evidenced by cap and trade legislation
 - Considering moving to smaller reactors to cut cost
 - Smaller, more affordable plants are being promoted
 - Molybdenum-99 production is low worldwide and is becoming a growing need
 - Moratorium lifts on nuclear power in Germany, Italy, and Belgium
 - The older, more experienced generation of nuclear employees is preparing to retire. “This renaissance belongs to the next generation!”

Questions and Answers

Concerning regulations on the nuclear industry

- Nils Diaz
 - The regulatory framework does make things more difficult
 - For the manufacturers, designers, etc., using the term ‘nuclear’ implies better, stronger, more redundant
 - The cost can be lowered, but the law needs to be used in favor of us

How can we better communicate the truth of the fuel issue with nuclear advocates?

- Nils Diaz
 - The fuel is safe and the transport is managed and safe
 - The problem is local
 - The idea that ‘a nuclear accident somewhere is a nuclear accident everywhere’ is a bad misconception!
 - The radiological impact is completely manageable
 - The “storage of fuel is not threatened by terrorists”
 - We need to find out what is behind the question in the general public’s mind!
 - The grassroots effort has to be grounded in the ‘know-how’
- Marvin Fertel
 - The NA-YGN needs activities going around global summits
- Tom Sanders

- Mentioned that he is going to get an invite from the Russian Nuclear Society for a summit
- He had mentioned earlier that he has been to a parliamentary debate over nuclear energy
- Nils Diaz
 - Mentioned that he has heard a big misstatement in an important meeting before – a nuclear proliferation expert said that nuclear energy will proliferate nuclear weapons.
 - We need to stand up against false statements such as this!

Concerning costs

- Mike Kurzeja
 - We are going to make the difference...to cut costs
 - Example: young construction industry professionals coming up with innovative ways to cut construction costs

Concerning fuel reprocessing in the US

- Tom Sanders
 - Nuclear non-proliferation has cut us [US] out of the fuel cycle
 - To get this going, it is a matter of having a good sales pitch
- Nils Diaz
 - It is a technology and management challenge to process fuel meeting
 - The requirements of the law
 - We need to make fuel reprocessing proliferation resistant. This could happen in a 25-year timeframe, as far as getting something built
- Marvin Fertel
 - Energy secretary Steven Chu discussed fuel reprocessing in his portion of the ANS' opening plenary session
 - We must deal with the waste from nuclear energy
 - We are likely to see a recycling proposal come from this current administration
 - In hindsight, we should have always promoted using interim storage as part of a strategic plan for waste management
- Nils Diaz
 - There are two organizations that we have neglected – the French Nuclear Agency and the IAEA. The aggressive talent needed from those agencies is not there for us.

Concerning challenges in professional development

- Mike Kurzeja
 - The serious challenge for him in NA-YGN was speaking in public. This was overcome by seeking counsel.
 - There are always people out there who have done it before and would be willing to help you out.
 - Bottom line: Do you walk the talk?

Pro-Nuclear Advocacy

“How to Sell Nuclear, One Drink at a Time”

Darby Kimball – Bechtel National

- Do not use the term ‘educate’ for telling people the facts about nuclear: saying that we’re ‘educating people’ is demeaning
- We need to learn from the past
- We need to go for ‘the idea that won’t die’
 - Referenced the book “Made to Stick” by Chip Heath and Dan Heath
- Cocktail napkin facts:
 - Make them short in length
 - Suitable for sharing at a party
 - Make the content memorable
 - Think about how you share sports/ sports stats, movies, news, and other things that stick
 - The goal is to share something repeatable so people will want and be able to share it with others
- Current trends in marketing circles – they have taken advertising models and had them share
 - Specific information about products in casual conversations with people at bars, parties, and around the city in order to get people to believe it and spread the word
- SUCCESS in advocacy:
 - Simple
 - One idea, stated concisely
 - Look for the core of the message
 - Saying three things is the same as saying nothing
 - Example – what is a pomelo? One could explicitly describe the fruit (multiple sentences) or could just say that it is a big grapefruit (2 words)
 - Accuracy will need to be traded for accessibility
 - This is difficult for engineers to do, but absolutely necessary
 - Why? Because “if it’s not remembered, it doesn’t matter how accurate you were!”
 - Example when talking about spent fuel: you could say that 95% of the
 - Energy is left, and it’s recyclable
 - Unexpected
 - Try to break a known pattern
 - Set your audience up to guess wrong about what the outcome will be
 - Try creating a mystery
 - Could tell a narrative story to get audience engaged
 - When telling story, start with a knowledge gap, but not an abyss
 - We need uncommon sense; common sense will just go in one ear and out the other

- Examples of unexpected statements: Would you rather live next to a coal or nuclear power plant? Coal will give you 100 times more radiation! Also, nuclear power is safer than sex! By far!
- Concrete
 - Relate numbers to well understood quantities, things that people use or see often and can easily imagine in their minds
 - Velcro theory of memory: when a new piece of information is obtained, the mind
 - Try to relate it to other things that are already known
 - A good example of this is, again, the pomelo. It is easier to imagine and remember what a pomelo is when you are told that it is a large grapefruit
 - 2nd example – dum-dum lollipop facts – dumdums that had simple short facts were given out to people, and the messages were retained since they were uncommon and could be related back to the lollipop since that’s not something normally seen when eating candy
- Credible
 - Expert reputation = credibility
 - Opinions from scholars, field experts, experience, etc.
 - Personal stories are usually believable
 - Stats provide credibility when used properly
 - Can show a relationship and inequalities
 - It’s all in the details
 - Use the details to bring the point down to earth, so the audience can relate to it
 - Let the audience test the evidence
 - Example was when the red dye was taken out of M&Ms due to a myth about specific negative consequences for eating red M&Ms.
 - This test helped dispel the rumor and red dye was eventually added back in
 - Give an example that proves the rule
 - It has been shown often that the use of just one example will give credibility to the story or information being presented
 - Example: if someone is worried about the transport of nuclear waste, you could ask if they have heard any news about nuclear waste transportation accidents. Because there is essentially no news of that sort, that person’s fears could be calmed.
- Emotional
 - Try to piggyback on existing emotions
 - Go from actual concerns to things you want them to be concerned about
 - Appeal to their self-interest
 - Appeal to their group identity

- Example of billboards in Texas showing famous Texans saying that ‘Texans don’t do this’ (referring to littering). This initiative was highly successful and much cheaper to implement than enforcing higher fines and stricter policies on littering
 - This can be hard to implement because it is more difficult to bring out and promote the positive
- Story
 - Narrative structure
 - Create a knowledge gap so that the story grabs the audience’s attention
 - Three types of plots to use: challenge, connection, and creativity
 - A story wraps it all together, e.g. A story about a leak in the coolant at a nuclear power plant – the supervisor looked around the entire line for a couple days to find out why they were slowly losing coolant. When he went on his break, he noticed some guys in the break room opening a small valve and using the coolant water to make their coffee!
 - The story isn’t really possible, but it gives the idea that the coolant water is safe and not harmful.
 - The story is likely to stick

“Scouting Programs for Educational Outreach”

R.N. Slaybaugh – University of Wisconsin, Madison

- The public needs to be well-informed
- Start at a young age
- Nuclear science badges for boy/ girl scouts:
 - NSBS merit badge program
 - Decades old
 - For boys age 12-18
 - Can get badge in one day
 - Badge covers the basics of nuclear
 - Requirements include: knowing basic definitions, important scientists, biological effects, the radiation symbol, isotopes, chain reactions, critical mass, activity includes making ‘marshmallowntopes’, will also know nuclear power facts and be able to use them, and will know about different careers in nuclear
 - Concerning girl scouts:
 - There is no nationally recognized patch
 - Local patches can be made
 - Target ages 12-18
 - The requirements are based on the boy scout patch
 - However, the attempt for a program with older girl scouts was not very successful since there are not many cadets and senior girls
 - Therefore, STEM programs were started for younger groups (i.e. Juniors)
 - Details of new programs for girls:
 - Less definitions to learn

- Discuss important female scientists
- Play the fission game (uses balloons and ‘control rods’ – human arms) and discuss the concepts afterwards
- Talk about careers
 - Have a dress-up time and have the girls give presentations to the group about what they are dressed up as and what career they represent
- Do cloud chamber activity with dry ice – ionization tracks can be seen in this experiment
- The new program will soon be available on the ANS website

“An Engineering Approach to Nuclear Energy Communications”

Dave Pointer, ANL

- Challenges of speaking to student groups
 - Generation differences
 - Information saturation – there is already a lot of information out there to take in
 - We have a temptation to be too focused instead of more broad and basic
 - Think ‘what is a nucleus? Radiation? Fission?’ and explain the basics
- Many kids already have basic engineering experience based on toys they’ve played with: Legos, science kits, etc.
- Address what engineers do!
 - Condense the facts
 - Keep it simple, stupid (KISS)
- Explain how one can become an engineer
- The tower challenge (example activity of designing a tower out of common school supplies
 - Have the students explain why they are designing the tower the way that they are
- The wiffle ball power plant (example activity for older student groups)

Innovations in Medical Physics

The session will focus on innovative methods and applications of nuclear-based imaging techniques in research and clinical environments. Expanding imaging techniques from anatomical and functional imaging to molecular imaging is expected to deliver significant contributions to diagnosis, disease staging, and therapy. The session will explore developments in nuclear imaging technologies, molecular imaging, imaging during therapy, as well as the potentials of combining plural imaging modalities. Methods and advances in computational medical physics and informatics are included to add critical evaluation and support for advanced imaging technologies and applications.

Next Generation of Nuclear Criticality Safety Professionals

The nuclear criticality safety discipline is faced with competing demands of growth in the nuclear power industry; namely, how do we assure an adequate talent pipeline to maintain current and future staffing needs at existing and planned new fissile process facilities? This session encourages current practitioners to provide information about

facility-specific resources used to train and qualify new NCS staff. This session also encourages practitioners to provide examples of NCS work experiences including (but not limited to) advancements in methods, criticality safety analyses format / content improvements, controls flowdown to operations personnel, and NCS training awareness program improvements. New or prospective criticality safety practitioners are encouraged to participate to learn about the diverse skill sets required in this important discipline and the resources available to facilitate developing that expertise.

Next Generation Nuclear Power Plants for Next Generation Professionals: Technology Transfer and Advancements - Panel

The next generation of nuclear professionals will need to address the design and construction challenges of the next generation nuclear power plant. Fast reactors and very high temperature reactors are the most prominent examples of technology transfer challenges as well as technology advancements. It is expected that a fast reactor will be an important component in closing the fuel cycle. Significant experience with fast reactors has been accumulated, but it may be lost if not transferred to a new generation of nuclear professionals.

This panel started with an overview of the technology, followed by discussion on how to effectively preserve the vast amount of existing knowledge and transfer it to the next generations as well as discussion on technology advancements and perspectives for deployment.

“Knowledge Preservation and Transfer: The Terrapower Example”

Kevan Weaver – Terrapower

- A meeting with the biggest investors in terrapower (Bill Gates, Edward Teller, and some others) along with Kevan concluded that wind and solar power alone don't cut it
- New reactors to be built will be fast reactors
 - Sodium-cooled fast reactors already have 300 combined reactor years of operation in India, Japan, Russia, US, UK, and some other countries
 - China and Russia are currently building new sodium-cooled fast reactors
 - India has a fast breeder test reactor
- What knowledge is to be preserved and transferred for success in building and operating
- New reactors?
 - Results of tests, experiments, calculations, and the data generated
 - Archived knowledge
 - Referred to as ‘applied technology’ by the DOE
 - Access is limited to this information and it must be guarded
 - ‘Tribal’ knowledge – undocumented, but remembered by employees
 - One big issue in the preservation and transfer of this knowledge is the bimodal population distribution in the nuclear industry; that is, there is a large generation gap between those who are close to retirement and those who are in the early years of their careers
- How does this apply to terrapower?

- They need data and experience on sodium-cooled fast reactors
- What can be done to retain and transfer knowledge?
 - Mentoring –experienced employees need to sit down and talk about expectations and information on current and past projects
 - ‘old-fashioned digging’ –existing information needs to be searched through and ‘dug up’ so that it can be easily accessed and applied today
 - More openness and transparency
 - Terrapower is working to make ‘Applied Technology’ reports more
 - Available
 - Ask questions – one of the best to ask is ‘what would you do differently if you had to do it over again?’
- Terrapower’s solution:
 - Hire the knowledge (direct or hire consultants)
 - Involve people in the design process
 - Ask questions (sharing war stories is a good way to transfer knowledge so that it will stick)
 - Do ‘data extraction’ projects
 - Acquire data
- Terrapower wants to have a new fast reactor up and running by the 2020 timeframe
 - This is a very aggressive schedule
 - Good knowledge transfer is essential
 - The path is to get export licenses for fast reactors to sell the technology to other countries

Eric Loewen – GE Hitachi, ANS Treasurer

- Encourages working as a congressional fellow
- CAFTA – new computer program for Probability Risk Assessment (PRA)
 - Younger employees could publish papers from PRA
- Biggest fear for getting new nuclear power plants up and going is governmental indecision
- An authorizations bill means nothing until an appropriations bill is passed
- Environmental Policy Act – In 1992 President George H.W. Bush authorized the sodium-cooled fast reactor in the US; the program, Experimental Breeder Reactor 2 (EBR2, in Idaho) was then stopped by President Clinton

Alan Waltar – PNNL

- 3 thoughts on knowledge transfer to help with next generation power plants:
 - Networking of young professionals is very important
 - Experience needs to be mined from the “gray beards” (older generation)
 - New publications
- World Nuclear University – established in 2003, current chancellor is Hans Blix
 - Virtual university, local changes
 - Summer institutes for next-generation leaders (was held in Oxford in 2009)
 - Alan highly encourages young employees in nuclear to go to one of these if given the chance
 - This helps to see issues through other peoples’ eyes (different countries, continents, and cultures)

- It is a life-changing experience
 - In Alan's words, "it keeps me young"
- Radioisotopes have a bigger economic impact here in the US than nuclear power
 - They are used more in the US than in any other countries
- Surprising fact: there is more support for nuclear power in the US (approx. 80%) than in France (approx. 50%)

Barry Ganapol – Professor, University of Arizona

- Presented on a broader sense of knowledge transfer
 - How do we not only transfer knowledge but encourage the innovation and critical thinking about the knowledge learned?
 - This innovation and critical thinking is necessary if the knowledge is to have any value
- He wants his students to have a broader perspective on nuclear than in the past
- It is essential that the theory behind the skills is taught and learned!
- Concerning online education, of which there were 4 million students in 2007:
 - Is this way of learning better than in class?
- The government must recognize that a more informed public will benefit everyone
- His parting advice to the next generation: "The more you know, the less you know."

Knowledge Management – Panel

Patricia Eng – NRC

- Created an online knowledge center at the NRC
 - View documents online
 - Listen to audio-synched powerpoint presentations
 - A subject matter expert speaks throughout the slide show
 - The audio jumps to whichever slide you click on
 - Watch video interviews with NRC subject matter experts
 - Can subscribe to various communities to share knowledge and read forums
 - Can search through resumes of subject matter experts
 - Currently an internal access program only
 - Eventually a portion of the knowledge center will be available to the public
 - However, commercial software is available to set up an online knowledge center within your company (ex. TOMOYE – a Canadian company)
 - Program managed by the Chief Learning Officer

Julie Sickle – Manager of Nuclear Training, Constellation Energy

- Constellation has hired 680 new employees to nuclear since 2007
- What are we doing at nuclear power plants to transfer and retain knowledge (KT&R)?
 - The situation is that many people are retiring soon and there are new nuclear power plants to be built; therefore, knowledge transfer is important!
 - The purpose and design of KT&R:
 - Identify weaknesses and opportunities to preclude loss of intellectual capital
 - Implement process that is user-friendly and can be maintained with internal resources

- Ensure that the ‘new to nuclear’ workers can efficiently learn from others’ experiences
- Ensure that the processes are robust
- Process for KT&R:
 - The goal is to have good documentation in place
 - Keep information clean and precise
 - Look for ‘single point vulnerabilities’
 - Refers to knowledge that is contained in only one person; therefore, having backups is critical
 - Need to determine these and train backups
 - Do not want to have any identifiable training gaps
 - Backup candidates are named and proficient
- Constellation Energy’s process:
 - Assess -> Plan -> Implement -> Evaluate -> repeat process
 - Assess: determine the Annual Risk Ranking in the industry, either by position or programs
 - Categorize and check the effectiveness of each program
 - Multiply risk ranking by a turnover risk factor
 - Plan:
 - Implement: put actions in place to close knowledge gaps
 - Suggested ideas for your company:
 - Start a pilot process at one location
 - Integrate knowledge into hiring strategies
 - Remember that this is about retaining knowledge, not people
 - Apply a rigorous change management process
 - Base decisions on the biggest risks!
 - But don’t over-commit
 - Evaluate: revise programs as needed based on feedback
 - Modify checklists
 - Revise employee self-assessment and task description forms to incorporate KT&R questions
 - Oversight – keep program fresh
 - Put results in front of jobsite and corporate senior managers
 - Establish a corrective action program
- Keys to success:
 - Strong support from management

Kim Mounssen – Office of Nuclear Energy Knowledge Management Program, US Dept. Of Energy

Knowledge management (KM) at the DOE

- Mission: capture, manage, and protect all Office of Nuclear Energy information
 - This entails much more than document management
 - Provides benefits to the nation and to researchers

- Better KM leads to results
 - The highest level goal is to improve data accuracy, consistency, and accessibility of nuclear energy information
- Working to capture tacit knowledge
 - Example of John Sackett on Experimental Breeder Reactor 2 (EBR2)
 - Recorded videos of John explaining different topics
 - Videos being broken down into 2-4 minute clips
- Online collaboration tool to be released in next 4-6 weeks
 - Information will only be shown on a ‘need-to-know’ basis
- New online search program – NEEDLE (for federated search data)
 - Searches through multiple engines (Yahoo, MSN, Osi, OCLC, etc.)
 - Sorts relevant results and gives breakdown of top 400
 - Graphical user interface shows a folder tree for sorting and viewing results
 - Can also sort by website extensions (.com, .gov, .org, etc.)
 - Duplicates are removed
 - Future accessibilities to universities and private industries
 - Gives the DOE access behind the firewalls of program collaborators such as MIT, Virginia Tech, University of Michigan, University of California – Berkeley, and the Library of Congress)

Question & Answer

- Discuss generation difference difficulties (between experts and new hires)
 - Need to counsel younger employees that ‘it’s not all about you’
 - The older employees see the younger as wanting things ‘right now’
 - However, the brain power from this generation is impressive
- Data conversion from old to new systems is a big challenge
- Concerning the older employees that are concerned about losing their jobs:
 - Give a personal touch to knowledge management so they don’t feel like they’re being targeted
 - “We don’t kick anyone out of the federal government”
 - Experts are willing to share lessons learned
 - People that want to see rich information be preserved have been very giving/ sharing of knowledge

Your Personal Career - Panel

Amy Sexton – Exelon

- Career Management: Philosophy (Exelon’s philosophy)
 - Career management can be viewed as a three-legged stool – it needs to participation from
 - The individual, the manager, and the organization to stand up
 - It is an ongoing process
 - You are the one driving your career!
 - Go and ask for the things you need

- Consider multiple options; don't always think about moving up
- Think about what the connection is between day-to-day activities and the future quality/deliverables
- What's in it for the organization?
 - Quality Development Plans:
 1. Clear career objectives (short and long-term)
 - a. Remember that internal progression charts have exceptions! They're just guides and won't be followed exactly as given.
 - b. Weak career goal statements are vague, lack measurable results, show no ownership, and are not clear.
 - c. Litmus test – the development plan is a coaching document. Someone who doesn't know you should be able to understand your direction by reading your objectives.
 - d. Good statements focus on what you can accomplish (ex. 'decrease backlog by 10%')
 - e. Carl Fricker suggested that for quality improvements, you need to find out who the best is and how to beat it
 - f. To drive the car, you have to have a great plan written down on paper
 2. Well-defined development areas (goals)
 - a. What do you personally have to get good at?
 - b. Focus on 1-3 areas for development, depending on the difficulty of each area
 - c. Good examples are skill-based, honest, and will state the focus
 - d. Remember that entry-level positions are more technically focused, and this focus gradually becomes more and more leadership-based as you progress towards executive management
 3. Actions based on Adult Learning Theory and written in SMART language
 - a. Showing application of what you have learned is better than presenting a degree (for instance, an MBA)
 - b. SMART language is:
 - i. Specific – what will be done? When? How?
 - ii. Measurable – need to establish metrics for quality and quantity
 - iii. Achievable – challenging, yet realistic
 - iv. Result-oriented
 - v. Time specific
 - c. Ask for help, it's like a magic phrase
 4. Identify tangible and intangible metrics
 - a. Set yourself up to get clear, measurable feedback
 - b. Something is a metric if it has some specificity to it
 - c. Think about what success looks like

- d. Weak metrics cannot be answered with a yes/no that was/wasn't done. Good metrics are more specific.
- e. Nicole Reilly suggests scheduling one-on-ones with your boss
 - i. Amy says this doesn't need to be a 30 minute conversation, but could be just 5 minutes
 - ii. Carl Fricker stressed that it's important to be transparent

Nicole Reilly – PSEG

- How do you get to where you want to be?
 - You need to own the process and execution
 - Get your peers and bosses involved
 - Demonstrate commitment:
 - Know the culture you are in (values and fundamentals)
 - Ask 'how am I doing?'
 - Get involved through employee resource groups
 - Be the first to volunteer, even for the things that no one else wants to do
 - Carl Fricker suggested to make yourself visible
 - NR – “who wins in life? The best salesman.”
- What makes an assignment developmental?
 - There is a possibility of success or failure
 - Includes a high variety of tasks
 - Requires aggressive individual leadership
 - Will make you do something different from before
 - Cross-functional work helps
 - Notice what others are doing so that you can find the most developmental jobs
 - Amy Buu made the comment that you also need to balance this with saying 'no'
 - When the responsibilities pile up
- Amy Sexton – what are you up to? Are you using opportunities to develop skills you don't possess? Are you building on the skills you already have?
 - You need to set and know clear objectives
- NR – the value:
 - Gain new perspectives
 - Think about all that you can bring back to the team/organization
 - You are learning while adding value to the company
 - Can develop specific competencies
 - Networking opportunities (you never know when a relationship will come back to you in a career)
 - Visibility (internal and external)
- Action to take:
 - On-going, daily evaluation – do whatever works for you (journal, reflection time, etc.)
 - Think outside the box when creating the plan
 - Choose a mentor (not necessarily formal)
 - Seek feedback

- Ask questions and show interest in learning
- Learn on the job
- Volunteer
- Remember that you are accountable

Carl Fricker – PSEG

- The industry cannot survive without people developing
- The NA-YGN is in the 15% group of nuclear industry age demographics
 - This means opportunity for you
 - The industry can no longer take 25 years to make people into plant managers
- Your career is up to you
 - Write down a plan. "You have to have a plan...so you can deviate from it"
 - Find a good mentor
 - Make yourself visible
 - Volunteer, take leadership roles, and get involved in employee resource groups
 - Don't be afraid of non-engineering jobs
- Concerning the current economy: it is the best thing for the management to help fill openings

Question & Answer

- Concerning work/life balance
 - Make a life plan and map things out
- Concerning career development plans:
 - It is your syllabus and marketing material
 - It gives you an idea of where you are headed
 - It is used to communicate your goals and sell yourself
 - Both a career development plan and networking are needed to move forward in your career
- Additional advice:
 - Focus on results
 - External mentors are invaluable
 - It's about how you handle mistakes. People can still be talked about favorably after making mistakes

Diverse Paths to Success: Navigating the Early Years of Your Career – Panel

This panel session was designed to provide young professionals with the insight and tips of ANS members who have been successful in the nuclear field. Panelists included representatives from industry, international organizations, academia, and government. The speakers provided overviews of their careers, including unique challenges negotiated such as age disparity, diversity, and work-life balance issues. Panelists provided recommendations on critical skills that young professionals should develop to achieve their career and personal goals. Presentations were followed by an open question-and-answer period.

Jack Tuohy – Executive Director, ANS

- Personal career experiences:
 - Taught at Manhattan College
 - Had a 100mw nuclear reactor, the only operating reactor in NYC, now decommissioned
 - Worked for Burns and Rowe three different times
 - B&R was the A/E for TMI
 - He remembers calling his wife from TMI
 - He learned that during stressful times, people bond
 - Outside of his career, he sees the amount of new nuclear work coming up as a means for more people to bond and work together
 - Predictability in your work/career doesn't really happen
 - He has been involved in transportation-related work
 - Started up a consulting company in South Africa – JM Tuohy and Associates
- General thoughts and advice:
 - “someday you guys will be running the industry”
 - GE Hitachi versus Toshiba was like the Yankees vs. The Red Sox

Shannon Bragg-Sitton – Assistant Professor in Nuclear Engineering, Texas A&M University

- Advice:
 - Be persistent in what you want to do
 - Follow your heart
 - Get involved early
- Personal experiences:
 - Research in the space applications of nuclear
 - 2 years medical engineering work for MS degree
 - Worked in space propulsion
 - Government experimental project got cancelled
 - Assistant professor and TAMU
 - Involved in professional societies
- Concerning the work/life balance:
 - It's tough; she is married and has two young boys
 - Remember that “family endures...don't neglect them”
 - Know that careers will change, but your family will be there at the end of the day, and at the end of your career

Shana Helton – NRC

- Personal experiences:
 - Became involved with ANS at the University of Illinois (in nuclear engineering)
 - Went from U of I to the University of Michigan
 - Worked in Detroit
 - Described going into inner-city Detroit daily as a “demoralizing experience”
 - Worked in different roles in the NRC
 - NRC focuses a lot on the work/life balance
 - Noted that NRC was rated as the best federal agency to work for

- Advice:
 - You need to set your priorities in life
 - Read your email twice, hit send once
 - Look for opportunities to give good oral presentations

Virginia Cleary – Sandia National Laboratory

- Personal experiences:
 - Did transparency project with Japanese Atomic Energy Agency, in Japan
 - Best part of Japan was going to a reprocessing plant
 - Volunteered to help ANS executives
 - Has done other volunteer work with many organizations
 - Currently working for Sandia National Laboratory
- Advice:
 - Expand outside of your comfort zone
 - Have your 15 second elevator speech ready
 - Show your value

Question & Answer

- How can we use ANS to get more involved?
 - Involvement in ANS is vital so that you can connect with people that have built and operated nuclear power plants before
 - Can learn many things from the experiences of others in the ANS network
 - For example, when dealing with radiation, it is good request 2 truck beds: one for normal use and the other as a backup – this was learned from experience and then passed on by network connections
 - Make your interests known and get involved in what lines up with your interests
- There is never a good time to leave your company
 - Ask for other developmental assignments
 - Train a replacement
- Employers will work to get employees to do their work
- Amy Buu will be posting the personal development plan guide online
 - Keep your ears and eyes open to find out where opportunities are in your company
- Shannon Bragg-Sitton – define where you think you want to go; have a goal in mind
- Shana Helton – plan where you think you want to go
- Jack Tuohy- ask yourself how you fit into the picture; what’s your personality type?
- In reference to future/career planning: “Nothing you do in life will matter...if you screw that job up (with your kids and family).” –Jack Tuohy

Innovation in Thermal Hydraulics

Submitted abstracts are to put forth recent research in the realm of heat transfer and fluid mechanics involved in the utilization of nuclear energy, including theoretical and experimental research on basic phenomena and application of thermal hydraulic principles to nuclear system design and analysis.

Fuel Cycle Elements in the Renaissance: Pulling It All Together - Panel

Young generation panel members will discuss their roles and responsibilities in the key elements of the fuel cycle including mining, milling, and conversion; enrichment; fuel fabrication; back end/reprocessing; waste storage/transport and disposal; and fuel management. The overall theme will focus on the opportunities and challenges in fulfilling the nuclear renaissance. Roles in academia, national research laboratories, utilities, and private industry will be featured.

Fuel Cycle Background Information

- Factors for fuel cycle growth:
 - Aging facilities
 - Market shift towards Asia
 - Want long-term contracts for swus
- Current fuel cost is approximately \$3,200 /kgu
- U3O8 – the uranium market
 - Essentially a commodity market
 - Kazakhstan is an up and coming producer
 - Mined uranium is currently about \$50/lb
 - Cost was up to \$136/lb in 2007, due to fear of a shortage
 - Utilities prefer long-term contracts
 - Government sales impact fuel prices
 - Demand is much higher than production now and in the future!
- Future supply and demand (base demand & high market demand)
 - Gap greatly widens from 2020-2030 (demand increasingly higher)
- Conversion supply and demand
 - Big need, gap is large in the future
- Potential new facilities to be built in India, China, and Russia
- Fuel is converted, then enriched
 - Major players are Areva, Urenco, Russia, and USEC
 - There is no gap in future supply and demand for enriched uranium
- Fabrication market also shows no future supply and demand gap
- Reprocessing – the amount of uranium retrieved is fairly small
 - Reprocessing is done in France, Russia, UK, Japan, and India
- Supplies of U3O8, UF6, and SWU are somewhat tight, but will be okay with new facilities coming in the future

Phillip Benavides – Fuel Supply Director, Constellation Energy (CENG)

- Fuel can be written off on financial statements (through amortization)
- Opportunities and challenges to the fuel cycle include:
 - Supply/demand
 - New build time length
- In his career, he went from safety analysis to more of project management type work

J'Tia Taylor – Phd candidate, University of Illinois

Material Flow Simulation in an International Fuel Supply Model

- Existing fuel cycle programs are Multinuke, Vista, and Vision
- For phd studies, built a model in powersim Studio 7
 - Model is to be used for developing countries, like Ghana, to help them produce nuclear power
 - Model accounts for multiple variables, including fuel types and ‘recipes’ and proliferation resistance

Marisa Vilardo – Sales Manager, USEC

- Building an enrichment plant in Piketon, OH (American Centrifuge)
- USEC has over 2900 employees
- Supplies 50% of US nuclear fuel requirements and 25% of the world’s requirements
- Has a gaseous diffusion plant in Paducah, KY (79 acres under roof)
 - Makes U235
- Gas centrifuges are like salad spinners
- Opportunities in the nuclear industry:
 - Variety of jobs
 - Desire for clean energy
- Challenges in the nuclear industry:
 - High capital costs
 - Knowledge transfer
 - Manufacturing base
 - Flexible contract terms
- Marketing and sales:
 - Manages sales team, responsible for more than 75% of US utilities

Aerospace Nuclear Science and Technology: General

Many space nuclear technologies were pioneered in the 1960s. The knowledge gained and lessons learned during this development period may be lost as the pioneers retire. This session will discuss those technologies, along with the issues and strategies for knowledge retention and transfer.

Evolutions in Nuclear Plant Safety

One of the major issues in the resurgence of public nuclear support is the issue of safety. This session would cover several of the major areas that are addressed in safety analysis for nuclear power plants. This would include topics such as: Neutronics, Thermal-hydraulic, Structural material evaluation, Fuel performance, PRA, Source Term and Consequence Assessment, and others. The session aims to present discussion of the various approaches towards assuring safety in the areas highlighted, to cover how nuclear power plant safety has evolved, followed by a brief panel discussion on where safety research is heading, and identification of the key challenges.

Challenges Facing the Young Generation in Nuclear - Panel

In order to retain student members as professional members after graduation, attract new young professional members, and encourage active participation in its activities, the American Nuclear Society and its constituent groups must provide clearly valuable services to those members. At the 2004 Winter Meeting, the North American Young Generation in Nuclear compiled a list of actions that young professionals, their employers, and professional societies should take to begin to address the specific challenges faced by young professionals in the workplace. This session sought to build upon the outcome of the previous session by developing a more detailed list of services and actions to be proposed to the American Nuclear Society to better meet the needs of young nuclear science and technology professionals and their employers. Introductory video: [A Peacock in the Land of Penguins](#)

Amy Buu, Westinghouse Electric Company
W. David Pointer, Argonne National Laboratory
Shana Helton, U.S. Nuclear Regulatory Commission
Nichole Ellis, Ellis Nuclear Engineering, LLC

Knowledge Management

- Westinghouse has a set of documents for knowledge sharing called ‘Stairs’ with potential to save a lot of time, but there are problems in implementation.
- The trick to mentoring is just to ask.
- Different knowledge management needs come from age differences
 - Older professionals interested in job security and communities and networks.
 - Younger professionals interested in diversity and training of replacements
- Best practices
 - Rotational programs
 - Online databases
 - Record computer work using screencastomatic with a headset
 - Cam Studio is another webinar creator
 - KMWorld is a good free knowledge management publication
 - Document your own work
 - Develop internal communities of practice like Sharepoint and Tomoyay.
 - Use an archived listserve
 - Use a wiki. To gain users make sure it has data from its introduction, and it helps to be searchable and work with any pre-existing documentation system.
 - Use a metadata platform for storing tribal knowledge
- Knowledge management journal from the IAEA wrote up a strengths and weaknesses checklist.

Recruiting and Retention

- Recruiting and Retention: what matters most to employees?
 - In order of decreasing personal importance:
 - Higher salaries
 - Internal pay equity (new employees are often better paid)

- Benefits programs
 - Over-management
 - Pay increase guidelines for merit (actually merit-based)
 - HR response to employees
 - Favoritism
 - Communication and availability (one-on-one time)
 - Workloads too heavy
 - Facility and cleanness
- The above concerns are recurring themes in employee surveys
- Nuclear industry is doing well in:
 - Coop and intern programs
 - Professional society participation
- Nuclear industry is doing poorly in:
 - Continuous development plan
 - Access to leadership positions
- Best practices:
 - Educating how young professionals can develop potential for future advancement
 - Work/life balance – offering flexible hours; great support for work at home
- Discussion:
 - Do new employees have reasonable expectations about what they can do?
 - Young professionals need to be engaged in recruiting new hires
 - Working from anywhere, anytime is a big factor for recruiting and retention
 - Constellation Energy requires 80 hours of work every two weeks; can work anytime desired, but need to attend meetings and get work done which creates a base of trust
 - However, utilities also have a lot of positions where you cannot do flex work because of what the job entails and how it is coordinated with others
 - Having active YGN chapters (or other affiliation groups) is vital to retention
 - People are the main reason that employees stay and leave a company
 - A best practice is to have casual positive meetings where you talk about successes ('employee of the month' type of idea)

Access to Leadership and Careers

- Best practices:
 - Have lunch and learn sessions for professional, leadership, and technical development
 - Have several mentors
 - Use professional society activities
- Discussion:
 - Attend Skillpath training seminars when you can
 - Nothing prepares you for leadership like the real thing
 - Also, people change every day
 - If you're doing something for the money, then don't do it
 - Ask yourself if you can say the hard things to people (like firing)
 - GE has a technical career path in nuclear
 - Also has mid-level management on the career path

Industry Awareness

- National Skills Academy for Nuclear
 - Enable new nuclear personnel to understand new environment and what's going on in the industry
- Industry awareness practices:
 - High involvement at national level, but not locally
 - Industry awareness does not mean self-promotion
 - Can sign up for NEI smart brief to get the pulse of the nuclear industry
 - Also WNN – World Nuclear News and ANS headlines
 - Listen to your company's quarterly reports
 - These seminars can be used to create awareness!

Networking

- Do you have external networks?
- Best practices:
 - Free food and drink
 - Facebook and Linked-in (online networking tools)
 - Don't be afraid to ask questions!

Public Communications/Professional Development — Focus on Members of Congress

On Thursday November 19, 2009, 21 conference participants visited 32 offices of their elected officials on Capitol Hill to advocate for nuclear energy.

Conclusion

This report provides a summary of the conference proceedings of the Young Professionals Congress by the North American Young Generation in Nuclear in collaboration with the Young Members Group of the American Nuclear Society at the 2009 ANS Winter Meeting. This report is intended to be a resource for young professionals, their employers and technical professional societies in the development of programs to address the challenges facing young professionals in the nuclear industry. Specific plans for the implementation of these proposed actions are left to the young professionals, employers or technical professional societies who are working to address these challenges.