WM2017 Conference Panel Report

PANEL SESSION 41: Graduating Students and New Engineers – Wants and Needs – STEM Students – Industry Dialog and Exchange of Knowledge

Co-Chairs: **Robert Berry**, *Foxfire Scientific, Inc*
Leonel E. Lagos, *Applied Research Center at Florida International University*

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Panelists

1. **Kevin Cooper**, *Dean of Engineering, Indian River State College*
2. **Mitch Pryor** – *Research Scientist, Cofounder of the Robotics Group, University of Austin*
3. **Leo Lagos** – *Director of Applied Research Center at Florida International University*
4. **Michael DiBono** – *DOE Fellow at the Applied Research Center at Florida International University*

The following summary includes the main points addressed by the panel members:

At this year's Waste Management Symposia, young professionals and industry had the opportunity to share their views and exchange ideas and concerns about early career professionals in the workforce. The panel was composed of young professionals representing the US and the UK. This forum provided a great opportunity for young professionals to understand the future of the waste management employment landscape and the challenges this industry faces.

Kevin Cooper is joining us from the Regional Center for Nuclear Education and Training at Indian River State College in Florida. He described the nuclear energy program that was launched to meet the demand of an aging technician workforce in the power generation industry. After the program was successfully launched, more tracks were added in environmental management, life and plant sciences, and manufacturing. This program emphasizes hands-on training and experience. Students start with STEM fundamentals and applied science basics and are later taught the building blocks needed to be a technician in the energy sector. One of the main objectives of his program is to target the underrepresented groups of females and African Americans, to increase their representation in the industry.

Mr. Cooper emphasized the importance of soft skills (critical thinking, communication, problem solving, and emotional control). His programs put students in an environment where they can build these skills and also develop them on their own by learning from their mistakes. Every student also gains an understanding of project management basics, specifically, the scope, planning, and budget phases of a project. Leadership, teamwork, and communications skill-set are also developed**. Mr. Cooper** also mentioned the importance of continuous learning and re-refining their skill-set at least every two years. He also noted that acquiring educational accreditations is important, but more important are certifications and gaining hands-on training. He encouraged students to engage in future learning, especially outside of their field of study.

Other skill sets that were highlighted in his program are entrepreneurship and innovation skills, along with strong interpersonal skills which he believes is essential in the STEM industry.

Mitch Pryor Interdisciplinary Graduate Program for Automation in Nuclear Applications. This presentation focused on the use of robotics in the nuclear environment. **Mr. Pryor** mentioned that much of the robotics work today is done in "silos" due to the difficulty of sharing data throughout the industry. **Mr. Pryor** acknowledged a lack of an adequate workforce to transfer automation technology to the labs and a failure to understand the demanding requirements for deploying systems in nuclear domains. He stated that often times Universities demonstrate technologies, but do not demonstrate solutions. There is a necessity of domain enterprise in the realm of technology enablers, e.g.: decommissioning/decontamination and drill rigs, specifically in areas where a high amount of uncertainty exists. The Nuclear Robotics Group was founded to train the next generation of engineer researchers to deploy advanced, flexible automation across the national-industrial nuclear complex. **Mr. Pryor's** program also fulfils the role of a STEM development pipeline. Students in his program are at graduate level and have a nuclear engineering background, coupled with robotics engineering.

The Nuclear Robotics Group's research philosophy centers on cutting edge research to develop application solutions. The program aims to define/quantify desired auto-capabilities, such as safety, address human factors, hardware agnostic, relevant field testing, develop domain experts, and are not advocates for a specific technology. Much of the research conducted by students is directly applicable to solving solutions at national laboratories: material reduction, glovebox manufacturing, remote survey and inspection, etc. The program was started in 2008, 15 students total, 5 already full time employees at National labs.

Leo Lagos STEM Workforce Development Program at Florida International University (FIU). This workforce development program works in coordination with the Department of Energy (DOE Fellows), Department of Defense (Cyber Fellows), and the Nuclear Regulatory Commission. Research through the DOE-EM program consists of robotics, soil and groundwater, high level waste, D&D technology testing and evaluation, knowledge management systems, and the Fellows workforce development program. In total, there are 131 STEM students in the Fellowship program. Internships are a large component of all of the fellowship programs, and take place at national labs around the country and DOE EM headquarters. Other activities also included in the program are annual poster exhibitions and competitions. DOE Fellows also recently established the American Nuclear Society FIU Student Chapter.

Mr. Lagos also described the Cyber Fellows program, in coordination with the Department of Defense – TRMC. This research tests DOD technology and cyber security, for example, the Cyberspace Threat Automation and Monitoring System (CTAM) which monitors and analyzes malware behavior.

This programs acts as a pipeline program to funnel students directly into the workforce with hands on training and research experience under their belt. **Mr. Lagos** emphasized that the critical component of these fellowships are the internships experiences where students learn firsthand at a DOE-EM site and can then apply those skills back to the research they are doing at FIU as well as their classes.

Michael DiBono Graduating STEM Students Wants and Needs. **Mr. DiBono** described some common job expectations from young professionals including: finding a job that where they feel they can utilize their skill-set towards adding value to the company/organization where they work. He also added that a strong mentorship program, effective communication, valued as an employee, strong moral compass were important considerations for young professionals choosing potential employers. **Mr. DiBono** offered a few recommendations for hiring managers: encouraging office engagement, community outreach programs, rotational trainings and leadership development programs. Advice for soon to be grads was to be engaged, stay positive, be proactive, find a mentor, create a plan for a healthy work life balance, learn, and challenge yourself. He also mentioned that if you are comfortable, you are not growing or challenging yourself enough. Push yourself to learn as much as you can.

After the panel members shared their experiences, the chair and co-chair opened the floor for questions from the audience. The conversation sparked a meaningful discussion and exchange of experiences by many of the audience members. For instance, one question was: How are you attracting kids to join these STEM programs from an early age?

The answer provided by **Mr. Lagos** was: through summer STEM camps; engineering expositions inviting local elementary, middle, and high school; STEM toys (robots); and exposing younger students to science museums in order to peak their curiosity and interest in STEM.