



# PERFORMANCE IMPROVEMENT—2

## Technical Human Performance

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NWI Associates Rey Gonzalez and Bill McNeill have been busy developing some fleet-wide *technical* human performance tools (THU) for TVA Nuclear Group’s engineering organization. But...why develop a specific toolbox for an engineer that is different from that used by operators and craft personnel? Because errors by made by knowledge workers, especially engineers, can have some of the greatest adverse impact on power plant safe operations and, ultimately, financial performance. These “In-process” errors normally are more subtle than errors committed by operators and craft personnel, latent errors can sometimes go undetected for long periods of time, in some cases, years or decades, resulting in hidden defects in plant equipment or supporting documentation such as a critical safety system calculation. The latency characteristic of these errors makes them very hard to detect. Therefore, awareness, and opportunities to prevent and catch them

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## NWI Throughput Assessment Screening System (TAS): Re-Engineered

How often do you think about spending \$300,000.00 on an investment and getting nothing in return? This is basically what has been happening across our nation’s nuclear utilities when an initial reactor operator license candidate “washes out” of initial license training (ILT). This can be for all sorts of good reason’s... but the bottom line is the same; ZERO ROI (return on investment). Since “good people” are put into ILT class, it can’t be the people...so therefore it must be the instruction? Or is it? Could it be the candidate’s skills, abilities and /or situational awareness potential?

Utilities continue to have difficulty in achieving high initial license training (ILT) candidate throughput (e.g., number of successful licensed operators compared to the number of candidates starting the ILT class) due to numerous factors. These candidate drop out rates continue to negatively impacting utility staffing needs and challenging the utility’s confidence in the ability to

prepare license candidates. A variety of factors including informal candidate selection processes, labor force seniority, minimal mentoring and experience waivers have been identified as contributors.

NWI developed a Throughput Assessment Screening (TAS) system in 2007 to assist utilities in gaining candidate behavioral insights targeting key characteristics of successful ILT candidates. TAS was designed comprised of three components; 1) Basic mathematics and science, 2) Comprehension and 3) Situational awareness assessments. Recently, NWI has re-engineered the situational awareness evaluation phase to gain greater insights into the candidate’s ability to perform activities in the following areas: Multi-tasking, Prioritization, Commu-

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## NWI Joins ENP Alliance

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NWI has agreed to in principle and intent to join Exelon and Sergeant and Lundy (S&L) to form a “one stop shop” Exelon Nuclear Partners Alliance whose expertise and experience base can address a multitude of nuclear power plant needs. In this highly competitive environment, this alliance comprised of proven high performance partners will foster high quality standard products with economies of scale for clients worldwide. ENP is a division of Exelon Generation which operates the largest nuclear fleet in the United States and the third largest fleet in the world. NWI brings to the ENP strategic alliance services that includes; due diligence/training optimization, education/training feasibility

determination, independent training program & performance improvement (PI) program design & support, learning technology selection/development, new plant training instructor/management augmentation & incumbent/license contracting strategies, training, simulation, procurement specification and bid assistance, and development/implementation of project plan and schedule.

NWI has experience in developing/designing training and PI programs, performing organizational resource analyses, identifying & quantifying project risks, designing risk mitigation plans, providing oversight and audit functions, conducting op-



## NWI Joins ENP Alliance (Continued from Page 1)

erator license training and other training , performance assessment & interface, Corrective Action Program and Training recovery, and 95-003 Collective evaluations/assessments,. In the new plant areas, NWI has extensive expertise in providing EPC technical specifications are met during EPC contract implementation, supporting all phases of new nuclear generation tasks

related to PI and Training programs including Human Factors – Task Analysis, learning technology systems development, and installation and simulator site acceptance. With engineering design and construction expertise of S&L and with the operating performance Exelon fleet, this alliance has the potential to have far reaching affect on the nuclear industry worldwide.

## NWI Throughput Assessment System (TAS): Re-Engineered

nication, Short Term Memory , Utilization of resources provided, Ability to handle distractions, and emotion control in high stress situations.

TAS is targeted to:

- ⇒ Reduce NRC license failures by increasing throughput from selection to successful licensure for RO and SRO candidates.
- ⇒ Secure a more technically-based decision making process for license

candidate selection.

- ⇒ Reduce stranded investment costs from license candidate failures.

In the past, TAS is designed to take input from candidate performance in each of the three evaluation phases and, using a complex empirically-derived algorithm, generate performance scores . An overall score is used to determine the probability of an ILT candidate to successfully complete the ILT training program. While some existing screening tools assess a

candidate’s basic math and science abilities; testing comprehension and performing situational awareness evaluations separates TAS from other screening instruments.

TAS combines behavior evaluation with other attributes to; 1) Demonstrate the ability to predict and/or monitor changes in parameters associated with a given scenario, 2) Demonstrate the ability to correctly use procedures or processes to correct, control, or

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makes the best course of action when fashioning error prevention methods. Since knowledge workers spend much of their time at desks, their work characterized as rule- or knowledge-based.

In addition, engineers or other knowledge workers engaged in field activities may perform work similar to those of front-line workers, where hands-on HU tools are better suited. The fundamental purpose of these tools is to help the engineer or knowledge worker maintain positive control of a work situation, especially during critical tasks or activities or doing the job right every time. Regardless of the work environment, engineers are expected to perform their activities and actions without error. Error is never acceptable, but it is tolerated by means of overlapping defenses, barriers, controls, and safeguards. In INPO 05-002, it states that “Every engineer intends to turn out a work product that is 100 percent accurate, that is 100 percent complete, that meets 100 percent of the requirements, and that result in a defect-free product. But, error is *not* a choice. Regardless of one’s intention to do a job well, errors and defects can still occur, usually without one’s knowledge, because of the inherent fallibility of human beings.” Therefore, as with TVANG, the management and supervision wanted to incorporate defenses into work processes to help catch or minimize these latent errors.

Through the analysis that Rey and Bill performed at TVA, they found that by concentrating on a few of the tools identified in INPO 05-002 (Human Performance Tools for Engineers and other Knowledge Workers), they could help focus the organization on gaining the biggest impact for the resources expended. The tools they focused on where to specifically address historic performance gaps identified through the fleet’s Corrective Action Program (CAP). In addition to the basic HU tools (self-check, etc.), many of the THU tools are inter-related that resulted from their analyses are briefly described based upon INPO’s guidance document below;

- ⇒ **Technical Pre-Job Briefings:** The pre-job briefing conducted prior to starting the work activity has three primary purposes: 1) to ensure the person is qualified to perform the assigned task; 2) to prepare an individual for what to accomplish; and 3) to sensitize the individual to what to avoid and to identify and compensate for error-likely situations that could lead to the product jeopardizing the plant or person. The pre-job briefing includes a discussion of human error and its possible consequences for critical attributes of the project, as well as the identification of additional controls or barriers needed.
- ⇒ **Questioning Attitude:** A questioning attitude fosters awareness of uncertainty, assumptions, risk factors, and the significance of a decision or action before proceeding. It helps a person make sure that planning, judgment, and decision-making are appropriate

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for the product in development. Questions, such as “If..., then?” “What if ...?” and “Why is this okay?” help improve recognition of actual or possible mistakes. A healthy questioning attitude will overcome the temptation to rationalize away a gut feeling that something is not right.

- ⇒ **Do Not Disturb Sign:** When engineers perform risk-important or safety-critical work, it is essential that they maintain their concentration and attention on the task at hand, especially if that task involves a review or a verification of the work product. Managers of such personnel assigned these tasks must control access to these people to prevent them from being distracted from their primary tasks. The “Do Not Disturb” sign provides a means to control this access. The intent of the sign is to limit access and interruption of the responsible individual performing the work or review.
- ⇒ **Signature:** Documentation of engineering products provides a record of the design of structures, systems, and components in the plant. Before engineering products are released to the next step in an engineering work process, the individual concludes the work by signing or affixing a seal to the document to signify that he or she performed the task completely and accurately in accordance with all standards, procedures, and code requirements. The signature implies the level of scrutiny an individual has applied to the functionality, accuracy, and safety of the product. Because a personal signature (or initials) reflects one’s professionalism and character, it is important that personnel not *give away* their signatures.
- ⇒ **Peer Review:** A reviewer provides a defense to detect errors and defects prior to the completion of documents by reading and checking the quality of another’s work product. The purpose of peer-review is to *catch* errors with a risk-important work product or to verify that a decision or plan of action is appropriate before proceeding. A peer review takes advantage of a fresh *set of eyes* not trapped by the originator’s task-focused mind-set. This tool provides an informal but structured method to help the reviewer identify errors that could lead to failure-likely situations with the product and to obtain assurance that a design-related document meets its intended purpose.
- ⇒ **Validate Assumptions:** Assumptions are a necessary part of engineering work so that a problem can be bounded. For situations such as these, engineers devote additional effort to justify why the assumption is conservative, providing detailed evidence that supports it. Engineers can inadvertently treat an assumption as fact or can forget that they made the assumption. Engineering judgment is sometimes involved at this point. Engineering judgment is applied and documented only when all uncertainties are bounded by the margins in the analysis and when inputs cannot be further substantiated. All assumptions are documented, tracked, and verified, leading to their closure before the product is delivered to the customer or placed into service. While performing a knowledge-based activity, engineers encounter another potential pitfall related to assumptions. The lack of requisite knowledge also tends to promote erroneous assumptions that may lead to errors and defects. In these cases, an assumption is a special mental shortcut, which becomes particularly tempting during stressful, anxious situations when time may be scarce. Qualifying statements, such as “I think ...,” “We’ve always done it this way,” “I’m pretty sure that ...,” “We didn’t have a problem last time,” or “I believe ...,” are hints that an assumption has been made. Consequently, until the additional information is available, engineers are tempted to make assumptions to improve efficiency or to simply make progress with the task.

These tools are not intended to replace formal methods specified in procedures or codes, but they do provide the engineer with “off-the-shelf,” informal methods to help him or her anticipate, prevent, and catch errors before they become embedded in the physical configuration of plant equipment or documentation related to plant design, operation, or maintenance. In addition to the analyses, Mr. Gonzalez and Mr. McNeill developed lesson plans/presentations and dynamic learning activities (DLA) with evaluation checklists that were successfully presented at Watts Bar and Browns Ferry Plants in late 2009 and early 2010. The impact on the performance gaps will be evaluated by TVANG after some time later (about 6 months) following reinforcement by site management.

*Note: This article is based upon INPO 05-002, HUMAN PERFORMANCE TOOLS FOR ENGINEERS AND OTHER KNOWLEDGE WORKERS. Practices for Anticipating, Preventing, and Catching In-Process Errors, Revision 1, February 2007.*

## NWI Throughput Assessment System (TAS): Re-Engineered

mitigate the consequences of normal and abnormal responses for the appropriate tasks, 3) Demonstrate the ability to monitor ongoing developments within a given scenario to ensure proper completion of the appropriate tasks and 4) Demonstrate the ability to complete administrative requirements, as necessary, within a given evaluation sequence to complete the appropriate tasks. Candidate critical decisions in stressful scenarios are evaluated and blended into the overall candidate perform in the other TAS phases. The re-engineered situational awareness methodology was developed using experienced initial instructors, experienced licensed operators, instructional technologists, an emergency preparedness expert, and psychometric/organizational development specialists. Call NWI for more information on this improved product offering.

## Recent NRC Initiatives in Safety Culture

Excerpt taken from Gregory B. Jaczko, Chairman, U.S. Regulatory Commission, at the National Association of Employee Concerns Professionals, September 29, 2009

“The Commission is now considering a broader view of the overall issue of safety culture, taking advantage of the knowledge we have gained in our Reactor Oversight Process. Our focus may extend beyond power reactors and may include the establishment of clear expectations for safety culture for all of our licensees. Additionally, we must remain mindful of the importance of the safety culture for all licensees and certificate holders, such as materials licensees; and also for vendors and contractors. The first step is to determine what we mean by safety culture and then whether there are regulatory changes, if any, that we need to make. The staff has drafted a new and expanded policy statement to do just that—and it is currently before the Commission for review. Once approved, this draft will be put out for crucial stakeholder input. In developing this policy statement, the staff engaged in outreach to materials licensees to obtain views on how to increase attention to safety culture. While these efforts have yielded suggestions, more outreach remains to be done.

In the future, the staff will be engaging Agreement States, Agreement State licensees, certificate holders, and the broader public. As these efforts continue, I want to encourage the crucial stakeholders in attendance here today to stay fully engaged with the NRC. The focus on safety culture has not been limited to our licensees. I believe that we must continually assess how our internal processes and programs are performing in the area of safety culture. As many of you know, questions about our allegation process were raised following an allegation concerning sleeping security officers at the Peach Bottom nuclear reactor in 2007. This prompted a thorough review of our allegation program and changes to improve our handling of safety concerns. We are requiring more structure in our allegation procedures and documentation to ensure that allegations are handled consistently across regions. We want to make sure that our allegation process is followed every time. We must be diligent in ensuring that no concerns “fall through the cracks.” Better documentation will also aid us in focusing inspections on areas where allegations have identified potential problems.

We have taken steps to improve communication with the individuals who raise safety concerns to make our resolution of their concerns as transparent as possible. Under our new allegation guidance, the staff may – in appropriate circumstances - initiate communication with individuals who initially decline further NRC contact. We believe that it is important to follow up in order to be sure that we obtain all information relevant to the concern, inform the individual of our plan to evaluate the concern, and encourage the individual to stay involved in the allegation process. We hope that more individuals will remain engaged in the process if they understand that they will receive feedback regarding our understanding of the concerns and plans to address them, and if they appreciate how valuable we consider their feedback about our allegation process.”

## *nwi Associate News*

- ⇒ Dan Slater: For his 2009 Efforts, Dan was recognized during a Site Procedures All Hands/Recognition meeting for going above and beyond the call for writing procedures AND developing an electron document datasystem (XML-based) APS provide a couple of movie tickets and a free lunch (who said that there is no such thing...).
- ⇒ Mike Gettle: In 2009, Mike lent his training expertise to the Bruce Power WANO visit resulting in a successful training performance evaluation outcome.
- ⇒ Tim Bostwick: Applied common cause analysis methodology to help SONGS personnel in refocusing their CAP backlog.
- ⇒ Tim Johnson & Miles Baumgartner: Joined the NWI team providing their work control expertise in scheduling and performance metric development.
- ⇒ Dave Hoffman with Tallman Whitler: Working together to improve the leadership behaviors through psychometrics for SONGS Operations crew managers, supervisors and incumbents
- ⇒ Bill Cheever : Providing operational expertise to Monticello EPU project management.
- ⇒ Dave Fan: Newly added associate Mr. Fan is assisting the electrical design folks at Xcel Energy’s Monticello Nuclear Plant.

# NWI Products And Services

## Check out our Products & Services



NWI Consulting, LLC is a professional consulting firm specializing in power generation performance improvement services, specialized learning interventions, computer-based training, organizational development, accreditation renewal/recovery, and professional staff augmentation. NWI has a broad portfolio of U.S. and international clients in the electric generation industry and is headquartered in Knoxville, TN. NWI's power plant services includes supporting such areas as Operations, Training, Outage Management, Nuclear Oversight, Maintenance, Radiation Protection, Chemistry, and Emergency Preparedness. NWI has assisted clients in other, more specialized efforts including Leadership/Management Development, Executive Coaching, Conflict Resolution, Multi-Discipline Assessments, Root Cause Analyses, Performance Improvement, NRC 95-002 & 95-003 and Preparations and specialized Safety Analysis (50.59).

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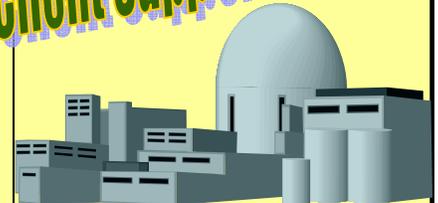
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*The following key activities are being conducted by NWI professionals...*

- Bruce Power Training Support
- SONGS Training, Operations, Work Control, Performance Improvement Program support
- Palo Verde 's Procedure Development and SGR Projects.
- DC Cook Training and Human Performance Support
- TVA Nuclear Power Group—Technical Human Perf. Support
- Xcel's Monticello EPU Project Support
- Entergy—Nuclear Oversight/Safety Review

## Client Support Update



## Thank You

We wish to express special thanks to the following clients for making NWI a preferred consulting company.

- AEP's D.C. Cook Nuclear Power Plant
- APS's Palo Verde Nuclear Station
- Bruce Power
- Exelon Nuclear Partners
- Entergy
- SCE's San Onofre Nuclear Generating Station
- Xcel Energy's Monticello Nuclear Generating Plant
- TVA Nuclear Power Group's Watts Bar, Sequoyah and Browns Ferry Nuclear Plants

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