Washington Group International

Communication with the dead is only slightly harder than talking to an Engineer

(Implementation of Human Performance (HU) for Engineers at DOE's Savannah River Site)

Bill Rigot
Fellow Technical Advisor
Washington Savannah River Co.

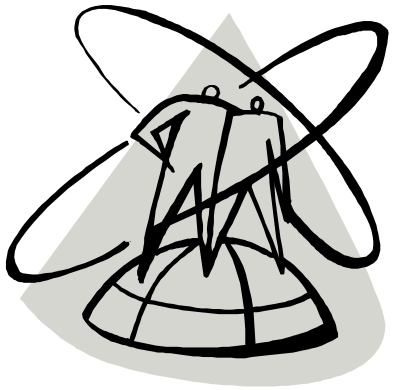
SRS savannah river site

WIIFM?
(What's in it for me?)

How do I leverage my investment in Human Performance for Engineers and Technical Staff in order to increase quality and reduce errors?

Savannah River Site

- 310 Square Mile Federal reservation operated by the Washington Savannah River Co. (WSRC) for the Department of Energy
- We serve the nation through safe, secure, cost-effective management of our nuclear weapons stockpile, nuclear materials, and the environment.



NUREG/CR-6753

- **Idaho National Energy & Environment Laboratory (INEEL) study commissioned in 2002 to look at Human Error contribution to risk in operating events**
  - Expectation was that contribution of Latent Errors would decrease over time relative to Active Errors (i.e. 70%)
- **The study found:**
  - 81% of contribution of Human Error was latent
  - Engineering contributed to 81% of Latent Errors
  - Maintenance contributed to 76% of Latent Errors
  - Management/Supervision actually contributed to only 30% of Latent Errors

NUREG/CR-6753

- **Much of the work of the nuclear industry post TMI was directed to improved operation, equipment reliability, and Human Performance including management and supervision**
  - This was the area where needed improvements were noted
- **Emphasis on management/supervision contribution to Latent Organizational Weaknesses masked engineering's significant contribution to Human Error (and to a lesser extent, the role of maintenance in Latent Errors)**
- **The realization that engineers contributed differently to Latent Errors led INPO to develop separate tools for engineers**

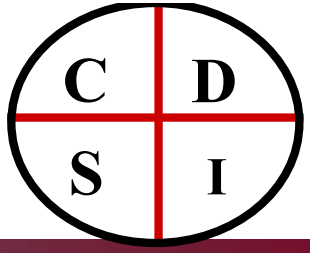
Why Personality Profiles Are Important

- **Engineers typically work in Knowledge Based or Rule Based Performance Mode**
- **Mistakes that engineers make are more subtle, often require special knowledge (or an event) to uncover, and can take years to discover**
- **Because of their personalities, engineers tend to be critical of others, but not self critical *(nor do they accept criticism well)***
- **Understanding the personality of engineers is a key to Human Performance implementation**
- **Self awareness by engineers of the strengths and weaknesses of their own personality profiles allows them to be more comfortable with accepting constructive criticism**

Why the DISC Profile?

- Easy to administer
- Results are intuitive to employees as well as management
- Useful for teambuilding, mentoring, employee development, etc.
- Natural follow-on to Meyers-Briggs profiles

The Four Quadrants



- ***D*** **– Dominance, Control**
  - How you respond to problems and challenges
  - This profile describes many managers and project managers
- ***I*** **– Influence, Contacts**
  - How you influence others to your point of view
  - This profile describes many trainers, and Human Performance practioners
- ***S*** **– Steadiness, Consistency**
  - How you respond to the pace of the environment
  - This profile describes many Human Resources and Administrative professionals
- ***C*** **– Conscientiousness, Compliance**
  - How you respond to rules/procedures set by others
  - This profile captures over 70% of all engineers at WSRC

Emotion Factor

Fear

Anger

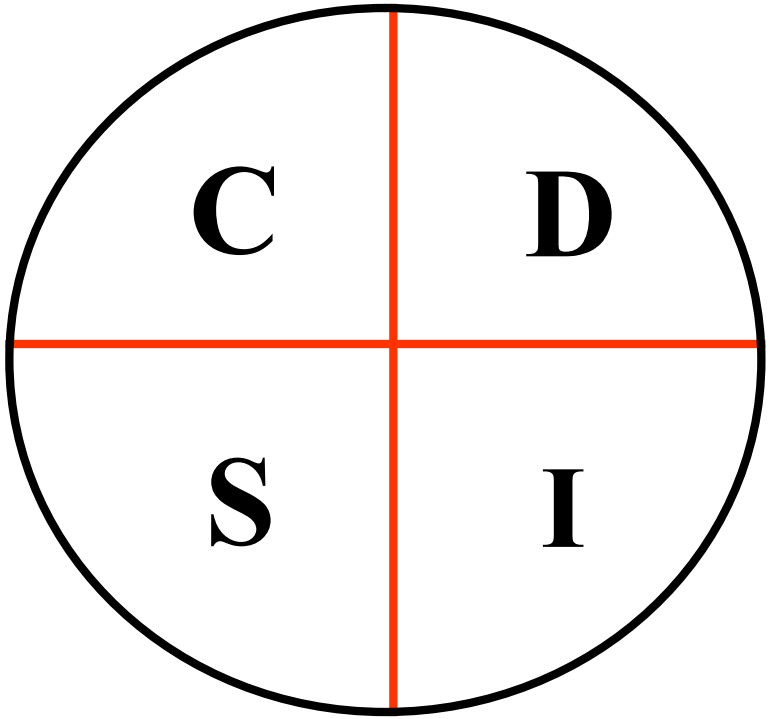
TASK

By the Book

No Fear

Short Fuse

Long Fuse



INTROVERTED

EXTROVERTED

Show no Emotion

Emotive/Open

High Trust

Skeptical

PEOPLE

Non-demonstrative

Optimism

Conscientiousness

Perfectionist

Courteous

Mature

Accurate

Conscientious

Evasive

Fact-finder

Restrained

Precise

Diplomatic

High Standards

Patient

Systematic

Analytical

Methodical

Conventional

Sensitive

Exacting

Value of the *C* to the Team

- Objective thinker
- Maintains high standards
- Defines, clarifies, gets information, criticizes and tests
- Task-oriented
- Asks the right questions
- Diplomatic
- Pays attention to small details

Ideal Environment for the *C*

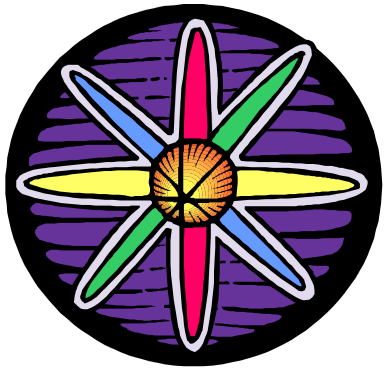
- Where critical thinking is needed and rewarded
- Assignments can be followed through to completion
- Technical, task-oriented work, specialized area
- Noise and people are at a minimum
- Close relationship with small group of people
- Where quality and/or standards are important

Communicating with the *C*

DO:	DO NOT:
Prepare your case in advance	Be disorganized
Approach them in a straightforward, direct manner	Be casual, informal or personal
Use a thoughtful approach; build credibility by looking at all sides of the issue	Force a quick decision
Present specifics and do what you say you can do	Be vague about expectations or fail to follow-through
Draft an “action plan” with scheduled dates and milestones	Over-promise results
Take your time, but be persistent	Be abrupt and rapid
Support disagreements with facts or testimonials from respected people	Appeal to opinion or feelings as evidence
Allow them their space	Touch them

Engineering HU Implementation at SRS

- **Gap Analysis**
- **Executive level training**
- **Established HU Steering Committee**
- **Benchmarking**
- **Management training**
- **Selected Engineering HU tools**
- **Engineering HU Fundamentals training**
  - Selected case studies to reinforce fundamentals and tools
- **Refined tools to meet specific needs**



WSRC Management Buy-In

- **Only limited support from DOE customer initially to implement Human Performance**
  - Pilot conducted with DOE support at Hanford, WA
  - DOE SR has recently begun to recognize HU value
- **DOE HQ Human Performance Office conducted initial HU Executive level training for both DOE and WSRC senior managers**
- **Assigned Senior Vice President as Executive sponsor**
- **Established HU Steering Committee comprised of HU savvy executives**
- **Conducted HU training for managers first, followed by engineers & knowledge workers, then workers**
- **Reinforced with continuing training emphasizing WSRC specific case studies**

WSRC Tool Selection

- **Benchmarked against Ontario Power Group (OPG)**
  - Selected because of similar organizational structure
  - Compared OPG's tools against significant SRS engineering related events
- **Selected 5 tools:**
  - Technical Pre-job Brief
  - Self Checking
  - Peer Review
  - Questioning Attitude
  - Validate Assumptions
- **Tailored tools to WSRC business models**
- **Reinforced with case studies at monthly Safety meetings**

Success Stories

- Use of Questioning Attitude tool by Shift Technical Engineer prevents Technical Safety Requirements (TSR) violation in Tank Farms
- Pre-job brief tool in Tritium Facility leads to better understanding of what engineers don't know
- Discovery of a radiological source term error in documentation for Transuranic drums buried in Burial Grounds contrary to State permit (Questioning Attitude/Validate Assumptions tools)
- Discovery of non-conservative error in 5 year old engineering calculation supporting calibration of Safety Related conductivity probe (Questioning Attitude/Validate Assumptions tools)

STREAM Analysis

- Implemented as an organizational tool Summer 2006
- Upgraded training at INPO Fall 2006
- Completed 5 analyses across 4 Area Projects plus Los Alamos National Laboratory
- Results helped management understand where to apply limited resources to more effectively drive improvements
- Core issues are starting to develop as more STREAM analyses are completed

In Summary

- **Human Performance principles and tools work for engineers**
  - Some tools are better than others
  - Tool selection must be tailored to individual company needs
- **Engineers have different personalities from other nuclear workers. This must be taken into account by managers in order to effect desired changes**
- **Excellence in Engineering Human Performance is the next opportunity for our industry to demonstrate measurable improvements in error reduction**