DYONYX

A PUP Cannot Give Birth to Better HUP

Despite spending $millions on Procedure Upgrade Projects (PUPs), there is no difference in Human Performance (HUP).

1 Do Procedure Upgrade Projects (PUPs) make a difference?

John C. Summers, Institute of Nuclear Power Operations (INPO) Manager Human Performance, asked conferees at the 20th Annual Procedure Symposium to answer by a show of hands: "Who among you has been involved in a Procedure Upgrade Project, a PUP?" The response was an almost unanimous show of hands. "Next question: with a show of hands, how many among you would say that a PUP costing $3 million to $5 million, sometimes sequentially costing $3 million to $5 million, has made a difference." The response was not so many showing hands. "This question: How many senior nuclear managers or executives say a PUP has ever made a difference? I'll tell you: zero."

2 "Why is that? Why don't PUPs make a difference?"

The most frequent answer is: "Because we don't get any support." Senior and executive management provide $millions in resources, sometimes sequentially; and the reason given that PUPs make no difference is lack of support! Hardly.

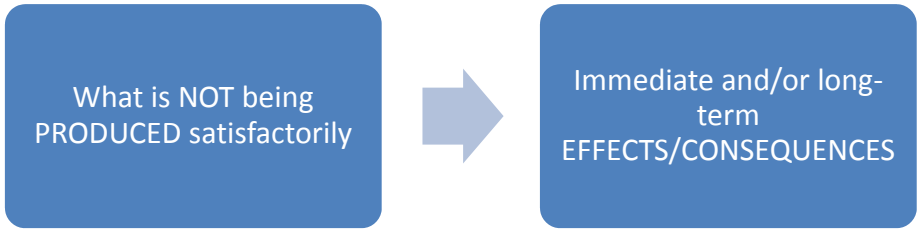
Just as disappointing as the situation is in itself, neither utility persons nor INPO offers a cause derived from root cause analysis. These disappointing circumstances remind us of when Albert Einstein said the definition of insanity is doing the same thing over and over again and expecting different results.

The track record of PUP Project results have been temporary relief from regulatory, quasi-regulatory, and management pressure for improvement where procedures are involved in known performance failures. After the millions of dollars are spent, the pressure is briefly relieved since no one can imagine what more could have done, having spent all that money. Victory is declared. Improvement results are often cosmetic, superficial and transitory.

PUPs generally result in regulatory relief; but PUPs rarely make a difference in terms of human performance improvement.

3 We ask again. Why don't PUPs make a difference?

Let's use DIAGNOSTIC Front-End Analysis to take a systematic approach to answer this question, starting with the GENERAL PROBLEM STATEMENT. The General Problem Statement is…



In order to understand the possible causes of a problem, we must know the accomplishment-deficient performers and the deficient tasks in order to write a Root Performance Deficiency statement below:

Root Performance Deficiency Statement:
Methods and procedure developers do NOT analyze process NOR detailed behavior of tasks and do NOT decide on a behavior-based format. This results in performance errors from "continuous use" procedures with consequential plant failures and high costs.

In other words, PUPs do not make a difference because procedure upgrade projects continue to focus on verbiage, language, grammar and text format as such. Whatever procedure improvements that do result are incremental.

Our experience has indicated that the focus on these "traditional" attributes is due to the lack of applying two critical concepts as follows:

ROOT CAUSE:
Methods and procedure developers do NOT know how to:
1. *Perform process engineering and analysis, and*
2. *Analyze and format BEHAVIORAL CONTENT for optimum human performance.*

When we formalize our past experiences we establish "Tradition"

"Tradition" = The Living ideas of Dead People

Business Enterprises have institutionalized many "Traditions" and have created "Traditionalism"

"Traditionalism" = The Dead ideas of Living People

4 The Performance Model

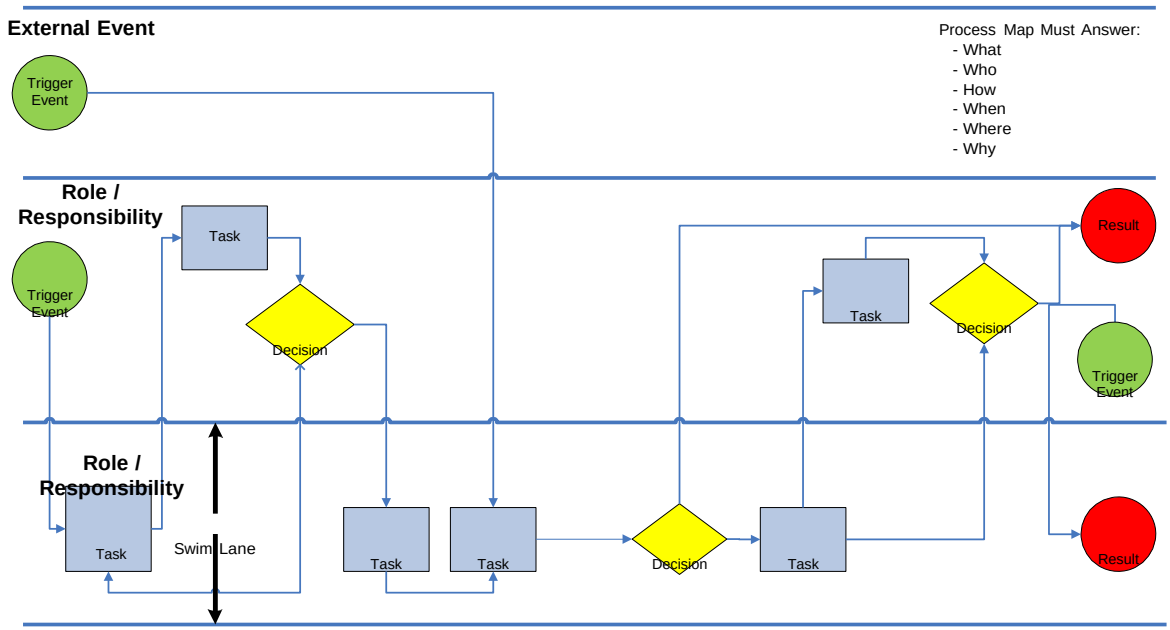
Root Cause of performance errors associated with continuous use procedures is therefore "rooted" in the lack of process engineering.

Most people among the nuclear industry have been exposed to the performance model: Behavior + Results → Performance. The next level of description detail decomposes behavior.

5 Process Engineering and Flow Diagrams

Effective process engineering uses "top-down" analysis starting with determining overall accomplishment and main process results. Each of these main processes is laid out in logical Flow Diagrams. A valuable type of flow diagram is called a "swim-lane" diagram because it organizes process relationships among jobs or role responsibilities.

For each process, the outputs or "Results" are defined; then the inputs are identified (Trigger Events); and then the Process(es)or "Tasks" that convert the inputs (Events) to outputs (Results) are developed — and it is done in that order.

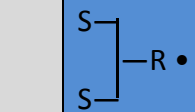
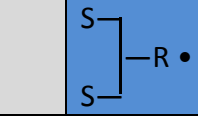


6 Converting Flow Diagrams to Methods and Procedures

Successful conversion of Flow Diagrams to methods and procedures must employ the application of these concepts three basic structures for behavior:

- Simple chain
- Discrimination
- Generalization

Simple chain behavior is not necessarily simple to do, especially long sequences; it is called "simple" chain because it is structurally simple. A graphic representation (sometimes called paradigm) of simple chain behavior goes like this: (where S = Stimulus & R = Response) Simple chain, sequential behavior, should be represented in procedures and methods as sequential steps.	Simple Chain (Sequential) Behavior Description S—R • S—R • S—R •

Discriminations in behavioral terms involve "telling the difference between," "telling the differences among," decisions, and the like. A graphic representation of discrimination behavior is shown at right:	Discrimination Behavior Description S—R • S—R •
Generalizations in behavioral terms are "rules." Rules are very difficult to discern in performance for various reasons. Missing, incomplete, or inadequate representation of rules are often the source of performance problems. Graphically a rule is shown as at right:	Generalization Behavior Description 
A discrimination among a generalization is behavior called "a concept," which is the hardest "thinking" behavior there is.	"Concept" Behavior Description S—R • 

7 Application of Behavior Structure to Procedure Format

The most general and over-arching guidance for developing a procedure step is the "15-second rule." A step should be written such that the performer can read and at least start to perform the step within 15 seconds. We say that this rule is based on sound behavioral theory; in fact, it is based on human physiology — fifteen seconds is the length of SHORT-term MEMORY. Also the number of steps in any one task sequence should be grouped within the parameters of Human Cognition (known as "Span of Control") so that task groups are constrained to limits of seven – nine steps.

Procedure steps have to be clear, precise and brief. Steps should describe the performance itself, not the rationale for the performance. Complying with the 15-second rule would be pretty straightforward were it not for complex behavior involving discriminations, generalizations and combinations (concepts). This non-linear behavior cannot usually be fashioned into a set of conditional statements, placed into sequences and subsequences and meet the 15-second rule.

Failure to fulfill the 15-second rule results in the following for the procedure user:

- Frustration and fatigue
- Place keeping problems
- Faulty logic
- Misinterpretation
- Performance errors

Linear behavior should be documented as STEPS in SEQUENCE – that can be performed in strict sequence or in optional sequence as required by the performance.

Linear Sequence of Steps

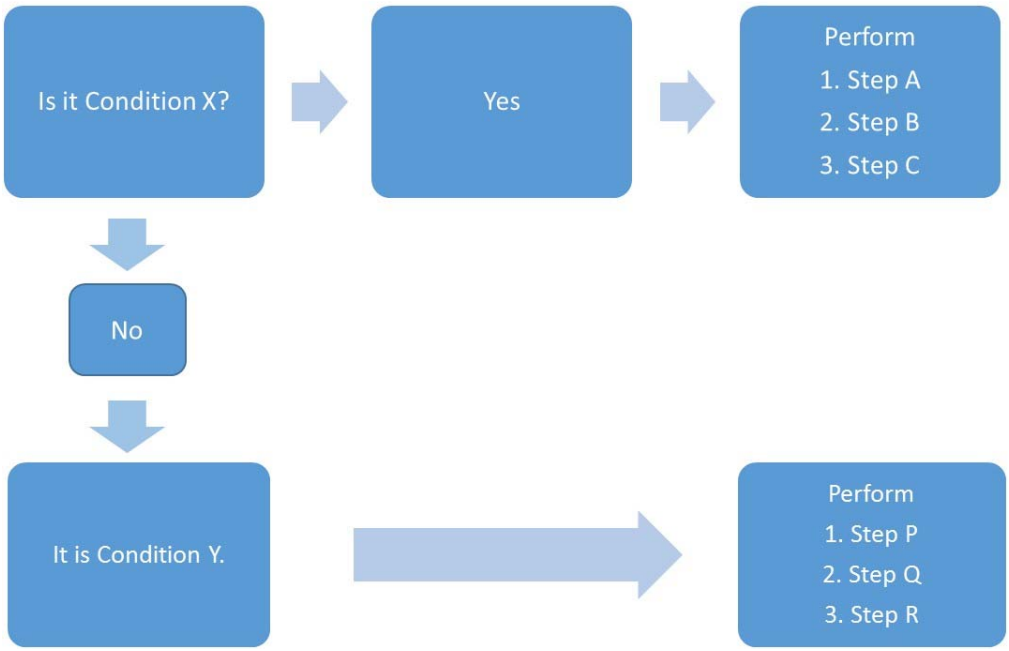
PERFORM as follows:

1. *Step A*
2. *Step B*
3. *Step C*

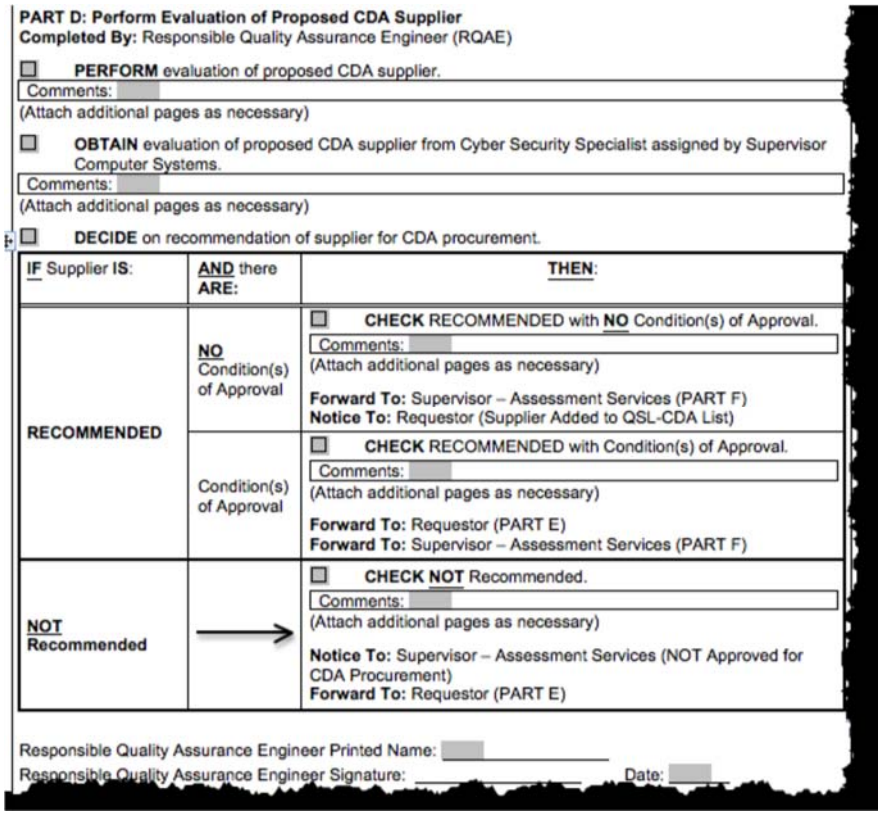
Non-linear behavior should be documented in DECISION TABLES or ALGORITHMS.

Decision Table	
IF	THEN PERFORM
Condition X	1. Step A 2. Step B 3. Step C
Condition Y	1. Step P 2. Step Q 3. Step R

OR Algorithms



Practical Example of Complex Behavior (Initial Discrimination followed by Alternate Sequence Decisions and Steps)



PART D: Perform Evaluation of Proposed CDA Supplier
Completed By: Responsible Quality Assurance Engineer (RQAE)

☐ **PERFORM** evaluation of proposed CDA supplier.
Comments:
(Attach additional pages as necessary)

☐ **OBTAIN** evaluation of proposed CDA supplier from Cyber Security Specialist assigned by Supervisor Computer Systems.
Comments:
(Attach additional pages as necessary)

☐ **DECIDE** on recommendation of supplier for CDA procurement.

IF Supplier **IS**:	**AND** there **ARE:**	**THEN**:
RECOMMENDED	**NO** Condition(s) of Approval	☐ **CHECK** RECOMMENDED with **NO** Condition(s) of Approval. Comments: (Attach additional pages as necessary) **Forward To:** Supervisor – Assessment Services (PART F) **Notice To:** Requestor (Supplier Added to QSL-CDA List)
	Condition(s) of Approval	☐ **CHECK** RECOMMENDED with Condition(s) of Approval. Comments: (Attach additional pages as necessary) **Forward To:** Requestor (PART E) **Forward To:** Supervisor – Assessment Services (PART F)
NOT Recommended	→	☐ **CHECK NOT** Recommended. Comments: (Attach additional pages as necessary) **Notice To:** Supervisor – Assessment Services (NOT Approved for CDA Procurement) **Forward To:** Requestor (PART E)

Responsible Quality Assurance Engineer Printed Name:
Responsible Quality Assurance Engineer Signature: Date:

8 Summary

Whether "continuous use" methods and procedures are undergoing initial development or upgrade, real success depends on these critical factors:

- Determining overall accomplishment and main accomplishments
- Obtaining task data
- Deciding on procedure vs. memory (training)
- Deciding on training support
- Logically diagramming processes that convert inputs to outputs
- Converting flow diagrams to methods description
- Formatting content consistently with behavior analyzed
- Editing methods description:
  - Content
  - Structure
  - Language
    - Consistency
    - Simplicity
    - Clarity

Note that language and grammar are addressed in due course in methods and procedure development, but performance description is the important thing; and as our great friend and human performance expert Dr. Joe H. Harless (1940-2012) said…

An ounce of analysis is worth a pound of almost anything else!

WHITE PAPERS

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[1] Human Performance (HUP), also known as Human Performance Technology (HPT) and Human Performance Improvement (HPI)), "uses a wide range of interventions that are drawn from many other disciplines, including total quality management, process improvement, behavioral psychology, instructional systems design, organizational development, and human resources management" (ISPI, 2007).

[2] Diagnostic Front-End Analysis developed by Dr. Joe Harless in 1970, is a logical, straight-forward assessment of the identified issue. The gist of this approach is to state the problem as specifically as possible, offer multiple cause hypotheses, and then through the investigative process, either support or refute the listed hypotheses (Ref Examiner.com).

For more information:
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