Predicting Errors using Human Performance Measurement Tools

Human Performance Fundamentals (2017)

T. Shane Bush
Peggy S. Bush
(208) 221-9378
2020 Stosich Lane
Idaho Falls, ID 83402
BushCo@cableone.net
Purpose of Course

To proactively prevent “Unwanted Outcomes” triggered by human error.
Suspect in Colo. prison chief death got out early

By NICHOLAS RICCARDI
Associated Press

DENVER — Because of a paperwork error, the suspect in last month’s killing of Colorado’s corrections chief was freed from prison in January — four years earlier than authorities intended.

Judicial officials acknowledged Monday that Evans Spencer Ebel’s previous conviction had been inaccurately recorded and his release was a mistake.

In 2008, Ebel pleaded guilty in rural Fremont County to assaulting a information that went to the state prisons, the statement said.

So on June 28, prison officials saw that Ebel had finished his court-ordered sentence and released him. They said they had no way of knowing the plea deal was intended to keep Ebel behind bars for years longer.

Two months later, Ebel Charles Barton, chief judge of the 11th Judicial District, and court administrator Walter Blair.

Leon’s father-in-law told The Denver Post, “I thank somebody for taking accountability for the error, however it doesn’t bring Nata back.”

The court officials vowed to review their procedures to ensure the same
Patient sues after surgeons remove wrong testicle

A patient suffering from cancer who had a healthy testicle removed by mistake is suing the hospital where he had the operation.
The 48-year-old company director says the botched operation has left him unable to have children.
He had gone into an operating theatre expecting a cancerous testicle would be removed, but 40 minutes after the operation a doctor realised the blunder.
The healthy testicle was frozen while a plastic surgeon dashed to the scene and tried to undo the damage done to the patient, who comes from a village in Wiltshire.
The man has asked not to be named ahead of legal proceedings against Salisbury District Hospital. He is hoping to be awarded compensation.
Although he already has family from a previous relationship, the man will not be able to have more children with his present partner. Last night, he said: 'It seems I can no longer father children. I have gone through incredible stress and strain. 'The matter is in the hands of my solicitor.'
Yesterday a patient watchdog called for a thorough investigation. A spokesman for the Wiltshire Involvement Network said: 'This is a tragic thing to have happened.'
'Obviously there needs to be an investigation by the hospital as to how it came about. With this type of operation men need confidence they can put their trust fully in the hospital.'
Salisbury NHS Foundation Trust, which runs the hospital, said in a statement: 'We have received notification from solicitors of pending legal action.
'This is a regrettable incident and the trust once again offers its sincere apologies to the patient.'
'It added: 'The patient was informed straight after the completion of surgery of the situation and that additional surgery had taken place to rectify this.'
'The trust carried out a thorough investigation and as part of this the trust immediately made changes to its processes.'
But there is one small problem: The quote actually originated not with the late poet and civil rights champion, but with a children's book author Joan Walsh.
Error?

Un-intentional Deviation from a Preferred Behavior
Error?

Something you didn’t intend to do!
Reducing Errors should not be the primary focus. It should be reducing the consequences of errors!

HENCE ZERO IS ACHIEVABLE!!!!!
Reducing Errors should not be the primary focus. It should be reducing the consequences of errors!

**HENCE ZERO IS ACHIEVABLE!!!!!**
Human Performance

Part One – Why A Human Performance Approach
Part Two – Individual
Part Three – Organization
Part Four – Leader
Part Five – Case Studies, Implementation, & Review
Objectives

1. Explain what constitutes an unwanted outcome

2. Describe why the applications of Human Performance are important in reducing the frequency & severity of unwanted outcomes

3. Explain how individual behavior affects the frequency & severity of unwanted outcomes

4. Explain how Organizational Processes and Values affects the frequency & severity of unwanted outcomes
Objectives

5. Explain how leader behavior affects the frequency & severity of unwanted outcomes

6. List the error prevention tools available to help anticipate and prevent error likely situations

7. Given a case study as a guide, explain the attributes of a successful Human Performance Improvement Process

8. Explain what we can do individually and as a company to meet the objectives of this course
Leadership
CEREBRAL

LEFT

Analytical
Math
Compliance
Regulated
Mandatory
Text
Logical
Factual

RIGHT

Creative
Synergistic
Imaginative
Holistic
Contextual
Futuristic
Intuitive
Feelings

Leadership
Discretionary Effort

Discretion of Employee

Percent of Effort

30%

50%

100%
A Simple Model

Performance outcome $Y$ is a function of factors $X$.

$$Y = f(x)$$
The real challenge is to identify those factors that do and don’t drive performance.

Captain Marty McDonough
Four Most Common Ways to Reinforce Behaviors:

1. Positive
2. Negative
3. Extinction, Nothingness
4. Punishment
The Challenge: Identifying what factors affect people performance
Why a Human Performance Improvement Approach?

- 80% Human Error
- 20% Equipment Failures
- 70% Latent Organization Weaknesses
- 30% Individual
Industry Event Causes
due to human performance

1,676 = Org behavior (68%)
806 = Individual behavior (32%)

How Bad Design Wrecked Steve Harvey’s “Universe”.

Image Credits: ABC News
MISS UNIVERSE 2015 ELIMINATION CARD - SHOW FINALS

3 TO 1

2nd Runner Up

COLOMBIA

1st Runner Up

USA

MISS UNIVERSE 2015

PHILIPPINES
Miss Universe 2015 Elimination Card - Show Finals

2ND RUNNER UP
USA

1ST RUNNER UP
COLOMBIA

MISS UNIVERSE
PHILIPPINES
Facts about Human Error

• It thrives in every industry
• It is a major contributor to events and unwanted outcomes
• It is costly, adverse to safety and hinders productivity
• The greatest cause of human error is weaknesses in the organization, not lack of skill or knowledge
• Error rates can never be reduced to zero
• Consequences of errors can be eliminated
Principles

1. People are fallible, and even the best make mistakes.

2. Error-likely situations are predictable, manageable, and preventable.

3. Individual behavior is influenced by organizational processes and values.

4. People achieve high levels of performance based largely on the encouragement and reinforcement received from leaders, peers, and subordinates.

5. Events can be avoided by understanding the reasons mistakes occur and applying the lessons learned from past events.
Principles

1. People are fallible, and even the best make mistakes.

2. Error-likely situations are predictable, manageable, and preventable.

3. Individual behavior is influenced by organizational processes and values.

4. People achieve high levels of performance based largely on the encouragement and reinforcement received from leaders, peers, and subordinates.

5. Events can be avoided by understanding the reasons mistakes occur and applying the lessons learned from past events.
MEDICAL ERRORS AND MISTAKES
Individual

Plant

Worker

Processes

Values
## Error Precursors

**short list**

<table>
<thead>
<tr>
<th>Task Demands</th>
<th>Individual Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Time pressure (in a hurry)</td>
<td>• Unfamiliarity w/ task / First time</td>
</tr>
<tr>
<td>• High Workload (memory requirements)</td>
<td>• Lack of knowledge (mental model)</td>
</tr>
<tr>
<td>• Simultaneous, multiple tasks</td>
<td>• New technique not used before</td>
</tr>
<tr>
<td>• Repetitive actions, monotonous</td>
<td>• Imprecise communication habits</td>
</tr>
<tr>
<td>• Irrecoverable acts</td>
<td>• Lack of proficiency / Inexperience</td>
</tr>
<tr>
<td>• Interpretation requirements</td>
<td>• Indistinct problem-solving skills</td>
</tr>
<tr>
<td>• Unclear goals, roles, &amp; responsibilities</td>
<td>• “Hazardous” attitude for critical task</td>
</tr>
<tr>
<td>• Lack of or unclear standards</td>
<td>• Illness / Fatigue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Environment</th>
<th>Human Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Distractions / Interruptions</td>
<td>• Stress (limits attention)</td>
</tr>
<tr>
<td>• Changes / Departures from routine</td>
<td>• Habit patterns</td>
</tr>
<tr>
<td>• Confusing displays or controls</td>
<td>• Assumptions (inaccurate mental picture)</td>
</tr>
<tr>
<td>• Workarounds / OOS instruments</td>
<td>• Complacency / Overconfidence</td>
</tr>
<tr>
<td>• Hidden system response</td>
<td>• Mindset (“tuned” to see)</td>
</tr>
<tr>
<td>• Unexpected equipment conditions</td>
<td>• Inaccurate risk perception (Pollyanna)</td>
</tr>
<tr>
<td>• Lack of alternative indication</td>
<td>• Mental shortcuts (biases)</td>
</tr>
<tr>
<td>• Personality conflicts</td>
<td>• Limited short-term memory</td>
</tr>
</tbody>
</table>
Limitations of Human Nature

❖ Avoidance of **mental strain**
❖ Inaccurate **mental models**
❖ Limited working **memory**
❖ Limited **attention** resources
❖ **Pollyanna** effect
❖ Mind **set**
❖ Difficulty **seeing** own errors
❖ Limited **perspective**
❖ Susceptible to **emotion**
❖ Focus on **goal**
Human Information Processing

- Sensing
- Thinking
- Acting

Shared Attention Resources

Information Flow Path

Source: Wickens, 1992
Victims of our own Success
Human Performance Fundamentals

Defenses

• Hard -

• Soft -
Two Kinds of Error

Active Error

Latent Error
Culpability Decision Tree

Was the behavior intended?  
- No  
  - Medical Restrictions?  
    - No  
      - Did employee knowingly violate requirement?  
        - No  
          - Pass substitution test?  
            - Yes  
              - History unsafe acts?  
                - Yes
                - Corrective training or counseling indicated
                - Blameless error
                - No
            - No  
              - Deficiencies in training & selection or inexperience?  
                - No
                - Yes
                - Possible negligent error
              - No
              - Possible intentional Violation
            - Yes
            - Blameless error
          - Yes
          - Possible intentional violation
        - Yes
        - System induced error
      - Yes
      - Intentional, sabotage
    - Yes
    - System induced violation
  - Yes
  - Were the consequences intended?
    - No
    - Were they communicated and clearly understood?
      - Yes
      - Possible intentional violation
      - No
      - System induced violation
    - Yes
    - Were requirements available, workable intelligible & correct?
      - Yes
      - System induced violation
      - No
      - Deficiencies in training & selection or inexperience?
        - No
        - Yes
        - Possible negligent error
        - Blameless error
      - No
      - Possible intentional Violation
    - No
    - Intentional, sabotage
  - Yes
  - Intentional, sabotage

(c) Intentional, sabotage,  
(f) System induced violation  
(g) Possible intentional violation  
(j) Possible intentional Violation  
(k) System induced violation  
(o) System induced error
Case Study

Air Ontario Flight 363 Fokker F28
Dryden, Canada
March 10, 1989
Performance Modes -- Attending Problems

- **Inattention**
- **Misinterpretation**
- **Inaccurate Mental Picture**

Familiarity (w/ task)

Attention (to task)

Low  |  High
---   |  ---
Low  |  High

The Blame Cycle

Human Error

More flawed defenses & error precursors

Latent organizational weaknesses persist

Management less aware of jobsite conditions

Less communication

Reduced trust

Individual counseled and/or disciplined

More flawed defenses & error precursors
Questioning Attitude Meter

Healthy Uneasiness/Wariness

Uncertain/Unsure

Too Certain/Too Sure
Human Performance Tools

- Critical Steps
- Enhanced Pre-Job Briefing
- Peer Check
- Self Check
- Independent Verification
- Error Traps
- Just Culture
- Effective Communication
- Questioning Attitude
- Feeling of Uneasiness

- Enhanced Turnover
- 3 way communication
- Error Precursors
- Performance/Error Modes
- Devils Advocate
- Place keeping
- Poka Yoke
- SAFE Dialogue
- Discovery Clock
- STAR
- Training
What is the Organizations Role?

- Support the Education and Implementation of the HPI process
- Encourage Accountability and the Development of a Just Culture
- Encourage the use of the HPI tools

What are the Employee’s Responsibilities?

- Have a Questioning Attitude
- Develop a strong sense of Accountability
- Use of the HPI tools, Use the HPI tools, Use the HPI tools
HPI Implementation Plan

- Stage 1: Obtain senior management commitment.
- Stage 2: Establish a steering committee.
- Stage 3: Perform a self-assessment of the current situation.
- Stage 4: Develop a human performance improvement strategy and plan.
- Stage 5: Communicate with and empower stakeholders.
- Stage 6: Implement the strategy and plan.
- Stage 7: Evaluate and improve the program.
- Stage 8: Maintain the program.

8 Initiative Areas
1. Organization Structure
2. Expectations
3. Rewards and Reinforcement
4. Communication and Education
5. Training
6. Work Process & Incident Analysis
7. Assessments
8. Performance Monitoring
Human Performance Fundamentals
Leading Indicators

I. Error Rates
II. Discovery Clock Resets
III. Latent Condition Identification
IV. Error Precursor Trending
V. Re-work
VI. Culture Survey – Just Culture
VII. Critical Step Identification
VIII. Workforce Human Performance Education
IX. Enhanced Pre-Job Usage
X. Positive to Negative Reinforcement Ratio
XI. Human Performance Defense Usage
The Dirty Little Secret of Root Causes

Drill into conduit

Fire Hydrant

Electrical Panel

Back Into Power Pole

Root Cause

Changes

Root Cause

Habit Patterns

Root Cause

Unclear Goals

Root Cause

Assumptions

Time Pressure

Habit Patterns

Unclear Goals

Stress

New Technique

Simultaneous

Hazardous Attitude

Workarounds

Hidden System Response

Complacency

Repetitive Actions

Latent Organization Weaknesses