This guide provides background information on the Savannah River Site's use of Human Performance Improvement (HPI) Dynamic Learning Activities (DLAs). It also provides practical information that an HPI Practitioner can use to prepare for and deliver an HPI DLA.

HPI Dynamic Learning Activities (DLA)s have been introduced to Savannah River Site by the HPI Working Group (HPIWG) in an effort to provide practical exercises that support HPI principles. DLAs are designed to be hands-on activities that engage all participants in the use of HPI error reduction tools and error precursors. They require participants to identify error precursors that created challenges during the activity and then determine which error reduction tool(s) would effectively mitigate the challenges. Postactivity discussions may include related topics such as Disciplined Operations, teamwork, attention-to-detail, etc.

HuPerT electronic HPI training consoles (similar to STAR trainers used in the past), have been procured and will be available in the future to further enhance out Human Performance Improvement tools. Additional information can be obtained from HPIWG Chairperson Daryl Smoldt at 803-761-4768.

Human Performance Improvement Dynamic Learning Activities are designed to be very "loose", with no lesson plans, Enabling Learning Objectives, or other typical Training factors. They work best if the work group "influencers" deliver the exercises, not necessarily the trainer. It helps to have an established relationship with the audience. They should be fun and engage everyone in the room in HPI error reduction tools and error precursor discussions. DLA's are designed to provide practical exercises that deepen the participants understanding of HPI Principles.

The activities have been performed with numerous groups around the site and they often take different directions based on the participants. We have seen success with the implementation of Dynamic Learning Activities to assist in recognizing error precursors and identifying the appropriate error reduction tools to reduce errors.

There are approved DLA's on the HPI website through InSite.

To get to the DLA's, open your browser and go to Insite. In the top right-hand corner, in the search bar, type, "HPI". Then, click the "Q". The results will show "Human Performance Improvement" and "Human Performance Improvement Logo", click on the "Human Performance Improvement" link. You will be redirected to the HPI home screen. In the ribbon, click on the "resources" tab. About halfway down the webpage, you will see, "Dynamic Learning Activity (DLA)".

DYNAMIC LEARNING ACTIVITY (DLA) AVOID THE HIDDEN HAZARDS BOARDGAME HPIDLA01 PICK A NUMBER HPIDLA02 SNAP CIRCUIT SUMP LEVEL ALARM HPIDLA03 SNAP CIRCUIT STARSHIP ENGINE HPIDLA04 BIO PLANT BOLT WIDGET ASSEMBLY HPIDLA05 WIN, LOSE OR DRAW HPIDLA06 TOWER BUILDING HPIDLA07

The DLA's are listed under that tab as shown in the image. Included in the titles of the DLAs, there are course codes that can assist with keeping record of which activities you have completed and vice versa.

The HPIWG is continuously working on new DLAs and will load them onto the web page as they are developed. Please contact the HPIWG Chairperson for information about associated supplies.

Training Required

At a minimum, training requirements are as follows:

- "SRSHP001 Human Performance Improvement", which can be found above the DLA section on the HPI Website.
- Attend performance of a DLA with an experienced HPI Practitioner.

DLA Construction

There are four parts of a DLA.

- Preparation
- Facilitator introduction and pre-activity briefing with the participants
- Activity
- Post-activity discussion

Preparation

- The first step to being ready to perform a DLA is to prepare.
- Review and understand the DLA and practice the use of it.
- Preparation for a DLA includes reminders to make copies, selecting a suitable location, and bringing associated supplies.
- Consider some of the errors you could introduce during the DLA.

Facilitator introduction and pre-activity briefing with the participants

- The facilitator introduction is the "ice breaker" for the participants.
- Introduce yourself and get to know your audience.
- You want to get their attention and introduce the idea that they are able to expand their mind with the concepts of HPI by having a hands-on experience.
- Let the participants know this activity will be fun.
- Introduce the activity you chose.
- Briefly explain what the activity is, and what the expected outcome of performing the activity will be.

Activity

- Follow the Activity guidance in the selected DLA.
- While the participants are performing the DLA, the HPI Facilitator can insert errors, listed below are a few examples.
 - o Time Pressure: set time goals per task and make it a competition.
 - Communicate need to complete quickly or imply that there is a reward for quick completion (pride or bragging rights).
 - Emphasize that the task is simple or that they have above average ability to easily complete.
 - Plan distractions, for example, have a visitor come and watch, announce loudly how much time has elapsed or initiate conversations with the participants to distract them from the activity.
- Ensure the participants understand the requirements for the activity, if there are no questions, allow the participants to start.

Post- Activity Discussion

- After the activity has concluded, the HPI Facilitator will help shape the discussion by discussing the problems the participants encountered and the error precursors that impacted their performance.
- Discuss the error precursors and error reduction tools that were used or could have been used to help the participants perform more efficiently.
- Go over the HPI tools and relate the activity to the serious side of human performance and how even the smallest of errors could have a drastic impact.
- Stress the importance of the use of HPI fundamentals and strong disciplined operations.
- Ask for feedback, you want to know what went well with the DLA and what was not the best so there can be adjustments made to make improvements to the DLA.
- Discuss the Principles of Human Performance.

The following pages provide reference materials that may be helpful to the HPI Practitioner.

Principles of Human Performance

Worker Feedback

· Issue Reviews/Fact Finding

Formal Mechanic Feedback

· Corrective Action Program

TWD Compliance &

HPI Tool Use

· Take a Time Out when needed

Conduct Job Site Review

Attitude

Post-Job Reviews

Error Reporting

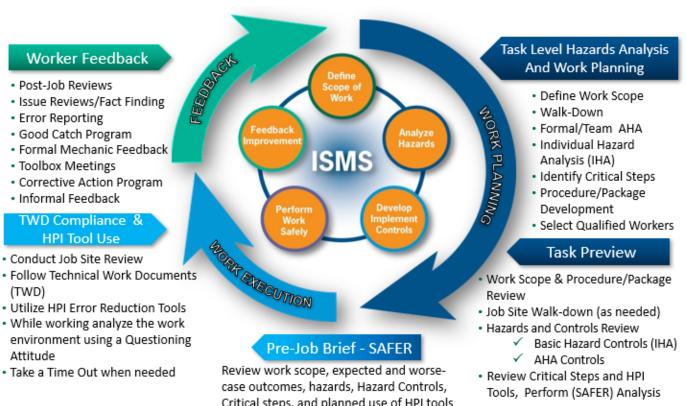
· Good Catch Program

Toolbox Meetings

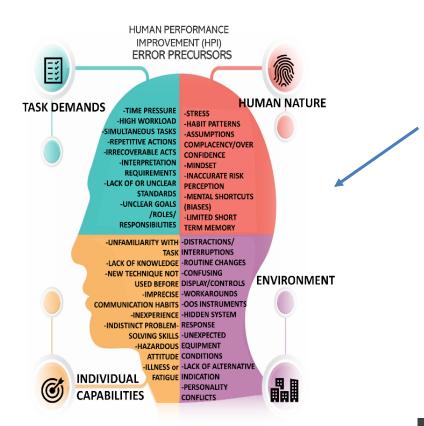
· Informal Feedback

- 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. Events can be avoided by understanding the reasons mistakes occur and applying the lessons learned from past events.
- 5. People achieve high levels of performance largely because of the encouragement and reinforcement received from leaders, peers, and subordinates.

ISMS / CONOPs /HPI



Critical steps, and planned use of HPI tools



To prevent or reduce the number of errors, you first must identify the potential error precursors.

This poster provides a listing of common error precursors in the workplace and in overall daily activities.

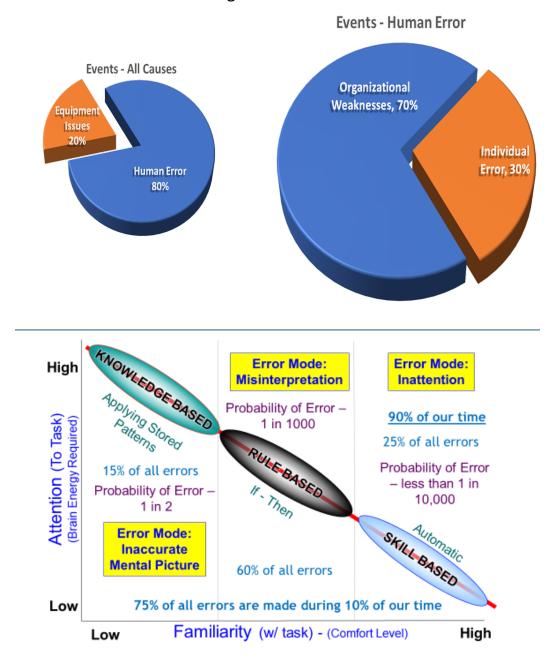
Once the error precursors have been identified, you must choose what error reduction tools can be used to help mitigate the error precursors.

Once they have been identified, here are the tools to help you.



Human Error is the cause of 80% of events.

• An **event** is an unwanted, undesirable change in the state of plant structures, systems, or components or in human/ organizational conditions that exceeds established significance criteria.



Performance Modes

When people perform work, they typically fall into one of the 3 categories of performance modes. Skill based, rule based, and knowledge based. These apply to the mode of operation we are in every moment of the day, depending on the situations we encounter.

Examples of Skill-Based Activities

- mowing the lawn;
- using a hammer or other hand tool;
- controlling various processes manually (such as pressure and level),
- hanging a tag;
- analyzing chemical composition of a routine sample;
- performing repetitive calculations;
- using measure and test equipment;
- opening a valve;

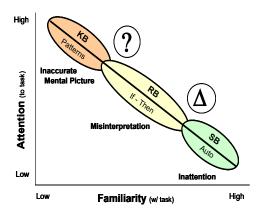
Examples of Rule-Based Activities

- deciding whether to replace a ball bearing inspected during preventive maintenance;
- responding to a control board alarm;
- estimating the change in tank level based on a temperature change (thumb rules);
- using emergency operating procedures; and
- developing work packages and procedures.

Examples of Knowledge-Based Activities

Knowledge-based activities involve problem-solving. Such situations require the use of fundamental knowledge of processes, systems, and so on— "thinking on your feet." Examples of common problem-solving situations include the following:

- troubleshooting;
- performing an engineering evaluation;
- reviewing a procedure for 'intent of change;'
- resolving human performance problems;
- planning business strategies, goals, and objectives;
- performing root cause analysis of events;
- making budget allocation decisions allocating resources;
- changing policies and expectations; and
- performing an engineering calculation



The error mode for skill-based performance is inattention. Skill-based errors are primarily execution errors, involving slips and lapses in attention or concentration.

Examples of Skill Based Performance

- o manipulating valves and switches.
- o taking logs.
- o using a hammer or other hand tool.
- controlling various processes manually.
- o hanging a tag.

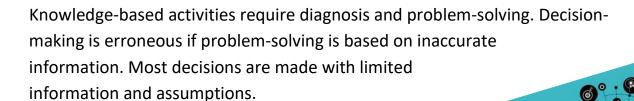


Since rule-based activities require interpretation through use of if-then logic, the prevalent error mode is misinterpretation.

People may not fully understand or detect the equipment or plant conditions that call for a particular response.

Examples of Rule Based Performance

- o deciding whether to replace a ball bearing
- o performing radiological surveys
- facilitating a training seminar



Examples of Knowledge Based Performance

- Troubleshooting
- o performing an engineering evaluation
- conducting trend analyses
- revising policies and expectations



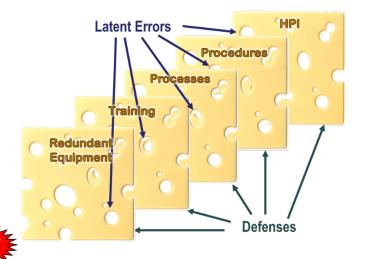
Active and Latent errors

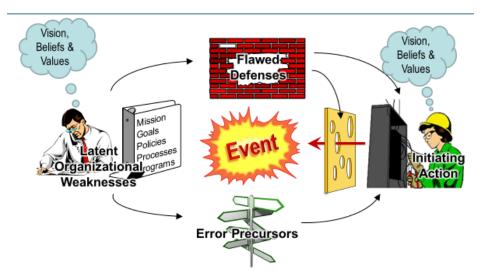
Active Errors: have immediate, observable, undesirable outcomes in the physical plant. They may be acts of omission or commission. Most have no consequences and can be quickly self-corrected, although, some may result in loss of life, disabling injury or forced outages and equipment damage.

Latent Errors: result in hidden organization-related weaknesses or equipment flaws that lie dormant. They have no immediate physical plant consequences. They include actions, directives, and decisions that either create the preconditions for error or fail to prevent, catch, or mitigate the effects of error. These weaknesses are undetected deficiencies in organizational processes or values that create workplace conditions that provoke error or degrade the integrity of defenses. For example, failure to self-check may be cited as the cause of a procedure violation while the actual cause was failure to train the individual in its use. Look for and consider these weaknesses in your cause determination.

Humans Make Errors!

- That's the reason for Defense In Depth
- For important things, we build processes with many defenses so one error doesn't usually result in an event.
 - A latent error creates a hole in our defenses, allowing an active error to cause an event.
 - We should strive to keep each defense intact.





An interruption anywhere in the cycle prevents events.

- Situation awareness is the activity of developing and maintaining an accurate mental model of the plant state and task situation based on knowledge of critical parameters, observations of system or equipment condition, the work environment, team members, and recall of basic knowledge of the plant.
- 5 Questions For Every Task:
 - Have we done this task before?
 - 2. What are the Critical / Irrecoverable Steps?
 - What are the Error Likely Situations?
 - 4. What is the worst thing that can happen?
 - 5. What kind of defenses should be considered?



When to Use HPI Tools

(DOE HPI Tool Manual Volume 2, Page 3)

Location	In the Field (1)			In the Office (2)		
HPI Tool	Prior to Start/Re- Start	Perform Work	Complete Work	Prior to Start/Re- Start	Problem Solving	Task Verification
Task Preview	Х					
Pre-Job Briefing	Х			X Technical		
Job-Site Review	Х					
Questioning Attitude	Х	Х	Х	Х	Х	Х
Timeout	Х	Х	Х	Х	Х	Х
Self-Checking	Х	Χ	Х	Х	Х	Х
Procedure Use & Adherence	Х	Х	Х	Х	Х	Х
Three-Way Communication		Х	Х			
Phonetic Alphabet		Х	Х			
Place-Keeping		X	Х			Х
Flagging		Х				
Peer-Checking		Х				
Concurrent		X				
Verification						
Independent Verification		Х				
Turnover		Х			Х	
Post-Job Review			Х			X Technical

(1) Ops, Maintenance, Field Support (2) Engineering, Science, Tech Support



SRS Human Performance Improvement How Does HPI Help You?

Human Performance Improvement

- This presentation is NOT intended to provide a full picture of Human Performance Improvement (HPI) efforts at SRS.
- It IS intended to provide a brief overview of HPI and illustrate how performing all work activities in a safe, disciplined manner with the use of HPI tools can reduce the likelihood of errors.
- It will also show the benefits of using HPI in our daily work activities and communicate management expectations regarding HPI.

Human Performance Improvement

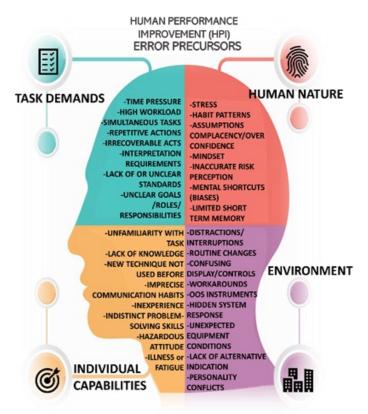
- At its core, HPI is simply a set of principles and tools that:
 - -Promote safe behaviors
 - -Results in reliable execution of work
 - Reduces the frequency of events by anticipating, catching and preventing errors
 - -Minimizes the severity of events by identifying and eliminating latent organizational weaknesses that hinder the effectiveness of defenses against errors and their consequences.
- HPI has a decades-long proven track record of improving worker performance in high-risk, high-complexity work environments.

Principles of HPI

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HPI Resources

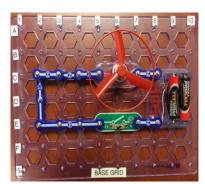
Error Precursors are factors that may increase the likelihood of errors. Error Reduction Tools are proven methods to decrease the likelihood of errors.





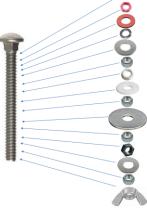
HPI Resources

- HPI topics are included on monthly safety meetings.
- Short HPI videos and Error Reduction Tool Guides have been added to the HPI webpage.
- A dedicated HPI Lab has been established in 766-H and is available for hands-on HPI activities.











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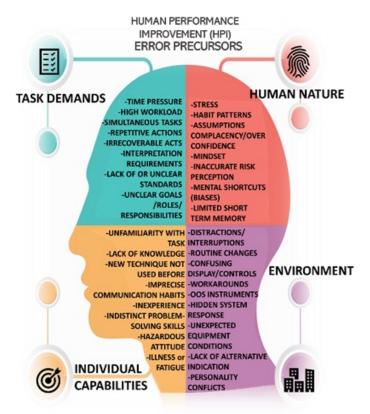
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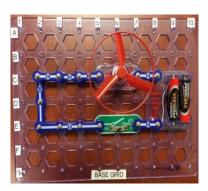
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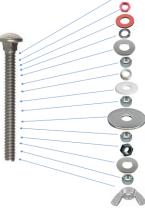
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QUESTIONS?

From: <u>Daryl Smoldt</u>
To: <u>Petrowski, Michael</u>

Cc: Darlene Murdoch; Gregory Sanborn; Douglas Mckenzie; Douglas Brill; Cassie Sistare; Stephanie Bennett; Susan

Simmons

Subject: RE: REQUEST: HPI Share at Thursdays EFCOG HPI TT Webex

Date: Wednesday, June 23, 2021 1:20:56 PM
Attachments: HPI Enterprise Business Systems.pptx

HPI Expectations ECS ACR path

HPI Expectations EC&ACP.pptx HPI DLA Practitioner Guide.pdf

image001.pnq

One thing we've recently started at SRS is providing a "light" HPI briefing to be covered by the Manager of a specific work group that has recently experienced an issue (from a low-tier issue to an ORPs event). The two examples I provided are to very different work groups (an IT team and also our infrastructure/utilities group); two vastly different business models and worker types).

We provide HPI fundamentals to all workers who "touch the plant" but some work group's level of knowledge for HPI is pretty shallow. With over two-thirds of our work force having less than 6-years of experience and a lot of our managers being new to their position it is critical that we gain full advantage from HPI efforts. Not all managers are adequately prepared to illustrate how HPI benefits their work group. When work groups experience an issue I can work directly with their manager, determine their level of HPI knowledge, coach them using the HPI Practitioner guide, provide them an 8-slide deck like the ones above and allow them to tweak the words to brief their folks. Now that I've got the slide deck built it doesn't take but a little effort on my part to quickly provide a good HPI tool for the manager to frame his issue around and show how HPI can help.

The slides are intentionally very topical, but the Notes section guides the manager on how to make these into effective briefings. I've only gotten feedback for the two we recently provided and so far it has all been good. It also pushes them to clearly state that the management expectation is to use HPI consistently in all activities.

If you like, I can cover this tomorrow or you can hold it for a later date if you get something better.

From: Petrowski, Michael <mpetrowski@lanl.gov>

Sent: Wednesday, June 23, 2021 10:04 AM

To: Andy Foster (Hanford MSA ESH) <andrew_foster@rl.gov>; BobbiJo Curley (NREL) <BobbiJo.Curley@nrel.gov>; Brian Thomson (SNL)

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<joseph.fulghum@srs.gov>; Joseph Lockwood <Joe.Lockwood@EM-LA.DOE.GOV>; Katrine Rocha (NSSS) < ROCHAKK@nv.doe.gov>; Kimbel Leffew (PANTEX - CNS) < Kimbel.Leffew@cns.doe.gov>; Laurel Davis (LBNL) lauren Gagan (lgagan@anl.gov">lgagan@anl.gov; Lloyd Keith (Hanford - WRPS) < lloyd_j_keith@rl.gov>; Marc Williams (SNL) < mwilli4@sandia.gov>; Matthew Alt (Y12) <ata@y12.doe.gov>; Michelle Keever (ettp) <Michelle.Keever@ettp.doe.gov>; (SLAC) <rpoliak@slac.stanford.edu>; Rizwan A Shah <rizwan.shah@hq.doe.gov>; Sean Whalen (Ames) <sbwhalen@ameslab.gov>; Shane Bush (INL) <Shane.Bush@inl.gov>; Shawn Gibson <sgibson2@Bechtel.com>; Shelby Prince (NNSS) <princesu@nv.doe.gov>; Shurter, Tony Eugene <tshurter@lanl.gov>; Stacey Alderson (NNSS) <Alderssl@nv.doe.gov>; Sue Baumann (ANL) <sbaumann@anl.gov>; Suzy Fowler (NBACC) < Virginia. Fowler@nbacc.dhs.gov>; Tamara Shokes (INL) <tamara.shokes@inl.gov>; Tanja Fitzgerald (SNL) <tmfitzg@sandia.gov>; Tom Bock (UCOR - Oak Ridge) <Thomas.Bock@ettp.doe.gov>; Trish Hughes (ICP) <Patricia.Hughes@icp.doe.gov>; Tyson Allen (INL) <tyson.allen@inl.gov>; William Brown (BNL) <wsbrown@bnl.gov> **Subject:** [EXTERNAL] REQUEST: HPI Share at Thursdays EFCOG HPI TT Webex

All.

Is there anyone who would like to do the "HPI share" at tomorrows EFCOG HPI Task Team meeting? Sorry for the late request.

Regards,



Michael W Petrowski

EFCOG HPI Task Group Co-Lead LANL Human Performance Improvement Program Lead, IQPA-PA

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Los Alamos National Laboratory

lanl.gov

