

Mousetrap
Human Performance Improvement (HPI)
Dynamic Learning Activity (DLA)
Course Code: CNPSDL21

INTRODUCTION

HPI DLAs have been introduced to Savannah River Site by the HPI Working Group in effort to provide practical exercises that support HPI principles. They are all designed to be informal, with no specific lesson plans, Enabling Learning Objectives, or other typical Training factors. They should be fun and engage everyone in the room in HPI error reduction tools and error precursor discussions. The purpose of a Dynamic Learning Activity (DLA) is to provide an opportunity for workers to use their skills and knowledge while performing tasks/activities in a simulated environment. Additionally, a DLA can be used to detect latent organizational weaknesses and improve work processes and procedures.

A Dynamic Learning Activity has four parts:

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

This DLA requires each team to assemble and test a Mousetrap Gameboard in a timely manner.

Preparation

- Print enough copies of the procedures and Pre-Job Briefing for the participants. Each team will have 6 participants.
- Ensure you have enough Mousetraps with all pieces for the participants to successfully complete the assembly.
- Plan to introduce some precursors such as time pressure, distract the participants by encouraging conversation and have a visitor enter the room with an announcement.
- Enforce the idea that this is a competition, and the participants are being timed. The team that finishes the assembly correctly in the shortest amount of time gets bragging rights.

Facilitator Introduction and Pre-Activity Briefing

Introduce yourself and provide a general description of the DLA.

“Today we will be assembling Mousetrap Gameboards. This will be a timed event. You have exactly 45 minutes to complete the assembly successfully. This includes a Pre-Job Briefing and testing of the Mousetrap Gameboard. You can use any HPI tools, but you will only have 45 minutes total”.

- The reader/worker method is to be used for this exercise. The workers will not be able to see the procedure and the readers will not be able to see the worker’s progress. The Shift Manager will be the reader. The Shift Manager will also lead the Pre-Job Briefing for this scenario. All 6 team members can discuss the procedure during the Pre-Job Briefing, but only the reader can see the attachments.
- The QA can perform the verification of the Mousetrap, but the QA cannot assist with the assembly. The operator and QA do NOT have a copy of the procedure during performance of the procedure and must rely on the Shift Manager to read the procedure to them.

Activity

- Have each team of 6 gather at their work location.
- Provide each team a Mousetrap box and a copy of the procedure and Pre-Job Briefing form face-down at their work location.
- Instruct them not to open the box or look at the procedure until instructed to do so.
- Start the exercise without further direction.

While the DLA is being performed, the facilitator can:

- Add error precursors, for example, saying out loud how much time has elapsed, cause distractions, and interrupt groups.
- Take note if participants are ensuring that all parts of the Mousetrap are available prior to starting the assembly.
- Take note if any participants notice the spelling errors and typos throughout the procedure.

Post-Activity Discussion

- Stop the exercise at exactly 45 minutes.
- Take note if any of the teams did not complete the assembly.
- Have the teams discuss the problems they encountered and error precursors that impacted their performance.
- Ask participants to explain the difference between “verify” and “ensure”.
- Help shape the discussion around the error precursors and Error Reduction Tools.
- Allow time for the participants to explain what they thought about the DLA.

After all of the teams have discussed their challenges with this exercise, the facilitator can say something like:

- “Hey, it looks like we’ve all had a little fun with this and had a good discussion about HPI Principles, but I also want to talk about the serious side of human performance. Most of what we talked about were relatively small errors, but even small errors can have significant consequences”. Stress the importance of HPI tools.

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1.0 INTRODUCTION

1.1 Purpose

This procedure provides instructions for proper assembly and functional testing of Mousetrap. This procedure is for training use only and not applicable for use in real situations.

1.2 Scope

This procedure is applicable to the Mousetraps at Savannah River Site, 707-7B Room 2.

2.0 GENERAL INFORMATION

2.1 Information

This project ensures that the facilities remain free of mice and other rodents. Proper placement of the gameboard pieces are imperative to the successful completion and operation of the Mousetrap.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Equipment Safety

Mice pose a threat to the safety of a nuclear facility. Therefore, the levels of mice must be controlled via the use of a Safety Significant Mousetrap. Failure to properly construct a Mousetrap can have a significant impact to both the facility and the facility personnel.

- Do not put Mousetrap pieces in mouth; this is a choking hazard.

CAUTION- Failure to complete Mousetrap in a timely manner may result in the spread of diseases and an increase in workplace injuries.

- A bold dollar sign within parentheses (\$) identifies a step that implements a Safety Basis requirement.

4.0 PREREQUISITES

Obtain all parts and tools needed for proper Mousetrap assembly.
Perform a formal pre-job briefing.

5.0 PROCEDURE

- 5.1 Component 1 Assembly Worker 1**
- 5.2 Component 2 Assembly Worker 2**
- 5.3 Component 3 Assembly Worker 3**
- 5.4 Installation of Components**
- 5.5 Component 4 Assembly Worker 4**
- 5.6 Functional Test Worker 1**

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5.1 Component 1 Assembly

5.1.1. **VERIFY** all Component 1 parts are accounted for as listed in Attachment 8.5.

Worker 1 _____

QA _____

5.1.2. **ATTACH** the Lamp Post into the cone on Base 1, lining up flat edges.

5.1.3. **ATTACH** the Stop Sign into the large opening at the corner of Base 1.

5.1.4. **HOOK** Rubber Band into the notch on Base 1 and attach it to the notch on the Stop Sign.

5.1.6. **ATTACH** the Boot to the top of the Lamp Post so that it hangs next to the lamp.

5.1.7. **(\$)** **ENSURE** the back shoe is making contact with the Stop Sign.

Worker 1 _____

QA _____

5.1.8. **INSERT** Staircase B the remaining openings in Base 1 so the “B” is facing the Shoe.

5.2 Component 2 Assembly

5.2.1. **VERIFY** all Component 2 parts are accounted for as listed in Attachment 8.5.

Worker 2 _____

QA _____

5.2.2. **ATTACH** the Ladder in the opening in Base 2.

5.2.3. **ATTACH** the Red Wrench to the Ladder via the bottom hole on the decorated side.

5.2.4. **PLACE** Bucket 2 between the nobbs at the top of the Broom.

5.2.5. **ATTACH** the Broom to the Ladder by inserting it into the Ladder’s top hole on the decorated side.

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5.3 Component 3 Assembly

5.3.1. **VERIFY** all Component 3 parts are accounted for as listed in Attachment 8.5.

Worker 3 _____

QA _____

5.3.2. **INSERT** the Plumbing to Base 3, lining up flat edges.

5.3.3. **ATTACH** the Bathtub to the Plumbing, inserting the narrow side to the center pipe and lining up the middle opening with the edge of the Plumbing piece.

5.3.4. **ATTACH** the Short Ramp to the plumbing and the narrow side of the Bathtub.

5.3.5. **INSERT** the perforated Cage Pole in the opening on the narrow side of Base 4, lining up flat edges.

5.4 Installation of Components

5.4.1. Request Worker 1 to **INSTALL** Base 1 at appropriate markings on board.

5.4.2. Request Worker 3 to **INSTALL** Base 3 at appropriate markings on board.

5.4.3. Request Worker 3 to **INSTALL** Base 4 at appropriate markings on board.

5.4.4. Request Worker 2 to **INSTALL** Base 2 at appropriate markings on board.

5.5 Component 4 Assembly

5.5.1. **VERIFY** all Assembly parts are accounted for as listed in Attachment 8.5.

Worker 4 _____

QA _____

5.5.2. **INSERT** Staircase A on the board in holes closest to red mouse, with “A” facing the mouse.

5.5.3. **ATTACH** the Stairs to Staircases A and B.

5.5.4. **INSERT** Bucket 1 to the Stairs.

5.5.5. **PLACE** the Ramp short side connecting with the Stairs on Staircase A.

5.5.6. **(S) ENSURE** the Ramp’s supporting pillars are fully attached to Bases 1 and 2.

Worker 4 _____

QA _____

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- 5.5.7. **ROTATE** the Broom so that Bucket 2 is next to the Ramp.
- 5.5.8. **FLIP** the Red Wrench so that it latched onto a lip on the Broom.
- 5.5.9. **PLACE** the Diving Board on the elevated rod of Base 3.
- 5.5.10. **TILT** the Diving Board so that one end is making contact with the yellow semi- circle.
- 5.5.11. **PLACE** the Green Diver facing Base 4.
- 5.5.12. **(\$)** **ENSURE** the Green Diver is halfway on the Diving Board and halfway on the yellow.

Worker 4 _____

QA _____

- 5.5.13. **PLACE** the Washtub on Base 4.
- 5.5.14. **BALANCE** the Cage on top of the Cage Pole, large opening pointing to Gameboard.
- 5.5.15. **PLACE** Mouse on board next to Cage Pole.

5.6 Functional Test

- 5.6.1. Request Worker 1 to **PLACE** the Marble into Bucket 1.
- 5.6.2. Request Worker 1 to **PULL** the Stop Sign so it divides the “start” circle in half and **RELEASE**.

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6.0 REFERENCES

2S Manual

7.0 RECORDS

Records generated as a result of implementing this procedure are maintained in accordance with Manual 1B, Procedure 3.31, Records Management.

8.0 ATTACHMENTS

- 8.1 Component 1**
- 8.2 Component 2**
- 8.3 Component 3**
- 8.4 Component 4**
- 8.5 Game board empty and assembled**
- 8.6 U-STR-F-00001**

8.1 Component 1

Component 1

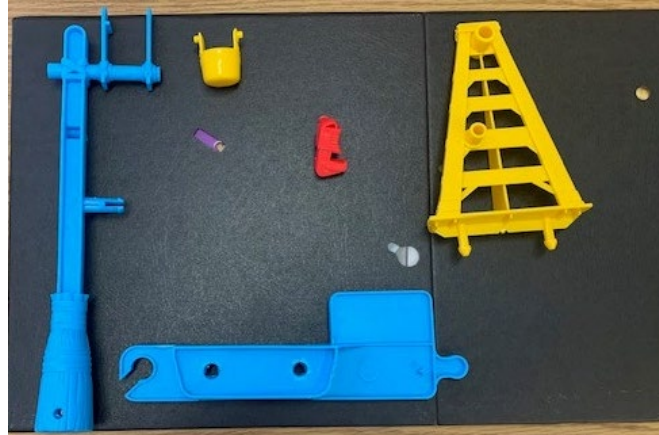
- Base 1
- Lamp post
- Stop Sign
- Rubber Band
- Boot
- Staircase B



8.2 Component 2

Component 2

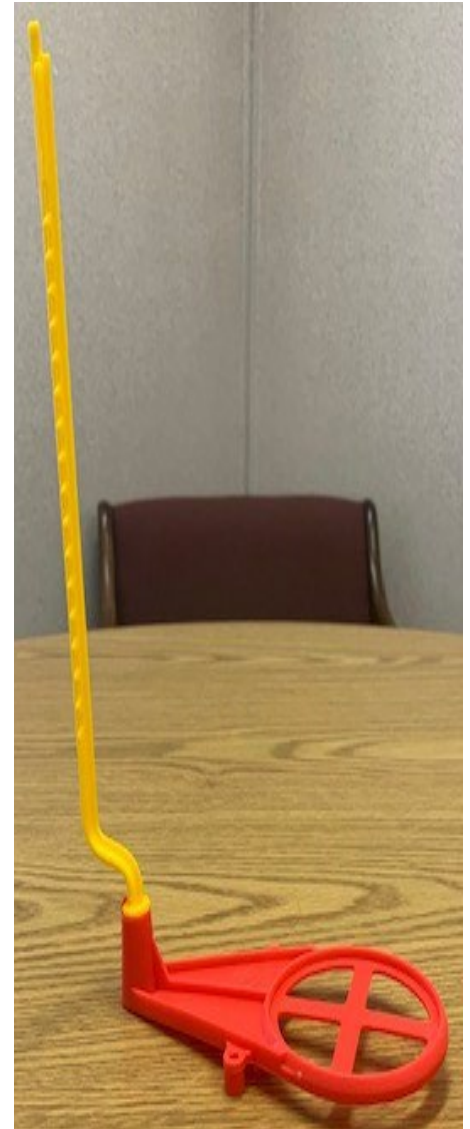
- Base 2
- Ladder
- Red Wrench
- Bucket 2
- Broom



8.3 Component 3

Component 3

- Base 3
- Plumbing
- Short Ramp
- Bathtub
- Base 4
- Cage Pole



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8.6 U-STR-F-00001

U-STR-F-00001

Safety Significant Mousetrap
3/4 3.2

3.3.2 SAFETY SIGNIFICANT MOUSETRAP

LCO 3.3.2: An OPERABLE Mousetrap is necessary to the functioning of the facility. Failure of a Mousetrap implements safety requirements.

APPLICABILITY: At all times

PROCESS AREA

APPLICABILITY: Savannah River Site, Building 707-7B Room 2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The Nuclear Safety Mousetrap is Inoperable. <u>OR</u> Has performed its function and needs resetting	A.1. Implement an alternate method of controlling the rodent population until Safety Significant Mousetrap is restored.	3 Dates

Pre-Job Briefing Checklist

Select boxes as applicable.

I. Define Scope of Work		
Briefing Date	Time	Title of Work
Description		
Technical Work Document(s)		
<input type="checkbox"/> Job scope and work boundaries <input type="checkbox"/> Status of equipment within the work boundary and details on open work requests, lockouts, etc. <input type="checkbox"/> Sequence of events to occur during performance of the work <input type="checkbox"/> Task assignment(s) for each individual <input type="checkbox"/> Fitness for duty	<input type="checkbox"/> Tools/equipment and consumable supplies required <input type="checkbox"/> Method of Communication <input type="checkbox"/> Required interactions with other work groups <input type="checkbox"/> Expected duration of the job <input type="checkbox"/> QA Hold Points and Inspection <input type="checkbox"/> Acceptance criteria and potential UNSAT conditions actions <input type="checkbox"/> Method for returning equipment to service, including post maintenance testing <input type="checkbox"/> Completed document reviews	
Notes		
IA. Individuals Performing 'Hands-On' Work		
<input type="checkbox"/> Maintenance <input type="checkbox"/> QA/QC <input type="checkbox"/> Other: _____	<input type="checkbox"/> Radiological Protection <input type="checkbox"/> Operations	<input type="checkbox"/> Engineering <input type="checkbox"/> Subcontractor <input type="checkbox"/> IH <input type="checkbox"/> Rigging
For Maintenance activities associated with Safety Class or Safety Significant systems, structures, or components, the following information shall be presented by a knowledgeable person (Shift Manager/Engineer, First Line Manager, etc.):		
<input type="checkbox"/> Basic purpose of the system <input type="checkbox"/> Relationship to other systems (alarms, interlocks, operability, etc.)	<input type="checkbox"/> Safety implications (LCO, time constraints, etc.) <input type="checkbox"/> Lessons Learned (known pitfalls)	
II. Hazards and Associated Controls		
<input type="checkbox"/> AHA Hazards and Controls (AHA No. _____) - Specific work practices/controls - Engineered controls (containment, ventilation, etc.) - Personal protective equipment (PPE) - General safety/area postings - Work area conditions (heat stress, lighting, etc.) - Potential for changing hazards/conditions <input type="checkbox"/> Hazardous Energy (Lockouts, Manual 18Q Electrical Safety, etc.) (L/T No. _____) <input type="checkbox"/> Radiation Work Permit (RWP No. _____) - Known/expected radiological conditions - Protective clothing/dosimetry - Respiratory equipment - Suspension Guides - RadCon Action Steps - Alarm Response (Air Radiation Monitor, etc.) <input type="checkbox"/> Review Pre-Job ALARA Checklist (OSR 4-528) items for applicability <input type="checkbox"/> Other Permits (Hot Work, Confined Space, etc.) <input type="checkbox"/> For electrical tasks include review of 18Q, 2, Attachment 8.12 <input type="checkbox"/> Breathing Air	<input type="checkbox"/> Environmental and Waste Compliance - Waste handling and minimization - Spill control measures (SWIMS) <input type="checkbox"/> Expected alarms and responses <input type="checkbox"/> Safety Basis impact (TSR, LCO, Criticality, etc.) <input type="checkbox"/> Abnormal conditions and responses - Loss of Breathing Air, Fire, NIM, etc. - Rally Points - Injury response <input type="checkbox"/> Impact work may have on operating or co-located systems <input type="checkbox"/> Potential for leaks or inadvertent transfer routes <input type="checkbox"/> Impact to facility ventilation Special hazards or unique requirements associated with the work <input type="checkbox"/> such as chemical hazards (asbestos, Beryllium, dust, etc.), including interactions in drain or ventilation systems. <input type="checkbox"/> Review Safety Data Sheet (SDS) for chemicals to be used Industrial Hygiene concerns such as chemical exposures, <input type="checkbox"/> temperature of the work environment, noise levels, manual and/or repetitive lifting, etc. <input type="checkbox"/> Housekeeping	
Notes		
Job Package/Procedure/Task No. _____		

Pre-Job Briefing Checklist (Continued)

III. Task Preview (SAFER)	
<input type="checkbox"/> Summarize the critical steps - Who will be performing critical steps? - Which steps change the state of systems or components? - Which steps are irrecoverable (once the action is taken, the reverse cannot recover)? - Which steps, if performed in error, would result in the potential for undesired consequences?	
<input type="checkbox"/> Anticipate error likely situations - Which of the critical steps depend solely on the individual worker to prevent error? - Which of the critical steps contain error traps/precursors? - Which of these error likely conditions may we encounter? - What Human Performance Improvement (HPI) tools can be used to address error precursors? <ul style="list-style-type: none"> • Job-site Review • Procedure Use and Adherence • Placekeeping • Self-Check • Peer-Check • 3-Way Communication • Phonetic Alphabet • Questioning Attitude • Timeout • Flagging 	
Task Demands	Individual Capabilities
<ul style="list-style-type: none"> • Time pressure (in a hurry) • High workload (memory requirements) • Simultaneous, multiple tasks • Repetitive actions • Irrecoverable acts • Interpretation requirements • Unclear goals, roles, and responsibilities • Lack of or unclear standards 	<ul style="list-style-type: none"> • Unfamiliarity with task / First time • Lack of knowledge (mental model) • New technique not used before • Imprecise communication habits • Lack of proficiency / inexperience • Indistinct problem-solving skills • "Hazardous" attitude for critical task • Illness / Fatigue
Work Environment	Human Nature
<ul style="list-style-type: none"> • Distractions / Interruptions • Changes / Departures from routine • Confusing displays or controls • Workarounds / OOS instruments • Hidden system response • Unexpected equipment conditions • Lack of alternative indication • Personality conflicts 	<ul style="list-style-type: none"> • Stress (limits attention) • Habit patterns • Assumptions (inaccurate mental picture) • Complacency / Overconfidence • Mindset ('tuned" to see) • Inaccurate risk perception (Pollyanna) • Mental shortcuts (biases) • Limited short-term memory
<input type="checkbox"/> Foresee consequences - What is the worst thing that can happen to people? The facility? The environment? - What are the expected results? - What actions will be taken for unexpected results?	
<input type="checkbox"/> Evaluate defenses - For each critical step, what HPI tools will be used and by whom to help prevent errors? - How will HPI tools be utilized? - How will data recording and/or transcription be performed? What HPI tools will be used to prevent errors? - Who will perform completed document reviews? What HPI tools will be used to prevent errors?	
<input type="checkbox"/> Review lessons learned - What happened the last time we did this task? - How have people made mistakes with this task in the past? - Has the technical work document been revised since last time? If so, then how?	
<input type="checkbox"/> Conduct Reverse Briefing	
Notes	
Job Package/Procedure/Task No. _____	

