

LUCAS OPT HOP TOOLKIT

This resource represents more than a decade long effort to field test various error reduction practices shared with and by clients of Lucas OPT. The tools are divided into 3 categories: Individual, Leadership, and Organization. These tools can be used without written permission to implement and improve the practices that create and sustain a safe, productive, and resilient work environment. For additional ideas on how to build expertise and reduce errors in work planning, project management and task execution, contact one of our Specialists at www.lucasopt.com.

Tool Kit Links

Individual Tools	Leadership Tools	Organization Tools
720 Walkaround Clearing the Mind Start Work Criteria Questioning Attitude STAR Stop and Seek Help Three-Way Communication Technology Metabolic Schedule Two-Minute Drill (Take 2) SAFE Check Dialogue Procedure Use and Adherence	Pre-Mortem Proximity Placement Red Team Blue Team DODAR Planning Tool Lagging and Leading Indicators P3 Analysis	Paint the Curb Pre Job Briefings Peer-Check Scan and Focus Shaping the Path Sterile Worksite (supplements Two-Minute Drill) Bureaucracy or Benefit

720 Walkaround

(Vehicle and Equipment Inspection—contributed by Tom Harrison of N3B Los Alamos)

Purpose

Ensure equipment and vehicles are in proper working condition and the environment is scanned for any hidden hazards, unknown or changing conditions before starting activities.

Challenge

Vehicle and equipment inspections are formally taught and practiced to someone who may not have performed them in the past. Due to increased frequency, our cognitive awareness falls victim to complacency and inattentional blindness. Using a deliberate two-step process, with the first being a focus on the vehicle or equipment and the second being the sole focus on the environment, people can better manage back up, pull forward and operational errors.

Process

Focus on the vehicle or equipment (crane, generator, forklift, etc.) solely—checklists for walkarounds listing specific items and areas to check can be useful until this becomes a skill-based practice. Having focused solely on the vehicle and equipment and correcting or noting any deficiencies or conditions that require correction or improvement, turn back to the vehicle or equipment and focus solely on the environment: look up, below, around, behind and in front of the vehicle or equipment. Address and correct any areas of obstruction, contact points, etc.

Clearing the Mind

Purpose

People are interrupted during work every 3 minutes (Hari, Stolen Focus/Newport, Deep Work). Distractions and interruptions have replaced complacency and operational drift as the top conditions leading to quality, productivity, and reliability issues. Interruptions are caused both extrinsically (in the environment we work in) and intrinsically by mind wandering, default mode network issues, and a sudden memory that reminds us we need to remember to do something at a later time.

When

Regardless of the type of task—routine or non-routine and the conditions under which the task is being performed—new, consistent or variable, cognitive control is required to manage the expected and be prepared for the unexpected. This requires attention, inhibition (stopping before you have to) and a useful and available working memory. Interruptions and distractions degrade the ability of these mental functions to operate properly (through cognitive overloading). Clearing the Mind is a deliberate practice used to prevent overloading the working memory and stealing attention from the task at hand by writing down the interruption or distraction (the thing we need to remember). Using a clean notepad or set of index cards, the moment we are extrinsically asked to remember something, while engaged in another activity, write down the distraction: “Stop by office, pick up work order”, “stop by shop at 2:00 to meet with client”, “bring permit to worksite for tomorrow’s job”. This always applies to anything you suddenly remember that you cannot afford to forget. By writing the interruption or distraction down, and referring to it upon task completion, cognitive loading is reduced in the working memory and attention is improved.

Research reveals those who practice clearing the mind are 22% more productive than those who do not under the same working conditions (Stolen Focus Lohann Hari).

Start Work Criteria (SWC)

(Credit to Tony McBee with ORNL for showing Lucas OPT this tool, and developing it as part of their work planning and control process)

Purpose

Provide a deliberate questioning pause prior to initiating activities to ensure unknown and unexpected conditions are considered and known and expected actions are clarified and reinforced. Start work criteria 'screens' work especially well in situations where 'Stopping when Unsure' is impractical if not impossible such as critical lifts, aviation, large batch manufacturing and surgical operations.

Examples: Prior to 2016, it was reported that as many as 98,000 deaths per year were the result of surgeries involving anesthesia. Anesthesiologists worked with surgical teams, developing a Start Work Criteria (SWC) screen with five questions that have to be satisfactorily answered before entering the operating room and an additional six answers prior to starting surgery. The use of the SWC has been chronicled to reduce the deaths to less than 1500 (Daniel Pink, When, the Science of Perfect Timing).

When

Oak Ridge National Laboratory Maintenance Craft created a Start Work Criteria by those performing the work—electricians, pipefitters, millwrights, machinists—every time they are assigned a scope of work or task. SWC consists of five to six questions the individual or work team must consider before initiating an activity. Questions may include:

- Will people not associated with this work but are in the area be exposed to hazards or harm during this work activity?
- Are any of the equipment, PPE or materials new to me?
- Are there any permits required?
- Am I uncertain about the specific outcome or method for achieving it?

If these or related questions are answered with a YES, the work does not begin until help and additional support is sought and provided.

Questioning Attitude



Purpose

A questioning attitude is a function of “a healthy sense of uneasiness.” It challenges assumptions and provides healthy skepticism. It also ensures actions such as planning and decision-making are appropriate for the situation. By using a questioning attitude, it allows openness to be questioned by others, especially when a work task or conditions don’t seem right.

When

Having a questioning attitude does not mean questioning those around you and doubting their knowledge about the work task. It is mental activity where we condition the situation around our work and allows us to think about our work tasks and if they make sense prior to conducting them. A good phrase to think about is “what if, and how.” This allows us to understand what our tasks should look like, and what would be the possible issues if the tasks is not as it was planned or if it has changed.

For instance, an electrician is to replace a breaker in a service panel. When arriving at the site, and opening the panel, the electrician should ask “what if the area I’m working in is still energized, how would I know?” This will help the electrician to stop the task and think about how to proceed.

STAR

Stop, Think, Act, Review

Purpose

Routine (skill-based) and non-routine (rule & knowledge-based) work present different challenges to our attention and perception during work execution. Unexpected equipment conditions, unfamiliarity with the task and an inaccurate risk perception are common error traps in performing non routine work.

When

Before beginning a task, prepare to use STAR:

- While getting ready to perform a “critical step”.
- When you have had to delay work activity due to interruptions or distractions.
- When following a complex or difficult checklist, instruction, or procedure

How

STOP – Pause and ask: “Am I focused?” Eliminate distractions and interruptions as much as possible.

THINK – Focus your attention and ask: What action am I about to perform?

Do not proceed until you have answered all questions related to doing the task then you should:

Confirm you have selected the correct component.

Resolve any uncertainties before proceeding with the action.

ACT – Focus on the equipment/object and perform the task at hand (Caution: avoid performing multiple actions simultaneously).

REVIEW – Look to verify that the anticipated results were obtained (actual response vs. expected response).

Stop and Seek Help



Purpose

Stop-When-Unsure is a tool that allows a worker to stop an activity or call a “time-out” when a work practice question, safety concern or confusion exists regarding the next step of a task, or when a job process is confusing.

In a knowledge-based situation, the chances for error are high (1:2 to 1:10), as the situation or next step is unfamiliar. It is important as a worker to understand and identify when a situation has become unsure or unfamiliar.

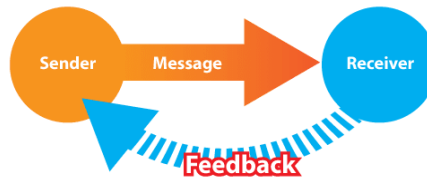
If you as a worker start thinking “what is my next step,” or “what am I doing,” the equipment should be placed in a safe configuration, and you should stop the task and go seek help. This doesn’t need to just be a supervisor or someone of rank, as it could be a co-worker that has done the job before.

When

As it is hard to physically or mentally stop a work task once started, this tool should be discussed prior to the work, so that it is in the worker’s consciousness. Some situations in which a worker should stop are:

- The results of a task are unexpected or not what was planned
- The situation is not familiar to what was expected
- There are no solutions when thinking of questions regarding the work
- The procedure or work document does not match the tasks that you are performing
- The end-result of the tasks no longer looks as it should prior to the work
- The planned work tasks have deviated to tasks that are unfamiliar

Three-Way Communication



Purpose

The responsibility for effective communication ultimately falls on both the sender of the message and the receiver of the message regarding how the message was understood.

When

This tool is used when verbal communication is required, either face-to-face or over communication devices. This tool is great when giving directions or work environmental warnings or cautions or limitations in the work environment or giving the status of equipment or procedure in the work environment.

How

- The sender states the message.
- The receiver paraphrases the message.
- The sender informs the receiver of the message or corrections the receiver and restates the message.

Avoid

- Stating back to the sender the message verbatim.
- Using slang instead of appropriate terms.
- Communicating when the sender is engaged in another conversation or task.
- Sender not taking responsibility for what is said and heard.

Technology Metabolic Schedule

References: Stolen Focus (Hari) and Deep Work (Newport), Why Zebras Don't Get Ulcers (Sapolsky)

Theory

Malnutrition does not occur because there is a lack of nutrients or food but also occurs due to food insecurity. If a body does not know when it will be fed again, cortisol and other neurotransmitters conserve fats and sugars rather than convert them to energy. If the body has certainty that it will be fed at 7, 11 and 4, as an example, these neurotransmitters promote a healthy condition. In a similar manner, when we snack on technology all day and night, creating insecurity as to when we will read a text, respond to an email, see how many posts or messages are 'liked', we create a constant distraction and energy drain that can cause us to lose focus, fail to achieve the task at hand or reduce our ability to notice gradual and sudden changes in our work environment.

When

Establishing a Technology Metabolic Schedule (TMS)—having designated times to check and respond to message or search the web to satisfy our interests, relieves the stress and constant distractions that would influence our performance. In one organization of 22,000 employees, 50% of the employees volunteered to establish and commit to a TMS, while the rest of the employees continued 'snacking all day' on their cellphones and computers. After 6 months, all employees were assessed using cognitive response tests and task focused exercises. Those that had committed to the TMS increase their focus four fold and performed 22% better than those who maintained the status quo.

Two-Minute Drill (Take 2)



Purpose

This tool appeals to the need to address the brain's challenge to focus on tasks while needing to actively be aware of our surroundings. After conducting a pre-work meeting (pre-job, pre-task to tailboard), workers will arrive on the worksite. Different days, shifts and environmental conditions can exist that didn't exist before.

When

To detect conditions unanticipated by work planning or the pre-job brief, this tool should be used:

- Following an extended break or interruptions after work.
- When decisions need to be made to bridge the gap between the ability to be task focused while maintaining situational awareness.
- When working alone or with a new crew.

How

When arriving at the worksite, each person (support, craft, supervisor) should take two minutes to observe:

- The surroundings at the worksite to determine if anything has changed since the previous work was performed (weather, different crew worked, etc.)
- The facility and if any conditions have changed such as new equipment, changing horizon (new portables, recently torn down building)
- Any new barriers or signage
- If any environmental or worksite conditions are different than what was discussed at the pre-job, tailboard, etc.

SAFE (Planning) Dialogue

Purpose

Many errors in executing work start with mistakes that are not recognized during planning. Two realities influence ill-fated outcomes:

“Errors are most often made due to the absence of thought not the presence” (The Influencer, Pattersons)

AND

“We tend to underestimate the challenges we will face while overestimating our ability to manage them” (Sibony, You’re About To Make A Terrible Mistake”)

When

Prior to starting non-routine projects or tasks, especially if they are first time or one of kind activities, a deliberate planning process helps reduce errors and conditions caused by optimism bias and reduced cognitive control (being mentally alert and mentally aware). The four letters-SAFE-helps both individuals and work teams avoid random acts of conversation, dead end conversations, and open-ended inconclusive determinations—all of which hinder an effective planning process.

Start with S:

S-Summarize the Critical Steps, one by one

Critical Steps are those that will not tolerate incorrect actions, wrong timing, or inadequate decisions

(Example: Clearing all articles and furniture from an area to steam clean carpets—failure to move appropriately or to the wrong location leads to personal injury and lot time and wasted effort.)

A-Assess hazards and error traps (precursors) associated with critical steps using TWIN Task Preview Check List

F-Foresee (envision) consequences associated with hazards and errors—frequency and severity of consequences— what’s the most likely thing to happen, if the hazards and error are inadequately addressed? (Blocking exits, lifting too much in the wrong way—back strain)

E-Establish controls, safeguards and barriers for hazards and error traps. (Agree on area all articles and furniture will be moved to, review lifting techniques if infrequently performed)

Procedure Use and Adherence

Purpose

Problems with procedures are varied. Is the procedure writer in the field when writing the procedure? When using equipment guided by an operating manual, can a worker use the manual as intended? Does the person completing the procedure for another user have any familiarity with the job being performed?

In a Federal Aviation Administration document, "Failure to Follow Written Procedures," identified errors in following written procedures as contributing factors of significant events involving two airline companies.

The report reviewed 154 "failure to follow procedures" events with the primary reason being Procedure Documentation-*documents were not readily available, not up to date, and poorly written. Procedure documentation errors accounted for 58% of the events.*

Procedures include more than physical documents. Most skill-based activities require the use of mental, not written procedures. These procedures can be equally 'wrong for the job and used in the wrong way' just as written work documents are.

When

Anytime a procedure is introduced into a work scope, procedure use and adherence should be followed. The procedure should be reviewed prior to the actual work, and it must be understood by anyone using it. If at any time the procedure cannot be used as it is written, the work should be stopped until the procedure can be used.

The 7 C's

If a procedure needs to be reviewed, the 7 C's should be used each time. The 7 C's are:

- Context: The procedure should only contain content applicable to the specific task
- Consistency: Action words, warning or caution words, and the format of the steps needs to be consistent throughout the procedure
- Completeness: Every step should be planned out until the tasks can be complete without question
- Control: Users should be called out prior to the action statements so everyone knows who is responsible
- Compliance: The content within the procedure should be referenced with any company or federal/state rules and regulations, and should not contradict any of these
- Correctness: Diagrams, equipment labels and other identifiers must match the actual components in the field or facility
- Clarity: Each procedure user should have the same level of understanding of the procedure, with no questions during the work scope

Premortem (Anatomy of an Event)

Purpose

Determine potential standards, requirements, and opportunities for error by discussing the possible routes of failure. The primary question to answer is, “we undertook the project or task and it is the end of the day and we did not achieve what was expected and encountered what was unexpected. Exactly where, when and how did these conditions occur?”

Doing a premortem reduces the likelihood of a postmortem.

When

During the final planning phase, prior to initiating activities where the opportunity for failure increases due to risk and complexity. Requires individuals’ knowledge of the system, processes and practices associated with the planned project or task.

How

Using the anatomy of an event, participants walk through the visual tool using the following process:

- 1.) Define the ‘event’ condition (failure to meet a deadline, safety related event, violation of regulatory rule or standard)
- 2.) Initiating action: what specific steps or decisions would promote the likelihood of the event
- 3.) Flawed defenses: What policies, procedures, practices, or protocols would increase the likelihood of the event?
- 4.) Error Traps/Precursors: Given this project or task is to be completed under these conditions, using the agreed upon prerequisite process, what error traps would increase the possibility of error likely situations?
- 5.) Latent Organizational Weaknesses: What goals, policies, programs, metrics, and organizational objectives will most influence the likelihood of error traps and flawed defenses?
- 6.) What improvements need to be made to promote the success of the operation?

Proximity Placement



Purpose

"Proximity placement" refers to the practice of placing items or objects in close proximity to each other based on their relevance, functionality, or convenience. It involves arranging things in a way that makes them easily accessible or noticeable to one another. The goal of proximity placement is to improve efficiency, organization, and user experience by grouping related items or elements together. The benefits in a work setting are:

- **Enhanced Organization:** It promotes a sense of order and organization, making it easier for individuals to locate and manage their belongings or information.
- **Reduced Cognitive Load:** When items are logically grouped together, it reduces the mental effort required to remember where things are or how they are organized.
- **Increased Productivity:** In a work or business context, proximity placement can lead to increased productivity because employees can access the tools or resources they need more quickly.
- **Reduced Errors:** In situations where proper placement is critical, such as in manufacturing or healthcare, proximity placement can help reduce errors by ensuring that the right tools or components are readily available when needed.
- **Optimized Space Utilization:** Proximity placement can help maximize the efficient use of physical or digital space by minimizing wasted areas and ensuring that space is allocated based on functionality.
- **Enhanced Decision-Making:** In decision-making processes, presenting relevant information or options in close proximity can assist individuals in making more informed choices.
- **Overall,** proximity placement is a versatile concept that can lead to improved organization, efficiency, and user experience across various domains, from personal organization and workplace productivity to design and user interface development.

When

Leaders should consistently review how groups, equipment and other materials are grouped to enhance the above bullets. If a new project is being created or new work groups are now working together, this is a critical time to look at this placement.

Red Team Blue Team



Purpose

The "red team-blue team" concept is a cybersecurity and military strategy practice that has also been adapted for other fields, including business, politics, and problem-solving in general. It involves two groups, the "red team" and the "blue team," simulating adversarial roles to assess and improve a system's security, resilience, or decision-making processes. The red team represents the adversarial or attacking side. They are tasked with finding vulnerabilities, weaknesses, and potential threats in a system or organization's defenses. Red teams use various techniques, including hacking, social engineering, and other methods to mimic the tactics and strategies of real-world attackers. The primary goal of the red team is to expose weaknesses, test the effectiveness of security measures, and help the blue team improve their defenses.

The blue team represents the defenders, or the organization being tested. They are responsible for maintaining and defending the system's security. Blue teams work to detect and respond to the simulated attacks and threats presented by the red team. They also use their knowledge and resources to assess the effectiveness of their security measures and improve their defenses based on the red team's findings.

The red team-blue team approach is beneficial for several reasons:

- **Realistic Testing:** It allows organizations to assess their security measures in a realistic and controlled environment, mimicking the tactics and strategies of actual adversaries.
- **Continuous Improvement:** By regularly conducting red team-blue team exercises, organizations can identify vulnerabilities and weaknesses, enabling them to continually improve their security posture.
- **Risk Mitigation:** It helps organizations identify and address potential risks before real threats exploit them, reducing the likelihood of security breaches.
- **Training and Skill Development:** Red team exercises provide valuable training for both the red and blue teams, enhancing their skills and knowledge in cybersecurity and defense.
- **Decision-Making:** In non-cybersecurity contexts, the red team-blue team approach can be used to assess strategies, policies, and decision-making processes, identifying weaknesses and making improvements.

When

This activity should be done once a work scope has been drafted and the work is ready to move to the execution phase.

DODAR Abnormal Events and Planning Tool

(Credit to Commercial Aviation websites)

Purpose

There are four types of work activities or tasks: Emergency (unexpected and unwanted), Emergent (somewhat Expected but Unwanted), Planned and Skill Based (Wanted and Expected)

Recognizing the type of work situation, we are in is necessary in ensuring the right error management technique is used to maximize its effectiveness. In Emergency situations, the following mental construct and dialogue is used to minimize distractions, focus on the important conditions, adjust to changing conditions and achieve the most desirable outcome in undesirable circumstances.

D – Diagnose (what is the problem)

O – Options (hold, divert, immediate landing etc.)

D – Decide (which option)

A – Act or Assign (carry out selected option and assign tasks)

R – Review (can involve addition of new information, and/or the ongoing result(s) of selected option)

When

The key to developing Leading Indicators is:

Identifying the Significant Few that matter the most rather than pages of data that creates confusion rather a clear path to performance improvement.

These Significant Few learning metrics can be identified by those who are most affected by them and whose actions have the greatest impact on what is being measured.

For instance, some organizations use the ‘compliance lagging indicator’ to measure how many pre jobs were conducted (as evidenced by how many checklists were documented) rather than a focus-on-improvement learning indicator which captures the changes and improvements created as a result of a pre-job or after-action review.

One of the most important factors in using metrics is knowing if the person whose decisions and actions affect the metric the most, understand exactly how and why they impact or affect it.

Details

Diagnose is the first step to solve a problem or make a decision. It is necessary to find out what is wrong and if possible, what causes it. Often the initial conditions may create a bias such the recency effect (this must be that same thing as the last challenge we faced) so it is important to confirm and to avoid “confirmation bias”. The Diagnose stage involves determining and confirming the problem.

Options is determining what choices you have given the problem and circumstances. Not all conditions or circumstances are urgent or require immediate action. If action is required, such as a stopping an activity there may be choices-immediate stop, progressive shutdown, pause until there is more certain, reduce the speed, remove certain steps or additional activities.

Decide is choosing the best option available to you. It is best to engage crew members with diverse perspectives and experiences as soon and as often as possible.

Act/Assign is to carry out the appropriate action and to assign tasks to people who are to carry them out.

Reviewing is possibly the most important stage and is a constant process, not solely when the actions are complete. It is needed to ensure that everything is proceeding according to plan, and the expected safe outcome is likely. If this is not the case the process can be started again to diagnose what has changed or what is not working and then adapt as necessary.

Conducting drills on a routine basis can help create a procedural memory for this tool, as the worst time to practice using it is during an actual event.

Lagging and Leading Indicators

Performance and Outcome Metrics

Purpose

Monitoring performance, assessing processes and determining growth and areas for continuous improvement are essential in every organization. But the scorecards and metrics for too many rely on lagging, quantifiable numbers which fail to identify what is happening and how something may be improved. Lost work day cases, numbers of people attending training and days and number of work packages completed do not provide information on how people are working and how work is planned, whether the training was a benefit or a waste of time, and if the work was performed satisfactorily or needs to be improved. Qualitative analysis or leading indicators provide learning information related to monitoring and improving the process rather than being solely focused on the results.

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P3 Alignment Analysis (Policies, Procedures and Practices)

Purpose

Successful implementation of new processes, initiatives and proposed preventative actions requires ensuring current policies, procedures and (training) practices are integrated. A disconnect or conflict between the 'way we currently do things' and the 'new way we are going to do things' requires the organization to reduce ambiguity and conflict in expectations and requirements.

When

A P3 Alignment Analysis focuses on integrating the new concepts, principles and practices into the existing guiding documentation and training practices. For example, when an organization moves from a 'Blame' approach in incident reviews or causal analysis to a 'Learning from Experience' perspective, policies, procedures and practices will need to be aligned with the principles. This alignment usually includes comparing the desired (new) concepts, principles, or processes to the prior to existing ones in:

- Work Management Documents
- Causal Analysis and Incident Review Procedures
- Human Resources Policies and Practices
- Supervisory Skills and Expectation Practices
- Leadership Training
- Trade or Craft Skills Development Apprenticeship Programs

The process of aligning the current P3s accelerates the learning and transition of individuals while ensuring the organization reduces conflict and uncertainty while introducing new practices.

Paint the Curb



Purpose

Painting sidewalk curbs serves as a visual aid to drivers, pedestrians, and law enforcement to ensure that the rules of the road are followed, and that public safety is maintained. But what does painting a curb have to do with reducing error?

In the United States and other places, people study a booklet and go to class to learn how to drive. The exam is a critical part of attaining a driver's license, however once the license is earned, where does that knowledge go?

The laws and rules still exist but people forget every specific rule due to distractions, aging, etc. Painting the curb helps direct people to correctly perform a step.

When

The act of painting the curb should be done with the workforce, and prior to starting work. During a walkdown and work meetings, any steps that cannot be performed wrong, or any critical steps should be reviewed to determine if the curb needs to be painted. Examples of "painting the curb" would be:

- Signage that is in a spot where workers can see it and cannot pass it
- Engineering controls that force a worker to stop and think before proceeding
- Placeholder in a procedure, where a signature is required prior to moving on to the next step

Pre Job Meetings and Briefs

Start Work Criteria

SAFE Dialogue

Start Work Criteria

(Thanks to Tony Mc Bee and the ORNL Instrument and Maintenance Craft for developing this practice as part of their Work Planning and Control process)

(A Self Check Before Starting Work)

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(Illustration: anesthesiologist Start Work Criteria Card or ORNL SWC List)

SAFE (Planning) Dialogue

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(Example: Clearing all articles and furniture from an area to steam clean carpets—failure to move appropriately or to the wrong location leads to personal injury and lot time and wasted effort.)

A-Assess hazards and error traps (precursors) associated with critical steps using TWIN Task Preview Check List (Show Example: improper lifting techniques, equipment in front of exits)

F-Foresee (envision) consequences associated with hazards and errors—frequency and severity of consequences—‘what’s the most likely thing to happen, if the hazards and error are inadequately addressed? (Blocking exits, lifting too much in the wrong way—back strain)

E-Establish controls, safeguards and barriers for the hazards and error traps. (Agree on area all articles and furniture will be moved to, review lifting techniques if infrequently performed)

Pre Job/Pre Task Briefs or Meetings

Purpose: Prior to beginning a on routine or infrequently performed task, or a routine task under changing or new conditions, a pre-job dialogue can provide just in time information, promoting cognitive control and the use of critical error management tools in the individuals and entire work team.

In order to successfully execute work, individual's can meeting expectations and properly respond to the unexpected by exercising the right amount and type of attention, inhibiting thoughts and actions BEFORE they need to (Stopping when Unsure) and not exceeding the design limits of their working memory on the task (On Task, Dr. Baeder)

To maximize the effectiveness of a Pre-Job Brief or Meeting, the following standards apply:

- Those performing the task should lead the discussion about their roles, responsibilities, objectives and critical steps
- Dialogues not Monologues (its about the conversation not just the instructions)
- Crew/Individuals should be dressed for the work being performed immediately following the meeting (enclothed cognition)
- Dialogue tools such as SPEAK, SAFE, and the Energy Wheel helps to remain focused on the specific subtasks, hazards, error likely situations and controls or defenses (see below)
- On projects or tasks requiring multiple days, the pre job should only address the scope of work, hazards, error likely situations (TWIN/WITH model) and defenses expected during the next 4-8 hours.
- After action reviews at the end or beginning of the day on multiple days of work provide more engagement and discussion leading to greater attention and retention of the materials covered than performing the same rote, scripted pre job each and every day.
- The decision to do an 'end of the day review or after action review to learn from experiences during the day should be decided and confirmed at the pre job.
- Most effective pre jobs set limits for the work being performed during a certain period to reduce scope creep caused by optimism bias (let's tackle other things since we did this so well and are ahead of schedule). Person leading the pre job should start with: "For this project or activity, the scope of work is limited to....". Be specific to reduce uncertainty when discussing roles, objectives and critical steps.
- Turn generic warnings and reminders into specific roles and responsibilities:
 - "If we have an acid spill during the offloading, make sure its cleaned up immediately and reported' does not promote the required action as the statement, "If there is an acid spill during the offloading, John and Hector will implement the Stop-Warn-Isolate-Minimize steps while Rhonda notifies the shift manager".

- Every work site including the office, shop and in the field, bombards our senses with over 10 billion bits of information per second. Our visual and verbal systems can process or be aware of 10,000 bits of information per second. We can only process 120 bits of information per second in our 'deliberate thinking' part of our brain (Pre Frontal Cortex/Executive Control area). No one can pay attention to everything, but we can focus on the specific conditions targeted to gain our attention.
 - In some cases, it is best to assign and discuss the Scan and Focus (Monitor and Manage) technique—while one person focuses solely on an issue or problem, the rest of the team focuses on the environment to improve both task focus and situational awareness.
- If a form is required to be used to document a pre job meeting, it should reflect the conversation rather than being constructed primarily as a compliance document (trap). Work teams should assist managers and safety professionals in drafting the appropriate checklist to improve its usefulness and value (see examples).

For non-routine tasks, in all performance modes, many work teams have benefited from the SPEAK CLEAR conversation.

Summarize Critical Steps-What actions are intolerant, irrecoverable if performed incorrectly?

Prior Performance? What has anyone learned from performing this task in the past?

Error Traps/Situations (TWIN/WITH Task Review Card)

Assess Consequences (Severity when errors occur or remain unidentified or unmanaged)

Know and agree on Defenses/Controls (Barriers discussed for hazards and controls)

Stop Criteria during Tasks (Specific indications to stop or pause and get help)

CLEAR (Post Job Meeting/End of Task Review)

Changes that needed to be made to continue?

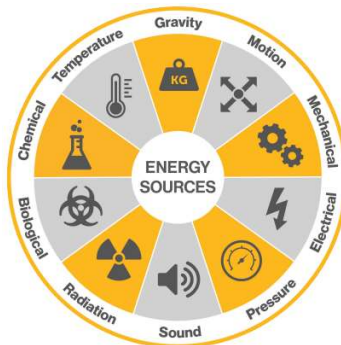
Lessons Learned? What went well, what needs to improve

Errors left unchecked or need further mitigation?

Adequate Resources—sufficient for the job?

Results as expected or unexpected?

PRE-JOB BRIEFING CHECKLIST											
Document/IWD #:											
Task Description:											
PIC Print Name:	Date:										
<p>The items in this box are the minimum items to be discussed during a Pre-Job Brief.</p> <table border="0"> <tr> <td><input type="checkbox"/> Announce name of PIC</td> <td><input type="checkbox"/> Workplace conditions/environment</td> </tr> <tr> <td><input type="checkbox"/> Scope of work to be performed</td> <td><input type="checkbox"/> Applicable steps to be worked</td> </tr> <tr> <td><input type="checkbox"/> Individual work assignments/roles/responsibilities</td> <td><input type="checkbox"/> Error likely situations and appropriate responses</td> </tr> <tr> <td><input type="checkbox"/> Precautions, limitations, prerequisites</td> <td><input type="checkbox"/> Expected accomplishments</td> </tr> <tr> <td><input type="checkbox"/> Hazards/Controls, and PPE</td> <td></td> </tr> </table>		<input type="checkbox"/> Announce name of PIC	<input type="checkbox"/> Workplace conditions/environment	<input type="checkbox"/> Scope of work to be performed	<input type="checkbox"/> Applicable steps to be worked	<input type="checkbox"/> Individual work assignments/roles/responsibilities	<input type="checkbox"/> Error likely situations and appropriate responses	<input type="checkbox"/> Precautions, limitations, prerequisites	<input type="checkbox"/> Expected accomplishments	<input type="checkbox"/> Hazards/Controls, and PPE	
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<input type="checkbox"/> Hazards/Controls, and PPE											
As appropriate to the work activity, discuss additional topics including a review of scope specific topics listed below:											
<p>Define Work:</p> <table border="0"> <tr> <td><input type="checkbox"/> Procedure type and compliance expectations</td> <td><input type="checkbox"/> Discuss coordination required with other groups, and that have a potential to affect personnel performing the work activity</td> </tr> <tr> <td><input type="checkbox"/> Discuss applicable permits</td> <td><input type="checkbox"/> Hold Points</td> </tr> <tr> <td><input type="checkbox"/> Housekeeping expectations</td> <td><input type="checkbox"/> Oversight requirements</td> </tr> <tr> <td><input type="checkbox"/> First Aid/CPR Provider(s) identified and available</td> <td></td> </tr> </table>		<input type="checkbox"/> Procedure type and compliance expectations	<input type="checkbox"/> Discuss coordination required with other groups, and that have a potential to affect personnel performing the work activity	<input type="checkbox"/> Discuss applicable permits	<input type="checkbox"/> Hold Points	<input type="checkbox"/> Housekeeping expectations	<input type="checkbox"/> Oversight requirements	<input type="checkbox"/> First Aid/CPR Provider(s) identified and available			
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<input type="checkbox"/> First Aid/CPR Provider(s) identified and available											
<p>Hazards and Controls:</p> <input type="checkbox"/> Discuss hazards and controls specific to work scope and work environment, both Skill Based and Beyond Skill Based as appropriate <input type="checkbox"/> Discuss/review any hazard controls that reside within permits and not in the work instructions <input type="checkbox"/> Waste minimization/disposal/storage requirements <input type="checkbox"/> Technical Safety Requirements (TSR)/Limiting Condition of Operations (LCO), TSR/LCO time restrictions, impacts to equipment operability <input type="checkbox"/> Criticality Prevention Specifications (CPS) and postings <input type="checkbox"/> Discuss Lock and Tag requirements											
<p>Industrial Safety and Health:</p> <table border="0"> <tr> <td><input type="checkbox"/> Discuss any unique postings in or near the work area</td> <td><input type="checkbox"/> Locations of spill, first aid, AED, and eyewash stations/kits</td> </tr> <tr> <td><input type="checkbox"/> Discuss chemical hazards to be encountered and MSDS/SDS</td> <td><input type="checkbox"/> Emergency phone No's, XXXX, other Heat/Cold stress/strain</td> </tr> <tr> <td><input type="checkbox"/> Concerns- Work/Rest times</td> <td><input type="checkbox"/> Rally points</td> </tr> <tr> <td><input type="checkbox"/> Alarm and casualty response actions</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Nearest phone location</td> <td></td> </tr> </table>		<input type="checkbox"/> Discuss any unique postings in or near the work area	<input type="checkbox"/> Locations of spill, first aid, AED, and eyewash stations/kits	<input type="checkbox"/> Discuss chemical hazards to be encountered and MSDS/SDS	<input type="checkbox"/> Emergency phone No's, XXXX, other Heat/Cold stress/strain	<input type="checkbox"/> Concerns- Work/Rest times	<input type="checkbox"/> Rally points	<input type="checkbox"/> Alarm and casualty response actions		<input type="checkbox"/> Nearest phone location	
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<input type="checkbox"/> Alarm and casualty response actions											
<input type="checkbox"/> Nearest phone location											
<p>Review Error Prevention Tools:</p> <input type="checkbox"/> Peer Checks <input type="checkbox"/> Procedure Use and Adherence <input type="checkbox"/> Two-Minute Rule <input type="checkbox"/> Time Out/Stop When Unsure/Stop-Think-Act-Review (STAR) <input type="checkbox"/> Questioning Attitude, Stop Work Authority											
<p>Radiological and/or Beryllium Work: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <input type="checkbox"/> Discuss Radiological Work Permit (RWP) and/or Beryllium Work Permit (BWP) if applicable <input type="checkbox"/> Identify specific actions or activities that will (or have potential to) create a change in radiological conditions when initiated or completed											
Comments or other areas/topics discussed:											
<input type="checkbox"/> Summary - Does everyone clearly understand their responsibilities, and are they qualified for the assigned job?											



Example of Energy Wheel Developed by Quanta Services
<https://www.quantaservices.com/safety/the-capacity-model>

Peer Check

Purpose

Peer checking (PC) is a series of actions by two individuals working together at the same time and place, before and during a specific action. PC augments self-checking by the performer—it does not replace it. The purpose of PC is to prevent an error by the performer. PC focuses on performing the correct act. PC is the least rigorous of the checking and verification tools.

When

Peer checking should occur immediately prior to, and while performing the task at hand. Both workers should meet prior to working and discuss the process of peer checking, in order to establish clear expectations.

Work activities involving tasks or situations such as the following could benefit from the use of PC.

- Critical steps
- Irreversible or otherwise unwanted actions
- Comparisons of test data with acceptance criteria
- Start or stop of major components
- Return to or removal from service
- Identification of correct parts or correct component before maintenance
- During installation of similar components or parts that could be interchanged or installed incorrectly

How

Recommended Practices When Using This Tool (Reference: DOE HDBK 1028-2009)

1. The performer self-checks the correct component.
2. The peer self-checks the correct component.
3. The performer and the peer agree on the action to take and on which component.
4. The peer observes the performer, before and during execution, to confirm that the performer takes the correct action on the correct component.
5. The performer executes the intended action on the correct component.

6. If the performer's action is inconsistent with the intended action, the peer stops the performer.
7. If the performer's action is consistent with the intended action, the peer informs the performer that the action taken is correct.

Scan and Focus (Manager-Monitor Model)



Purpose

Scan: Scanning refers to the initial, broad observation of your surroundings or work area before you begin a task. The purpose of scanning is to identify potential hazards, assess the work environment, and gather information about the task ahead. It allows you to become aware of any unsafe conditions, equipment malfunctions, or obstacles that might pose a risk during the task.

Focus: Focusing follows scanning and involves concentrating your attention on the specific task or objective at hand. Once you've identified potential hazards through scanning, focusing ensures that you carry out the task with precision and care, taking into account safety measures and best practices.

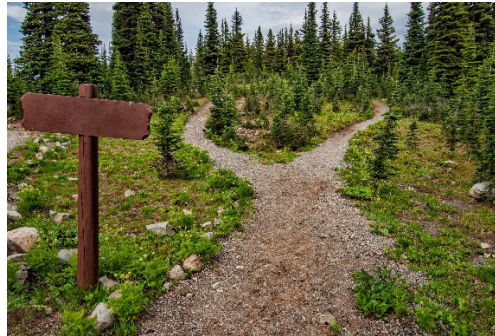
The purpose of scan and focus during work steps is to enhance safety, efficiency, and productivity. It helps workers:

- Identify and mitigate potential risks before starting a task, reducing the likelihood of accidents or injuries.
- Ensure that the task is carried out correctly, minimizing errors and rework.
- Maintain concentration and mindfulness during the task to avoid distractions and accidents.
- Promote a culture of safety in the workplace by emphasizing the importance of hazard recognition and focused execution.

When

In the Manager-Monitor model, a supervisor or support person directly related to the work should be scanning the environment and workers, and the workers should focus on the task at hand.

Shaping the Path



Purpose

The purpose of "shaping the path" is to design and modify the environment or context in a way that encourages desired behaviors and makes them easier to perform, while also discouraging undesired behaviors by creating obstacles or making them more difficult. It recognizes that people's actions are influenced by their environment, and by shaping the path, you can steer them toward the desired outcomes more effectively.

In short, a leader should shape the path to make work easier to do correctly, and harder to do incorrectly.

When

From a work management standpoint, shaping the path should be done during the planning of work and projects. Some of examples are:

Change management: Shaping the path can help individuals adopt new habits and behaviors more easily by removing barriers and providing cues that prompt the desired actions.

Compliance: In healthcare and safety contexts, shaping the path can improve compliance with recommended practices, such as handwashing in hospitals or wearing seatbelts in vehicles.

Better Decision-Making: Shaping the path can guide people toward making more informed decisions by presenting relevant information in a clear and accessible manner.

Safety and Risk Reduction: In safety-critical industries, shaping the path can reduce the risk of accidents by implementing safety features and protocols that are difficult to bypass or ignore.

Efficient Resource Utilization: Shaping the path can optimize resource use by creating systems that encourage responsible consumption and reduce waste.

Long-Term Change: By modifying the environment in a sustained manner, shaping the path can lead to long-lasting behavioral changes that persist even when external influences are removed.

Overall, shaping the path is a powerful strategy for achieving desired outcomes, promoting positive behaviors, and creating environments that support individuals and organizations in reaching their goals.

START CLEAN (Sterile Worksite)

(Based upon the Sterile Cockpit practice in commercial aviation)

Purpose

Each phase of a task or operation—the start, the duration and the ending—have their own hazards and error likely situations which may require a specific error management tool used for a specific time. According to pilot training and aviation policy, the first 10,000 feet during the aircraft's ascent is crucial...mistakes, indicators, alarms, various conditions require complete attention without the distraction of conversation. During the first 10,000 feet personal conversations are prohibited, the focus is entirely on the climb.

When

At the worksite, before beginning an activity, there should be a sterile cockpit mentally. Personal conversations and distractions should be eliminated with all attention paid to the initial critical steps and current conditions. This activity can be supplemented by using the Two-Minute Drill/Take 2 tool, which is located in the "Individual tools" area of this toolkit.

Bureaucracy or Benefit: Building a Better Organization

Purpose

Project and work planning require team effort. Unfortunately, in many organizations this effort is hindered or sabotaged by an unproductive mindset originating from the concept of who serves or supports who. Producing the product, completing the task and delivering the service is the only reason why an organization exists. When supporting organizations believe they are the only reason the organization exists, a bureaucracy replaces the supporting system and unpredictable and unwanted outcomes are produced.

This table compares the difference between each system in creating metrics:

System Comparisons

Safety Bureaucracy	Supportive Safety System
Outcome Metrics (Weapons of Math Destruction)	Performance Metrics (Learning about Health of System)
Compliance Focused (Nudges)	Competency Focused (Jigs)
System is the Goal	Safe Planning and Execution of the Work is the Goal
Regulatory Professionals	Safety Technical Professionals

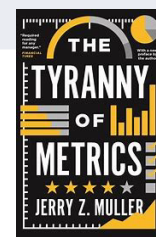
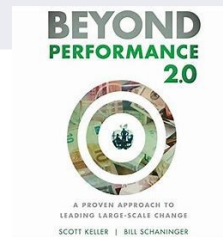
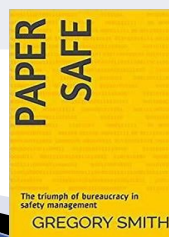
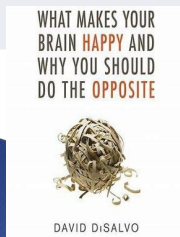


Table Information

Bureaucracies create metrics to ensure their bureaucracy exists. These metrics (lagging) report the quantitative results but never the quality or characteristic of what is being measured. What gets measured in these systems doesn't count, and what really counts cannot be measured this way.

Performance metrics measure the health of an organization and the attributes that distract or reinforce the mission, objectives and goals being achieved by the organization's activities. A scale can tell a person their current weight but not their health. A 220-pound coach potato weighs the same as a 220-pound athlete. However, the diet, exercise and routines of the athlete can be 'measured and counted' which provides the learning data for improvement that a scale cannot. Organizations can learn from data or learn how complaint they are to a standard, but one metric cannot tell the organization both. Supportive systems use metrics as a learning tool not a compliance outcome.

Nudges are used by organizations to push people to perform while jigs 'draw people' into improving their performance. One is usually established by a rule—you will walk around your vehicle doing an inspection before driving—while the other promotes the practices without a warning or threat. Bartenders use jigs when they set their glasses up in making drinks to 'jig' their mind into remembering the order, chefs do the same with cutlery, doctors with instruments and craftsperson's with their tools. The key is not to rigidly require changed practices, but to encourage changing a practice that makes the job easier to do correctly and more difficult to do incorrectly.

Regulatory professionals cite the standard, rule or requirement as expected by a Bureaucracy. In a supportive system, a safety, environmental, quality or other technical subject matter expert views their role as providing the guidance and advice a rule or requirement cannot provide—best practices, triggers, traps and tools to use in support of the work—rather than ensuring the work is compliantly performed.

It's the difference between a partnership and a hierarchy.