



Blah, Blah, Blah!!! - Effective Individual and Team Communication Lead to Effective PHAs

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Abstract

Process hazards analyses are structured, team-based exercises focused on hazard identification, risk assessment, and risk management. A competent facilitator serves a multi-disciplined team in applying the appropriate PHA methodology to identify, assess, and safeguard vulnerabilities. PHAs help a business define its overall risk profile and subsequently its overall strategy.

The various generally-accepted PHA methodologies are fairly well-defined by industry and company-specific guidance documents. PHA methodologies are processes that have evolved in response to societal norms, organizational culture shifts, and ever-changing regulatory requirements. Unlike PHA methodologies, which are typically bound by rule-sets and scope definition, multi-disciplined teams made up of diverse individuals are typically unbound when it comes to behavioral norms and personality types. Hence, as with any process, it is not the documented protocols that define the effectiveness of a process. It is the people leading, establishing, applying, and using the outputs of a process that determine its effectiveness. Hence, a PHA methodology is only as effective as the team involved.

Many factors influence team performance, no matter the task. Communication is often touted as the most critical factor for effective team performance. Hence, team communication is critical for effective application of a PHA methodology. But what is communication? More importantly, what is effective communication? Can a team's ability to communicate be assessed prior to attempting to apply a PHA methodology? If so, what safeguards can be put in place to protect against communication vulnerabilities at both the individual and team levels?

In this paper, the authors posit a team's communication capacity and potential can be assessed prior to starting a PHA. Specifically, the authors provide insight through case study and idea synthesis of potential individual and team communication vulnerabilities and safeguards. They also present tools and recommendations to enhance team communication and subsequently PHA quality, which bear directly on operational, organizational, and commercial integrity.

The target audience for this paper is anyone whose responsibilities include (1) leading within an organization that uses PHAs, (2) establishing PHA guidance documents, (3) applying PHA methodologies, and (4) reviewing PHA outputs and reports; however, anyone who works on a team will benefit from this paper's content.

1. Background and Purpose

Along with running a process safety and technical business consulting company, I facilitate brainstorming, process hazard analysis (PHA), and strategy-setting workshops. Respectively, these workshops help a business innovate and grow, identify/assess/manage risk, and set its overall vision and strategy. During a retreat in the summer of 2013, I kept turning a problem over and over trying to find a solution. The problem:

Brainstorming, strategy-setting, and PHA methodologies are fairly well-defined by industry and company-specific guidance documents. These methodologies are typically bound by documented objectives, prescriptive rule-sets, narrowed scopes, and actual business and/or design information. Despite the fairly well-defined and bounded methodologies, no two workshops are ever the same - even within the same company with the same set of team members. Some workshops are executed more effectively than others with more effective results as the outcome. To achieve excellence, inconsistent and ineffective team performance must be eliminated, prevented, and/or mitigated.

My first question was: “what drives the inconsistency?” The answer to this first question was evident - people. Unlike the abovementioned methodologies, the multi-disciplined teams utilized per methodology protocol are made up of diverse individuals who are typically unbound when it comes to behavioral norms and personality types. A methodology does not alone ensure consistent effectiveness. The people leading, establishing, applying, and using the methodologies determine their effectiveness. Hence, a brainstorm, strategy, or PHA is only as effective as the team utilized in creating it.

Farther along my thought process towards a solution, my second question was: “how can I consistently facilitate effective workshops, regardless of type?” The answer to this second question was not as evident as the first. Facilitators serve a leadership role and the teams they “lead” are often multi-disciplined, multi-generational, multi-ethnic, and multi-titular. I was essentially facing the age-old problem of how to lead teams for excellence. I was frustrated to find myself facing what seemed to be a fundamental, yet pervasive, business and organizational quandary. Let’s face it...I am not alone in this dilemma. Anyone serving a team, no matter his/her role, is forced to navigate the foggy waters in search of performance excellence. I know it sounds corny and I know most of us are numb to our plight, which might explain why we tend to focus on our individual efforts and sphere of influence rather than try to achieve overall team excellence.

Nonetheless, it did not take me long to realize that developing a set of tools and recommendations focused on (1) achieving excellent team performance and (2) delivering consistent and effective workshop results would be valuable to my company, the companies we serve, and more importantly to the people we serve. Rather than tackle the elephant, I decided to focus on one of its legs - PHAs. In this paper, my colleagues and I will (1) describe PHAs and their importance, (2) describe how teams impact PHAs through their decision-making traps, (3) posit and support communication as the most critical factor to team performance, (4) present a case study using Insights Discovery® personal profiles, and (5) offer a set of tools and recommendations to improve the likelihood for consistent PHA effectiveness.

2. What Are PHAs and Why Are They Important?

2.1 PHA Methodology and Logistics Descriptions

PHAs are structured, team-based exercises focused on hazard identification, risk assessment, and risk management. The deliverables of PHAs help drive design and procedural improvements to avoid potentially catastrophic consequences to personnel, the environment, and commercial interests. Traditional PHA approaches include Checklist, What-If, What-If/Checklist, Hazard Identification (HAZID), and Hazard and Operability (HAZOP) analyses. A competent facilitator serves a multi-disciplined team in applying the appropriate PHA methodology to identify, assess, and safeguard technical design and/or procedural vulnerabilities.

Most PHAs comply with defined rule-sets, protocols, and narrowed scopes. The Checklist PHA methodology uses a prescribed element set to evaluate a proposed design against process safety and risk management guidelines. Checklist PHAs usually employ questions similar to the following:

1. Are effective mechanisms for isolation, venting, bleeding, and de-energization readily available and accessible?
2. Are the governing design cases for pressure relief devices indicated on the drawing?
3. Are safe limits for critical process parameters indicated on the drawings?

A HAZID uses guidewords and parameters (e.g. dropped objects, simultaneous operations, ergonomics) along with nodes (i.e. system sections or procedural tasks) to focus the team's discussion and scrutiny.

The HAZOP PHA methodology is another structured brainstorming exercise. HAZOPS use guidewords and parameters (e.g. high pressure, low level, no flow) to identify (1) causes of hazard scenarios, (2) consequences of hazard scenarios, (3) safeguards that eliminate/prevent/mitigate the hazard scenarios and/or their consequences. Unlike the HAZID PHA methodology, a HAZOP uses risk assessment criteria to determine Likelihood and Consequence rankings within a given risk matrix. Safeguards are not accounted for in assigning the Consequence value; however, safeguards are taken into account when determining the Likelihood value. Where the qualitative risk-ranking recognizes process safety or risk management vulnerabilities, the team crafts a recommendation to resolve the gaps.

PHAs are normally conducted via face-to-face workshops in rooms large enough to accommodate the PHA team. Remote PHA team members sometimes participate via web-meeting capability. PHAs vary in duration with some lasting one hour and others lasting months. To avoid mental fatigue, the length of a PHA workshop day is usually limited to six hours of workshop time.

2.2 PHA Inputs

In order to perform an effective PHA, team members should have the following information

readily available:

1. Material safety data sheets;
2. Fire and explosion models;
3. Dispersion models of potential release scenarios;
4. Chemical/Material reactivity matrices;
5. Mass and energy balances;
6. Safe upper and lower limits for critical process parameters;
7. Operating philosophies;
8. Materials of construction;
9. Electrical area classification drawings;
10. Relief and effluent system design bases;
11. Ventilation system design basis;
12. List of design codes and standards applicable to the process;
13. Cause and effect matrices for safety controls, alarms, and interlocks (SCAI);
14. Equipment specifications;
15. Sparring philosophies (primarily used in upstream subsea asset development);
16. Electrical one-line diagrams;
17. Plot plans;
18. Safety shower/eyewash location drawings; and
19. Vendor-provided skid package information.

Some of these items may not be available due to the timing of the PHA against the project's life cycle. For example, checklist PHAs are typically performed towards the end of the Front-End Engineering Design (FEED) stage of a project when fire and blast studies may not be complete.

2.3 PHA Team Characteristics

A multi-disciplined PHA team usually includes (1) relevant engineering personnel (e.g. mechanical, process, electrical, marine, flow assurance engineers), (2) operations personnel (e.g. foremen, technicians or operators), (3) maintenance personnel as necessary, (4) third-party vendors as necessary, (5) process safety personnel (e.g. PSM manager, PSM coordinator, risk engineer), (6) a scribe and (7) a facilitator. Given current workforce demographics and business globalization, it is common for PHA teams to not only be multi-disciplined, but also multi-generational, multi-ethnic, and multi-titular. PHA team compositions are dynamic, even at units within the same refinery or assets within the same upstream business unit.

2.4 PHA Deliverables and Subsequent Utilization

PHAs identify vulnerabilities in designs and procedures. If the PHA team does not identify adequate safeguards to eliminate, prevent, or mitigate the risk to acceptable levels, then the team generates recommendations to close the risk gap. The primary goal of PHAs is to help protect people, the environment, and commercial interests by ensuring high-integrity business operations. A company's overall technical risk profile consists of the aggregate risk based on all internal independent PHAs or other risk assessments. In short, PHA teams assess a lot of information, make a lot of decisions, and generate a lot of recommendations in a relatively short

of amount of time to help companies define and understand their risk profiles. Businesses then incorporate their overall technical risk profiles and their overall commercial risk profiles into their strategy-setting activities. These strategies subsequently govern resource (personnel and capital expense) allocation. Ineffective PHAs may compromise the integrity of business operations both in the short-term (via unidentified high-risk vulnerabilities and subsequent catastrophic events) and the long-term (via flawed, forward-looking, strategy-setting activities and mismanagement of resources).

3. Despite Defined Methodologies, Inconsistent PHA Effectiveness Persists Through Decision-Making Traps

As previously mentioned, despite the fairly well-defined and bounded methodologies, no two PHA workshops are ever the same. I acknowledge scopes differ from PHA to PHA and this drives some of the differences across efforts. However, the scope is simply what is to be analyzed using the designated methodology. The scope does not alone drive a PHA's effectiveness. I also acknowledge information availability differs from PHA to PHA, which can also drive differences across efforts. Once again, PHA methodologies define how to handle missing information and this factor should not drive a PHA's effectiveness. There are a number of protocol-driven elements that differ from effort to effort, but all are addressed by the various PHA methodologies and should not drive PHA effectiveness.

The truly un-controllable and undefined elements of a PHA are the team members. Humans are the elements within a PHA that change from day to day, hour to hour, and sometimes minute to minute. Humans are the elements within a PHA that change for sometimes unseen reasons. As the humans are the decision-making engines of the PHA, they drive PHA effectiveness. So, the problem evolves to leading teams for PHA excellence. In order to tackle this problem, we need to answer more questions:

1. What specifically do people do that lead to inconsistent and ineffective PHAs?
2. At what point in the PHA exercise do people exhibit the de-railing behaviors?
3. Are people aware of their de-railing actions when they occur?

John Hammond, Ralph Keeney, and Howard Raiffa, offer answers to the above questions in their *Harvard Business Review* article "The Hidden Traps in Decision Making". They assert people are inherently vulnerable to psychological (hence, invisible) "traps" when making decisions. These traps include the following:

1. Anchoring trap - letting initial information and impressions anchor minds;
2. Status-Quo trap - avoiding action that takes people out of their comfort zones and makes them vulnerable;
3. Sunk-Cost trap - perpetuating bad decisions to avoid having to admit a mistake;
4. Confirming-Evidence trap - seeking information to support a decision while ignoring contradictory information regardless of its significance;
5. Overconfidence trap - being overconfident in estimating/forecasting accuracy;
6. Prudence trap - adjusting estimates/forecasts to overly conservative values; and

7. Recallability trap - allowing dramatic past events/experiences/memories to bias estimates/forecasts.

Since these traps are ever-present during decision-making activity, people are falling into them throughout the PHA workshop...and they do not always know they have fallen into a trap. The authors mentioned above also offer tips to avoid the traps. These tips include:

1. Seeking information/opinions from a variety of people;
2. Exercising caution when communicating with others to avoid triggering a trap with your own words;
3. Challenging yourself and others to objectively evaluate all options;
4. Serving your team by supporting discipline and accountability;
5. Assigning someone to play devil's advocate to argue against the decision being contemplated;
6. Challenging the motives of evidence and data;
7. Examining how other people frame decisions and recommendations; and
8. Challenge numbers (e.g. estimates, forecasts, statistics, likelihoods, design limit values).

Effective implementation of these tips hinges on one facet of team activity - *communication*.

4. Communication Patterns: The Most Critical Factor to a PHA Team's Performance

As promised earlier in this paper, we have (1) described PHAs and their importance and (2) described how teams impact PHAs through their decision-making traps. In this section we further posit and support communication as the most critical factor to a PHA team's performance (i.e. effectiveness). We have already noted communication as a critical factor to avoiding decision-making traps.

4.1 *Communication Patterns of High-Performing Teams*

According to studies led by Alex Pentland (professor at MIT and director of MIT's Human Dynamics Laboratory), patterns of communication are the most important predictors of a team's success. In the *Harvard Business Review* article, "The New Science of Building Great Teams", Pentland states that patterns of communication "are as significant as all the other factors - individual intelligence, personality, skill, and the substance of discussions." Pentland goes on to list the following as communication characteristics of high-performing teams:

1. Every team member spends about the same amount of time talking and listening;
2. Discussions consist of succinctly-delivered content;
3. Team members look at each other when speaking and use energetic gestures;
4. Team members speak to each other and not through the team leader;
5. Team members engage in "back-channel or side conversations within the team"; and
6. Team members go hunting outside of the team to gather and bring back information for discussion and application to the project.

So, we have identified communication as a necessary element to avoid decision-making traps. And, we have identified communication patterns as the most important predictor of a team's success. We have listed decision-making pitfalls as well as communication patterns of high-performing teams. But where do trust and confidence come into play? How do you get team members to have the confidence and trust to share and listen?

4.2 *Critical Factors for Effective Communication in Highly Collaborative Teams*

Gratton and Erickson have conducted research to identify factors that correlate with team success. Their list includes a skills factor focused on building relationships, effective communication, and conflict resolution. Highly collaborative teams have team members that know how to do these critical people-related activities. These members are the collective confidence-builders and trust-builders. Additionally, highly-collaborative teams enjoy a strong sense of community, which helps establish the confidence and trust among team members. When team members feel everyone is focused on achieving the same goals in a manner supportive of who they are, they develop the confidence to speak up, challenge, and keep an open mind. Gratton and Erickson also posit that teams should not be made up entirely of strangers. When everyone is a stranger to everyone else, it is very difficult to build the confidence and trust necessary for effective communication. The last factor worth noting is leadership. Highly collaborative teams benefit by having a leader that can focus on task-oriented activities early in the project where it is most important to get momentum and traction. As the project progresses and relationship issues arise, the leader should be able to shift to relationship-building activities to ensure collective, effective communication.

Hence, team communication and communication patterns are critical for effective application of a PHA methodology. We also now have an idea of what effective communication resembles. And lastly, we have identified other factors necessary to establish the trust and confidence for effective communication and subsequently team performance. But how does this help us? How does this help me as a facilitator? How does this help future PHA team members?

Oftentimes, I walk into a workshop without knowing some of the team members. It does not take long for me to realize that some of the team members do not know each other. It is common for representatives from several companies to be present at a single PHA. Given the short durations of PHAs, teams do not always have the luxury of time to build a sense of community that fosters trust and confidence for effective communication. So, can we assess a team's ability to communicate prior to attempting to apply a PHA methodology? If so, what safeguards can be put in place to protect against communication vulnerabilities at both the individual and team levels?

5. PHA Case Study Informed By Insights Discovery® Personality Profiles

5.1 *The HAZOP of 2012*

In 2012, I facilitated one of the most challenging PHAs of my career. The project involved an upstream development and the HAZOP PHA methodology was employed. There were more than 15 team members in the room at any given time, but not all of them were core. Most of the

team members knew each other and had been working with each other for months before the PHA.

The first three days of the PHA were peppered with aggressive, intense, passionate, and fierce exchanges - voices were raised, fingers were pointed, and eye contact or its avoidance was strategic. These exchanges were sporadic throughout the PHA, which lasted just over two months. The number and frequency of the outbursts lessened as the PHA went on; however, the style of communication did not lend to team collaboration and effectiveness. The result was a prolonged effort to accomplish a high-quality PHA. The team averaged about one node per day.

5.2 *The HAZOP of 2013*

In 2013, I facilitated another PHA for the same project using the HAZOP methodology. The project had been re-run through the relevant capital deployment stage-gate process to reduce scope and cost and delivery time. Once again, there were more than 15 team members in the room at any given time, but not all of them were core.

Unlike the HAZOP of 2012, the effort was dominated by more effective communication. The heated exchanges of 2012 never flared up. The team engaged in a more constructive style of communication. The team averaged about two nodes per day.

You might expect a shorter PHA due to the reduced scope; however, the number of nodes requiring analysis did not decrease by half. In fact, the number of nodes only decreased by 10%. You might also expect more effective communication from a team comprised of members that had been through a similar exercise with each other just one year before. However, just before the 2013 PHA effort, the project was transferred to a new Engineering-Procurement-Construction (EPC) company. This transfer was accompanied by the onboarding of new EPC technical leads to the project. So unlike the 2012 effort, roughly half of the team members knew each other and had been working with each other for months before the PHA. The other half of the PHA team consisted of complete strangers to the legacy project team. So, why did the teams perform differently? We know the answer lies in the people, but what specifically was different?

5.3 *Insights Discovery® Personality Profiles*

Developed in 1988 in Scotland, Insights Discovery® is a tool based on the psychological-types theory of Dr. Carl G. Jung and Dr. Jolande Jacobi. Dr. Jung proposed personalities manifest through the interaction of four functions: (1) thinking, (2) feeling, (3) sensation, and (4) intuition; and two attitudes: introversion and extroversion. When combined, these functions and attitudes generate eight personality types. Dr. Jung argued that uniqueness comes from the different balances of these functions and attitudes. It is these balances that make up the Insights® 4 Color System: Cool Blue, Fiery Red, Sunshine Yellow, and Earth Green.

Figure 1: Insights® 4-Type Wheel



Insights® measures an individual's unique preference-set via the Discovery evaluator - a 25-frame questionnaire of 100 word pairs. The output is the Insights Discovery® Personal Profile highlighting and individual's strengths, weaknesses, communication style, and potential value to the team. In 2005, The University of Westminster published a paper outlining the case for validity and reliability of the Insights Discovery® Evaluator. In summary, strong evidence exists to support the four color measures calculated from the Insights Discovery® model being both reliable and valid. The below table presents the four colors and high-level characteristics:

Table 1. Insights® 4-Color System Quick Reference

	Cool Blue	Earth Green	Sunshine Yellow	Fiery Red
Jung equivalent:	Introverted Thinking	Introverted Feeling	Extraverted Feeling	Extraverted Thinking
Appears:	Formal, conservative	Casual, conforming	Fashionable, stylish	Business-like, functional
Work preferences:	Structured, organized, functional, formal	Personal, relaxed, friendly, informal	Stimulating, personal, cluttered, friendly	Busy, formal, efficient, structured
Style:	Slow/systematic	Slow/easy	Fast/spontaneous	Fast/decisive
Focus:	The task, the process	Maintaining relationships	Interacting/relationships	The task, the results
Fears:	Embarrassment	Confrontation	Lack of prestige	Loss of control
Under tension will:	Withdraw/avoid	Submit/acquiesce	Attack/be sarcastic	Dictate/assert
Likes:	Accuracy	Attention	Recognition	Productivity
Seeks security in:	Preparation	Close relationships	Flexibility	Control
Wants to maintain:	Credibility	Relationships	Status	Success
Help to support their:	Analysis	Warmth	Relationship	Objectives
Seeks to achieve acceptance through:	Correctness, thoroughness	Conforming, loyalty	Playfulness, stimulating the environment	Leadership, competitiveness
Likes you to be:	Precise	Pleasant	Outgoing	Brief
Wants to be:	Correct	Liked	Admired	In control
Is irritated by:	Surprises, unpredictability	Insensitivity, impatience	Boredom, routine	Inefficiency, indecision
Decisions are:	Paced/deliberate	Consideration	Spontaneous	Quick/decisive

As presented above, Cool Blues are introverted thinkers, but Sunshine Yellows are extraverted feelers. By their very natures, these two personality types represent extremes on a spectrum, which present inherent communication challenges. The same applies to Earth Greens (i.e. introverted feelers) and Fiery Reds (i.e. extraverted thinkers). When approaching decisions, Cool Blues are data-oriented, Fiery Reds are action-oriented, Earth Greens are considerate, and Sunshine Yellows are spontaneous and innovative. Hence, while it may be easier for similar personality types to communicate, they may be more susceptible to the aforementioned decision-making traps. For example, a room dominated by Fiery Red energy is more apt to make a quick decision without examining all of the evidence/information beforehand. On the other hand, a room dominated by Cool Blue energy may suffer paralysis by analysis with little action as the result.

It is important to note that most people have some degree of each color in their personality. In a sense, we are chameleons with a dominant color, but have the potential to demonstrate the personality of another color in certain situations. This multi-colored profile is what allows persons with different personalities to get along through effective communication. Understanding who you are trying to communicate with coupled with understanding your own personality profile allows you to “dial up” or “dial down” a particular color in order to adjust/improve your communication style for certain interactions. Therefore, when we use the terms “Cool Blue”, “Fiery Red”, “Earth Green”, or “Sunshine Yellow” in this paper, we are simply referring to a personality’s dominant color. A person of a specific personality type can exhibit behaviors, attitudes, and functions of other personality types, especially once the person is aware of their natural affinities and the affinities of others.

By generating the personality profiles of each team member, a color wheel depicting the team’s composition can be assembled. This color wheel can be used as a communication awareness tool when assessing a team’s potential for success. The color wheel can also afford action prior to conducting or during a PHA workshop.

5.4 The Insights® Color Wheels of 2012 and 2013 HAZOP Teams

After completion of the 2013 HAZOP and upon reflection of the efforts, we collaborated with Insights Learning & Development Limited to generate the personality profiles of core/critical PHA team members. The members selected represented the driving forces behind the efforts. The color wheels of both teams are presented below:

Figure 2: 2012 HAZOP Team Color Wheel

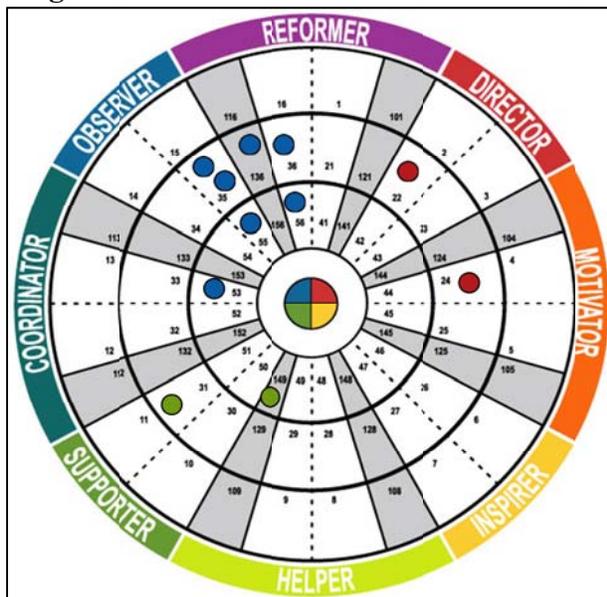
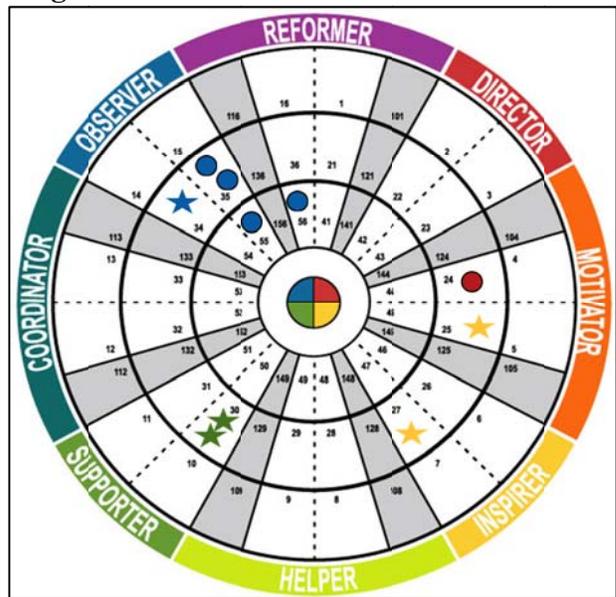


Figure 3: 2013 HAZOP Team Color Wheel



As depicted in the respective color wheels, the 2012 HAZOP team was (1) more heavily weighted on Cool Blues, (2) absent of Sunshine Yellows, and (3) potentially subjected to competing Fiery Reds. Sunshine Yellows bring energy and encourage involvement. They are

outgoing and adept at building relationships. This behavior was more observable in the 2013 team where team-building outings were organized by one of the new Sunshine Yellow members.

The “★” symbol in the 2013 HAZOP team color wheel depicts new members as compared to the 2012 team. The 2013 HAZOP team enjoyed the presence of two Sunshine Yellow personalities. Two core Earth Green personalities from the 2012 team were replaced with two new Earth Greens and the 2012 directing Fiery Red dropped off the 2013 team. While these differences may seem insignificant, the 2012 Earth Greens and the 2012 directing Fiery Red were three of the players usually involved with the de-railing exchanges. A fourth player (one of the Cool Blues of 2012) usually at the heart of the heated exchanges of 2012 remained on the team for the 2013 effort. But the communication style of the fourth player seems to have been influenced in a more distracting manner by the now-departed 2012 players...or perhaps more positively influenced by the collective 2013 team.

When assessing the color wheels against potential decision-making traps, a more balanced team has the potential to avoid more traps...especially if they can evolve to a highly-effective mode of communication. With the introduction of Sunshine Yellows onto the 2013 team, a more balanced team was achieved with the potential for more effective decision-making. Additionally, with fewer core Cool Blues, a more effective balance of analysis and decision-making may have been achieved.

Please note the above analysis is not meant to assess the behavior of any one individual. The above analysis is focused on understanding communication differences across the two teams with the purpose of identifying potential communication safeguards for future efforts. Is it fair to say the 2013 team was more effective than the 2012 team? I would not make that assessment by simply looking at the above color wheels; however, the above color wheels do provide a level of awareness and insight to afford upfront and midstream communication and team performance adjustments.

5. Recommendations to Enhance Communication for More Effective PHAs

My colleagues and I have (1) described PHAs and their importance, (2) described how teams impact PHAs through their decision-making traps, (3) posited and supported communication as the most critical factor to team performance, and (4) presented a case study using Insights Discovery® personality profiles. Below, we offer a set of tools and recommendations to improve the likelihood for consistent PHA effectiveness:

1. Before Day 1
 - a. Generate the personality profiles for each core team member.
 - b. Generate the color wheel for the proposed team.
 - c. Ensure every color is represented on the team. If the core team is missing a color, then find someone of the missing color to participate in the session. If someone of the missing color cannot be secured, then at least the team members have the insight to “dial-up” or “dial-down” colors to compensate.
 - d. Ensure the PHA team is not made up entirely of strangers. This is especially critical of short PHAs as the speed to trust and confidence is greatly impacted by

healthy relationships. The facilitator should assess the team dynamics and help each team member use their strengths. The facilitator should also actively push team members to stretch their less dominant energies to overcome communication challenges.

- e. Challenge your Sunshine Yellows to serve the team with their relationship-building skills. Sunshine Yellows may need to lead the communication at first to get things rolling and then back off once enough confidence and trust has been established and others are engaged and participating freely.
 - f. Similar challenges can be discussed with other colors. For example, challenges can be made to Cool Blues for data assurance and to Fiery Reds for maintaining momentum. Earth Greens may be given the task to ensure consideration is afforded to all team members and key stakeholders.
 - g. Ensure the facilitator is aware of:
 - i. Individual personality colors as well as the team's color wheel;
 - ii. Common decision-making traps;
 - iii. Communication patterns of high-performing teams;
 - iv. Critical factors for effective team collaboration.
2. Day 1
- a. Designate a team member to be the decision-making trap "cop". It is his/her job to be on the lookout for offenses. This job could be split across several team members as Cool Blues have a greater affinity to challenge numbers. Fiery Reds may be more successful at enforcing discipline and accountability.
 - b. Designate a team member to monitor talking/listening time. This person does not have to be a core team member.
 - c. Ensure the facilitator promotes cross-talk between individuals and not through themselves.
3. Ongoing
- a. Ensure plenty of breaks early in the effort to promote and catalyze back-channel and side conversations
 - b. Keep a running list of opportunities to seek information from external sources to further inform the analysis.
 - c. Assign your Sunshine Yellows to coordinate inclusive, team-building activities outside of the workshop, such as ice-cream socials or celebratory lunches for achieving a significant milestone.
4. Last Day
- a. Perform a lessons learned focused on team communication and team performance. Identify best practices and opportunities for improvement. Try to recall moments of ineffective communication and decision-making deficiencies and propose future safeguards.
 - b. Celebrate your success.

6. Conclusions

Brainstorming, strategy-setting, and PHA methodologies are fairly well-defined by industry and company-specific guidance documents. These methodologies are typically bound by documented objectives, prescriptive rule-sets, narrowed scopes, and actual business and/or

design information. Despite the fairly well-defined and bounded methodologies, no two workshops are ever the same - even within the same company with the same set of team members. Some workshops are executed more effectively than others with more effective results as the outcome. To achieve excellence, inconsistent and ineffective team performance must be eliminated, prevented, and/or mitigated.

Humans are the primary source of inconsistent and ineffective PHA team performance. As humans, we are vulnerable to the hidden decision-making traps that dwell within our brains. In order to avoid these traps people must be effective communicators; however, few know what effective communication looks like. In addition, effective communication does not just involve body language and verbal cues, but also patterns that improve team performance. Lastly, several critical factors for team collaboration are dependent on effective communication. Given the importance of communication on a PHA team's performance, developing a set of tools and recommendations focused on (1) achieving excellent team performance and (2) delivering consistent and effective workshop results would be valuable to the energy industry and, more importantly, to the people served by the energy industry.

Moving forward, it is worth spending time and money upfront to identify and understand the various personalities on a proposed PHA team. This insight will help you predict and/or plan for the decision-making pitfalls. Knowing your team make-up will also help you assess your potential to achieve the communication patterns of high-performing teams. And lastly, determining where you stand against the factors for highly-collaborative teams will help you make adjustments for effective delivery of the PHA. In the end, organizations should achieve higher-integrity operations by safeguarding communication vulnerabilities.

7. References

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