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## Capturing What's in People's Heads to Learn from Successes and Failures and Provide Effective Ways Forward

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### Abstract

In industry, much can be gained by drawing from different people's experiences and what they have learned or can collectively learn from successes as well as failures. However, capturing and utilizing this knowledge is often challenging in many areas such as product development, testing, and operations, particularly due to the following circumstances:

- New information is continually being generated
- Many employees are specialized
- Much information is sought out for specific situations
- There are many different circumstances and ways to utilize information and resources
- Not all valuable information can be captured in employee/training programs

This paper explains a process for capturing people's knowledge and translating it into useful directions that can guide various business functions to move forward and increase their success. Using the process facilitates the spreading of valuable resources, information, solutions, and practices within and across business groups, functions, and organizations by drawing from workers' experiences to piece them together so that they can be utilized most effectively. Benefits of this process include:

- Gaining confidence and effective directions to move forward with solutions/technologies or new endeavors
- Solidifying circumstances to get the most out of resources and minimize problems and wasted effort
- Optimizing solutions
- Reducing the time and effort seeking out information and resources; avoiding "reinventing the wheel"
- Improving business choices

This paper covers applications of this process to safety and loss prevention in product development, testing, and operations with examples from the oil and gas industry.

## **Keywords**

Preparedness, lessons learned, reliability, operations, mechanical integrity, human factors, risk, maintenance, training

## **Introduction**

The process for capturing what's in people's heads and providing effective ways forward is effective in cases in which people and business groups can benefit from:

- Piecing together useful information, resources, solutions, and practices
- Coming up with the most favorable ways to tie information into what they or others do
- Filling in any holes that could prevent success

Example cases where the process provides value include:

- Incorporating information, resources, and solutions into design and planning stages and operations
- Utilizing resources and analyses in the most advantageous ways to prevent problems or failures or optimize solutions
- Addressing improvement opportunities with handoffs among groups
- Clarifying expectations with customers for successful implementations and corresponding procedures
- Utilizing customer feedback

The process is especially valuable in industries like the oil and gas industry that have innovation, complex projects, and many different types of companies contributing to success, putting an emphasis on connecting with each other to be able to move forward and avoid issues and failures. The process has three main steps and can be used by workers of various business functions, disciplines, and groups to collectively guide greater contributions to any ways forward, operations, explanations, and/or directions for a variety of scenarios.

## **Process for building on directions we provide each other**

Consider how much resources, information, solutions, and practices people of various backgrounds, functions, disciplines, and groups have to piece together to reliably advance products, systems, and processes in any industry. There is an immense amount of information and resources people piece together to make the following endeavors most effective:

- Creating and implementing new solutions of any kind
- Creating, selecting, and maintaining parts
- Analyzing and selecting materials

- Planning
- Guiding progress throughout value chains
- Capturing what has been learned and is in people’s heads

All of these endeavors generate lots of new directions, resources, and the need to spread those directions and resources and tie them into what workers do, use, and know. There are multiple avenues that guide us, the workers, to effectively piece together valuable information and resources such as:

- Standard procedures such as test & assembly procedures, operations & maintenance procedures, and design reviews
- Supporting functions
- Employee training and workforce development programs
- Competencies

However, not all valuable direction and work is captured using these formal avenues that increase our success. People guide people with directions outside of these formal avenues, and there is a lot that can be gained by capturing what’s in people’s heads. See the bulleted list in the abstract for a breakdown of some of the benefits. Some challenges to doing this effectively include the following:

1. Specialized employees and employees with varying responsibilities: This creates the need for significant clarification of “who” specifically should receive information and resources and put them to use.
2. Change: People are continually moving around, and progress is continually being made. Resources, information, solutions, and practices are continually being generated and modified and require people of various backgrounds to piece them together to effectively increase success and prevent what might reduce success.
3. Circumstances: There is a broad range of circumstances to effectively use information and resources, and it’s different for different people and job functions. This creates the need to clarify “when” and “how” workers should reliably and most advantageously use information and resources.

There is an effective process for capturing, building on, and spreading directions from workers and managers who connect on ways to increase success and prevent what might reduce success. It involves the following three steps, and we call it an Advancement Process as it elicits and captures greater guidance to advance capabilities and performance.

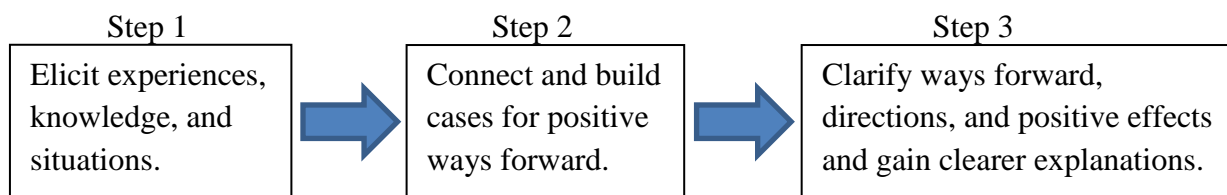


Figure 1. Advancement Process for building on directions and ways forward

## **Keys to increasing the utilization of different people's directions for success**

People of various backgrounds and functions have much knowledge captured in their heads that can be used to increase the success of companies and industries. To most effectively make use of that direction, workers must not only utilize formal avenues for increasing success, but also must connect and piece together useful resources, information, solutions, and practices outside of those formal avenues. The following are some keys to doing this effectively, making both short term and long term gains more manageable.

### Line up avenues for increasing success

The three step process in figure 1 is effective at getting people to connect, find ways to increase success, and get clear on ways forward and how to convey those ways forward to others. Discovering how different people and groups can help each other is an important part of the process. Therefore, participants in the process must communicate with each other what they tie information and resources into and the different effective ways they help workers to be prepared and do the right things. These avenues for increasing success are vast and vary depending on groups' situations. In engineering, for example, information could be tied into design guidelines, design reviews, managers' directions, experts' duties, decision tables, and many other resources. Also, there are a myriad of ways to help ensure people and groups are prepared, doing the right things, and making worthwhile contributions. Working together to line these avenues for increasing success up is key to arriving at the most favorable ways to set people and groups up for success with valuable information and resources that would otherwise remain in people's heads or not be pieced together at all.

### Elicit and incorporate

Workers and managers of different, relevant backgrounds should elicit what strikes them as useful and incorporate what is agreed to be useful. For example, if a worker comes up with a new technique for preventing tool mishaps or optimizing failure analyses, this can be spread to other people, groups, or even organizations in different places in the value chain. If a sales or marketing team keys in on what information would help customers with expectations or ways to increase success, engineering can point to and build informational resources that could better set up for success managers and workers in the field. This can also lead to greater solutions in the pipeline. There are very many ways people of different backgrounds and functions can help each other achieve greater success and prevent problems, and efficiently and effectively spreading and incorporating valuable resources, information, solutions, and practices is key.

### Build on contributions for moving forward

There are key ways to move forward with goals that require input from various parties. Participants should focus on the following ways to move forward to maximize their contributions.

- Evaluate – Evaluate any ways forward, options, and solutions

- Input – Gain input from different people and groups
- Work – Identify what work will lead to success and who should contribute
- Directions – Provide directions that will lead to desirable results
- Tie in – Clarify what valuable resources, information, solutions, and practices should be tied into organizations and groups and the best ways to do that

Focusing on these relevant ways to move forward guides people of varying backgrounds to provide greater contributions to whatever your organization is trying to achieve. Working together to provide greater clarity here leads to positive results and minimizes wasted effort.

Ultimately, success is achieved by making selections that line up valuable information and resources with the most favorable ways to get people to put them to their greatest use. The three step Advancement Process guides this, clarifying positive effects, meaning, explanations, ways forward, and directions.

### **Ramifications for safety**

Workers connecting with other workers outside of formal avenues and building on directions they provide each other is required when there is building and progress, and this is prevalent in R&D, product development, engineering, test laboratories, and operations for example. Consider all the contributions from various technical and business functions that have led to progress in companies and industries. Much of this improvement is through collaboration outside of standard procedures and other formal avenues. The effective execution of an Advancement Process of drawing from people's experiences, connecting, and clarifying ways forward has contributed to many gains. Here are a few examples of progress that has been made, the contributions that have come from various technical and business functions, and how those contributions have translated to increased safety and responsibility.

### Composite materials and products

Many contributors have played a part in the successful use of composite materials in companies. Table 1 provides some of the contributions that have taken departments from being reluctant to use composites, with many problems caught in test labs, to getting composite materials reliably incorporated into designs, reducing costly failures, and making better products.

Table 1. Example contributions to composite materials and products

<b>Composite Materials and Products</b>	
<b>Function</b>	<b>Contribution</b>
Suppliers	Options, standards, practices, techniques
Materials & testing	Circumstances for using decision tables and reliability data, practices, techniques
Different engineering depts.	What specialized employees should contribute to decision tables and who should be using them and when, practices, techniques
Operations & manufacturing	What knowledge and resources would be effective for their procedures, practices, techniques
FEA professionals	What their responsibilities could be and which experts could help optimize fiber patterns, practices, techniques

These contributions have collectively led to increased safety through: safer manufacturing and assembly practices, improved creation and utilization of strength and failure analyses, and the spreading of information to ensure long term reliability, among other things.

Tools in the field

The effective and responsible use and maintenance of tools in the field in the oil and gas industry has successfully evolved due to the contributions of many. Table 2 provides some of the contributions and communication that has gone into this.

Table 2. Example contributions to tools in the field

<b>Tools in the Field</b>	
<b>Function</b>	<b>Contribution</b>
Design engineers	Details of responsibilities and importance
Operations	What decisions they would make and resources they would use
Both	Improving accuracy and effectiveness of decision tables, practices, techniques

Such contributions have played a large role in improving safety through: preparedness, reduction of mistakes, improved troubleshooting, appropriate parts selections, and the reduction of repairs and rework.

## Industry standards

Understanding and using industry standards is often very challenging, and important sections of many industry standards are not used properly.

The Ocean Energy Safety Institute has clarified important points for getting greater value from Human Factors/Ergonomics (HF/E) standards to provide positive contributions to safety in offshore drilling and production, including increasing the efficiency of standards for multiple types of users,

“To increase the usability and usefulness of these standards it will be important to ensure that the standards are easily accessible and interpreted by both HF/E and industry personnel.” [1]

The following contributions from various groups have led to the effective use of industry standards, reducing mistakes and getting products out the door more reliably.

Table 3. Example contributions to the effective use of industry standards

<b>Industry Standards</b>	
<b>Function</b>	<b>Contribution</b>
Operations & different product managers	Success and failure stories, practices
Standards users	Critical sections, practices
Managers of different engineering departments	The company knowledge that the standards pertained to and how to incorporate that into tasks and responsibilities, practices

Spreading and using valuable directions pertaining to industry standards has increased safety in many ways including: greater mechanical integrity of equipment, less rework and design adjustments in the field, better manufacturing and assembly practices, and designs that more effectively take into account human factors.

## Manufacturing, testing, assembly, and tools

Manufacturing, testing, and assembly are dynamic groups that interact with engineering and continually contend with change. The following are contributions that have led to the reduction of costly problems stemming from incompatible engineering designs, procedures, and directions.

Table 4. Example contributions to manufacturing, testing, assembly, and tools

<b>Manufacturing, Testing, Assembly, and Tools</b>	
<b>Function</b>	<b>Contribution</b>
Manufacturing, Test & Assembly	Issues, ways to avoid issues, how they could improve engineering resources such as design guidelines, who to consult with, practices, techniques
Engineering	How they would improve understanding of capabilities and limitations of machines/tools, use of specialized machines/tools, who to consult with, resources, designs, practices, techniques, how to incorporate into design reviews

Directions from these contributions have translated to greater safety in many areas. Collectively, workers have positively impacted: the proper use of tools; safe manufacturing, testing, and assembly practices/techniques; the responsible use and discarding of materials and fluids; and safety rules; among other things.

Collectively guiding increased success

The three step process in figure 1 guides people of different backgrounds to learn from each other what goes right and what doesn't work, so they can collectively learn from their successes and failures and also arrive at the most favorable ways to set people and groups up for success with the ways they wish to move forward and execute. Effectively doing this captures more of what's in people's heads and translates that knowledge into ways to increase success and prevent what might reduce success. Valuable knowledge that people could spread to others can come in many forms. Examples include: design considerations to avoid pressure build ups, a thorough understanding of failure modes and proper failure analyses, techniques to prevent explosions, considerations to ensure the strength of welds, and techniques and steps used in operations.

Progress in many forms

In the oil and gas industry, progress continually comes in many forms from new equipment and materials to new techniques and analyses, so people of various companies and organizations are constantly piecing together useful information and resources and seeking out what they believe could help them. Working to reduce uncertainty is inherently a part of this building process, so it is important to capture progress from many different groups, companies, and job functions and work together to relay that progress effectively, tying it in where it needs to go. The current complexities of the oil and gas industry place more and more of a need on this connecting and effectively utilizing lessons learned. The three step Advancement Process for building on the directions workers provide each other can be used in more situations. For example, it can be used effectively to communicate across technical functions the appropriate rigor of analyses, which can prevent problems in planning stages. The process can also set up for success design engineers and project managers with knowledge of progress made in the field, new techniques, and any issues, drawing from various people's experiences to key in on the best ways to continue to spread that information and make it most useful.



## **Assessing the value of the Advancement Process for organizations and situations**

The value an Advancement Process provides depends on the value of the directions people and groups can provide each other and the usefulness of what is captured and/or effectively communicated. This value is especially high in cases in which workers generate significant resources, information, solutions, or practices and can benefit from piecing it together, spreading it, reducing uncertainty, and putting it to effective use. As an example, for engineering teams, the process can at various stages prevent equipment and system failures and going down the wrong paths in other ways as well, which can save significant time, effort, and money in materials, equipment, test lab costs, and redesign time.

The process is a building process that can incorporate many contributions from different people and groups, so you can't put a precise number on the long term benefits. The value depends on what you are building and the problems you are averting, which could be many. To evaluate the value the three step process could provide for an organization or situation, one can consider the possible dollars that could be gained or saved through the following objectives that the process achieves.

1. Less hesitation to move forward with endeavors, solutions, or any improvements
2. Quicker spreading/finding of what is useful to increase success
3. Greater impact, fewer problems, and work done faster
4. Building on contributions to increase successes

## **Greater involvement means greater connections**

People have great ability to build on knowledge and “craft ever more advanced technology” [2].

“Indeed, we daily take the ideas of others and put our own twist on them, adding one modification after another, until we end up with something new and very complex. No one individual, for example, came up with all the intricate technology embedded in a laptop computer...” [2]

Building with others, finding better resources and ways to use information and resources, and helping each other improve is indeed in our nature.

Mark Thomas of University College London points out, “It's not how smart you are. It's how well connected you are” [2].

## **Process for building on contributions**

The three step Advancement Process allows workers to take greater advantage of their connections by capturing relevant ways to set each other up for success as they constructively piece together valuable resources, information, solutions, and practices and connect on important details. Essentially, the Advancement Process is a sequence for building out effective ways to incorporate what can be valuable to organizations. People's greater involvement in this process allows them to provide greater contributions to moving forward with solutions and guide the

incorporation of what they have learned and what they see can lead to greater success and problems avoided.

### Industry is very constructive

Getting these greater contributions is especially valuable in complex industries like the oil and gas industry, where deploying technologies takes many more than just one person or group to guide solutions to their fruition. Figure 2 shows how there are many areas that must be worked on to successfully deploy technologies, and this requires a lot of teamwork.

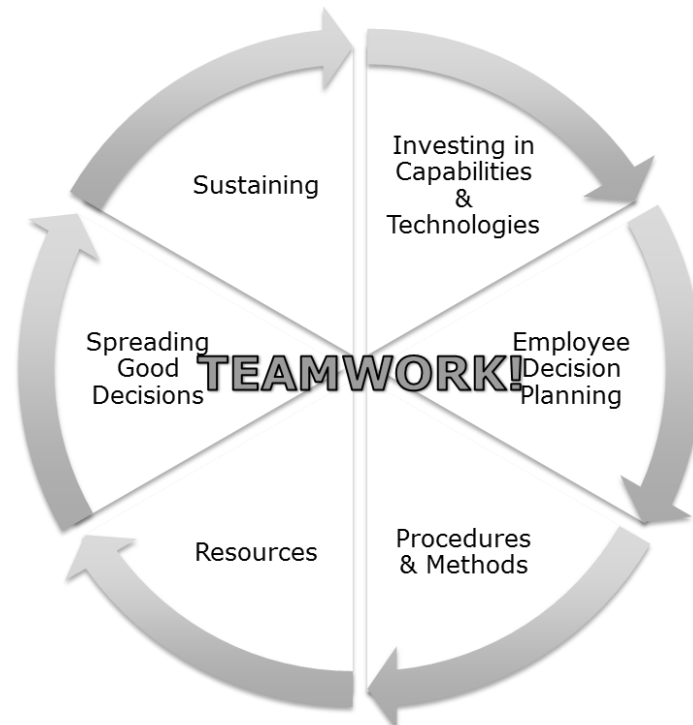


Figure 2. Opportunities/aspects for improving that require building on contributions

The challenge of technology deployment in the oil and gas industry was reinforced by participants at a gathering of senior executives held by Lloyd’s Register Energy in January 2015,

“Perhaps we are focusing in the wrong areas, and it is the deployment processes that will be key to innovation within the industry.” [3]

Taking greater advantage of worker connections is critical to confidently going forward with solutions and reliably deploying them. An important aspect of this is incorporating what workers learn from successes as well as problems. This was duly noted by participants at an Ocean Energy Safety Institute Forum for Dialogue on topics related to risk held May 12-13, 2014,

“Another problem is that companies should pay more attention to the activities that industry has been doing well, not only focusing on negative and only to solve the latest problem. What is

done well and the corresponding reasons, such as good practice or just luck should be identified.” [4]

The entire energy industry is very constructive with positive contributions coming from many places and stages including: many companies, universities, and organizations; many types of business and technical functions and disciplines; and many stages in engineering, operations, and elsewhere. The more people and groups connect on ways to utilize the many kinds of positive contributions that are made, the more those contributions can be pieced together for applications in different areas, spread, and solidified to get the results people appreciate.

## Conclusions

In summary, in cases where people and groups can collectively piece together how to use resources, information, solutions, and practices for mutual benefit, an effective Advancement Process guides workers of various functions to arrive at and solidify positive ways to set each other up for success for the contributions they make and circumstances they face. It does this by building on people’s knowledge and the directions people provide each other. This is relevant for the industry challenges shown in Table 5 that require building on directions from many groups.

Table 5. Industry challenges and corresponding direction needed from groups

Industry Challenges	
Challenge	Valuable direction from groups
Reliability & safety	Decisions, resources, procedures, practices, techniques, handoffs, pointing people in the right direction
Technology deployment	Decisions, resources, procedures, practices, techniques, handoffs, pointing people in the right direction
Cross functional collaboration	Support, resources, practices, techniques
Spreading success stories	Decisions, resources, practices, techniques
STEM workforce	Specializations, change, practices, techniques

An effective Advancement Process builds on directions people provide each other and leads to:

- Effectively capturing, spreading, and utilizing what’s in people’s heads that would otherwise remain in individuals’ heads or not be pieced together at all
- Learning from successes and failures
- Providing effective ways forward
- Favorable ways to:
  - Work with solution and resource creators, workers, and supporting functions
  - Set workers and groups up for success

The more thoroughly, efficiently, and effectively workers contribute to the three step Advancement Process, the more they can guide their companies and industries to confidently improve operations and create and implement new solutions. The Advancement Process works because people are constructive by nature and do like contributing to ways to not waste their efforts.

### Using the Advancement Process

Organizations should utilize Advancement Processes in their own ways that suit their situations and goals most favorably. Different applications call for varying degrees of input from different parties to be successful. Also, contributions can vary at different stages and in different circumstances.

There are no strict timeline rules for using an Advancement Process as it can be incorporated according to the needs of organizations and their corresponding objectives. An Advancement Process should be carried out iteratively in cases where greater benefits can be achieved through continual contributions. One iteration of the Advancement Process through the three steps in figure 1 can typically take about 12 hours, 4 hours for each step. However, this can vary depending on the situation and the input being gained.

The following are applications where an Advancement Process can be used to generate and incorporate greater guidance from people of various functions to increase success:

- New endeavors/solutions and progress
- Capturing and spreading what has been learned and is in people's heads
- Teams
- Collaboration across functions
- Areas of concern
- Opportunities for improvement

Workers and groups should contribute to an Advancement Process when what they know and have learned can potentially increase the success of any ways forward, operations, explanations, and/or directions. Contributions should guide the incorporation of valuable resources, information, solutions, and practices where they can be used most effectively.

Thank you to the many people I have worked with and interviewed who have provided valuable guidance and examples of the many contributions people of various business functions have made.

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