

# Peeling the Onion of Operational Safety

Creating an environment for success in  
upstream and downstream organizations

By  
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## EXECUTIVE SUMMARY

Ensuring safety consistently across all business units can be compared to peeling an onion. In order to effectively peel the safety “onion,” a company must have the right tools and processes in place. This white paper offers an overview of the operational safety arena, the specific challenges our clients have faced in designing and implementing initiatives, and proven leading practices that address the critical layers of the safety onion in upstream and downstream operations.

Bracketed by four strategic factors (increased regulatory focus, workforce demographics, organizational culture, and operating pressures), management across the industry must answer key questions in relation to safety programs:

- How can we move toward more consistent, sustainable, and safe operations?
- What is the “right” level of standardization to allow flexibility depending on location?
- What is the best approach to engage and enable operational units in the change?
- How can we create a more coherent and consistent operations culture across the organization?

Our upstream and downstream clients have identified three major challenges that impact the effectiveness of operational safety procedures and systems:

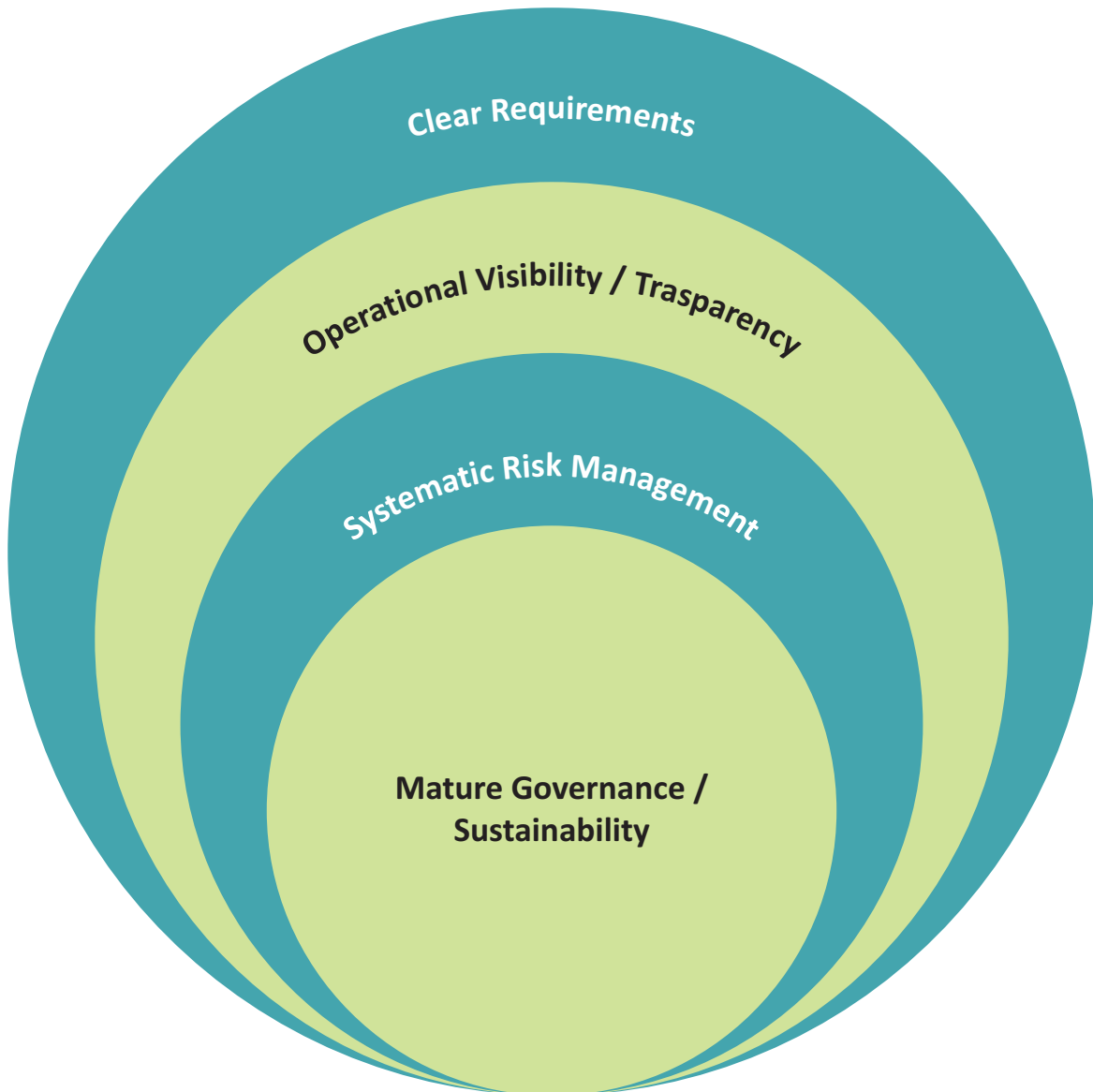
1. Lack of visibility to enterprise level incident/accident data.
2. Limited ability to: 1) proactively mitigate risks around enterprise operations and assets, and 2) ensure effective levels of integrity within day-to-day performance.
3. Difficulty leveraging legacy IT architecture and interfaces to support operational safety processes, procedures and systems.

In helping our clients answer this question, we have identified four key leading practice areas that can greatly improve operation safety procedures, monitoring, and risk management across an enterprise. The end result of these practices is an operational safety program that consists of:

1. Clear requirements
2. Operational visibility/transparency
3. Systematic risk management
4. Mature governance/sustainability

## EXECUTIVE SUMMARY

These areas follow our “safety onion” model, meaning that putting them into play is a stepwise progression from the first to the fourth.



The four “layers” of leading practices for effective operational safety

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## Introduction

The intricacies of upstream and downstream operations can't be found in any other industry. Geographic location, business model, and asset type are just three of the many variables that create a highly complex enterprise.

This complexity applies to operational safety. Ensuring safety consistently across all business units can be compared to peeling an onion: Layer upon layer of factors must be defined, considered, and decided upon. The outermost layers take in external factors such as regulatory entities and local culture. The innermost layers deal with elements within the enterprise such as organizational culture and technology infrastructure. The "in-between" layers deal with strategic issues that every company faces, regardless of size. Management decisions are made in these middle layers; this is where funding takes place, initiatives are deployed, and the success of an operational safety program is determined.

In order to effectively peel the safety "onion," a company must have the right tools and processes in place. In our work with enterprises of all sizes to accomplish this objective, we have seen common challenges and have identified leading practices for their solution. This white paper offers an overview of the operational safety arena, the specific challenges our clients have faced in designing and implementing initiatives, and proven leading practices that address the critical "in-between" layers of the safety onion in upstream and downstream operations.

## The Big Picture

### *Four strategic industry issues that drive decision making*

Safety programs are implemented in the context of strategic outer and inner layers of our metaphorical onion. External considerations are:

- *Increased regulatory focus.* A number of factors have prompted regulators in many countries to more closely consider safety requirements imposed upon oil and gas operations within their borders. With multiple government agencies overseeing safety issues, this increased focus adds greatly to the complexity of program design and execution<sup>1</sup>.
- *Workforce demographics.* Companies operating globally must implement effective safety programs in different countries and cultures. Additionally, operations in a single location can involve personnel from multiple companies, so safety programs often must span more than one enterprise.

### *Inside an enterprise, two strategic factors impact the success of safety practices:*

- *Organizational culture.* The "way things are done around here" can impact the success of operational safety initiatives. A "safety culture" is created when management ensures inclusion of safe processes in operations. Workers in this type of environment will naturally incorporate appropriate practices into their daily routines.
- *Operating pressures.* This is an industry where shutdown of a well, refinery, or other asset can cost millions of dollars per day, and where there is high pressure for productivity.

### *Bracketed by these four factors, management must answer key questions in relation to safety programs:*

- How can we move toward more consistent, sustainable, and safe operations?
- What is the "right" level of standardization to allow flexibility depending on location?
- What is the best approach to engage and enable operational units in the change?
- How can we create a more coherent and consistent operations culture across the organization?

These questions help translate the strategic factors into operational, day-to-day practices.

# Observations from the Field

### *Issues common to many oil and gas companies*

In assessing these questions, as well as the external and internal factors discussed above, our upstream and downstream clients have identified three major challenges that impact the effectiveness of operational safety procedures and systems. We suggest that these issues are common to many oil and gas companies.

**Lack of visibility to enterprise level incident/accident data.** Most of our clients obtain data around incidents and accidents from various and different systems. This situation might be the result of the acquisition of one or more companies with their own systems. It also could arise from locally built solutions within business units, so that an operation in Nigeria, for example, might be utilizing a different system than one in the Gulf of Mexico. Whatever the root cause, these system differences result in:

- Inconsistent incident/accident/illness data across business units
- Lack of capability for built-in management reporting
- Lack of standard operating procedures for data collection
- Informal management of disparate input data types (structured and unstructured)

At an enterprise level, the use of different systems across business units clouds the incident/accident picture. In order to gain visibility across all operations, time must be put into evaluating and standardizing the data, and enterprise-level reporting must be done manually. This results in serious loss of time, accuracy, and transparency to companywide incident/accident information.

**Limited ability to: 1) proactively mitigate risks around enterprise operations and assets, and 2) ensure effective levels of integrity within day-to-day performance.** Following on from the previous issue, the lack of standardized data across the enterprise adversely impacts risk assessment, management and mitigation. Without this standardization, there is no way to create a single management dashboard to enable operational safety validation and incident/risk management. Further, it is not possible to implement a single incident notification system to allow timely and targeted mitigation. A number of our clients have noted that the templates and procedures in place to assess risk no longer meet business requirements. In other words, risk assessment practices are not keeping pace with the strategic industry factors discussed above. This impedes both risk mitigation and day-to-day performance around safety.

A further challenge related to this issue relates to variable workforce demographics. Clients have cited a lack of flexibility in safety programs and procedures to support risk management in various geographies and diverse business conditions. This points directly to the question around the level of standardization—the challenge here is to provide structure that improves visibility to data (per the previous point) while at the same time allowing enough flexibility to account for local variations in culture and business conditions.

**Difficulty leveraging legacy IT architecture and interfaces to support operational safety processes, procedures and systems.** Clients report lack of IT integration at all organization levels, which presents obstacles to the previous two points. Successful integration requires applications and technology that can “talk” to each other and seamlessly share information; further, these systems must enable and support safety processes and procedures. With inventories today that often include legacy systems well over ten years old and current systems utilizing the newest technical architectures and services, clients find it difficult to effectively interface their IT assets to support operational safety.

## Operational Safety Case Study

### Implementation/Support of Incident Management and Risk Assessment System on SAP EHS

#### Business Problem

One of the world's largest refineries, based in the Middle East, was dealing with issues that impacted the effectiveness of reporting and risk assessment. Challenges included:

1. Lack of an enterprise level view on incident/accident data.
2. Inconsistent data was resulting in manual reporting.
3. Lack of capability for built in management reporting.
4. Existing risk assessment matrices were not meeting business requirements.
5. Existing legacy system in use over nine years; outdated IT architecture and lack of interfaces.

#### Action for Solution

Wipro developed and designed a solution in SAP EHS for processes related to action tracking, incident tracking and management and risk assessment (for an activity carried out within the plant, defining the risk consequences, identifying root causes and control measures).

More than 30 customizations were made to SAP EHS to cater to requirements around incident and accident management and risk assessment.

#### Key characteristics of the solution included:

1. EHS dashboard developed to raise and track incident/accident issues as well as retrieve past incident/accident data. This resulted in an integrated system providing enterprise level view having standardized and consistent data
2. Reporting environment simplified and built-in management reporting capability provided; In addition, customized reports developed to cater to client's specific needs (E.g. heat stress and noise measurement). Reporting capabilities could now be used for optimized site management and driving HSSE activities
3. Additional multidimensional risk calculation matrices created for more robust risk assessment: More than ten custom screens were developed in addition to enhanced workflow approval process
4. Standardized solution ensured that there was minimal maintenance and use of in house resources

#### Results

The client now has:

- An effective and efficient incident management and action tracking system.
- An enhanced risk assessment process in line with global standards.

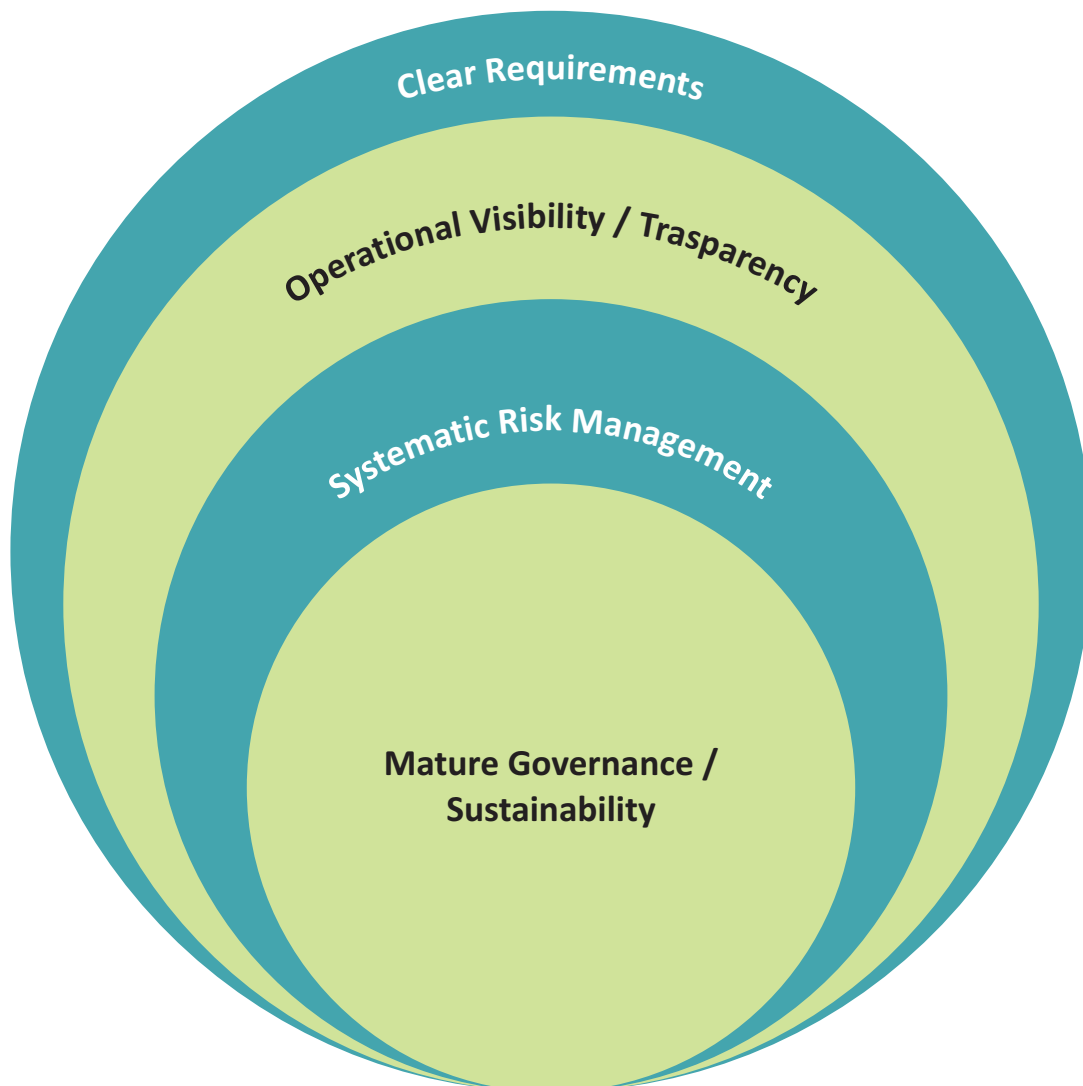
## Leading Practices for Solution

*How do you expect your business units or your enterprise to function from a safety standpoint?*

In helping our clients answer this question, we have identified four key leading practice areas that can greatly improve operation safety procedures, monitoring, and risk management across an enterprise. The end result of these practices is an operational safety program that consists of:

1. Clear requirements
2. Operational visibility/transparency
3. Systematic risk management
4. Mature governance/sustainability

These areas follow our “safety onion” model, meaning that putting them into play is a stepwise progression from the first to the fourth.



The four “layers” of leading practices for effective operational safety

### Leading Practice #1: Define and Embed Clear Requirements

While regulatory requirements serve as the starting point, it is important to go beyond external mandates in defining the essentials of the operational safety function. A program needs to incorporate governmental expectations and company requirements, and at a minimum it must address:

- **Personal Safety**, which involves the systematic identification of safety hazards and associated mitigation measures to ensure that personnel operate in a safe working environment.
- **Permit to Work**, which establishes a work setting where tasks are executed safely and without loss of containment that can cause environmental damage.
- **Process Safety**, which ensures the integrity of hazardous systems and processes through application of good design principles, engineering, and operating practices to prevent and control incidents.

These are the essential components that create a true “license to operate” scenario.

To embed requirements into day-to-day operations, an effective communication and training initiative must be undertaken. Human behavior is a very large component of a safety program; the goal of communication and training should be to move safety practices and procedures into the “automatic” behaviors of operating personnel.

Applying this practice to a safety program requires these steps:

- Identify the unique requirements, regulations, and audit needs that must be addressed by the business unit.
- Identify the standard operating procedures and practices to be leveraged across the organization and by site (e.g., Asset Integrity, Permit to Work).
- Standardize the approach for storage and easy retrieval of structured and unstructured data.
- Ensure appropriate leadership support and commitment at the enterprise and business unit levels.
- Define engagement and communication processes to ensure awareness of operating procedures and practices by business unit personnel.
- Address competency and capability issues (via training if necessary), both at the leadership and site operations level.

### Leading Practice #2: Achieve visibility and transparency to operational performance

With the first leading practice in place, unclouding the operational performance picture is the next layer of the onion. This practice is about understanding where an operation stands in terms of operating limits standpoint, effective alarm management, and providing data to the appropriate users in real time.

To accomplish this, an enterprise must establish a foundational system that:

- Improves accuracy and visibility of performance measures.
- Identifies measures critical to targeted, “high exposure” process areas.
- Addresses any issues related to master data, data consistency, and data governance.
- Standardizes a solution for gathering real-time data for better surveillance, data visualization, monitoring, and alerting.
- Integrates system components to provide an enterprise-level view using standardized and consistent data.

These actions can provide far more benefit to an operation than just monitoring and alarm management:

**They maximize cost benefits and productivity.** Implementing a foundational system that enables business applications and which includes data systems that collect real time data as well as a document management system, then standardizing this system across the operation (and, over time, across the enterprise) will:

- Simplify day-to-day activities.
- Allow personnel to move between business units without needing to climb a new learning curve.
- Retain knowledge within the originating business units.

**They allow operational staff to be proactive.** Technology can be used to run “what if” scenarios to predict the results of planned actions. These scenarios help staff make safe and effective operating decisions.

**They pave the way for a higher and more effective level of automation.** Automating surveillance and monitoring is key to optimum operational safety. Applying technology in this area significantly decreases issues arising from human error. Further, predictive analytics allow operators to be proactive in the management of integrity-based systems so that corrections and replacements can be made before failures occur or equipment problems crop up.

### Leading Practice #3: Approach risk management systematically

To achieve system-base risk management, focus on these actions:

- Establish processes and procedures for risk identification, assessment, and tracking.
- Establish a systematic infrastructure to ensure action is taken against gaps in “high exposure” process areas to leverage rigorous and consistent investment planning. Provide visibility of the infrastructure for audit management purposes.
- Create multidimensional risk calculation matrices for more robust risk assessment.
- Create onscreen dashboards to raise and track incident/accident issues as well as retrieve past incident/accident data.
- Simplify the reporting environment, allow report customization to cater to user’s specific needs, and build management reporting capability into the system.

The foundational system established through the previous practice, when coupled with a risk management program, is the basis for systematic risk management. Embedding risk rules in the system furthers the benefits available from automation, allowing staff to focus on optimizing performance rather than trying to anticipate and manage operational risk.

### Leading Practice #4: Ensure mature governance and sustainability

Requirements are clearly defined. Operational performance is measurable and trackable. Risk management is embedded into the foundational system. This leads to the final step: Ensuring sustainability of safe operating expectations, processes, and systems via an effective operational management system. Said another way, this practice “operationalizes” the results produced through the three previous practices, so that safety procedures, processes, and systems are maintained and part of day-to-day routines.

Key elements of the operational safety sustainability model are:

#### *Governance Roles and Responsibilities*

- Determines structure, organization and delegation of authority
- Defines accountabilities, roles and competencies
- Sets stage for infrastructure

#### *Information Management and Document Control*

- Defines and implements document control process (approval, review, storage) management of operational safety policy, practices, and procedures
- Specifies types of documents that have to be controlled
- Provides secure access to controlled documents

#### *Compliance Assurance*

- Identify compliance tasks to meet requirements (internal and external and assign respective accountabilities)
- Install processes to verify and monitor completion of those tasks
- Ensure enterprise is aware of applicable requirements

#### *Management of Change (MOC)*

- Install MOC process that identifies changes in scope of requirements around operational performance, risks, and/or requirements
- Ensure communication of changes and track changes to closure

#### *Performance Review and Improvement*

- Conduct leadership reviews to determine effectiveness for safe operations
- Develop, monitor and review key performance indicators (KPIs) to measure for safe operations
- Establish processes for internal audits
- Identify trends, risks, degradation in safe operations management and implement improvement actions

This leading practice is not limited to the safety program. Each major function in a business unit requires governance, and in many instances each function has its own governance structure. A business unit can realize a greater benefit by establishing a single governance entity that covers all the elements listed above for all the major functions. For example, one set of governance protocols for information management and document control can be applied across the board. Also, a single governance entity that develops, monitors and reviews KPIs across the entire business unit will offer senior management a comprehensive and integrated view of operational performance. Essentially, implementing all of the elements listed above into a single governance entity will increase efficiency, improve management insight, and pave the way for sustainability.

## Conclusion

The leading practices presented here are based on recognition of industry-wide issues related to operational safety and on the work we've done with clients in this area.

We suggest applying the detail provided for each practice as a high level checklist. This will help identify gaps in current safety initiatives and offer a starting point to build the structure for an effective, enterprise-wide approach to personal, process, and equipment safety.

## Reference

- 1) In the United States, for example, the Occupational Safety and Health Administration (OSHA) oversees worker safety, the Minerals Management Service (MMS) oversees equipment safety, and the Environmental Protection Agency (EPA) oversees safety as it relates to the natural environment.

## About the Authors

### **Kathryn Thompson**

Kathryn Thompson is a Partner in Wipro's Global Energy Consulting Practice. She is a hands-on IT professional with over 20 years in the upstream oil and gas industry providing extensive experience in programme, project and technical management. Ms. Thompson is PMP certified with proven proficiency in programme and project management, financial management, strategic planning, problem solving, communication and facilitation. Ms. Thompson has managed large, multi-year global programs and projects for both domestic and international oil and gas firms. Most recently, in the upstream production arena, she delivered projects providing operations, surveillance and flow assurance tools for a super-major company, many of which were targeted at reducing risk and increasing safety for operations personnel.

### **Derek Prothro**

Derek is a Sr. Manager in Wipro's Global Energy Consulting Practice who possesses ten years of experience, in the energy and utility markets. He specifically has spent significant time working within the Downstream enterprise for clients focused on building and delivering solutions within the Trading, Manufacturing and Distribution business units. Solution efforts include, but not limited to: performance management and "MI" development, materials and service management, multi-year Information Technology (IT) Planning, application portfolio rationalization and operational management systems.

Derek is also PMP certified with significant experience in leading large-scale programs than involve business transformation and change within Downstream to support operations, maintenance, HSSE, compliance management, and next generation initiatives.

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Wipro Technologies (<http://wipro.com>) is the first PCMM Level 5 and SEI CMMi Level 5 certified IT Services Company globally. Wipro provides comprehensive IT solutions and services (including systems integration, IS outsourcing, package implementation, software application development and maintenance) and Research and Development services (hardware and software design, development and implementation) to corporations globally.

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