Assessing the Processes, Tools, and Value of Sharing and Learning from Offshore E&P Safety Related Data

TECHNICAL REPORT

SPE International
Society of Petroleum Engineers

SPE Technical Report

Assessing the Processes, Tools, and Value of Sharing and Learning from Offshore E&P Safety Related Data

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1.0 Executive Summary

In 2014, the US Department of the Interior's Bureau of Safety and Environmental Enforcement (BSEE) approached SPE regarding a proposed collaboration opportunity to develop a voluntary industrywide near miss data sharing framework. The goal of this near miss data sharing framework was envisioned as a resource to enhance the industry's ability to capture and to share key learnings from significant near miss events with the objective of identifying and mitigating potential high-consequence risks. While the scope of this collaboration initially focused on near misses, further discussion of the desired outcome resulted in increasing the scope to include a broader range of data that have learning value to help the industry to achieve improved safety performance. Further, in the spirit of continuous improvement, a related objective was identified to bring government and industry together to make a safe industry safer, and to enhance public confidence in the industry.

SPE and BSEE agreed to co-chair a summit which included representatives from SPE, BSEE, exploration and production (E&P) operators, service companies, the US Bureau of Transportation Statistics (BTS), the Center for Offshore Safety (COS), the American Bureau of Shipping (ABS), and the International Association of Oil and Gas Producers (IOGP). During the planning process of the Summit, it was agreed that the scope of a data collection and reporting framework would start with the US Outer Continental Shelf (OCS). Additionally, a secondary objective was to consider how existing processes might be leveraged with an overarching objective to extend influence beyond the US OCS to align with other systems and requirements globally. In considering industry alternatives for developing a safety-data management framework, caution was advised to avoid creating an additional layer of reporting expectations over and above the current requirements by regulators and industry associations.

During the Summit, Vice Admiral Brian Salerno, Director of BSEE, shared his perspective on the importance of safety-data collection and sharing (BSEE 2015). BSEE is responsible for promoting safety, protecting the environment, and conserving resources through the vigorous regulatory oversight and enforcement of offshore operations on the US OCS.

Director Salerno encouraged the E&P industry to demonstrate to the public how a safe industry may be made safer through more open data sharing. Although a basic framework exists (SafeOCS discussed in Section 3.7.3), BSEE invited E&P industry help to identify value-added data categories, to overcome information sharing obstacles, and to address concerns raised in a variety of reports subsequent to the Deep Water Horizon incident.

An overview of the next steps resulting from the Summit is listed below with further detailed discussion in subsequent report sections:

- Prepare an SPE Technical Report that captures the essence of the discussions and observations of participants in the two-day Summit.
- Pursue a volunteer pilot implementation program with willing operators, service companies, and equipment manufacturers to "test run" a consolidated industrywide safety-data sharing process based on the results of the Summit discussions.

- Use pilot program results to determine if the "right" data are being collected to allow for risk-based decision making.
- Develop proposals for future summits and technical workshops on specific subtopics that support the Technical Report; for example,
    - ✓ Data collection and analysis to improve barrier management
        - Standard industry definitions for hardware and human barriers
        - Reporting hardware barrier successes
        - Definition and boundaries for barrier testing and inspection failures
    - ✓ Data reporting, review and analysis
        - Precursor data identification
        - Metadata
        - Data categories (e.g., causal factors, areas for improvement)
        - High actual or potential consequence events
- Use SPE Technical Sections and other groups, as appropriate, for ongoing networking on safety-data sharing and risk management.
- Establish a data framework and culture (both industry and regulator) that encourages open reporting, protects and secures the identity of the submitters, protects business sensitive information, and promotes sharing of safety-data and learnings.
- Leverage SPE's online publication – *HSE Now* – and other industry publications to share articles of interest and build industry awareness related to improved safety-data management, analysis, and reporting processes.

2.0 Introduction

2.1 Objectives

In April 2016, SPE held a two-day Summit to discuss the opportunities, challenges, and processes needed for the development and implementation of an industrywide safety-data sharing framework. Summit participant engagement on the proposed future state and advice for modifications and enhancements was sought to increase stakeholder acceptance of the program. The Summit objectives were as follows:

- Establish a pathway to address opportunities and challenges of industrywide safety-data management processes.
- Identify how BSEE and SPE may collaborate to add value to existing and future processes.
- Leverage strategic processes (new and existing) to address opportunities and gaps focused on collection, analysis, and dissemination of data, including major incident and precursor data.
- Encourage and facilitate continuous feedback and learning in support of ongoing safety management systems and programs.
- Consider how existing processes may be leveraged with an overarching objective to extend influence beyond the US OCS, and align with other systems and requirements globally.

This Technical Report is based on discussions and conclusions from the Summit and is intended to provide guidance on an industrywide safety-data sharing program. The overall objective of the effort is to: (a) eliminate or reduce risk of harm through industry sharing of data; (b) generate information that builds knowledge, understanding and ownership; and (c) disseminate recommended corrective actions to prevent a reoccurrence.

2.2 Process and Scope

In 2014, the US BSEE approached SPE regarding a proposed collaboration opportunity to develop an industrywide near miss framework. The goal of this near miss framework would be to enhance the industry's ability to capture and to share key learnings from significant near miss events with the objective of identifying and mitigating potential high-consequence risks. While the scope of this collaboration initially focused on near misses, further discussion of the desired outcome resulted in increasing the scope to include a broader range of data that have learning value to help the industry achieve improved safety performance.

After a series of discussions between SPE and BSEE, it was agreed that a Steering Committee would be formed to plan an SPE Summit to address the opportunities and the challenges associated with this effort, with a desired outcome being the development of an industrywide safety-data sharing framework. The Steering Committee was co-chaired by SPE and BSEE and included subject-matter experts (SMEs) from SPE, BSEE, E&P operators, service companies, the BTS, the COS, the ABS, and the IOGP.

The Steering Committee drafted a proposed future state designed to capture specific data related to health, safety and environment (HSE) hazards to enable analyses, learning, and ultimately action to improve barrier integrity and eliminate or reduce the risk of incidents. The proposed future state (Appendix 9.3.2) was a consolidation of several programs within the industry combined with enhancements from good practice outside the industry. It was proposed as a voluntary program geared toward learning and was not intended to measure the performance of the E&P industry or a specific company.

Candidate Summit participants were either nominated by the Steering Committee or applied to attend and were accepted by the Steering Committee. Sixty-two (62) participants from 47 organizations attended, representing the E&P industry associations, operators, drilling contractors, service companies, equipment manufacturers, consulting organizations, regulators (US and international), universities/research organizations, the aviation industry, and other industries and agencies (Appendix 9.3.3).

In preparation for the Summit, the Steering Committee developed a process flow chart **(Fig. 1)** to structure the Summit discussion. The flow chart covered the five topics listed below:

1. What data should be shared?
2. Who should share data and from where?
3. What should be the data collection process?
4. How should the data be reviewed and analyzed?
5. How should learning and action occur?

Fig. 1 — Safety-data discussion process.

Some of the challenges and boundaries identified during the planning process included the following principles:

- Clarifying the specific problem that the Summit seeks to address including identification of any gaps and subsequent resolution methods
- Ensuring confidence among participants that there is a safe data sharing environment, as well as providing similar assurances during the Summit to promote more open discussion
- Discussing the current barriers for providing information
- Determining the breadth of safety metrics and of truly critical data for good risk-based management decision-making
- Addressing voluntary participation, confidentiality, protection from legal discovery, protection of source data, and laws and government regulation

Additional points offered for consideration as the Steering Committee prepared for the Summit included:

- A need to focus on a broad, descriptive definition of incidents vs. near misses (i.e., What do we not want to capture?)
- The extent to which an industrywide database should focus on actual vs. potential consequences
- The extent to which the scope should address or define high value learning events and safety critical equipment events
- The means to effectively leverage the "best of the best" from existing systems and processes
- The design of a front-end data entry system which could then feed the various existing databases to minimize redundant, identical data entry into multiple databases
- A framework which includes a mechanism for issuing alerts to share information on industrywide events of interest
- The means to leverage existing processes and organizations to review data details and trends to avoid redundancies and overburdening organization representatives
- Presenting an initial framework at the Summit that is simple and not too comprehensive in order to encourage Summit participants to commit to adoption
- Keeping initial focus on safety event identification, capture, analysis, and reporting (a focus on root-cause analysis may be postponed for later discussion)
- A need to focus on barrier management and associated indicators (i.e., the need to do more than just identify and report on trends)
- Good personnel and process safety performance continues to rely upon a strong safety leadership and safety culture
- Company-led data submittal rather than individual-led data submittals is preferred for data collection

The final step prior to publication included a 30-day SPE membership and summit participant comment period. On 6 August 2016, the draft technical report was published on the SPE website for a 30-day comment period. Comments were received from 3 individuals. The report steering committee met on 8 September 2016 and reviewed all comments provided. Several selected comments were addressed and have been incorporated into the final report.

2.3 Desired Outcomes

This Technical Report captures the discussions, expert opinions, and suggestions offered by the group of safety-data management SMEs during the Summit as well as the planning process. In addition to issuance of the SPE Technical Report, the following additional next steps could result from the Summit:

- Periodic industry workshops to share and discuss anonymous data results and trends
- Industry and government workshops on specific Summit-related topics that enable more-effective interpretation of data and provide opportunities for increased awareness and understanding of issues to improve safety performance

- Formation of SPE Technical Sections and other groups for ongoing assessment and direction of data collection and use

3.0 Current State

Shared learning from incidents and events that occur in an industry is a key factor in the continual improvement in health, safety, security, and environmental (HSSE) performance. This is particularly important for the prevention and mitigation barriers associated with major hazards. Important aspects of an effective shared learning system are the following:

- Identification of the type of data that will provide valuable information
- Creation of a secure process for data collection and analyses
- Dissemination of the results to stakeholders for action to reduce or to eliminate the risk of a reoccurrence through greater barrier integrity

Effective systems deliver value and meaning. The ideal progression in value and meaning is depicted in **Fig. 2** below (Rowley 2007).

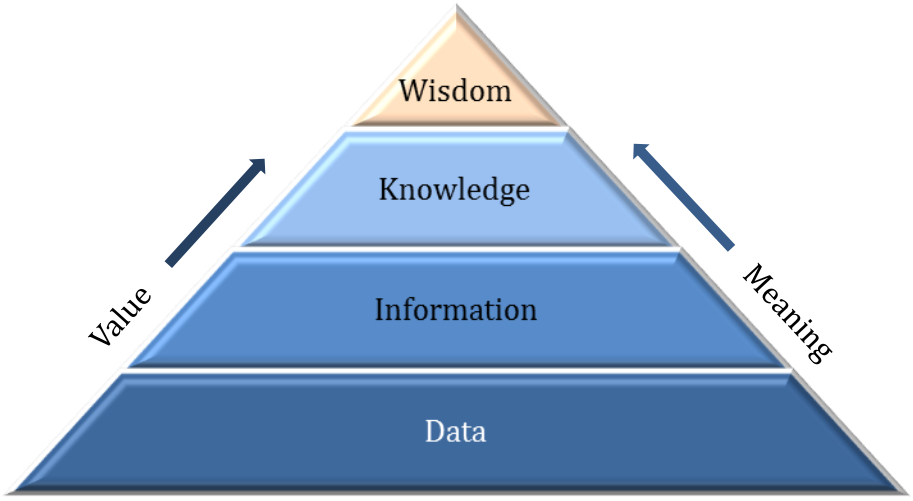

Fig. 2 — Value and meaning progression

The offshore E&P industry is being continuously challenged to improve its safety performance by breaking down obstacles to learning from the past, to build wisdom, and to create a better, safer future. During the Summit, Vice Admiral Brian Salerno, Director of BSEE, shared his perspective on the importance of safety-data collection and sharing (BSEE 2015). BSEE is responsible for promoting safety, protecting the environment, and conserving resources through the vigorous regulatory oversight and enforcement of offshore operations on the US OCS.

Director Salerno encouraged the E&P industry to demonstrate to the public how a safe industry may be made safer through more open data sharing. Although a basic framework exists (SafeOCS discussed below), BSEE invited E&P industry help to identify value-added data categories, to overcome information-sharing obstacles, and to address concerns raised in a variety of reports subsequent to the Deep Water Horizon incident.

Several programs currently exist that cover some data types and some sectors of the E&P industry. However, the US offshore E&P industry is considering design and implementation of a broader safety-data program. Other industries have programs that

capture more data and serve as models to the E&P industry. Section 3 subsections include overviews of several existing data management frameworks that either were discussed in detail by the Steering Committee in advance of the Summit, or were referenced during the Summit.

3.1 International Association of Oil and Gas Producers Safety Incident and Event Reporting System

IOGP is an upstream forum in which its 77 members voluntarily identify and share knowledge and good practices to achieve improvements in health, safety, the environment, security, and social responsibility. IOGP captures global data for its members on occupational and process safety, well-control incidents, fatalities, and high-potential incidents. The organization has been collecting global safety incident data from member companies since 1985 and specifically process safety events (PSEs) since 2011 **(Fig. 3)**.

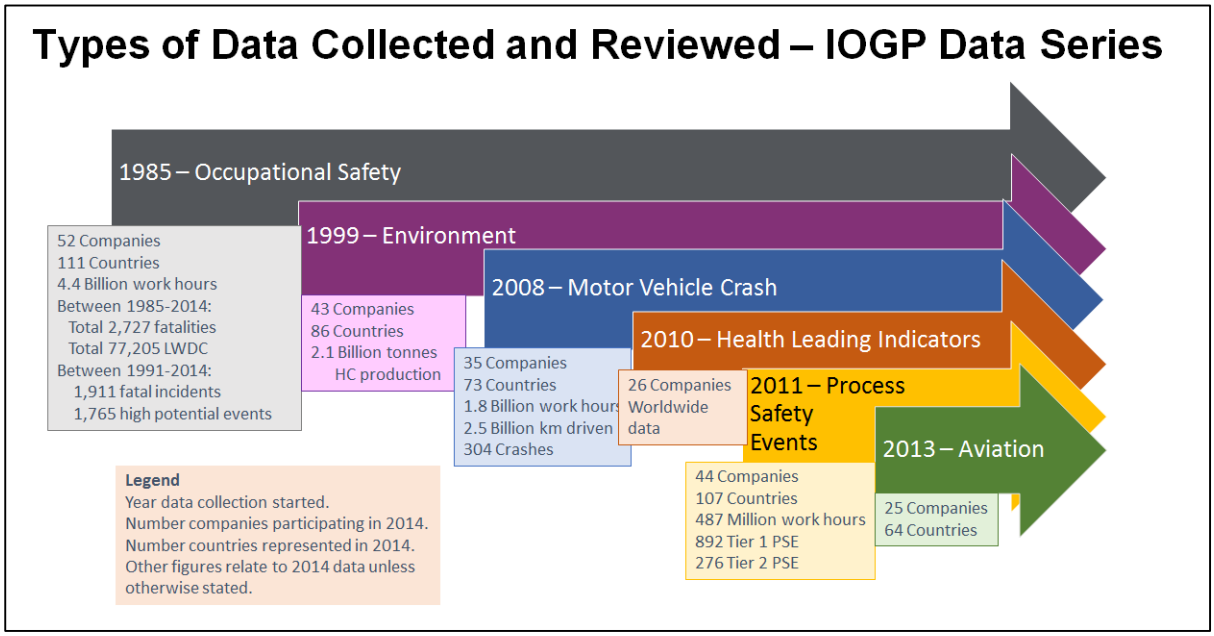

Fig. 3 — IOGP safety-data collection timeline. LWDC = Lost work day case.

The principal purpose of the data collection is to annually record and analyze the global event and incident statistics of IOGP member companies. All databases reside on secure and protected servers with very limited access rights. Each company is assigned a blind code for the preservation of company anonymity. Only overall company results may be published. Company codes are kept strictly confidential by IOGP employees.

Every data set is owned by an IOGP Standing Committee and managed by the Committee, a Data Subcommittee, or a Data Work Group within the Subcommittee. The groups conduct the required validation and analysis. The annual reports that are produced provide the information required to analyze industry incident trends, benchmark performance, and identify subject areas and activities in which focused efforts may be made to effect the greatest improvements.

Reportable PSEs are classified as Tier 1 or Tier 2 on the basis of whether a loss-of-primary-containment (LOPC) event meets or exceeds defined consequences or release thresholds [see Forms 6, 6A, and 6B of IOGP (2015) in Appendix 9.4]. Reported data are categorized by work function, incident activity, consequence, materials released, and (anonymous) company. An example of PSE analysis results is shown in **Fig. 4** below.

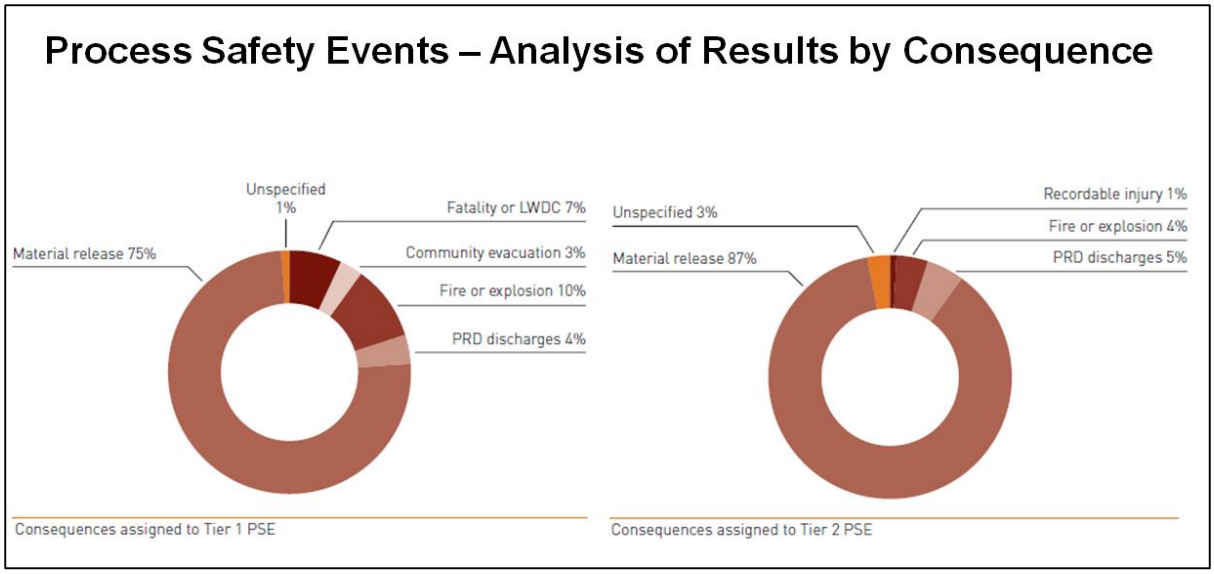

Fig. 4 — Process-safety event analysis results.

One IOGP Safety Committee objective within the Committee's Terms of Reference is "to provide information to, and enter into dialogue with, those intergovernmental authorities that regulate our industry." A dialogue is established between IOGP and the European Union Offshore Authority Group (EUOAG) and the International Regulators Forum (IRF). Priority activities are derived from IOGP's Safety Performance Indicators and Process Safety Events annual reports. These represent objective safety observations held by member companies and are proactively shared with regulators and other stakeholders with the goal of improving the industry's safety performance. (http://www.ogp.org.uk/pubs/456.pdf), (http://www.iogp.org/pubs/2015su.pdf)

3.2 International Association of Drilling Contractors Incident Statistics Program (ISP)

The International Association of Drilling Contractors (IADC) ISP was implemented in 1962. The purpose of this program is to support the industry's efforts to improve safety on E&P drilling rigs by reporting data on incident trends and rates. ISP is a voluntary program for any drilling contractor and tracks man-hours, medical treatment, restricted work, lost time, and fatality incidents worldwide in 18 regions, onshore and offshore. There are currently 107 companies participating in ISP. This program closely follows US Occupational Safety & Health Administration (OSHA) guidelines, but does not include first-aid cases or third-party incidents. Published reports include four quarterly summary reports and an annual report. The annual report includes man-hours, historical trends, and a breakdown of incidents including job position, body part, equipment involved, operation, and location for the total industry and for each region.

Each year a task group meets to review proposed revisions to ISP with subsequent confirmation by the ISP participating companies and IADC (HSE) Committee. In 2016,

the ISP task group is proposing the addition of a near miss tracking element to the program.

Key Elements are:

- Drilling contractors only
- Does not include third-party
- Voluntary participation

IADC also provides safety alerts in an effort to prevent the next incident in the drilling space. IADC safety alerts originated in 1998, with 692 safety alerts published since implementation. They range from near miss events to fatalities occurring onshore and offshore as well as domestic and international locations. The program is voluntary and designed to maintain confidentiality for all parties.

Additionally, the IADC Safety Toolbox webpage (http://www.iadc.org/safety-toolbox) contains resources to support daily drilling operations:

- 700 IADC Safety Alerts
- 125 Safety Meeting Topics for Job Safety Analysis (JSA)s or other meetings
- Near miss/Hit Report forms for both drilling and well servicing / workover
- 60 IADC Safety Posters

3.3 IOGP/IADC Blowout-Preventer Joint-Industry Project (JIP)

Originally developed by seven offshore drilling contractors in order to improve the safety and reliability of subsea blowout preventers (BOPs) and to standardize BOP failure reporting following American Petroleum Institute (API) Standard 53 (2012), this initiative began data collection efforts in January 2015. This effort was merged into a joint-industry project (JIP) developed by IOGP and IADC in January 2016. Phase I participants included the original seven contractors, 10 operators, and three equipment manufacturers.

The project has already produced measureable benefits to participants through the reduction of BOP non-productive time. **Fig. 5** illustrates aggregate BOP reliability data from 2015 - 2106. Discussions are also ongoing with BSEE and BTS over how the JIP can help operators and contractors comply with the equipment failure provisions of the Well Control Rule (see Section 3.7.3).

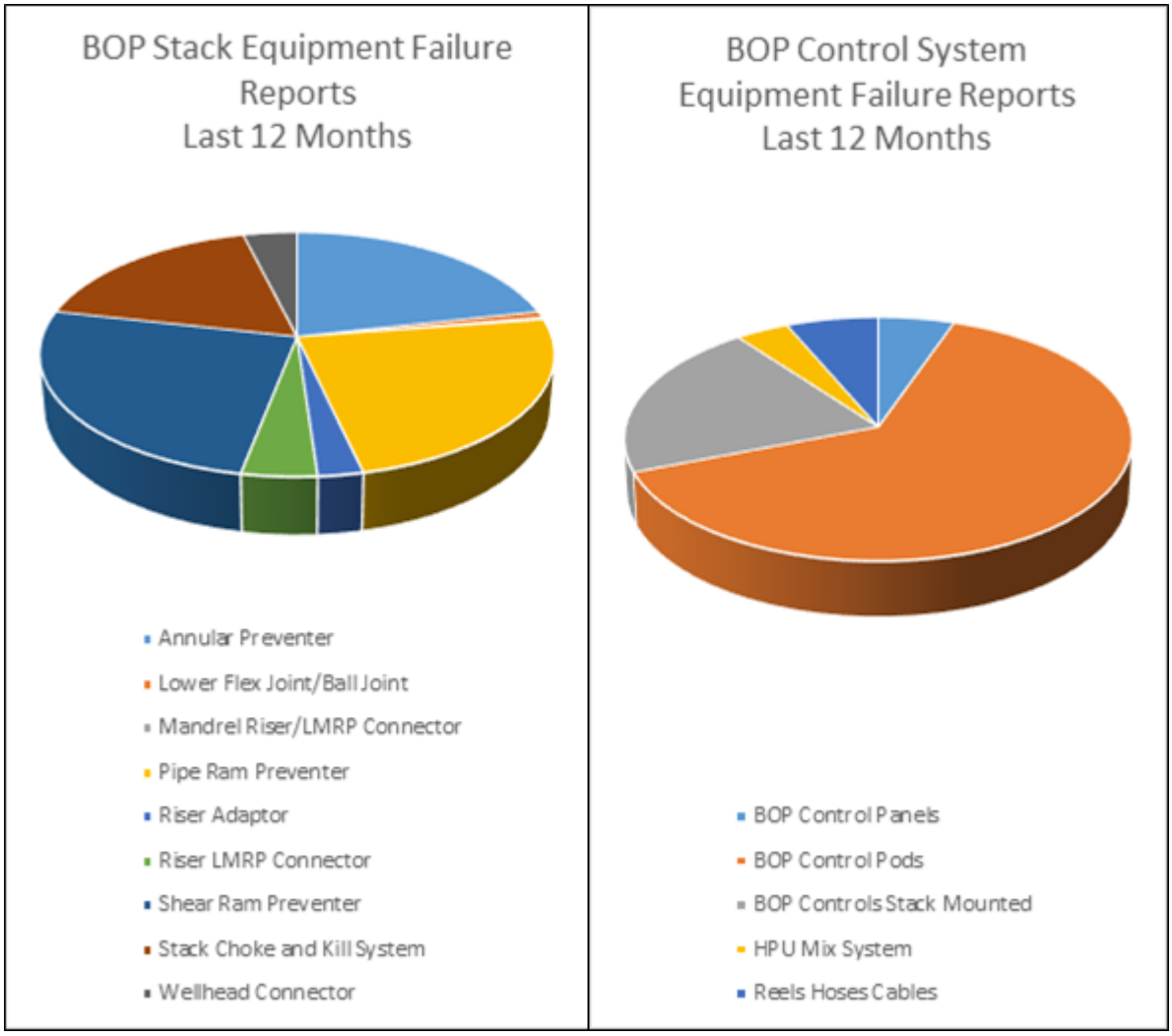

Fig. 5 -- Aggregated data 2015-2016 from BOP Reliability JIP

With the fundamentals of the database refined during Phase I, JIP members have elected to invite more stakeholders to support the increased demand for BOP component reliability data and improved BOP performance. Phase II was announced in July 2016, and will begin collecting information on surface-stack BOPs as well as subsea BOPs. Participation in this phase of the JIP will be open to additional operators and offshore contractors with subsea BOPs, as well as to offshore contractors with surface BOPs only and to onshore contractors.

Phase II will provide further opportunities to improve the quality of the database and provide members with access to key learnings through JIP collaboration. New Phase II participants will obtain industrywide BOP defect and failure knowledge, which should lead to improved BOP safety and integrity in their own operations.

3.4 Center for Offshore Safety Programs

COS serves the US offshore oil and natural gas industry to support and enable continuous improvement in safety and operational integrity. The foundation of the COS is based on *API RP 75* (2004), *Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities.* COS implements two

voluntary programs: Safety Performance Indicators (SPI) and Learnings from Incidents (LFI).

A COS SPI is a measurement that provides insights into the strength of barriers and is inclusive of those that measure performance with respect to protection of personnel, the environment, and offshore facilities and property. COS began work on safety performance indicators for the US deepwater industry in April 2012 and captures data from its members on major incidents (SPI 1), some precursor events (SPI 2), and high value learning events (HVLEs). The programs were expanded to cover the US OCS in 2014.

The COS SPI program objectives are to provide a means for sharing safety related data and assessing past performance so that actions may be taken by relevant stakeholders to improve future safety performance. **Fig. 6** illustrates the SPI program development process.

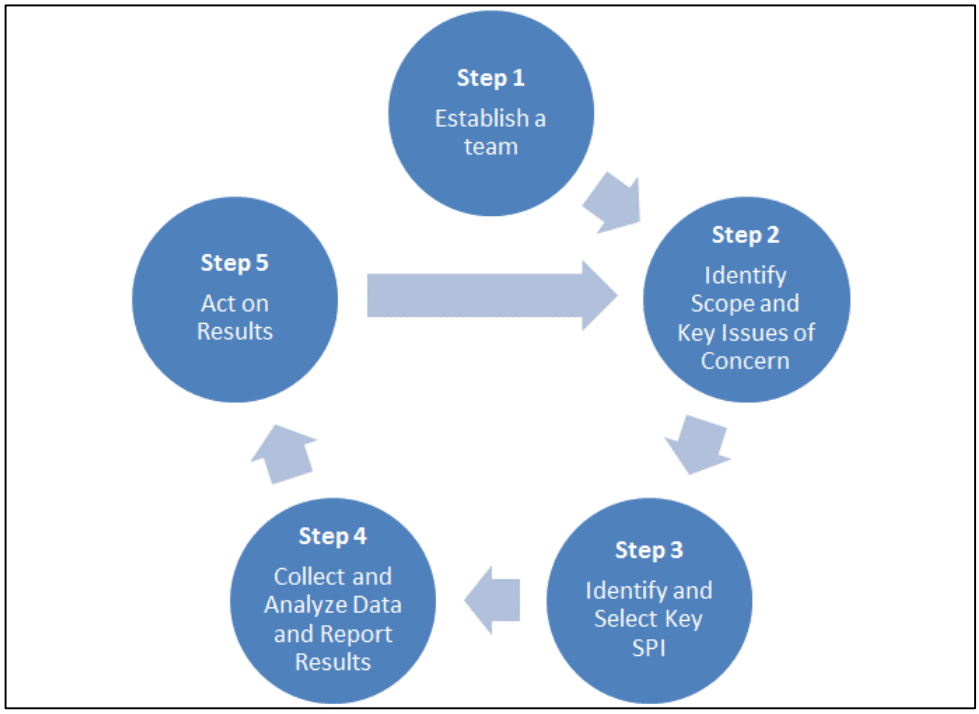

Fig. 6— SPI program development process.

The SPI program is a platform that has been developed, implemented, and continually improved through which SPIs are established, collected, analyzed, and reported for specific safety issues of concern. The bow-tie methodology **(Fig. 7)** is applied to identify key issues of concern.

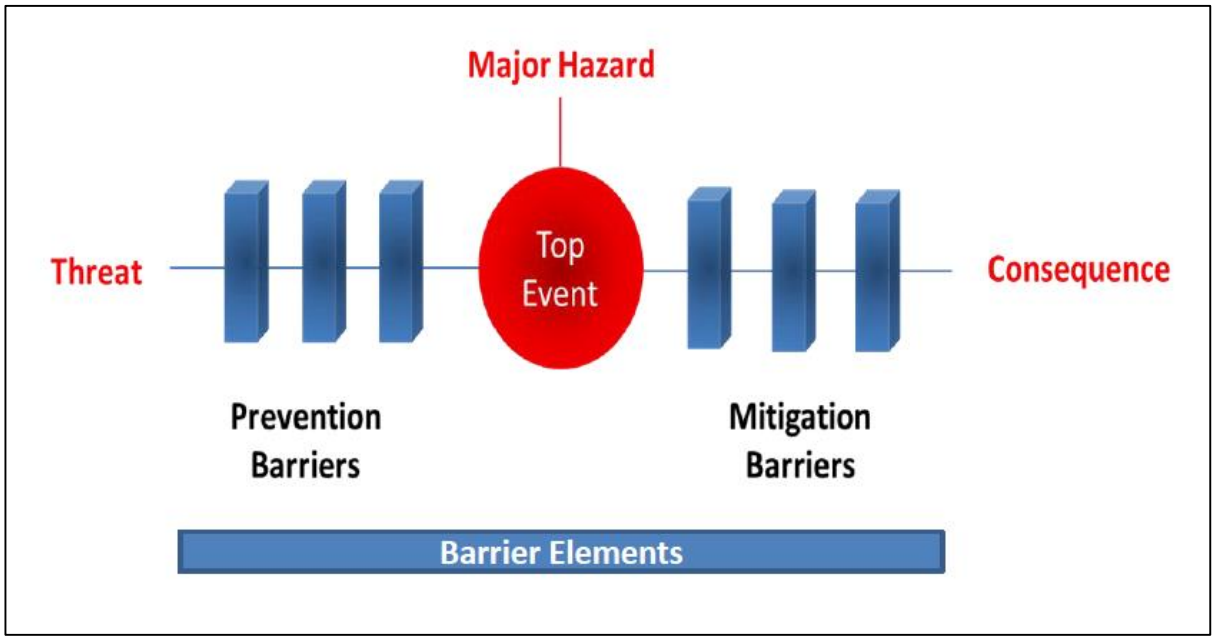

Fig. 7 — Safety bow-tie diagram.

The bow-tie process and results can identify weaknesses in barriers intended to prevent the occurrence or recurrence of incidents and to mitigate consequences. Most SPI are outcomes or consequences of failed prevention or mitigation barriers.

As a complement to the COS SPI program, the COS LFI program provides guidelines and a process by which COS members share and learn from safety incidents and events. It provides a mechanism for sharing timely information from the SPI program and HVLE for use in decision making regarding standards and practices.

The COS database of incident and event information has been established for analysis and sharing, with the ultimate goals of improving the communication and understanding of incident and event circumstances and identifying areas for improvement. Areas for improvement are divided into three categories: (1) physical facility, equipment, and process; (2) administrative processes; and (3) people.

Data shared by members are kept confidential through both a confidential database as well as a third-party reviewer. SPI results are shared annually, while LFI are shared year-round. Both SPI and LFI trends are published in the Annual Performance Report (APR) (COS 2013). http://www.centerforoffshoresafety.org/Documents

3.5 American Bureau of Shipping

The ABS database represents input from 31 US and international member companies (e.g., liquefied-natural-gas (LNG) tankers, crew boats,) whose occupational safety-data are collected and sanitized by Lamar University to ensure confidentiality. Of the data captured, approximately 80% are categorized as near misses and 20% are actual incidents. Some of the analyzed data and other information are shared and made available on the ABS/Lamar Mariner Safety Research Initiative website (http://maritime.lamar.edu/) including toolbox talks, ergonomic and safety discussion papers, lessons learned, and implemented corrective actions.

Separate databases are maintained for near miss events ("close calls") and incidents. The Ship Operations Cooperative Program (SOCP) and the US Maritime Administration (MARAD) have expressed interest in the program with the objective of standardizing terminology and reporting processes. Additionally, SOCP and MARAD are sponsoring the development of draft American Society for Testing and Materials (ASTM) best practices to standardize near miss and injury reporting and recording taxonomies. Key objectives of the draft ASTM best practices are to minimize the work load on crew members and enable easier industry incident trending and benchmarking. Among the challenges faced by ABS and their system is the marine industry's current lack of consistency in defining events categorized as "close calls."

3.6 US Airlines/Federal Aviation Administration

The Aviation Safety Reporting System (ASRS) was established by the Federal Aviation Administration (FAA) in 1976 and has been operated by the National Aeronautics and Space Administration (NASA) since its inception. Since then, the FAA has established several Near miss Reporting Systems (NMRS) with various airline companies, industry groups, and FAA employee groups. One such program is the Aviation Safety Action Program (ASAP) that involves triparty agreements among the affected industry management, labor groups, and the FAA.

The ASAP program represents a successful partnership among the FAA, the US airlines, and their participating unions, with the objective of encouraging no "safety secrets" among the airlines. It has been in place for more than 20 years, and major airlines see up to 1,000 reports per month. Reports are submitted by individual employees by iPad or tablet (flight-attendant reports are currently submitted through a company website, with tablet functionality forthcoming).

A Memorandum of Understanding (MoU) exists with the FAA on how the ASAP program works and is agreed to by airline and employee groups. An Event Review Team (ERT) convenes weekly, consisting of representatives from the FAA, the airline, and the employee group. This ERT three-party makeup is key to the program. If an employee ASAP report is accepted by ERT (i.e., not associated with causes such as willful negligence or disregard for procedures), the FAA and the airlines have agreed to not take any punitive corrective actions. This feature is a key component to the success of this reporting program. However, some airlines could still pursue internal company discipline.

A meeting of airline safety counterparts is held twice yearly to discuss data results and trends, as well as high-value learning events. Root causes tend to mostly be process or policy issues and are not related to specific individuals. The critical difference between the ASAP reports and standard hazard or behavior observation reports is that the person reporting typically recognizes his or her mistake and reports the mistake along with the circumstances surrounding the mistake. This allows the airlines and regulator to better understand the types of errors occurring and the factors contributing to the errors.

3.7 Bureau of Transportation Statistics: Near miss Reporting Data Programs

3.7.1 Bureau of Transportation Statistics (BTS) Overview. Near misses, or close calls, are events that could have resulted in human injury, environmental damage, or monetary loss but did not. They serve as early warnings of unsafe conditions and provide an opportunity to improve safety practices. Near miss reporting programs have a long track record of successfully reducing safety incidents in other industries, such as transportation and health care.

As a federal statistical agency, BTS lends its expertise in data collection, data analysis, and data dissemination to support safety programs in partnership with other government and nongovernment entities. In addition, BTS as a member of the federal statistical system has unique authority to protect the confidentiality of information the agency collects for statistical purposes. In the past 10 years, BTS has developed and operated confidential near miss reporting programs for the rail and transit industries and has recently partnered with BSEE to develop and operate SafeOCS.

3.7.2 Data Confidentiality Protection — The Confidential Information Protection and Statistical Efficiency Act of 2002. The Confidential Information Protection and Statistical Efficiency Act (CIPSEA) is a federal law that establishes uniform confidentiality protections across all agencies in the executive branch for information collected under a Pledge of Confidentiality and strictly for statistical purposes. Per CIPSEA requirements, under strict criminal and civil penalties for noncompliance, BTS must protect reporters' and companies' identities and treat all reports and data sets as confidential information. Unauthorized release of identifiable CIPSEA data is a Class E felony, punishable by up to $250,000 in fines and up to 5 years in jail. CIPSEA prohibits the release of SafeOCS data to other government agencies, including BSEE. SafeOCS data may be used only to identify trends and patterns, not for enforcement or regulatory activities. BTS has strict procedures in place for collecting and protecting confidential data. Further, CIPSEA data are protected from subpoenas or any other legal discovery and Freedom of Information (FOIA) requests. Federal agencies engaged in CIPSEA data collections must report to the Office of Management and Budget (OMB) on particular actions related to confidentiality and data use of information collected under CIPSEA. Roughly speaking, the law guides standardized approaches to the idea that a respondent's information should not be exposed in ways that lead to inappropriate or surprising identification of the respondent. (http://www.eia.gov/cipsea/cipsea.pdf) (Pulic Law 2002)

By protecting the microdata from disclosure through CIPSEA, confidential data collection programs seek to foster a constructive safety culture that encourages reporting and awareness and promotes a proactive approach to addressing safety concerns.

3.7.3 SafeOCS: Near miss Reporting in Offshore E&P Operations. BSEE determined the need for a joint safety-data program with BTS to benefit the nation through a comprehensive and trusted data collection process to support continual safety improvements on the OCS. BSEE continues to follow other successful near miss reporting efforts, such as the FAA and the aviation industry's lead in breaking new ground to advance safety through the use of more-robust safety-data.

SafeOCS was started as a voluntary and confidential near miss reporting program sponsored by BSEE and developed by BTS. It was launched in May 2015 as a confidential safety program that allowed employees and companies to report near miss events. By ensuring the data confidentiality protections of CIPSEA, SafeOCS seeks to minimize distrust and fear of recrimination, which are two well-documented barriers to near miss reporting by workers and companies alike. By upholding reporters' trust, SafeOCS seeks to foster a constructive safety culture that encourages reporting, awareness, and discussion of safety issues in offshore operations.

Information collected and analyzed by SafeOCS identifies industrywide safety trends that can improve safety practices in E&P operations on the OCS. Aggregated data are meant to be shared with the general public through the BTS website, and used to identify safety trends and increase understanding of safety risk in offshore operations.

The first phase of SafeOCS is strictly voluntary and has two components: the NMRS and the Company Data Portal. NMRS allows any witness to a near miss event on an offshore E&P platform to submit a report. These near miss reports may contain crucial data about the precursor events that may lead to potentially more serious incidents. The SafeOCS Company Data Portal gives individual E&P companies the opportunity to submit internal near miss data to an extensive, industrywide database. This database assists with the comparison of data across companies and improves the consistency of collected data over time. SafeOCS supports statistical analyses for various operations' safety issues and shares the results with the industry.

Offshore workers may submit near miss reports to SafeOCS online, by phone, or by mail. The web-based NMRS uses a secure, encrypted connection. There is no time limit for submitting a report; workers can report issues once they are off the facility and back onshore. While using a confidential reporting system is no substitute for the open, bidirectional communication that defines a constructive safety culture, this commitment to confidentiality allows SafeOCS to collect crucial near miss data that might not be reported otherwise.

Submitting a near miss report through NMRS involves answering a standard data form **(Fig. 8)** designed to collect data that helps identify the root cause and contributing factors involved in the event. Data sets submitted through the SafeOCS Company Data Portal follow the format outlined in the Cooperative Agreement between BTS and the participating E&P companies, so the scope of data received through this method varies.

Section	Summary of Data Collected
Reporter Information	• Name • Contact information • Work information • Work experience
General Event Information	• Source of near miss information • When near miss occurred • Location of near miss • Written description • If a similar near miss has happened before • Operation in which near miss occurred
Rig Operations*	• Rig type • Rig components/location • If lifting or hoisting was involved
Production Operations*	• Platform/facility type • If the facility is manned or unmanned • Location of near miss • If lifting or hoisting was involved
Pipeline Operations*	• Pipeline-identifying information • Material in pipeline • If the pipeline was in H_2S service • Location of pipeline activity equipment • If diving or ROV was involved • If lifting or hoisting was involved
Transportation Operations*	• If rig involved • If platform involved • If motor vessel/helicopter was in radio contact with the facility • Transportation mode • Near miss location • Work activity • If lifting or hoisting was involved
Lifting and Hoisting Operations*	• Lifting/hoisting activity • Crane information • Crane inspection and maintenance • Load information
Other Operations*	• Written description

**This section depends on the operation and task in which the near miss occurred.*

Fig. 8 — NMRS data form at a glance.

Near misses and safety incidents are not only the result of the interplay between complicated technical systems but they are also the result of the interaction between these complicated systems and human factors. Contributing factors of near misses may stem from either a technical error or a human one. SafeOCS seeks data on both the technical and human factors associated with a near miss event through answers to the questionnaire from NMRS and data sets submitted to the Company Data Portal.

The second phase of SafeOCS expands the framework and scope to allow for the submission of barrier-failure data by operators in response to reporting required in BSEE 30 CFR 250.730(c). The latest action by BSEE, aimed at improving safety, expands SafeOCS to accept barrier-failure data otherwise required to be reported to BSEE. BSEE believes these actions will help prevent major incidents, loss of life, injury, and negative impacts on the environment and help achieve the goal of every offshore worker arriving home safely.

The authority to collect these data resides in BSEE 30 CFR 250.730(c) and potentially in other authorities. Once collected, the data will be included in the SafeOCS database and therefore protected under CIPSEA by BTS.

The processing of near miss and equipment-failure reports, review of submissions, analysis of information, and creation of reports for external consideration is through structured, layered review processes that are inclusive of appropriate experts with direct expertise in the technical content. This is accomplished through the use of SME teams from industry and government. Aggregate reports shared with the public are about safety and early indication of important areas for improvement. Published reports focus on trends and statistical information, and seek meaningful patterns in the data that are often missed when data remain in individual databases. Because of strict CIPSEA disclosure limitations, these reports will not identify specific companies or manufacturers nor address system performance. Analyzing these trends and patterns supports the development of innovative solutions that reduce incidents, improve operational safety, and protect the environment. The post-publication process is envisioned as very inclusive, with an active dialogue for government and industry, consideration of the meaning of the results, and formulation of actions after a meaningful consideration of optimum solutions.

The hallmark of all of these interactions is a safe, protective environment for sharing safety-related data, including failure data, in a more-open and-transparent way by active protection of microdata. SafeOCS is designed to improve with reporter feedback. Just as safety practices must improve continuously, SafeOCS constantly adapts to better serve reporters, operators, and companies. Reporter feedback influences the questionnaire included in the NMRS and ultimately what data SafeOCS collects. By listening to reporters' experiences, SafeOCS may collect more-relevant data that will better advance offshore safety.

In BTS's opinion, it is important to note that the program does not belong only to BSEE and BTS—it belongs to all stakeholders. Giving a sense of collective ownership over SafeOCS bridges the gaps that may prevent workers from making the reports and companies from contributing their data that can be used to develop a more comprehensive safety profile and facilitate innovative solutions to emerging safety concerns. By establishing easy-to-use platforms to share near miss data, SafeOCS's goal is to make data as accurate as possible so the industry's response to near misses may promote effective preventive measures.

3.8 European Union Offshore Authorities Group System

The EUOAG system is a common format for the sharing of information on major hazard indicators by operators and owners of offshore E&P installations. Additionally, it includes a common format for the publication of information on major hazard indicators by the Member States.

Following the Deepwater Horizon major accident in the Gulf of Mexico in April 2010, the European Commission (EC) published Directive 2013/30/EU on Safety of Offshore Oil and Gas Operations (Offshore Safety Directive/OSD[1]). The Directive requested by means of an Implementing Act to develop a common data reporting format for the sharing of information on major hazard indicators by operators and owners of offshore E&P installations. The common format for the reporting of data by operators and owners to the Member State was to provide transparency of the safety and related environmental performance of operators and owners and EU-wide comparable information on safety of offshore E&P operations. This aims also at facilitating the dissemination of lessons learned from major accidents and near misses.

For each calendar year EU Member States are required to prepare a document for publication to the EU Commission and the Public. Collection of data started January 2016, with the first EU report expected mid-2017.

The EU Implementing Regulation No 1112/2014[2] was published 13 October 2014. A Guidance document[3] developed in consultation with industry (represented by IOGP) provides competent authorities, operators, and owners with supporting information and examples to promote consistent reporting. The guidance document is nonbinding.

The reporting requirements described in the Implementing Regulation focus on incidents i.e., the potential to cause a major accident [e.g., the loss of containment of hazardous substances specified in the Register of Major Hazards (RoMH) *Safety Case*] and on the safety and environmental critical elements (SECEs) defined in the RoMH for the installation.

The reporting requirements of the implementing regulation are

A. Unintended release of oil, gas, or other hazardous substances, whether or not ignited
B. Loss of well control requiring actuation of well-control equipment, or failure of a well barrier requiring its replacement or repair
C. Failure of a safety and environmental critical element
D. Significant loss of structural integrity, or loss of protection against the effects of fire or explosion, or loss of station keeping in relation to a mobile installation: any detected condition that reduces the designed structural integrity of the installation, including stability, buoyancy and station keeping, to the extent that it requires immediate remedial action

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1 http://euoag.jrc.ec.europa.eu/files/attachments/osd_final_eu_directive_2013_30_eu1.pdf

2 http://euoag.jrc.ec.europa.eu/files/attachments/implementing_regulation_13_oct_2014.pdf

3 http://euoag.jrc.ec.europa.eu/node/11

E. Vessels on collision course and actual vessel collisions with an offshore installation: any collision, or potential collision, between a vessel and an offshore installation which has, or would have, enough energy to cause sufficient damage to the installation and/or vessel, to jeopardize the overall structural or process integrity
F. Helicopter accidents, on or near offshore installations: any collision, or potential collision, between a helicopter and an offshore installation
G. Any fatal accident to be reported under the requirements of Directive 92/91/EEC
H. Any serious injuries to five or more persons in the same accident to be reported under the requirements of Directive 92/91/EEC
I. Any evacuation of personnel: any unplanned emergency evacuation of some or all personnel as a result of, or where there is a significant risk of, a major accident
J. A major environmental incident: any major environmental incident, defined in Article 2.1.d and Article 2.37 of Directive 2013/30/EU

4.0 Value-Add Shared Data Identification

4.1 Introduction

From the Summit Day 1 safety moment, the fundamental question was posed, "What data do you address first?" Data collection focused on precursor events and major incidents with high risk potential will add value when the causes and lessons learned are shared. **Fig. 9** illustrates the proposed incident and event layers with increasing consequences. For the purposes of this paper, refer to the legend below when "layer", "level" and "tier" are used.

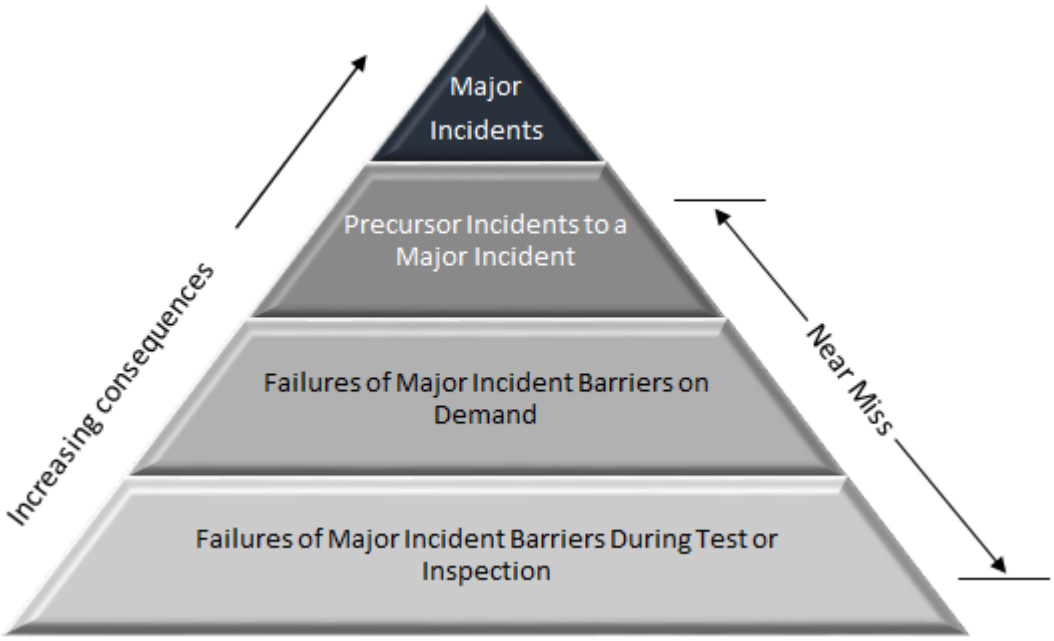


Fig. 9 — Incident and event layers.

Layer – refers to the different types of incidents and events as described in **Fig. 9.**
Level – refers to the COS definitions of the types of Well Control Incidents and Events (e.g. Level 1, Level 2, Level 3, and Level 4).
Tier – refers to the *API RP 754* (2010) and IOGP Report 456 of the different types of process safety events (e.g. Tier 1, Tier 2, Tier 3, and Tier 4).

An initial conservative approach to the volume and scope of data allows for a focus on the most valuable data. Controls would be required to eliminate duplication of data. Major incidents serve as the starting point, but it is also important to understand precursor events (including near misses), barrier integrity in regard to incident prevention and mitigation; and high-value learning events. The scope of the data would cover the life cycle of E&P offshore operations, including seismic acquisition, construction, well drilling, production, marine and aviation activity, and decommissioning. At this time, onshore operations are outside the scope of the data reporting and sharing program and may be incorporated in a future phase.

4.2 Shared Data

The type of data needed for value-add sharing is categorized in the four layers as illustrated in **Fig.** 9 The top layer are major incidents (SPI 1) with one or more of the following consequences:

- One or more fatalities
- Multiple recordable injures in a single incident
- Tier 1 Process Safety Event
- Level 1 Well Control Incident
- ≥ USD 1 million direct damage or loss of an asset
- Oil spill to water ≥ 10,000 gallons

The second layer are precursor incidents (SPI 2) that have the potential to result in a major incident given different circumstances including, but not limited to:

- Tier 2 process safety event
- Level 2 Well-control incident
- Collision that results in property or equipment damage ≥ USD 25,000
- Mechanical lifting incidents
- Loss of station keeping resulting in drive off or drift off
- Lifeboat, life raft, or rescue boat event

As a starting point for discussion, the Summit SME examined criteria for SPI 1 and SPI 2 incidents based on current programs used within COS and IOGP. All SPI 1 and SPI 2 incidents are deemed as value-add, and voluntary reporting allows for flexibility. Use of standard industry definitions and thresholds provides consistency.

Significant discussion focused on the need for a future workshop to define the thresholds for an aviation incident or event. Other issues for future workshops may include further refinement of the current definitions for station keeping, oil to water spills, Tier 1 and Tier 2 process safety events, other fires and explosions, and collisions. As an example, in considering the current definition of collisions, loss of marine integrity may be more critical than the monetary damage threshold.

The third and fourth layers in **Fig. 9** are failures of a major incident barrier on demand and failures of a major incident barrier during test or inspection, respectively. Barriers may be either hardware or human.

Hardware barriers are primary containment, process equipment, and engineered systems designed and managed to prevent loss of primary containment (LOPC) and other

types of asset integrity or process safety events and to mitigate any potential consequences of such events. **Fig. 10** below illustrates the correlation between COS and IOGP hardware barriers. Definition of hardware barriers may be addressed in a future workshop.

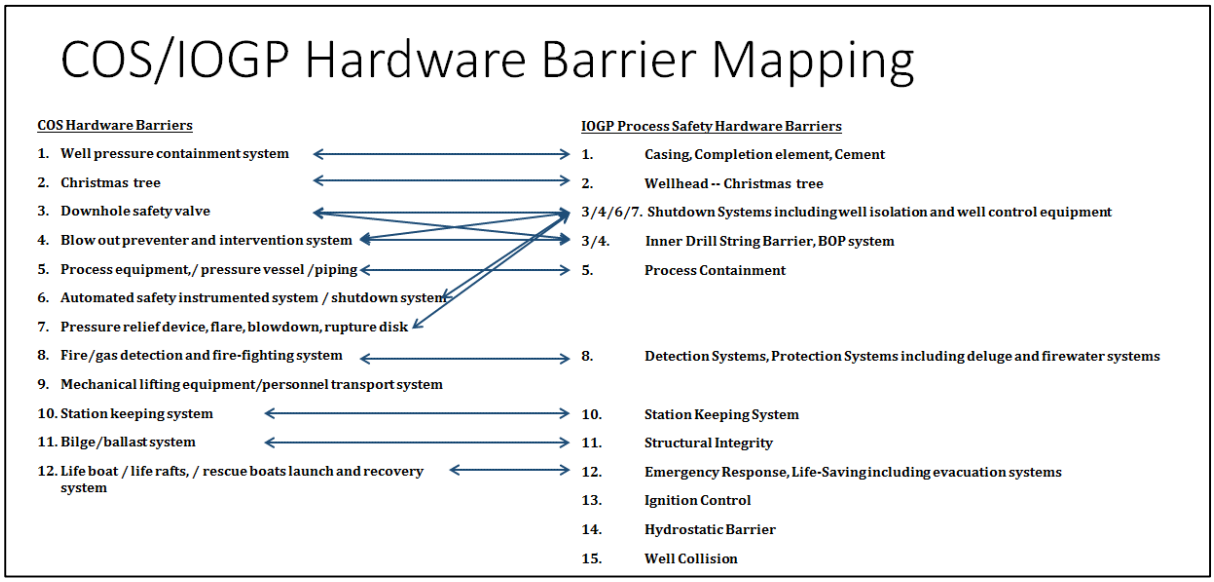


Fig. 10 — COS and IOGP hardware barrier correlation.

Human barriers rely on the actions of people capable of carrying out activities designed to prevent LOPC and other types of asset integrity or process safety events, and to mitigate any potential consequences of such events.

The Summit SME also discussed the potential impact of reporting challenges to major incident barriers (on demand) that did not fail but worked successfully. Significant feedback was expressed supporting data reporting that covers not only near misses but also successful recoveries – both hardware barrier successes as well as human barrier successes. The potential upside of looking at barrier "successes" as well as "failures" would be to help increase barrier confidence. Reporting not only failed barriers but also successful barriers may capture correct human action and/or decision making that activates the hardware barrier. While much speculation may be involved in describing root causes after an incident, relating successful recovery/handling may directly demonstrated what worked. The potential downside of this additional reporting burden should be evaluated by reviewing the value of reporting the data vs. the effort involved to collect, report, and analyze the data. This could be a topic at a future workshop.

Layer 3 and Layer 4 reporting may be improved by clarifying "testing" and "inspection" terminology and boundaries. Reporting boundaries may benefit from further definition of field testing, office testing, manufacturing facility, in-service testing, and other. It was suggested that work be performed to define and clarify what constitutes a failure for each barrier and associated test or inspection.

It was recognized that the industry may need a future workshop to address various topics, including:

- Development of a definition for an aviation incident.

- Refinement of the current definitions for station keeping, oil to water spills, Tier 1 and Tier 2 process safety events, other fires and explosions, and collisions. As an example, in considering the current definition of collisions, loss of marine integrity may be more critical than the monetary damage threshold.
- Definition of hardware barriers may also be addressed in a future workshop.
- Evaluation of the human factor perspective for barrier design and performance and non-technical training covering communication, situational awareness, teamwork, decision making, leadership, and personal limitations (stress, fatigue).
- Evaluation of additional reporting burdens relative to the benefits of collecting, reporting, and analyzing certain data.

4.3 Metadata

Meta data are data that provide information about other data. Two types of metadata exist: structural metadata, and descriptive metadata. Structural metadata are data about the containers of data. Descriptive metadata use individual instances of application data or the data content.

The main purpose of metadata is to facilitate the discovery of relevant information, more often classified as resource discovery. Metadata also help organize electronic resources, provide digital identification, and support archiving, preservation, and searchability of the resource. Metadata assist in resource discovery by "allowing resources to be found by relevant criteria, identifying resources, bringing similar resources together, distinguishing dissimilar resources, and giving location information."

IOGP and BSEE provided Summit participants with the examples of metadata shown in **Fig. 11** and **Fig. 12,** respectively.

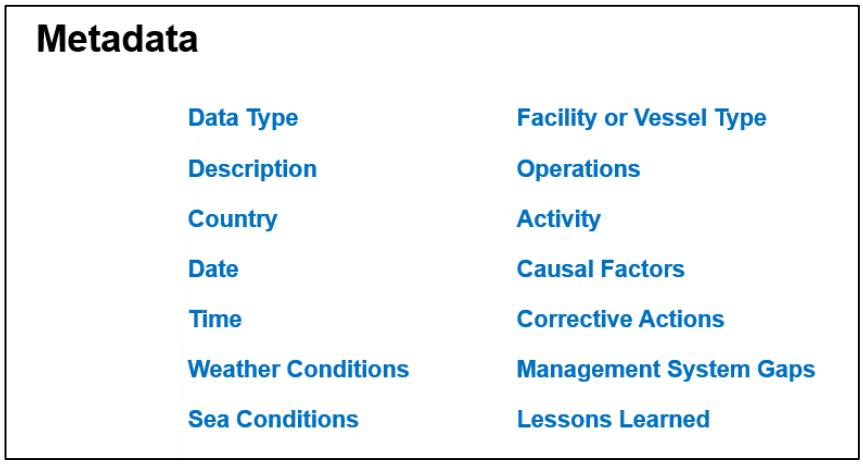


Fig. 11 — IOGP example metadata.

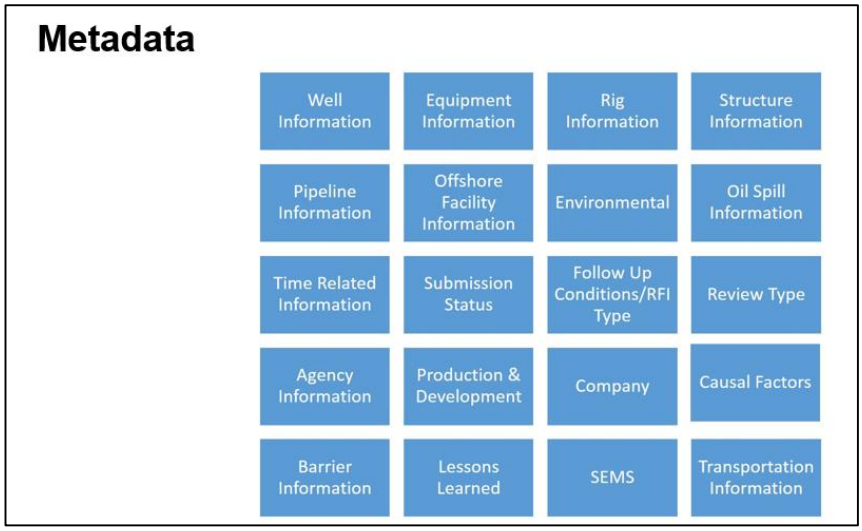


Fig. 12 — BSEE example metadata.

Summit participants discussed the type and value of metadata at high-level/general headings. **Table 1** summarizes the Summit discussion and the types of metadata discussed or proposed. Items highlighted in yellow indicate new data categories identified by participants deemed important to capture and record. Data format, units needed, and measurement methods were beyond the scope of the Summit. Therefore, a future workshop may be warranted to further delineate the metadata.

Data	Discussion	Reporting Form
Type	1 of 4 layers of Incidents/Events from the proposed pyramid (Fig. 9)	Drop down
Type subcategory	Expansion from Type	Drop down
Description	Description of loss/potential loss	Free text
Country	More geographic location detail; OCS area / US state Note: Careful not so detailed to identify operator.	Drop down
Water depth	Consider ranges	Drop down
Date	Specific; seasonal events need to be captured.	Free text
Time		Free text
Weather		Drop down?
Sea Conditions		Drop down?
Facility/Vessel Type	Drop down menu with more detail	Drop down
Operations	Include all types of high level E&P, (e.g., drilling, production, construction, seismic).	Drop down
Activity	Specific subset of Operations; detail w/ task; equipment information as subset	Drop down
Task	Add for more detail under Activity.	Free text
Hazard Categories		Drop down
Causal Factors	Include human factors.	Drop down
Barrier	Failed barriers; Successful barriers	Free text
Corrective Actions/ Areas for Improvement	Use hierarchy of controls as subset, (e.g., Administrative, Human, Engineering); Human factors need clear industry definition.	Free text
Management System Gaps	Possibly consider as a subset of Causal Factors? "Gap" term may prevent capturing "Benefits" because of negative connotation. Ensure mapping between SEMS, IOGP, etc.	Free text
Lessons Learned	Capture things that worked/went well; provide quantitative data about failure of barrier under test.	Free text

Table 1 — Potential Value-add metadata.

4.4 Challenges

It is clear that significant data are already being captured by the industry and BSEE. The challenge is one of focus, whether the offshore E&P industry needs more data, different data, or better analysis of the existing data. Challenges exist as to who should report the data – individuals, companies, or both? From what location should data be reported – US OCS, or globally? What obstacles, if any, exist which hinder industrywide data sharing? What gaps are there in the proposed data?

As demonstrated in the Summit Day 2 safety moment presentation by the FAA, safety-data reporting systems help an industry identify latent issues. Currently, there is no central E&P industry database and data are reported to various systems (i.e., COS, IOGP, IADC, BSEE). Looking to the approach adopted by the aviation industry may serve as a guide for the E&P industry. The FAA has amassed a large assortment of transportation data programs over 40 years from which important learnings may be mined and shared industry wide. Similar to how the FAA takes data from individual airline's reporting programs, the E&P industry may benefit by leveraging technology to take output from the existing systems rather than creating a new system.

Additionally, the airline and air traffic control segments of the transportation industry have established programs which use a three-party review committee (the regulator, the company, and the employee representative) to evaluate reported incident data and to issue mitigations or alerts. The key to successful implementation is a regulatory culture that leads to a "no-blame" culture among the industry and the regulator. A similar E&P program could mean collaboration between BSEE, the E&P company, and the employee workforce to improve safety in a positive manner by involving key stakeholders. A pilot E&P industry safety-data sharing program could be instituted with a memorandum of understanding (MoU) with an initial selected number of companies, a refinement of the existing reporting process, collaboration with the workforce on goals, and expansion to the entire OCS industry. The rigor of investigation at each layer of the triangle (**Fig. 9**) would need to be defined.

Looking at the FAA model, data collection is important but cultural routines also need to be addressed. A better safety culture and willingness and incentive to share information within each company is needed. Typically, operators report for contractors. An operator may share incidents and events and their causes with original equipment manufacturers (OEM), but identification of OEM products and equipment are usually blinded in data shared at an industry level. Obstacles to sharing data on specific equipment types vs. generic vernacular need to be overcome.

Who Should Report the Data?

The source of reporting of data today depends on the program. Data reported to BSEE is the accountability of the operator. IOGP reporting is done through operators. COS reporting is done both by operators and contractors and is bounded by incidents and events that occur inside and outside a 500-m zone around a facility. E&P companies require reporting of any incident or event by individuals. Reporting of some of these incidents and events are reported to BSEE or industry programs by the companies and not by individuals. BSEE's SafeOCS program allows for both individual and company reporting. The challenge in creating a central system will be to prevent duplication of data

reports and effort – coming either from an individual and a company or from different companies.

Notably, if a report is shared, the E&P industry needs to be prepared to solve any identified problems. Therefore, a feedback system between the entity receiving the data and the submitter is critical to ensure data consistency and quality. The E&P industry needs to conduct good-quality investigations that result in something of value to share and agree to a consistent taxonomy for capturing causes and corrective actions. The E&P industry needs to understand the causes by conducting good investigations which result in something of value to share.

A positive approach can take the program a step further. If something is being done well, tell others about it. Simply sharing bad information is not the only way of creating knowledge.

From What Location? Deciding where to start collecting data may present a challenge. The larger the scope, the more information must be collected in order to gain knowledge. By starting with the US OCS, a program could be initiated and tested using an agreed upon set of data. To facilitate future potential international application, collaboration would need to occur between regulators and industry to agree on data types and definitions. The challenge is that many countries and entities (EU for example) have their own programs and may be reluctant to change. Additionally, any proposed global safety-data collection and reporting program's metadata would need to include a "Country" category.

Is This Doable? Are There Any Obstacles That Would Keep Industry, as a Whole, From Sharing Data and Metadata?
Participants from Canadian offshore E&P regulation shared provisions of their own legislation in some working groups. These provisions arose out of a regulatory framework that required company collected near miss reporting to be fostered and forwarded to the regulator without penalty to employees who chose to report safety concerns. Ultimately, these provisions in the offshore E&P regulatory framework were codified into Canadian law.

There needs to be a willingness and incentive to share information. Without a willingness to share information, especially safety related information, this initiative could not succeed. The biggest challenge will be to overcome the specific barriers (i.e. legal employee confidentiality) to sharing information.

5.0 Data Collection Process and Tools

5.1 Data Collection Process

The collection framework would include the following:

1. Confidentiality guidelines
2. Common submittal process
3. Standardized data collection format including narrative
4. Data clarification feedback mechanism
5. Reporting frequency and timing, (e.g., real-time, annually)
6. Critical alert publications in real-time
7. Periodic, open discussion forums with operators, contractors, OEMs, regulatory agencies and others

Organizations associated with offshore E&P operations, including operators, contractors and subcontractors (including suppliers, OEMs), or regulatory agencies, would voluntarily submit data. The intent is for a designated organization to act as the central repository for the data using a process that protects the submitter from regulatory enforcement for data not required to be reported per regulations.

Reporting boundaries between organizations need to be defined; e.g., operators report from within a 500 meter zone of a facility and the vessel owner reports outside the 500 meter zone. Reporting by individuals working in the E&P industry could be an option with controls to eliminate duplicate reports. A pilot program would begin within the US OCS but scope to collect data from other countries operating offshore, even onshore, could be added in the future.

The data could be submitted using a standardized electronic format to enable user friendliness; program participant accessibility; and efficient data collection, loading, and storage. Data may be submitted at any time but should follow the completion of an investigation to capture specific resultant information such as causal factors and corrective actions.

A third-party intermediary would be used to collect the data, to perform quality assurance and quality control and to ensure all identifying organization information is scrubbed to preserve anonymity of the submitter. Using a confidential feedback loop, the data repository organization would communicate, if necessary, through the third-party intermediary to a single point of contact with the submitter.

5.2 Data Collection Tools

The intent of this section was to focus on the various aspects that need to be considered when developing a broad-base safety-data management system. Examples include the following:

1. Confidential repository
2. Online reporting tools
3. Simplified electronic format with common industry data
4. User friendly and easy submission to ensure participation
5. Data preparation and filtering to ensure data standardization
6. Early analysis facilitation by intertwining mechanical, human, and process factors to ensure complete understanding of the event
7. Relevance of *API RP 75* (2004) and SEMS, IOGP OMS 510 (IOGP/IPIECA 2014)
8. Identification of keywords, patterns, latent pre-cursor trends, causal factors, corrective actions, barrier failures or successes

An example of an approach to identify and to analyze high-potential incidents and events is an initiative developed by ExxonMobil Development Company (EMDC) for more effectively managing personal safety called "Mining-the-Diamond" **(Fig. 133)** (Smith and Jones 2013).

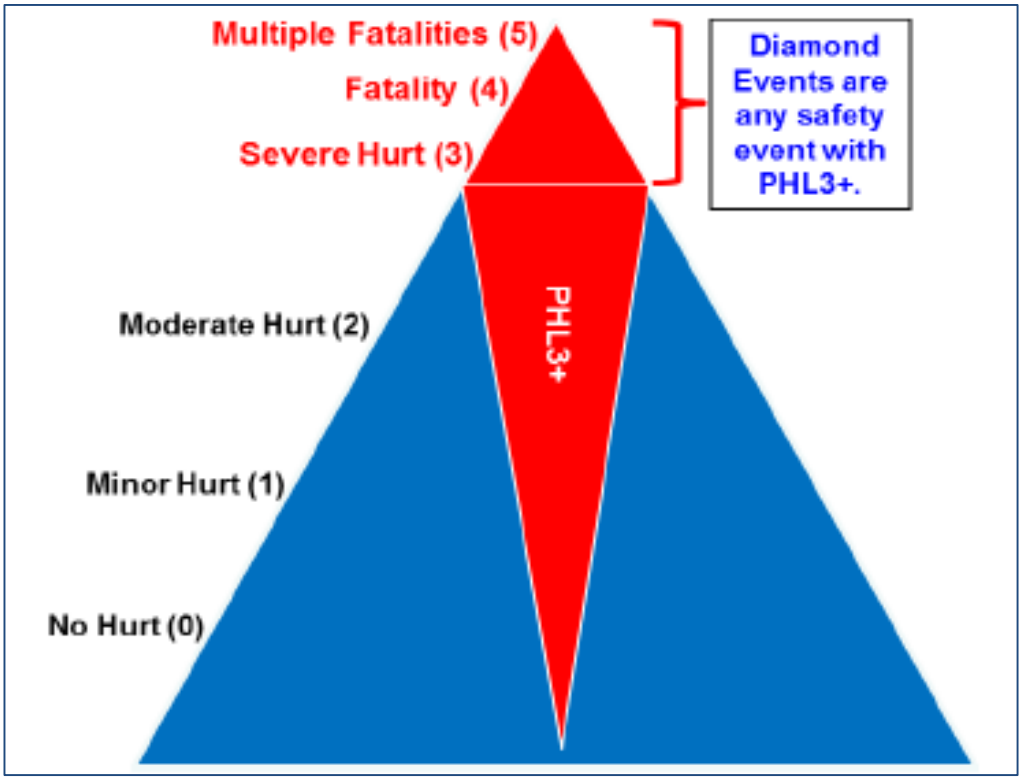


Fig. 13 — "Mining-the-Diamond" safety event concept. PHL=potential hurt level.

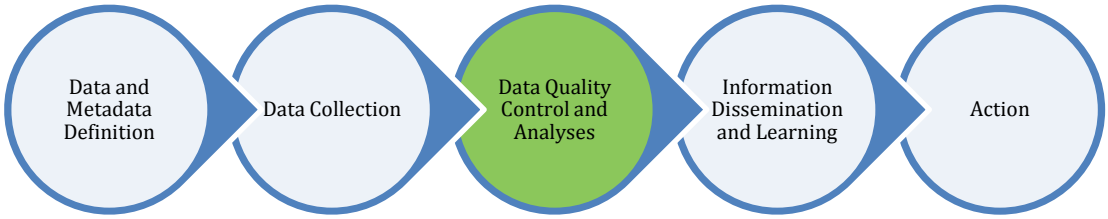
"Mining-the-Diamond" is an approach to prioritize resources for a safety event that has occurred and focuses on high consequence potential work activities that could result in life-altering injuries or death. All safety events that fall inside the red diamond in **Fig. 13** have the potential to maim or kill. These safety events warrant and require a detailed assessment to maximize learnings so that preventive actions may be taken to mitigate

similar future events. Therefore, all diamond events require in-depth root causal factor analysis. For more information on this approach refer to the technical paper SPE-163757-MS found in the online E&P industry library *OnePetro* (https://www.onepetro.org/) and referenced in Section 9.4. (Smith and Jones 2013)

5.3 Data Collection Responsibilities

The intent is for an organization to act as the central repository for the data through use of a process that protects the submitter organization from regulatory enforcement for data not already required to be reported. The central data repository organization should be independent of the E&P industry. The third-party data submission intermediary should have a proven track record and credibility, be familiar with the data collection process, and oversee data analysis and feedback. Available data repository options are the BTS, NASA, or another government agency subject to the terms of CIPSEA.

6.0 Data Review and Analysis



6.1 User Needs and Expectations

The user of the safety-data reporting and sharing program is expected to include the E&P industry, regulators, and the public. To more accurately identify the user, the critical questions are "who is going to use the output from the data, and how?" All users are driven primarily by their own objectives.

E&P industry leaders want to continually improve their safety performance to protect personnel, the public, producing assets, and their corporate reputation and brand. The frontline E&P facility personnel want to carry out their job responsibilities safely and effectively. Regulator responsibilities are to protect the public and environment. Limiting access to data creates a transparency-optimization challenge.

6.2 Data Review and Evaluation Process

The proposed process starts with the E&P companies preparing and sharing data with the third-party data submission intermediary. This data will be redacted of all unique company identifiers and then added to a central data repository.

It was suggested that a Peer Review Team (PRT) be commissioned by the central data repository organization and include SMEs, E&P company representatives, and the applicable regulatory agency representative. There was consensus on the importance of having the right mix of SMEs in the review to ensure a quality assessment, to provide a meaningful analysis, and to prevent disclosure of potentially misleading information. The PRT would analyze the data and develop an aggregate report(s) highlighting emerging trends. The PRT would use the feedback loop between the third-party intermediary and the submitting organization regarding the quality of the data and the understanding of the shared information. It was also noted that additional information may be needed from original equipment manufacturers (OEMs). **Fig. 14** illustrates the proposed data reporting and sharing process. (All PRT members would be subject to confidentiality requirements.)

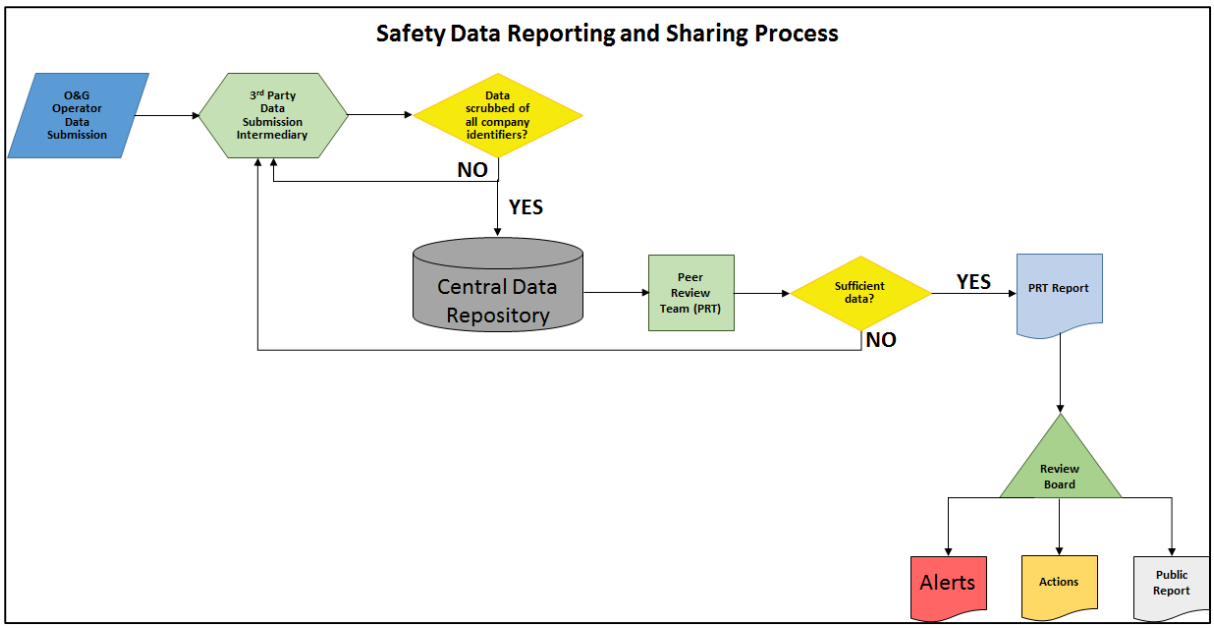


Fig. 14 — Safety-data reporting and sharing process.

A Review Board could be established to review all aggregated data, final reports, and trends developed by the PRT before dissemination. The Review Board would be resourced by industry leaders and specialists, repository organization representatives, and regulatory personnel and should be directed by an independent leader. The Review Board would have access to the repository organization to request further information or clarification to the original submitter on data within all CIPSEA requirements.

Because of the broad composition of the E&P industry, a potential challenge was identified regarding the makeup of the PRT and the Review Board. The skill sets of these two groups would need to be diverse enough to cover the wide spectrum of potential data to be reviewed. For example, vessel/dynamic-positioning (DP) operations and aviation operations.

6.3 Types of Analyses, Forms, and Formats

The analysis process should be standardized and auditable. The intent of the analyses should be to identify trends and issues for use by stakeholders to improve major incident barrier integrity and reduce or eliminate the risk of incident or event recurrence. The analyses should form the basis for a report that would be completed on a periodic basis — recommended to begin annually and, once established, at more frequent intervals, as appropriate.

The analysis would be at a higher level but with the capability for program participants to conduct more-detailed evaluations to identify trends and benchmark internal data. The reports should have a view of incidents and near misses involving different types of barriers, levels of events, supporting equipment, or processes that can lead to insight and action. The reporting should be both fixed format, as put together by the PRT, and ad hoc, enabled by the system collecting the data. The reports created by the PRT would be subject to disclosure limitations, and attribution to a single company would be prevented. The report should provide enough information for the industry functional experts to

understand the trends and to identify appropriate actions. While performance could be benchmarked within this program, it is a voluntary program that may not include all data.

7.0 Dissemination of Information and Learnings

7.1 Report Quality and Publication

Participants discussed many different perspectives related to report quality and publication. Although the collecting and sharing of data are critically important; the quality of the information and reports generated and how that information is shared are even more important to affecting safer operations.

An independent review team, including legal, should review the aggregated data and final report and any other information developed for public dissemination. It is important to involve an appropriate mix of expertise on the review team. The content and presentation of the information should be well-designed and appropriate for the intended audience. Protocols and governance need to be transparent and consistent in the development of information from the data. Likewise, the distribution of the information to various audiences (e.g., internal vs. external) should leverage existing methods of information sharing — i.e. do not create parallel processes. The review team needs to confirm that the report reflects factual information about the data and makes no recommendations.

The following items were discussed with regard to the format of the report and the process for dissemination:

- Strategy for communication/distribution of the report
- Preamble and Executive Summary sections
- Accessibility (e.g., electronic report and social media)
- Trend identification by geographic region
- Disclaimers regarding data quality

7.2 Alert Framework

The following questions were posed to structure the discussion on alerts:

- What criteria should dictate an alert?
- What form should an alert take?
- Which entity should be entrusted to deliver an alert?

What Criteria Should Dictate an Alert? The trigger mechanism may be a result of an identified immediate hazard, a newly discovered issue, or a trend that results from data

analysis. The basis of an alert should focus on existing or newly recognizable barriers and the quality of those barriers to function as designed.

One of the criteria that received broad agreement was that alerts should be developed for any opportunity that results in high value learning. Such opportunities might include the frequency or severity of risk associated with the topic; generic OEM alerts; a voluntary alert that could be submitted by OEMs, operators, or other parties; and best practices. (Note: The legal protections and limits of liability need to be established for alerts.)

What Form Should an Alert Take? In addressing the proper form of alerts, an "all of the above" approach should be taken to ensure the widest possible distribution and dissemination. Some means for alerts were the following:

- Electronic
- Social media
- Subscription-based products
- Moderated blog

Alerts should be constructed so that keywords are searchable, include primary contacts, and include clear identification of who or what entity is managing the alert. When applicable, alerts might include photographs or videos to help in understanding. Also, alerts must have legal disclaimers.

A future aspect of the alert framework could potentially be a method that allows opportunities for others to offer suggestions or recommendations to reduce or mitigate the associated risk. The alert system could eventually evolve into a Wiki- or an Expedia-type clearinghouse concept — e.g., SPE *PetroWiki* (http://petrowiki.org/PetroWiki%3AAbout *PetroWiki*) — whereby interested SMEs could continually add to the knowledge base to solve specific problems.

Which Entity Should Be Entrusted for the Delivery of Alerts? Many entities issue alerts today. If the intent is to issue alerts through this program, then those responsible should be technically qualified on the subject of the alert. The alert delivery process should be streamlined as much as possible. Finally, a feedback and evaluation process should be developed to ensure alert quality.

7.3 Review of Learnings and Actions

The final report should be shared at an annual meeting of program participants, the data repository organization, regulators, and invited entities. Participants should include SME, industry leaders, and regulators who should represent their respective discipline or entity.

There should be a general overview to start the meeting for all attendees, followed by breakouts by discipline to review details. The content of the final report should dictate the meeting agenda and drive the subject matter breakout sessions.

The outcome of this meeting may initiate or supplement joint-industry effort(s) to create new, or revise existing, standards or recommended practices with a primary focus on major incident barriers. Action items may be assigned to industry groups or owners of the original recommended practice or guidance documents. The groups of SMEs would

provide their summary of actions to the broader attendees at the end of the meeting along with plans for the follow-up meetings with industry groups to create or revise standards, as appropriate.

8.0 Industry and BSEE Next Steps

Upon conclusion of the Summit, it was agreed that a number of near-and long-term next steps could be undertaken in parallel with the objective of retaining the momentum gained during the Summit so that change could be enacted as efficiently and effectively as possible. The following checklist is provided as an output of this Summit to facilitate future action.

8.1 Pilot Program

- Pursue a volunteer pilot implementation program with willing operators, service companies, and equipment manufacturers to "test run" a consolidated industrywide safety-data management process based on the results of the Summit discussions.
- Use pilot program results to determine if the "right" data are being collected to allow for risk-based decision making. Proposed options include:
  - ✓ working with COS members to utilize data that has already been collected as a starting point; or
  - ✓ other interested companies (i.e., operators, service companies, OEMs) could also be invited to participate.

8.2 Workshops, Summits, Forums

- Develop a schedule of proposed future summits and technical workshops on specific subtopics that support the Technical Report, such as,
  - ✓ Data collection and analysis to improve barrier management
    - Standard industry definitions for hardware and human barriers
    - Reporting hardware barrier successes
    - Definition and boundaries for barrier testing and inspection failures
  - ✓ Data reporting/review/analysis
    - Precursor data identification
    - Metadata
    - Data categories (e.g., causal factors and areas for improvement)
    - High actual or potential consequence events
    - Safety incident classification methodology
    - Decision for issuing alerts
    - Cyber security and cyber physical safety
  - ✓ Testing and inspection criteria

- Define the elements of operation and specifying their role in testing and inspection (e.g., well drilling, production)
- Define the roles of the stakeholders across the life cycle and their proposed reporting requirements from manufacturer to operator
- Clarify requirements to record data on failures regardless of barrier status
- Evaluate the benefits of developing a list of reportable failures

8.3 Networking and Collaboration

- Use SPE Technical Sections and other groups, as appropriate, for ongoing networking on safety-data management and risk management.
- Establish a data framework and culture (both industry and regulator) that encourage open reporting, protect and secure the identity of the submitters, protect business sensitive information, and promote sharing of safety-data and learnings.
- Leverage SPE's online publication *HSE Now*, SPE *PetroWiki*, and other industry publications to share articles of interest related to improved safety-data management, analysis, and reporting processes.
- Assess the benefits of establishing an SPE Technical Section as a global forum to allow members to network on the topic of safety-data sharing.
- Seek opportunities to integrate safety-data sharing and related topics into existing SPE workshops, conferences and training programs.

9.0 Appendices

9.1 Acronyms

ABS	American Bureau of Shipping
API RP	American Petroleum Institute Recommended Practice
APR	Annual Performance Report
ASAP	Aviation Safety Action Program
ASRS	Aviation Safety Reporting System
ASTM	American Society for Testing and Materials
BOP	Blowout Preventer
BSEE	Bureau of Safety and Environmental Enforcement
BTS	Bureau of Transportation Statistics
CIPSEA	Confidential Information Protection and Statistical Efficiency Act of 2002
COS	Center for Offshore Safety
DP	Dynamically Positioned; Dynamic Positioning
E&P	Exploration and Production
ERT	Event Review Team
ESD	Emergency Shutdown
EUOAG	European Union Offshore Authority Group
FAA	Federal Aviation Administration
FOIA	Freedom of Information Act
HSE	Health Safety Environment
HVLE	High Value Learning Event
IADC	International Association of Drilling Contractors
IOGP	International Association of Oil and Gas Producers
IRF	International Regulators Forum
ISP	Incident Statistics Program
JIP	Joint-Industry Project
JSA	Job Safety Analysis
LFI	Learning from Incidents
LNG	Liquefied Natural Gas
LOPC	Loss of Primary Containment
LWDC	Lost Work Day Case
LTI	Lost Time Incident
MARAD	US Maritime Administration
MoU	Memorandums of Understanding
NASA	National Aeronautics and Space Administration
NMRS	Near miss Reporting System
O&G	Oil & Gas
OCS	Outer Continental Shelf
OEM	Original Equipment Manufacturers
OESI	Ocean Energy Safety Institute
OMB	Office of Management and Budget
OSHA	US Occupational Safety & Health Administration
PHL	Potential Hurt Level
PRD	Pressure Release Device

PRT	Peer Review Team
PSE	Process Safety Event
RoMH	Register of Major Hazards
SCSSV	Surface Controlled Subsurface Safety Valve
SECE	Safety and Environmental Critical Element
SEMS	Safety and Environmental Management System
SME	Subject Matter Expert
SOCP	Ship Operations Cooperative Program
SPE	Society of Petroleum Engineers
SPI	Safety Performance Indicator
SSCSV	Subsurface Controlled Safety Valve
USCG	United States Coast Guard

9.2 Glossary of Terms

Please note that: The source for each term is indicated in parentheses at the end of each definition.

Automated Safety Instrumented System: A system implementing one or more safety functions, with specified safety integrity level(s), that detect abnormal process conditions and take automatic, necessary actions to achieve or maintain a safe state for the process with respect to a hazardous event. (COS)

Automatic Fire Detection System: A system to alert personnel of the existence of a fire condition and to allow rapid identification of the location of the fire. The system may be used to automatically activate emergency alarms, initiate emergency shutdown (ESD), isolate fuel sources, start fire water pumps, shut -in ventilation systems, and activate fire extinguishing systems such as gaseous agents, dry chemical, foam, or water. (COS)

Bilge/Ballast System: The vessel structure, machinery, piping, or controls related to ballast movement, watertight integrity and stability. (COS)

Blowdown System: A collection of controls, valves, and pipes that allow controlled depressurization of liquid or gas pressure contained within a process, piping, or pressure vessel to reduce or eliminate pressure-induced stresses during a time of potential heat weakening of vessels and piping, and to reduce the inventory of fuel present on the facility. (COS)

Blowout Preventer and Intervention System: Equipment installed on the wellhead or wellhead assemblies to contain wellbore fluids in the annular space between the casing and the other tubular equipment, in the tubular equipment, or in an open hole during well drilling, completion, and testing operations. For the purposes of SPI data collection, this also includes pressure control equipment used in intervention operations, such as wireline and coiled-tubing, BOPs, and lubricators. (COS)

Christmas Tree: Equipment attached to the uppermost connection of the wellhead or tubing spool to contain wellbore fluids in both the tubing and in the annular space between the casing and tubing during producing operations. The subsea tree may provide locations where nitrogen and chemical additives can be injected into the annulus or tubing string. The tree consists of assembled equipment that includes a wellhead connector, valves, choke, tree cap, and control system to operate the various components. (COS)

Downhole Safety Valve: A device installed in a well below the wellhead with the design function to prevent uncontrolled well flow when actuated — e.g., subsurface controlled safety valve (SSCSV) or surface controlled subsurface safety valve (SCSSV). An SSCSV is a subsurface safety valve actuated by the pressure characteristics of the well. An SCSSV is a subsurface safety valve controlled from the surface by hydraulic, electric, mechanical, or other means. (COS)

Fire Water System: A system composed of the fire water pump, the distribution piping, the hose, nozzle, and the deluge sprinkler system which is used to provide exposure protection, control of burning, or extinguishment of fires. (COS)

Fixed Fire-Fighting System: Includes fire water pumps and drivers, distribution piping, fire hoses, stations, nozzles, water spray systems, monitors, foam systems (fixed or portable), dry chemical systems, gaseous systems (e.g., CO_2, Halon, FM-200, FE-13, Inergen), and water mist or fine water spray systems. (COS)

Flare System: The use of combustion to safely dispose of relief gases in an environmentally compliant manner. (COS)

Gas Detection System: A system to alert personnel to the presence of flammable gases, toxic gases, or a combination of both. (COS)

High Potential Event: Any incident or near miss that could have realistically resulted in one or more fatalities. (IOGP)

High Value Learning Event: Any HSSE or operational incident or event where the most serious probable outcome is a Major Incident; an event that identifies:

- A previously unknown risk, situation, operational or mechanical hazard, or barrier failure
- A previously unknown combination of factors that resulted in an unexpected condition or event
- A routine operation or activity that created a previously unidentified risk or consequence
- A situation where established industry designs, controls, or procedures failed to prevent an event
- An event that is part of a pattern in industry events that could indicate that certain hazardous conditions are not well-understood (COS)

Incident Involving Mechanical Lifting: A mechanical lifting (or lowering) incident that results in one or more of the following consequences:

- Four or less recordable injuries in a single incident that occurs during the lift
- Between USD 25,000 and USD 1 million direct damage to or loss of an asset (including the load itself)
- A loss of primary containment of a material meeting a Tier 2 PSE threshold quantity
- A dropped load that strikes live process equipment

Mechanical lifting includes lifts of an asset or personnel (personnel transfer and man-riding). Not included are:

- Lifting incident resulting only in a first-aid injury
- Lifting incident resulting only in direct damage to an asset (including the load itself) < USD 25,000
- Lifting incident resulting only in a slipped load
- Dropped load or object into the water valued at < USD 25,000
- Manual lifting incidents (COS)

Launch and Recovery Systems: Systems used to deploy or retrieve a lifeboat, life raft, or rescue boat. (COS)

Level 1 Well Control Incident: Uncontrolled flow of formation fluid or other fluids resulting in a seabed or surface release, underground communication to another formation or well, or shallow water flows with equipment damage or facilities loss. Excludes planned shallow gas mitigation operations. (COS)

Level 2 Well Control Incident: One barrier system within the well design failed and other barrier system(s) either failed or were challenged beyond design capacity, resulting in an influx without controlled flow. (COS)

Lifeboat/Survival Craft: A craft capable of sustaining the lives of persons in distress from the time of abandoning the ship. (COS)

Life Raft: An inflatable appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept uninflated until ready to use. (COS)

Loss of Station Keeping Resulting in Drive Off or Drift Off: a malfunction or improper operation of the DP system. (COS)

Lifeboat, Life Raft, or Rescue Boat Event: A recordable injury or equipment damage or malfunction during lifeboat, life raft, or rescue boat operations or that takes the craft out of service. (COS)

Major Incident: An incident that has resulted in multiple fatalities or serious damage, possibly beyond the asset itself. Typically initiated by a hazardous release, but may also result from major structural failure or loss of stability that has caused serious damage to an asset (note this is intended to incorporate terms such as 'Major Accident' as defined by UK HSE). (IOGP)

Near miss: An unplanned or uncontrolled event or chain of events that has not resulted in recordable injury or physical damage or environmental damage but had the potential to do so in other circumstances. (IOGP)

Piping: An assembly of interconnected pipes that are used to convey, distribute, mix, separate, discharge, meter, control, or snub flows of hydrocarbons or toxic and hazardous chemicals. (COS)

Pressure Relief Device: A device actuated by inlet static pressure and designed to open during emergency or abnormal conditions to prevent a rise of internal fluid pressure in excess of a specified design value. The device may also be designed to prevent excess internal vacuum. The device may be a pressure relief valve, a non-reclosing pressure relief device, or a vacuum relief valve. (COS)

Process Equipment and Pressure Vessels: A container associated with drilling, production, gathering, transportation, and treatment of liquid petroleum, natural gas, natural gas liquids, or associated salt water (brine) designed to withstand internal or

external pressure above ambient conditions. Also included are containers used for pressurized storage of toxic and hazardous chemicals. (COS)

Process Safety: A disciplined framework for managing the integrity of operating systems and processes handling hazardous substances. It is achieved by applying good design principles, engineering, and operating and maintenance practices. It deals with the prevention and control of events that have the potential to release hazardous materials and energy. Such incidents can result in toxic exposures, fires, or explosions, and could ultimately result in serious incidents including fatalities, injuries, property damage, lost production, or environmental damage. (IOGP)

Process Safety Event: An unplanned or uncontrolled LOPC of any material including non-toxic and nonflammable materials (e.g. steam, hot condensate, nitrogen, compressed CO_2, or compressed air) from a process, or an undesired event or condition, that, under slightly different circumstances, could have resulted in an LOPC of a material. *API RP 754* (2010)

Rescue Boat: A boat designed to rescue persons in distress and to marshal survival craft. (COS)

Rupture Disk: A pressure-containing, pressure-and temperature-sensitive element of a rupture disk device. A rupture disk device is a non-reclosing pressure relief device actuated by static differential pressure between the inlet and outlet of the device and designed to function by the bursting of a rupture disk. The device includes a rupture disk and a rupture-disk holder. (COS)

Shutdown System: A system of manual stations that, when activated, will initiate the shutting in (isolation and cessation) of all process stations of a platform production process and all support equipment for the process. It may also be integrated with fire and gas detection systems for automatic initiation. (COS)

Station Keeping Systems: Typically a single point mooring, a spread mooring, vertical tension legs, or a DP system used to achieve reliable position keeping capability of a floating structure. (COS)

Tier 1 Process Safety Event (PSE): an unplanned or uncontrolled release of any material, including nontoxic and nonflammable materials (e.g., steam, hot condensate, nitrogen, compressed CO_2, compressed air), from a process that results in one or more of the consequences listed below:

- An employee, contractor, or subcontractor “days away from work” injury or fatality
- A hospital admission or fatality of a third party
- An officially declared community evacuation or community shelter-in-place
- A fire or explosion resulting in greater than or equal to USD 25,000 of direct cost to the company
- A pressure-release-device (PRD) discharge to atmosphere whether directly or through a downstream destructive device that results in one or more of the following four consequences:
    - Liquid carryover

    - Discharge to a potentially unsafe location
    - An onsite shelter-in-place
    - Public protective measures (e.g., road closure)

  and a PRD discharge quantity greater than the threshold quantities described within *API RP 754* (2010) in any 1-hour period. *API RP 754* (2010)
- A release of material greater than the threshold quantities described within *API RP 754* (2010) in any 1-hour period. *API RP 754* (2010)

Tier 2 Process Safety Event (PSE): An unplanned or uncontrolled release of any material, including nontoxic and nonflammable materials (e.g., steam, hot condensate, nitrogen, compressed CO_2, compressed air), from a process that results in one or more of the consequences listed below and is not reported as a Tier 1 PSE:

- An employee, contractor, or subcontractor recordable injury
- A fire or explosion resulting in greater than or equal to USD 2,500 of direct cost to the company
- A PRD discharge to atmosphere whether directly or through a downstream destructive device that results in one or more of the following four consequences:
    - Liquid carryover
    - Discharge to a potentially unsafe location
    - An on-site shelter-in-place
    - Public protective measures (e.g., road closure)

  and a PRD discharge quantity greater than the threshold quantities described within *API RP 754* (2010) in any 1-hour period. *API RP 754* (2010); or
- A release of material greater than the threshold quantities described within *API RP 754* (2010) in any 1-hour period. *API RP 754* (2010)

Well Pressure Containment System: The equipment below the BOP or Christmas tree that provides the ability to contain pressure when a BOP or Christmas Tree has been closed. It includes the casing and wellhead (with cement support and isolation where applicable) and tubing, tubing hardware, and tubing hanger. (COS)

9.3 Summit Documents

9.3.1 Summit Agenda

SPE Summit: Assessing the Processes, Tools, and Value of Sharing and Learning from Offshore E&P Safety Related Data

SPE and BSEE will facilitate a discussion to explore the opportunities, challenges, and processes needed for the development and implementation of an industrywide safety management data sharing framework. This framework will describe processes for the protected collection, analysis, and sharing of safety management information (including major incident and precursor data). Topics to be covered include: benchmarking of existing key industry systems; identifying data to be captured and analyzed while maintaining data confidentiality; and strategies for effective sharing of learnings to enable action. The results of this Summit will be documented in a Technical Report that will provide a basis for an effective means to share information and learnings across the industry.

About the SPE Technology Summit Program

An SPE Summit is a one- to three-day, invitation-only event with specific, predefined objectives. It is intended to result in a deliverable that benefits the industry and may lead to further initiatives. Summits are a fast-track response to emerging issues, problems, technologies, or strategies of broad significance to the industry. The event is guided by a program committee, which selects participants on the basis of their expertise and knowledge of the topic. Written records of the discussions and conclusions are published.

Agenda

TUESDAY, 5 APRIL
SESSION I: Introductions and Agenda Review
SESSION II: Setting the Context This session will provide an overview of the Summit objectives and address the driver for this collaborative effort between SPE and BSEE. This session will also include perspectives from BSEE Director Admiral Brian Salerno.
SESSION III: Setting the Baseline: Outside and Inside the O&G Industry

The purpose of this session will be to provide overviews of key existing systems that should be considered as we discuss a proposed common industrywide data management framework. Data management systems to be discussed include the aviation industry, IOGP, and the Center for Offshore Safety.

SESSION IV: What Data Add Value if Shared?

This session will explore and seek feedback on the type and value of data that should be collected and eventually shared to help make the industry safer. A key part of this discussion will include identifying data that are already being captured elsewhere with the objective of leveraging existing systems, to the extent possible, to avoid creating new reporting obligations for companies.

WEDNESDAY, 6 APRIL

SESSION V: Reconnect with Day 1

SESSION VI: Data Collection Process and Tools

The intent of this session will be to define a confidential process to capture data, as well as define a secure feedback mechanism to clarify data submissions without disclosure of the data collection entity. A desired objective will be to discuss a common, uniform data submission process for all of industry.

SESSION VII: Data Review and Analysis

Key aspects of this session will focus on the need for data consistency (i.e., standard taxonomy), expected output, and agreeing on who the ultimate recipient of the data is. The discussion will also include the proposal of establishing an independent review board to review data, conduct analyses, and write a report containing the results and identifying trends.

SESSION VIII: Strategies for Learning and Action

A desired outcome of this initiative would be an annual report available to all stakeholders that shares the results and learnings at industry meetings/workshops with stakeholders. The report will include potential actions to improve the integrity of major incident barriers and reduce/eliminate the risk of recurrence.

SESSION IX: Next Steps for Industry and BSEE

This session will focus on obstacles that Summit participants anticipate that might prevent acceptance and implementation of an industrywide safety-data management system. This session will also explore various potential avenues for industry to meet to share results and learnings, as well as encourage dialogue on specific topics of interest (e.g., precursor analysis, barriers, causal factors).

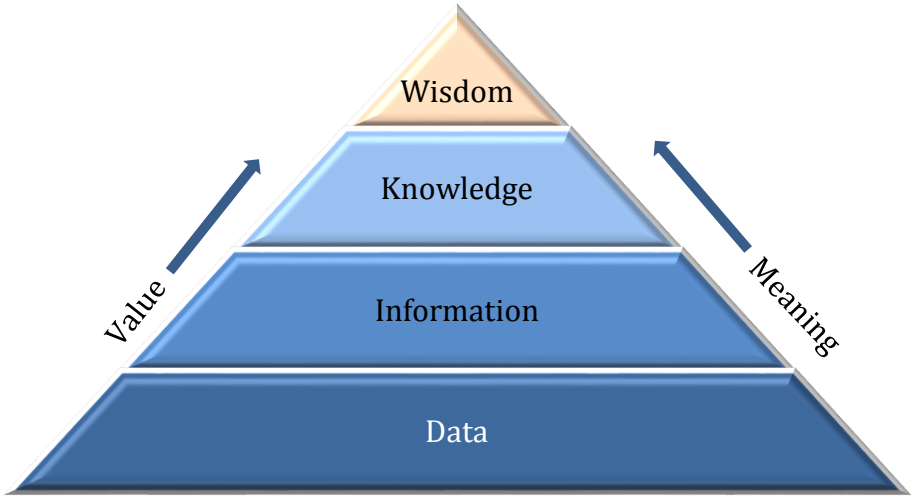
SESSION X: Closing

9.3.2 Summit Preread

SPE/BSEE Summit

Assessing the Processes, Tools, and Value of Sharing and Learning from Offshore E&P Safety Related Data

Setting the Context



A key factor in the continual improvement in HSSE performance is the implementation of the learnings shared from incidents and events that occur in an industry. This is particularly important for major hazards and associated prevention/mitigation barriers. Important aspects of this effort are identifying the type of data that will provide valuable information, a secure process for collection and analysis of the data, and a robust methodology for disseminating the results to stakeholders who can take actions to reduce or eliminate the risk of recurrence through greater barrier integrity.

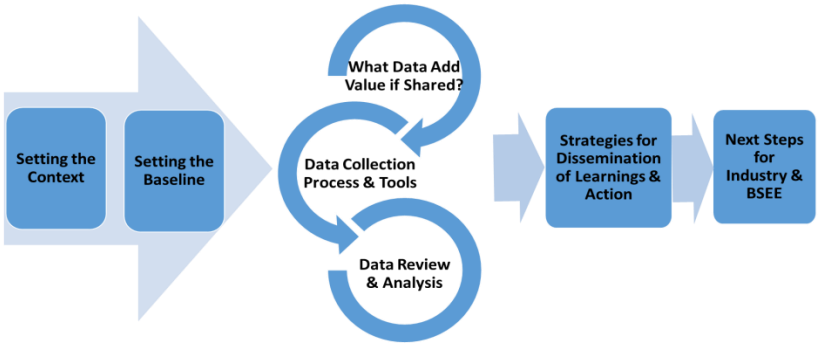
The US E&P OCS industry has yet to design, establish and implement a comprehensive program as described above. Several programs exist today covering some data types and some sectors of the industry. Two will be presented at the Summit. The IOGP captures global data from its members on process safety, well control incidents, and fatalities and high potential incidents. The COS captures data from its members on major incidents, some precursor events, and high value learning events. Other industries have programs that have gone deeper to capture more data and give the E&P industry a glimpse of what is possible. At the Summit, you will hear specifically about the ASAP. They have been through their own journey and are achieving great benefits from this program. The E&P industry is being challenged to progress in its own journey by breaking down obstacles to learn from the past to build wisdom and create a better, safer future.

An SPE/BSEE Steering Team has drafted a proposed future state designed to capture specific data related to HSSE hazards to enable analyses, learning, and ultimately action to improve barrier integrity and eliminate or reduce the risk of incidents. The proposal is a consolidation of several programs within the industry, with enhancements from good practice outside the industry. It is proposed as a voluntary program. It is geared toward

learning and is not intended to measure the performance of industry or a specific company. **The objective of this Summit is to get your feedback on this proposed future state and advice on ways to modify and enhance it so that it meets your requirements and increases the probability of acceptance by our stakeholders. The objective of the effort is to eliminate or reduce risk of harm through industry sharing of data, generation of information that builds knowledge and understanding, and wise action.**

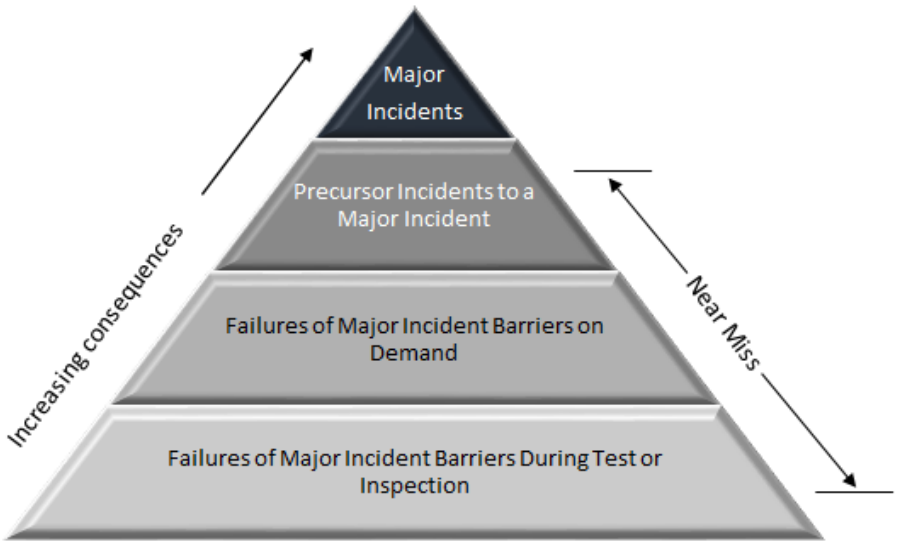
"A smart man learns from his mistakes, a wise man learns from the mistakes of others."
— Latin Proverb

The Proposed Future State



What Data Should Be Reported?
We propose that we start small in terms of the volume and scope of the data but with the data that are the most valuable. Therefore, we have selected as our starting point major incidents, their precursor events (including near misses), integrity data on the barriers that prevent and mitigate the probability and consequences of a major incident, and high value learning events. The scope of the data would cover the life cycle of E&P offshore operations including seismic, construction, wells, production, marine, aviation, and decommissioning. Not in scope would be operations conducted onshore (e.g. shorebase, manufacturing plant). Controls would be needed to eliminate duplication of data.

The proposed data are as follows:



- Major Incident with the following consequences (from COS Safety Performance Indicator Program)
    - One or more fatalities
    - Multiple recordable injures in a single incident
    - Tier 1 Process Safety Event
    - Level 1 Well Control Incident
    - ≥ USD 1 million direct damage or loss of an asset
    - Oil spill to water ≥ 10,000 gal
- Precursor Incident or Event (from COS Safety Performance Indicator Program) — incident or event that had the potential to have resulted in a Major Incident given different circumstances and includes, but not limited to, the following
    - Tier 2 process safety event
    - Level 2 Well Control Incident
    - Collision (includes allision) that results in property or equipment damage ≥ USD 25,000
    - Mechanical lifting incidents
    - Loss of station keeping resulting in drive off or drift off
    - Lifeboat, life raft, or rescue boat event
- Failure of a major incident barrier or its support systems on demand (in service) not captured in incidents or events above
- Failure of a major incident barrier test or inspection and test (internal or external) of a major incident barrier including, but not limited to:
    - A hardware barrier defined as a primary containment, process equipment and engineered systems designed and managed to prevent LOPC, and other types of asset integrity or process safety events and mitigate any potential consequences of such events
        - Use COS or IOGP categories or combination for designating type of hardware barrier:
            - COS
                - Well pressure containment system
                - Christmas tree
                - Downhole safety valve
                - Blowout preventer and intervention system
                - Process equipment/pressure vessel, piping
                - Automated safety instrumented system/shutdown system
                - Pressure relief device, flare, blowdown, rupture disk
                - Fire/gas detection and fire-fighting system
                - Mechanical lifting equipment/personnel transport system
                - Station keeping system
                - Bilge/ballast system

        - Lifeboat, life rafts, rescue boats, launch and recovery system
    - IOGP process safety:
        - Structural integrity
        - Process containment
        - Ignition control
        - Detection systems
        - Protection systems including deluge and firewater systems
        - Shutdown systems including operation-well isolation and drilling well control equipment
        - Emergency response
        - Life-saving systems including evacuation systems
    - IOGP Wells
        - Detection systems
        - Hydrostatic barrier
        - Inner drill string barrier
        - BOP system
        - Station keeping system
        - Casing
        - Completion element
        - Cement
        - Wellhead /Christmas tree
        - Well collision
- Human barrier relies on the actions of people capable of carrying out activities designed to prevent LOPC and other types of asset integrity or process safety events and mitigate any potential consequences of such events. Human barrier types will require another workshop to define categories.
  Note: Intent is to collect only data of failed inspections or testing of barriers and not mean-time-between-failures-type data.

- High value learning event (high potential event)
    - Any HSSE or operational incident or event where the most serious probable outcome is a major incident.
    - An event that identifies
        - A previously unknown risk, situation, operational or mechanical hazard, or barrier failure
        - A previously unknown combination of factors that resulted in an unexpected condition, or event
        - A routine operation or activity that created a previously unidentified risk, or consequence
        - A situation where established industry designs, controls, or procedures failed to prevent an event

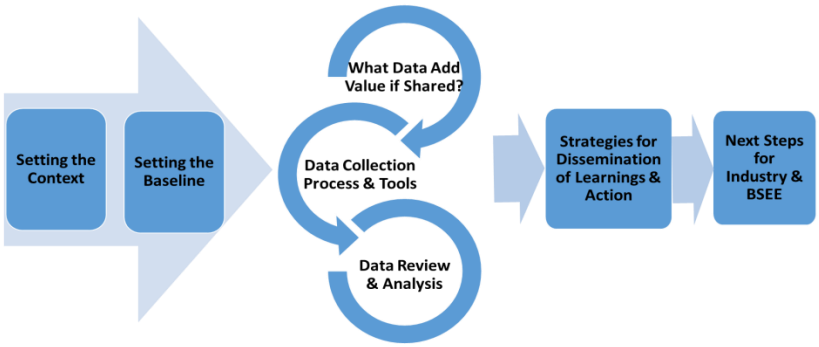
- An event that is part of a pattern in industry events which could indicate that certain hazardous conditions are not well-understood

Metadata: Incident or event information required on the data above includes:

- Data type (drop down)
- Country (drop down)
- Description (free text)
- Date
- Time
- Weather conditions
- Sea conditions
- Facility or vessel type (drop down)
- Operation type (drop down) for example, production, well, marine, or aviation.
- Activity type (drop down) or example, normal drilling, energy isolation, lifting, or maintenance.
- Causal factors — immediate and/or root cause? (drop down plus free text)
- Corrective actions or areas for improvement (drop down plus free text)
- *API RP 75* (2004) element gaps
- Lessons learned (free text)

Who Should Report Data and from Where?

The proposal calls for organizations associated with offshore E&P operations including operators, contractors, and subcontractors (including suppliers/OEMs) and/or regulatory agencies to submit data voluntarily. Reporting boundaries between organizations would have to be defined — i.e., operators report from within a 500-m zone of a facility, vessel owner reports outside the 500-m zone. Reporting by individuals working in the E&P industry could be an option, with controls to eliminate duplicate reports. The proposed program would begin within the US OCS but scope to collect data from other countries operating offshore, or even onshore, could be added at any time.



What Should be the Data Collection Process?

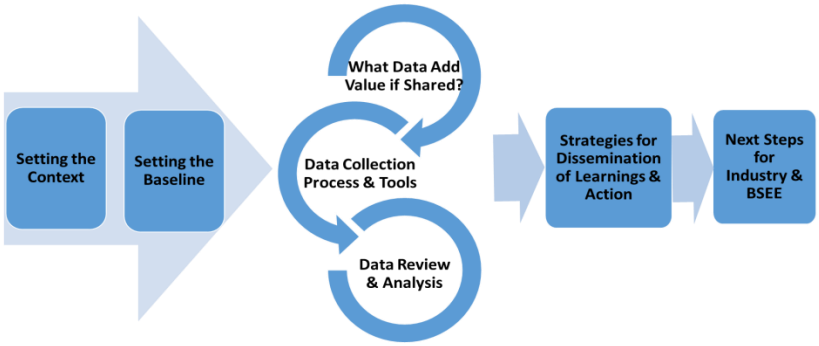
Intent is for an organization to act as the repository for the data using a process that protects the organization of the submitter and also shields the submitter from regulatory enforcement in the case of data that are not already required to be reported to a regulator. Options available are the BTS, NASA, or another government agency subject to the terms of CIPSEA.

CIPSEA is a US federal law that establishes uniform confidentiality protections for information collected for statistical purposes by US statistical agencies, and it allows some data sharing between the Bureau of Labor Statistics, Bureau of Economic Analysis, and Census Bureau. The agencies report to OMB on particular actions related to confidentiality and data sharing. Roughly speaking, the law guides standardized approaches to the idea that a respondent's information should not be exposed in ways that lead to inappropriate or surprising identification of the respondent. By default the respondent's data are used for statistical purposes only. If the respondent gives informed consent, the data may be put to some other use.

The collection process would define:

1. The format of the data collection (standard across the industry taking into account relevance with existing practice and taxonomy)
2. The timing of data collection

There will be a confidential feedback loop in place to enable the organization to contact a single point of contact with an organization who has submitted data to conduct quality assurance/quality control, if necessary. The data will be submitted using one standard electronic format to enable efficient data collection, loading, and storage. It must be simple and user friendly and assessable to every participating organization. Data can be submitted at any time, but should follow the completion of an investigation to capture specific data such as causal factors and corrective actions.

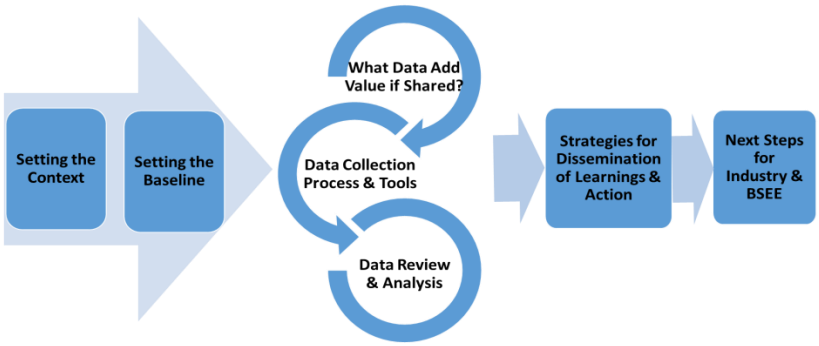


How Should the Data be Reviewed and Analyzed?

A PRT led by the repository organization, including subject matter experts and representatives from participating companies will analyze the data and develop an aggregate report(s) highlighting emerging trends. It will also serve as the feedback loop with the submitting organization regarding the quality of the data and understanding of the shared information. All PRT members will be subject to confidentiality requirements.

The analysis process will be standardized and auditable. The intent of the analyses will be to identify trends and issues that should be considered by stakeholders to improve major incident barrier integrity and reduce or eliminate the risk of incident or event recurrence. The analyses will form the basis for a report that will be completed on a periodic basis — annually initially and more frequently, if practical.

A Review Board will be established to review all aggregate and final reports and trends before dissemination. The Review Board will be resourced by industry leaders and specialists, and repository-organization and regulatory personnel, and be directed by an independent leader. The Review Board will have access to the repository organization to request further information or clarification to the original submitter on data within all CIPSEA requirements.



How Should Learning and Action Occur?

The report developed by the PRT will be made available to the public following Review Board endorsement. The results will be shared at a meeting of stakeholders that would be jointly planned and executed by one or more of the stakeholders. Participants invited to the meeting will include SMEs, industry leaders, and regulators. The information in the report would be categorized in terms of their subject matter for review, discussion, and action by SMEs. The output from this meeting will be recommended actions to improve the integrity of major incident barriers. Disciplines that are likely targeted for this meeting, primarily focused on the life cycle of barriers, will be

- Seismic
- Facility design (including subsea infrastructure)
- Facility construction
- Well design
- Well operations
- Production operations
- Marine
- Aviation
- Mechanical lifting
- Process safety
- Maintenance, testing, and inspection
- Health, safety, and environment
- Emergency response
- Decommissioning

The results of this Summit will be documented in a Technical Report that captures highlights from the two days of discussion, including an overview of the objectives, challenges, expected benefits, and suggested path forward. This Technical Report will be jointly issued by SPE and BSEE following a 30-day public comment period on the SPE website, which is typical procedure for SPE Technical Reports.

9.3.3 Summit Participant Industry Representation

Summit Industry Representation (62 participants from 47 entities)

American Bureau of Shipping
American Petroleum Institute
Anadarko Petroleum
Arena Offshore
Ascend Coaching
Baker Hughes
BHP Billiton
BP
Cameron
Canada - Nova Scotia Offshore Petroleum Board
Canada - Newfoundland and Labrador Offshore Petroleum Board
Center for Offshore Safety
Chevron
Contek Solutions
Deloitte Consulting, LLP
DNV-GL
Environmental Resources Management
ExxonMobil
Federal Aviation Administration
Frontline Group
FMC Technologies
GE Oil & Gas
Hess
International Association of Drilling Contractors
International Marine Contractors
International Association of Oil & Gas Producers
International Regulators Forum
Lamar University
Lloyd's Register
National Aeronautics and Space Administration
National Air Traffic Controllers Association
National Oilwell Varco
Ocean Energy Safety Institute
Offshore Operators Committee
Research Partnership to Secure Energy for America
Rowan Companies
Schlumberger
Shell
Society of Petroleum Engineers
Statoil
Systems Improvement
Mary Kay O'Connor Process Safety Center Texas A&M Engineering Experiment Station
Total
US Bureau of Transportation Statistics
US Bureau of Safety and Environmental Enforcement
US Chemical Safety Board
US Coast Guard

9.4 References

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