One of the most pressing challenges facing the offshore industry today is the effective interpretation, decision making, and action identification using the large volumes of operational data that are being collected and stored. Offshore operators, drilling contractors, and third party suppliers have developed real time operations centers designed to support offshore operations. The Bureau of Safety and Environmental Enforcement (BSEE) has proposed requirements for the collection of offshore real time monitoring data, but how such data will be used to support regulatory decision making is not yet clear. Operating companies and original equipment manufacturers are designing and implementing new equipment with a very high degree of instrumentation and advanced diagnostics capabilities, leading to new sources of operational data that could be analyzed to further enhance reliability, reduce downtime, and increase safety.

The potential benefits to be realized from the collection and interpretation of such volumes of operational data are substantial. Individual organizations are already using the data to provide remote decision support for offshore operations as well as off-line analysis to enhance equipment reliability and plan maintenance activities. At a higher level, the potential benefits of analysis and interpretation of large volumes of operational data across organizational boundaries and at the industry level have been recognized but not yet realized. There has been lots of discussion regarding the promise of “big data analytics” to address these industry-level issues, but practical solutions are not yet available to deliver on the promises. However, a number of promising initiatives are underway. For example, the Society of Petroleum Engineers (SPE) and BSEE have initiated collaborative efforts to assess the processes, tools, and value of sharing and learning from offshore safety related data.

A critical component that must be developed for effective utilization of operational data at the industry level is a framework for interpreting operation experience that will protect data confidentiality while allowing consistent interpretation and identification of lessons learned. Such a framework could support consistent application to identify lessons learned across discipline and organizational boundaries and the development of a “common language” for communication and consensus for action amongst industry and regulatory organizations. DNV GL has developed a framework for interpreting operational data that is built on a combination of barriers and success paths. Using this approach, data from operational incidents
can be interpreted in light of the effects on barrier health and the utilization of effective success paths for responding to degraded or failed barriers. The approach is built upon experience gained in interpretation of aviation incidents in the NASA Aviation Safety Reporting System (ASRS), identification of lessons learned from incidents and accidents in nuclear power plants, and assessment of lessons learned from major pipeline leak accidents. The approach is currently being used in a project with an offshore operator and a drilling contractor to support development of diagnostic algorithms and regulatory compliance assessment for new well control equipment and procedures for deepwater drilling. A unique feature of this application is the utilization of the barrier-success path framework to form the foundation of a common language for regulatory approval of the new equipment and procedures, as well as continuous regulatory compliance assessment during operations. The development process includes proactive interaction with regulatory personnel to identify pre-defined decision criteria and communication protocols for continuous compliance assessment during operation.

This paper will summarize experience gained in application of the barrier-success path approach for identification of lessons learned from operational experience in the nuclear, aerospace, and pipeline industries and current developments for design of diagnostics and compliance assessment for deepwater drilling. The paper will also summarize the potential benefits for broader application of the approach for interpretation of operational data to support communication, decision making, and consensus for action across the industry including offshore operators, industry groups, regulatory authorities, and external stakeholders.