Integrity Management Plan Pitfalls & Best Practices

Integrity Management (IM) planning is a challenge that is currently center-stage with oil and gas operators as the downturn has led to focused attention on extending the life of existing assets while optimizing ongoing operating expenditure. This is particularly true in the deepwater basins of the world, where capital costs are high, the cycle time to deliver new facilities is long, and the life extension of existing assets to support hub and spoke tieback developments is often commercially favorable.

Multiple teams or individuals are typically responsible for the integrity management and lifetime extension of such aging deepwater infrastructure. This creates many lines of communication, generating the potential for inefficiencies and miscommunication. However, when planned and managed effectively, an IM plan that accounts for these lines of communication can deliver substantial operational value. This article will outline the challenges during IM, and the best practices that ultimately deliver a coordinated, effective, and cost-optimized IM plan.

Common Foundational Weaknesses in Integrity Management Delivery

The responsibility for integrity management of a deepwater production hub often involves a complex arrangement of individuals, teams, roles, responsibilities and tasks. Examples of key processes are presented in Figure 1. Ineffective plans, this complex interplay of data, actions and accountabilities need to be anticipated, described and managed in a single overarching IM strategy. Such plans often fail in one of three common modes:

1. Lack of a Defined Data Management and Communication Strategy
2. Lack of Defined Roles and Responsibilities
3. Lack of Suitable Measures of Success

Lack of a Defined Data Management & Communication Strategy

IM program responsibilities for large and complex projects are often broken down into separate teams. These often deliver via separate corporate entities, be they separate divisions within the broader operating company or external specialists whose services have been outsourced, who frequently work from dispersed locations. This physical dispersion creates substantial interface management challenges as isolated teams tend to develop a silo mentality whose focus falls on the data they can readily gather via their existing contacts and data sources - and that specifically relate to the deliverables they are responsible for.

Individuals outside the IM discipline may perceive that a lack of data transfer will generate an increased level of risk within the IM space because teams are working from an imperfect data set. More commonly, however, the professionals involved in IM recognize an absence of data and subsequently adopt a more conservative risk profile as a result. GATE's experience when implementing or supporting the continuous improvement of IM strategies for existing assets is that much of the risk reduction achieved by such programs in their first few years of operation is the result of teams having greater confidence in the information available, rather than as a result of any systemic decrease in absolute risk faced.

Lack of Defined Roles & Responsibilities

The functional breakdown of roles within an IM program is largely dictated by the differing workloads and drivers in each area, the types of expertise required to deliver effectively in each, and the organizational preference of the asset operator (e.g. the use of centralized specialist teams or decentralized resources dedicated to a particular asset or region). Where alignment and responsibilities across interfaces are not clearly defined by the IM strategy, a high potential for duplicate effort or silo generation between teams is generated. This exacerbates any existing deficiencies in the data management and communications plan and further undermines IM effectiveness.

This leaves value on the table and generates rework or otherwise removes opportunities for operational efficiency, for example, when external non-destructive testing of a riser uses a separate vessel mobilization for a subsea CP inspection undertaken two months later. Unfortunately, such gaps and inefficiencies have only become more common during the budget cuts of recent years because often brought about a bunker-style inwards-looking mentality in many teams.
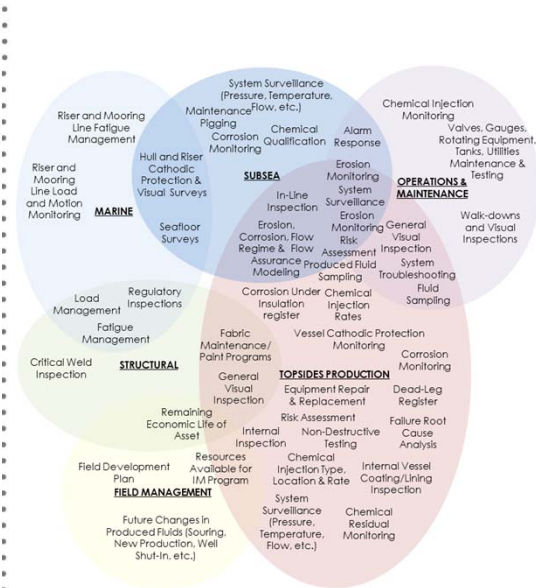

Figure 1: Example Responsibilities Within the Integrity Management Remit for a Deepwater Offshore Asset

1. Program Objectives
2. Communicating Risks & Opportunities
3. Standard Risk Assessment Methods
4. Management of Change
5. Communication Strategy
6. Documentation Strategy
7. Key Performance Indicators (KPI)
8. Program Oversight & Annual Review
9. Addressing Non-Conformities & Corrective Actions

Figure 2: Best Practice Content for an Integrity Management Strategy

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However, it is not only in large or complex organizations where failures can occur. A common problem in smaller organizations or those using a decentralized support structure is the specialist that is required to act as a generalist. Without defined expectations for the IM program and the assignment of clear roles, responsibilities and criteria to measure program success, this can lead to IM plans that focus on the skills of the lead person or team, for instance by driving a strong emphasis on topsides inspection and a diminished focus on chemical injection trends or operational knowledge.

Lack of Suitable Measures of Success

The most widely shared deliverables from many of the teams supporting an integrated IM plan are routine key performance indicator (KPI) reports. These may focus on aspects such as chemical injection uptime, measured wall loss for key items, maximum loads on mooring lines, proportion of scheduled maintenance items completed, and a host of other metric-driven criteria that can be used to evaluate the functional condition of key asset components.

KPI dashboards and their associated reports focus on compliance with pre-determined metrics that often remain static over many years. This creates two major areas of weakness.

Firstly, without a strategy to critically evaluate the metrics on an ongoing basis, it is possible that compliance to the metrics no longer effectively mitigates risk as first intended. An example of this behavior can be the assigning of a passing KPI to a separator showing a corrosion rate below 5 mpy over the last 12 months that ignores a sustained period of seawater washing that coincided with wall loss rates of 100 mpy earlier in the life of the system.

Secondly, it is common for static performance metrics to ignore key aspects of program delivery, such as the timely communication of information to other teams; the ongoing review, improvement and optimization of the overall IM strategy; and ongoing efficiency increases in program delivery. This misses opportunities to modify the program year upon year to ensure that it provides the most effective use of personnel and resources for a given level of resource availability and risk reduction.

What Are The Equivalent Best Practices?

The inclusive and far-reaching nature of IM activities means that these programs are often large and complex. The natural tendency to mitigate the worst aspects of a previously suboptimal IM plan is to develop a huge online data repository and associated KPI dashboard that makes all data available to all stakeholders at all times. Unfortunately, although useful from a data management perspective, systems that rely on a database as an interface management tool typically miss the mark.

GATE's experience over many years is that the most effective IM plans outline who is required to do what and when, who the accountable parties are for key aspects of program communication and delivery, how often the key stakeholders will meet and what will be discussed, and the process by which the plan will be evaluated and continually improved and optimized each year.

Even for a large and complex production system and its associated infrastructure, the outline presented in Figure 2 will typically suffice to describe the key aspects of the IM program strategy. In overall structure, this is not significantly different from the best practices contained in quality management standards such as ISO 9001 1. This is not surprising, as such systems are based on using a simple process hierarchy to address the delivery of complex multi-step production processes by distilling their key components down to a 'plan, do, check, act' process with built-in feedback loops to drive compliance and continuous improvement.

Continuing the theme set by quality management standards, it is common practice for the most effective IM programs to incorporate an annual 'cold-eyes' review alongside an annual management review of the program. This may involve either the use of outside consultants or the use of subject matter experts from within the operating company. Figure 3 provides an outline structure for an annual cold-eyes review within the context of a best-practice IM program.

Conclusion

It is common for IM programs to be developed and delivered as a series of discrete activities that focus on core disciplines and teams, rather than the overall integration and coordination of program delivery and the ongoing continual improvement of the overall IM delivery strategy. Use of a single overarching document to describe the key objectives, roles, responsibilities, communication paths and continuous improvement strategies can have a profound impact - maximizing understanding and engagement, and delivering value of the plan stakeholders.

Furthermore, it is easy for IM programs, and their participants, to get into a groove that codifies the status quo and that becomes a repetitive exercise of routine information delivery and pre-packaged assessment. The use of annual program management reviews and cold-eyes assessments ensures that there is ongoing accountability and a drive to streamline and improve both the management plan and the activities that compose it.

Such best practice approaches generate programs that remain adaptive and fit for purpose as facilities mature and as their integrity-related challenges evolve and change.

References

1. ISO9001:2015. Quality Management Systems – Requirements. International Organization for Standardization, 2015.
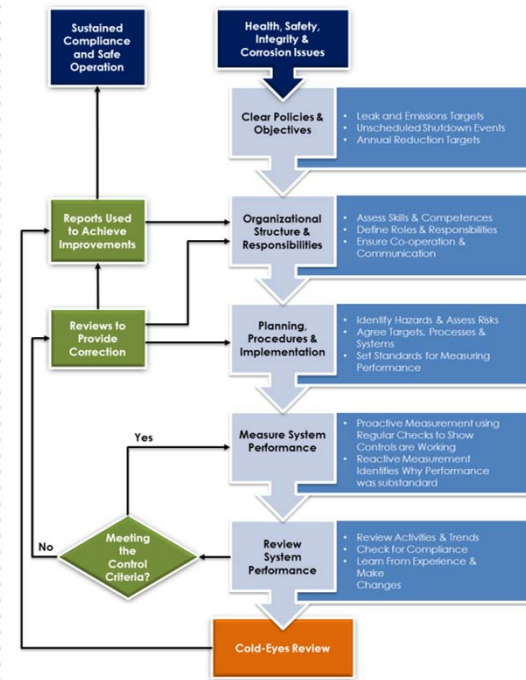
Figure 3: Common Format For a 'Cold-Eyes' Review

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