Asset Information: Addressing 21st Century Challenges

Regulatory challenges and the Internet of Things are unleashing a tsunami of data that is rich in process-optimization insights. Using this new information, asset-intensive companies can reduce costs, improve operational uptime and enhance worker safety.

Executive Summary

For the last 10 years or so, asset managers and infrastructure owners have had to contend with ever-changing requirements for driving down operational expenditure, optimizing investments and improving workforce safety. To achieve these goals, asset-intensive organizations have enhanced their information management capabilities to enable significant changes, such as the move to reliability-centered and risk-based maintenance approaches.

This white paper highlights the challenges of the asset-intensive industry and provides insights into how best practices in information strategy, information ownership and systems changes can successfully address the needs of asset-intensive businesses.

Today’s Reality

Over the last decade, the asset management landscape has changed dramatically in industries such as power generation, transmission and distribution; railroads and light rail; and water and waste water processing.

Globally, pressure is increasing to optimize operational activities to address the needs of shareholders and regulators. These constituents are demanding improved return on investment and speedier resolution of incidents – and better still, avoidance of unplanned outages. When planned outages occur, they often do so under pressure from system operators who run networks with higher utilization, meaning that work must be carried out in shorter windows, with better assurance of delivery.

Asset-intensive organizations are also under increased scrutiny to ensure safe conditions for their workforce. This requires that planners can access data on the location and condition of assets, as well as natural and system-based hazards. Planners also need asset instrumentation to avoid the need for manual inspections.

An aging infrastructure, combined with customer demand for high-quality, “always-on” and reliable services, creates an ongoing need to invest in new network capabilities and capacity. This requires capital expenditure plans that are informed by reliable sources of information on asset condition, degradation and replacement/renewal options.

A final ticking time bomb is the aging workforce. Demographic trends suggest that the majority of current engineers are likely to retire by 2020,
and the available pool of new and experienced engineers is lagging. As a consequence, the historic ability to pass on local knowledge to new engineers is diminishing. This, coupled with the need for increased flexibility in the workforce to operate across a range of locations, poses the risk of reduced ground knowledge.

Legacy asset management systems have tended to focus on capturing activity and driving work order production based on incomplete knowledge of assets. A good example of this is that they are usually effective at capturing a “productive unit hierarchy” view that is used to drive traditional time-based inspection and maintenance, but cannot simultaneously capture a cross-hierarchy “systems” view of the work – such as safety integrity loops in the pipelines world.

This one-dimensional asset modeling approach results in inappropriate work order production – and, in some cases, an inability to see whether the assets have been maintained in accordance with asset management regimes defined by manufacturers and asset management systems. Historically, these risks have been mitigated by local experts who are able to ensure that inspections and routine maintenance are carried out as local conditions dictate.

With the retirement of experienced engineers, and a new breed of engineers lacking detailed local knowledge, it is becoming ever more critical for IT systems that support asset management to contain accurate and reliable information. The risk of inappropriate maintenance and inspection, with the consequent increase in the risk of asset failure – and pressure to increase operational expenditure in response to unplanned incidents at relatively high cost – presents a real risk to the critical infrastructure in the future, at a time when economies globally are placing more demands on these services.

In addition to these “internal” challenges, asset managers face two significant macro trends:

- **Regulatory standards and regimes:** Originating within the UK, standards such as the PAS55 suite have now been adopted at a global level as ISO55000 to provide a framework for integrating asset management capability across the organization. These standards require asset managers to develop and document their asset management strategy; demonstrate ongoing alignment with organization objectives; develop and refine their supporting asset management systems; and, increasingly, focus on implementing asset information strategies and asset knowledge standards to measure and improve the scope and accuracy of asset information held in corporate systems. Advanced regulatory approaches require organizations to track their future asset management capability against the aforementioned standards to provide assurance that system performance gains are sustainable. A good example of this is the approach taken in the UK by the Office of Rail Regulation, which now requires Network Rail to define its asset management improvement objectives, measured against a global benchmark of asset management capability.

In the construction industry, global standards such as the BS1192 Building Information Modeling (BIM) suite have been proposed and (in some cases) adopted to assist construction organizations in reducing costs. Large outfits, such as CrossRail in the UK, have adopted these
standards, together with supporting toolsets. Moreover, there is significant activity among systems vendors such as Bentley and AutoCAD to build BIM-compliant toolsets. Realizable benefits include the ability to integrate downstream asset management systems with these construction toolsets, especially for discrete entities, such as buildings.

However, the reality for many large infrastructure owners is that a small proportion of their asset estate is the subject of annual capital plans. This means that the end-to-end benefits of BIM will take many years — and possibly decades — to realize, especially because BIM efficacy requires having a vast majority of asset management data in the system.

Overall, regulatory regimes — which are often mirrored in shareholder-owned entities to demonstrate improved return on capital deployed — are driving organizations to increase the maturity of their asset management and asset information regimes.

**The Internet of Things:** Suppliers of infrastructure components are increasingly installing measurement instrumentation on their equipment. This is often based on the manufacturer’s understanding of its own designs, and the failure modes to which their equipment is subject. Pre-cursor events and readings can be monitored and data streams provided to system owners and operators to help prevent unexpected failure. However, the sheer aggregated volume of such data streams poses real problems for asset-intensive owners and operators.

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This can provide, for example, insights into the actual ride quality experienced by a passenger. These data streams can then be integrated with track condition data, such as geometry measurements to help isolate where additional maintenance may be needed. Often, these insights reveal issues that are complex and require joint analysis of data sources between system owners and operators.

**Today’s Response: Pilots and Proofs of Concept**

In our experience working with asset-intensive organizations, a well-trodden path has been carved for achieving the Holy Grail of reduced OpEx and improved asset performance. All roads tend to lead to reliability-centered and risk-based maintenance. However, many approaches fail to deliver what valuable because they can provide near-real-time insights into asset performance. This data can inform operational decisions “on the day” to avoid overloading infrastructure to the point of failure. Moreover, organizations require the historic archive of reliable performance, condition and failure data, correlated with actual failure experience, in order to tune their asset inspection and maintenance regimes.

In addition to instrumenting static devices to provide highly accessible performance and condition insights, the same is being done to mobile assets. This includes rolling stock and vehicle/infrastructure interface measurement. Train operators and Infrastructure owners are now exploiting these data streams, supplemented with apps that utilize the global positioning system (GPS) capabilities contained within a mobile phone, as well as internal accelerometers.

The prize however, seems clear. These data types flowing downstream are intensely
organizations need: access to reliable, actionable insights to help reduce costs safely.

Current approaches that fall short include pilots based on proprietary, stand-alone and, sometimes, customized analytics engines for extracting data from core systems. Often, systems vendors compound the belief that Nirvana is achievable at minimum effort by making great claims for these analytics toolsets and advanced “artificial intelligence” insights.

However, we’ve seen such approaches fail to deliver the anticipated benefits due to a combination of reasons, including:

- A lack of sufficient information about the assets, such as an incomplete asset inventory or the failure to move beyond a simple hierarchical view of assets, to the “system” view.
- Poor recording of incidents and the root causes of failure in operational systems.
- Lack of sufficient history of operational conditions.
- Poor integration of operational and asset management systems, resulting in the inability to correlate data between the various sources.

As a result, early analytics adopters are disillusioned and may fail to meet their regulatory and financial targets because they are unable to make the necessary business and operational changes.

The Journey to Nirvana

Organizations faced with these kinds of challenges need, in our view, to follow a structured approach, recognizing it will be a relatively long journey to attaining the required maturity in systems, processes and working practices that support advanced asset management.

One industry executive we recently spoke with drew a parallel to safety initiatives; it took her organization over five years to embed the safety message into working practices, she recalled, and success required significant and repeated involvement from leadership. A culture change was required that supported the recording of near misses, as well as challenging unsafe working conditions in a no-blame environment.

The journey to putting information at the core of the business requires a similar scale of change. Initial focal points include:

- **The scope of information** required to be understood and managed by the business.
- **Significant technology transformation** to minimize the cost and disruption of data capture in the field.
- **Opportunities to increase asset instrumentation** and integration with operational management systems, which could result in an explosion in data volumes and transmission requirements.
- **The need to develop an organizational capability** that will change the information collected and maintained, in line with the evolution of the organization and its asset management system.
Using best practices, organizations can map a route through this complexity, which is characterized by four critical success factors.

1. **Define the integrated asset management strategy:** The asset management strategy defines the engineering-led need to introduce, maintain, renew and manage organizational assets. Advanced operators recognize that achieving this outcome requires end-to-end integration of asset management policy development, operational excellence, systems integration and financial management, spanning the organization. Best practices include establishing time-limited, 360-degree measurements of asset management capability, as evidenced by benchmarking against global best practices such as The Institute of Asset Management’s Asset Management Conceptual Model.

2. **Develop integrated delivery plans:** While the asset management strategy defines the targets and measures, the plans should include “transition states” that deliver benefits. Building on the insights drawn from the last 30 years of change management, the integrated delivery plan should prioritize organizational realignment, performance management regimes, IT strategy and “special exercises” required to collect, collate and operationalize the information base to match real-world realities. The plan should also implement changes to internal processes, culture and systems to ensure that this new reality remains aligned.

3. **Manage the change:** Asset-intensive industries have a long history and complex relationships across their supply chains. Moving to the new reality cannot be achieved overnight and requires sensitive management of change. Our clients’ best practices reveal that management of the “human factors” is critical to achieving desired outcomes. Early engagement of the ecosystem of partners, stakeholders, workforce representatives and communities mitigates many of the risks associated with such a transformation.

4. **Deliver:** Delivery is mandatory; however, organizations often fail to align their delivery plans with achieving asset management excellence with other change initiatives, such as workforce realignment, policy redevelopment, major project delivery and business-as-usual activities. The worst-case result is a failure to deliver; the best-case scenario is significant cost overruns. Industry leaders that have reached high levels of maturity start with aligning executive leadership objectives with outcomes needed to achieve sustainably. These objectives should then flow through the organization and be supported by strong leadership, which will ensure that extraneous changes are eliminated through active strategy management.

**Looking Ahead: Move-forward Recommendations**

In our view, asset-intensive organizations must scope and deliver complex change by considering the following:

- **Recognize current reality.** Organizations need to work openly across operational delivery, maintenance and projects to develop an understanding of the need for change. Optimization of single elements of the value chain will not deliver sustainable benefits, so hard-hitting insights are required into today’s assets, performance and operations. Leading companies are working with us to establish 360-degree views of their capabilities and information before embarking on significant change programs.

- **Realign organizational governance.** Many of our clients have designed their investment and change governance regimes to manage change. Change is needed to manage the evolution to address tomorrow’s priorities so that initiatives are firmly aligned and leadership priorities clearly embedded in delivery plans.

- **Review the change plan.** Many organizations struggle with dozens of “high-priority” change initiatives that are simultaneously in play at any given time. Leaders in successful delivery (measured, for example, in sustainable long-term investor, customer and workforce confidence) sometimes halt or reshape their initiatives to simplify and focus delivery. This is a hallmark of organizations that successfully deliver end-to-end change.

- **Optimize partnerships.** The partner ecosystem often has the answers – albeit in fragments. Leading executives and their organizations frequently work with partners and new market entrants to capture and incorporate new viewpoints.
Next Steps

In our experience, successful organizations take time out to evaluate their current reality against the needs of their future asset management imperative and recognize the need for structural benchmarking and realignment of corporate plans. Many of the ingredients for success are already in place, but few organizations have successfully integrated their change plans, resulting in fragmented delivery and wasted investments. Key elements of successful plans include:

- **Definition of the information scope, ownership and governance** involved in tomorrow’s reality.
- **Development of system-agnostic information specifications** that define the information quality parameters required to run the business.
- **Data collection strategies embedded in business-as-usual workflows**, often supplemented with special exercises to populate priority information that is incomplete.
- **Information-focused human factors development plans** integrated into organization-wide change initiatives that embed the “information focus” alongside the “safety message.”
- **Systems strategy realignment** and often systems partnership re-evaluation to ensure that the ecosystem can support tomorrow’s needs.

Asset-intensive organizations face a complex and challenging environment that will only become more difficult over time. Leadership is key, but the priorities for decision-makers are clear, and the roadmap is increasingly well-defined.

About the Author

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