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KBC VIEWPOINT:

RELIABILITY ENGINEERS
ARE WASTING YOUR TIME ONLY
TELLING YOU ABOUT RELIABILITY



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Written by:
Andrew Normand, Global Product Manager, KBC



Overview

The focus should be on providing information and understanding directly to the decision makers in a way that drives the business as a whole to make improvements in reliability.



Leading operators deliver levels of integrity and availability that are 2 to 8 per cent higher than their competition, at 20 to 35 per cent lower cost, which contributes significantly to higher returns on capital employed for their organizations.

Achieving these returns in today's business environment is only possible with plants that are available in a reliable and predictable manner. Making sure the plant is ready to go when required is vital for capturing market opportunities and maximizing profitability, particularly in high volume / low margin hydrocarbon processing businesses. This puts an enormous burden on reliability and maintenance teams to keep the plant running, while at the same time reducing costs and remaining safe.

**UP TO
35%**

Savings when leading operators deliver higher levels of integrity and availability

However, plant reliability is an organization-wide endeavor and the outcome of many factors. Every day, throughout the business, people's decisions and actions directly and indirectly affect asset reliability and running costs. Such factors may be in the form of a major shutdown but more often are the accumulation of multiple less obvious factors which occur outside of the control of the plant reliability organization. Every part of the business makes daily decisions that impact reliability to a greater or lesser degree. However, they often lack the awareness, or don't have the information necessary to know or predict the plant reliability implications of the decisions they are making.

Where do people make decisions that most impact plant reliability? A few examples are:

- Poor operating practices
- Work prioritization and scheduling
- Production planning selecting crudes
- Process engineers making optimization decisions
- Shift supervisors deciding utility balances
- Field operations making rounds and caring for equipment

Any plant reliability organization that really wants to make a revolutionary change in how they impact the profitability of their business needs to stop telling people how to make their asset reliable, and instead focus on providing information and understanding directly to the decision makers in a way that drives the business as a whole to make improvements in reliability.



Current approaches to reliability management are inefficient

Plant reliability teams often spend many hours in meetings and discussions influencing the decisions of others by explaining the implications for reliability.

The methods for creating and spreading this advice is often based on quick analyses, rules of thumb and “gut feel” from prior experience. They try to monitor the highest risks and feed back to the organization on performance, using whatever influence they can gather to make reliability a priority in a world of many competing demands.

This approach requires a lot of effort with little assurance of delivering the desired outcomes. The success of the plant reliability team depends on how well it can change behaviors by wielding influence and imparting knowledge within itself and in other functions.

The result is a major loss of precision in how plant reliability is managed. Extrapolations of operating conditions based on rules of thumb create unnecessarily conservative operation. Gaining cross-functional buy-in can get political very quickly and take a long time. Making your priority someone else’s priority is often met with resistance.

Some businesses understand these challenges and recognize the difficulty of managing reliability analyses and other activities and have established dedicated plant reliability organizations. While this has made the process more efficient, it has also siloed knowledge to the point that many decisions in the wider organization are now conducted without full awareness of their impact on reliability.

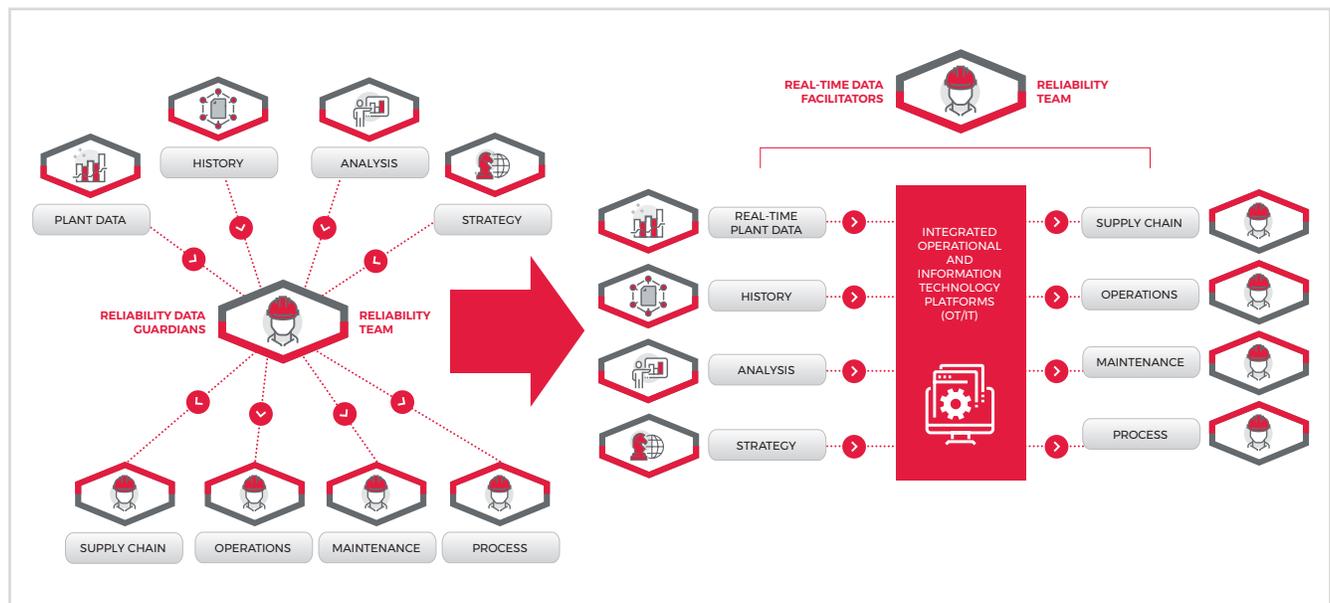
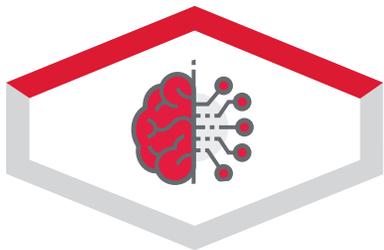


FIGURE 1. FUTURE RELIABILITY TEAMS MUST SHIFT FOCUS AWAY FROM PROVIDING RELIABILITY OPINION AND ANALYSIS, TOWARDS ENSURING THAT MEANINGFUL DATA IS DIRECTED TO PLANT TEAMS.



Solving for siloed knowledge

To counter this concentration of knowledge, reliability teams have to find ways to push their agenda out to the wider organization. There is a need to get the required information directly to the decision maker so that they understand the implications, optimize their decisions for maximum profitability and monitor the results.

Data management, analytics and information technology has made this much easier and more practical. So too has the convergence of Operational Technology (OT) to control the automation of machines and processes, and Information Technology (IT) catering for the enterprise data requirements essential for analysis and management oversight.

With these developments, high volumes of data from different parts of the business can be gathered straight from source in real-time. The data can then be quickly processed and analyzed with other data sources to deliver more context and broader, richer insights, ultimately enabling better quality decision-making. With monitoring and a feedback loop, individuals can quickly understand the immediate and long-term implications of their decisions and change behaviors.

By understanding and effectively using these new data technologies, reliability teams can consistently direct the organization in the optimum way of improving reliability.



Technology forming the basis of better reliability

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Significant value is created in plant reliability through the use of digital twins of both production facilities and their supply chains, made possible through the integration of process simulation, hydrocarbon management, asset management and manufacturing execution systems.

The integration of these enables the reliability team to push a single version of the truth to be used more effectively across the OT domain and with other IT systems to run the business more efficiently, thereby increasing the rigor of their analysis and gaining the trust of those who receive it.

The digital twin is able to calculate equipment health parameters which cannot be directly measured by sensors, opening up the opportunity to identify and mitigate issues in unit operations and across the plant, well before they constrain or impact performance. This enables the business to ensure that the plant achieves its full potential at all times in the most efficient way possible.

It takes more than technology to get the best results

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To enable a step change in plant reliability, simply having technology connect various data sources and implement analytics doesn't guarantee results. It takes much more than that.

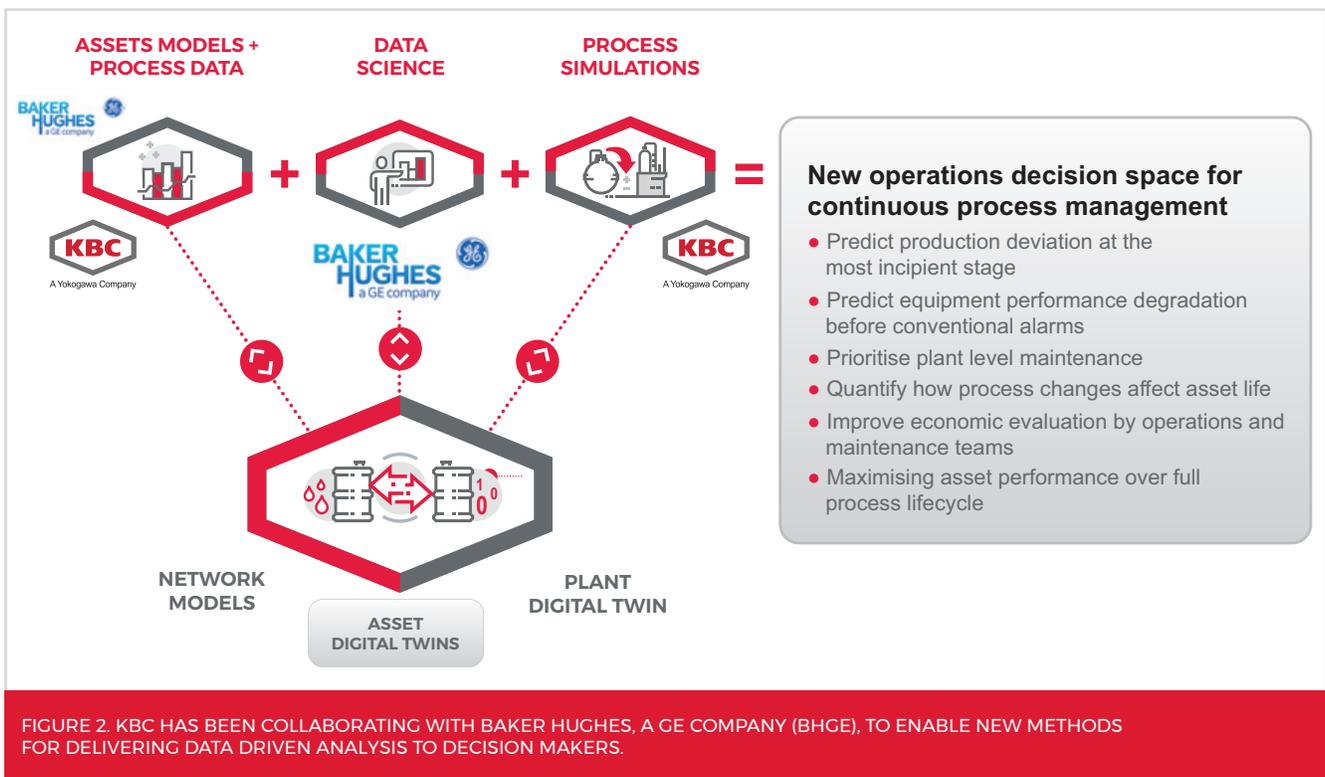
These systems need to be implemented and controlled with a deep understanding of the business, and a cross-functional approach to bring together a variety of necessary skill sets.

In addition to greater use of the business's data, the evolving technologies must support the necessary link between the business goals and front-line execution. They serve as a rigorous and consistent platform on top of which asset management strategies can be implemented as well as the necessary feedback loop to keep the content relevant.

Any effective strategy needs to understand:

- The functionality, power and limitations of the technology
- The decision-making and execution processes that impact equipment availability and operating cost
- How informed decisions add strategic value to the business
- The business requirements and the practical trade-offs in balancing plant reliability, profitability and safety
- What motivates people to adopt the systems and use them to their full capacity





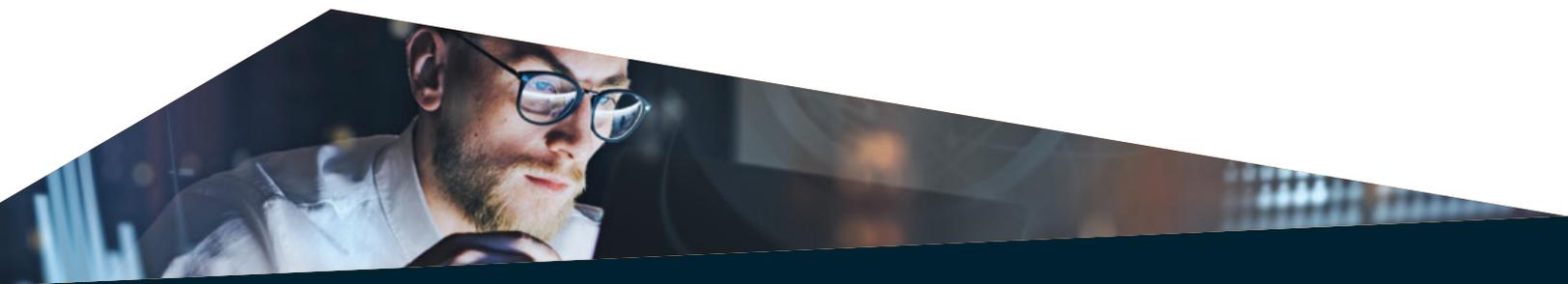
Addressing some key challenges

Major rotating equipment reliability is a major source of throughput constraint, maintenance expense and energy cost, but there is a trade-off that needs considering. When an overly conservative operating approach is taken, a unit is run light, resulting in missed profit opportunities. If the operating approach taken is reliability suffers causing lost throughput, excess maintenance cost, wasted energy and potentially downtime to make necessary repairs.

Trying to explain the reliability implications of their actions to all operators in a precise and consistent manner requires predicting the decisions and economic and trade-offs that may appear and understanding how the operator would react. Instead, operators should be continually advised where a unit should be run for the current conditions and get feedback on how well this is working in a manner that is easily understood and can be used to make informed decisions quickly.

For example, as a critical asset deteriorates either faster or slower than expected towards a planned maintenance event there is an opportunity to adjust operation to either increase production or protect the asset reliability. The recommended operating range is fed to the operator in a simple, easily understood form – an operating window – but in this case a dynamic operating window. This is now variable, based on the reliability engineers’ knowledge being systematized and integrated with the knowledge of his peers in the production, planning and energy efficiency groups.

Correct use of these technologies is about moving into a world in which production decisions are conducted with clear baseline supporting data that are utilized and adjusted based upon the operational realities of the plant. All staff can then make their decisions based on a much broader combined knowledge base, enabling much less deviation between actual versus forecast performance and associated operating plans.



Delivering on this concept



KBC has been actively collaborating in this area with Baker Hughes, a GE company (BHGE), by integrating KBC's process simulation technology, Petro-SIM, with BHGE's analytics and 'fullstream' software, together with GE's Predix platform within a cloud environment.

In this collaboration, operating data taken directly from the plant is monitored in real-time and fed into the simulation models to create digital twins of the assets. These digital twins are reviewed, analyzed and set into guidelines for plant operations. Staff are then able to ask for production advice or improvements knowing that the solution will find the optimal recommendation that balances both production and reliability management constraints.

With this solution, every panel operator obtains consistent, expert reliability advice based on detailed analysis of the trade-offs in an easy and useable format at any time. In addition, this approach can also be used to monitor adherence to operating procedures and associated implications. These benefits are all enabled by having large volumes of new data, which, when placed in the right hands in a clear relevant form, can enable crisp, data-driven decision-making.

Addressing maintenance and integrity effectiveness with this new approach

In addition to facilitating better equipment operation, these new technologies can be used to provide new data to the maintenance and inspection teams and a much more efficient approach to reliability management is possible.

In reviewing and maintaining equipment these teams can get a detailed understanding of its operating history – significant events are recorded and analyzed and the team immediately knows what it should be expecting. This includes knowledge of execution of operating procedures, excursions from operating windows, regular running points of equipment and actual operating parameters vs the design conditions. Decisions on maintenance timing and work scope are then more precise, reducing lost availability, cost and risk.

The role of the reliability engineer in this digital world

The role of the reliability engineer is changing and needs a shift in focus. Reliability management teams will need to concentrate on empowering the rest of the organization to understand the reliability levers, being clear about where the value comes from and driving the data to the right people in the right forms.

KBC has been working with plant engineers and management to help them with their reliability strategies, so that the reliability engineers of the future will not talk about reliability alone, but will be able to understand how people can get the data they need and will be as concerned with how their colleagues work as the equipment they use.





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AMERICAS

15021 Katy Freeway
Suite 600
Houston, TX 77094
USA

T: +1 281 293 8200

E: info@kbc.global

www.kbc.global



EUROPE

42-50 Hersham Road
Walton on Thames
Surrey KT12 1RZ
UK

T: +44 (0) 1932 242 424

ASIA PACIFIC

8 Temasek Boulevard #08-02
Suntec Tower Three
Singapore 038988

T: +65 6735 5488

MIDDLE EAST

Level 17, The Offices World
Trade Center, Central Market,
Al Markaziya
P.O. Box 3876
Abu Dhabi,
United Arab Emirates

T: +971 2 508 7300