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A dual management operating system to improve digitalisation and automation outcomes in mining

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Digitalisation and automation are vital for the future, but miners are finding the transition harder than expected.

Automation, internet of things and digitalisation projects in mining have often under-delivered. This under-delivery is not a phenomenon unique to mining. Bernard Marr in Forbes claims that 25% of IT projects fail outright, 20-25% don't show ROI, and 50% need massive rework (B. Marr, 2016). Stratflow believes that we can categorise the reasons given for this state of affairs as either "error of omission" (management) or cultural obstacles.

According to the EY-Top 10 business risks and opportunities for 2020 “Forty-eight per cent of respondents to our business risks and opportunities survey cited leadership and culture as critical factors constraining digital transformation……For decades, successful mining leaders have been rewarded for risk-averse decision-making and relentless focus on efficiency through loss elimination. To create conditions conducive to digital transformation, mining leaders now need to also encourage innovation, with new ideas, experimentation, and a culture that celebrates and learns quickly from failure.”

Organisational obstacles to the successful implementation of digitalisation, automation and AI initiatives

Mining executives are battling to keep up with the pace of change. While the social, financial, environmental stakes are rising, they are expected to also holistically transform their enterprises end-to-end to cope with the demands of automation and digitisation, and to attract and retaining highly skilled employees. But there is a problem; the hierarchical structures and organisational processes are not capable of delivering the agility organisations need to cope with rapid change.

To make matters worse, planner Horst Rittel in the '70s identified a class of problems he referred to as Wicked Problems (Rittel and Webber, 1976). These are problems where we cannot know upfront what the exact nature of the problem is that we are trying to solve. For example, understanding the problem is the same as solving it; we are not sure if we are dealing with a problem or a symptom, every time we attempt to solve the problem we change its nature irreversibly. Implementing new technology has many of the attributes of wicked problems. Planners in the project design stage are stressed by their inevitable limit to understanding of what new technological systems are capable of and therefore, what needs to be adapted in the bigger complex adaptive system. It is understandable then that traditional centralised project/change management interventions where we specify upfront what is required, how we will run the project and make change happen, have a high probability of failure.

According to Gary Hamel (Hamel and Zanini, 2014) " In most organisations, change is regarded as an episodic interruption of the status quo, something initiated and managed from the top. The power to initiate strategic change is concentrated there, and every change program must be endorsed, scripted, and piloted before launch….What's needed is a real-time, socially constructed approach to change, so that the leader's job isn't to design a change program but to build a change platform—one that allows anyone to initiate change, recruit confederates, suggest solutions, and launch experiments."

Development of organisational thinking

To develop a good solution to the problem of making digitalisation, internet of things and automation implementations succeed, we need to look at the history of organisational development first. In Figure 1, we show thinking evolving along a series of S curves (Lourens and Wong, 2019). In each age, the methods used carry along the best ideas and processes from previous ages. These methods deliver more and more value until society, technology and the environment start to change. What is considered 'best practice' starts to struggle to solve emerging problems. This crises period is shown in the yellow bubbles. In these bubbles, new methods emerge, but the dominant methods are strong enough to prevent them from taking off. It is our view that we are currently in the Information Age yellow bubble – ie, at the beginning of the 'Ecology' Age.

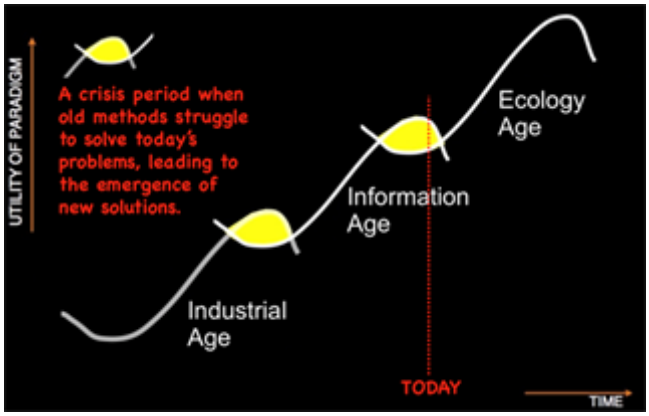

Figure 1. The evolution of thinking in the Industrial, Information and Ecology Ages.

In the Ecology Age, confusing dilemmas, ambiguous paradoxes, diverse conflicts are natural occurrences. Mining has become a complex adaptive system. The unexpected emergence of new things means "the whole is greater than the sum of its parts". Culture is not a lever but emerges as an outcome of people, process, and technology interacting.

Two ideas from the Industrial and Information Ages have been instrumental in destabilising the production system. The first is the idea that all parts of the process should be run at maximum efficiency (Lourens and Wong, 2019). The second idea is that we should optimise the entire production chain from end to end – this could be implemented for the first time during the Information Age, as computing power increased and cost reduced (Lourens and Wong, 2019).

It would seem to management that forcing accountability onto employees for the lower than expected production is the logical solution. With more data available, it became possible to enforce individual accountability by measuring employees and departments on more detailed KPIs. But this makes matters worse. Disharmony is injected into the organisation reaping diminishing returns.

Is there a better way of working?

What a good solution looks like

If we want to ensure that technology implementations deliver the best value, we have to address the issue of culture and management failure highlighted in the beginning.

It should deliver stability to free up management and employee attention which is needed to deal in an agile fashion with the changing environment. And to deliver the stability, it should simplify processes and guide employees to critical areas which require focus. The solution should support implementation by creating an effective change platform, from where bottom-up initiatives can launch continuously, at low risk. This is the best way of dealing with wicked and changing problems.

And finally, it should provide early warning to management and employees of risks developing that can destabilise the production process and mandated financial targets. Enabling the organisation to operate from stability while being able to act with agility is crucial to success.

A dual management operating system for the Ecology Age

The traditional processes and hierarchy are well suited to the need for efficiency and control without which no organisation can survive. It functions by allocating work to departments with clear reporting relationships and accountability and using planning, budgeting, job specifications and performance management systems. This system is efficient but not suitable to handle rapid change. Change management slots in well when the goal is clear, and the pushback from employees to the new way of working is limited.

The tools of the hierarchical structure do not function well in an environment of rapid technological and social change. We are in need of another system running in parallel to deliver the agility that is missing.

At Stratflow we developed a dual operating system we call the Productivity Platform that delivers the missing functionality (agility) without detracting from the benefits of traditional hierarchy. It is based on the principles of the Theory of Constraints (TOC) and Dialogic Organisation Development and fits into the current management system with minimal interference while reducing the overall workload substantially. Since 2000, in more than 80 interventions, the methodology has delivered output increases of average 20 per cent (using the same resources) by creating a stable change platform from where improvement initiatives can be optimally targeted, sequenced and successfully implemented. (Blakemore& Lourens, 2017)

The image below (J.P. Kotter, 2012) shows the relationship between our hierarchical system and the agile network structure we require. On the left, we have a standard management structure. On the right, we have a network structure ideal for dealing with rapid change. By creating an environment we call the Flow Room for 30 minutes each day managers and employees come together from their particular areas and think and act as a network structure like the one on the right. This structure deals effectively with interdepartmental coordination and what is interesting is that for the first month or so these meetings can take up to 50 minutes, because crucial issues come to the surface that has not been dealt with, and cannot be dealt with within the departments.

Figure 2: Kotter's dual operating system.

The Productivity Platform: The Flow Room

The Flow Room is the place where the heads of departments, middle managers, and selected employees get up-to-date visual information on what is happening to the business as a whole. Colour codes identify where attention should be focused and where help from support functions such as HR and maintenance is required. In the Flow Room, HR, Logistics, Maintenance become aware of what the business needs and becomes empowered to deliver. The Flow Room provides a forward view and highlights patterns of interaction requiring more attention.

Studies in software development have found that the speed of work in individual programmers varies by a factor of 10 from best to worst. In teams, the variation between the slowest and fastest differs by a factor of 2000 (JJ Sutherland, 2014). Getting teams to work together is much more important than trying to obtain the most skilled workers in every position. The ability to get the team to work together towards the same goal is where Productivity Platform delivers the most value.

A necessary part of the success of the dual operating system is that we have to make a distinction between a bottleneck and non-bottleneck and manage them differently. We have to manage for system flow and not for departmental efficiency.

How a Productivity Platform enable digitalisation and automation programs

In this manner, all managers and employees know which information is crucial for running the overall system (silos connected), and which departments needs this, how changes to the system will affect this information, work proactively and can react quickly to changes in the system, know which skills are required, what systems are already in place and which ones have the potential to be adapted, which improvement programs need to be fast-tracked and prioritised, which measurements need to be abolished and what alternatives are to be introduced since employees are part of the process of ongoing improvement there is no resistance.

Conclusion

It is possible to remove the cultural obstacles in trying to achieve success in Digitalisation, Internet of Things and automation while improving productivity, employee engagement and managing the risks inherent in change. We need to create a change platform to do this, not launch another change program. By changing management paradigms, effort can be focussed where it will deliver outsized returns, and bottom-up improvement becomes possible. This creates the stability from where implementations can be properly sequenced and involve internal champions who buy into the change. The hardest part is to convince the head office to sit back and let those on-site do what needs to be done.

If you found this article interesting, you may also want to see the 16 July 2020 Stratflow/Austmine webinar recording "Making the most of new technology for Manufacturing and Mining"
at https://youtu.be/nl3tQV0wp6g or the playlist “A dual operating system for digitisation and automation”
at https://www.youtube.com/playlist?list=PLfZlfkOSE_Dr1YWWytzakCGMmg7U38fKp

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About Hendrik Lourens

Hendrik Lourens is a Sydney based management consultant who has worked with Aurizon, Qantas, John Holland, CPB, Downer & Anglo American. He has qualifications in Physics, Polymer Science as well as an MBA. Hendrik has worked at Director level in manufacturing businesses and for a number of Tier 1 companies. On completing the "Managing the Theory of Constraints Way" in 2010 Hendrik became the first practitioner to pass all exams involved in the TOC Body of Knowledge within one year. His focus is on applying Complexity Science & Theory of Constraints to deliver breakthrough results. He has turned around manufacturers and improved the safety & productivity of mining and construction companies as well as published in various journals on efficiency and innovation.

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