The Digital Future of Asset Management

How digital disruption is transforming physical asset management | Chris Charlwood, Joe Inniss, and team

Introduction

Since humans first discovered fire, it has been obvious that technology is fundamental to who we are and what we, as a species, can achieve. In the 21st century, this has never been truer and arguably the most significant technology changes have occurred around the use and rapid expansion of digital systems.

Asset management, the coordination of an organisation's activities to maximise value from its assets, is not immune from this digital change.

Over the last 30 years, asset-intensive infrastructure organisations have been investing in technology to better manage their physical assets. This has often been piecemeal due to funding constraints and the need limited to specific target areas. For example, Digital Work Management Systems have been introduced to coordinate maintenance activities. And Decision Support Tools to help prioritise investment for regulatory business plans. These have traditionally been discrete systems, with the only links between them being human – meaning that analysis and the linked decision making are still largely manual processes, even for the most advanced organisations.

In other industries, traditional ways of working have been completely disrupted by technology. 'Disruptor' companies that come along with an entirely different way of doing things, usually in a digitally connected way. Disruption thrives in competitive markets with low or flexible regulation.

However, asset-owning infrastructure companies typically have a large and expensive asset base, operate in highly regulated industries, and are often monopoly suppliers.

This means that they often cannot move with the pace and high risk involved with some of these start-ups. However, even with a more conservative approach, there is clearly change coming. This brings us to the question;

What is the future of infrastructure Asset Management?

Imagine a near future where assets are smart enough to report their condition on a regular basis and can flag when their condition has degraded to the point where performance will soon be impacted so that a maintenance intervention is automatically arranged. This would be collected by the intelligent company-wide 'Digital Asset Manager' system which would collate asset data from around the asset base and change various parameters to optimise performance within the live cognitive 'digital twin' to deal with customer and network demands.

This same system could also optimise a programme of asset work to predict any failure long before it occurs, to maintain a high standard of service to the customer by adjusting the whole asset system (including operational parameters) and to ensure that the programme fits within the constraints set by company investors, by the company strategy and by the industry regulator. This same system could schedule in work orders for maintenance teams to complete and packages of larger works, to be sent to framework Contractors for delivery. Robust decision making, with clear audit trails throughout and all in real-time.

This kind of system isn't far away from reality – most of this technology already exists on the market – but not as a full, integrated system. Linkages between each component are difficult to establish and most of the current version of this 'system' is managed and run by people. No organisation has yet managed to dynamically link it all up and, most importantly, none have yet taken the leap to empower a digital system with these key decisions.

However – as component and system costs fall, connectivity improves and most importantly for risk-averse organisations, someone else proves that the concept can work – it is surely inevitable that intelligent systems like the above will become commonplace for managing complex infrastructure asset systems and the traditional (manual) approaches to asset management will be left behind.

This new connected and live asset management system would allow organisations to rapidly respond to customer demand and regulatory change. It will allow organisations to improve their decision making on a system (rather than asset) level, to truly understand the impact on their customers of every investment and piece of work and to quickly respond to change. This will allow people to focus on making key business decisions, whilst the system deals with the

day to day. This will be the mark of leading organisations in their respective industries. Digital decision-making using real asset data will become the new normal.

Is anyone doing this already?

Sort of! There are examples in some industries dealing with discrete asset systems, where this integrated approach has been applied. As an example, modern airliners often operate with near real time digital twin models allowing for predictive maintenance scheduling, works management and more.

Within infrastructure management for the built environment, many of the necessary components are already in use, such as Work Management Systems which allow work to be scheduled and recorded digitally. Decision Support Tools can calculate optimal decisions using data for manual review. Early Digital Twins allow asset-intensive organisations to model system changes to see the effect of their asset decisions, which will then shape the decisions that they make.

In the vast majority of cases, digital tools currently operate as discrete systems, with the only interlink being human.

What are the challenges?

Imbuing any system with the power to make its own operational decisions invites a good deal of risk. That risk can be mitigated with sufficient governance measures and by consistent manual oversight. The system's performance must be audited thoroughly and regularly, and must be adjusted to address any flaws uncovered by an audit. A Common Data Environment increases efficiency in some ways, but adds risks to existing systems. These risks must be mitigated through enhanced security measures and data-transit checks. They also require daily off-site backups.

Cybersecurity is a clear and present danger for organisations of all types and sizes. Infrastructure organisations are not immune from the threat, and can make especially inviting targets for some hackers: the Colonial Pipeline hack in the US is just one famous example of an infrastructure system being successfully attacked by ransomware. The increased popularity of centralised systems connected to asset sensors can increase any system's vulnerability unless significant security measures are taken.

Finally, the old quip holds true: garbage in, garbage out.

How do we get there?

We know what we need: a system that can do all the above, and do it reliably and securely. The problem is, no such system currently exists. For now, organisations can take some practical steps toward bringing their systems up to speed:

Focus on the basics. This means ensuring that data is consistent, complete, clear, and robust. To reduce the time and money spent on data cleansing, operatives should be well trained in getting things right before they enter the system, by capturing the right data and entering it properly.

Understand both the data collected in the system and the uses to which it will be put, then automate the input and output processes that lend themselves to such a switch, and allow people to focus on tasks requiring independent judgment. Seek ways to improve the quality of asset data, and to place it at the centre of key decision-making efforts. These steps will allow for quicker, better-informed, and more impactful decision-making while reducing the inefficiencies caused by incomplete and incorrect data. These changes require broad organisational support and can take time. On the bright side, the same is true for competing interests, since no end-to-end DAMS system exists just yet.

There's no point in waiting for the perfect system to come along. The future arrives in stages, and some core components of tomorrow's full-blown DAMS systems are currently available. Integrating those into your system will convey immediate benefits to your organisation while preparing it for future improvements and hedging against obsolescence. Digital twins, for example, can improve fault diagnosis while providing valuable information for reviews and decision making. Preparing your organisation now will make the transition to future developments like predictive digital twins all the easier.

Embracing the change

The digital future has a way of quickly becoming the practical present. That's true in all sectors, and it is critically important that infrastructure organisations acknowledge and embrace the fact. The best organisations anticipate and prepare for change. The others risk being left behind.