

ASSET MANAGEMENT

03 MANAGING INTANGIBLES AND 'INTERNET OF ASSETS'

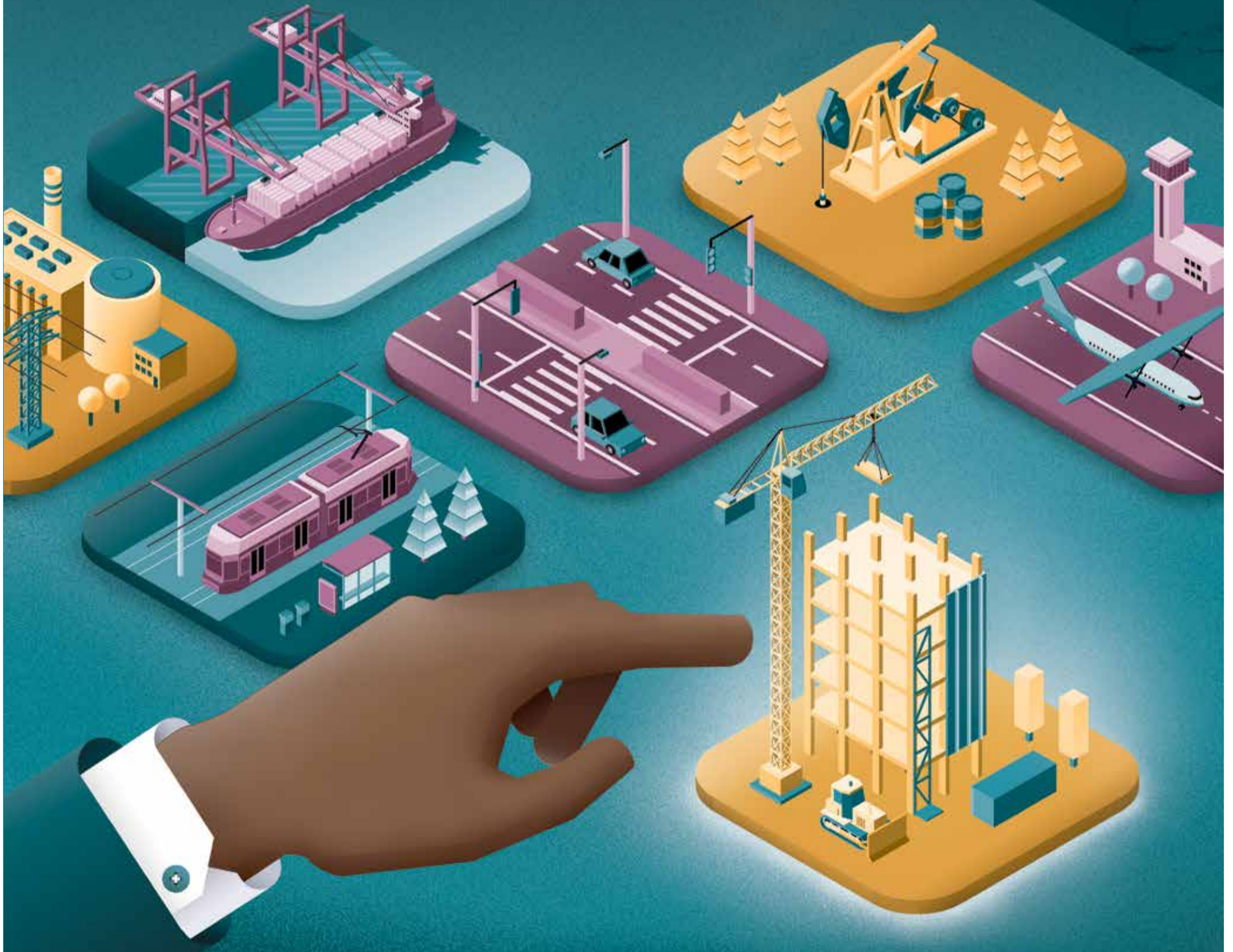
Asset management is evolving with the changing nature of business

05 IT'S A STORMY TIME FOR CLIMATE RISK

More extreme weather requires a realignment of assets and risk

15 CHALLENGE AND OPPORTUNITY

Decommissioning redundant North Sea oil and gas rigs



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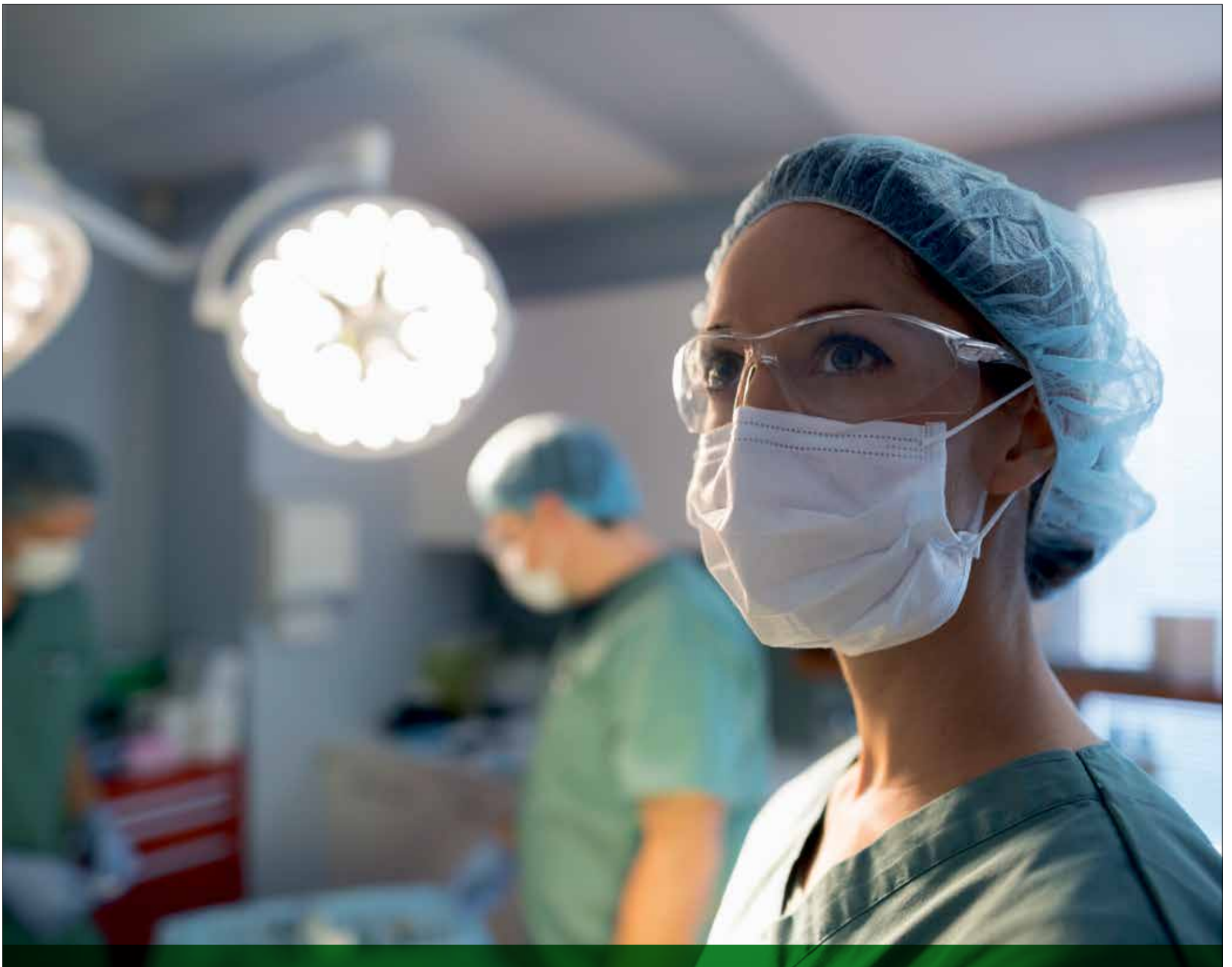
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OVERVIEW

Managing intangibles and ‘internet of assets’

The discipline of asset management is evolving with the changing nature of business in a fast-moving digital world

JIM McCLELLAND

Asset management has always been about more than simply managing assets. There is a strategic dimension to the discipline. It is this intrinsic connection to the bigger corporate picture, though, that means as the wider business world changes, so must asset management evolve too.

The challenge is to think beyond risk and count in metrics other than cash, says Richard Edwards, president of the Institute of Asset Management. “Risk is an important consideration in decision-making, but asset management is about delivering value and is defined as such in ISO 55000,” he says. “This requires real clarity about what constitutes value for each organisation and its stakeholders. Money is likely to be part of this, but value means much more, including reputation, safety, sustainability, community and wellbeing.”

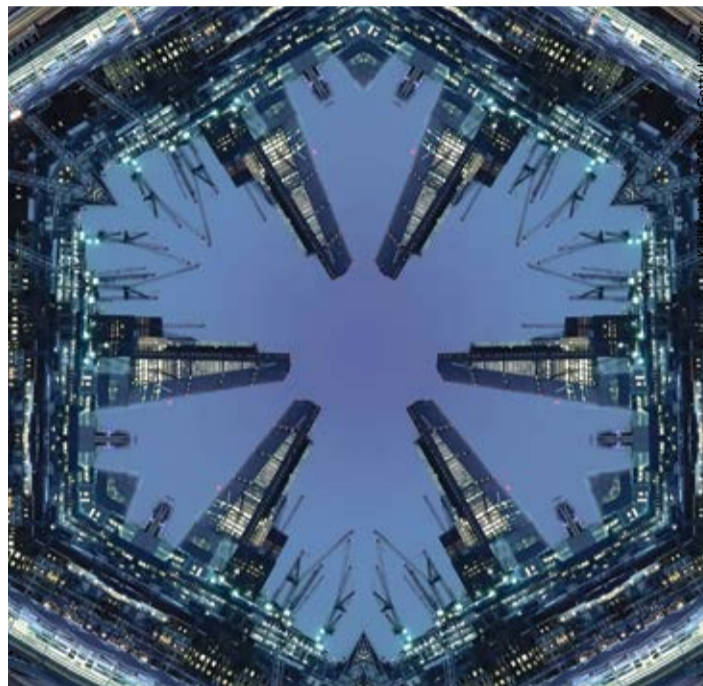
According to Mr Edwards, the overall shift in focus from risk to value has been most prevalent initially in strongly regulated industries, such as energy, water and transport, in the UK and Europe, as well as in Canada, Australia and New Zealand, where it is the public sector that has taken the lead.

Other countries leading on implementation in asset management include the Netherlands, China, and some in the Middle East, says Norberto J. Levin, chief executive of Levin Global, an asset management consulting firm, working mostly in Latin America, but also in the United States and Europe.

As the professional remit expands, Mr Levin sees a move away from exclusively physical assets as inevitable. “Currently, asset management is still mostly focused on physical assets, but down the road that focus will expand to include non-physical, which in many cases can be valued significantly higher,” he says.

As a result, interest and investment in enterprise asset management is strong and growing, says Steve Treagust, global industry director of finance, human capital management and strategy at IFS. For businesses managing asset optimisation of ageing infrastructure, alongside demands of corporate social responsibility and sustainability regulation, the approach to intangibles still follows fundamentally familiar lines, he says.

“If you have heavy, tangible assets, typically your perception is based on sweating those assets,” says Mr Treagust. “Moving towards more intangible assets, this perception



is likely to carry through. Organisations will look to get value out of those intangible assets, like skills, training and branding. This thinking is becoming more prominent in the boardroom. Drivers include ethical investment portfolios.”

When it comes to environmental and ethical exposure, investment community keywords are responsibility and resilience, transparency and trust. The objective, however, is still one of contextualising and quantifying risk, with implications for asset management, says Jacob Messina, head of sustainability investing research at RobecoSAM. “Sustainability challenges are shaping the competitive landscape, and companies that take the lead in seizing opportunities and managing risks are best positioned to outperform their peers,” he says. “As more asset managers adopt this view, companies will benefit with longer-term shareholders.”

Asset management does not happen in a vacuum. The environmental, social and governance (ESG) criteria used to assess risk and opportunities cover issues from climate change and urbanisation to poverty and diversity.

Significant market growth in sustainable investing is impacting the whole value chain, as evidenced by figures for the UN-backed Principles for Responsible Investment (PRI), argues Martina Macpherson, head of ESG at S&P Dow Jones Indices. “Global assets under management linked with companies that are signatories to the PRI almost tripled to \$62 trillion in 2016 from \$21 trillion in 2010,” she says. “Responsible investment now stands at 26 per cent of all professionally managed assets globally, with Japan the fastest-growing region.”

The shift has been dramatic, with near-inversion of the original order, adds Ms Macpherson:

“In 1975, 83 per cent of market value in the S&P 500 was attributed to physical and financial assets; in contrast, as of January 2015, an average of 84 per cent of market value was attributed to intangible factors, which may be bolstered by companies’ commitment to ESG.”

The picture is one of a market not just changed, but transformed, says Mr Treagust. “This is a huge swing, although it took about a quarter of a century. Where this is most evident is in social media companies. Snapchat, for instance, has no tangible assets and its entire value is made up of intangibles. Twitter and Facebook are a similar story,” he says.

Against this backdrop of integrated reporting, intangibles and sustainable investment, appreciation of asset management amongst the C-suite remains poor, however, Mr Levin concedes. “Boards and C-levels are generally focused on the short term – quarter and year profits, EBITDA [earnings before interest, tax, depreciation and amortisation] and share value – rather than total cost of ownership and maximising shareholder value for the long term.”

There is still a sales job to be done pitching the case upstream, adds Mr Edwards. “Understanding and adoption of asset management rarely begins at the C-suite; it typically starts somewhere in middle management,” he says. “Those organisations that successfully ‘sell’ concepts upwards to the C-suite are able to articulate in business and financial terms the implications of different funding strategies in the long term, for example a maintenance department able to demonstrate increased capital costs and risks in the future that result from underinvestment.”

One potential game-changer for leveraging benefits of more joined-up thinking and working is maybe not so much investment in human networks as digital ones. Mr Treagust concludes: “Digital transformation has definitely elevated the importance of asset management. If organisations begin to tie physical assets together, implementing the internet of things, blockchain and analysing big data, they will have gained a tangible asset in-between their assets. We will see physical assets speaking to each other, to create a network between them.”

This effectively describes the connective tissue of an “internet of assets”. For the modern asset manager, armed with algorithm-based analytics and data-driven intelligence, it perhaps promises some much-needed muscle in fighting to be heard by the C-suite. ●



\$62trn

of global assets under management in 2016, up from \$21 trillion in 2010



83%

of market value in the S&P 500 attributed to physical and financial assets in 1975



84%

of market value attributed to intangible factors by 2015

S&P Dow Jones Indices

New way to manage assets for the long, medium and short term

Increasing demands on asset managers aiming for ISO 55001 certification or compliance is driving a growing number of them to adopt a powerful new decision-analytics solution



Asset intensive companies are under greater pressure than ever, both to do more with less and to meet increasingly strict regulatory requirements. Attaining the ISO 55001 standard and being able to demonstrate they've done so has presented companies with a range of challenges.

"Companies these days have three key stakeholders when it comes to managing assets," says Boudewijn Neijens, chief marketing officer of Copperleaf, a leading provider of decision analytics for companies that manage critical infrastructure. "First, they have to prove to shareholders and investors that their money is being well spent."

Second, he points out, companies have to demonstrate to their insurance providers they're managing their risk effectively and adequately protecting the assets that these providers are insuring. The third audience consists of regulators.

"They're obviously concerned about safety but in many areas, such as utilities, they need to be satisfied that investment in the sustainment of assets is cost effective and can be justified so customers, who are ultimately footing the bill, are getting value for money."

Generally, where assets degrade and wear out, they work less efficiently, are at risk of failing, and the



value they deliver to the organisation diminishes accordingly. Therefore those managing them need to have constant, accurate visibility so they can make timely intervention decisions and ensure they get the best return on their investment.

It's to meet these varied and growing demands, and to implement asset investment planning and management effectively, a best-practice approach used by asset-intensive organisations to improve decision-making and investment planning processes, that a growing number of companies are turning to C55, a decision-analytics solution created by Copperleaf.

C55 helps companies to attain and enforce ISO 55001 by enabling them to manage optimally the competing needs of hundreds, if not thousands, of projects pertaining to millions of assets. Managers can compare outcomes depending on which of these projects get the go-ahead, are postponed or rejected altogether and they can explore different combinations of actions.

"C55 enables asset managers to make better-informed decisions on three time scales," says Mr Neijens. "In the long term, it uses predictive analytics to indicate when each asset will reach its end of economic life and need to be refurbished or replaced."

Copperleaf calls this bottom-up management and is the foundation for robust asset management plans. In the mid term, considerations are

“Customers tell us that with C55 they're seeing quick gains

often top-down as managers look to allocate scarce resources across projects optimally. In this case, C55 can help managers to consider the competing demands of project teams, who have responsibility for an asset class, for instance, and individual projects.

"The third timeline is the execution phase," says Mr Neijens. "This is when project performances have to be managed and when things can go wrong. We've designed C55 so managers can respond to problems and unexpected incidents, and still deliver the highest possible value."

As well as enabling clients, who include Anglian Water, Hydro-Québec, Tennessee Valley Authority and other utilities, to manage their assets cost effectively and to the highest standards, C55 also allows them to do so demonstrably.

"You can prove to insurers, for instance, that you're minimising your risk and this can reduce your premiums," says Mr Neijens. "Customers tell us that with C55 they're seeing quick gains that can pay off their investment in the system within a year – and that keeps all their stakeholders happy."

For more information please visit www.copperleaf.com

'There's mainstream excitement as organisations realise the potential value asset management releases for them'

DAVID McKEOWN
Chief executive
Institute of Asset Management



Not long ago, *Wikipedia* described asset management as hedge funds and wealth management. Now there is a broader usage in ISO 55000 of "co-ordinated activity of an organisation to realise value from...

has potential or actual value to an organisation". This is deliberately wider than physical assets.

ISO 55000 appeared only three years ago, in the same family as ISO 9001 on quality management systems. Awareness is turning into mainstream excitement as organisations realise the potential value asset management releases for them.

But how do you know every pound is being well spent – that it contributes to your vision and strategy?

Asset management is a structured way of assuring delivery of your goals and maximum exploitation of your assets over time. I do not mean simplistic sweating, but deriving sustained value by balancing cost and performance with risk mitigation.

This is why large insurance discounts are being offered to leading Australian electricity companies that can demonstrate understanding and mitigation of their risks. Informed investment funds such as IFM are no longer using the single dimension of money or share price to choose new acquisitions, instead they are assessing true value and potential value over time. Like Canada, more countries are explicitly fostering public sector capability to derive maximum value for their taxpayers.

Value is a slippery word. But that is also its point. You must have clarity of purpose and be explicit about what is valuable to you. Your stakeholders have very clear views – do you need to understand them better?

Three significant ideas are gaining ground currently: the difference between asset management and managing assets; the part that culture and leadership plays; and the clarification of value.

Managing assets is what you do to your widgets, but this can only be known to be valuable set in a stra-

tegic context of asset management. Do you need any assets? And which ones? What should you spend on them for known benefit? Organisations that miss this point treat asset management as a responsibility delegated to maintenance or IT functions.

Michael Porter's value chain is a concept familiar to business leaders and schools. Asset management is a means of ensuring that value can be delivered in a structured and predictable way. This does not replace operational excellence and other essential factors, but integrates and directs them.

The real value can only come from cross-functional collaboration. Developing such a culture is challenging and that's what good leaders need to do. Asset management organisations distribute responsibility throughout the organisation and pay attention to interfaces, where processes can break down most easily.

A trend that is sure to burgeon is assets as a service. An example is Rolls-Royce aero engines, which are owned throughout their lives by the maker; they are maintained, exchanged and upgraded with Rolls-Royce responsible throughout, while the airline pays for thrust by the hour.

Doing asset management is simple; doing it well is not easy. We all manage our assets, but how well?

National Grid has derived tangible benefits in both gas and electricity in the UK and United States, and is committed to developing its already capable workforce. The City of Calgary has not only implemented asset management for its public assets, it saves money and has more satisfied citizens by doing so, and recovered more quickly from catastrophic floods in 2013. How do you compare?

In the next decade we shall become so used to this approach that stakeholders will quickly turn on organisations that fail to think this way. It may take two decades for national and local governments to reach the same position, but once implemented, taxpayers will not permit backsliding. It's just good management.



£240bn
of assets
managed by C55



20%
increase in portfolio
value reported by
clients



400%
return on investment
within clients' first
planning cycle

EXTREME WEATHER

Stormy time for insuring climate risk

Increasing frequency of once rare weather events means established predictions are no longer valid, calling for a realignment of asset and risk management

RUSS SWAN

How often does a “one-in-a-hundred-year” storm occur? It’s not a trick question and it is something that is being asked repeatedly as the realities of climate change make themselves felt.

The meteorological models of the past cannot predict the extent, intensity and frequency of extreme events in the future, and this presents a problem. Both insurance and climate modelling are numbers games: you roll the dice and know the chances that it will show a particular number.

But when underwriting business assets in 21st century, not only are the dice no longer square, they are probably weighted and possibly magnetised. And the dots have been obliterated. Fancy the odds now?

This conundrum is at the heart of the December 2016 ClimateWise report *Investing for Resilience*. An initiative by insurers, brokers and service providers, convened by the University of Cambridge Institute

for Sustainability Leadership, ClimateWise estimates there is now a \$100-billion annual “protection gap” in the insurance market as a result of climate change.

The frequency of weather-related catastrophes such as windstorms and floods has increased six-fold since the 1950s, it says. Put another way, 100-year events now have a repeat interval of around 17 years.

This protection gap, between exposure to climate risk and insurance coverage, means the insurance sector must adapt or face the consequences, says Maurice Tulloch, chairman of Global General Insurance at Aviva and chair of ClimateWise. “The insurance industry’s role as society’s risk manager is under threat. Our sector will struggle if response is limited to avoiding, rather than managing, exposure to climate risk.”

ClimateWise advocates a more hands-on approach to organising resilience. An analogy might be the Thames Barrier: had this not been built, it would make economic sense for its construction to be funded by the insurance industry, as the expense would be a small fraction of the pay-outs when London disappears beneath a storm surge.

Recommendations by ClimateWise are not quite so radical, calling for a realignment of asset management, risk management and underwriting to support greater resilience, and for the introduction of a resilience rating system.

Central to all this is the assessment of what the climate will actually be like in 20, 50 or 100 years. Just about the only thing that can be known with any confidence is that frequency analysis of past events is of less use than ever in predicting the future.

A new industry is emerging to fill this information void. New sources



Chris Kridler / Getty Images

of data are being tapped, new methods of interpretation developed and new techniques of prediction employed in a bid to get ahead of the curve on future climate risks.

Among the new sources is geospatial data, which has increased enormously as satellites and other Earth-monitoring technologies flourish. Financial software consultancy First Derivatives has recently signed a deal with Airbus Industries to access historic and future satellite imagery to feed into its Kx number-crunching system, specifically to improve how climate-related risk is measured. The company says traditional relational databases are unable to cope with today’s data explosion or the need for time-critical processing and analysis.

Environmental consultancy Ambiental specialises in flood modelling and forecasting, and with Landmark Information Group has developed a technology using probabilistic climate predictions to generate more realistic flood models. The FloodFutures project strengthens planning by improving understanding of how the risk profile changes over time. It includes the generation of future flood maps, predictions of erosion, and the risk to transport links and power supplies.

This “future-facing” data supports adaptation reporting requirements, says Ambiental chief executive Dr Justin Butler. “It represents a step-change in the way we view risk. The potential for improved planning, risk mitigation and adaptation is considerable,” he says.



The insurance industry’s role as society’s risk manager is under threat

As with any computer modelling, the quality of the output is only as good as the input and the techniques used to crunch the numbers. Both historic and contemporary data has an appreciable value, and the insurance sector faces the challenge of gaining rapid access to top-quality information at a reasonable price. This is where the Oasis Loss Modelling Framework comes in.

Created as a not-for-profit company in 2011, Oasis aims to bring down the cost of modelling while

improving prediction models. Chief executive Dickie Whitaker says this enables decisions to be made on a granular level, taking into account actual developments at real-world locations. Oasis uses Monte Carlo simulation techniques to provide a probabilistic density output including figures for financial loss.

“I firmly believe that knowledge of risk is not something only the rich should have. I co-founded this open source loss modelling software to provide data in the format needed by the insurance industry,” says Mr Whitaker.

Oasis allows the effect of construction decisions on resilience to be modelled. A stronger roof may prove a better bet over the life of an asset and reduce insurance costs. Oasis is being used by the Potsdam Institute to create a new flood model of the Danube basin, to create a range of “synthetic events” and so determine what can be done to reduce risk. Its value is also recognised with an endorsement from the G7-backed Global Innovation Lab for Climate Finance.

Extreme weather events may still be known as acts of God, even though climate change is the result of acts of humans. God, after all, does not play dice. ●



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CHIEF EXECUTIVE ROLE

Valuing chief executives

For any new chief executive the task of transforming a business used to defining its assets in terms of technical standards and terminology can be formidable

JOHN OSBORNE

The concept of asset management has grown up in the infrastructure and transport sectors. In so doing it has generated a raft of concepts and technologies which may seem alien to a chief executive with a track record of improving the fortunes of businesses focused on managing financial assets or IT systems.

To make things even more complicated, any newcomer has quickly to get to grips with terms which even asset managers say are not precisely defined.

John Woodhouse, chief executive of TWPL and chair of the Panel of Experts at the Institute of Asset Management, says: "There is plenty of lively debate about appropriate terminology and scope for such things as asset life cycles, whole lives and life-cycle activities. At the simplest level, of course, the life cycle concept is clear: for a discrete component that goes through a cre-



ation stage, a period of usage and possible maintenance, leading to ultimate disposal or replacement.

"It becomes more complicated, however, when we acknowledge two common realities. The life stages may not be clear-cut, and may even have physical existence periods that span multiple cycles of acquisition, usage and disposal by different organisations.

"Secondly, an asset could have an infinite life if it is defined at a functional system level rather than just a free-standing and disposable item. It may be possible, for example, to

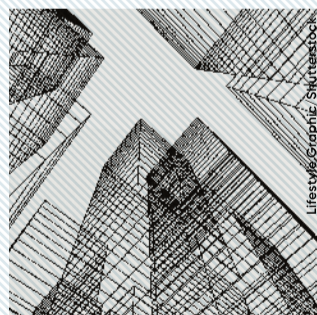
sustain a system-level 'asset' indefinitely through maintenance and renewal of component elements.

"So the development of asset life-cycle plans or evaluation of investments based on life-cycle costs, and 'optimising' horizon for such plans and costs, can be problematic. What horizons should we use in such complex cases? What does life cycle mean in these cases, if anything?"

Mr Woodhouse says the first complex case arises from the differences between seeing the asset from a physical existence viewpoint or from an

CASE STUDY

TURNER & TOWNSEND



The need to manage assets effectively and efficiently, with resources and funds under ever increasing pressure, means understanding and building asset management capability is becoming a priority for both owners and investors in infrastructure assets.

Turner & Townsend is an independent professional

services company specialising in programme, project, cost management and consulting across the real estate, infrastructure and natural resources sectors. In 2014, the company joined forces with AMCL, an asset management consultancy providing performance diagnostics and capability analysis, to create an end-to-end advisory service across all stages of the asset life cycle, from acquisition and planning through to delivery and operation.

The ability to create the right environment and capabilities for the management of long-lived assets is a skillset in which the UK has long been at the forefront. In addition to domestic clients including

Network Rail, Crossrail and National Grid, AMCL's global clients include electricity businesses in Australia, utility companies in the Middle East and several major infrastructure owners in the United States. AMCL is helping these businesses to develop asset management plans looking many decades ahead to ensure they can deliver what's needed for the future, not just for today.

The full life cycle-focused approach to asset management means Turner & Townsend together with AMCL can claim to be well placed to deliver tangible efficiencies and risk reduction in the planning, delivery and operation of major infrastructure projects.

and asset life cycles



Spencer Images / Getty Images

asset management perspective that is to say responsibility, usage and value realisation. “In developing the [British Standards Institution] PAS 55 standard, we defined life cycle from the asset management perspective – covering the period from recognition of need for the asset through to disposal and any residual risks or liability period thereafter,” he says.

He says this has provided a good catalyst for organisations to consider operations, maintenance and longevity when specifying or investing in assets, and in developing strategic maintenance and renewal plans. “It has certainly helped to break down some of the departmental barriers between engineering design and projects, procurement, operations or asset usage, maintenance or asset care, and renewals or decommissioning,” he adds.

Richard Edwards, global technical director at AMCL and president of

the Institute of Asset Management, says asset management “boils down to making sure that asset investment decisions directly correspond to business results”.

He says: “The conflict for a chief executive or financial director comes when they are under pressure to demonstrate short-term financial results when the asset in question is a building or piece of infrastructure, such as a road, a bridge or part of the rail network, where the relationship between investment and return plays out over several years or even decades.”

According to Mr Edwards, justifying this investment comes down to articulating risk effectively – what could happen in the long term if spending is withheld and what the ultimate cost could be.

“Increasingly, we are able to define this risk in a way that decision-makers can understand through more effective and consistent measurement of an asset’s condition, and also much more accurate forecasting of how it will perform over time. This in turn enables chief executives to identify what the financial and organisational consequences would be for the business,” he says.

Chief executives often have a shorter tenure than the assets that are such a core part of businesses involved in the running of infrastructure and transport. What he or she can achieve may be affected by the long-term nature of such systems.

David Millar, joint owner of Morphose, believes the short-term imperative can work side by side with long-term strategies. He is a chartered surveyor by profession who has worked in healthcare, utilities and telecommunications in the UK and internationally.

“A CEO’s ambition is ultimately dictated by the status of a company and its underlying trading as well as operating fundamentals,” he says. “In a publicly traded entity, the CEO will always be beholden to the major shareholders’ desires, so the asset management strategy must align closely and achieve their interests, which can restrict change. However, if the business is privately owned, then the situation is slightly more flexible where the owners can take a much longer time horizon on pay-back and intrinsic value.”

According to Mr Millar, while the owner of a private company will still dictate much of the immediate and long-term direction, there is more room for a chief executive to take the reins and make longer-term asset commitments.

He says it is imperative organisations keep a lean portfolio of assets to negotiate the discrepancy between senior management changes, customer demands and available cash, balanced alongside a long-term asset management plan that protects stakeholder interests.

Essentially, this discrepancy has to be approached on a case-by-case basis. No two businesses are the same, with historical circumstances playing a large role in the dynamic. An asset-rich business that is look-



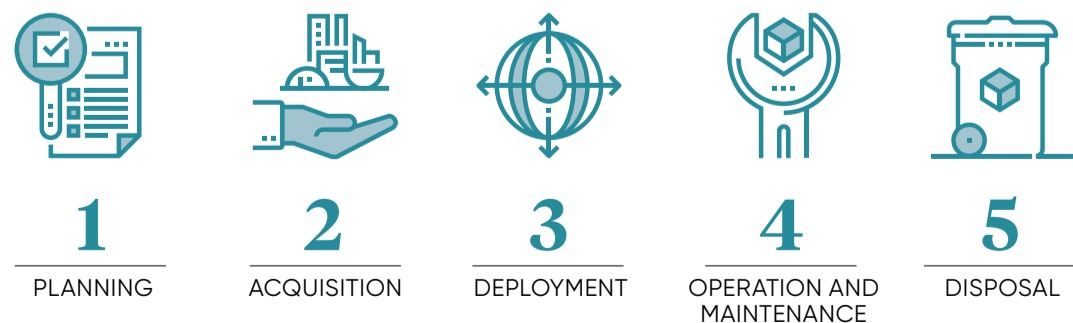
Chief executives often have a shorter tenure than the assets that are such a core part of businesses

ing to downscale its portfolio will be predisposed for considerable savings and the incumbent chief executive tasked with this will typically have immediate success.

Another challenging area for chief executives is risk because there can be short-term and long-term consequences of taking or not taking risks. According to Oliver Pritchard, a member of Arup’s infrastructure advisory team: “Historically, infrastructure assets and networks have been considered in isolation in terms of risk. However, networks are becoming more and more reliant upon each other, with increasing interdependencies, which necessitate their continued function.”

As pressures increase on owners of infrastructure, transport and utilities to maximise the value of assets, those challenges are likely to concern chief executives and their boards for some time to come. ●

FIVE STAGES OF AN ASSET LIFE CYCLE



Can you show stakeholders that every pound you spend contributes to your strategy?



Asset management - “the coordinated activity of an organisation to realise value from assets”

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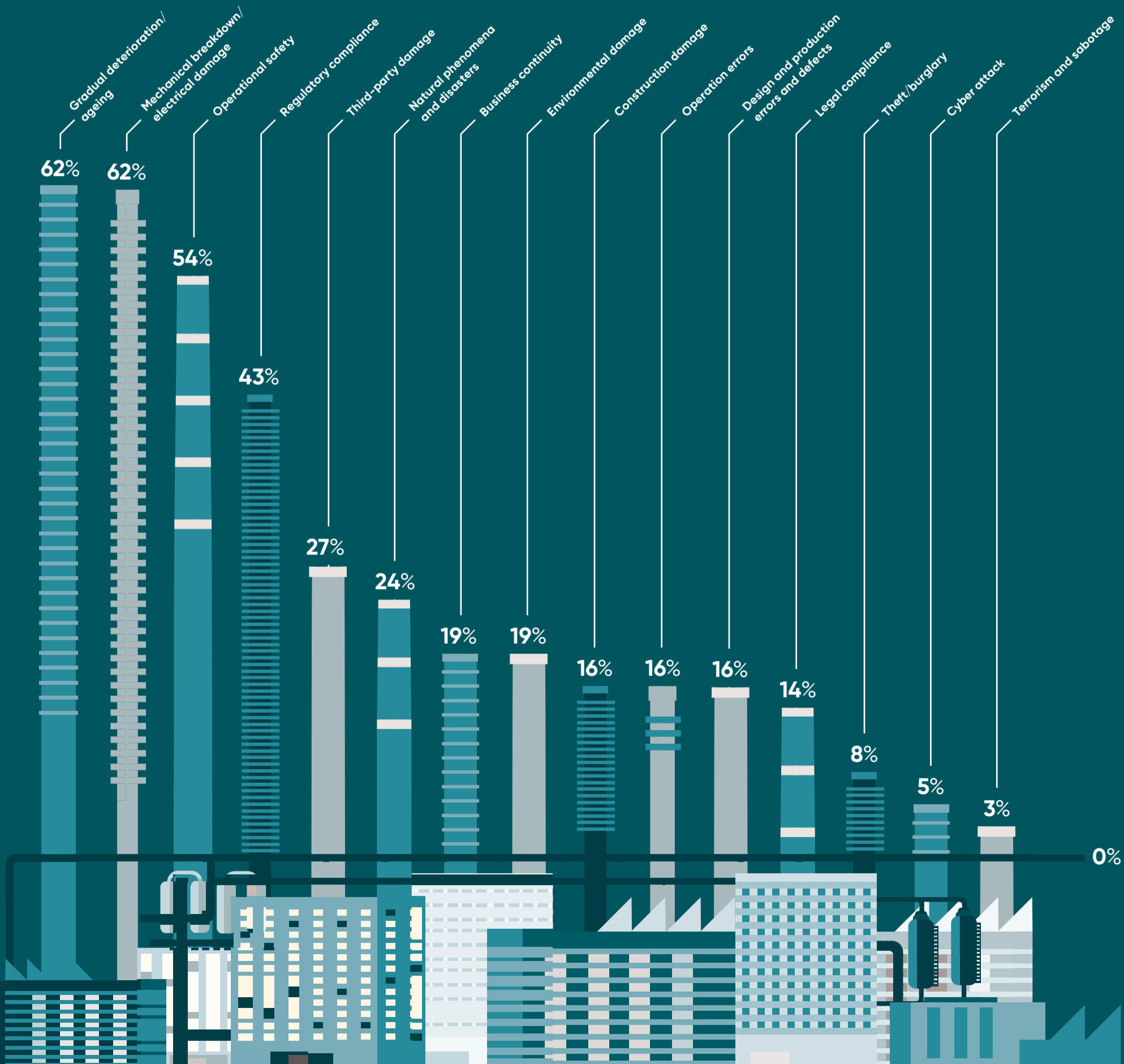


MANAGING ASSET RISKS

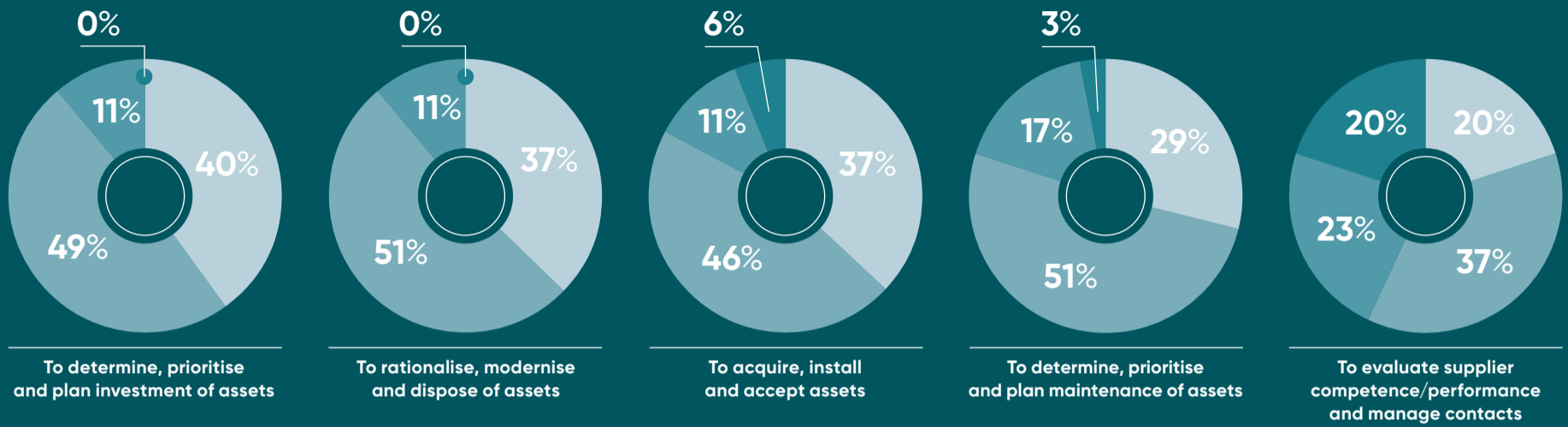
IN ENERGY AND RESOURCES

Energy and resources companies by their nature are asset-intensive. Firms in sectors such as power, utilities, and oil and gas are vulnerable to ageing assets and increased environmental and regulatory requirements. Effective asset management factors in a wide range of risks such as these to generate maximum value from physical assets. The following data is taken from a global survey of companies in the utilities, power and resources sectors

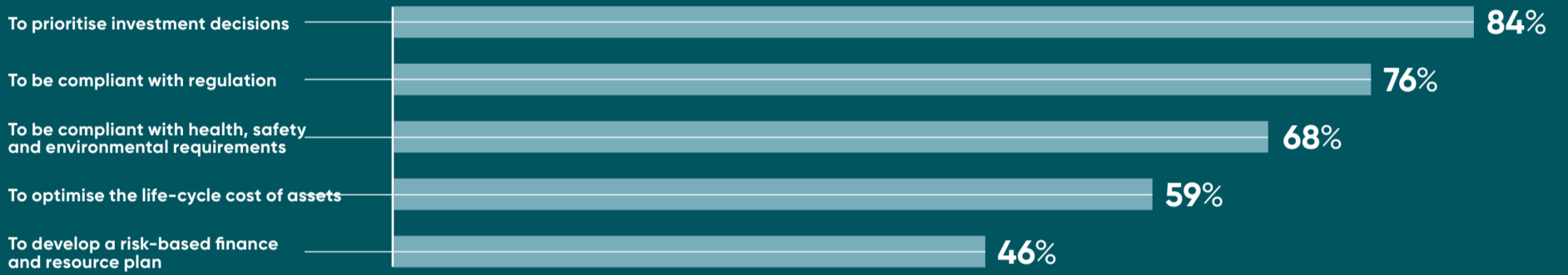
TOP RISKS ASSOCIATED WITH OWNING/OPERATING ASSETS



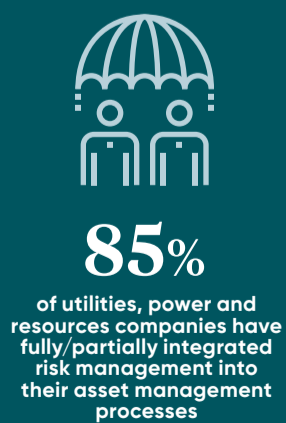
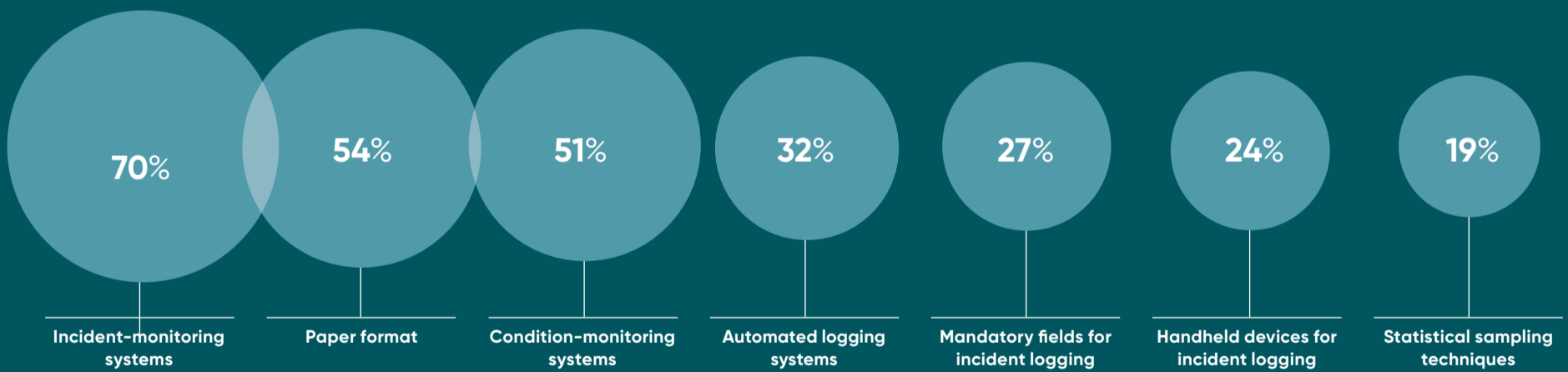
HOW RISK MANAGEMENT IS INCORPORATED WITHIN ASSET MANAGEMENT PROCESSES



DRIVERS FOR ASSET RISK MANAGEMENT



HOW ASSET DATA IS CAPTURED



Getting down to the basics

Asset management excellence can be defined in many ways, but essentially it is about optimising the operation of assets critical to an organisation's output and profitability, says **Colin Beaney**, global industry director for energy and utilities at IFS

While new technologies such as big data and predictive analytics continue to drive innovation in asset management, companies cannot afford to overlook the basics and the importance of embedding the core foundations of asset management excellence within their organisation.

New technology makes asset management and maintenance more exciting, but the fundamentals, considered routine and mundane by comparison, are crucial to best practice. However, these core principles are frequently not as deeply entrenched within organisations as they should be, which is a concern.

There is a need for innovation and the use of new technologies to deliver cost-savings and efficiencies, but we also need a pragmatic approach. Organisations need to know what assets they have, their location, condition, performance and potential deterioration rate; what the criticality of those assets is to the business. These foundations must be in place. This applies equally to the work-management side of looking after those assets, for example, looking at data quality being fed back from those work-

ing in the field, carrying out servicing and so on.

One of the challenges, however, is that while asset maintenance professionals are highly motivated by opportunities to resolve unexpected problems, they find the more routine and mundane aspects less exciting. This presents a problem. If organisations don't take the routine work seriously, how do they truly know how well their critical assets are performing and, perhaps even more importantly, the implications of not having this information?

In March, one of the UK's water companies was hit with a fine of £20 million when untreated sewerage from their treatment works leaked into rivers in their region. The Environment Agency charges and court verdict referred to inadequate management and maintenance of the water treatment equipment as a direct cause. This really drives home the need to embed the foundations of asset management in an organisation and to have senior C-level buy-in because the costs and the reputational damage when things go wrong can be huge.

IFS is at the leading edge of asset management and maintenance best practice, working with major



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01

01
Songa offshore
Endurance
drilling rig

02
Three Gorges
Hydropower Plant,
China

clients in the global manufacturing, transportation and power generation industries that recognise the criticality of asset management excellence to their cost control, efficiency and output. China's Three Gorges Hydropower Plant (TGHP), the world's largest, adopted best practice asset management and maintenance solutions from IFS to help with the operation, maintenance and repairing of the assets of the plant and flood control systems, while at the same time reducing the manpower requirements. Its sister hydropower plant, GeZhouBa Hydropower Plant requires 3,000 employees to operate and maintain the plant and its assets. TGHP's goal is to run with fewer than 400 people.

But we also work with clients at the early stages of best practice asset management implementation. One of them, a distillery firm, has made tremendous improvements to its high volume bottling and packaging processes. Taking a stairway approach, starting from a low base, they identified their performance-critical assets, analysed and reported on them, then continued tracking and trending, and making improvements. It was about the fundamentals, carrying out the right maintenance to the assets that are critical to output and profitability.

Central to both vastly different organisations' effectiveness is the

appreciation and adoption of a "through-life" asset management philosophy. By maintaining consistency in process and information management at each stage of the asset life cycle, design, construction, commissioning and servicing, both companies have the ability to manage with much greater effectiveness their asset portfolio.

Having established an upward curve of improvements, organisations must avoid falling back. With the foundations embedded, they can consider improvement strategies, leading naturally to new technologies such as the internet of things, predictive analytics and big data that can transform many aspects of the asset management and maintenance processes.

When Storm Doris hit the UK in February, we lost power for 30 hours, the result of storm damaged trees hitting overhead power lines. That shouldn't have come as a complete surprise to the grid company; if you have an overhead power line with trees in the vicinity, you have an asset that needs to be maintained.

Technology could play a key role. IFS Labs have a proof of concept utilising drones to fly around the network, using video capture. If it detected an anomaly, for example, a tilting pylon or an overhang of vegetation, it automatically raised a fault report, geo-located the problem and scheduled resources to the specific location where remedial work could be quickly carried out. Taking that to its natural conclusion, new technologies provide scope to map the entire network in England, overlay vegetation, apply data analytics and predict problems that can be avoided.

However, the basics – knowing where your assets are, their condition and performance – still need to be in place. During the power outage, the engineers had no clear idea of the location of the issue. The part of the asset history that would have assisted the repair was missing and this is absolutely crucial when it

“ If organisations don't take the routine work seriously, how do they truly know how well their critical assets are performing?

comes to the through-life project asset management cycle.

Many of the clients we work with are involved in running transportation hubs, building new power stations, for example, and what is critically important when you are going to embark on huge new infrastructure renewal, replacement or modification is that you manage the whole process seamlessly through the complete life cycle, so nothing is lost during the construction and engineering stages, and the handover to operations and maintenance and beyond.

The key lies in the initial asset design and capturing all the design information, the iterations of the design cycle, within a single system before the asset is delivered or constructed, and the modular approach of IFS solutions enables this to happen. A complete history of the item can be found in one application at any time, in effect presenting "as maintained" in terms of the information that is available.

Spend on global capital projects and infrastructure is growing, set to exceed \$9 trillion by 2025, according to PwC research, while investment in new plant within asset-intensive sectors such as transport, oil and gas, and manufacturing could double to nearly \$2 trillion. Technology will make many of these new assets smarter and more reliable, but the fundamentals of asset management and maintenance excellence will remain integral to their optimal performance.

For more information please visit www.ifsworld.com/times or call 01494 428900



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02



COLIN BEANEY
GLOBAL INDUSTRY DIRECTOR, ASSET
INTENSIVE, ENERGY AND UTILITIES, IFS

AVIATION

Data analysis is keeping planes flying

With large sums involved, getting the most from aircraft assets is make or break for airlines

CAROLINE BULLOCK

Few sectors epitomise the phrase “time is money” more than aviation.

Passengers may bemoan delays and disruptions but for the airline operator, with a plane on the tarmac grounded by mechanical failure, the frustration is even more acute. According to estimates based on a study from the Federal Aviation Administration, this inertia equates to a loss of \$150 dollars a minute – and that’s being conservative.

With optimal reliability and up-time vital just to break even, squeezing every drop of efficiency from an aircraft’s assets has become the sector’s Holy Grail. Forecasts from aviation consultancy Cavok predict global sector spend on maintenance, repair and overhaul (MRO) will hit \$100 billion by 2021, with smarter analysis of the data now flooding the aircraft playing a central role.

In turn, engine and airframe manufacturers are incorporating predictive models in their offerings to airlines, which not only help identify faults and component failures, but pre-empt issues before they escalate.

“Predictive technology is great at finding a needle in a haystack and helping engineers pinpoint the areas they need to focus on,” says Torsten Welte, global vice president for aerospace and defence at the enterprise software company SAP.

“With experienced aircraft engineers proving scarce and many now retiring, these solutions are set to become even more vital in gathering and utilising all this invaluable knowledge and information.”

Mr Welte traces the genesis of this traction to the power-by-the-hour approach to engine maintenance which Rolls-Royce pioneered in commercial aviation in the 1980s.

“When Rolls-Royce innovated the model with performance-based

contracts that charge customers per flying hour of the engine, it became a case of ‘we must keep the engine running or we won’t make any money,’” he says.

“This changed the dynamics in the aviation industry between manufacturer and operator, and drove a different behaviour from the former that was now far more focused on getting the most out of their resources at all times.”

The exponential rise in data usage has continued to fuel momentum. IBM figures reveal that an average aircraft generates between 500 to 1,000 gigabytes of data. Data analytic platforms such as SAP HANNA tap into this business intelligence to monitor fuel speed, torque and pressure with internal predictive algorithms making recommendations in real time so parts can be sourced and engineers reassigned even while the plane is airborne.

And it doesn’t stop there. The technology is also able to tackle the information silos which have traditionally undermined the effective sharing of key intelligence across the aviation ecosystem.

Mr Welte says: “In some countries, due to local ownership rights, performance data is owned by the pilot rather than the airline, which means they have to get permission to access it. Elsewhere, a manufacturer does not necessarily have access to maintenance data which is often owned by the airlines’ own maintenance systems, so it’s all very disjointed.”

“Virtual data models get around this by allowing ‘read only’ access to the data irrespective of ownership, which most companies are more open to rather than transferring the data between different systems. This way the ownership is still with the airline or MRO, but the processing party can still access specific information at specific times.”

Another process undergoing significant transformation is the



Victor Fraile/Power Sport Images/Getty Images

Emirates now automates the complex process of tail planning using predictive technology to reduce risk and increase fuel efficiency

traditionally complex task of tail planning, in essence assigning the most appropriate aircraft to a flight route. For example, if an aircraft has an issue that adversely affects fuel burn, it will be allocated to the shortest flight.

Typically an airline would spend three to four hours working on a plan which can be subject to 150 changes daily. Until recently, the process had barely evolved from the handwritten schedules of the mid-1980s, with many airlines still transferring the information manually into spreadsheets comprising a dozen pages.

Dubai-based airline Emirates is one of the big names now automating the process, having adopted software vendor IFS Aviation and Defence’s predictive technology.

“Previously the plans were devised based on the judgment of someone with perhaps ten to twenty years’ experience, but our technology means we can tap into historical data that goes back forty years, all in a matter of minutes,” says IFS business development head Espen Olsen.

“Maintenance history, fuel consumption, climate, forecast – all these characteristics are put into the algorithm to calculate the best option, which means reduced risk, increased fuel efficiency, and improved fleet utilisation and maintenance planning.”

He believes the Middle East is driving this market. “They see an

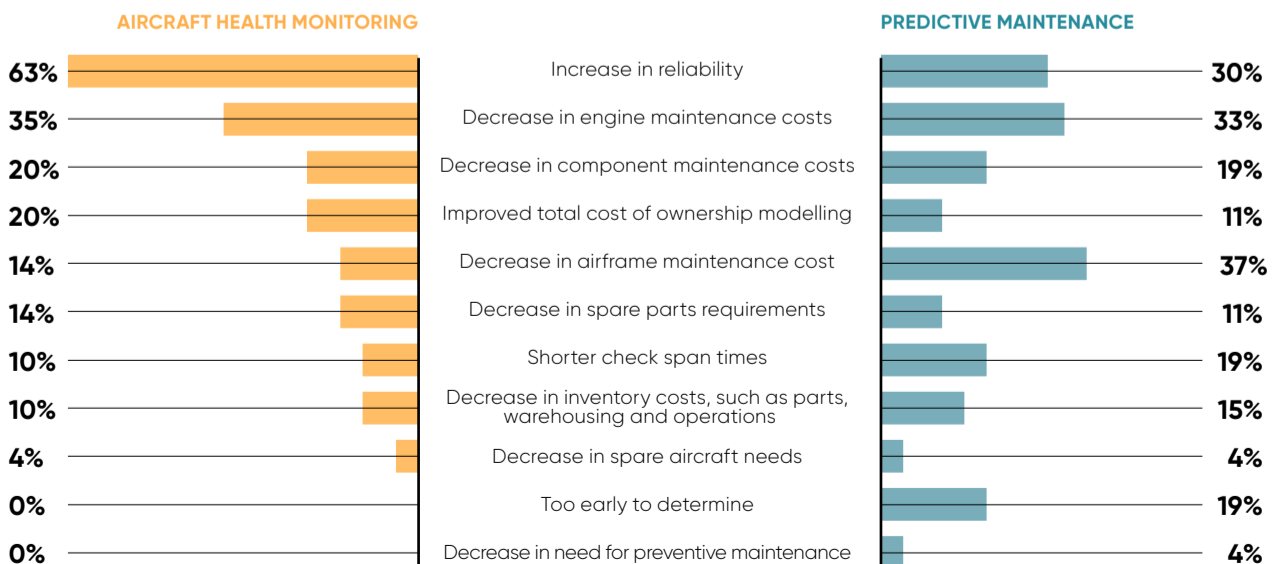
issue and do something about it without over-analysing the problem, and they are definitely ahead of Europe when it comes to using this technology. One manufacturer does something visionary and everyone follows,” says Mr Olsen.

More broadly, he is seeing a lot of interest from oil and gas companies inspired by the latest innovation in aerospace and defence. “There has been so much money in this market in the past, they didn’t have to consider how they could become more efficient,” says Mr Olsen. “Yet since the downturn, they are now far more focused on extending the life of equipment and how, as a service provider to the industry, they can commit to a ten-year contract on a fixed basis and still make money – increasingly predictive analytics has the answers.” ●

“Predictive technology is great at finding a needle in a haystack and helping engineers pinpoint the areas they need to focus on

TANGIBLE BENEFITS OF AIRCRAFT HEALTH MONITORING AND PREDICTIVE MAINTENANCE

GLOBAL SURVEY OF LEADERS FROM THE MAINTENANCE, REPAIR AND OPERATIONS INDUSTRY



AFRICAN ENERGY

Breakthrough tech gives power to Africa

Innovative clean energy alternatives signpost Africa's energy future with impetus from foreign investment

MARK HILLSDON

The figures are startling. An estimated 620 million Africans have no access to electricity and in some rural areas 86 per cent of the population still rely on candles, kerosene and kindling to survive, according to the World Energy Council.

Decades of neglect, mismanagement and a lack of investment have left the continent's energy infrastructure in ruins. But it's a state of affairs that puts Africa in a unique position too, presenting the opportunity to develop new energy networks from the ground up, rather than patching up old assets, or building new coal-fired power stations just as the industrialised world looks to close theirs.

In February, the African Progress Panel launched a new report, *Lights Power Action: Electrifying Africa*, in which its chair Kofi Annan argues: "Traditional approaches to extending the grid are no longer viable as the main option for African countries. They will take too long and will not meet the needs of our growing economies and societies. Instead, governments and their partners need to seize the opportunity to reimagine their energy futures."

There will, of course, always be a need for a national grid, and grid-connected mega-projects such as large dams are essential to scale up national and regional energy generation and transmission. "Big urban centres and industrial hubs will always benefit from a centralised type of infrastructure and supply," explains Christoph



ISAAC KASAMANI/AFP/Getty Images



ZACHARIAS ABUBEKER/AFP/Getty Images

Frei, chief executive of the World Energy Council, because they need base-load electricity that can only be supplied by a high-powered grid.

However, Max Bankole Jarrett, director-in-charge of the Africa Progress Panel, says: "Where no infrastructure exists, there needs to be innovative ways of trying to develop

energy systems." Mini-grids, small-scale hydro, household solar, all have a role to play, he says, bringing power to communities too remote to connect to the grid.

As the cost of renewables drops, Africa can leapfrog into a new era of power generation, with new electricity systems, technologies and business

models that could be as transformative in energy as the mobile phone has been in telecommunications.

"The climate agenda is an opportunity for Africa to do energy differently," says Mr Jarrett, and the chance to by-pass belching chimneys and head straight towards a low-carbon economy.

01 Access Power's solar plant in Uganda's Soroti District, producing 50GW a year, is the largest of its kind in East Africa

02 Ethiopia is self-funding the new 6,000MW Grand Ethiopian Renaissance Dam, which will be Africa's largest when completed

In Ghana, Israeli-owned Yam Pro Energy is looking at innovative technology that will harness the power of the waves that crash on to country's coastline, while in Uganda's Soroti District, Dubai-based Access Power operate East Africa's largest solar plant, which is now producing 50 gigawatts a year.

Kenya champions geothermal energy, which now accounts for around half of the power on the national grid, and there are plans to produce an extra 2,000 megawatts (MW) of power from steam in the next six years, thanks to international loans from the likes of Germany and Japan.

Hydro dominates the energy landscape in Ethiopia, generating 80 per cent of the country's power, and although foreign investment has played a role, Ethiopia is self-funding the new 6,000MW Grand Ethiopian Renaissance Dam.

However, according to New Deal on Energy for Africa, an initiative spearheaded by the African Development Bank, only a fraction of Africa's renewables are currently being harnessed. Hydro power, for instance, may provide a fifth of current capacity, but not even a tenth of its potential is being utilised.

The New Deal is ambitious and hopes to create 130 million new on-grid connections, 75 million new off-grid connections and provide 150 million households with access to clean cooking solutions. But ambition costs and the bank's figures suggest this could cost as much as \$90 billion a year.

Mr Frei talks of a triple transition that's under way in African energy, driven by decarbonisation, new risks and new business models.

The need to cut carbon is seen in the growth of renewables, he says, while the key risk element for Africa is extreme weather events. This is leading to greater regional integration, he explains, as a way of balancing out the impacts of droughts and floods.

But it's the new business models which really excite him, especially the huge opportunities to transform lives.

Of the 315 million people the African Progress Panel say could gain access to electricity in Afri-



620m

Africans have no access to electricity

World Energy Council



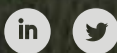
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CASE STUDY

RWANDA: AFRICA'S LEADING LIGHT



Peter Cade / Getty Images

Rwanda is a leading light in Africa's energy revolution. Between 2008 and 2011, the land-locked country expanded electricity access by 160 per cent and by the end of 2017 it expects 70 per cent of the population to have access, compared with just 12 per cent in 2012.

"I wouldn't use the word development for that – I think that's truly transformational," says Max Bankole Jarrett, director-in-charge of the Africa Progress Panel. "The leadership has a willingness to think outside the box and to create an enabling environment that allows various actors to enter the market and provide electricity in different ways."

The government has adopted a policy that has seen it embrace both on and off-grid solutions. The solar plant in the country's Rwamagana District is famously designed so that from the air it resembles a

map of Africa. Its 28,360 PV panels are now producing 6 per cent of the country's electricity supply.

As well as utility-scale, grid-connected solar power, the government has partnered with Ignite Power, a pan-African developer and financier of energy solutions. They are now well on their way to bringing rooftop solar to 250,000 households by the end of next year. Small-scale hydro is also helping to power the country's mini-grids and there is a pioneering project to extract methane from Lake Kivu to generate affordable electricity.

Perhaps the only carbon-tainted mark in Rwanda's remarkable energy turnaround was April's opening of the first of two peat-fired powered plants, something the government has argued is essential to meet its 70 per cent access target.

ca's rural areas by 2040, it is estimated that only 30 per cent will be connected to national grids. Most will get their energy from off-grid household and mini-grid systems, breakthrough technologies that can provide a range of energy services to homes and businesses, and offer a real and sustainable alternative for remote villages.

Entrepreneurial businesses such as M-Kopa in East Africa are providing families with a household pack that includes a solar cell, battery, lamps and a cell-phone charging station, but also bigger goods such as TVs and fridges.

Although many of these households bring in just a few dollars a day, micro-leasing schemes mean that by adding a small amount to their daily phone bill, they can afford to pay back the money. "It's something that is changing the lives of millions of people," says Mr Frei.

This kind of innovation is crucial to Africa's energy revolution, to promote the ideas and encourage the entrepreneurs who can bring power to the people, but governments need to be proactive, too.

"Historically energy grids were government business," says Mr Jarrett. "It was their role to provide power, but often they haven't been able to do this at the scale or at the service levels society demands."

"At a political level, there must be a willingness to adopt holistic programmes that ensure there is



Breakthrough technologies that can provide a range of energy services to homes and businesses offer a real and sustainable alternative for remote villages

an enabling environment in each country, which allows for the private sector to come in and offer its solutions to meet the energy demands... because the challenge is so huge that it is clear government alone cannot deal with it."

Mr Frei agrees that leadership needs to be bold and far-sighted, and has an important role to play in encouraging innovation. And with many local entrepreneurs operating on absolute minimal profits, regulatory restraints need to be kept to an absolute minimum.

Foreign investors are central. "Import complications are the biggest impediment for progress," Mr Frei says. "Some things cannot be locally produced immediately... but to get [the technology] on the ground cheaply and effectively, countries need to look abroad and not put barriers in the way." ●

COMMERCIAL FEATURE



Focusing minds in an era of rapid change

Marcel Van Velthoven, chief executive at ZNAPZ, global experts in asset management in the rail industry, considers the challenges and the solutions available to asset managers

Asset managers involved in the maintenance and improvement of rail networks usually have a mechanical engineering background, and are accustomed to thinking in terms of decades. Often their minds are focused on whether to recommend extending the life of surprisingly resilient infrastructure built in the 1900s.

There is still that pressure, but it is being compounded by increasing demands from politicians and regulators who expect operators of rail networks to respond rapidly to changes in travel patterns and different fiscal regimes. In addition, customers' expectations are much higher.

Seamless 4G mobile phone and wi-fi networks are becoming the norm, and more customers are expecting this level of service even in tunnels. The opportunity to capture data from social networking platforms and integrate it into other entertainment technologies and telematics systems is also offering op-

portunities for operators of rail networks and train companies to add value.

Enterprise asset management systems that are always connected and can interrogate and model customer behaviour, then reconfigure the data to create new products and services have been available for many years in manufacturing. Now there is an opportunity to do that in the rail industry.

We are entering a new era of asset management. We are achieving insights into asset behaviour that were not available two or three years ago. We are also getting better at analysing data. A number of emerging competences are helping asset managers in the rail industry do that. These are the ability to process big data and cognitive computing. It is impossible to manage assets today, especially in the rail industry, without them.

ZNAPZ believes the way to harness these competences and maximise the value of assets is to focus on three key areas. The first is integration, the second is the capability to manipulate advanced information systems and the third is that your organisation should be able to ask the right questions in advance.

There are two types of integration – commercial and technical. The latter is often easier to achieve because it usually depends on sufficient investment in hardware and software. The former is a major challenge in many companies because it involves cultural changes, and a willingness to share data and appreciate the benefits of seamless use in the whole organisation.

The second area or aspect involves collating data. About 90 per cent of all data generated by devices such as

“ ZNAPZ recommends rail asset managers decide which applications of IoT technology should be exploited first

sensors on equipment, smartphones, tablets, connected vehicles and appliances is never analysed or acted on.

This is the internet of things or IoT. It is an integrated fabric of sensors, devices, data, connections, processes and people.

According to the Ovum white paper, *Harnessing Data in the Internet of Things*: "Up until now, big data has largely been made up of human-generated transactional and interaction data that is held in relational databases. As the deployment of IoT networks continues to grow, the balance will shift firmly in the direction of very large volumes of data in the form of the sensor readings, alerts and events that are generated by connected devices."

The third area is to ask the right questions in advance. IoT offers so many opportunities that ZNAPZ recommends rail asset managers decide which applications of the technology should be exploited first. For example, an IBM blog quotes Eurotech, a supplier of embedded boards and systems: "Social networking apps could be used in conjunction with passenger loading information from trains to help spread demand peaks."

The potential is enormous. The only limit is the breadth of your imagination.

For more information please visit www.znapz.com



MARCEL VAN VELTHOVEN
CHIEF EXECUTIVE
ZNAPZ

Analytics with a bias for action

Prescriptive analytics enables a business to move from hindsight, via insight, to foresight

SEAMS

Building Analytic Capability

The world invests around \$2.5 trillion a year in key infrastructure systems for transportation, power, water and telecoms. However, that total is simply nowhere near enough.

This stark assessment was one of the findings of the report *Bridging Global Infrastructure Gaps*, published last year by McKinsey. The numbers make for a sobering reality check. Forecasts from 2016 to 2030 suggest the annual figure needs to be more like \$3.3 trillion, to support expected rates of growth. Continuing "business as usual" will therefore result in cumulative underinvestment on a grand scale. The shortfall means we will end up needing to find an extra \$350 billion a year to bridge the gap.

For the physical assets concerned and those tasked with their management, the scenario unfolding amounts to almost a perfect storm, says John Phillips, chairman of SEAMS: "For many countries and utilities, infrastructure is at a tipping point. Under intense pressure, it is ageing rapidly with deterioration exacerbated by new and worsening factors, ranging from increased wheel loads, to extreme weather. Yet, that same infrastructure is simultaneously being asked to deliver improved levels of service and enhanced customer satisfaction."

Clearly a new approach is needed: the question is what? As a leader in prescriptive analytics, SEAMS is focused purely on asset management and helping business meet the infrastructure challenge ahead. According to Mr Phillips, though, many asset managers are finding themselves worryingly short of answers.

He says: "It is going to become increasingly important to bridge the

growing infrastructure gap between investment and maintenance, to achieve delivery against regulatory key performance indicators, business objectives, stakeholder demands and ultimately save money. With the clock ticking, however, organisations are struggling to produce evidence-based near and long-term investment plans."

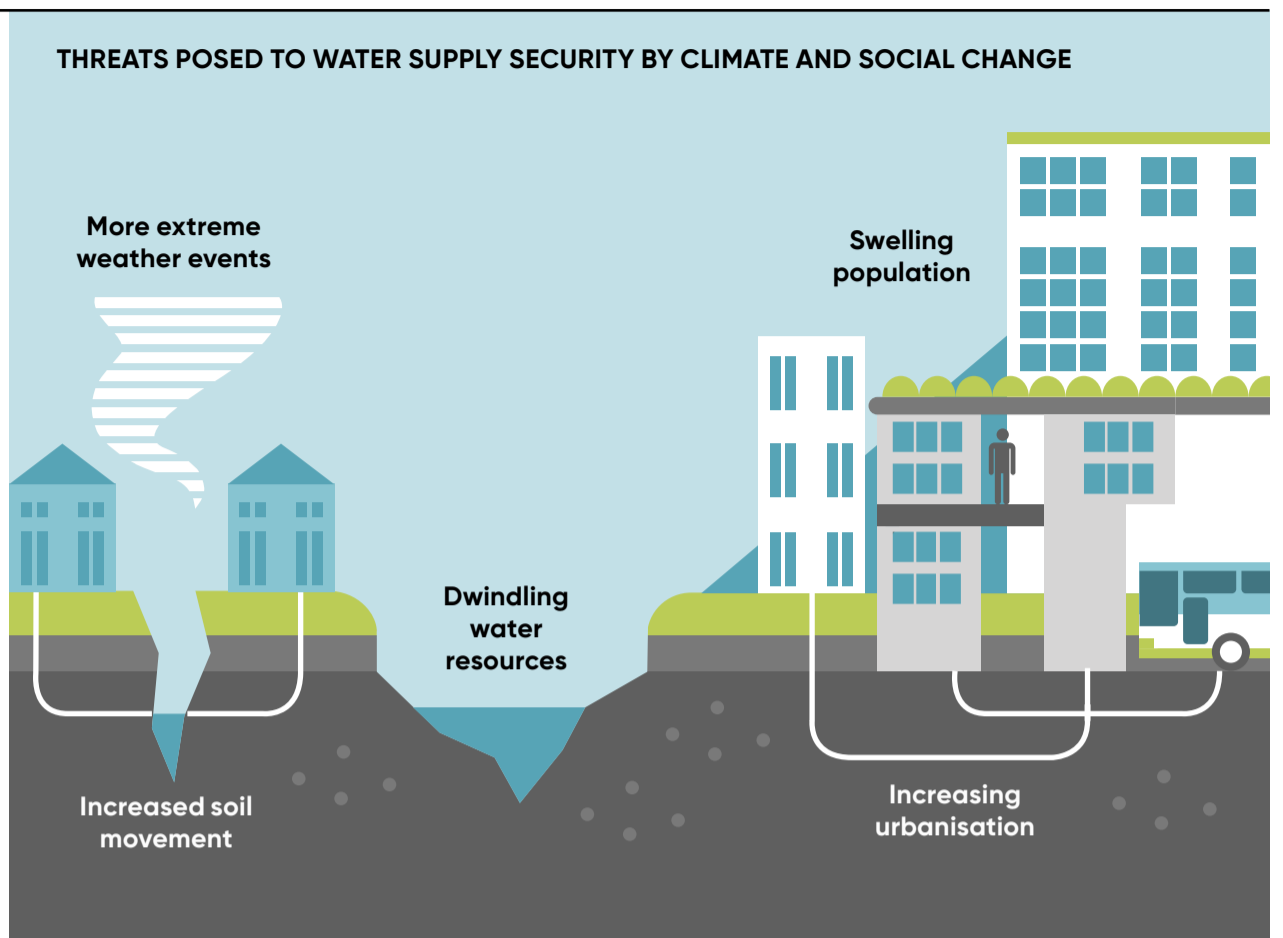
Optimising infrastructure portfolios means evaluating spend across all permutations of investment, weighing the relative merits of adding new capacity against those of upgrading existing assets, balancing the competing claims of capital and operating expenditure, risk and investor returns.

In short, you need a plan. This is where prescriptive analytics and decision support tools come in.

Gartner, a leading global information technology research company, has forecast prescriptive analytics will become the fastest growing software application internationally, with use rising from 10 to 35 per cent between 2016 and 2020. What prescriptive analytics does is take information derived from data and use it to identify specific actions to achieve strategic goals.

Developing true decision-making power calls for analytics that can integrate intelligence about the past, present and future, enabling a business to move from hindsight, via insight, to foresight. This requires decision support tools (DSTs) in the form of four kinds of analytics: descriptive, to know what has happened, historically; diagnostic, to understand why it happened; predictive, to learn what will happen next; and prescriptive, to know what to do about it.

As a discipline, analytics is a complex combination of mathe-



“ Developing true decision-making power calls for analytics that can integrate intelligence about the past, present and future

matics and statistics, data techniques and advanced algorithms, with rich visualisation to communicate insight. As a DST, however, prescriptive analytics is designed to answer the tough, straight questions asked in business.

Knowing what is going to happen is not the same as doing something about it. So to transition from predictive to prescriptive analytics, the SEAMS Enterprise Decision Analytics (EDA) software adds modelling into the optimisation mix, to help get some real-world answers.

While analytics for assets might express the outputs of data analysis in terms of deterioration rates, or curves, modelling takes matters a step further. Used to explore the outcomes of different courses of action, models can be created to answer specific sets of questions, such as when to replace plant or how much maintenance is needed.

Modelling can be undertaken either on a project portfolio basis and/or an individual asset level. The SEAMS EDA approach enables both,

offering significant business benefits. Mr Phillips explains: "Organisations need to be able to analyse not just which projects are needed for investment, but the individual performance of assets too. This allows management to shift gears between the strategic ten-year vision, an operational annual approach and tactical daily delivery."

Originally formed at the request of the UK water industry, SEAMS was born out of ten years of research and development at Sheffield University and Exeter University, with its analytics software commercialised in 2002. Since then SEAMS has diversified its offering, supporting more than £200 billion in investment decisions worldwide and developing analytics solutions for FTSE 100 companies. With a typical range of efficiencies between 7 and 17 per cent, clients include the likes of Yorkshire Water, Severn Trent Water, National Grid and E-ON, plus London Underground and Highways England.

In the case of Yorkshire Water, 2016 saw SEAMS appointed as lead of a consortium with AECOM, Sweco, AMCL and CGI to enhance its asset management processes and support systems. A tailored decision making framework was created using the SEAMS EDA software to monitor performance of the multi-million-pound network of underground pipes and treatment infrastructure.

As climate risk and resource scarcity begin to impact economic development, plus urbanisation and population growth intensify demand, sustainability and resilience are increasingly important concerns for infrastructure. As a result, incorporation of additional, often non-financial, metrics into decision-making calls for application of more holistic analytics. Increasing customer expectation, affordability challenges and stiffening regulation are also all contributing factors.



Left to right

JOHN PHILLIPS, CHAIRMAN
MARK ENGELHARDT, MANAGING DIRECTOR
MARK TURNER, CHIEF SCIENTIFIC OFFICER

In response, therefore, Yorkshire Water is looking for a broader basket of valuation methods to support best-practice decision-making, helping reduce cost, increase profit and balance risk, so improving corporate performance and return on investment. This has meant adopting the Five Capitals methodology for assessing impacts, thinking not just in terms of financial and manufactured capital, but also natural, human and social capital.

Given such decision-making sophistication, the whole-life-cost view of assets provided by prescriptive analytics represents a perfect fit for joined-up C-suite thinking. Mr Phillips concludes: "Ultimately, empowering the main board of a major utility to adopt more sustainable investment scenarios and achieve smarter asset management still begins at entry and collection level with the data. Culture change must be systemic throughout the business, people and process, as only then can an organisation successfully build the necessary analytic capability with a bias for action."

For more information please visit www.seamsltd.com

FOUR LEVELS OF ANALYTICS FOR ASSET INVESTMENT PLANNERS



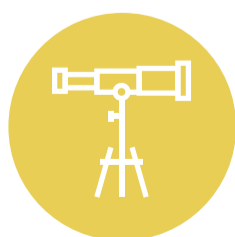
Descriptive

What has happened?



Diagnostic

Why did it happen?



Predictive

What will happen next?



Prescriptive

What should I do?

← Looking back | Looking forward →

DECOMMISSIONING OIL AND GAS

It's already time to start planning...

Decommissioning oil and gas rigs in the North Sea poses a costly challenge, but also an opportunity for the UK to become a world leader for hire

OLIVIA GAGAN

The UK's oil and gas industry has been relied upon for decades to bolster the country's coffers and provide thousands of workers with skilled employment.

It is now facing challenges. Tumbling global oil and gas prices and shrinking reserves meant the average rate of return for extraction companies in 2016 was just 0.2 per cent compared with 50 per cent in 2011, according to industry body Oil & Gas UK.

In addition, the infrastructure used to produce oil and gas is ageing. The UK's oil fields are mature, reaching peak production in the late-1990s. After producing more than 43 billion barrels of oil equivalent since first production in 1967, many rigs and oil wells are now coming to the end of their working lives.

Dismantling these assets and restoring the area they were built on can often cost more than the construction of the sites to begin with. The estimated bill for de-

commissioning on the UK Continental Shelf is £17.6 billion between 2016 and 2025, says Oil & Gas UK. It places a £2-billion price tag on decommissioning costs for 2017 alone.

As a result, the need for effective, good-value decommissioning in the North Sea is becoming an industry in its own right. Roger Eason, chief executive of UK industry group Decom North Sea, says peak decommissioning activity is forecast to take place around 2024 and 2025. Although he stresses: "Effective, efficient decommissioning can only be preceded by intelligent asset management in the late-life phase, which can commence anything up to ten years prior to decommissioning."

The time, then, is now. But deciding the best way to shut up shop is a contentious sub-sector of the oil and gas industry, and one that has been fraught in the past with planning and public relations failures.

Shell's Brent Spar debacle in 1995, for example, badly damaged the Anglo-Dutch oil giant's reputation. A decision to detonate and dump the Brent Spar oil storage tanker in waters off the north coast of Scotland led to a three-week occupation of the asset by Greenpeace and public boycotts of Shell service stations across Europe. Shell is now gearing up to decommission four of its giant, remote Brent oil rigs. Unlike its calamitous Spar plans, the current idea is to remove the rigs one at a time in a single lift, before shipping them back to land for recycling.

The UK government is aware of the demands facing such businesses. In February, the state-backed Oil and Gas Authority (OGA) launched a search for operators to participate in a programme to find ways to share work and cut costs.



Redundant oil rigs off the coast of Cromarty Firth, north Scotland

For now, this means research and planning on the best ways to remove structures and equipment. These options include, controversially, simply leaving the infrastructure in place. Other choices include cutting the structure up to reduce its height and laying formerly exposed parts on the sea bed, towing the structure to another site or simply sinking it entirely.

As ever, timing in such decisions is key, says insurer and risk expert Marsh. Amy Barnes, chief client

officer of the firm's energy practice, says the North Sea's oil and gas infrastructure is "very interconnected, meaning that many operators rely on other operators' assets or infrastructure". She adds: "If infrastructure that an operator is dependent on is decommissioned 'early', there may be unforeseen costs to build new infrastructure."

The industry is faced with the task of decommissioning in ways that make economic and en-

vironmental sense. According to OGA head of decommissioning Jim Christie: "While estimates of cost, scale and scope vary, there is no doubt that the decommissioning effort facing our basin is significant. We must act now to capitalise on the opportunity it presents."

If the UK can get it right in the North Sea, it will be laying the foundations for an industry that can be replicated and a skilled workforce that could be hired all over the world. ●

CASE STUDY

REEFS, HOTELS AND WIND FARMS



If necessity is the mother of invention, finding cost-effective ways to manage a growing number of obsolete oil and gas assets has certainly birthed some innovative schemes.

Retired marine-based assets have been reworked in a variety of ways, which are as much testament to their developers' imaginations as to the

assets' durability. For example, off the coast of Sipadan, Malaysia, lies a 25-room hotel housed in a former oil rig.

In the Netherlands, two bright orange oil rig escape pods now serve as floating accommodation designed by the Dutch architect Denis Oudendijk.

Amy Barnes, chief client officer of insurer and risk expert Marsh's energy practice, says she has seen "proposals for off-shore platform jackets to be repurposed to take on wind farms or scuba-diving stations".

Perhaps most significantly, obsolete oil rigs have great potential as artificial reefs. With natural reefs under threat globally, the underwater sections of rigs become economically and ecologically valuable ecosystems, scientists at University of California, Santa

Barbara argue, supporting fish larval production, and acting as homes for delicate plant and marine life.

Californians Amber Jackson and Emily Callahan are the founders of organisation Rigs-to-Reefs, which advocates removing the visible sections of disused oil rigs and converting the underwater remainder into fish-producing artificial reefs. They put the cost of a single rig-to-reef conversion at \$800,000, compared with around \$5 million for dismantling and removing a rig entirely.

Far from being ghostly reminders of former industry, there is the possibility of decommissioned assets becoming thriving businesses, albeit enterprises which may yet surprise the former owners.

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