The Power of Data for Long-lasting Change

Using data to achieve long-term net-zero carbon targets is helping secure better lending rates, achieve better financial returns, and build successful business partnerships in the long-term.

A Bentley White Paper

Mark Coates
Strategic Industry Engagements Director, UK

Published:
February, 2021

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Foreword

Thank you to all our members who participated in the survey, which resulted in this report, and, of course, to Bentley Systems for their expert analysis and conclusions.

This report brings together two of the most important topics facing the world of major projects today – the role of major projects in delivering sustainability goals and the massive opportunity offered through data analytics to radically improve project performance. Neither are easy. Firstly, major projects are inherently carbon intensive and secondly, the data required for effective analytics is not easily obtained, as major projects span multiple organisations, each with their individual objectives and separate data strategies. This is why these two topics were featured in recent annual conferences held by the Major Project Association's members, why we established working groups to tackle them, and why we supported this survey and report.

This report shows an aspiration for major projects to shift from being part of the problem to being a key piece of the solution to addressing climate change and the nature emergency. This report also shows that whilst progress is being made, the world of major projects is struggling to tackle the barriers preventing data analytics being adopted at pace and to its full potential. To overcome the barriers, we need to transition from a passive adoption of data analytics from general business applications to an active pursuit of data analytics specifically for major projects – some examples of this are highlighted in this report.

To seize the opportunity provided by data analytics to improve the sustainability of project delivery and their outcomes, we need collective leadership, which is why the Major Projects Association will be working with members, the Project Data Analytics task force, and other institutions to facilitate this ahead of COP26 taking place in Glasgow later in 2021.

Andy Murray
Executive Director, Major Projects Association.

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Executive Summary

In July 2020, the former Governor of the Bank of England, Mark Carney, said, "Companies that don't adapt [to zero carbon], including companies in the financial system, will go bankrupt."

Bentley Systems and the Major Projects Association have partnered together for this report to look into how data can help advance infrastructure delivery; improve client, contractor, and consultant relationships; and enable lower carbon construction. It is intended for individuals in the engineering, architecture, and construction industry; individuals managing their own assets, individuals who are part of a delivery contractor team, and individuals financing infrastructure assets.

It will be the first of our two papers aimed at facilitating dialogue between clients, consultants, contractors, and financial institutions that are involved in major projects to consider these challenges and to allocate and monitor resources accordingly.

Due to their nature, major projects represent the largest infrastructure projects taking place in the UK. These projects are also the most digitally enabled. However, they are one of the largest consumers of construction material and, therefore, among the largest producers of carbon.

While this situation provides significant challenges, it also empowers infrastructure projects with an opportunity to overcome this problem and do the most good.

As the foundation on which civil society is built, infrastructure has a key role to play in reducing whole-life carbon. Infrastructure owners and engineers are well-placed to help overcome this problem. Infrastructure engineers need to deliver these projects as efficiently and environmentally responsible as possible to make this change a reality.

"We need smart people, smart partnerships, and smart systems to power the delivery of major and complex programmes to produce better outcomes. The design, delivery, and operation of critical national infrastructure, in this digital decade, demands never-before-seen levels of data, sensors, integration, insights, and visualisation. It's this monitoring and measurement that will provide the evidence of whether major projects achieve social value and sustainability targets."

– Nathan Marsh, Chief Digital Officer at Costain

Introduction

In 1969, Alfred Mayo, an aerospace consultant who was previously employed by NASA, said, "People historically have tended to overestimate achievements in the short run and to underestimate what can be achieved in the long run."

Too often, people and businesses focus on the short term – daily news reports, weekly share price fluctuations, quarterly results, and annual reports. Similarly, when we look at infrastructure development, there can be a lot of focus on short-term delivery milestones, which are very important. However, as the world changes, business, public-sector organisations, and the wider population are becoming increasingly focused on the need to overcome larger, long-term strategic challenges.

For any sceptics reading this, it's important to illustrate just how seriously world business leaders take the long-term strategic challenge of decarbonisation.

Ahead of the World Economic Forum's 50th annual meeting in Davos in January 2020, 800 global experts and decision-makers named inaction on climate change and extreme weather as the greatest long-term threats to the world economy in the 15th edition of the forum's Global Risks Report.

The World Economic Forum has identified 10 key global challenges to tackle in the coming decades. They include:

- The growing impact of climate change over the next 30 years to avert an environmental crisis
- The environment and the scarcity of natural resources
- Creating a resilient, accessible global financial system
- Long-term investing

It is also important to highlight how seriously national governments are taking the issue of decarbonisation, with at least nine countries now having set legally binding targets to achieve net-zero greenhouse gas emissions by the year 2050, including the UK, France, Japan, and South Korea. In addition, the UK also plans to cut carbon emissions by 68% by 2030. President Joe Biden recently proposed that the US achieves net zero by that year as well. China, the world's second largest economy, has pledged to do so by the year 2060.

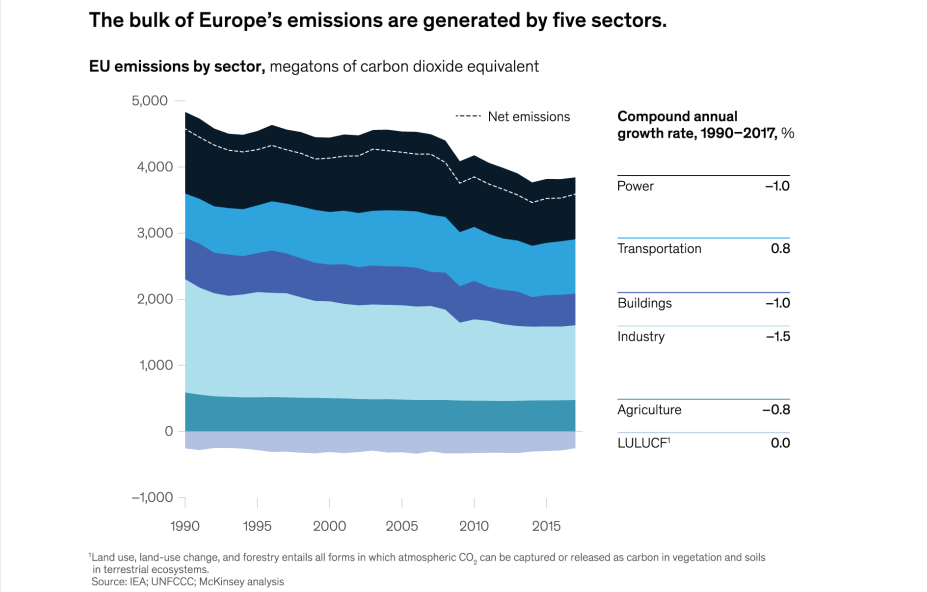

Figure 1: With countries setting legally binding targets to achieve net-zero greenhouse gas emissions, it's important to understand which sectors generate the most carbon emissions. (Image courtesy of McKinsey & Company)

"The UK government is accelerating, and evolving, its 'net zero' agenda, as it seeks to show itself as a global leader on climate change issues. This will create a lot of opportunities, and jobs, for the infrastructure sector. However, the government already recognises that its existing policies to decarbonise new, and existing, assets will not be enough to meet its timetable for achieving net-zero carbon. There is a need for more innovation from those engaged in the infrastructure sector, to bring forward new approaches and technologies for delivering zero-carbon solutions. It's clear that data-driven solutions will be an area of such innovation going forward, and many in the sector are already investing heavily in this space."

– Stacey Collins, Energy & Infrastructure Partner for Pinsent Masons LLP

Succeeding in this new world of economic priorities requires organisations to challenge themselves and work together closely with partners to formulate new environmental, social, and corporate governance (ESG) objectives; embrace new procurement models; deliver less polluting infrastructure; and create new financial vehicles that incentivise change and monitor the impact.

This situation doesn't mean that we should dismiss short-term wins or individual interests but rather reallocate resources to meet both business and societal goals. In fact, by understanding the direction of travel and tackling these long-term challenges, businesses can also win more in the short-term too.

The New World of ESG Objectives

Traditionally, ESG objectives have been set to reduce the negative impact of an organisation's activities. To deliver transformational change, the new generation of ESG objectives seek to change the behaviour of an organisation's entire value chain – we are already seeing examples of this.

In October 2020, Network Rail—which manages Britain's railway infrastructure—announced three climate-related targets, including two aimed at reducing its direct and indirect greenhouse gas emissions by 2029. Their third target will help ensure that at least 75% of their suppliers set their own "science-based targets" to reduce carbon emissions by 2025. As a result, Network Rail is now the first railway organisation anywhere in the world to commit to cutting emissions to the extent of limiting global warming to 1.5°C (in line with the Paris Agreement signed by over 190 countries in 2015).

In November, HM Treasury, the British government's economic and finance ministry, published a roadmap towards compelling financial institutions to make mandatory climate-related disclosures about their investments. The Treasury believes that information on how financial institutions are investing can help combat climate change and will improve transparency, thus encouraging better-informed capital allocation and, therefore, driving investment in more sustainable projects and activities.

In plain English, this means that financial institutions will have to declare their investments and the carbon emitted by their investments and what their impact is on the climate.

Furthermore, the UK Treasury is creating a new national Infrastructure Bank to be up and running in the spring of 2021, which will co-invest alongside private sector investors such as banks, institutional investors, sovereign wealth funds, pension funds, and global infrastructure investors to support infrastructure projects, helping meet the government's objectives on economic growth, levelling up, and transitioning to net zero.

In its new infrastructure strategy, HM Treasury has stated that the next generation of British infrastructure will be greener because the requirements of the net-zero commitment will be embedded in every stage of the project lifecycle and underpin decisions on the technical solutions chosen to deliver a project.

Why Is Data So Important?

In monetary terms, data is now widely regarded as one of the most valuable resources on earth. One only needs to look at the USD 160 billion of sales that Google made in 2019 or the USD 70 billion in revenue Facebook recorded in 2019 to know that it's true.

Achieving long-term targets to limit emissions will be impossible unless infrastructure businesses measure carbon output and create data models that provide insight on opportunities to cut carbon.

As forward-thinking organisations, Bentley Systems and the Major Projects Association have partnered together for this report to look into how data can help to advance infrastructure delivery; improve client, contractor, and consultant relationships; and inform lower carbon construction.

For net-zero carbon to become a reality, we cannot just rely on organisations wanting to do the right thing. It cannot be just a worthy goal. We also need to convince businesses that reaching net-zero carbon will deliver long-term commercial and business benefits, as well as help educate the market about how new engineering technology is available to enable a move to net-zero carbon.

"For future UK infrastructure investment, there is a clear government intent to "build back greener" and to achieve lower greenhouse gas emissions – particularly carbon dioxide. This requires the industry to look at every aspect of the lifecycle of an asset."

– Anne-Marie Friel, Partner for Pinsent Masons LLP

How Will ESG Impact the Financing of Infrastructure?

"Companies that don't adapt [to net-zero carbon], including companies in the financial system, will go bankrupt," stated Bank of England Governor Mark Carney in a July interview.

To put into context how polluting infrastructure can be, in its new National Infrastructure Strategy, HM Treasury states the majority (over 80%) of the UK's emissions come from infrastructure sectors. Therefore, action on infrastructure will be crucial for meeting the UK's carbon budgets and continuing progress towards the net-zero target.

Cement is the second most-used substance on the planet after water and is responsible for 8% of global carbon emissions. If it was a country, cement would be the third largest emitter of carbon after the US and China, releasing 2.8 billion tonnes of carbon every year. For more context, research from McKinsey & Company demonstrates that the cement industry alone is responsible for about a quarter of all industry carbon dioxide emissions. It also generates the most carbon dioxide emissions per dollar of revenue.

However, it is important to note that lower carbon substitutes to traditional cement are available, including products like Cemfree and Cemex's net zero carbon cement called Vertua. Implementing these substitutes can provide the industry with a cleaner way to continue its essential work.

McKinsey & Company's report "Laying the foundation for zero-carbon cement" suggests that while the development of new technologies to decarbonise cement might not be scalable for years, the industry could potentially reduce its 2017-level emissions by more than 75% by 2050.

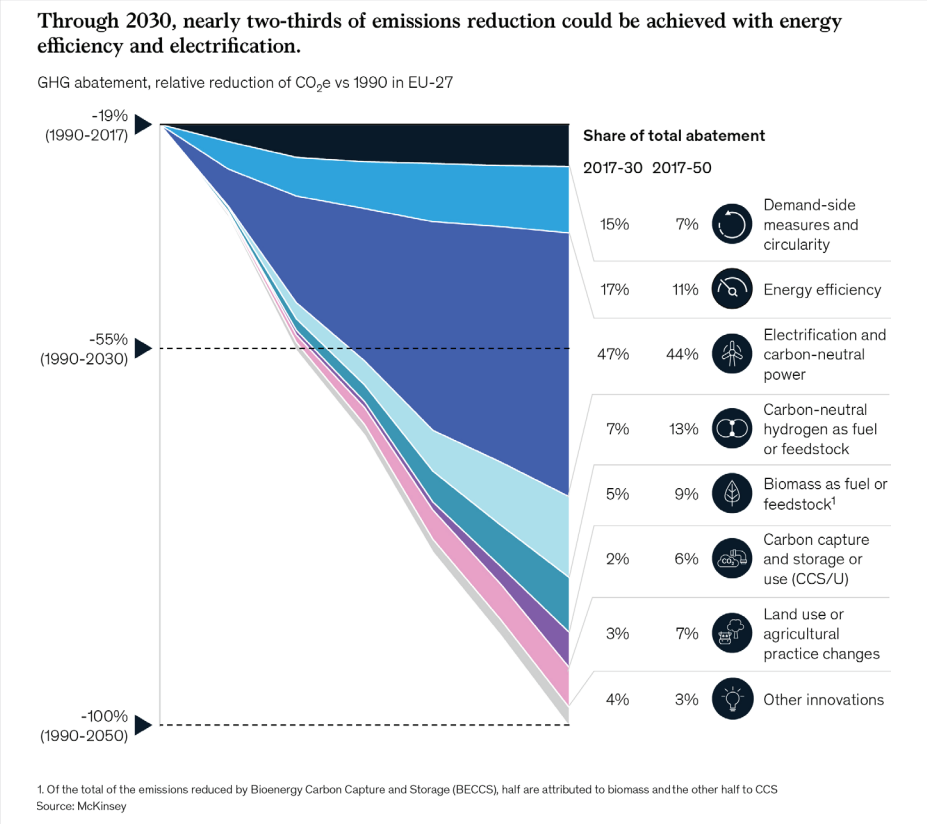

Figure 2: New technologies for greater energy efficiency can reduce emissions through 2030. (Image courtesy of McKinsey & Company)

"Bentley's survey with the Major Projects Association is well-timed. Although progress has been made in the ten years since the BIM mandate was introduced, we still have a considerable way to go. We need to standardise and automate data specification, collection, validation, and reporting to eliminate data silos and create data everyone has confidence in. This will enable better carbon based decisions across projects and within organisations using the breadth of technology now available."

– Karen Alford, FCRM Manager at The Environment Agency

Sceptical that financial institutions can change carbon emissions? The former Governor of the Bank of England isn't. In 27 February 2020, Mark Carney launched the "COP26 Private Finance Agenda" at the Guildhall, London. The objective is for every professional financial decision to take climate change into account.

Carney, who is also the former Governor of the Bank of Canada, said, "There is USD 120 trillion [GBP 99 trillion] of capital behind the framework that's saying to companies: 'Tell us how you're going to manage these risks' – that's the first thing. The second thing that the capitalist system needs to do is to manage the risks around climate, be ready for different speeds of the adjustment, and […] the most important thing is to move capital from where it is today to where it needs to be tomorrow. So, the system is very much part of the solution."

When announcing plans to launch the country's first green gilts in November last year Rishi Sunak, argued that financial services would be a "critical enabler" in the UK's attempts to hit a net zero-carbon target by 2050.

As one of the world's largest users of cement, the infrastructure industry should be aware that the green focus of financial institutions will shortly begin focusing more closely on the pollution created by infrastructure and construction.

Case Study

In February 2020, Great Portland Estates (GPE) signed a GBP 450 million, ESG-linked, unsecured revolving credit facility (RCF) as part of its plans to become net zero by 2030. This innovative facility, the first to be issued by a UK REIT, incorporates three ESG-linked KPIs, which align with GPE's ambitious sustainability strategy.

These KPIs include annual pre-agreed targets and are based on:

- Supporting GPEs target to decarbonise its existing buildings and reducing the energy intensity of its portfolio by 40% by 2030
- Supporting GPEs target to build net zero carbon new buildings from 2030
- Providing better quality urban greening measures by increasing biodiversity across GPEs portfolio

These targets incentivise GPE to accelerate the decarbonisation of their business and will support continued behavioural change across their supply chain.

This is where the engineers can step in.

As the new president of the Institute of Civil Engineers, Rachel Skinner said, "Our infrastructure is now, in terms of our processes, the operations and the way we do things. The number one driver of carbon dioxide emissions across the world and those emissions are the cause of climate change. So, from civil engineer's point of view, this is a huge problem, but is also a serious opportunity for change and leadership."

From May 2021, GPE will measure performance against each KPI annually. A decrease or increase of up to 2.5 basis points will be applied to the headline margin on the basis of this performance. All margin adjustments will be given by GPE to registered charities focused on environmental initiatives.

Where Are We Now?

In this report, we have reviewed the results of our Bentley-MPA joint survey to show that a growing number of firms are digitally enabled. For this research, we surveyed 102 construction leaders involved with major projects or significant programmes of construction work.

More than 80% of respondents predominantly worked in the following sectors: rail and transit (21%), buildings and facilities (20%), heavy civil construction (17%), water (13%), and road (12%).

The people that we surveyed predominantly worked in construction consultancy firms (24%), as civil engineers (23%), or as contractors (13%).

Digital adoption among firms in this sector is widespread. 82% of the people that surveyed said that they are currently deploying digital workflows enabled by engineering software.

"We are on the cusp of the information age where data will enable new economic opportunity. Just as physical infrastructure underpins today's economy, we see digital assets enabled by AI creating a foundation for future generations to thrive. This new information revolution will drive more sustainable and better value services to meet the needs of a changing world."

– Kevin Reeves, Director of IoT & Digital Twin Honorary Research Fellow WMG at Costain

The Prevalence of Data Silos and the Project Mindset Rather than the Enterprise Mindset

Despite many individuals adopting software, we found it concerning that almost two thirds of respondents (63%) said they are using four or more software solutions for project delivery. It tells us that the majority of respondents are using several different software suppliers and that data is most likely being siloed among individual project teams and departments rather than shared openly across the business at enterprise level.

These data silos are confirmed by other responses to the research. Just over a third of respondents (36%) said that they had a connected data environment in place to share information across different data platforms.

Why is this happening?

Interestingly, the project management team was the group most commonly identified as having driven their business to adopt digital workflows, accounting for exactly a quarter of responses. Senior management were cited as the second most influential source for driving digital transformation at 22%. Over the past five years, there has been a marked increase in chief information officer and chief digital officer positions, and these two are already the drivers for 20% of businesses. The influence of project management teams in driving the adoption of construction software partly helps to explain why businesses are using so many different software packages.

However, it also helps to explain why data is so siloed. If the requirement for data is being driven at a project level rather than at an enterprise level, it also explains why so few businesses have connected data environments in place.

While project teams should be congratulated for recognising the importance of data for project delivery, more efforts need to be made to educate senior business leaders that they need enterprise-level solutions in place to prevent data silos.

More of an effort also needs to be made to educate clients on how to deliver a better, broader specification of data requirements to prevent contractors and consultants from providing their own freeform data deliverables, which are unguided and can lead to data silos.

Value of Information to Fuel Long-term Relationships

It was interesting to hear responses on the value that people involved with major projects said that they are receiving from their data. More than three-quarters (76%) of respondents said that software was important for giving them insight and visibility over major projects.

Firms should be leveraging the level of insight that data gives them into construction projects and major project asset performance so that they can advise how to improve the performance of that asset over future years, including the carbon performance of that asset.

As digital twins and climate-related disclosures become the norm—and data is harnessed to better manage assets and their carbon emissions—the importance of data in winning new business will one day to be accepted by 100% of people working on major infrastructure projects.

While personal relationships and experience are always at the heart of business development, the additional insight that data provides should help put contractors and consultants in an even stronger position.

As Mark Enzer, digital director at the Centre for Digital Built Britain, states in his white paper on creating a system of systems: "Making better use of asset and systems data is central to this vision: better analysis of better data enables better decisions, producing better outcomes. It promises to improve the way [that] organisations function, the delivery of new assets and the operation, maintenance and use of existing assets. 'Digital assets', such as data, information, algorithms and digital twins, should be recognised as genuine assets that have value, which therefore must be managed effectively and securely. In time, as these digital assets become valued, connected data will be seen as infrastructure."

"Clearly, we need to do the right thing as leaders, which is substantial reduction in the carbon that we produce or use building megaprojects, in rail such as HS2, NPR, and TRU. Our industry needs to use every last drop of focused data to help us achieve those goals, so we can build back better."

– Tim Wood, Director at Northern Powerhouse Rail

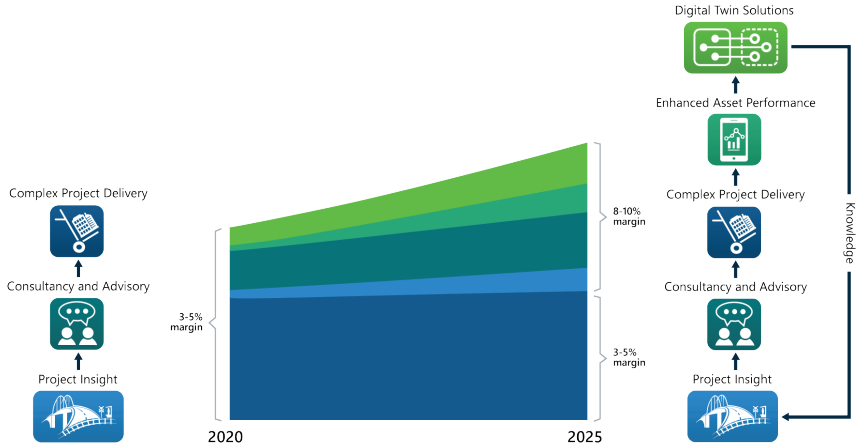

Figure 3: The insight gained throughout the lifecycle of a project can be used on future projects, producing better outcomes.

Having a longer-term relationship is in the best interests for all parties: the contractor and consultant and the client. It means additional income streams for the contractor and consultant over longer time periods. A number of delivery partners are now looking at extending these relationships in what we have coined "x +10 or 20," where x equals the length of a project and 10 or 20 equates to the number of additional years that they could be employed to manage the asset.

For the client, this means that they can hold the delivery team to account and deal with the people who know the asset best. For the delivery partners adopting this model, they are gaining a wealth of knowledge about how the asset is meeting the "factory results," in the real world.

However, the Institute for Civil Engineer's Project 13 approach envisions the role of contractors and consultants evolving into a new role as integrators.

Anglian Water's One Alliance initiative already employs consultants and contractors in this integrator role. Integrators are deemed to be integral to the client for a much longer period of the project or programme lifecycle. They also play an even more trusted partnering role by supporting:

- Development of the outcome requirements with the owner
- Performance briefing for suppliers and advisors
- Procurement and on-boarding of suppliers
- Concept development
- Engineering and prototyping
- Manufacture and assembly
- Commissioning into operation

Integrators will bring together different partners to create a common understanding of value, coordinate activities, and focus all participants on achieving a successful outcome through all of these stages.

"For all business, there also remains an ongoing need to understand the true 'carbon footprint' of an asset. This will increasingly require the infrastructure sector to assess all aspects of its production-cycle, and the processes that it uses, and to deploy better use of a 'golden-thread' of information throughout the lifecycle of an asset, to enable more accurate data-enabled decisions to be made."

– Anne-Marie Friel, Partner for Pinsent Masons LLP

How Will Compliance with Financial Incentives for Carbon Reduction Be Measured?

Through project data, consultants, contractors, and clients can now monitor the performance of infrastructure assets throughout their entire lifecycle. Building information modelling (BIM), geographical information systems (GIS), and the golden thread of information are key, providing the ability to measure the carbon performance of an asset and incorporate the wider climate-related impact on biodiversity. The financial institutions, which offer improved lending terms to cut carbon emissions, will also need to monitor carbon performance of the project and asset, as well as receive regular reporting on their performance.

Essentially, the infrastructure industry will be using one of the most valuable resources on earth—data—to help deliver change in the primary driver of carbon dioxide emissions across the world's infrastructure.

To achieve this, clients and contactors will need to put systems and processes in place that not only empower them with project-level data, but also enterprise-level data and insight, allowing long-term partnerships to flourish at both levels.

There is also a financial incentive for consultants and contractors to move into this space. By embracing construction and asset data through digital twins and other methods, contractors and consultants can improve their margin and create a longer-term role for themselves as operators monitoring and improving the performance of an infrastructure asset over a ten-, twenty-, or fifty-year period.

As digital twins have been created to support decision-making across the entire lifecycle of an asset, digital twins are currently the most advanced manifestation of this long-term relationship.

Put simply, a digital twin is a detailed digital model of a physical asset which is continuously updated with data from multiple sources, which makes them different from static, 3D models.

Digital twins of physical assets enable contractors and consultants to optimise the design and performance of assets over the assets' lifecycle and, therefore, give them the information that they need to reduce carbon. They also capture invaluable information to enable them to be better positioned to design and construct future infrastructure assets with both the same and different clients, as they have a trove of project and asset data behind them to improve the construction and management of future assets.

This trove of data can play a very important role in:

- Increasing margins
- Increasing the lifespan of an asset
- Improving the length and depth of client relationships
- Increasing revenue and profit

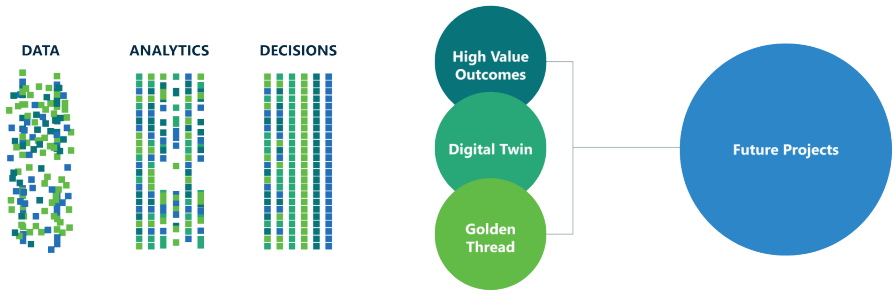

Figure 4: By bringing together the latest technology and best outcomes, we have all the data we need to better invest in future projects.

"In our recent study – Projects 5.0 – more than 300 leaders agreed that future-proofing projects to promote innovation for long-term commercial and environmental sustainability is now a critical design principle. But many capital-projects players still give little consideration to long-term sustainability and total lifecycle costs. Change will require bold ambition, and there are plenty of levers to draw on, from advances in technology to planning and process-management approaches that have proved remarkably effective in other sectors, which this paper highlights."

– Prakash Parbhoo, Partner at McKinsey & Company, Co-author of the Capital Projects 5.0 report

How Do We Get There? Data Leadership

It is impossible to ignore the impact that COVID-19 has had on digital transformation. As the world's largest health emergency in 100 years, it has forced people to work differently and often more remotely from construction sites. As a result, we expected significant numbers of people to state that COVID-19 has helped to accelerate plans for digital transformation. In total, more than half (56%) of participants said COVID-19 had accelerated the digital transformation of their company.

However, our research highlights some concerns about who is driving the infrastructure firms in going digital, both internally and externally.

Only a fifth (22%) of respondents reported that senior management were the most influential source driving digital transformation, with a further fifth of them citing chief information officers. Therefore, this data shows us that the C-suite was driving less than a half of digital transformation projects. Conversely, almost a quarter (24%) of respondents said that a lack of senior leadership buy-in was the most challenging obstacle to making the most of their software solution.

This research highlights that there is a significant need to educate the most influential people in businesses to adopt and drive digital transformation. It's also important to ensure that it is an enterprise-wide initiative rather than a piecemeal, project-by-project initiative, as these methods builds data silos into an organisation.

Furthermore, when external factors driving digital transformation were taken into account, clients were the most cited external influence, which infers that infrastructure businesses are adopting digital transformation measures because they have to.

Only 2% of respondents believed that a financial institution drove digital transformation. This finding highlights a significant gap in the latest thinking on climate change and the current behaviour of the industry. The way that people are thinking about climate change is emerging from financial institutions and is going to be driven by national governments, such as in the UK. This behaviour sits downstream of the way of working and the new regulations of climate-related disclosures, which are coming into force in the UK.

On the 9th November 2020, the UK's Chancellor of the Exchequer Rishi Sunak announced that climate risk reporting will become mandatory for large companies and financial institutions in the UK and come into effect for some companies as early as 2021.

In the US, after the inauguration of President Joe Biden, his "Build Back Better" initiative indicates that the Securities and Exchange Commission will push ESG- and climate change-related risk alerts, guidance, and rulemaking that could require companies to disclose how climate-change risks affect their bottom line. It is expected to include an enforcement mechanism to achieve net-zero emissions no later than 2050. This enforcement mechanism will be based on the principles that polluters must bear the full cost of the carbon pollution that they are emitting and that our economy must achieve ambitious reductions in emissions economy-wide instead of having just a few sectors carry the burden of change.

There are now established tools in place to enable clients and contractors to monitor the carbon consumption of a project and recommend ways to reduce the carbon intensity. More than a decade ago, Mott MacDonald's construction economics business, Franklin + Andrews, launched an industry-first cost and carbon modelling tool. By looking at all materials and supply chain activity, the tool can model the embodied carbon of all construction, operation, and maintenance activity. This capability empowers clients to make strategic decisions based on financial and environmental performance throughout and asset's life and model the impact of transporting materials and labour to a site over different distances and using different methods.

Depending on where a structure will be built, different life expectancy values are given for constituent parts, affecting maintenance periods, cleaning regimes, and cycles for repair and replacement. Wastage factors for different materials and construction processes are also incorporated. Cost data takes account of inflation, including local market factors, enabling customers to determine capital, operating, maintenance, and repair costs.

Another example is Skanska Costain Strabag JV. While working on HS2 as Europe's largest infrastructure project, in addition to estimating material costs, they needed to estimate carbon costs to meet client-imposed carbon savings of 50%. Working in the connected data environment facilitated data feeds to the carbon team to accurately calculate and analyse the carbon scheme. When the design and materials quantities are modified, the tool enables the carbon footprint to change as well.

In November 2020, HS2 became the first organisation in the UK transport sector, and the second in the world, to achieve PAS 2080 global accreditation, recognising its extensive plans to reduce carbon through the design, construction, and operation of Britain's new railway.

Conclusion – Harnessing Data Is Key to Delivering Purpose-driven Digital Transformation

It is heartening to see that the infrastructure industry is progressing down the digital roadmap. Businesses now have much more insight on the performance of individual projects. However, the number of digital systems being used gives rise to concerns over data silos and the inoperability between different software systems stifling.

Data is one of the most powerful resources in the world.

Businesses need to focus on how data can help them to build more successful long-term business partnerships, achieve better long-term financial returns, secure better ESG-linked long-term lending rates, and achieve long-term net-zero carbon targets.

It is only through digital transformation that business are truly able to model, plan to reduce, and crucially monitor carbon emissions, which cut the amount of greenhouse gases going into our atmosphere.

Therefore, it is imperative that digital transformation becomes a C-suite issue among contractors, consultants, and clients to ensure that their business is at the forefront of driving enterprise-wide adoption of digital.

There is a huge opportunity for these contractors and consultants to develop longer-term operator and integrator roles and earn more margin if they start to gather and mobilise their data to give them better insight into the performance of assets and organisations.

The C-suite of financial institutions have an even more important role to play, as new laws on climate-related disclosures start to come into force in the UK and around the world. There is a golden opportunity for financial institutions to become the drivers of ESG investment and harness the power of data to reduce carbon emissions, reduce costs, and create better-quality, more sustainable infrastructure. The long-term strategic opportunity for financial institutions appears to be making ESG investment the norm.

Increasingly, business leaders are harnessing the power of purpose to drive change within their organisation and within society. General Motors' "Zero, Zero, Zero" initiative is a prime example of a business harnessing purpose to deliver a vision of a world with zero crashes, zero emissions and zero congestion through the creation of electric, self-driving, connected vehicles and shared mobility services that will transform how we get around. Another great example is Phillip Morris International, who are focusing on their mission to one day stop selling cigarettes and move customers on to smoke-free products that—while not risk-free—are a far better choice.

Research by Deloitte in 2019 has shown that purpose-oriented companies have higher productivity and growth rates, along with a more satisfied workforce who stay longer with them. Their research shows that such companies with a strong sense of purpose report 30% higher levels of innovation and 40% higher levels of workforce retention than their competitors.

To be successful, carbon reduction cannot just be a project issue, or a board issue. Instead, it must become a purpose-led mission that is embedded across the business.

The C-suite needs to drive home the purpose of going digital to reach long-term targets to reduce carbon emissions as well as delivering better business relationships both short-term and long-term. As highlighted in our conversations with Howard Mitchell, head of innovation at HS2, and Tim Wood, the director of Northern Powerhouse Rail at Transport for the North, the ultimate success of carbon reducing initiatives is dependent upon effectively cascading the importance of carbon reduction throughout the workforce. As Mitchell cited, effectively delivering this change relies on the education and empowerment of site operatives to make important decisions, such as not allowing polluting vehicles to enter sites and to send deliveries back.

Successfully embedding a carbon-cutting mindset across an organisation and recording the reductions will be crucial if climate-related disclosure is to be accurate.

There is perhaps an even larger opportunity here to create a new economic model for infrastructure.

Going digital must be seen as an enabler to genuine transformation of the infrastructure industry, which should be tied to standardised production methods seen in manufacturing and taking into account the potential that AI, automation, and construction robotics provides to deliver transformational change.

If we simply digitise what we are currently doing, we have missed an important opportunity.

Contributors

- Costain
- Environmental Agency
- HS2
- Pinsent Masons
- Transport for the North

Grateful thanks to the following business that took part in the survey:

- AECOM
- Anglian Water Services
- Arup
- Atkins
- Balfour Beatty
- BAM Nuttall Ltd
- British Water
- Crossrail International Limited
- Dŵr Cymru Welsh Water
- i3P
- LandSec
- McKinsey and Partners
- Mott MacDonald
- Network Rail
- Rolls Royce
- Royal Haskoning DHV
- Sir Robert McApline
- TFL
- Thames Tideway
- Transport for Wales
- Turner & Townsend
- University College London

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