



# CAMBRIDGE SERVICE ALLIANCE

## Annual Review Year 11

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# Cambridge Service Alliance

## industrial partners



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A global building materials company, CEMEX provides high-quality products and reliable service to customers and communities in more than 50 countries throughout the world, and maintains trade relationships in 100 nations. It works hard to develop and deliver the best solutions in cement, ready-mix, and aggregates, transforming ideas into reality. It is focused on creating sustainable value by providing industry-leading products and solutions to satisfy the construction needs of its customers around the world. It strives to make the future better for its customers, shareholders and communities by becoming the world's most efficient and innovative building materials company.



Founded in 1976 as one of India's original IT garage start-ups, HCL is a pioneer of modern computing with many firsts to its credit, including the introduction of the 8-bit microprocessor-based computer in 1978 well before its global peers. Today, the HCL enterprise has a presence across varied sectors that include technology, healthcare and talent management solutions and comprises three companies – HCL Infosystems, HCL Technologies and HCL Healthcare. The enterprise generates annual revenues of over US \$ 8.9 billion with more than 143,000 employees from 140 nationalities operating across 44 countries.



Operating in the UK for over 20 years, Bouygues Construction is active in the building, infrastructure and energies and services sectors. With 58,000 responsible and committed employees in more than 60 countries, Bouygues Construction is a leader in sustainable construction. The Group sees shared innovation as its primary added value and ensures that health and safety are its top priorities. It has pledged to cut its greenhouse gas emissions by 30% by 2030 and offers its customers a wide range of low-carbon solutions. In 2020, Bouygues Construction generated sales of €12 billion.

# WELCOME



## Building digitally-enabled businesses in a time of pandemic

The last year has been a challenging one, as the pandemic has continued to affect all organisations, particularly their ambitions for digital transformation. In many cases, plans for digitalisation have been accelerated in order to support seamless operations, maintain - or improve - customer service and, ultimately, guarantee economic survival.

Widespread vaccination had given us grounds for optimism that a return to pre-pandemic life was just around the corner. However, it now seems that adaptation to the virus and its variants will continue to be a fact of life for the foreseeable future. Agility and flexibility will be key, with hybrid working and digital acceleration the norm, presenting plenty of challenges as well as opportunities to create value in new and different ways.

Before the pandemic, the Cambridge Service Alliance had agreed our four core research themes with our industry partners. If anything, they are now more important to organisations than they were then:

- ▶ How firms can formulate a successful digital transformation strategy.
- ▶ How digital twins and platforms can create new business models and revenue streams.
- ▶ How to apply and benefit from emerging technologies.
- ▶ How technology can help us better understand customer behaviour and improve the customer experience.

In this *Review*, you can read about the groundbreaking work my team has been undertaking in collaboration with our partner, HCL Technologies and its Premier League client, Manchester United (page 4). We have shown that AI can predict with a high degree of accuracy how well a particular social media post will perform in terms of customer engagement. Our findings have the potential to revolutionise customer engagement strategies. Customer experience and engagement is also the focus of Gautam Jha's research (page 11), in which he explores how UK retailers have fared during the pandemic and, in particular, how a digital presence can increase resilience in the face of market shocks. Meanwhile, Stephen Mak, under the supervision of the IfM's Dr Alexandra Brintrup has been using deep learning techniques (page 16) to help reduce the environmental impact of supply chains by enabling distribution firms to increase efficiency through collaboration.

In spite of the disruption caused by COVID, business model innovation is still top of many organisations' to-do lists. However, while the opportunities are compelling, the barriers to success remain high. Dr Faisal Rashed explains (page 7) how he is helping executives overcome those barriers by putting in place robust organisational structures and systems to drive and deliver new business models. Business model innovation is also the focus of Dr Erika Pärn's work (page 13) on digital twins. She is looking at how the technology has the potential to do more than improve operational efficiency and provide the foundation for brand new business models and revenue streams.

These are just some of the projects touched on in this *Review*. We hope it gives you an insight into the work we are doing in collaboration with our industry partners to support digital transformation in these challenging times. Do get in touch if you would like to know more about any of the topics covered in it, or, indeed, how you can join the Cambridge Service Alliance.

Professor Andy Neely  
Director, Cambridge Service Alliance

Dr Mohamed Zaki  
Deputy Director, Cambridge Service Alliance

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# ‘Likes’ guaranteed: how AI can revolutionise your social media and customer engagement strategy

The Cambridge Service Alliance, working with HCL client and Premier League football club, Manchester United, is using deep learning to understand why some social media posts work and others don't – and how those insights can help businesses to boost customer engagement.

Social media lies at the heart of every organisation's customer engagement strategy yet its engagement rates remain surprisingly modest. For example, according to Rival IQ's 2021 Social Media Industry Benchmark Report, the median Instagram engagement rate across industries is less than 1%.

Even in the highly emotive world of football fandom, Manchester United's most successful Instagram posts engage fewer than 10% of its 26 million followers.

One of the attractions of social media channels is that they give the impression of being highly measurable, with executives able to produce eye-catching graphs showing the numbers of likes, shares, reach and impressions. However, because they only capture a key stroke and not the sentiment behind it, what these metrics can't tell you is why one post appeals more than another and, by extension, how best to drive engagement through future posts.

At the Cambridge Service Alliance, we have been using deep learning techniques to understand what kind of posts perform best. To do this, we have had to solve a number of problems: how do you measure responses, how do you differentiate between different types of

content and how do you 'get behind the click' to understand what's driving – or deterring – engagement.

## Like for like

The first question we needed to address was how to compare responses to two different posts. At first glance, this seems obvious. Surely, you just need to check the number of likes, shares or comments? But if you take two posts, posted several years apart, which have attracted a similar number of responses, how do you really know which has been the most successful, given that the older one will have continued to attract engagement over time. To find out, you have to factor in the number of followers you had at the time of the post and, hence, what proportion of them engaged with your content.

Our first task, then, was to create a new metric which looks both at engagement levels (likes, new followers, number of comments) and the number of followers on the day of posting, allowing us to determine the percentage of engagement at that time, thereby disposing of the accumulation problem. Another approach would be to compare the response to today's post with the average performance of similar posts over the previous three or six months.

Both of these solutions generate a more nuanced and therefore more useful engagement metric which can not only help marketers interpret results more accurately but also enables our deep learning algorithm to understand which posts have been the most successful and therefore predict what is going to work better in the future.

A further challenge when trying to measure the success of a post is that you are not comparing like with like. Different types of content are trying to achieve different objectives. Manchester United, for example, posts on a wide range of topics for many different reasons, ranging from a celebratory photo after a big win to a post promoting a commercial partner.

The Club knows the former will always outperform the latter in terms of engagement but those promotional posts play an important part in generating value for it and are therefore here to stay, even if the engagement rates are low. What we need to assess, therefore, is how different posts perform when measured against similar types of content.





## About the author

**Dr Mohamed Zaki**, Deputy Director, Cambridge Service Alliance. His research interests lie in the field of machine learning and its application to digital manufacturing and services

## Categorising content

To understand how the content or style of imagery affects customer engagement, we developed a framework that can accommodate different types of customer interaction. We defined these as: emotional, informational and commercial. For Manchester United, an 'emotional' interaction is likely to be sharing content about star players and big wins. In other sectors, we see brands using celebrities and influencers to achieve similar kinds of emotional connection.

Informational interactions could be news about a new signing or, in other sectors, a product launch. Commercial interactions include more business-related content such as entering into new partnerships or the latest share price.

## The power of imagery

Social media is all about photos and videos. We also needed to understand what kind of imagery is the most engaging.

To do this we used machine learning to analyse both photographs and individual frames of videos to find out which elicit the best response. We found that certain types of image performed consistently better than others. For example, photographs of people generally score well, but how well is determined by a number of factors including the position of their eyes in the frame or if their gaze is straight ahead or off to one side. People who have their eyes shut or who

have a sad or neutral expression tend not to score highly whereas a smiling face, looking straight ahead has a positive correlation with engagement.

Other positive characteristics include pictures taken outside with good light. Too much sky seems to be undesirable, as is text overlaid on a photograph. Image quality is important, with blurriness scoring badly which may account for underperforming archive footage.

This approach can be applied to any organisation's social media accounts or other digital platforms to tell them what type of imagery will work best for their audience. It can go as far as helping them choose the right image. On a match day, for example, Manchester United has around 12,000 photographs to choose from. This algorithm can instantly identify which of those is likely to get the most engagement.

## Behind the clicks

Imagery is just one aspect of social media. To find out more about how people are relating to your content, you also need to analyse what they are saying in their comments. We used natural language processing techniques to look at one and a half million pieces of data, representing six months' worth of posts, analysing both what the post says and how people have responded to it.

For Manchester United, certain topics such as announcements about players and match-day results have a positive

impact on engagement whereas podcasts, archive images and footage and behind-the-scenes tours all had a negative correlation with engagement.

## Predicting the future

All of these different elements – the medium, the metrics, the style and content of the imagery, the comments – were analysed separately using deep learning architectures. We experimented to see which type of analysis contributed most to a positive outcome and then chose the highest scoring features to train the algorithm to classify those topics and content types that drive engagement. Our algorithm is 86% accurate in predicting low or high levels of engagement.

The research question we set ourselves was to see if we could apply new AI techniques to predict which kinds of social media content will generate higher or lower levels of engagement. To test our approach, we worked with one organisation, Manchester United and one social media channel, Instagram but these techniques can be used by anyone to optimise their social media (and other digital platform) activities and develop customer engagement strategies that are guaranteed to work.



Photo by Carlos Muza on Unsplash

## DIGITAL TRANSFORMATION STRATEGY

# Using data to drive business model innovation

New technologies have transformed the ways businesses are able to collect, analyse and leverage their data. The digital tech giants have demonstrated the value of doing so in no uncertain terms, disrupting the old order with their platform-based business models. If they are to thrive in this new landscape, those companies that weren't 'born digital' also need to harness the power of data in order to renovate their existing business models - or invent completely new ones.



But making this happen is not a straightforward task. Companies that have been in business for decades – or even centuries – often have a wealth of data at their disposal but may lack both a clear understanding of its value and the capabilities to exploit it.

To better understand how established firms are trying to leverage their data more effectively – and the challenges they have encountered in the process – we have looked at 19 examples of data-driven business model innovation from the United States, Europe and Asia-Pacific. Building on this research and combining it with established theoretical approaches, we have developed two models to help executives navigate the business model transformation journey. The first describes the organisational structures that firms need to put in place and the second, the steps they need to take along the way.

## Understanding the scale of the task

If a firm is serious about reinventing its business model, it will need to undergo seismic organisational transformation, overhauling its existing capabilities and putting in place the structural, cultural and procedural change that enable organisation-wide collaboration, particularly between the business and technical functions. It may also need to completely rethink its relationships with other organisations in its ecosystem, perhaps entering into partnership with its competitors.

Leadership and support from senior management is crucial in driving this kind of root and branch change. New business models will compete with the firm's existing models for resources. Strong direction is needed to prevent innovation from being smothered by traditional business models.

To compound the difficulty, all companies are facing a shortage of skills in data science and computer programming. In the face of such significant challenges, how can firms move forward and make

good strategic and operational decision as they go?

## Four routes to data-driven business model innovation

Our research revealed that companies tend to take one of four approaches, two of which we described as 'indirect' and two as 'direct'. The indirect approaches are all about building capabilities first, whether that's analytical or technical and introducing change incrementally. The direct approaches set out with an overarching strategy and a fully mapped out route to achieving it. They are characterised by clear vision and leadership, often coming directly from the CEO.

### 1. Analysis first

The emphasis here is on developing detailed use cases, usually driven by a particular business unit, which are rigorously tested and a minimum viable product developed before further investment and scaling can take place. In our study, this approach was exemplified by a global pharmaceutical company with an ambition to be a data-led enterprise. Its sales and marketing division worked with consultancy firms to identify analytics use cases for both enhancing the existing business models and developing new ones. Supported by IT staff, the sales and marketing team developed, prioritised and sequenced the use cases, deciding to favour those that increased efficiency rather than undertaking riskier transformation projects. IT developed a solution architecture to support the project, building in the ability to scale it over time. A minimum viable product was developed and presented to the leadership team, resulting in funding to implement the innovation at scale.

### 2. Technology first

Another common approach is to start by building technical capabilities. These projects are often led by the IT department with a focus on sourcing best-in-class technology solutions but not always with a clear understanding

of the business needs. A European Bank with global reach demonstrated the pitfalls of this approach. Its leadership recognised the critical role data can play in delivering financial services and decided to implement a platform as the backbone for its new digital offerings. Based only on high level use cases, the IT team embarked on a vendor selection process and invited the top-ranked supplier to carry out a proof of concept for the proposed data lake. It was only once the platform was in place, the bank realised it was missing critical analytical capabilities.

Both of these pathways take a bottom-up approach but in the companies we looked at those that had taken a gradual business-centric approach rather than a technology or platform-led approach were most likely to be successful.

### 3. Business model integration

This approach starts with a new business model design which is implemented through a major organisational transformation. This was the preferred route for a European energy provider looking to develop new data-driven business models. It set up an innovation division charged with this task which in turn established a cross-functional team to identify opportunities. The result was a multisided platform that can deliver new services which save money for consumers and ecosystem partners. The team designed the whole thing including the operating model, the information system architecture and the technology architecture.

### 4. The start-up approach

Alternatively, a firm may decide that company-wide transformation is biting off more than it can chew and opts instead to create a start-up to develop its new business models. This can be a more agile solution, allowing the company, for example, to circumnavigate some of the challenges caused by legacy IT systems and to bring in new skills and mindsets. This approach was exemplified by a Chinese insurance company wanting to develop new business models to leverage

## About the author

Dr Faisal Rashed, Research Associate, Cambridge Service Alliance. Before joining CSA, Faisal worked as a strategy consulting manager at Accenture Strategy in Zurich.

its 650 million clients' 10 years of health data. It set up a brand new company, hiring people with the right skills and expertise, extracting data as needed from its parent and designing a new architecture that would allow rapid scaling with minimum effort.

## A new framework for data-driven business model innovation

Whichever approach firms take to business model innovation, one thing is certain: it is a complex, multi-functional task. To guide executives through it, we have developed two models drawing on established organisational theory: the first describes the structural building blocks needed to achieve a successful transformation and the second shows what needs to happen at every stage of the process.

### Building the system

Our model is predicated on an agile approach to innovation. Its building blocks support the three key elements of business model design and delivery: value proposition, value creation and value capture (see figure below).

The value proposition contains the strategy, which sets the direction for the endeavour. Use cases and potential business models are developed to support the value proposition, using proven techniques such as the Business Model Canvass. The system's 'engine' is the value creation element and is what

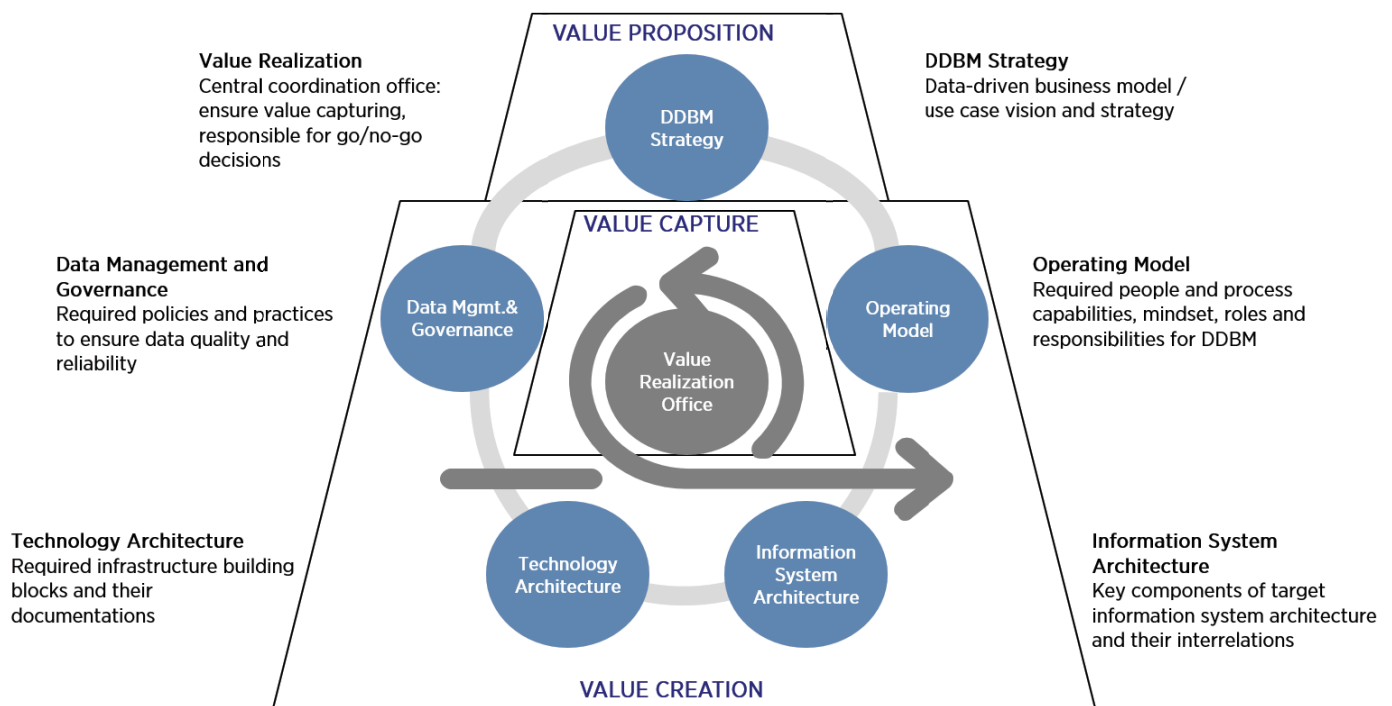
enables change. It includes all the business and technical capabilities needed to bring about transformation, such as the infrastructure and governance required for good data management, the selection of appropriate technologies and having the right people in place with the right skills, roles and mindsets.

The value realisation office at the heart of the system controls value capture, tracking progress, monitoring costs and ensuring that all investment is justified.

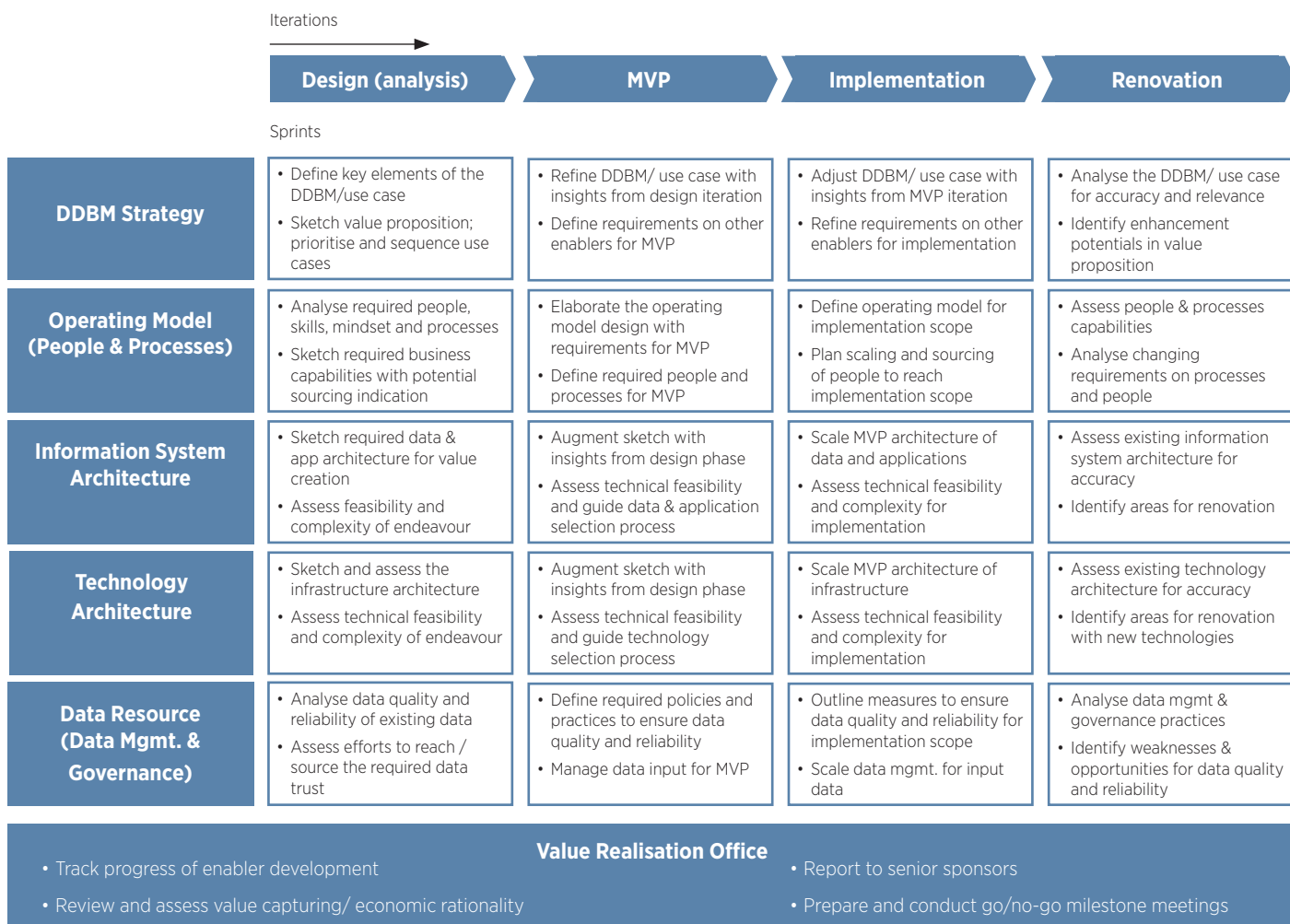
### A step-wise approach

With the appropriate structures and resources in place, executives should seek to adopt a consistent process that supports effective decision-making and cross-disciplinary cohesion. Building on previous research and our own case studies, we have developed a guide to implementing the value creation activities using this agile and iterative but clearly structured approach (see figure right).

Successful data-driven business model innovation requires new capabilities, new organisational structures, processes and cultures. It is never going to be easy but those firms that take a robust, analytical and structured approach combined with strong vision and leadership and a willingness to invest will be well-placed to succeed.



Data-driven business model framework



Data-driven business model: dynamic view

## Five critical success factors for data-driven business model innovation

**1. Invest in the data:** data is only useful if it is both reliable and retrievable. Making sure you have the right infrastructure and governance in place is critical. Don't underestimate the complexity of this task: it often requires organisational transformation on a massive scale.

**2. Act like a start-up:** decide what capabilities you need rather than being constrained by what you've got, particularly if legacy systems are a barrier to progress. Build a core team to mitigate knowledge loss and bring in external help. Consultants can share useful insights and experiences from other industries and can play an important part in designing, testing and scaling new business models.

**3. Be agile:** developing new business models is full of uncertainty and, however detailed a use case, will inevitably require a lot of trial and error. Teams need to test different options, iterate and adjust – and do so quickly, in order to get to market and achieve competitive advantage.

**4. Control your decentralisation:** agile working means flat structures and autonomous teams. But you need a central unit (what we call a 'value realisation office') to co-ordinate this work, making sure that senior management is engaged, progress is monitored, go/no go decisions are taken at the right times and that the activities are appropriately funded.

**5. Prioritise.** this kind of business model innovation carries high risks for established companies, as they embark on capability development and organisational restructuring with unclear returns. It is easy to be seduced by the hype around new technologies. To avoid this you need to retain a value-driven mindset. At the ideation stage, many different options may be put on the table, each one promising rewards and demanding resources. Tackling them in the right order is crucial. By doing so, you can get early results and build strong foundations for future innovation. Falling into the technology trap may lead you to focus on prestige projects that sound impressive but are unlikely to deliver value.



### Read more:

A reference model for data-driven business model innovation, Faisal Rashed, Paul Drews, Mohamed Zaki, Communications of the Association for Information Systems. DOI: 10.17705/ICAIS.044XX

# Winners and losers: the role of technology in consumer retail during a crisis

**Many online retailers were able to thrive during the pandemic, while their bricks and mortar counterparts struggled. This research project is looking at the critical role of technology in delivering a resilient – and in many cases, enhanced – customer experience in a time of crisis.**

Before the pandemic, online shopping had been growing at a steady pace, accounting for more than 13% of total retail sales worldwide by 2019<sup>1</sup>. In 2020, after a year of lockdowns, that share had jumped to 18% of overall retail sales.

During the COVID crisis, retailers with an online presence were able to carry on serving their customers, even if they had to put a huge effort into managing their over-stretched supply chains and logistics. We saw many of them rise spectacularly to the challenge, with companies like Amazon seeing their profits soar as they kept households supplied initially with hand sanitiser and face coverings before switching to office supplies and fitness equipment as we all settled in for the long haul.

Another company that responded effectively to this most shocking of market shocks was UK health food chain Holland & Barrett. It also had to deal with an unprecedented surge of online orders. It was also able to pivot its operations by, for

example, turning some of its stores into distribution hubs and by partnering with consumer delivery specialist, Deliveroo<sup>2</sup>.

Those retailers, on the other hand, who relied solely on physical stores and footfall for their revenues were severely hit by the lockdowns.

The world of fashion retail is a good example of how that played out. Prior to the outbreak of COVID, it had already been undergoing a major structural realignment with high-street stalwarts such as Debenhams and House of Fraser struggling while online-only newcomers such as ASOS and Boohoo snapped up market share. The pandemic, in effect, turbo-charged what was an already accelerating trend, bringing forward the retail landscape predicted for 2025-30 to the here and now.

The UK-based fast-fashion giant Primark, which has remained resolutely committed to bricks and mortar – despite a growing clamour from its customers for online

shopping – lost £2 billion in sales during 2020. ASOS, in contrast, saw its revenues grow by 24% in the second half of the year.

## What does this mean for companies like Primark?

If they are to be resilient to future shocks, they need to adjust their thinking. A digital presence is critical and it needs to be more than a standalone website. To compete online, retailers need a sophisticated distribution operation that is seamlessly integrated with their stores so that it can offer services now considered as standard, such as 'Click and Collect'. Retailers will need to pivot from being 'touchpoint centric' to becoming 'customer experience centric'. This will come with a heavy price tag, particularly in the fashion sector where there is a culture of returns which can be as high as 25% of sales.

But there are opportunities here too. By not developing their own online channels, retailers like Primark are ruling themselves out of a huge slice of the market. Going

1. <https://www.statista.com/study/70406/retail-market-worldwide/>

2. <https://internetretailing.net/strategy-and-innovation/strategy-and-innovation/interview-how-holland--barrett-enabled-its-customers-to-give-to-charity-during-lockdown--and-other-ways-its-adapted-in-the-light-of-covid-19-21577>





Photo by freestocks on Unsplash

online has other benefits, such as the swathes of real-time customer experience data that can generate the insights it will increasingly need to build further loyalty among its customers. At the same time, a proportion of the investments will be recouped through supply chain efficiencies derived from end-to-end digitalisation.

But the most critical lesson bricks and mortar retailers have learnt from COVID 19 is the need for resilience. The world was unprepared for a pandemic and the only thing we can be certain of is that unforeseen challenges lie ahead, whether it's an Icelandic volcano, a blockage in the Suez Canal, cyber attacks, lorry driver shortages, catastrophic climate events or an outbreak of a deadly new virus.

Whatever the future holds, the pandemic has given us an opportunity to study how the adoption of technology has made some retailers more resilient than others and, in some cases, allowed them to enhance their customer service in a crisis.

By understanding who were the winners and losers this time round – and why – we can help retailers make sure they are ready for their next big challenge.



### About the author

Gautam Jha, University of Cambridge  
Prior to studying for a PhD, Jha forged a successful career in customer experience management and digital transformation with major brands globally such as Marks and Spencer in the UK and Avaya in the US.

His research interests lie in holistically studying how firms can improve management of customer experience. For this particular research, he is interviewing technology leaders and practitioners across the consumer retail sector, assessing their market performance during COVID and analysing how technology helped them maintain service continuity and manage the customer experience.



## PLATFORM-BASED BUSINESS MODELS

# Developing new services: how digital twins can realise their true potential

The bigger and more complicated the engineering problem, the more likely it is to have a digital twin. Firms that build rockets, planes and ships, for example, have been creating digital twins since the early 2000s, seeing significant operational efficiencies and cost-savings as a result. To date, however, few firms have been able to realise the full potential of this technology by using it to develop new value-added services for their customers. We have developed a framework designed to help scale the value of digital twins beyond operational efficiency towards new revenue streams.

In spite of the hype surrounding digital twins, there is little guidance for executives to help them make sense of the business opportunities the technology presents, beyond cost savings and operational efficiencies.

Many businesses are keen to get a greater return on their digital twins' investment by capitalising on the innovation – and revenue generating – opportunities that may arise from a deeper understanding of how customers use their products. However, because very few firms are making significant progress in this regard, there is no blueprint to follow. New business models are evolving but the business opportunities for suppliers, technology partners and end-users is yet to be fully documented.

Most businesses will be familiar with the business model canvas as a tool to identify current and future business model opportunities. Our 'Four Values' (4Vs) framework for digital twins is a more concise version of the tool, developed to help executives better understand potential new business models. It was designed from a literature review and validated and modified through industry interviews.

The 4Vs framework covers: the value proposition for the product or service being offered, the value architecture or the infrastructure that the firm creates and maintains in order to generate sustainable revenues; the value network representing the firm's infrastructure and network of partners needed to create value and to maintain good customer relationships; and value finance such as cost and revenue structures.

### Value proposition

The value proposition describes how an organisation creates value for itself, its customers and other stakeholders such as supply chain partners. It defines the products and services offered, customer value (both for customers and other businesses) as well as the ownership structure.

Examples of digital twin-based services include condition monitoring, visualization, analytics, data selling, training, data aggregation and lifespan extension.

Examples of customer value in this context might include: decision support, personalisation, process optimisation and transparency, customer/operator experience and training.

### Value architecture

The value architecture describes how the business model is structured. It has 5 elements:

1. Value control is the approach an organisation takes to control value in the ecosystem. For example, does it exist solely within its own ecosystem of digital twin services or does it intersect with other ecosystems?
2. Value delivery describes how the digital twins are delivered, are they centralised, decentralised or hybrid? It also seeks to understand any barriers that may prevent the delivery of digital twins to customers.
3. Interactions refers to the method of customer interaction with the digital twin. Common examples of interaction include desktop or mobile app, virtual reality and augmented reality interactions.
4. Data collection underlies the digital twin value proposition and can be a combination of the following: sensor based and/or supplied/purchased data.
5. Boundary resources are the resources made available to enhance network effects and scale of digital twin services. This typically comprises the following: APIs, hackathons, software development toolkits and forums.

### Value network

The value network is the understanding of interorganisational connections and collaborations between a network of parties, organisations and stakeholders. In the context of digital twin services, this is a given as the delivery mechanism relies on multiple organisations, technological infrastructure and stakeholders.

### Value finance

This defines how organisations approach costing, pricing methods and revenue structure for digital twins. Digital twin revenue model most commonly refers to outcomes-based

revenue streams and data-driven revenue models.

Digital twin pricing models include, for example, freemium and premium, subscription models, value-based pricing and outcome-based pricing models. Four types of digital twin business models From extensive interviews with middle and top management on services offered by digital twins, we identified four different types of business models and applied our 4Vs approach to understand how those models are configured and how they generate value.

### Brokers

These were all found in information, data and system services industries. Their value proposition is to provide a data marketplace that orchestrates the different players in the ecosystem and provides anonymised performance data from, for example, vehicle engines or heating systems for buildings. Value Finance consists of recurring monthly revenues levied through a platform which itself takes a fee and allocates the rest according to the partnership arrangements.

### Maintenance-optimisers

This business model is prevalent in the world of complex assets, such as chemical processing plants and buildings. Its value proposition lies in providing additional insights to the customer on the maintenance of their assets to provide just-in-time services. What-if analysis and scenario planning are used to augment the services provided with the physical asset that is sold.

Its Value Architecture is both open and closed, as these firms play in ecosystems but also create their own. They control the supply chain, how they design the asset, how they test it and deliver it. Its Value Network consists of strategic partners in process modelling, 3D visualisation, CAD, infrastructure and telecommunications. Value Finance includes software and services which provide a good margin within a subscription model. Clients are more likely to take add-on services that show significant cost savings.





## Uptime assurers

This business model tends to be found in the transport sector, where it's important to maximise the uptime of the aircraft, train or vehicle.

The value proposition centres on keeping these vehicles operational, either through predictive maintenance for vehicle/ aircraft fleet management and, in the case of HGVs, route optimisation. Its Value Architecture is transitioning from closed to open ecosystems. There are fewer lock-in solutions as customers increasingly want an ecosystems approach. Typically, it is distributors, head offices and workshops that interact with the digital twin rather than the end-customer. The Value Network is open at the design and assembly lifecycle stages but becomes closed during sustainment phases. For direct customers digital twins are built in-house and are therefore less reliant on third-party solutions. Its Value Finance is focused on customers paying a fee to maximise the uptime of the vehicle or aircraft, guaranteeing, for example, access five days a week between certain hours.

## Mission assurers

This business model focuses on delivering the necessary outcome to the customers. It tends to be found with government clients in the defense and aerospace sector. Value propositions are centered around improving efficacy of support and maintenance/ operator insight and guaranteeing mission success or completion. These business models suffer from a complex landscape of ownership for integrators of systems as much of the data does not make it to sustainment stages.

Its Value Architecture is designed to deliver a series of digital threads in a decentralised manner. Immersive technologies are used for training purposes or improved operator experience. Its Value Network is more closed than open as these industries focus on critical missions of highly secure assets. Therefore, service providers are more security minded and careful of relying on third-party platforms for digital twin services. Semi-open architecture is

4Vs	Dimensions	Characteristics
Value Proposition	Customer value	Personalisation
		Decision support
	Service	Customer insight
		Data analytics
		Employee training
		Lifespan extension
	Ownership	Sole ownership
		Co-ownership
Value Architecture	Value control	Open ecosystem
		Closed ecosystem
	Value delivery	Hybrid (centralised and decentralised DT)
	Interaction	Immersive technology
	Data collection	Internal sensor data
		Externally purchased data
	Boundary resources	APIs, hackathons, toolkits
Value Network	Operating Mechanism	Third-party platform dependent
		Developed in-house
Value Finance	Pricing	Subscription-based
		Performance-based
		Value-based

used to connect to different hierarchies of digital twins/digital threads. Value Finance revealed that existing pricing models, contracts and commercial models are not yet necessarily mature enough to transition into platform-based revenue models. Insights as a service is a future direction but challenging at the moment, with the market not yet mature for outcome-based pricing.

For B2B service-providers who are looking to generate new revenue from their digital twins, it is important to consider how the business model should be configured and identify major barriers to their success. Our research found that the barriers most often cited were cost, cybersecurity, cultural acceptance of the technology, commercial or market needs and, perhaps most significantly, a lack of buy-in from business leaders. Our 4Vs framework has been designed to help those leaders arrive at a

better understanding of the business opportunities digital twin services can provide. We hope this will drive innovation and help digital twins realise their full business potential.

## About the authors

**Dr Erika Pärn** is a Research Associate at University of Cambridge supporting the Cambridge Service Alliance and Centre for Digital Built Britain.

**Dr Michael Grieves** is Chief Scientist of Advanced Manufacturing and the Executive Vice President of Operations at the Florida Institute of Technology.

**Dr Mohamed Zaki** is Deputy Director of the Cambridge Service Alliance.



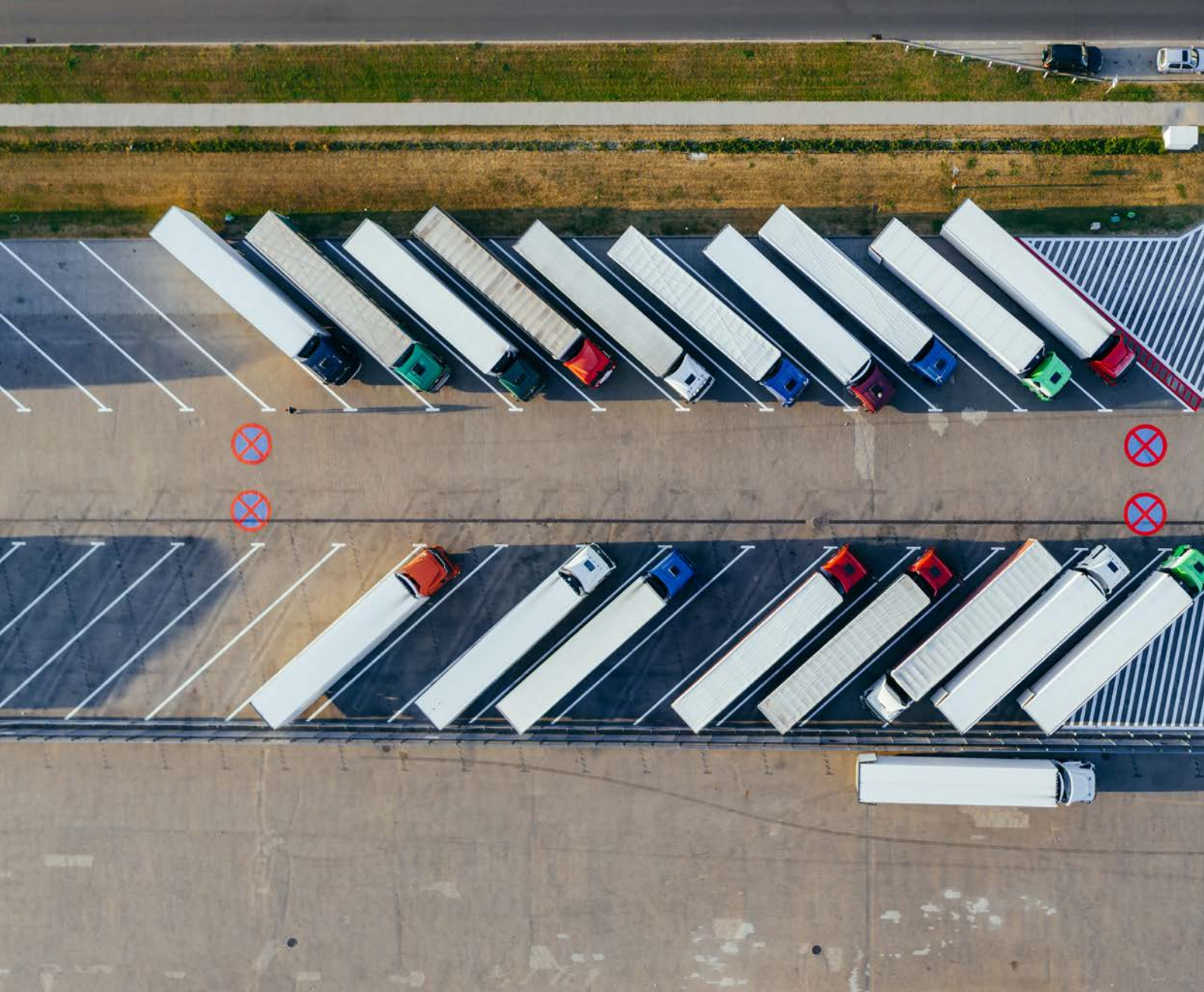


Photo by Marcin Jozwiak on Unsplash

## APPLICATION OF EMERGING TECHNOLOGIES

# Deep learning for greener supply chains

Heavy Goods Vehicles (HGVs) account for around 5% of the UK's greenhouse gas emissions and are an important target for decarbonisation. Unfortunately, they are also one of the most difficult types of vehicle to decarbonise. This project investigates the use of deep learning to help transport firms work together to reduce their CO<sub>2</sub> emissions.

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Moving huge loads thousands of miles requires vast amounts of power which battery (or hydrogen) technology is currently unable to supply. The problem is compounded by endemic inefficiencies in the sector: trucks are, on average, only 61% full and they are completely empty for 29% of miles travelled.

We aim to address this inefficiency through 'collaborative vehicle routing', an idea that has been around since the early 2000s. Since then, logistics companies have put a lot of effort in to making their own processes more efficient by adopting methodologies such as lean manufacturing and six sigma. But this efficiency only extends as far as their own organisational boundaries. If companies could be persuaded to collaborate, there are significant opportunities for making further efficiencies and, by doing so, reducing CO2 emissions.

At the moment, each distribution company, working on its own, calculates the shortest distance for each journey in order to maximise profits. However, this means that different companies will often be making deliveries in the same area at the same time. By sharing information and working together, these firms could plan much more efficient routes. Where they don't have enough goods to fill a truck, they may also want to collaborate and share the space within a truck with other shippers. These kinds of efficiencies could result in significant cost-savings while reducing CO2 emissions and road congestion.

A potential application of collaborative vehicle routing lies in the less-than-

truckload transportation of goods, where shippers may decide to ship goods from point A to B, but do not have enough volume to fill the entire truck. Therefore, they may want to collaborate

If the rewards are so great, and the idea has been around for more than a decade, why hasn't it been adopted? One of the main barriers is the financial model: how do you divide the financial benefits fairly between the participating companies, particularly when the division of labour may fluctuate over time, with one company working harder than others.

Previous attempts to solve this problem have failed to scale but advances in deep reinforcement learning could help overcome the barriers to implementation

the collaborative routing problem, and it is already outperforming traditional approaches in terms of producing optimal results, quickly.

Modelling the most efficient routes for companies working collaboratively is relatively easy. But companies need to maximise their individual profits. Adding their self-interest into the mix makes the problem significantly more complicated. That's the problem we are now aiming to solve.

### What is reinforcement learning?

Reinforcement learning is a field within machine learning. Here, decision making entities, or agents, learn to navigate their environment in order to accumulate higher rewards or profit. Recently, success has been found in combining deep neural networks with reinforcement learning. Through introducing this non-linearity, amongst other tricks, richer strategies are made possible. The recent success of AlphaGo at beating the world champions at board game Go is testament to that. Not only did Alpha Go win, it used its deep reinforcement learning to invent a completely new move, known as Move 37, which had not been seen in the 2,500 years of Go history.

We are starting to make some promising progress in applying this approach to

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### About the author

Stephen Mak is a PhD student working with Dr Alexandra Brintrup in the Manufacturing Analytics Group at the Institute for Manufacturing

# How to create a digitalisation strategy that works

The convergence of new technologies such as smart sensors, Internet of Things (IoT), digital twins, blockchain, data analytics and AI is driving change at an unprecedented rate. This convergence has the potential to transform every aspect of the way a company does business.

As part of a Pitch-In\* project in 2021, the Cambridge Service Alliance, working with colleagues from the Universities of Sheffield and Surrey and Queen Mary University of London, published a report to help firms formulate successful digitalisation strategies.

The research team carried out in-depth interviews with 20 manufacturing companies and surveyed a further 290, ranging from some of the world's largest multinationals to firms with fewer than 50 members of staff in sectors including aerospace, chemicals, food and drink, machine and equipment manufacturing and pharmaceuticals.

## How to develop a successful digitalisation strategy: the process

The report sets out how key dimensions of strategy formulation affect the strategising process, which in turn affects the content of the strategy, and, ultimately, a firm's performance.

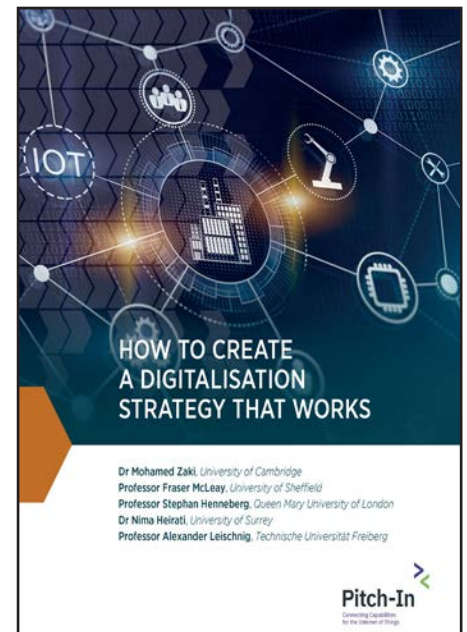
### External environment: dynamism and competition

Understanding the external environment and the social, economic and technological changes it is undergoing, is

the first step in the strategy formulation process.

Research has identified two key dimensions of the external environment that particularly affect a firm's approach to strategy formulation: the intensity of competition firms are experiencing and the rate of change they are seeing in their markets, the latter often driven by customer demand.

Why are these two dimensions so important? In sectors experiencing high levels of competition, firms may be forced to actively differentiate themselves from their competitors by being more of a risk-taker than a 'defender', a firm that seeks to protect its market position not through transformation but by offering superior products and services. High levels of market turbulence also make the strategising problem a more complex one – you are dealing with a constantly moving target – which also has an impact on the strategising process.

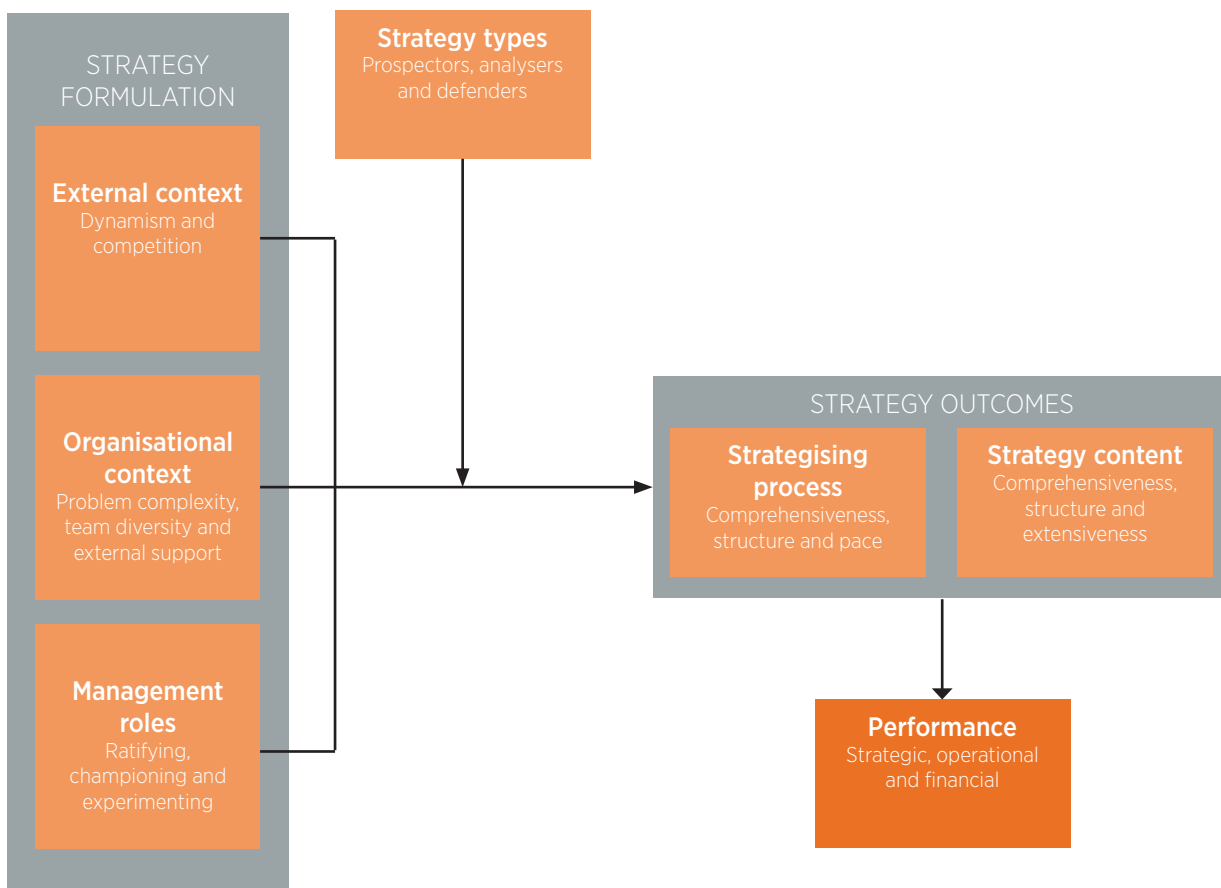


## Organisational context: problem complexity

Clearly, the complexity of the problem being addressed by the strategy will have a bearing on the strategy formulation process. In the case of digital transformation the level of complexity is likely to be high (although there is significant variation between sectors), with decisions having to be taken in a constantly shifting external and internal landscape.

Problem complexity can actually enhance strategy formulation. We found that where there are high levels of complexity, the planning and introduction phases of the strategies are more comprehensive and better structured. Unsurprisingly, complexity does not have a positive effect





on the pace of strategy development. However, at the transformation and operational stages, problem complexity does appear to result in more rapid progress, perhaps because the strategy planning stage was more effective

### Organisational context: team diversity

Given the complexity of the ‘problem’ being addressed, the composition of the team involved in addressing it is likely to be an important factor in successful strategy formulation. We know that a diverse team makes better decisions. The more functions that are represented (for example, HR, manufacturing, supply chain, IT, sales and marketing) at different levels of seniority with a variety of different backgrounds and experience, and the greater the age, gender and ethnic diversity of the team, the more effective the strategy is likely to be.

At the planning and introductory stages, the diversity of the digital strategy formulation team is the single most important success factor. It is still important at the transformation and operation stages, resulting in a more structured process.

### Organisational context: external support

The team also wanted to find out how much external support companies were seeking from, for example, consultancy firms, business investors and partners and universities and how much impact their input had on the process.

Its findings suggest that in the early phases of strategy development, external support helps to increase the pace of decision-making but it improves neither the comprehensiveness nor the structure of the process. In contrast, in

the later stages, it improves both the comprehensiveness and structure of the approach but does nothing to increase the speed of implementation.

### Management roles

Leadership is a critical success factor in strategy formulation but firms find that it is not straightforward to apply the usual governance structures and mechanisms when dealing with rapid technological and market change.

Research identified three different management roles that are critical in supporting strategy formulation, including ratifying, championing and experimenting.

**Ratifying:** evaluating the solutions that emerge from the digitalisation strategy development process and endorsing and monitoring those solutions that have the

This article is adapted from the Pitch-In report, ‘How to create a digitalisation strategy that works’. Read the full report at: [www.ifm.eng.cam.ac.uk/uploads/Pitch\\_In\\_Digi\\_Strategy\\_pdf\\_web.pdf](http://www.ifm.eng.cam.ac.uk/uploads/Pitch_In_Digi_Strategy_pdf_web.pdf)



greatest potential to meet the challenges emerging from environmental demands. This role is expected to sit with senior management.

**Championing:** presenting and advocating the most promising solutions and their long-term implications during the digitalisation strategy development process. Championing is expected to sit with middle management.

**Experimenting:** reacting to information from and developments in the firm's business environment when developing the digitalisation strategy. Operations managers are expected to engage in experimenting, which includes learning and improving, linking technical ability and need, initiating autonomous activities and taking risks.

The academic literature tells us that these roles are all important for success in strategy formulation and that they are typically carried out at different levels within the organisation. However, the researchers found that for digitalisation strategies, while the roles themselves are

important, it is senior management that is, in most cases, doing all three.

Of the three roles, experimenting seems to be the most important, particularly at the planning and implementation stages where it has a positive impact on all three dimensions: comprehensiveness, structure and pace. For firms at the more advanced digitalisation phases, being able to experiment increases the speed of the strategising process.

Championing and ratifying are not important early on but they become critical during the transformation and operation stages.

### Good process leads to good strategy leads to good performance

Having identified some critical success factors for strategy formulation we wanted to see if the effectiveness of the process improves the content of the strategy and if that, in turn, has an effect on performance.

The analysis shows that for firms in early digitalisation phases, the nature of the strategising process has an important impact on its outcome. The comprehensiveness of the process, how well structured it is, and the speed with which it is developed and executed have a significant impact on the extensiveness and comprehensiveness of the strategy itself. For those firms at a more advanced digitalisation stage, they saw the same results but with less of an impact on speed.

To find out if a good strategy results in good performance, they asked firms to rate their performance against their competitors over the last three years in three ways:

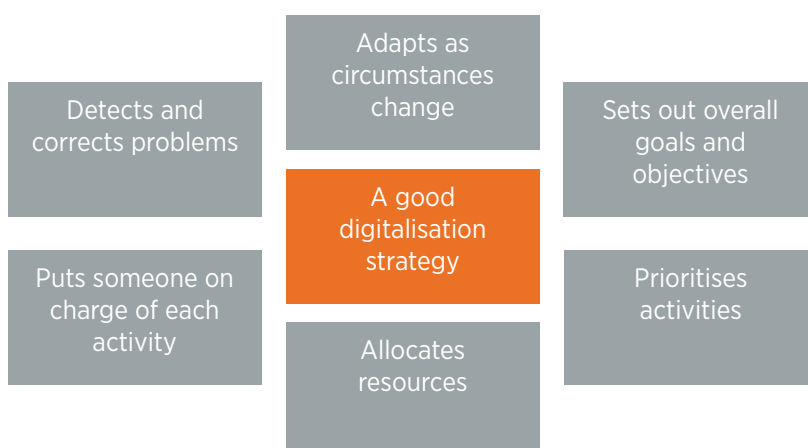
**Strategic:** has it led to the firm developing new products or services or entering new markets or introducing new technologies?

**Operational:** has it reduced costs, improved processes or reduced lead times?

**Financial:** has it resulted in increased sales and market share, profitability and delivered a significant return on investment?

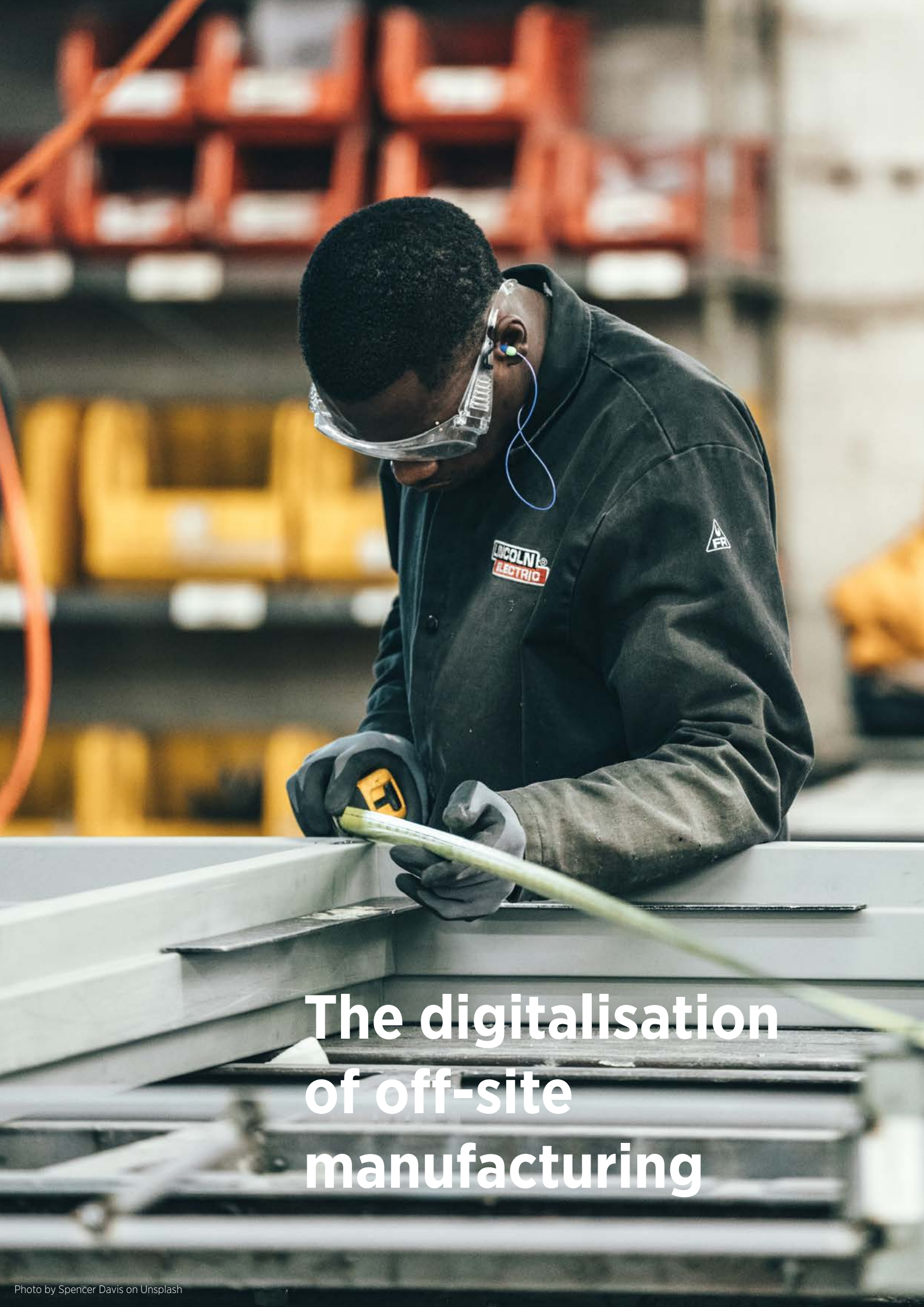
The researchers found that a good strategy does indeed result in strong performance in all three areas with operational performance fractionally ahead of financial performance, followed by strategic performance.

For firms engaged in digital transformation, this is clearly an important finding. It seems that how you set about formulating your strategy directly affects the content of the strategy, which in turn affects the firm's performance.



### About Pitch-In

The Pitch-In project shows how the Universities of Sheffield, Newcastle, Oxford and Cambridge, together with industrial and commercial partners, can deliver benefits by significantly enhancing Internet of Things (IoT) innovation. Pitch-in has carried out a range of 'mini-projects', each developing and trialling solutions to address one or more barriers, or seeking to exploit IoT opportunities. The project is funded until 2021 through Research England's Connecting Capability Fund. Find out more at [www.pitch-in.ac.uk](http://www.pitch-in.ac.uk)



# The digitalisation of off-site manufacturing

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## DIGITAL TRANSFORMATION STRATEGY

Off-site manufacturing (OSM) was introduced decades ago as a way to improve productivity, consistency and quality in construction. It is defined as the manufacturing, planning, design, fabrication and assembly of building elements off-site under controlled factory condition.

### Big picture

The case for use of OSM in construction is well established. The 'Off-site Manufacture for construction: building for change' report by the UK's House of Lords Science and Technology Committee concluded that OSM can help increase productivity in the construction sector while reducing labour demands, improving the quality and efficiency of buildings and reducing the environmental impacts associated with traditional construction.

The number of dwellings being built in the UK has been rising since 2013, reaching 202,250 in 2018/2019 but the total is not enough to address the housing crisis. Balancing supply and demand and securing sustainability will require upgrading construction capabilities by adopting new approaches at scale – such as modular and off-site manufacturing – and generating value through digital technology and emerging services.

### The project

We are exploring the landscape of OSM internationally and comparing use cases with the UK to develop a global picture. Looking at OSM through the lens of ecosystems economics and servitisation, we are considering the appropriateness of OSM as a solution to construction's productivity and efficiency problems. Furthermore, this research will attempt to identify new digital services that can reposition OSM as a sustainable business model.

Industry partners supporting the project (spanning both traditional construction and OSM) will supply data to be analysed and researchers will present case studies showcasing both successful and unsuccessful OSM deployment to highlight enablers and barriers to OSM in construction. Data analysis will inform a framework developed to support organisations making decisions in relation to OSM and identify service-based business models and associated new digital services.

The project will bring focus to: the new service-based business models and contracts required to support and enhance OSM current business models; the supply chain challenges; the financial implications of investment in innovation; and the attitudes and interests of different stakeholders. The research seeks to understand and evidence the impacts of digital innovation in construction and whole life value beyond productivity.

Researchers will work with industry partners to validate the framework developed to support organisations (both supply and demand) select the best service-based business model in relation

to OSM. These findings will provide case studies and findings useful to construction and, in the future, researchers hope to develop industry guidance.

### Key insights of this research

The development of a framework to support organisations identify the best service-based business model to support OSM and optimise benefits from new digital services emerging from OSM. Supporting organisations to better understand how to choose the right capabilities for OSM rather than sub-contracting and using intermediaries will secure better value for (public) money.

### Challenges

The manufacturing industry is built on a strongly consolidated structure and automated environment with integrated information flow, long-term relationships and shared benefits. The fragmented project management delivery model in construction does not seamlessly support digital transformation of the sector and features short-term relationships and lack of sharing information, risk and benefits between companies.

### Industry impact of the research

A new framework which will be tested with construction companies and clients (supply and demand) to provide guidance on how to choose the right service-based business model for OSM and optimise benefits from associated new digital services.

### Wider benefits

A shift towards a production-based model opens the door for vertical integration that enables new digital services including:

- Machine learning capabilities
- Development of a traceability system for monitoring the construction production which increases supply chain visibility, improves quality control systems and reduces risk
- Predictive maintenance that contributes to economic optimisation during the operating phase of the construction.



This article is adapted from one first published on the Centre for Digital Build Britain website: [www.cdbb.cam.ac.uk/news/research-profile-facilitating-digitalisation-site-manufacturing](http://www.cdbb.cam.ac.uk/news/research-profile-facilitating-digitalisation-site-manufacturing)





# The future of services in a time of pandemic

In our tenth anniversary year, the pandemic forced us to move our annual Industry Day online. COVID also became the focus of the day, with our speakers reflecting on the challenges - and in some cases, opportunities - it has presented. All our speakers - from Microsoft to Manchester United - shared pandemic stories of agility and rapid change, built on strong digital foundations.

## Deep research and innovation in health and life sciences

Dr Kenji Takeda, *Director of Health and AI Partnerships, Microsoft Research*

Takeda described how Microsoft's video-conferencing platform 'Teams' became an integral part of our working lives almost overnight - and how a digital transformation that looked like it would take years, happened in less than a week when it was rolled out to 1.3 million users in just four days.

He also explained how Microsoft Research's approach is to be a bridge between fundamental understanding and real-world problems. Recent projects include Project Inner Eye, working with Addenbrooke's Hospital and the University of Cambridge on medical imaging AI in precision radiotherapy. By using deep neural networks, it is able to create a precise map for treatment, saving clinical oncologists hours of work. Another ambitious project is ImmuneCode which aims to map the T-cell immune response to the virus.

For Takeda, the rapid acceleration in development in response to the pandemic will change the way we all think about services - because it has shown us what is possible.

## Digital transformation accelerated by a pandemic

Ahmed Wagih, *General Manager, L'Oréal Consumer*

L'Oréal is the world's largest beauty tech business. Over the last few years, it has seen a huge change in the way its customers consume beauty products. For Wagih, it is L'Oréal's early adoption of digital that has enabled it to meet this need.

In the 2000s, marketing content was created and delivered through print, television and radio. Today, the landscape is vastly more complex with web, apps and social media dominating the way L'Oréal communicates with its customers. Business channels have also changed with the rise ofetailers. At the same time, the amount of data available from supply chain partners has increased exponentially, which makes it possible to identify customers, understand which channels are most effective in reaching them and how to maximise its return on investment.

In 2018 L'Oréal acquired Modiface, experts in facial recognition and augmented reality so that consumers can try products such as lipsticks, foundation and hair colour virtually. When COVID struck, make-up was L'Oréal's most affected product line as people weren't going out. However, thanks to its acquisition of Modiface, it was able to offer a service which lets consumers try out its cosmetics, putting it ahead of the competition.

Wagih attributed L'Oréal's success during COVID to the company's previous focus on and investment in digital transformation and skills.



### Watch again

Watch the talks at  
[www.cambridgeservicealliance.eng.cam.ac.uk/IndustryDay/2020](http://www.cambridgeservicealliance.eng.cam.ac.uk/IndustryDay/2020)



# INDUSTRY DAY 2020

## How to reinvent a \$1.5 trillion industry in the midst of a pandemic

Saad Berrada, CEO and Co-founder, Fairjungle

Fairjungle is a start-up aiming to disrupt the business travel industry – during a global pandemic which has seen a 70% downturn in business travel. Berrada explained how his firm was finding the silver linings and opportunities for growth in a depressed market.

The industry had not evolved since the 1990s and was ripe for disruption. It has been technology companies rather than traditional travel agencies that have spotted the opportunity to develop new, platform-based services. Berrada described the impact of COVID on the industry. On the demand side, it led to less international travel and more regional travel and a concomitant shift from planes to trains.

There has also been a greater demand for managed travel. If people have to travel, they want to do so as safely as possible and with the reassurance a professional service can provide. Berrada has also seen a shift in mindset as regards sustainability. What was once a box that needed to be ticked, is now become a core value for many firms.

The pandemic has also affected the supply side. It has accelerated the move to digital – those without a platform cannot compete. Incumbents need to transform or they will disappear and be replaced by new, more agile players.

## Digital engagement in the era of COVID

Phil Salt, Head of Digital Product, Manchester United

Manchester United is a huge global brand. It connects with its 1.1 billion fans via a number of digital channels: selling kit and merchandise online, through its pioneering app, social media platforms, its ticketing and venue website and a 24/7 MUTV channel which also provides content to 195 territories through seven digital platforms.

Suddenly, there were no matches. How would the Club maintain its connection with its followers in the absence of football? In fact, this is something Manchester United has always done, explained Salt, between matches and between seasons. But COVID fundamentally changed the rules of engagement.

A key element in the Club's response was the move from 'social' to 'social responsibility'. How businesses responded to the unfolding crisis would have lasting implications for their brand.

It also meant finding new content and formats that would keep the fans engaged. Before 2019, the Club had embarked on a huge programme to tag all its digital content. This proved to have been an invaluable decision that allowed it to focus on classic games ('Match Rewind') and to package them as box sets. It also developed new formats such as UTD Unscripted 'long reads', a UTD podcast and massively ramped up activities such as competitions, quizzes, fantasy football teams.

Content diversification was another important strategy with 60 print publications that would normally be available at matches going online, providing further opportunities for tracking engagement. That ability to learn more about the fans is something the app was already delivering and the Club has been further leveraging it by developing more incentives to register.

Three takeaways:

- Invest in CSR – it is more important than ever for brands to be trusted and relevant. They need to not just meet consumer expectations but to be on the front foot.
- Prepare for the worst and be ready to pivot: worst case scenarios can and do happen
- New opportunities will emerge from a crisis – even when things go back to 'normal', both new consumer behaviours and business efficiencies will stick.

# COMMUNITY OF INTEREST 2021

## The future of services in a time of pandemic: challenges and opportunities?

Cambridge Service Alliance researchers and industry partners get together three times a year at our Community of Interest (Col) meetings to progress our joint research themes and to hear from distinguished industry speakers who share their insights into aspects of our four core themes.

### MARCH

At the March Community of Interest, CSA researcher Faisal Rashed followed by Erwin Bakker and Fatema El-Wakeel from Jaguar Land Rover tackled head on the challenges of harnessing big data and machine learning in order to achieve digital transformation. Rashed introduced his framework for data-driven business model innovation and the Jaguar Land Rover team described how they set about creating an analytics-driven decision-making team from scratch – during a pandemic.

The second half of the morning was concerned with creating new business models through the development of Industry 4.0 technologies. Erika Pärn presented her latest research into digital twins and their potential for driving business model innovation (see page 13). Don Kinard, Senior Fellow at Lockheed Martin described how his company is already deriving significant benefits from digital twins, digital threads and Industry 4.0.



Image: Bentley Systems, Microsoft HoloLens

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## MAY

At our second Col, Gautam Jha a Cambridge PhD student with a background in customer experience management and digital transformation, talked us through the changing landscape of UK retail in a digital world, with a focus on fast-fashion giant Primark's reluctance to develop an online offer.

Guest speaker Salla Eckhardt, Director of the Centre of Innovation at Microsoft Real Estate and Security helped us to develop our Digital Strategy theme. She explored the impact of digital transformation on the built environment using Microsoft's extensive real estate as a real-world example.

The rise of hugely successful platform-based businesses such as Uber and Airbnb has shown that it is possible to generate revenues through platforms but it's something other firms - particularly those that weren't born digital - are struggling to emulate. We were delighted to welcome Professor Annabelle Gawer from the University of Surrey who explained how to build a profitable platform business in four steps.

Finally, John Vickers, Principal Technologist at NASA gave us a fascinating insight into how the agency is undergoing a huge, organisation-wide digital transformation programme with the ultimate goal of enhancing its mission through business and engineering improvements.

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## SEPTEMBER

In September, CSA researchers gave updates on their research projects. Dr Zakaria Dakhli talked about his research into the construction sector and why offsite manufacturing still has a low market share when it consistently delivers higher levels of customer satisfaction than conventional builds.

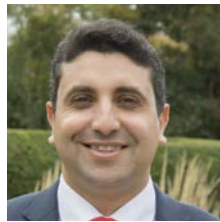
PhD student Stephen Mak talked about how emerging technologies such as deep reinforcement learning could solve the problem of collaborative routing in the transport sector. Dr Erika Pärn updated us on her digital twin research, sharing three very different case studies - digital twins of Tallin City and Notre Dame Cathedral in Paris and an example from the defence sector - to illustrate the variety of business models that can be supported by digital twin technology. Finally, Dr Faisal Rashed described a particular facet of his research on data-driven business models: the creation of 'temporary organisations' - groups of individuals with different skillsets who are brought together to perform a particular task - to drive innovation.



# 2020/21 PEOPLE

## STAFF

Left to right:  
Professor Andy Neely,  
Dr Mohamed Zaki, Dr  
Zakaria Dakhli,  
Dr Veronica Martinez,

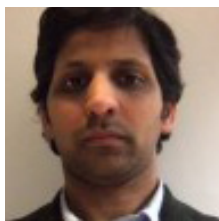
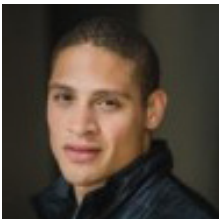


## STAFF T

left to right:  
Dr Erika Parn, Dr Faisal  
Rashed, Dr Florian  
Urmetzer, Dr Chander  
Velu

## PhD STUDENTS

This row, left to right:  
Ruben Amenyogbo,  
Jan Bluemel, Simon  
Dietlmeier, Maximillian  
Ge



## PhD STUDENTS

This row, left to right:  
Gautam Jha, Karolina  
Kuta, Francisco Gomez  
Medina, Paula Melfe





#### PhD STUDENTS

left to right: Sunil Sarferaz, Dequn Teng, Joseph Tsung-Yu Tsai, Neo C. K. Yiu (Not pictured: Fatema El-Zahraa El-Wakeel and Stephen Lile)

#### VISITORS

This row, left to right: Fiona Buckhardt, Dr David Diaz, Dr Ebru Gokalp, Professor Stephan Henneberg



This row, left to right: Professor Janet McColl-Kennedy, Professor Lars Witell

Not pictured: Michael Grieves, Mahsa Honary and Nicolai Huss

#### PROGRAMME ADMINISTRATION AND COMMUNICATIONS

Jacqueline Brown





## CAMBRIDGE SERVICE ALLIANCE (CSA)

A unique collaboration between the University of Cambridge and some of the world's leading businesses to design and deliver the services of the future.

“Our partnership with the CSA will create a wealth of new opportunities for HCL and our customers. Working alongside the world's foremost academics and leading organizations, we aim to pioneer new digital solutions for the next decade, today. Through these efforts, we will uncover new ways in which digital technologies can empower and transform businesses. We are also excited to be able to uniquely offer our customers the benefits of being a member of such a prestigious alliance.”

**Ashish Gupta, CVP and Head of EMEA, HCL Technologies**

“CEMEX has started its journey to design new services focusing on improving our customers' experience. The Design Lab Services was launched to research, diffuse and implement new approaches and best practices for service design. We are also committed to collaborating with the best universities and experts around the world on applied research and innovation projects to get prepared for the digital revolution.”

**Martin Adolfo Herrera Salado, Digital Enablement, Business Consulting Services, CEMEX**

“One of the key things about the Alliance is the non-competitive nature of the partners within it. That allows us to move away from some of the more traditional IP and confidentiality rules, to openly share our challenges, dig beneath the surface of some of the hype about digital and get into the nuts and bolts about how we really deliver it and the challenges we all face.”

**Caroline Burstall, Supply Chain Manager For Industrial Power Systems, Caterpillar**

“Innovation for the benefit of our customers, communities, and the environment is critical. We very much look forward to partnering with such a prestigious academic institution and are proud to be contributing to Cambridge and its regional reputation for excellence and innovation by sharing our research and experience.”

**Fabienne Viala, Chair of Bouygues Construction United Kingdom**

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