The big break

Post-pandemic 'New-Normal'

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May 8th 2020

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Foreword

This is the second edition of 'The big break', the first being published on the 8th April. This edition now covers the likely 'new normal' of 40 sectors and contains views on the impact on community, work and religion and a more in-depth economic outlook. Whilst 'new normal' is now a slightly overused phrase it represents well the business environment and changed circumstances that are likely to emerge after the lock-down and virtual closure of most sectors during the pandemic are lifted.

Following a season of environmental turbulence, we now face the challenge of surviving the COVID-19 Coronavirus pandemic and of equal importance to business, its aftermath. In addition, in the UK, and for the rest of the EU, the impending change brought about by BREXIT and our desire to counter the impact of man-made climate change will add to the general discontinuity. Add to this, the inexorable rise of technology which presents us with the challenge to change, not just the technology we use but also our processes, culture and even our propositions. Automation and new practices will impact almost every area of our lives in the future. It will present itself in many guises, including through artificial intelligence (AI), the internet of things (IoT), 5G, edge and quantum computing and every sort of virtual and extended reality and also generate data on a scale and speed that we have never experienced and rarely imagined possible.

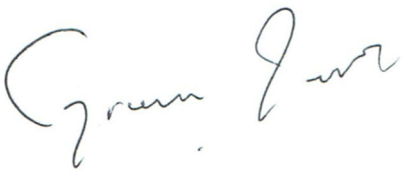
What the lockdown has shown us is that the imperative of co-location, which stemmed from the industrial era, is no longer a pre-requisite in the knowledge economy and we can now imagine new ways of working, seeking health advice, learning and entertaining ourselves, to name but a few ways. This report illustrates how forty sectors are likely to have changed after the strictures of the pandemic are fully lifted.

This report is written for two audiences:

1. For organisations to be informed and motivated to think that their position before the pandemic might never be regained in the same way. Some will see great opportunities to build on changes that emerged during the lockdown of the world. Others may believe that most things will return to normal. Only time will tell us who is right. However, one thing is certain, slipping into irrelevance is not just possible but has been experienced by many past sector leaders who refused to think that the world and its needs, could ever change.

2. For Agencies and advisers to help their clients to not just grasp that times may be changing but that they need to lead the sectors they serve into that change, its consequences and potential responses. This is a time for confident firms/brands to prepare their markets to not just meet these new challenges but renew themselves in the process. A time to share their thought leadership with their target markets.

Every one of the following short illustrations on how sectors may change post pandemic can be expanded to produce comprehensive illustrations of the changes and challenges faced by their participants in the years ahead.



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Introduction

We are not going back to the 'normal' we had before, however much certain industries or businesses may want to. Beyond the immediate and perhaps long-term health implications of the virus, lie the certainty of a deep recession or depression, shifting industry structures and hugely impacted human behaviours and expectations[i]. It is plausible that five years-worth of 'change' has occurred in just five weeks, and it is natural that such a shock has led many CEOs and leaders into fire-fighting mode. Were this crisis either a strict public health issue or a one-off economic problem, such a stance may be understandable. However, the intertwined nature of this crisis, not to mention its depth and breadth, necessitate a different approach, especially as lockdowns begin to ease around the world.

The assumptions we were operating on in a pre-COVID-19 world were already straining at the seams, with sustainability, changing consumer wants, uncertain global norms all demanding change, not to mention the friction from advanced technologies with legacy business, political and economic systems. Some of the changes underway will be turbocharged by the pandemic, some possibly reversed and whole new dimensions of risk, change and uncertainty introduced. We need to re-think our plans, strategies and purpose, using tools and methodologies able to interrogate a wider range of drivers than is typically available in corporate strategy processes.

Uncertainty is at present our only reliable indicator; for many this is profoundly uncomfortable, but it does allow us – or even compel us – to reexamine how we do things and even what it is that we do. Foresight will be central to many efforts. In the post-COVID world, notions of resiliency will change and likely become more systemic. If history teaches us one thing, it is that crises – both economic and social – are inflection points from which new ideas, new companies and new industries emerge. This crisis will be no different in this regard yet the tools, mindset and opportunities to build new services and industries are now more widely spread than perhaps any time in history.

Competitors will increasingly emerge from previously unrelated fields, as will potential partners and talent. Industries from banking to manufacturing and construction to law are likely to see lasting shifts in how business is conducted, what it means to be a professional in such an industry and what it is these industries even do.

"It is not necessary to change. Survival is not mandatory."

W. Edwards Deming

Economic Outlook

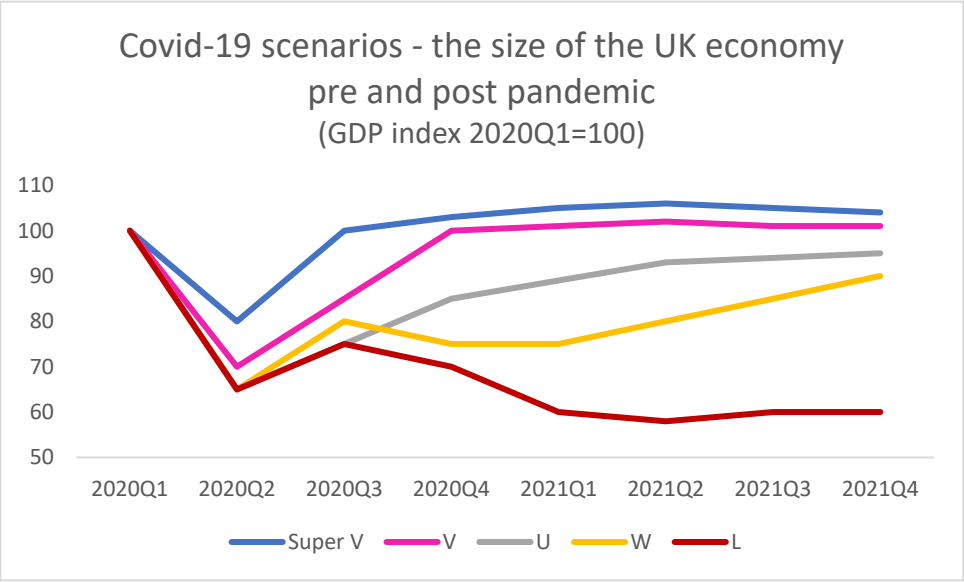
2020-21 Coronanomics scenarios

Introduction

The scale of economic uncertainty at present is perhaps greater than at any time in our economic history. As these scenarios show, in the second half of the year the economy could bounce back and regain all the lost output in the first half. Alternatively, if there is a second wave to the pandemic - over the Autumn-Winter period - the economy could implode and not regain pre-pandemic output levels until 2025-30. The range of possibilities is that stark.

Social distancing and the lockdown are a double-edged sword. They achieve the vital task of slowing the spread of the disease, but this leaves the majority of the population with little chance of gaining herd immunity. The knock-on economic threat is that permanent damage to the economy is likely to be a non-linear function of the length of the lockdown. It is non-linear because the longer the lockdown and social distancing continue the more economic difficulties intensify, with rising indebtedness, insolvencies, unemployment and precautionary behaviour. Of course, if the containment measures are released too early, a second pandemic wave might ensue, with the possibility of even more dire economic consequences. Governments need the wisdom of Solomon at times such as this.

Chart 1



The reason why a recession became a public health necessity remains the same. In the words of one American epidemiologist: *"This virus is a combination of The Alien, The Day the Earth Stood Still, The Andromeda Strain and Apocalypse Now".*

Whilst there is increasing concern at the economic carnage wrought by social

distancing and the lockdown, this does not mean that the tail is now wagging the dog. Epidemiological factors continue to outweigh economic considerations in the minds of policymakers. Newspaper reports on the Prime Minister's first Cabinet meeting following his dice with death and Covid-19, stated that he quoted the Roman orator Cicero: *"The Health of the people should be the supreme law".*

This is not to suggest that economic factors are being ignored, anything but. The Government clearly wants to get as many people as possible back to work *"safely"*. Flattening the curve has flattened the economy but lifting decisions will still be epidemiologically driven. Not least because a second wave to the pandemic would be even more devastating from an economic perspective, because the re-introduced lockdown could then extend for many more months.

The Government's strategy is to move towards more targeted and less disruptive measures, subject to the reality that, *"this ain't over until it's over"* - when herd immunity and a vaccine are finally obtained, and that is likely to be 2021 at the earliest. Life is going to remain very different until that point in time. It is going to be very difficult to maintain control of the virus without some form of social distancing, unless a highly effective contact, tracing and isolation system can be put into operation.

So in lifting the lockdown and social distancing the Government is likely to proceed very cautiously with what has been described as a *"whack-a-mole policy"* hitting down hard on any flare ups with the potential re-imposition of stringent lockdown and social distancing where required. This has also been described as *"adaptive tightening"* with containment measures responding to hot spots around the country.

The economic need for lifting is obvious, but there is an epidemiological reason as well. Epidemiological models may not fully account for what is known as an endogenous behavioural response. This is the behavioural change which occurs during the lockdown and social distancing, which if not accounted for, risks leaving the containment measures in place too long. This points towards another sociological reason for lifting the lockdown as quickly and safely as possible. Former Governor of the Bank of England, Lord Mervyn King, has spoken of the potential for *"rebellion risk"* from people fed up with the controls and likely to start breaking all the rules.

Assuming there is no immediate complete lifting, or the authorities do not leave all the containment measures in place until there is an effective vaccine, there are 4 unlocking and lifting options:

- Unlocking based on age.
- Unlocking based on geography.
- Unlocking based on immunisation.
- Unlocking based on economic activity.

There are difficulties with all of the approaches. Unlocking by age might require that it becomes an offence to meet with people outside of the cohort age group. That's surely not workable. A lack of herd immunity would also risk spreading the disease even with unlocking by age. Lifting by geography would yield the greatest economic benefit if it started in London, but that is where the threat of new cases could potentially be greatest given the melting pot of peoples. Without effective testing and tracking the infection rate might quickly climb back up. Lifting by

immunisation is complicated by epidemiological uncertainty regarding the effectiveness of an anti-body test and how long immunity lasts. Moreover, this route would require massive testing, maybe up to 0.5 million per day.

The final option is lifting based on economic activity and it has been suggested that a traffic light approach be adopted with 3 phases; red, amber and green. These phases would each last roughly 3-4 weeks to enable the authorities to be clear as to whether an upturn in cases and deaths was occurring. As the lights change from red to amber lockdown and social distancing restrictions would gradually be lifted. In the final green phase nearly (but not all e.g. for vulnerable groups) containment measures would be removed.

The underlying problem would however remain, namely any easing in the absence of the required level of herd immunity, is fraught with risk. The only re-assurance for politicians would be the experience of those economies further down the road in terms of their death and case load curves, who have successfully eased. There is also the possibility that minor manageable upticks over the summer months could be followed by a second pandemic wave over the Autumn-Winter of 2020-21.

Economic scenarios summary

- The economic uncertainty is now greater than at any time in our peacetime economic history. It is possible that any of the 5 scenarios, Super V, V, U, W or L could occur.
- On balance we think the U scenario is the most likely, given the lack of herd immunity to date, and the need for sustained social distancing rules for a sustained period, which will be a constant reminder of the threat to lives and livelihoods.
- Economic history suggests that Super V or V shaped bounce-backs are possible, but these tend to be after economic downturns far less than at present.
- A second wave to the pandemic would have catastrophic consequences for the economy.

Previous pandemics and the economy

Studies of the Spanish Flu suggest it resulted in a 6-8% reduction in GDP and a 20% loss of manufacturing output. But we're hampered by poor data and a dearth of studies on this earlier period. One literature review[ii] of the impact of the Spanish Flu on the US economy found little effect.

A cursory glance at the historic quarterly UK GDP series for the period of the Asian and Hong Kong Flu pandemics shows mere blips with a complete bounce back in the next quarter.

The most recent studies modelling the economic impact of pandemics have been of an order of magnitude greater than previous ones. A 2020 study[iii] from the OECD estimated that a large economic shutdown as a result of a pandemic would result in a 20-25% GDP loss for each month, implying a three-month shutdown would induce a 5-6% drop in annual GDP – other things unchanged. In the UK, the

Office for Budget Responsibility (OBR), in compiling its baseline reference scenario[iv] for HM Treasury, estimated that each month of full lockdown reduces the level of monthly GDP by 35%.

Moreover, the longer the crisis lasts the bigger the economic problem becomes as wider negative effects take hold. The difference between the economic impact of this pandemic with those previously, has been highlighted by the Bank for has stated that*: "the context of high globalisation and high leverage in parts of the corporate and household sectors makes these short-term amplification mechanisms more potent than in past epidemics".*

What we do know is that: (1) The economic consequences of a pandemic will differ in each case. (2) The economic impact is a combination of supply and demand shock effects. (3) Pandemics can have long lasting economic effects well beyond the point when herd immunity is attained.

Table 1

Post Covid-19 Economic Scenarios

Scenario	Economic prognosis	Speed of lift/size of lockdown	2020Q2 GDP loss (quarter-on-quarter)	Date regain 2020Q2 lost output	Probability
Super V	Miraculous recovery	Very fast lift	-20	2020Q3	10%
V	Full recovery	Fast lift	-30	2020Q4	25%
U	Hospitalised	Slow lift	-35	2023	40%
W	Intensive care	Small lock	-35	2025	15%
L	Near death experience	Big lock	-35	2030	10%

The 5 scenarios

The 5 economic scenarios are intended to be illustrative of the key factors which will lead to alternative outcomes. From an economic perspective the critical epidemiological influences are:

- The speed and scale of the lifting (or re-imposition) of containment measures.
- Whether or not there is a second or third wave to the pandemic.

The economic scenarios described are:

- **Super V economic cycle (The miraculous recovery scenario)** - Based on a superfast lifting of the lockdown and social distancing. This results in a miraculous economic recovery with pre-pandemic output regained by the end of the third quarter 2020.

- **V economic cycle (The full recovery scenario)** - This scenario assumes a fast lifting of the lockdown and social distancing, with half the economic losses removed in 2020Q3 and the remainder in 2020Q4. This results in a full economic recovery by the end of the year.

- **U economic cycle (The hospitalised scenario)** - Based on a slow lifting of the lockdown and social distancing, with the economy continuing to be hospitalised and pre-pandemic output levels not regained until 2023.

- **W economic cycle (The intensive care scenario)** - This scenario sees the emergence of a second wave of infections, with a tightening in lockdown and social distancing. This is enough to keep the economy in intensive care over the 2020-21 period. The double-dip in output means that pre-pandemic output levels aren't regained until 2025.

- **L economic cycle (The near-death scenario)** - This scenario sees the emergence of a massive second and possibly third wave of infections over the 2020-21 period. Mutation of the virus and very low levels of herd immunity result in draconian lockdown and social distancing rules, the economic consequences of which are catastrophic. The economy nearly dies and takes until 2030 to recover pre-pandemic output levels. It's that bad. This is an outlier scenario to illustrate the worst possible case.

Super V scenario

The Super V economic scenario is based on a rapid lifting of the economic lockdown and social distancing beginning in the middle/end of May, as the authorities draw confidence from other economies such as China and Italy, who are further along the epidemiological curve. Declining cases and deaths leads the authorities into a phased lifting of restrictions with most lifted by mid-August 2020. This is the superfast lift scenario with strong knock-on economic effects. What goes down goes back up - this is the idea of Say's Law, paraphrased as supply creates its own demand, and that if a negative supply shock started the crisis, a positive one can end it, if the intervening period has been relatively short without permanent damage to the economy.

Consumer and business confidence builds as mass testing produces evidence that herd immunity could be reached before the Autumn/Winter. Consumers return to the High Street in droves, eager to spend their repressed consumption. The stock market surges as a result as well. Significantly also, the projected 2020Q2 fall in output is reduced as a result of the containment measures beginning to be lifted in 2020Q2. Unemployment falls quickly under this scenario with most furloughed workers returning to work by the end of 2020.

The strong economic pick-up is encouraged by pro-cyclical fiscal and monetary policy with the economic benefits of the relief measures timed to coincide with shops and businesses re-opening. The lag in payments from HMRC to individuals and businesses means that restrictions begin to ease just as the money comes through the letterbox. In other words, fiscal policy begins to take effect in an upturn not a downturn, encouraging the economy to overshoot upwards. The strong policy stimulus – both fiscal and monetary – with an acceleration in money supply growth, leads to higher inflation and higher interest rates in 2021 to slow the economy.

Wider and more enduring economic effects may emerge at this time as well, with the emergence of new business models based around alternative ways of working, retailing and learning which emerged during the crisis. There may also be a greater agility and openness to new business model ideas built around AI, 5G and IoT. We could see a positive sense of post-pandemic new normal emerge, along the lines of what was seen in the US in the 'Roaring Twenties' (1920s).

The Super V recovery scenario would be a repeat of the quick rebounds in the UK economy seen after the Asian Flu (1958-59) and Hong Kong Flu (1969-70). It would also be akin to those seen in China and Hong Kong post SARS in 2003-04.

The V scenario

The V economic scenario has the quarterly rate of output growth slightly slower in 2020 than under the Super V scenario. In the Super V scenario the economy contracts by 20% (quarter-on-quarter) in 2020Q2 but then grows by 25% (quarter-on-quarter) in 2020Q3 and a further 3% (quarter-on-quarter) in 2020Q4, thus regaining pre-pandemic level of output by the end of 2020Q3. In the V scenario the economy contracts 30% (quarter-on-quarter) in 2020Q2 but then grows by 21% (quarter-on-quarter) in 2020Q3 and a further 18% (quarter-on-quarter) in 2020Q4, thus regaining pre-pandemic level of output by year-end.

Comparing the V with the Super V scenario there are very similar effects: consumer bounce, improved consumer and business confidence, stock market recovery, investment pick-up, pro-cyclical policy effects, falling unemployment and very little loss of permanent output. These effects are slightly more muted, that's all. This also means that the upward overshoot seen in the Super V scenario is less marked and the increase in inflation in 2021 (as a result of faster money supply growth in 2020) is as well. This still requires a policy response in 2021 but the tightening is less as a result also.

As with the Super V scenario, the V scenario is supported by historical experience seen in the previous Asian and Hong Kong Flu and SARS episodes. Both the Super V and V economic scenarios may also be supported by the economic effects of the Spanish Flu in 1918-19. The conventional wisdom is that the US economy contracted sharply over that period. However, revised estimates of historical GDP over this period in the US suggest the downturn was far less, and therefore compatible with a V shaped recovery.

In the UK the economy boomed over the 1918-20 period. Comparisons are however confounded by the difficulty in separating out the effects of Spanish Flu from demobilisation at the end of World War 1, poor quality data and a dearth of economic studies on the impact of the pandemic on the economy. The sheer scale of the Spanish Flu pandemic makes it relevant to understanding Covid-19 now, but it's a frustrating comparison. Unlike the US, the UK had an immediate post-war boom, but then experienced a GDP downturn in the early 1920s which was worse than in the depression of the 1930s.

The U scenario

The U economic scenario is based on a slow lifting of the lockdown with around half the bounce back seen in the Super V and V scenarios in 2020Q3 and 2020Q4. Subsequently, whilst there is no second wave of infections in the U scenario, there are sporadic upticks in cases and deaths which result in the authorities keeping some aspects of social distancing (e.g. for the over 70s and those with vulnerable conditions, or on a geographical basis tied to hot spots) until after the Autumn/Winter of 2020-21.

The retention of these controls provides a constant reminder to households and firms that an invisible threat to their lives and their livelihoods remains. The natural consequence of this is a significant increase in precautionary savings by individuals and companies, a caution reinforced by the higher levels of unemployment this scenario entails. Firms are also likely to be wary of making investment decisions given the greater uncertainty which will arise every time an uptick in cases or deaths occurs. As a result, the U economic scenario foresees the economy not regaining pre-pandemic levels of output until 2023, partly due to the permanent losses of output which occur due to the depth and duration of the downturn.

Another important factor in this U-shaped cycle is the emergence of stagflation i.e. high simultaneous levels of both unemployment and inflation. The weaker economic recovery following the sharp downturn naturally lead to higher levels of unemployment. However, the economic policy response (government guarantees for bank lending and monetisation of the budget deficit) leads to more inflation as well due to an acceleration in the money supply. This requires a little explanation,

for the opposite might thought to be the case.

The initial economic effect of the pandemic was a supply-side shock as the Government sought to prevent workers from working, and consumers from consuming, in order to keep infected and uninfected people as far apart as possible. This resulted in a collapse in output way below its potential rate of growth – in economic speak, a very wide output gap opened up. In this situation of rising precautionary saving and reduced investment (saving exceeding investment in the economy), deflationary pressures might be expected to increase, and they could if nothing else changed.

But these developments are not in isolation. There has been a massive fiscal and monetary policy response. Moreover, this response – certainly in the US at the time of writing, less so in the UK, but changing – has resulted in a sharp acceleration in the money supply. The money supply is being boosted by further quantitative easing, the monetisation of budget deficits and commercial banks encouraged to lend – as opposed to being told re-build capital after the financial crisis. The velocity of money (crudely, the number of times it changes hands) will have fallen as well with the lockdown and social distancing, and this will take some of the edge off the inflation increase.

The W scenario

The W economic scenario is the second worst economic scenario in the set of 5. It's worse because it incorporates the possibility of a moderate second wave of infections in the Autumn-Winter of 2020-21. This leads the authorities to tighten social distancing rules and certain aspects of the lockdown. It is not a full-retreat to the containment policies enforced over the March-May period, but it is sufficient to have a very negative effect on consumer and business confidence.

The W shaped cycle incorporates a 23% (quarter-on-quarter) recovery in output in 2020Q3. Things appear to be fine, but then the second wave hits in the Autumn and the economy contracts by -6% (quarter-on-quarter) in 2020Q4 and by -7% (quarter-on-quarter) in 2021Q1. This second wave is brought under control, but it is sufficient to trigger a further wave of insolvencies and unemployment.

This scenario is dangerous because it results in GDP in 2021Q1 still being at only 75% of its pre-pandemic level in 2020Q1. This suggests enormous permanent losses in output across the economy. Precautionary saving is much higher and investment much lower, as the nascent recovery is completely snuffed out.

The scale of the explosion in public debt is enormous because in this scenario: (1) Automatic stabilisers - such as unemployment and other benefits - are much higher. (2) Tax revenues are much lower. (3) Discretionary expenditures - such as reliefs for business - are much higher. (4) Government guarantees to the banks begin to be called in on a large scale.

In contrast to the Stagflation seen in the U economic scenario, the W scenario foresees the arrival of Super Stagflation with sustained double-digit inflation and unemployment. The super stagflation is encouraged by even greater monetisation of the budget deficit and consequent money supply growth.

In this scenario more inflation becomes an actual policy target as a means of eroding the real value of debt in the public and

private sector. The rise in inflation triggers a response in the bond markets with spikes in yields well beyond current extraordinarily low levels. This further weakens the economy and the prospects for recovery, with the result that the economy doesn't regain its pre-pandemic level of output until 2025.

One of the dangers in the W scenario is that if the weakness intensifies in a supply-demand doom loop, the shape of the cycle could end-up being less W and more VL shape. In such circumstances the even more frightening prospect of the L scenario comes into play.

The L scenario

The L economic scenario is without doubt the most shocking economic outlook I've ever considered in 30 years of economic forecasting. Everything but the kitchen sink is in there (listed below), not because it would all happen (though it could), but simply because everything in there is a possibility, if there were to be a major second and possibly third wave of infection. If herd immunity levels are very low going into the Autumn/Winter and/or the virus mutates, this lower probability ultra-high impact scenario could come to pass. It is a scenario where the R_0 number moves well above 2 and a massive lockdown is then enforced, even more stringent than before. Draconian containment measures are then kept in place throughout the Autumn/Winter of 2020-21.

The economic consequences of a second (and third wave) are simply horrific. Having grown 15% (quarter-on-quarter) in 2020Q3, the economy declines -7% (quarter-on-quarter) in 2020Q4 and a further -14% (quarter-on-quarter) in 2021Q1. There is also the possibility of a further contraction in GDP in 2021Q3, due to a third wave, but this is less important (in terms of whether it happens or not) because the damage will already have been done.

Under the L scenario, by the end of 2021Q1 the UK economy would be at 60% of its pre-pandemic level of output. In other words the economy will be down 40% (year-on-year). Feed these assumptions through and it means that the UK economy would contract 22% (year-on-year) in 2020 and 23% (year-on-year) in 2021. Such an economic scenario would unleash economic, social and political dislocation on a par with a devastating war – it is the Armageddon scenario. This is 'one L of a recovery' for all the wrong reasons. Here are just a few of the potential outcomes from it:

- Depression levels of unemployment at 20%+.
- Transition from deflation to inflation.
- Massive public deficits above 20% of GDP, with an explosion in public debt.
- Monetisation of budget deficits.
- A surge in inflation because of monetisation.
- Financial contagion.
- Supply-demand doom loops.
- Sovereign-bank doom loops.
- Protectionism and beggar thy neighbour policies.
- Return of the euro crisis.
- North-South tensions in the EU and pressures towards disintegration.
- An epidemic of zombie companies.
- A glacial return to normal with pre-pandemic output not regained until 2030.

Key takeaways

- The epidemiological uncertainty is such that all the scenarios need to be considered. The most probable at present would appear to be the U-shaped cycle because of the likely maintenance of social distancing and certain aspects of the lockdown for many months to come. Prepare your business for this scenario but also be alert to signs that alternative scenarios might be coming to pass. If evidence of stronger herd immunity appears then the V and possibly even the Super V scenario would come into play. The lack of evidence of herd immunity and any sign of a second wave brings the W scenario into consideration.

- Most commentators think that the crisis is likely to lead to deflation. Whilst this might be true in the short-term, later in the year and into 2021 inflationary pressures might begin to emerge because of the acceleration in the money supply underway. Be aware of this possibility in your business planning.

- Be alert to the potential introduction of new business models around AI, 5G and IoT by your competitors. Lessons learned in the lockdown could have an enduring impact and make companies more agile than previously.

Accountancy

In a survey of 2,373 accountants, four in ten suggested that COVID-19 would induce job losses in the industry[v]. This could compound an existing forecast that many of the functions performed by accountants today could be done by machines in three to five years' time[vi]. At the very least, we are likely to witness a rise in the 72 percent of CFOs reporting a strong commitment to the digital transformation of finance and accounting[vii].

While much focus is understandably on the immediate and direct impact of COVID-19, indirect long-term impacts could prove more significant. These could include the state of the economy or the services potentially offered by accountants and any associated professional liability consequences[viii]. Being digitally ready and possessing wider business acumen will be a pre-requisite for exploring some of these new opportunities.

The Big Four have long since diversified their offerings; the quest for new services many now echo throughout the accountancy profession. Almost all corporate clients face a range of operational and strategic choices that are often confusing and more complex than they can handle alone. With many individuals and organisations turning to their accountants for advice, there are clearly new revenue streams opening-up in which accountants could add-value if they possess the requisite skill-set, but it is accompanied by corresponding risk.

New markets could also emerge that accountants could work in or benefit from. A centralised consumer data profile, outlined by the World Economic Forum as '…residing in an account where it would be controlled, managed, exchanged and accounted for[ix],' by around 2028, could enable a range of financial services organisations to reposition themselves as trusted advisers able to deliver value over a wider remit.

Working with intelligent machines and algorithms will become a key future success factor for accounting professionals: 'intelligent automation, robotic process automation, real time analytics, automated reporting, predictive enterprise risk assessment, pre-configured Cloud ERP, and digital workforce automation,[x]' will all impact the profession.

Appearing/*disappearing*

- New demands and risk factors.
- New forms of client partnership.
- Automation.
- Analytical skills will be needed across many roles, and beyond traditional ones.
- *Traditional value propositions.*

Challenges and Opportunities

- Many financial services organisations start from a handicapped position with regards to digital talent; only 10 percent of young adults are interested in finance as a broad career option[xi].
- Shifting demographics, changes in consumer behaviour, a dynamic tax and regulatory environment, technology, and a multitude of other factors are having a profound impact on the future of accounting[xii].

Artificial Intelligence

The need to continue operations with fewer people, in some cases without people at all, and doing things in different ways as a result, all create a compelling logic for why the pandemic could act as a catalyst for AI use[xiii] across a range of industries.

The suite of AI technologies are rarely plug-and-play, with considerable expertise required not just for installation but for employees working alongside and within automated systems. However, in places where mass retraining is not required, accelerated AI adoption may be increasingly plausible. For the 75 percent of global executives thinking AI is critical for their pre-COVID company's future[xiv], plans for developing, testing and trialling such solutions will almost certainly assume new urgency.

It has been remarked that while AI isn't on the verge of yet replacing all our jobs, it does create the opportunity for us to rethink what jobs are[xv]. Given the scale of the emerging employment crisis, moving this discussion forward in boardrooms, public policy circles and beyond would seem critical.

AI may also form a key part of our built environments in the fight against COVID-19. Indeed, even before the outbreak, Singapore had announced a national AI strategy that aims to 'transform' the country by 2030. It features adaptive learning systems, personalised risk scores for chronic diseases and a fully automated immigration system involving biometrics[xvi]. Adding COVID detecting features or other health dimensions seem a natural fit.

However, in the rush to find solutions to acute problems, we risk ignoring long-term problems. The EU Commission's digital department has already recommended a regulatory framework for AI that would set transparency obligations on automated decision-making[xvii]. Could AI be the next GDPR? Wired notes that '...Intelligent systems at scale need regulation because they are an unprecedented force multiplier for the promotion of the interests of an individual or a group[xviii].'

Appearing/*disappearing*

- Ambient AI at work, home and city.
- More AI in the public health realm.
- Regulation.
- The intelligent era.
- Moving from plans to actions.

Challenges

- Anticipating regulations.
- Talent and cultural preparedness.
- Doing new things, not just doing things differently.

Opportunities

- 45 percent of AI's total economic gains by 2030 ($15.7 Trillion) is forecast to come from product enhancements and stimulating consumer demand[xix].
- Rolling out AI solutions across industries, lowering boundaries and reorienting their strategies.
- Using data better, quicker and more effectively.

Aviation

The impact of COVID-19 on aviation could be 5 or 6 times worse than the 9/11 attacks[xx]. Without financial aid, around half of the 800 or so airlines around the world could cease to exist by the end of May[xxi]. As of late April, some 164 airlines had grounded their entire fleets; another 91 were using less than 10 percent of theirs[xxii]. British Airways plans to make up to 12,000 staff, or more than one in four, redundant[xxiii]. The scale of this indicates a long-term challenge. Even allowing for recovery, 'normal' will not be the same as before[xxiv].

Consumer behaviour will almost certainly shift, while there is an opportunity to revisit some foundations of the industry that remain little changed since the end of the second world war. Were the Chicago Convention to be revisited, cross-border ownership of airlines could be reexamined, truly global airlines could in turn emerge that better match consumer demand, for example. The degree to which any bailouts mix with politics will be key for the prospects of what remains an international industry and its indirect satellite industries such as tourism and closely related ones such as airports. Globally, airports could lose $76 billion in 2020[xxv].

The crisis will likely, in due course, prompt investment in efficiency and new models. It has been suggested that connected airlines,' could save $15 billion a year as well as 21.3 million tonnes of CO2 emissions by 2035[xxvi]. PwC also suggests new models be explored by airlines and airports '…that could boost revenues, lower costs, improve efficiencies, and enhance the customer experience[xxvii].' Not all solutions need to come at high cost; value could be unlocked at limited incremental cost in terms of sales channels, loyalty programs, joint digitisation and improved real-estate development. Indeed, '…even after accounting for profit-sharing, these joint sales channels could boost airport commercial sales by 10 to 20 percent, while airlines could increase their commercial sales by more than 50 percent[xxviii].'

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- New mashup models and ownership structures.
- Electric aircraft – eg: The Norwegian authorities are aiming for electric aircraft debut by 2030[xxix].
- Digitised aviation ecosystem.
- *Numerous regional airports and many airlines.*
- *Assumptions about certain markets and routes.*

Challenges

- Risk is becoming more systemic and complex. Aviation stakeholders may need to embrace '...a broader strategy of enterprise-risk management across their organisation[xxx].'
- Preparing for climate-change, sustainability and business model diversification.
- Building resiliency and flexibility into models run on lean principles.

Opportunities

- New forms of partnership.
- Chinese aviation recovery offers hope.
- Customer-centric propositions across the entire travel experience.
- Abundance of resources potentially lowering costs.

Banking and Finance

The digital footprint of users was already healthily growing pre-crisis, with some 3.6 billion digital banking users expected by 2024[xxxi]. This could now extend to bank and finance employees. Approaches to talent management, and consideration of workplace dynamics, already evolving in a digital world, '...may be durably changed after an extended period of remote working[xxxii].'

Nevertheless, it is likely that customers, in response to COVID and its aftermath, will increasingly need and expect '...individualised offerings, and leaders will need to use data to fine-tune their customer, product and pricing strategy to deliver on those expectations[xxxiii].' Likewise, the COVID-19 crisis will put to the test many of the ESG factors that many banks have acknowledged they need to factor into their future strategies and models. Such strategies, whether officially implemented or not, will probably be judged by the consumer starting now. Long-term damage could be wrought by short-term thinking.

Lastly, banks must be cognisant of changes in their wider operating environment, and of new post-COVID factors that will influence it. PwC notes that '...in every recent financial crisis, the number of bank mergers has exceeded the number of bank failures. Banks will not only look intra-industry for attractive combinations given valuation resets, but also outside of financial services given industry convergence[xxxiv].' New models would seem a given. UBS' rise in digital engagement with its clients during lockdown, for example, is cited as having 'probably accelerated by five years user adoption of its digital tools[xxxv].'

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- Data-driven personalisation of services.
- New industry mashups and synergies.
- Ambient banking and finance.
- *Product driven services that fail to treat customers as individuals.*
- *Analogue systems, cultures, processes and people.*

Challenges

- Developing a culture of collaboration that cuts across industry.
- Long-held assumptions and mental models that have underpinned existing business models may need to change.
- Trust is the future for banking and financial services. Demonstrating reasons for that now, and strategically in the future, is key.

Opportunities

- Banks and financial organisations can build greater operational and financial resiliency into their structures[xxxvi].
- Gerd Leonhard believes '...we are going to see a new stock market emerge in the next five to seven years- a kind of NASDAQ for sustainable capitalism[xxxvii].'
- The banking industry occupies an almost unique position among private sector entities to play a driving role in restoring communities ravaged by COVID-19.

Biotech

If the background for the post-war period of the 20th century was driven by physics, and the latter half by IT, we are now entering a potentially more significant epoch - the biotech era[xxxviii]. It is likely that the COVID crisis, not least through the search for a vaccine or treatment or even more indirect impacts, such as the search for greener growth, will accelerate the emergence of this era.

Indeed, biotechnology is held as able to '…help address many global problems, such as climate change, an ageing society, food security, energy security and infectious diseases, to name just a few[xxxix].' The way in which biotech addresses these issues will ensure disruption to existing business models and structures and remake what it is that industries do and how they do it. The speed of biotech's impact on a given market is likely to be exponential once initial case uses are established and commercialised.

As organisations we remain unprepared for the changes that biotechnology could instigate not just within the healthcare, industrial and agricultural spheres but for various sectors in which '...biotechnology has become the driving force of radical changes[xl].'

Our health, our houses, manufacturing processes, electronics and built environment and our food will likely all be impacted, as could the way we consume. For example, scientists have created a 'mutant enzyme' able to recycle plastic bottles in hours and has plans to commercialise the technology within 5 years[xli]. Innovations within the industry could impact sectors at best considered tangential in our current economic orthodoxy. Assumptions, limits and possibilities underpinning our thinking could all be revisited in due course. If data mastery has shown to erode existing industry boundaries, biotech could further rewrite our expectations.

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- Disruption across a wide range of industries.
- The biotech era.
- Large networks and ecosystems.
- *The digital era.*
- *20th century approaches.*

Challenges

- 'It's a big question - to what extent any political system in existence today is capable of handling the repercussions of breakthrough technologies like biotechnology[xlii].'
- Regulatory barriers.
- Ethical issues.

Opportunities

- A new economy.
- Revised focus on health and wellness, post Covid-19.
- Mitigation of humankinds' environmental impact.
- Innovation across a broad range of industries.

Chemicals

In response to major supply chain disruptions, starting with trade conflict and de-globalisation, '...chemical companies have started to (partly) relocate or ramp-up the production of critical chemicals supplies and medical goods closer to end-customers.[xliii].' COVID will likely accentuate many of these trends.

The crisis, catastrophic as it is for humanity and even certain chemical industry incumbents, also provides opportunities for industries. Innovation around 3D printing, biotech-based products and new sources of energy could, for example, rise in importance, especially with the green stimulus featuring in many governments rescue packages[xliv].

Many of these technologies will prove foreign to some incumbents since the industry has been a relatively late adopter of digital innovation[xlv]. To-date this has not proven too large a burden, but continuing ignorance of these trends will prove costly.

The post COVID environment, featuring an emerging quantum computing scene, may well be different. Rather than improve existing processes, or boost back-office efficiency, quantum computing, along with biotech, promises to change our understanding of molecular structure, chemical reactions and the discovery of new products – all facets central to the success of the modern chemical industry.

Since colocation of sufficient talent to explore quantum and biotech is difficult, owing to expanding market demand and supply shortages, collaboration will be critical. Accessing the talent to be able to test use cases and assess the required level of internal capabilities[xlvi] will be a key step in building future strategies. Quantum computing could form a $9.1 billion market annually by 2030[xlvii]. Biotech and bio-manufacturing could in the coming decade present both an opportunity and challenge for the industry, with news ways of doing things also allowing new things to be done. Such techniques could drastically cut chemical input, with implications for production strategies and indeed the potential relevance of the industry as it is currently configured.

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- A range of new technologies.
- Prioritising cybersecurity and system resiliency[xlviii].
- New ecosystems.
- *Traditional supply chains and production techniques.*
- *Existing skillsets as a sufficient basis for employment.*

Challenges

- Create digital and AI enabled models to address end-user needs[xlix].
- Build capabilities to scale solutions across fragmented bases efficiently[l]
- Developing collaborative cultures.

Opportunities

- Players able to harness quantum computing could reshape the industry, lower costs and create superior products.
- Use technology to gain a real-time awareness of supply chains[li].
- Greener solutions.

Construction

Peter Kelly, head of sustainability at ISG suggests that in the future, '...using off-site and digital construction techniques means buildings will be cheaper, quicker to build, higher quality, healthier and more productive[lii].' On a global level, full scale digitalisation over the next decade could yield significant cost savings up to $1.7 trillion[liii], yet will require the type of investment that such a conservative industry is slow to embrace in good times, let alone a crisis. It is possible that the cost/benefit ratio will be changed decisively by the crisis, however.

Increasingly, all that is required is a trigger, since much of the technology is ready. Icon, in the U.S, has 3D printed a home for $10,000 in 48 hours and recently a home in 24 hours for $4,000[liv]. Such housing units are forecast to account for up to 30 percent of new construction by the mid 2020s[lv], while Dubai plans for 25 percent of new buildings to be constructed using 3D printing by 2025, reducing labour by 70 percent and cutting costs by 90 percent across different sectors[lvi]. Digitisation could also alter the need for collocated labour. For example, from Germany, South Korean construction machinery manufacturer Doosan Infracore, demonstrated the use of a 5G network and autonomous construction machine to overcome the 8,500-kilometer distance to a simulated construction site in Incheon[lvii].

If COVID-19 does speed up the digitisation of construction, the implications will be systemic. Talent should also be sought from new places, with new pipelines established. Future skills central to the construction industry are likely to feature artificial expertise, data analysis, experts on modular design and logistics and even resilience experts and circular economy specialists[lviii]. The World Economic Forum cites the gaming industry as one possible talent pool given digital skills crossover for building information modeling and virtual or augmented realities[lix]. Construction companies are already tech companies, their talent strategy and increasing parts of the workflow - need to reflect it.

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- New production and work methods.
- New talent strategies and sources.
- KPIs related to sustainability and building function.
- *Old supply chains could be withdrawn rapidly.*
- *Necessary colocation of all labour inputs on-site.*

Challenges

- 'At the heart of many pressing challenges in capital projects and infrastructure are problems with culture[lx],' says McKinsey.
- Initial investment lead times are likely to be long, and the capital required high, but the returns on such investment could be substantial.
- The industry has traditionally been slow to adopt new tech: this must change[lxi].

Opportunities

- Maximize data and digital model use and standardise the data across boundaries and silos where possible.
- Review the existing product portfolio and assess where new business opportunities could arise.
- 'There could be a number of viable 3D-construction-printing businesses in five to ten years[lxii].'

Consulting

In 2018, Clayton Christensen suggested that 'We're still early in the story of consulting's disruption… More likely than not, alarms won't sound until it's already too late in the game[lxiii].' Is our response to COVID that alarm?

Consulting's underlying precepts of change and disruption may be insufficient for interrogating a world now subject to multiple drivers leading to our reimaging, redesigning and rebuilding our societies. Change and disruption are undeniable but COVID represents something deeper, systemic and involved.

Not all of these drivers of change relate to COVID but could be heightened by it. The rise of corporate pressures for change, from the IoT and other emerging trends, and arguably driven by many rushed digital transformations, could limit the value of traditional consulting roles such as collecting and using information[lxiv]. Despite this shift in role, consultants are still in demand as companies across nearly all sectors grapple with the immediate economic consequences and begin to acknowledge the need to envisage tomorrow.

The COVID crisis also necessitates consultants to conduct their work in a different manner. For example, 'enVista, the technology and consulting business, is ramping up the use of tools it had used sparingly prior to COVID-19 as it builds a remote consulting business[lxv].' Technology is also becoming a key part of what consultants do, not just how they do it. McKinsey has made tech-related advising more integral to its proposition, as have the Big Four and others such as Accenture[lxvi], in efforts to build greater consumer-centrism. This implies not just the use of '...data, artificial intelligence and other technologies to predict outcomes, reduce costs, improve transparency and ultimately add value.'

Of equal importance is the need of developing closer ties to clients, in terms of '...understanding their business more deeply and delivering solutions to problems that clients may not even know they have yet[lxvii].'

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- Development of more remote consulting models.
- Further erosion between consulting and tech providers.
- More in-depth forms of collaboration and partnership.
- *Less travel.*
- *A possible retreat from 'strategy' to 'operations,' as acute problems dominate.*

Challenges and Opportunities

- Questioning assumptions, methods and the basis from which advice is provided.
- Developing new practices able to navigate new and undefined territories/markets.
- Developing new concepts and advice for a re-imagined business environment.

Cybersecurity

Business spend on key cybersecurity tenants – data protection, compliance with regulations and insurance – have boomed, yet the average organisation has a systemic blind-spot to its network endpoints. Prior to COVID-19 and the mass adoption of remote working, 71 percent of CIOs reported finding computing devices they weren't aware of on a daily or weekly basis[lxviii]. As a result, only 17 percent of organisation were considered leaders in cyber-resilience[lxix]. Data breaches could potentially reach $5Tn yearly by 2024[lxx]. New models were needed pre-COVID: now is an ideal time to develop them.

COVID-19, not least through the enhanced cyber risk introduced by sometimes slapdash efforts to digitise and provide distance working, offers an opportunity to pilot zero trust models, rapidly and at scale. This model sees access to business apps, including legacy operations, funneled through a secure web-based gateway following least-privilege principles. One survey suggests that 31 percent are considering this approach, 19 percent are in the adoption phase, and 8 percent have already implemented it[lxxi].

Emerging IoT and edge computing will also bring about significant changes to organisational IT architecture[lxxii]. The networked nature of the edge, the likely creation of ecosystems around edge data, and the increasingly intertwined nature of IT systems, all mean cybersecurity at the ecosystem level is necessary to protect potentially weaker links in the chain, such as third parties.

With most organisations having limited visibility to their network, let alone insight into their exposure to cyber risk, new standards will likely be needed. Security and privacy controls will need to be built at the edge and in devices. If information security strategy is to thrive in an edge era, new security and data architectures that span multiple organisations and even industries will need to emerge.

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- 70 percent of Asia Pacific business leaders see more cyber regulation as needed to build public trust[lxxiii].
- Edge computing and IoT.
- Distance working.
- New standards.
- New cybersecurity architectures and methods.

Challenges

- Building trust.
- Talent acquisition/access.
- New technologies as threat vectors.

Opportunities

- New cybersecurity ecosystems.
- Opportunity to trial new models.
- Chance to use information security as a strategic driver.

Education

The World Economic Forum says '...the slow pace of change in academic institutions globally is lamentable, with centuries-old, lecture-based approaches to teaching, entrenched institutional biases, and outmoded classrooms[lxxiv]. COVID-19 is a one-off shock to the system that compels things to be done differently. For David van Zandt, president of the New School in New York, '...the virus is an accelerator, like gasoline thrown on to burning embers. This is going to bring about a lot of changes in higher education that probably needed to be made[lxxv].'

Mass adoption of distance learning in the U.S, China and Japan, all 5G enabled, will allow the concept of learning anywhere, anytime to take hold. This method of learning also has the, probably unintended, effect of redefining the role of the educator. School and university have long been transitioning from places and education towards an activity. This has held interesting implications for the teacher that has hitherto been defined as a knowledge-repository who then dispenses it to the student. In a wider sense then, COVID could increase student resilience.

Changes to what we need to learn in terms of practical and theoretical knowledge for future jobs, the ascendance of soft skills and how we access knowledge all render this description close to invalid. COVID-19 may consign it to history. 'This may mean that the role of educators will need to move towards facilitating young people's development as contributing members of society[lxxvi].' Many academics likely have this as a goal. Indeed, even before the COVID crisis hit, some 98 percent of educators anticipated the rise of self-paced curriculums[lxxvii], something which shifts their role significantly.

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- Learning,' states WEF, '...could become a habit that is integrated into daily routines - a true lifestyle[lxxviii].'
- A standardised micro-accreditation system is likely to emerge.
- *School district and educational lotteries could lessen if premium content is unlocked from anywhere.*
- *The current model of higher education. Value for money, relevance in the future job market and continuous type learning contracts will all be key.*
- *The end of education as a life-stage between childhood and adulthood.*

Challenges

- Shifting the role of the educator towards that of facilitator/curator.
- Universities are forecast to be hit by a £2.6 billion shortfall in the next academic year due to the pandemic, risking up to 30,000 direct jobs[lxxix].
- The over-reliance on international students in the UK: 47 percent decrease in enrolment predicted, costing the sector £1.5 billion[lxxx].

Opportunities

- Businesses believe only 27 percent of workers have the skills they need[lxxxi]. 75 percent of employees agree that continuous education is essential to their success, yet nearly half don't believe that they're receiving the training they need to stay relevant[lxxxii].
- If a micro-accreditation system does indeed appear imminently, the whole paradigm of tasks, jobs and skills will change.
- Increased personalisation.

Energy, Oil and Gas

'If the first phase of COVID-19's effects on the global energy system is a story of energy consumption, oil demand, and emissions, the second phase will be how emerging supply chains of the energy transition shift,' says Jennifer Gordon at Atlantic Council[lxxxiii].

While low oil prices for a sustained period could slow decarbonisation efforts, it is also likely to cause a longer-term oil supply contraction – some 6 percent by 2030[lxxxiv]. Together with the prolonged interest rate slump that is conducive to long-term financing of cleaner systems, this could, on balance, accelerate the transition[lxxxv]. The IEA says that the crisis could wipe out demand for fossil fuels, with renewable electricity possibly the only source to withstand the biggest shock in 70 years[lxxxvi].

Even before the collapse of the oil price, many oil majors had already engaged in their pivot. BP has announced plans to achieve net zero emissions by 2050, while Total has stated that renewable investment is its priority. More specifically, Enerco and Shell are jointly investing in offshore wind, while Repsol and Equinor continue to purchase solar and wind energy capacity. These moves hint at an acknowledgment of the industry's long-term sustainability or lack thereof[lxxxvii]. The degree to which the current crisis can catalyse change will likely have differing political footprints with regards to green stimulus money for example, but the opportunity is certainly there to accelerate the shift from the burning platform and onto new models. Might Qatar or other LNG heavy nations wish to completely abolish the gas-oil indexation[lxxxviii]? Might divestment of fossil fuel assets become incumbents' key strategic future driver?

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- LNG talent wars and broader skills shortages when the industry rebounds.
- Deloitte suggests that '...some of the larger healthier companies may alter or accelerate their plans to diversify into other energy segments, prompting a change in business model[lxxxix].'
- More partnerships with unrelated sectors as new models demand new skills, reach and approach.
- *Inefficient or highly leveraged companies may face a liquidity crisis or the end of operations.*
- *Current structures of oil and gas markets - the oil industry itself may wither.*

Challenges

- A market replete with depressed oil prices, revenue, and subsequently production declines will prove tricky to navigate for those unable to a) refinance debt[xc], and/or b) diversify the business model.
- The state of the global economy/ geopolitics.
- Sourcing the talent for the future.

Opportunities

- Low interest rates to fund long-term projects.
- Green stimulus in European countries.
- Creating sustainable business models.

Financial Advisors

Prior to COVID, two of the biggest trends for wealth management focused on Asia-Pacific's household wealth growth and the rise of female financial power. While Asia was on track to eclipse North America's by 2023[xci], women were expected to account for 60 percent of the UK's wealth by 2025[xcii]. There is now uncertainty regarding these trends, with the former possibly accelerated and the latter slowed.

Platformisation, use of AI and increasing personalisation have become more likely. In 2019, just 5 years after Ant Financial Services was launched, the number of consumers using its services passed the 1 billion mark. AI, not human workers, runs the show[xciii]. 8 out of every 10 Ant Financial customers use at least 3 of its 5 primary services[xciv]. Such models and technology can, at scale, provide cheaper and personalised advice, especially if Netflix style financial data markets emerge.

Hyper-personalised advice that closely follows client's individuals' goals is likely to appear by 2030, with 80 percent of advisors predicted to offer this 'bite-size,' approach[xcv].

With customers seeking both greater value and a different scale of approach, '...in the next 10 years, advisors will gradually shed their role as investment managers and become more like 'integrated life/wealth coaches' who advise clients on investments, banking, healthcare, protection, taxes, estate, and financial wellness needs more broadly[xcvi].' Such a shift will have consequences for industry recruiting – including new talent pathways – as well as continuous training and education.

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- On-demand Netflix style models for financial data.
- A new breed of advisor.
- Assets managed ESG fund could reach $2.08 trillion by 2025[xcvii].
- Robo-advisor use could nearly double in the next five years[xcviii].
- *High fees for traditional services.*

Challenges

- Re-evalute enterprise risk management frameworks for tech, operational and reputational risks.
- New models and value propositions needed for Gen Y.
- Competition from other financial professionals, such as accountants.

Opportunities

- Model multiple business model scenarios & develop contingencies.
- By 2030 the share of global wealth held by Baby Boomers will be surpassed by Gen X and Millennials[xcix].
- 60 percent of younger investors report they are concerned about ensuring their financial well-being, about twice the level of Baby Boomers[c].

Food and Farming

In the short-term, many international production and trade channels are likely to be interrupted due to a combination of possible worker scarcity, freight volatility and even the banning of certain food exports from some countries[ci]. Beyond the crisis, notions of food security will sustain importance, and have a lasting impact – witness Abu Dhabi's recent $100m investment in indoor farming[cii].

The world's population is set to grow by 2.2 billion between now and 2050[ciii], and given that this is in tandem with rising prosperity, it is forecast that we will need an extra 70 percent of food than we did in 2009[civ]. Despite the serious challenge of climate change, a range of technologies, from GPS and drones to robotics could help achieve much of the needed gains.

To facilitate a sustainable breakthrough, the future of food is going to have to depart radically from its traditions. This is unavoidable if we are to sustain a growing array of environmental, economic and social needs. Business as usual, plus technology, as in so many other industries, will probably not meet the multiple demands being placed on food producers.

Given the water intensiveness of meat, for example, alternatives are needed. Indeed, the alternative meat industry could become toward a $140bn market by 2030 and by 2040, AT Kearney believes that 60 percent of all meat will either be grown in vats or come from textured plant proteins[cv]. It is perhaps worth noting that 3D printing could also become a viable production method of proteins, however unappetising that sounds.

Regardless, the shift from industrialised agriculture to scientific agriculture could be one of the most important changes in the last hundred years or so. UBS notes that '...the ability to grow food in a lab that replicates meat, fish, eggs, and dairy products — with lower carbon footprint and without the need to slaughter animals — is likely to become a commercially viable option in the next decade[cvi].' WEF suggests that food computers could be the future of agriculture[cvii]. Precision fermentation and the 'food-as-software' trend are helping dramatically lower manufactured protein cost. By 2030, the U.S market for ground beef could shrink by 70 percent, the steak market by 30 percent and the dairy market by 90 percent[cviii].

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- Farming is already, in places, a highly digital industry. It will become more so.
- Fully autonomous farm equipment is already becoming commercially available, meaning machines can completely take over many tasks[cix].
- More locally grown foods.
- Alternative meat and protein products.
- *Farm employment numbers.*

Challenges

- Value chain players need to build bridges between today and what food production could look like tomorrow.
- Forming partnerships with competitor industries.
- New skills and talent needs.

Opportunities

- Sourcing strategies and supply chains can be reimagined.
- Diversifying business models.
- Sustainable production.

Government/Public sector

A range of companies will need to explore '...public-private partnerships wherever applicable. Companies' best partner in recovery may be a local municipality, mayor, governor, a regional committee, or a country's governing body[cx].' With these new relationships blurring the lines between private and public sectors, public services may be able to tap new sources of innovation, new skillsets and new ideas.

In the UK, the Economist reports that the 'NHS struck a deal at cost price with private hospitals for beds, ventilators and clinicians and to improve data use[cxi].' Longer-term however, the links formed not to mention the growth of GovTech to $1 trillion by 2025, from $400bn now[cxii], suggest deep-seated change in how public services operate, and indeed even what they do. Putting aside the future role, scope and structure of the state, the day to day workings of government will shift. For one, the barriers that have traditionally halted government in the widespread adoption of flexible working are being overcome[cxiii], albeit imperfectly with culture and cybersecurity sometimes lagging technology.

The nature of many public-sector jobs is also likely to change, with some 42 percent of core job skills set to change as soon as 2022[cxiv]. The skills needed to utilise data analytics and the suite of AI technologies differ quite substantially from what most public sectors can provide. For those able to attract, train or access such talent through partnerships, these technologies could change the scope of public services as well as boost existing efficiency. Natural language processing, for example, is cited by Deloitte as able to '...provide the tools needed to identify patterns and glean insights from data, allowing government agencies to improve operations, identify potential risks, solve crimes and improve public services[cxv].'

Together with predictive analytics and machine learning, such systems could become more anticipatory, connected and thus able to scale to meet various demand. Various public sector bodies could also benefit from augmenting their workforce, with AI and automation cited in the U.S, as able to free up to 1.2 billion federal working hours and induce annual savings of $41.1 billion[cxvi].

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- A greater discussion about the role of government and how to fund public services.
- Greater use of certain technologies will make governments less dependent on physical locations and, potentially, more resilient to any future crisis[cxvii].
- Predictive services.
- More public-private partnerships and other enhanced forms of collaboration.
- *Significant uncertainty around future government finances and funding.*

Challenges

- Technology doesn't work in a vacuum. Already scarce talent and skills will be needed.
- Coordinating the energy, leadership and will to further transform after the COVID-19 catastrophe abates.

Opportunities

- Create citizen-centric services.
- Provide better service at lower cost.

Groceries

The demands and restrictions of COVID have forced grocers of varying digital capacity into full on transformation efforts at speed. Pre-COVID, the online grocery market stood at 8 percent of the total market, while that figure is likely to reach around 15 percent as a direct result of COVID[cxviii]. Future intent for online grocery shopping is mixed, however. Consumers in the UK, Italy, and Japan intend to increase their share of online grocery shopping, while American, German, French, and Spanish consumers intend to do less[cxix].

Once the crisis is over, not only will IT capacity need revisiting, stores will need to develop a strategy for introducing safe and innovative ways of rebuilding brick-and-mortar grocery shopping[cxx].

Perhaps most prominently, 'Just Walk Out' shopping and other smart checkout tech pioneered by the likes of AmazonGo that minimise queuing could create a $45 billion market by 2023[cxxi]. Sustainability could also become a key and actionable driver of success; while 98 percent of business executives see the IoT contributing to a sustainable future, only half currently use data and connectivity to support such efforts[cxxii].

Harvard Business Review correctly notes that '…the next generation of smart assistants and connected devices will learn from user habits and pick up on behavioural and environmental patterns in order to make these experiences more predictive[cxxiii].' Demonstrating and delivering value to the customer will be key in gaining trust and acceptance as models become ever more consumer-centric and perhaps even more local as vertical farming offers new possibilities for reducing food miles and so on.

Of equal import is that there are more points at which we can engage consumers (both physically and in hybrid forms), especially with forthcoming micro-GPS that can better contextualise data to within mere feet of our position, and the ambient passivity with which we will 'interact,' with technology. Emerging data sources and forms of personalisation will ultimately spawn new services and even industries, enabling retailers to add value in entirely new ways – perhaps by creating shopping lists for specific health conditions or personal life goals, for example.

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- Blockchain forecast to be used for 20 percent of leading grocers by 2025[cxxiv].
- Design thinking for store layout.
- Fluid consumer wants and needs.
- *Traditional supply chains.*
- *Old layouts.*

Challenges

- Adjusting to sudden consumer changes and segments.
- Investing in technology coherently.
- Aligning tech to overall strategy.

Opportunities

- Greener solutions throughout the supply chain.
- P2P logistics for delivery.
- More localism.

Health

Commentators suggest that '...very few things could rival COVID-19 for catalyzing and accelerating the long-anticipated transformation of healthcare[cxxv].' During the initial outbreak, China moved at pace to shift half of all medical care online[cxxvi]. Telemedicine was already reaching a turning point in Asia-Pacific. COVID has prompted the number of new users on Ping An Good Doctor, a Chinese healthcare services platform, to rise nearly 900 percent in January 2020, compared with December 2019[cxxvii].

This adds impetus to the increasing technological capability to redesign healthcare models. For example, technologies such as the Medwand, a diagnostic tool not much bigger than a computer mouse, can '...listen to your heart and lungs, measure respiratory rates and blood oxygen levels, take your temperature, scan your skin and even peer at your tonsils[cxxviii].'

Such tools are likely to raise the efficacy, utility and attractiveness of digital home health, with Peter Diamandis suggesting that '...we're going to see Apple and Amazon and Google and all the data-driven companies that are in our homes right now become our healthcare providers[cxxix].' The foundations for this model are already in place: Alexa has partnered with the NHS to field routine health questions, and with numerous healthcare insurers in the U.S, while Apple's HealthKit connects Apple's products and electronic medical records with healthcare providers. Indeed, Apple's 'healthcare plans now appear to extend beyond adding features to AppleWatch, as it researches photomedicine techniques for use in medical cases ranging from opthalmology to surgery[cxxx].'

Healthcare will be moving toward patient-centric models that seek to prevent disease as much as cure it. Although new regulatory, organisational and business models would be needed, 96 percent agree that the future of healthcare will be people-driven[cxxxi], while 68 percent expect this scenario to be the norm in major healthcare markets by 2030.

China's COVID-19 response has seen 5G thermal imaging now supporting contagion monitoring and accurately detecting a person's temperature in real-time as they move around a city[cxxxii]. Physicians, meanwhile, expect almost a third of their current duties to be automated in 20 years[cxxxiii]. The acceleration of this in the presence of COVID-19 ravaged healthcare systems could be sudden, far-reaching, and dramatic.

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- The future of healthcare would appear increasingly decentralised, networked, automated and likely features our home at the heart of our own personalised health ecosystems.
- Our health data at our fingertips.
- DIY diagnostics and treatments.
- *Waiting for appointments.*
- *Hospitals as centres of healthcare system.*

Challenges

- Regulatory barriers.
- Big Tech and privacy.
- Ecosystem formation.

Opportunities

- Personalised/preventative healthcare.
- Reducing healthcare as a percentage of GDP while boosting outcomes.
- New advisor-type health roles.

Human Resourcing and Recruitment

COVID-19 is changing the recruiting and hiring process[cxxxiv], perhaps for good, but this is not enough to make the function future ready. New ways of working, team formation, collaboration across multiple industries and public-private spaces will all demand a new range of skills and HR approach. This could accelerate the prediction that by 2024, more than one-third of the skills believed essential for today's workforce would change[cxxxv].

If the COVID crisis has emphasized anything, it is the need for agility. This is already partially acknowledged, with 57 percent of HR executives saying that if HR does not modernise its approach, it will become irrelevant within the modern organisation[cxxxvi]. Reskilling and the provision of it would appear as one clear proxy for agility. However, while 78 percent of employees indicate a readiness to reskill, only 45 percent of execs think their current workforce can adapt. Furthermore, investing in future learning is only fourth on HR's priority list[cxxxvii].

COVID could also further blur the distinctions between customer, candidate and employee[cxxxviii], as technologies, processes and even 'ownership' of a given brand overlap and become more fluid. Planning to engage these blurring segments will become increasingly possible with the rise of platforms such as HireSweet, which aim to help employers find candidates that are not actively looking to change jobs[cxxxix]. Building networks of 'pre-workers' able to contribute to problems, ideate and so on could become a standard practice for organisations.

Accessing skills, talent and ideas will likely see more fluid organisational boundaries. The concept of a small core team surrounded by agile on-demand teams is more than a possibility as we enter the mid 2020's. Forrester meanwhile, foresees an era in which core staff, expertise-as-a-service and robots will work side by side on teams that form to address a specific initiative - and dissolve as those needs expire[cxl].

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- Our current concept of work silos.
- Work in and alongside automated systems.
- New talent pathways, recruitment tech and access to talent.
- *HR as an admin centre.*
- *Execs unable to envision and deliver the future.*

Challenges

- HR becomes too important to be left to HR alone.
- Ensuring future facing talent becomes a key priority.
- Integrating robots and other facets of automation with the human workforce.

Opportunities

- The strategic view of future needs.
- Develop an agile model able to quickly access talent.
- Solving talent shortages can also be achieved via work design strategies focused on structure, workflow and systems[cxli].

Information Technology/Communications

IT and communications are on the verge of becoming ambient, embedded and to an extent, become part of other products and services. The IoT will turn any object into a gadget and communications tool.

Surveillance technologies emerging from the COVID period, such as Taiwan's electronic fence or China's use of drones and mobile phone positioning, highlight the trade-offs between liberty and security[cxlii]. This crisis may also be a point at which IT and communications system develop in a new way.

Security will likely triumph over privacy in the years ahead in the struggle against COVID. Tech companies, large and small, were already looking to innovate with location-tracking technology – and this will accelerate[cxliii]. Yet a huge gap is opening between technological possibilities and the reality many companies find themselves in.

For example, 90 percent of businesses do not consider themselves as IT resilient[cxliv], even though by 2022, some 80 percent of revenue growth will likely depend on digital offerings[cxlv].

The role of IT will need to change accordingly. IT could cease to be a standalone functional organisation but is perhaps equally unlikely to become a fully decentralised competency that feeds tools, expertise, capabilities into the wider organisation. Rather, '...IT could be deeply federated with a central control framework[cxlvi].' CIOs roles, already strained by COVID-19, will need to be reimagined as a result of systems further shifting away from traditional control or provision and towards an 'ambient' type framework.

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- New communications methods, including AR, VR and possibly without words[cxlvii].
- By 2025, 70 percent of IT functions will be completely automated, claims Oracle[cxlviii]
- Small paper and plastic devices will be able to connect to the internet for a short duration, providing information on everything[cxlix].
- IT and communications will be ubiquitous and ambient.
- *The boundary between IT and communications, and IT and the organisation will further erode.*

Challenges

- New CIO skills and aptitudes required.
- Balancing privacy and security – especially in the post-COVID period.
- Building data systems capable of supporting ubiquitous data.

Opportunities

- Chance to rethink core functions of the company and its organisational chart imprint.
- IoT based business models.
- Reorient current business models and strategies across a range of industries.

Innovation

Recessions usually initiate an acceleration in business model change, but the type of deep-seated economic shock COVID will unleash has the potential to compound another existing trend of technology enabling entirely new categories of businesses[cl].

Traditional efforts to innovate in this way are often thwarted. McKinsey notes that 70 percent of complex change programmes result in failure[cli] whilst only half of reorganisations are deemed successful[clii]. Legacy assets, cultures and previous success all conspire against innovation in many big firms. Yet Gary Hamel of the London Business School notes that while '...in a small crisis power moves to the centre, (in a big one) it moves to the periphery[cliii].' This could change the nature of innovation strategies for a prolonged period, especially if successful solutions are found.

Solutions for the short-term have already proliferated. American food distributor Sysco, for example, built '...an entirely new supply chain and billing system to serve grocery stores in less than a week[cliv].'

Designing organisation models that allow for urgent and rapid innovation will become a pre-requisite for future success. This redesign must be holistic –oriented towards employees just as much as consumers. Companies spend $1 trillion on the customer journey, yet around one thousand times less on employees' journeys[clv]. Such an imbalance makes innovation more likely to fail and remains a clear space for exploration.

Might we also change our definition of innovation as a result of the pandemic? MIT Technology Review argues that the pandemic has revealed that the US has largely been distracted by 'software-driven bling,' and '...is no longer very good at coming up with new ideas and technologies relevant to our most basic needs[clvi].' Might we measure innovation in a different way, to account for rural areas and others traditionally overlooked[clvii]?

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- New metrics for measuring it.
- More outside-in/bottom-up ideation.
- New business categories (mash-ups)
- Focus on core human issues.
- New focus on employees.
- *Relegation of top-down strategies.*

Challenges

- Only a fifth of execs believe they understand the best ways to achieve agility and innovation[clviii].
- Regulations and legal systems constrain innovation.
- Overcoming old approaches and cultural resistance.

Opportunities

- Create new cross-industry solutions.
- Shift innovation from a department to an organisational 'process.'
- Move beyond Silicon Valley definitions of innovation.

Insurance

McKinsey believes that the US and Eurozone's economies could take until 2023 to fully recover from the impact of the COVID-19 crisis[clix], while the World Economic Forum suggests that '...the industries hardest hit by COVID-19, including commercial aerospace, travel and insurance, may see a slower recovery[clx],' than others.

Insurers not dependent on paper-based applications and processes will almost certainly stand a better chance than analogue insurers in surviving what is almost certainly set to be a period in which insurers – possibly many of them – fail[clxi]. This may prove especially true in areas of the industry with unscaled and untried comms technologies, or else those lacking digital workflow tools or possessing only limited virtual or mobile work capabilities[clxii].

Earlier in 2020 it had been reported that insurtech funding over the next five years was forecast to be greater than the prior 10 years combined[clxiii]. The depth and length of the crisis may well impact the viability of many insurtechs, perhaps lending insurers the upper hand in acquiring new ideas and innovation on the cheap.

Indeed, the longer-term impact of the crisis may be to drive a wave of digitalisation and innovation in the industry as market conditions prohibit the continuation of incremental change or else business as usual. Some 89 percent of insurers expect that, within five years, personalised insurance will be expected as a standard practice[clxiv]. Closer engagement with customers will demand insurers develop greater levels of trust, real-time data analytics ability and the organisation structure able to respond in real-time. This goal will take a new commitment to digital transformation, with omnichannel service capabilities and other capabilities rising in importance not just for the acute phase of the crisis, but the period afterwards[clxv].

Asia will continue to innovate in advance of Europe and North America. In China For example, Ping An, already uses AI to recruit and train its 1.5 million agents, who are deemed 50 percent more efficient than their competition[clxvi].

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- Digitally transformed insurers.
- Personalised services and products.
- Insurtech boom.
- *Product driven policies.*
- *Legacy culture and technologies.*

Challenges

- Diversifying sources of income.
- Developing leadership and mid-management cadre capable of transitioning to digital.
- Ensuring digital does not just become a veneer.

Opportunities

- Pivot towards necessary investment in digital capabilities and people.
- Developing new ways of working, communicating and transacting business.
- Becoming more relevant and trusted by consumers starting with actions taken today.

Insurance Brokers

In May 2019, 51 percent of insurance brokers acknowledged concern for the future of their business[clxvii]. The challenges arising from the COVID crisis are very real, but so too are the opportunities for those willing to accelerate their transition and skills acquisition.

On the one hand, '50 percent of the top 30 insurance brokers are backed by private equity, and publicly-traded brokers have dropped by 30 percent since February in anticipation of future business strain[clxviii].' On the other hand, COVID has increased the already significant potential for brokers concerning emerging risks.

Insurance brokers could therefore morph in relatively quick order to becoming risk facilitation leaders[clxix]. 70 percent of brokers think AI '...will enable them to work smarter and offer personalised solutions to clients,[clxx]' but a broader emphasis on data will be required. A better understanding of the role of IoT in risk handling is one example of where sophisticated analytical tools could be used to help brokers develop ever more granular data and resultant consumer-centric services[clxxi].

Brokers are already repositioning as underwriting and risk advisors[clxxii], COVID could bring forwards the immediate value in strengthening these customer relationships.

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- Better data quality[clxxiii] will emerge, requiring better collaboration and transparency needed for brokers, insurers and risk managers.
- New insurance services will be created. Brokers that leverage necessary data at speed will emerge and excel[clxxiv].
- Asia as the main innovation source.
- *Risk placement will always be important to commercial insurance brokers but will no longer be their sole focus.*
- *Non-digital brokers/brokerages.*

Challenges

- Extensive re-skilling could see brokers include underwriting & risk advisory services.
- To succeed in a digital world, brokers must demonstrate their ability to add value to the market.
- Establishing the collaboration and buy-in needed to create the future insurance ecosystem.

Opportunities

- Brokers focusing on customer support could help prove the value of the relationship model[clxxv].
- Speed, accuracy and convenience can help brokers be a key part in the hybridisation of physical and digital systems [clxxvi].
- Lead the creation of new industry ecosystems.

Law

Analogue organisations and traditional structures simply will not suffice in an era compounded by pandemic where agility and flexibility are fast becoming core competencies. Stuart Fuller, the global head of the legal services arm of KPMG, expects the COVID-19 crisis to ultimately change the way law around the world is practiced[clxxvii]. This is likely to feature more than just turbocharging the need for law to digitise and even automate existing processes, workflows and culture. Even prior to the COVID-19 crisis, Dani McCormick of LexisNexis had suggested that '...lawyers will become more and more niche and specialist, creating their own more individual brand,' as digital transformation and automation account for a wide range of general tasks[clxxviii].

Indeed, KPMG believes it will '...drive this eco-legal system of business and legal to being seen as more intertwined, and legal in a business context will come a lot more to the fore[clxxix].' Ramifications could perhaps be even broader, with legal sector opportunities further enticing big tech into the space.

Mark Cohen believes that in the long-term, '...tech-enabled companies will create legal training and learning centres that offer competencies including, but not limited to, legal expertise[clxxx].' The erosion of industry and silo boundaries, already underway before the crisis, could accelerate as a result of shifting customer demand and tech possibilities. The legal industry in some ways typifies the type of fragmented market that platforms, whether big-tech driven or not, thrive in. It is plausible that '...the legal function will no longer be divided into law firms, corporate departments, and other supply chain providers. It will operate as a seamless, integrated team drawn from multiple sources.[clxxxi]'

Such work could increasingly coalesce remotely. 'I think that the way we do our daily business will change fundamentally,' says Tomu Johnson, counsel at Parsons Behle & Latimer[clxxxii].

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- Law as an embedded service.
- New forms, and sources of competition.
- Legal industry ecosystems.
- *Traditional law training as the only route into the industry.*
- *The billable hour.*

Challenges

- Need for professionals to engage in continuous learning to find, establish and reinvent their own niches.
- Digital transformation of a conservative industry that has done well in the past adhering to its rules and assumptions.
- The courage and culture to self-disrupt.

Opportunities

- Shifting the role of legal services into a more continuous, advisory state for customers.
- Widen the reach and affordability of legal services.
- Create new ecosystems, delivery-systems and points at which to provide value adding services.

Logistics and Warehousing

Globally, online retail sales are projected to surge by 53 percent to $6 trillion by 2024[clxxxiii]. Ecommerce in the UK could rise from 19.2 percent of total retail to 33.8 percent by 2024 and 53 percent by 2028[clxxxiv]. COVID-19 is likely to accelerate ecommerce usage, placing emphasis on the capacity of logistics and warehousing and compelling the use of new technologies and systems.

Drone technology could see a tipping point[clxxxv] as tech capacity matches consumer demand for instant delivery. The logistics and transportation drone market is forecast to grow to $1.6 billion in 2027, from $24.5 million in 2018[clxxxvi]. Autonomous delivery systems could redraw the spatial geographies of logistics companies with access to road networks potentially becoming less important. If P2P logistics take-off for last mile deliveries, this redrawing of warehousing spatial economics could further change.

By 2026, 80 percent of last mile delivery could be carried out by autonomous machines, including drones[clxxxvii]. Such examples exemplify why the warehouse industry possesses the third highest automation potential of any sector[clxxxviii], with around 50 different technologies being used at various points of the chain.

By 2025, over 4 million commercial robots are forecast to be installed in over 50,000 warehouses, up from just under 4,000 robotic warehouses in 2018[clxxxix]. By 2030, most warehousing operations could be automated completely, especially with regards to the more simple and repetitive tasks[cxc].

As a market, warehousing faces two conflicting trends in the post COVID era. The first is a potential redrawing of supply chains from just-in-time to just-in-case, implying the end of 'lean.' The countertrend is the emergence of 3D printing as a way of reducing warehousing needs (and supply chains) by ensuring the copy only exists in cyberspace until needed. Although more likely for manufacturing goods than the wide range of consumer goods, the economics of warehousing could be completely rewritten as a result.

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- New models that limit personal contact and road congestion.
- Automation of processes/systems.
- Technology tipping point.
- *Relative reduction in just-in-time warehousing vs. previous trajectory?*
- *Changing economic rationale.*

Challenges

- Regulation.
- Picking tech that gives greatest ROI.
- Matching customer expectations.

Opportunities

- Provide near-instant delivery.
- Last-mile delivery market boom.
- New models for providing goods.

Manufacturing

An analysis of global supply chains in early March 2020 calculated that the world's 1,000 largest companies and their suppliers had over 12,000 facilities in then-quarantined areas of China, Korea, and Italy[cxci]. For organisations with risky, opaque or else vulnerable supply chains, de-risking and even reshoring capacity to home markets will likely form an immediate priority. Japan has begun a 'mass manufacturing exodus' from China[cxcii] for example. Political pressure could exacerbate this trend while automation could in part counter the impact, but either way the nature of jobs, skills and tasks in a post COVID-19 world are unlikely to resemble those of today, to say nothing of changing purpose, perceived societal value and attractiveness to potential employees.

Take enabling technologies such as additive manufacturing (AM), for example. Pre-pandemic studies from 2019 estimate the impact of AM on global trade range anywhere from lowering it by 10 percent to 40 percent by 2030[cxciii].

However, the reshoring of manufacturing can unlikely be achieved solely by 3D printing, as some 500,000 unfilled jobs exist in the U.S alone thanks to a manufacturing skills deficit[cxciv]. Sweeping automation stands out as one quasi-plausible solution but perhaps a more sustainable one from a societal perspective can be found in how we acquire skills and education.

Machines and advanced automation are now being paired with human workers. 85 percent of manufacturers globally believe such connected workers will be commonplace in their plants[cxcv].

The range of skills required will change. Digital already prompts a greater number of multidisciplinary and cross-sector partnerships – a situation likely to accelerate as manufacturers switch markets overnight, services tap external expertise and government becomes enmeshed in everything. Smash-up businesses and sectors will ensue[cxcvi], with new capabilities and skills resulting.

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- 'By 2030, AM will integrate into existing manufacturing workflows (and) revolutionise the way we develop, create and source goods[cxcvii].'
- Regionalised production[cxcviii] and digital supply chains.
- Supply chains could move from just-in-time to just-in-case.
- *Global supply chains that optimise for centralisation and reduced costs have serious potential weaknesses[cxcix].*
- *MIT suggests that '...businesses should value resiliency and risk reduction in their plans and investment calculations, not just whatever gets them the lowest cost today[cc].'*

Challenges

- Skills and talent acquisition.
- New competitors from different markets.
- Changing mindsets.

Opportunities

- Building resilience to future shocks.
- AI based modelling.
- Digital twin usage will gain prominence and used to compare the long-term impact of different action plans, making it easier for companies to make good decisions[cci]

Marketing

At the dawn of 2020 we had accepted that social media, big data, AI, geolocation and other technologies were significantly changing how marketing works[ccii]. As of late April 2020, print advertising revenue had declined by some 80 percent versus the pre-COVID baseline[cciii]. Fluidity in consumer behaviors and attitudes are inevitable in the post-COVID world. This requires marketers to revisit underlying assumptions and accepted truths that may no longer apply: COVID could prompt a complete marketing reset.

Marketing leaders will likely be compelled to rethink their companies' value proposition and reassess which products and services could best deliver on that[cciv]. Beyond the acute phase of the crisis, new norms will certainly form. As with much planning for the future, the key lies in horizon 2 – building that bridge between the immediate horizon 1 COVID environment and the future horizon 3 of 2030 and beyond.

Horizon 2 technologies such as VR and AR have the potential to rapidly rearrange the marketing environment, as will market moves by Google to abolish third-party cookies in its Chrome browser by 2022[ccv]. Partly due to such moves, Gartner forecasts 80 percent of marketers who have 'already invested in personalisation will abandon their efforts by 2025 because of a lack of ROI, the perils of customer data or both[ccvi].' Indeed, only 17 percent of consumers believe personalised ads are ethical[ccvii]. How to provide personalisation without appearing intrusive may require consumer buy-in, or else rely on a degree of 'de-personalisation' by aiming offers not at humans, but at their bots. Drucker foretold 'the market of one' decades ago but it will need to be permissive to take hold.

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- New paradigms.
- New forms of consumer-centrism.
- VR and AR forms of marketing.
- *Current forms of data gathering and personalisation.*
- *Old forms of ROI as boundaries between consumers, workers and other stakeholders blur.*

Challenges

- Marketers will need to be fast and pragmatic to manage the crisis, while also being strategic on how to weather the downturn.
- As we delegate commerce search to our bots, 'adverts will seek to game our avatars' algorithms, making marketing as much about information and computing power as human creativity[ccviii].'
- Marketing to robots will require a different approach.

Opportunities

- Go beyond purpose led marketing to purpose led products and services[ccix].
- New tech allows new forms of engagement.
- Rethink value propositions.

Media and Entertainment

Media and entertainment have already seen significant disruption in the period since 2010, thanks to a range of technological evolutions and breakthroughs. What remains from this upending of entire business models is a 'weakened ecosystem vulnerable to failure and abuse[ccx].' It thus lacks widespread trust. Indeed, a Sky News poll revealed that 72 percent of the public does not trust newspapers with regards to the coronavirus, and 64 percent do not trust TV journalists[ccxi].

In the broader consumer economy, changes in behaviour previously expected to take more than five years may have already happened in five weeks[ccxii]. For example, print advertising revenue has decreased some 80 percent since the start of the pandemic[ccxiii], indicating an acute shock that could further shape future media usage.

Entertainment has undergone a similar change with esports assuming a prominent role for Forumla1 and others. The hybridisation of sports coverage for viewers will see physical events complemented with digital offerings[ccxiv] and perhaps even change the in-stadium experience. Such changes are likely to endure after the crisis.

These technologies, perhaps especially augmented and virtual realities could introduce a more immersive form of media - dubbed spatial journalism – seen as the potential future of reporting[ccxv].

It has also been noted that, somewhat counter-intuitively given low trust levels, COVID-19 proves media's value and importance, but that it requires new and better ways to measure such value[ccxvi]. New models, for connecting people-to people, for consuming a wider array of media, verifying truths, highlighting disinformation and allowing the media to connect with consumers will all likely appear during this decade.

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- Private micro-networks could be the future of how we connect[ccxvii].
- New forms of participation and consumption.
- Tech driven customer-centric experiences.
- New measurements of value.
- Appearance of niche 'narrowcasters.'

Challenges

- Overcoming lack of trust and disinformation.
- New business models.
- Legacy mindsets in incumbent organisations.

Opportunities

- Rebuild trust and deepen participation.
- Technological rebuttal of deep-fakes and disinformation.
- Use new technologies to rewrite the media and entertainment industries.

Meetings and Events

The meetings and events industry was one of the first to succumb to the impact of COVID. In March 2020, 99 percent of business-related travel was cancelled in China, 96 percent in Europe and 85 percent in the United States. Thanks not only to its reliance on other industries such as airlines but the nature of logistics planning for events, it could be one of the slower industries to recover.

Pre COVID, virtual events were already starting to change the way we meet. When comparing the 2019 survey results to the 2020 results 'of the percentage of planners who use hybrid/ virtual meetings in more than 10 percent of meetings, North America has seen an uptick in that number, going from 43 percent to 58 percent. Europe has seen an even larger increase, jumping from 49 percent up to 66 percent[ccxviii].' With corporate budgets for travel likely impacted in the post COVID environment, the lower cost of attendance coupled with the increased content flexibility that online allows, could all see many previously face-to-face events remain virtual[ccxix].

This shift, however, is unlikely to '...be universal, and it won't be evenly distributed among types of events, industry sectors, local vs. distant, or other factors[ccxx].' For some, hybrid events will likely act as a useful and necessary stop-gap but not one that is ultimately viable as a replacement for face-to-face meetings[ccxxi].

Indeed, 7 out of 10 events professionals 'have moved their face-to-face event partially or fully to a virtual platform, and many don't see that as a short-term fix during the pandemic but something that will continue alongside in-person events going forward[ccxxii].'

For those pioneering a new virtual model, but perhaps especially those not planning on it, the need to embrace innovation, new formats and new technology is heightened by COVID-19. Virtual events may well indeed require a different blueprint[ccxxiii], but face-to-face events will need more than ever to justify the ROI of participants.

Personalising content, enhancing the professional gain, a better personal experience and more will all be necessary against a backdrop of heightened sustainability awareness and shifting customer behaviour.

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- New business models.
- New forms of collaboration and partnerships – perhaps even with only tangentially associated industries.
- *The number of in-person events, conferences & meetings will be lower than any pre-COVID projections.*
- *The rationale for many low-level meetings that can be done virtually.*
- *Many providers and parts of the ecosystem today will likely disappear.*

Challenges

- Those in the meetings and events industry will need to explore diversifying revenue streams.
- Events will need to coalesce tightly around individuals' needs – meaning more customisation, personalisation and technology to make this happen.
- New talent and skills needs.

Opportunities

- Human need for connection remains.
- Technology from 5G, AR, VR and holograms can improve the online (and in-person) experience.
- Reinvent the industry.

Mental Health services

COVID represents a dual health challenge; with the mental health crisis stemming from social isolation, economic worries and health concerns almost certainly likely to outlive the acute physical health challenge, and likely require enduring engagement for years to come.

Pre-COVID, mental health disorders were on the rise in every country in the world and were forecast to cost the global economy up to $16 trillion by 2030[ccxxiv]. In 2018, the WHO forecast the number one cause of depression to be work-related stress by 2030[ccxxv]. Likewise, nearly a third of people believe that increasing digital life would be mostly harmful to people's future health, mental fitness and happiness[ccxxvi].

Could COVID accelerate the sentiment expressed in Davos 2020 that mental health should be a social and economic imperative[ccxxvii]? 'Governments must find evidence-based ways to boost the resilience of our societies and ... to treat those with mental ill health remotely to come out of this pandemic in good mental health[ccxxviii].' Since the mental health problem could be so widespread, any solution could feature business involvement to a greater degree than at present, for example by providing therapy access or modifying work conditions if necessary.

Moment-to-moment monitoring of anxiety and depression could feature, using digital technology, machine learning, AI counselling[ccxxix] and an on-demand deployment of evidence-based treatments. AI is already able to detect depression[ccxxx]. Ultimately governments may compel companies to fund the treatment of workers they have impacted negatively mentally.

The story of COVID and mental health is not only one-way, however. The advent of widespread homeworking could help tap potential talent pools unable to compete in dense office environments because of their existing conditions. Microsoft and Goldman Sachs have already banked on neuro-diverse talent to fill their talent needs[ccxxxi] - others may look into this area as homeworking becomes a more mainstream practice.

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- Greater involvement of employers in mental health provision and care.
- Providing alternative working conditions for a range of neuro-diverse employees.
- Greater awareness.
- Public-private collaboration.
- *Greater costs and human suffering, absent strategic change.*

Challenges

- Building collaborative platforms.
- Building new pathways to work for people unable to socialise/engage in crowds.
- Cultural change.

Opportunities

- Develop new pools of sometimes otherwise ignored talent.
- Demonstrate greater loyalty to employees.
- Contribute to cross and intra-industry solutions.

Pharma

McKinsey estimates that '…big data and machine learning in pharma and medicine could generate a value of up to $100bn annually, based on better decision-making, optimised innovation, improved efficiency of research/clinical trials, and new tool creation for physicians, consumers, insurers, and regulators[ccxxxii].' New models are likely to emerge; indeed, investments in digital-therapeutics companies in the United States have grown by an average of 40 percent a year over the past seven years to reach more than $1 billion in 2018[ccxxxiii].

However, several of these new companies thrive in areas that pharma traditionally does not, such as advanced analytics, human-centric product design, appetite for risk and flexible business models. In a digital future, such features are a likely requisite for pharma companies unless they choose to partner widely and deeply. 'The payers, providers, and pharmaceutical companies that gain experience and build partnerships now will be in the best position to grow with the industry and benefit from the coming waves of innovation[ccxxxiv].' In some cases, these partnerships may appear counter-intuitive; witness the emergence of cigarette makers as possible sources of a COVID-19 vaccine[ccxxxv].

The COVID crisis and its response will likely hasten the advent of a post-digital world and usher in the emergence of the biotech era[ccxxxvi]. Steve Jobs once remarked that '…the biggest innovations of the 21st century will be at the intersection of biology and technology[ccxxxvii].' Biology, in part thanks to COVID-19, is fast becoming the new 'digital' and biotechnology (broadly speaking the combination of the two) a key driver of the future economy. Using living organisms to make products or manipulate existing processes could fuel innovation across healthcare, wellness and pharma itself. If DNA does indeed emerge as the new silicon as is suggested, Wired proclaims that '…biology will be the next great computing platform[ccxxxviii].' Pharma straddles many of these changing areas, but absent change is not guaranteed to thrive in them.

Benefits in the biotech and pharma environment could have far reaching implications in other parts of the consumer economy.

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- New and non-traditional competitors.
- New overlapping. health/pharma/biotech ecosystems.
- 3D printed pharmaceuticals.
- Shorter value chains.
- Holistic cost of illness model.
- *Analogue supply chains.*
- *Purely manipulating atoms*

Challenges

- Developing a risk-tolerant culture.
- Developing the ability to collaborate and partner effectively.
- Using strengths to pivot models at the appropriate time.

Opportunities

- Biotech.
- Machine learning and AI in drug discovery and development.
- New business models.

Real Estate

Deloitte correctly suggests that '...real estate companies are being impacted in different ways, largely dependent on region and asset class[ccxxxix].' The long-term outlook is likely to depend on these very factors too.

That said, the long-term impact on specific sectors can be outlined. The long march of the death of the high street has continued for more than a decade. What might be different now is the speed of acceleration in the wake of COVID-19 fall-out. There is an old saying that it only takes a month to change a habit, and we may be about to experience the phenomenon that when forced to get used to something, it has residual effects. The disease's unique pressures will likely shape how senior living communities are designed for years to come, for example[ccxl].

What we expect from real estate is also likely to evolve. Buildings that automatically adapt to the preferences of occupants, that engage outside help where need be – for example relating to the security or health of occupants and are capable of balancing preferences[ccxli] may strike some as fanciful. However, the technology to do many of these individual things is already proven through IoT, wearables and smart buildings use cases. 97 percent of real estate players think that digital and technological innovation will impact their businesses, but 56 percent rank themselves as 5 or less out of 10 with regards to their digital and innovation maturity[ccxlii].

Indeed, without a clear sense of how to engage and with the distraction of a multitude of short-term problems to deal with, the danger is that the evolving ecosystem will be defined by others. Building management, data management and performance measurement[ccxliii] will become critical levels of future RE success. RE will also plug into wider infrastructure initiatives; for example, Chicago has announced plans that require electric vehicle (EV) charge capability for new buildings by 2040[ccxliv].

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- Need for flexible buildings and flexible terms.
- Value-adding smart buildings.
- More empty space.
- *Real-estate agents?*
- *Analogue real estate players.*

Challenges

- Players will need to offer new value propositions for distressed occupants.
- The need to digitise at pace.
- The need for new skills, competencies and ideas.

Opportunities

- All RE players are in the data business and are inherently digital businesses and orient talent, skills, practices and management to reflect this.
- Adopt advanced technologies at scale. The industry has traditionally been slow to adopt new tech and to adopt a customer-centric view: this must change. Some sort of tech-radar and awareness of global trends is vital.
- Build ecosystems that help players realise their long-term strategies.

Real Estate (Commercial)

It is plausible that the commercial real estate (CRE) market will never look the same again. Even when lockdowns are lifted and commercial space reoccupied, it is likely that many people and companies will be less eager to return to the previous status-quo of densely packed workplaces. Barclays has suggested that big offices '...may be a thing of the past[ccxlv].' This would seem especially so if the remote work experiment proves successful[ccxlvi].

Indeed, Bain predicted pre-COVID that by 2027, most work will be project based, with teams blending internal and external expertise to provide the required skill-sets[ccxlvii]. Virtual forms of collaboration, the rise of co-working spaces and how we access scarce talent will all impact how much office space we need, how we use it from day-to-day and in what capacity we use it. For one, '...changing patterns of work are prompting companies to see workplace design as a way to attract talent. Office design...must be responsive to the speed of change[ccxlviii].' If it isn't, most companies have already discovered an alternative during the COVID lockdown.

Longer term, subsectors such as office and industrial could be impacted by changes in where people work and changes in supply chain. Could COVID-19 lead to a lot more, empty retail and office space? Could it then be re-developed as residential accommodation or space for remote workers and self-employed, financed by zero or negative interest rates continuing much longer than previously thought? And could this be eagerly bought up in a negative interest rate induced housing boom?

COVID will likely prompt some CRE players to digitise and look to provide a distinctive and personalised tenant and customer experience[ccxlix]. As seen with retail, where leases are being renegotiated throughout the acute phase of the COVID crisis, a new relationship between occupant and owner/developer is likely required. This is perhaps the most obvious way for real estate players to actively remake the old-value chain into a broader ecosystem and to allow for a greater degree of personalisation. Undoubtedly, new markets could flourish, with ecommerce demands increasing demand for warehousing spaces.

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- Flexible space.
- More engagement with Proptech.
- Rebalancing of CRE profiles.
- *Demand for non-value adding solutions.*
- *Growth of virtual spaces lowering CRE demand vs as-usual growth – including closure of up to 100,000 stores in the U.S by 2025[ccl].*

Challenges

- Overcoming acute short-term issues.
- The ultimate goal for developers, investors and owners is to identify and incorporate weak signals and trends before end users are even aware of them.
- Adapting to continuous change.

Opportunities

- Technology could feasibly contribute to redrawing the entire industry.
- As new formats of work prosper, physical spaces will need to become ever more strategic and enablers of wider workforce strategies.
- New partnerships, standards and direct to end user relationships.

Retail

In 2003, the SARS outbreak helped provide not just a boost, but lasting growth for China's nascent ecommerce sector[cclii] and for Alibaba in particular. The COVID-19 crisis will likely have similar impacts globally.

Since workers globally stand to lose between $860 billion and $3.4 trillion of income in 2020 due to the crisis[ccliii], retailers everywhere will need to revisit strategy, messaging and value propositions. Consumer habits will be lost, and others will be gained, for example Lazada Singapore's CMO believes that the future of e-commerce is in combining livestreaming and entertainment[ccliii]. 59 percent of consumers worldwide reported high levels of interaction with physical stores before COVID-19. In next 6–9 months, 39 percent of consumers expect a high level of interaction with physical stores – clearly below the pre-COVID levels[ccliv].

The interplay with existing trends will be interesting – the American economy for example is already in the midst of 'broad and often deep dematerialization[cclv].' While 'sharing' is out for the moment, it could resume at some point given the convenience and economy it offers. Rent the Runway has partnered with the retailer Nordstrom which sees the former incorporate Nordstrom's inventory into their platform. Future plans include using data about the kinds of products customers want and what items work best within the rental model[cclvi]. COVID-19 will likely accelerate this type of convergence and other forms of hybridisation of conventional retail business models[cclvii]. On-demand services could surge. McKinsey, citing numbers from China in March 2020 suggests room for cautious optimism for a consumer rebound[cclviii]. Those that are prepared for it with appropriate offers, partnerships, strategies and engagement will rebound quicker than those who assume a resumption of normal.

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- Shoppable video could form the future of retail[cclix].
- More hybridisation, collaboration and partnerships with a range of sectors any competing models.
- Digital platforms and remote retail.
- *Amid the COVID-19 outbreak. UBS analysts think 100,000 stores will close in the US by 2025[cclx].*
- *Complex supply chains.*

Challenges

- Consumer tolerance of crowds may require rethinking of plans to build physical experiential retail.
- Adapting messaging, relationship and purpose to rapidly and drastically changing consumer circumstances.
- Adapting organisational skill base to a different future of connection and experience.

Opportunities

- 52 percent of UK shoppers are happy to share their consumer data with retailers if they can save money, suggesting closer relationships[cclxi].
- Digital retail platform use will become a central part of our lives.
- Tech offers room to personalise and experientialise in-home retail too.

Shipping

Despite the changing face of globalisation and the ascendancy of China, the nature of the global supply chain has remained reasonably static since the 1950s. The COVID-19 crisis not only impacts the face of globalisation and prompts greater regionalisation but could catalyse required changes in its nature too.

Navin Kumar, director of Maritime Research at Drewry suggests that an early lesson of COVID-19 is that '...the world has been too dependent on China for everything[cclxii].' Long term it seems almost certain that supply chains will diversify and, in some cases, shrink as companies look to re-shore capacity with the assistance of additive manufacturing and other technologies. Ports could therefore increasingly cater to smaller ships and shorter routes due to the rise in local and regional production processes[cclxiii],' for example.

Paul Cuatrecasas, CEO of investment banking firm Aquaa Partners says that 'Covid-19 has just slapped everybody in the face so get ready because what's coming is going to be even greater disruption in different forms[cclxiv].' The digitalisation of the sector, extending even unto autonomous shipping will necessarily embed resilience and flexibility into supply chains and logistics more generally.

In 2019, it was forecast that shipping-related emissions - accounting for 3 percent of the total global carbon emissions – could climb between 150 percent and 250 percent over the next 40 years[cclxv]. Decarbonisation of the shipping sector could cost anywhere between $1 trillion and $1.4 trillion[cclxvi] yet coalitions have already been established that seek to produce zero carbon vessels and fuel by 2030[cclxvii]. Beyond COVID-19, industry and environmental sustainability would appear intertwined. The current crisis may prompt more rapid digitisation as resiliency and flexibility become core competencies and thus accelerate the journey towards a more sustainable future.

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- Green technologies.
- Digitally enabled models.
- Platforms and ecosystems that include non-traditional competitors/partners.
- *Old assumptions about global trade, in both its nature and geographical footprint.*
- *The regulatory environment will likely require extensive change.*

Challenges

- The COVID-19 crisis represents a long-term issue of disruption for the industry, not a one-off.
- Multiple vectors of change, some only tangentially connected to COVID-19.
- Regionalisation replacing globalisation.

Opportunities

- Accelerating digital diffusion and building smart shipping options.
- Autonomous shipping.
- Building the resiliency to cope with the looming sustainability issue.

Smart Cities

Governments and urban authorities are using smart city technology, 5G, sensors and data to trace real-time health issues and conduct contact tracing. Smart cities' technologies are also helping to determine whether social distancing rules are being followed[cclxviii]. Such a moment would appear to be a watershed for smart city development, if not universally welcomed from a longer-term privacy perspective.

The use of machine learning allied to such systems could create not just sensing, but predictive cities. Nashville Fire Department, in the US, is already testing advanced analytics software predict the location of future incidents[cclxix].

By 2025, one-fifth of all data generated worldwide is forecast to be marked as 'critical' to daily life, and nearly a tenth as 'hypercritical[cclxx].' Data collection and analysis are becoming prominent features of building systems, which will likely mean that facilities and cities best positioned to analyse their data and provide actionable output to users will likely gain competitive advantage within the marketplace[cclxxi].

Collaboration and ecosystem partnerships will accrue prominence in many organisations' smart city plans since few have the necessary direct to consumer reach with the 100 billion to one trillion IoT connected devices forecast to be around in 2030-2035. At the same time '...the future is moving toward integrated solutions that connect all verticals within a single platform[cclxxii].' All buildings and ambient data will likely feed into one of a number of shared systems, including a health based one.

Such data is likely to span freely available sources such as local demographic patterns to more protected sources. The benefits of these platforms are already being factored into decision making.

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- A.I in cities governance.
- Open data.
- Smart city governance platforms.
- Unified data.
- *Stand-alone solutions*

Challenges

- Balancing privacy and security.
- Public and private collaboration.
- Building citizen centric services.

Opportunities

- The first global framework for smart city governance is emerging[cclxxiii] and potential players and stakeholders should engage with it immediately.
- Smart cities could generate up to $2 trillion worth of business by 2025[cclxxiv].
- Smart cities could become key talent magnets in their own right (43 percent of business leaders are looking to move offices to cities with a compelling smart city vision[cclxxv].)

Sustainability

A 2019 study found that 78 percent of asset owners globally are already integrating ESG into their investment processes[cclxxvi]. This relatively narrow interest in sustainability is likely to broaden into other areas and issues.

Health care and issues surrounding food, obesity, and tobacco could face renewed interest and calls for collaboration that have already been demanded from pharmaceutical organisations. However, the concept of sustainability will probably need redefining in the COVID-19 era and what follows[cclxxvii].

For example, '90 percent of companies feel as though they need to change their core business model at least somewhat in order to operate within a truly sustainable economy, and 38 percent feel that their core business model will need to change radically[cclxxviii].' If city-level actions are anything to judge by, the crisis could be the time to reassess how things are done. For example, Milan has announced an ambitious scheme to reduce car use after lockdown[cclxxix], and has repurposed 35km of roads into cycling lanes.

The circular economy concept could be key to achieving a new form of sustainability. Our pre-COVID evidence suggested we are becoming less circular, not more[cclxxx], yet Gartner suggests that by 2029, the circular economy will be the only economy that matters, replacing wasteful linear economies[cclxxxi]. With the economy, supply chains and consumer attitudes all being rewritten, now would appear the time to start building the type of networks and collaboration required for such a system.

Scientific breakthroughs are concurrently allowing such a transformation; witness the creation of a mutant enzyme that can recycle plastic bottles in hours that could be commercialised within five years[cclxxxii].

Sustainability is increasingly likely to form a key KPI, not just for investors, but consumers becoming more aware of the impact and link between humans and the natural world.

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- Sustainability as a KPI and investment factor.
- Infrastructure of circular economy.
- A new definition of sustainability.
- New recycling paradigms.
- *Linear supply chains.*

Challenges

- Need for new metrics.
- Overcoming legacy thinking and business models.
- Investment in a time of recession.

Opportunities

- Review the role of the organisation in the wider community.
- Create sustainable long-term value.
- Creating purpose driven organisations that appeal to talent.

Technology

The new normal of the COVID crisis – of remote work, online education and social distancing – will continue to create demand for products and services delivered by the tech industry[cclxxxiii] that could become long term in nature. Demand for cybersecurity solutions will also boom since at present organisations only protect 60 percent of their business ecosystem[cclxxxiv]. The 73 percent of executives citing the rising importance of cybersecurity over the next three years[cclxxxv] will almost certainly have grown thanks to the COVID crisis and the cybersecurity mess it could turn out to be.

Big tech is almost certain to emerge from the crisis in a stronger position than it entered it. Various forms of technology receiving public scrutiny before the crisis are now central in fighting it, including the gamut of surveillance-based options. However, given the expansion of the state, governments may also feel emboldened. The Economist suggests that tech companies '...best defence is to propose a new deal to the citizens of the world. That means clear and verifiable rules on how they publish and moderate content, helping users own, control and profit from their own data[cclxxxvi].'

Outlined by the World Economic Forum, it was suggested back in 2017 that a '…person's data should reside in an account where it would be controlled, managed, exchanged and accounted for[cclxxxvii],' by around 2028.

In addition, 'the pattern of 'life data' could emerge as a new way to de-commoditize consumer financial products.

Consequently, new businesses may emerge to meet the market need for access to these data flows[cclxxxviii].' Consensual data access could knock down the remaining barrier to entries if not to existing industries themselves, then the ability to offers customers new ways of doing things and meeting their demands and wishes in non-traditional ways – such as providing 'banking' but not being a bank.

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- Ambient technology.
- A new bigtech/public compact
- Tech will propel new working, health, entertainment and shopping practices that will probably become a permanent fixture of the next normal.
- *Me-too products and services that do not satisfy shifting consumer demand.*
- *Free to use consumer data.*

Challenges

- Avoiding bigtech vs. big government issues.
- International patchwork of regulations.
- Ensuring cybersecurity as an in-built, default style setting.

Opportunities

- Creating new sticky markets - virtual events for example – that endure past the crisis.
- Regaining broad public trust.
- Create value for users when using their data.

Transportation and Automotive

The transport and automotive sectors are significantly impacted by the crisis. Some 80 percent of automotive and related companies report that it will have a direct impact on their 2020 revenues, while more than 80 percent of the world's auto supply chain is also connected to China[cclxxxix]. The crisis also provides an opportunity – or perhaps compels incumbents - to experiment with new ways of doing things, trialling new technology such as autonomous vehicles (AVs) and accelerating strategic plans[ccxc].

The obvious example lies with autonomous vehicles. During lockdown in China, food delivery service 'Meituan began piloting AVs for delivery throughout Beijing. The delivery vehicle from Meituan can travel up to 100km carrying load of 100kg at the speed up to 20km/h. It mainly delivers fresh vegetables and food. China Unicom worked together with Meituan to ensure the support of 5G network for its autonomous delivery vehicle[ccxci].' Milton Keynes has also seen COVID inspired AV use.

It is noted that young markets plus those with dense geographic concentration of key parts, such as electric vehicles (EVs), are especially vulnerable to the nature of the COVID-19 crisis. The longer term looks more promising. For example, previous forecasts were for green transport set to overtake cars in world's major cities by 2030[ccxcii]. It should also be acknowledged that interest in autonomous vehicles has risen in direct response to the crisis '...as manufacturers look for driverless delivery systems that would be useful in pandemic situations. If those systems take hold, EVs could benefit[ccxciii].' If they do, and in a timely manner, this could even speed up development and investment for electric air taxis, which were forecast earlier in 2020 to reach a $1.5 trillion market globally by 2040[ccxciv].

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- More autonomous vehicles and transport.
- More person to person logistics to cope with the growth of ecommerce.
- New mass transport concepts that reduce physical contact.
- *Less business-related transport than many otherwise have occurred thanks to proliferation of virtual options.*
- *Could spatial economics start to be lessened by AVs to the extent that commuting patterns etc. begin to be inexorably altered?*

Challenges

- Long term investment plans will likely need revisiting and re-prioritised, in light of decreased short to mid-term revenue[ccxcv].
- Travel patterns, as well as commuting ones, may not recover to their pre COVID-19 state[ccxcvi], regardless of AV uptake.
- New models for premium transport – will we still need business class as previously configured if we are traveling less for business?

Opportunities

- Mobility-as-a-Service
- Ecosystem approach to aviation, e.g. profit sharing for airlines and airports.
- New public-private ownership models may begin to address sustainability?

Travel and Tourism

COVID-19 is likely to cause $1 trillion in direct losses for the global tourism industry, up to $5 trillion indirectly, as well as lead to around 50m job cuts in 2020 alone[ccxcvii]. The previous normal may never be fully replicated, with trust in safe travelling, disposable income and consumer behaviour all potentially impacted in key ways, not to mention the status of airlines, hotels and other key infrastructure. A return for hotels to their 2019 levels could take six years at least[ccxcviii]. Enhanced short-term challenges could also feature: Australia and New Zealand for example, have already discussed the banning of international travel, both inbound and outbound, for 12 months[ccxcix] - or forming a 'Tasman travel-bubble.'Indeen, Germany is considering allowing foreign holidays to countries with low levels ov the virus and modern hospitals.

The old normal may not be desirable in any case. Many destinations have quickly progressed from over-tourism being their primary problem to complete loss of livelihood. Neither are sustainable. The COVID pause will enable new strategies to be crafted for those with the foresight to create more economically, culturally and environmentally tenable propositions. The environmental costs associated with industrial tourism were being questioned pre COVID. For example, a 2020 study of EU consumers found 62 percent advocated banning short-haul flights for the sake of the environment[ccc].

A lot of commentary has suggested virtual travel as a possible substitute, both short and long term. Whether this satisfies the needs and desires that drove the wish for travel in the first place remains unresolved, but technology will clearly have a part to play in the recovery, or redesign, of the industry. Extended reality tools 'could boost event sales for hotels by 8 percent[ccci], for example, while the Faroe Islands has launched virtual forms of tourism that have proven extremely popular.

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- More local, time-limited tourism.
- Increased use of tech throughout travel.
- Attempts to provide virtual and personalised forms of travel.
- *Freedom of movement is likely to be reduced, whether periodically, or should politics take inward turns in key countries, perhaps permanently with regards to some international routes.*
- *The middle market, should recovery follow an L or U shape, could see reduced growth.*

Challenges

- We are still forecast for four billion part-time tourists, globally, by 2040[cccii]. Environmental limits are finite; services, products and incentives for greener and more sustainable travel must emerge.
- Create more resilient tourism models and reduce risk of overly concentrated industries.
- Adapt to the new consumer norms that will likely emerge in the post COVID world. Tourism related interests need to plan for a range of scenarios.

Opportunities

- Align tourism with sustainability, health and the needs of the local community.
- Reorient products and services.
- Pioneer alternative ways of experiencing and consuming.

Future of Community

As of April 25th 2020, 22 percent of Britons are noted as belonging to a community support group, with more than a third joining since the start of the pandemic. The Economist notes that '...2 million people have joined local support networks on Facebook while daily users of Nextdoor, a hyperlocal social network, has risen 90 percent[ccciii].'

Depending on how economic structures and paradigms evolve, the pandemic could preference localism over globalism and also change how we fund our communities. In the short term, community development financial institutions, churches, and nonprofits could help businesses and residents to rebuild. In the medium to longer-term, '...new financial products and programs such as community rainy-day funds could fortify the resilience of communities[ccciv].'

It is equally plausible that companies will be asked to contribute in new ways. The concept of social intrapreneurs could flourish, whereby entrepreneurs who work as employees within companies, develop business solutions for social or environmental problems, and attempt to 'future-proof' communities. In fact, companies may themselves seek this role since evidence suggests such moves also benefit the company - 24 percent see their initiative as a catalyst toward company transformation[cccv]. The relationship between communities and the state will also change. It could plausibly become more 'remote,' whereby states digitise much of their services[cccvi] in the face of higher debt. Future partnerships joining the state, business and local communities would seem more likely.

Changes in how the community relates to itself, to business and the state will all need to coalesce to some degree to combat future issues. For example, loneliness is something most of us are uncomfortably getting used to during the lockdown. Yet there are 6.8 million men aged 60 and over living alone in the UK today, which is projected to reach 9.6 million by 2030[cccvii].

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- New personal support networks. Will they endure?
- New business-community links.
- New government-community links.
- More localism and local awareness.
- Plans for dealing with ageing.

Challenges

- Creating new norms.
- The challenge of loneliness.
- The digital divide could limit effectiveness of digital services.

Opportunities

- Chance to re-assess social norms.
- Chance to build more resilient communities.
- Future-proof our communities.

Future of Religion

Danish analysis of 75 countries' internet use since the onset of the pandemic, reveals that '...search intensity for prayer doubles for every 80,000 new registered cases of COVID-19[cccviii].'

In March 2020, these reached a 5-year peak, surpassing levels of major events such as Christmas, Easter, or Ramadan. At the same time, churches are already finding new ways of fulfilling many outreach programs. For instance, at NorthWood Church, Texas, the women's ministry has organised '...online coordination to take the elderly to the hospital, to providing them with meals, as well as organising and providing lunches for impoverished children[cccix].' Equally many congregations found that video conferencing was an ideal way to stay in touch, look after one another and share the message of their faith. This will likely persist after the pandemic is over.

The level of change COVID could induce may be unprecedented, but a wider interest in religion and spirituality is not the only plausible implication. The 2013-2016 Ebola crisis highlighted the need to 'build bridges between development and faith, science and spiritual approaches vital[cccx].' Organisations that push narratives of pseudo-science, or embrace a complete absence of science, rather than science complimenting faith, could instead 'reinforce the decision of the non-religious to stay away from organised religion[cccxi].'

The Economist notes that 'COVID-19 has not generally widened fissures between faiths. Rather, it has widened those within the ranks of all great religions[cccxii]. In countries such as Morocco, Saudi Arabia, Bahrain, and Iraq many view the restrictions as violations of religious practice and, in some cases, outright repression of religious minorities. Could the new normal be used as yet another justification to marginalise religious expression deemed too extreme, or religious practices that are politically inconvenient[cccxiii]?'

Pre-COVID, many churches arguably operated without too much reflection on their identity or mission. Inherent questions now require an answer: 'What is the Church? A building? A particular gathering? A community? What is worship? What really matters in a worship service[cccxiv]?'

Appearing/disappearing by 2030

- More visible religious organisations footprints in wider local communities.
- Use of tech to provide community.
- Rising interest in spirituality.
- More regionalisation of previously global entities (Methodist Church split)
- More online only churches.

Challenges

- Fissures within religions.
- Accommodating new interest without alienating the faithful.
- Prolonged COVID changes could redraw notions of what constitutes a church.

Opportunities

- Provide stability, community and hope in a world in flux.
- Partnering with other community or faith organisations to help further-community outreach[cccxv].
- Increased roles for women as more activities are and remain home based.

Future of Work

In August 2019, some 54 percent of executives predicted that 'digital' would have a significant impact on their industry over the next five years[cccxvi]. We would assume that a similar survey today would reveal a significantly higher percentage. Work from home, a consumer-centric proposition, collaboration, digital supply chains and other facets of digital transformation have fast become necessary to transact business.

On April 29th, the ILO announced that nearly half of global workforce was at risk of losing their livelihoods[cccxvii]. It is likely that swathes of these jobs will not be restored in their original capacity once the acute first phase of the COVID-19 crisis passes. Especially interesting will be the evolution of the platformed business model, which is now posing new and immediate 'challenges for regulators, workers and established businesses in the formal economy[cccxviii].'

Businesses everywhere now should accelerate their plans for creating, staffing and sustaining the jobs that will drive their planned-for future success. Likewise, those that have managed to partner widely, collaborate and enter new markets generally have a greater opportunity to climb out of the depression that COVID-19 could leave behind – whether through access to talent or by using technology to switch business models[cccxix].

Indeed, the issues of collaboration and colliding markets are likely to rise in importance the longer the COVID-19 pandemic and aftermath last. Bain, for example, suggests that to survive many CEOs will need to explore '...public-private partnerships wherever applicable. Companies' best partner in recovery may be a local municipality, mayor, governor, a regional committee, or a country's governing body[cccxx].'

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- The extraordinary impositions of the pandemic could lead to more automation.
- Innovation acceleration: The solutions implemented during crises often endure, recession-launched services and products often become market leaders while behaviour shifts can be permanent[cccxxi].
- Economic resilience in the face of COVID-19 and other wildcards requires companies to do things differently[cccxxii] and to do different things.
- New partnership and collaboration sources.
- *The assumptions that we have based many of our models and practices on.*
- *Colocation as the default.*

Challenges

- The benefits of digital workplaces are fast becoming realised but are increasingly unable to provide competitive advantage. It's table stakes now.
- Build, source and manage the talent for the future.
- Build the ecosystem and partnerships to deal with the evolving environment.

Opportunities

- Orient processes and practices around consumers and employees.
- Use talent, expertise and data capability to open new revenue streams or business models.

Conclusion

Rules governing politics, economics, social norms, work and more are being rewritten at pace, leaving yesterdays’ assumptions increasingly invalid. For example, distance, long minimised as a critical factor thanks to globalisation, is back to some degree as both a social and economic factor. Trends and drivers that were set to materialise over the next 5 to 10 years are appearing now, leaving many companies with shorter planning and strategy horizons in unenviable situations. Digitalism is fast becoming a bare minimum for survival, while redesign, adaptation, restructuring and rebuilding will become critical pillars of future business. COVID-19 may or may not be the only pandemic to impact our lifetime, but it will not be the only ‘black swan.’ Resilience is critical and must be realised by design.

Tactics devised to survive the acute phase of the crisis, must evolve into a more strategic view of change. The groundwork for organisational recovery and renewal must be laid now, using tools capable of incorporating a wide range of forces larger and more complex than many standard industry-level trends that are interrogated by tools such as Porter’s Five Forces. It is essential that business reconstructs and redesigns for the future and is not driven towards solving the problems of the past.

The long-term view, although imperfect and beyond many leaders’ likely job tenure, is a key facet of organisational sustainability and resiliency. Foresight seeks to redress the dangerous, short-term weighted imbalance evident in planning by providing a systemic framework for thinking about, imagining, and planning for the future. At its core, foresight allows stakeholders to have structured conversations about uncertainty, which is perhaps the only certainty right now. Done correctly, it can reveal challenges and opportunities that are easily dismissed in a business-as-usual environment.

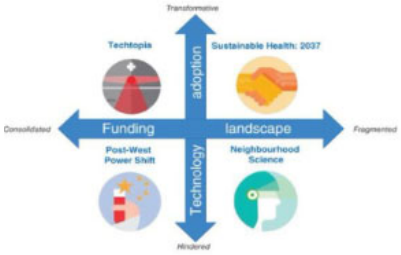
The brands, industries and ideas that will come to dominate their sectors and beyond are still being created. This crisis, for all its human and economic suffering, will compel us to do things better, to do different things and establish a new set of rules. For those that dislike change this is set to be extremely uncomfortable as we enter an era of unprecedented disruption and challenge. For those that embrace change, the post COVID environment will provide a range of opportunities, ideas and innovation that help rebuild our communities, businesses and the world may even be a better place. In the post-COVID economy, thinking about the future is no longer an indulgence or useful thought exercise for business, but rather a key tool for interrogating uncertainty while building more sustainable and resilient futures into the ‘New Normal’.

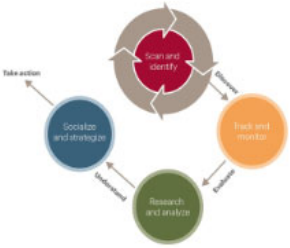
Call to Action

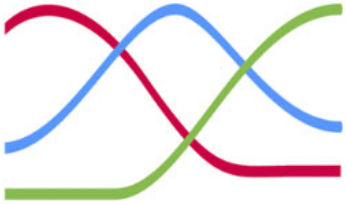
After we've learned to survive the economic and social disruption of the pandemic, we must plan for the changed future our organisations will need to operate in afterwards and test our current assumptions, offerings and goals. Apart from the pandemic, we are at the start of the greatest impact of technology on our lives and organisations that we have ever experienced, and the rate of impact is accelerating.

Traditional strategy and planning tools have been barely adequate to-date but we now need to look deeper at the drivers of change, determine their possible impact on us and prepare strategies for adapting to them or even better, grasp the opportunities they present.

Several tools are excellent at this. Horizon Scanning, scenario planning, Three Horizon mapping, Impact Wheels, to name but a few. These are neither difficult or time consuming to use and they produce instant feedback to participants and subsequent reviewers.







I've long said that 'if you want to get ahead you need to look ahead' and there isn't a better time to do this than right now. Consider:

"The root causes of decline in public companies are;
strategic risks (60%) rather than operational risks (30%) or financial risks (10%)."
The Society of Actuaries

"The assumptions on which the organisation has been built
and is being run no longer fits reality."
Peter Drucker

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Global Futures and Foresight is a research and consulting firm that helps organisations be better prepared to embrace change, innovate and develop new strategies and solutions and helps clients to avoid the risk of being blindsided by external disruptive change.

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Department for Business, Energy & Industrial Strategy

The GFF is a Futures Framework supplier of futures methods and insights to the UK government via the Department for Business, Energy and Industrial Strategy.

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References

[i] Source: McKinsey, 2020 https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business
[ii] Source: https://ideas.repec.org/p/oxf/wpaper/431.html
[iii] Source: https://www.oecd.org/coronavirus/policy-responses/evaluating-the-initial-impact-of-covid-19-containment-measures-on-economic-activity/
[iv] Source: https://obr.uk/coronavirus-analysis/
[v] Source: Going Concern, 2020 https://goingconcern.com/covid-19-accountants-layoffs-survey/
[vi] Source: Brainstorm, 2020 http://www.brainstormmag.co.za/technology/14898-automating-the-future-of-accounting
[vii] Source: Forbes, 2020 https://www.forbes.com/sites/jonyounger/2020/04/14/covid-19-is-likely-to-give-freelancing-a-major-growth-spurt/#7d4498f97f37
[viii] Source: Journal of Accountancy, 2020 https://www.journalofaccountancy.com/news/2020/apr/indirect-impacts-of-coronavirus-on-cpa-firms.html
[ix] Source: The Economist, 2017 https://www.economist.com/news/briefing/21721634-how-it-shaping-up-data-giving-rise-new-economy
[x] Source: Forbes, 2020 https://www.forbes.com/sites/jonyounger/2020/04/14/covid-19-is-likely-to-give-freelancing-a-major-growth-spurt/#7d4498f97f37
[xi] Source: GoBrightWing, 2019 https://www.gobrightwing.com/2019/03/06/millennials-working-in-accounting-finance/#!/
[xii] Source: ThomsonReuters, 2019 https://tax.thomsonreuters.com/blog/future-of-accounting-reforming-your-cpa-firm-into-an-advisory-practice/
[xiii] Source: Lifeboat foundation, 2020 https://lifeboat.com/blog/2020/03/coronavirus-may-mean-automation-is-coming-sooner-than-we-thought
[xiv] Source: Forbes, 2020 https://www.forbes.com/sites/forbestechcouncil/2020/03/04/how-can-ai-impact-work-in-ma/?linkId=100000011022266#47fc82878bc4
[xv] Source: Accenture, via yahoo, 2019 https://finance.yahoo.com/news/accentures-chief-technology-officer-on-how-artificial-intelligence-is-changing-work-202428555.html?linkId=100000008529712
[xvi] Source: Business Insider 2019 https://www.businessinsider.sg/singapore-just-announced-a-national-ai-strategy-that-will-transform-the-country-by-2030-here-are-the-5-major-plans-underway
[xvii] Source: Politico, 2019 https://www.politico.eu/article/ai-data-regulator-rules-next-european-commission-takes-aim/
[xviii] Source: Wired, 2019 https://www.wired.com/story/ai-algorithms-need-drug-trials/
[xix] Source: PwC, 2019 https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html
[xx] Source: Infrastructure Investor, 2020 https://www.infrastructureinvestor.com/aviation-impact-to-be-5-6-times-worse-than-9-11-mckinsey/
[xxi] Source: Forbes, 2020 https://www.forbes.com/sites/danielreed/2020/03/17/could-covid-19-really-wipe-out-half-the-worlds-airlines-and-change-global-aviation-forever-at-least-one-keen-observer-thinks-so/#5f33d19b20bf
[xxii] Source: The Economist, 2020 https://www.economist.com/graphic-detail/2020/04/29/the-travel-industry-is-going-local
[xxiii] Source: The Guardian, 2020 https://www.theguardian.com/business/2020/apr/28/british-airways-plans-to-make-up-to-12000-staff-redundant
[xxiv] Source: Centre for Aviation, 2020 https://centreforaviation.com/analysis/reports/covid-19-no-more-normal-for-aviation-519513
[xxv] https://airport-world.com/airports-set-to-lose-38-of-traffic-and-50-of-revenues-in-2020/
[xxvi] Source: PhocusWire, 2018 https://www.phocuswire.com/The-aviation-industry-could-save-15-billion-a-year-through-connected-aircraft
[xxvii] Source: Strategy& (PwC), 2017 https://www.strategyand.pwc.com/reports/natural-partners
[xxviii] Source: Strategy& (PwC), 2017 https://www.strategyand.pwc.com/reports/natural-partners
[xxix] Source: Flight Global, 2020 https://www.flightglobal.com/air-transport/norwegian-authorities-aim-for-electric-aircraft-debut-by-2030/137146.article
[xxx] Source: Willis Towers Watson, 2020 https://www.willistowerswatson.com/en-US/Insights/2020/03/covid-19-and-the-airport-industry
[xxxi] Source: Juniper Research, 2020 https://www.juniperresearch.com/press/press-releases/digital-banking-users-to-exceed-3-6-billion
[xxxii] Source: McKinsey, 2020 https://www.mckinsey.com/industries/financial-services/our-insights/leadership-in-the-time-of-coronavirus-covid-19-response-and-implications-for-banks
[xxxiii] Source: PwC, 2020 https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-retail-banking.html
[xxxiv] Source: PwC, 2020 https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-retail-banking.html
[xxxv] Source: Financial Planning, 2020 https://www.financial-planning.com/news/ubs-sees-spike-in-digital-engagement-could-it-be-the-new-normal
[xxxvi] Source: McKinsey, 2020 https://www.mckinsey.com/industries/financial-services/our-insights/leadership-in-the-time-of-coronavirus-covid-19-response-and-implications-for-banks
[xxxvii] Source: Forbes, 2020 https://www.forbes.com/sites/cognitiveworld/2020/01/05/2020-will-bring-a-new-renaissance-humanity-over-technology/#25da5a18dd78
[xxxviii] Source: Wall Street Journal, 2020 https://www.wsj.com/articles/a-spur-to-the-biotech-century-ahead-11585238908
[xxxix] Source: World Economic Forum, 2016 https://www.weforum.org/agenda/2016/12/what-is-biotechnology-how-will-it-change-our-lives/
[xl] Source: Entrepreneur, 2020 https://www.entrepreneur.com/article/345226
[xli] Source: Guardian, 2020 https://www.theguardian.com/environment/2020/apr/08/scientists-create-mutant-enzyme-that-recycles-plastic-bottles-in-hours
[xlii] Source: HuffPost, 2016 https://www.huffpost.com/entry/computers-biology-algorithms-yuval-harari_b_9999150
[xliii] Source: Consultancy, 2020 https://www.consultancy.eu/news/4078/how-covid-19-is-impacting-the-global-chemicals-industry
[xliv] Source: Consultancy, 2020 https://www.consultancy.eu/news/4078/how-covid-19-is-impacting-the-global-chemicals-industry
[xlv] Source: McKinsey, 2019 https://www.mckinsey.com/industries/chemicals/our-insights/the-next-big-thing-quantum-computings-potential-impact-on-chemicals
[xlvi] Source: McKinsey, 2019 https://www.mckinsey.com/industries/chemicals/our-insights/the-next-big-thing-quantum-computings-potential-impact-on-chemicals
[xlvii] Source: Help Net Security, 2019 https://www.helpnetsecurity.com/2019/09/03/quantum-computing-market-revenue/
[xlviii] Source: PwC, 2020 https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-chemicals.html
[xlix] Source: Consultancy, 2020 https://www.consultancy.eu/news/4078/how-covid-19-is-impacting-the-global-chemicals-industry
[l] Source: Consultancy, 2020 https://www.consultancy.eu/news/4078/how-covid-19-is-impacting-the-global-chemicals-industry
[li] Source: PwC, 2020 https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-chemicals.html
[lii] Source: Raconteur, 2018 https://www.raconteur.net/future-construction-dec-2018
[liii] Source: European Sting, 2018 https://europeansting.com/2018/06/14/the-fourth-industrial-revolution-is-about-to-hit-the-construction-industry-heres-how-it-can-thrive/
[liv] Source: Business Insider, 2018 https://www.businessinsider.com/3d-homes-that-take-24-hours-and-less-than-4000-to-print-2018-9
[lv] Source: AFCEA, 2018 https://www.afcea.org/content/experts-identify-emerging-technologies
[lvi] Source: World Economic Forum, 2018 https://www.weforum.org/agenda/2018/05/25-of-dubai-s-buildings-will-be-3d-printed-by-2025
[lvii] Source: Aju Daily, 2019 https://www.ajudaily.com/view/20190409125548712
[lviii] Source: World Economic Forum, 2018 http://www3.weforum.org/docs/Future_Scenarios_Implications_Industry_report_2018.pdf
[lix] Source: World Economic Forum, 2018 http://www3.weforum.org/docs/Future_Scenarios_Implications_Industry_report_2018.pdf
[lx] Source: McKinsey, 2018 https://www.mckinsey.com/~/media/mckinsey/industries/capital%20projects%20and%20infrastructure/our%20insights/voices%20on%20infrastructur

e%20future%20proofing%20infrastructure%20in%20a%20fast%20changing%20world/future-proofing-infrastructure-in-a-fast-changing-world-voi-october-2018.ashx
[lxi] Source: World Economic Forum, 2018 https://www.weforum.org/agenda/2018/03/how-construction-industry-can-build-its-future/
[lxii] Source: BCG, 2018 https://www.bcg.com/en-us/publications/2018/will-3d-printing-remodel-construction-industry.aspx
[lxiii] Source: CBI Insights, 2019 https://www.cbinsights.com/research/disrupting-management-consulting/
[lxiv] Source: CBI Insights, 2019 https://www.cbinsights.com/research/disrupting-management-consulting/
[lxv] Source: Freight Waves, 2020 https://www.freightwaves.com/news/the-future-of-consulting-could-be-virtual
[lxvi] Source: Economist, 2019 https://www.economist.com/business/2019/11/21/rethinking-mckinsey
[lxvii] Source: Lexology, 2019 https://www.lexology.com/library/detail.aspx?g=f5a16336-4ee2-41a0-a66d-50061b3f23fd
[lxviii] Source: SC Media, 2020 https://www.scmagazineuk.com/71-cios-regularly-blindsided-unknown-devices/article/1676437
[lxix] Source: BusinessWire, 2020 https://www.businesswire.com/news/home/20200203005070/en/17-Organizations-Globally-Considered-%E2%80%9CLeaders%E2%80%9D-Cyber-Resilience
[lxx] Source: Silicon Republic, 2019 https://www.siliconrepublic.com/enterprise/data-breaches-cost-2024-juniper-research
[lxxi] Source: CSO Online, 2020 https://www.csoonline.com/article/3533353/covid-19-offers-a-unique-opportunity-to-pilot-zero-trust-rapidly-and-at-scale.html
[lxxii] Source: Search CIO, 2019 https://searchcio.techtarget.com/feature/Edge-computing-architecture-takes-on-a-partner-ecosystem
[lxxiii] Source: PwC, retrieved 2020 https://www.pwc.com/apec
[lxxiv] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/3-ways-coronavirus-is-reshaping-education-and-what-changes-might-be-here-to-stay/
[lxxv] Source: Financial Times, 2020 https://www.ft.com/content/0ae1c300-7fee-11ea-82f6-150830b3b99a
[lxxvi] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/4-ways-covid-19-education-future-generations/
[lxxvii] Source: Visual Capitalist, 2020 https://www.visualcapitalist.com/how-technology-is-shaping-the-future-of-education/
[lxxviii] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/3-ways-coronavirus-is-reshaping-education-and-what-changes-might-be-here-to-stay
[lxxix] Source: Times Higher Education, 2020 https://www.timeshighereducation.com/news/uk-universities-face-ps26bn-coronavirus-hit-30k-jobs-risk
[lxxx] Source: Times Higher Education, 2020 https://www.timeshighereducation.com/news/uk-universities-face-ps26bn-coronavirus-hit-30k-jobs-risk
[lxxxi] Source: Cognizant, 2019 https://www.cognizant.com/future-of-learning
[lxxxii] Source: HR Grapevine, 2019 https://www.hrgrapevine.com/content/article/2019-01-30-businesses-witnessing-skills-gap-crisis
[lxxxiii] Source: Atlantic Council, 2020 https://www.atlanticcouncil.org/blogs/new-atlanticist/the-implications-of-the-coronavirus-crisis-on-the-global-energy-sector-and-the-environment/
[lxxxiv]
Source: Reuters, 2020 https://www.reuters.com/article/us-global-oil-supply-graphic/global-oil-supply-to-fall-6-by-2030-due-to-delayed-projects-data-idUSKCN2261LL
[lxxxv] Source: Atlantic Council, 2020 https://www.atlanticcouncil.org/blogs/new-atlanticist/the-implications-of-the-coronavirus-crisis-on-the-global-energy-sector-and-the-environment/
[lxxxvi] Source: The Guardian, 2020 https://www.theguardian.com/business/2020/apr/30/covid-19-crisis-demand-fossil-fuels-iea-renewable-electricity
[lxxxvii] Source: Forbes, 2020 https://www.forbes.com/sites/feliciajackson/2020/03/31/could-covid-19-drive-a-structural-shift-in-the-oil-markets/#510745c582f0
[lxxxviii] Source: CSIS, 2020 https://www.csis.org/analysis/how-covid-19-will-reshape-global-gas
[lxxxix] Source: Deloitte, 2020 https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/COVID-19/COVID-19-Understand-sector-impact-oil-gas.pdf
[xc] Source: PwC, 2020 https://www.pwc.com/us/en/library/covid-19/coronavirus-energy-industry-impact.html
[xci] Source: Bain, 2019 https://www.bain.com/insights/making-the-most-of-asia-pacifics-insurance-boom
[xcii] Source: Barclays, 2020 https://privatebank.barclays.com/news-and-insights/womens-rising-wealth/
[xciii] Source: Harvard Business Review, 2020 https://hbr.org/2020/01/competing-in-the-age-of-ai
[xciv] Source: FinTech Takes, 2020 https://ficofintech.substack.com/p/the-fintech-laboratory
[xcv] Source: Advisor Perspectives, 2020 https://www.advisorperspectives.com/articles/2020/03/30/mckinseys-vision-of-wealth-management-in-2030
[xcvi] Source: McKinsey, 2020 https://www.mckinsey.com/industries/financial-services/our-insights/on-the-cusp-of-change-north-american-wealth-management-in-2030
[xcvii] Source: PwC, via Irish Times, 2019 https://www.irishtimes.com/business/financial-services/socially-conscious-funds-assets-to-top-2tn-by-2025-pwc-says-1.4079578
[xcviii] Source: Wealth Management, 'Assets on Wealth Management Platforms to Nearly Double by 2022,' 2018 https://www.wealthmanagement.com/technology/assets-wealth-management-platforms-nearly-double-2022
[xcix] Source: RBC Wealth Management, 2019 https://www.rbcwealthmanagement.com/us/en/research-insights/the-shifting-landscape-of-global-wealth/detail/
[c] Source: RBC Wealth Management / EIU, 2019 https://eiuperspectives.economist.com/sites/default/files/images/eiu_rbc_-_the_shifting_landscape_of_global_wealth_future-proofing_prosperity_in_a_time_of_upheaval.pdf
[ci] Source: Foodtank, 2020 https://foodtank.com/news/2020/03/how-will-coronavirus-affect-our-food-a-dispatch-from-mexico/
[cii] Source: Fast Company, 2020 https://www.fastcompany.com/90485666/the-united-arab-emirates-is-100-million-in-indoor-farming-as-it-tries-to-become-more-resilient
[ciii] Source: UN, 2018 https://news.un.org/en/story/2018/10/1023371
[civ] Source: CNN, 2019 https://www.cnn.com/2019/04/01/business/5g-farming/index.html
[cv] Source: CNBC, 2019 https://www.cnbc.com/2019/05/23/alternative-meat-to-become-140-billion-industry-barclays-says.html
[cvi] Source: Live Kindly, 2019 https://www.livekindly.co/vegan-meat-market-85-billion-2030/
[cvii] Source: World Economic Forum, 2019 https://www.weforum.org/agenda/2019/04/the-future-of-agriculture-is-computerized
[cviii] Source: Food Navigator, 2019 https://www.foodnavigator-usa.com/Article/2019/09/17/By-2030-the-US-dairy-and-cattle-industry-will-have-collapsed-predicts-RethinkX
[cix] Source: Independent, 2019 https://www.independent.co.uk/life-style/gadgets-and-tech/robots-farming-autonomous-equipment-canada-australia-a8919836.html
[cx] Source: Bain, 2020 https://www.bain.com/insights/the-great-retooling-fm-blog/
[cxi] Source: The Economist, 2020 https://www.economist.com/britain/2020/04/03/how-covid-19-is-driving-public-sector-innovation
[cxii] Source: Information Age, 2018 https://www.information-age.com/govtech-1-trillion-2025-123476398/
[cxiii] Source: apolitical, 2020 https://apolitical.co/en/solution_article/covid-19-can-be-a-teachable-moment-lets-not-waste-it
[cxiv] Source: Microsoft, 2020 https://cloudblogs.microsoft.com/industry-blog/government/2020/03/19/empowering-government-employees-through-digital-skills/
[cxv] Source: Deloitte, 2018 https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/public-sector/lu-ai-unstructured-government-data.pdf
[cxvi] Source: Deloitte, Wall Street Journal, 2020 https://deloitte.wsj.com/cio/2020/03/04/2020-government-public-services-outlook/
[cxvii] Source: Deloitte, 2020 https://www2.deloitte.com/us/en/insights/economy/covid-19/governments-respond-to-covid-19.html#from-crisis-to-a-better-future
[cxviii] Source: Marketing Week, 2020 https://www.marketingweek.com/aldi-online-grocery-service-coronavirus/

[cxix] Source: McKinsey, 2020 https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/a-global-view-of-how-consumer-behavior-is-changing-amid-covid-19
[cxx] Source: ZDNet, 2020 https://www.zdnet.com/article/after-covid-19-what-happens-to-the-grocery-industry/
[cxxi] Source: juniper Research, 2018 https://www.juniperresearch.com/press/press-releases/just-walk-out-shopping-other-smart-checkout
[cxxii] Source: IoT Business News, 2017 https://iotbusinessnews.com/2017/11/15/13695-new-report-envisions-connected-iot-future-2030-barriers-adoption/
[cxxiii] Source: Harvard Business Review, 2016 https://hbr.org/2016/11/how-predictive-ai-will-change-shopping
[cxxiv] Source: Coin Telegraph, 2019 https://cointelegraph.com/news/prediction-20-percent-of-leading-global-grocers-to-use-blockchain-by-2025
[cxxv] Source: Modern Healthcare, 2020 https://www.modernhealthcare.com/opinion-editorial/therell-be-no-back-normal-healthcare-after-covid-19-crisis
[cxxvi] Source: LA Times, 2020 https://www.latimes.com/opinion/story/2020-03-17/op-ed-as-a-doctor-i-use-telemedicine-with-the-coronavirus-threat-it-could-revolutionize-healthcare
[cxxvii] Source: Bain, 2020 https://www.bain.com/insights/covid-19-accelerates-the-adoption-of-telemedicine-in-asia-pacific-countries/
[cxxviii] Source: USA Today, 2020 https://www.usatoday.com/story/tech/columnist/2020/03/18/coronavirus-tech-telemedicine-and-gadgets-war-against-covid-19/5058150002/
[cxxix] Source: Fast Company, 2019 https://www.fastcompany.com/90440921/amazon-and-apple-will-be-our-doctors-in-the-future-says-tech-guru-peter-diamandis
[cxxx] Source: Apple Insider, 2020 https://appleinsider.com/articles/20/04/14/apple-investigating-expansion-into-major-health-hardware
[cxxxi] Source: Strategy&, 2020 https://www.strategyand.pwc.com/gx/en/insights/future-of-health.html
[cxxxii] Source: LiveMint, 2020 https://www.livemint.com/technology/tech-news/how-5g-can-help-fight-coronavirus-11584617010491.html
[cxxxiii] Source: Fierce Healthcare, 2020 https://www.fiercehealthcare.com/practices/20-years-physicians-expect-almost-one-third-their-job-to-be-automated-stanford-medicine
[cxxxiv] Source: Fast Company, 2020 https://www.fastcompany.com/90481508/how-covid-19-is-changing-the-recruiting-and-hiring-process
[cxxxv] Source: Forbes, 2019 https://www.forbes.com/sites/bernardmarr/2019/04/29/the-10-vital-skills-you-will-need-for-the-future-of-work/#248766693f5b
[cxxxvi] Source: Business 2 Community, 2020 https://www.business2community.com/human-resources/the-future-of-hr-requires-talent-optimization-02275155
[cxxxvii] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/04/coronavirus-covid-business-resilience-preparedness-skills/
[cxxxviii] Source: HR Dive, 2020 https://www.hrdive.com/news/5-ways-hiring-will-feel-more-not-less-human-in-2030/573153/
[cxxxix] Source: TechCrunch, 2020 https://techcrunch.com/2020/03/09/hiresweet-helps-employers-find-candidates-that-arent-actively-looking-to-change-jobs/
[cxl] Source: CIO Magazine, 2018 https://www.cio.co.nz/article/643851/why-shapeshifting-organisations-future/
[cxli] Source: AI Thority, 2019 https://www.aithority.com/hrtechnology/gartner-says-only-29-of-functional-leaders-believe-they-have-the-right-talent-to-meet-current-performance-needs/
[cxlii] Source: NESTA, 2020 https://www.nesta.org.uk/blog/there-will-be-no-back-normal/
[cxliii] Source: Yahoo, 2020 https://finance.yahoo.com/news/12-ways-covid-19-change-161645112.html
[cxliv] Source: CIO Magazine, 2019 https://www.cio.com/article/3388681/if-data-s-the-fuel-is-your-it-engine-ready.html
[cxlv] Source: KPMG, 2019 https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/03/creating-future-ready-it-function-today.pdf
[cxlvi] Source: CIO, 2019 https://www.cio.com/article/3510090/why-immersive-it-is-the-future-forrester.html
[cxlvii] Source: Quartz, retrieved 2020 https://qz.com/1553770/how-microsoft-teams-learned-to-love-the-gif/
[cxlviii] Source: Oracle, 2020 https://www.oracle.com/a/ocom/docs/cloud/oracle-cloud-predictions-2020.pdf#page=22
[cxlix] Source: TechXplore, 2019 https://techxplore.com/news/2019-06-internet-biobattery.html
[cl] Source: Entrepreneur, 2020 https://www.entrepreneur.com/article/347669
[cli] Source: McKinsey, 2016 http://www.mckinsey.com/industries/retail/our-insights/the-how-of-transformation
[clii] Source: Boston Consulting Group, 2016 https://www.bcgperspectives.com/content/articles/people-organization-smart-design-for-performance/
[cliii] Source: Economist, 2020 https://www.economist.com/business/2020/04/25/the-pandemic-is-liberating-firms-to-experiment-with-radical-new-ideas
[cliv] Source: Economist, 2020 https://www.economist.com/business/2020/04/25/the-pandemic-is-liberating-firms-to-experiment-with-radical-new-ideas
[clv] Source: Boston Consulting Group, 2016 https://www.bcgperspectives.com/onwards-upwards-growth/people-productivity/need-treat-employees-thoughtfully-as-customers
[clvi] Source: MIT Technology Review, 2020 https://www.technologyreview.com/2020/04/25/1000563/covid-19-has-killed-the-myth-of-silicon-valley-innovation/
[clvii] Source: Phys.org, 2020 https://phys.org/news/2020-01-widespread-rural-areas-cities.html
[clviii] Source: Bain, 2019 https://www.bain.com/insights/change-is-the-new-superpower-forbes/
[clix] Source: McKinsey, 2020 https://www.mckinsey.com/~/media/mckinsey/business%20functions/risk/our%20insights/covid%2019%20implications%20for%20business/covid%2019%20march%2025/covid-19-facts-and-insights-march-25-v3.ashx
[clx] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/economic-impact-covid-19/
[clxi] Source: 11FS, 2020 https://11fs.com/blog/the-impact-of-coronavirus-on-the-insurance-industry
[clxii] Source: KPMG, 2020 https://home.kpmg/xx/en/home/insights/2020/03/do-insurers-have-covid-19-covered.html
[clxiii] Source: Insurance Thought Leadership, 2020 https://www.insurancethoughtleadership.com/insurtech-a-decade-gone-a-decade-ahead/
[clxiv] Source: Raconteur, 2020 https://res.cloudinary.com/yumyoshojin/image/upload/v1/pdf/future-insurance-2020.pdf
[clxv] Source: Insurance Thought Leadership, 2020 https://www.insurancethoughtleadership.com/will-covid-19-disrupt-insurtech/
[clxvi] Source: Economist, 2019 https://www.economist.com/finance-and-economics/2019/07/20/the-future-of-insurance-is-happening-without-insurance-firms
[clxvii] Source: Insurance Times, 2019 https://www.insurancetimes.co.uk/news/exclusive-more-than-half-of-brokers-fear-for-the-future-of-their-business-as-market-uncertainty-grows/1430375.article
[clxviii] Source: Oliver Wyman, 2020 https://www.oliverwyman.com/our-expertise/insights/2020/apr/insurance-brokers-face-covid-19.html
[clxix] Source: WNS, 2020 https://www.wns.com/insights/articles/articledetail/725/5-trends-in-insurance-broking
[clxx] Source: Insurance Business, 2019 https://www.insurancebusinessmag.com/us/news/technology/majority-of-brokers-dont-think-disruption-will-be-detrimental-193278.aspx
[clxxi] Source: WNS, 2020 https://www.wns.com/insights/articles/articledetail/725/5-trends-in-insurance-broking
[clxxii] Source: Ernst & Young, 2020 https://www.ey.com/en_gl/innovation-in-insurance/seven-business-models-of-the-future-for-the-insurance-sector
[clxxiii] Source: Insurance Business, 2019 https://www.insurancebusinessmag.com/us/news/technology/why-data-literacy-is-so-important-for-your-clients-170859.aspx#.
[clxxiv] Source: WNS, 2020 https://www.wns.com/Portals/0/FSx/Documents/Articles/PDFFiles/600/233/Article_5-Trends-in-Insurance-Broking_Jan_2020.pdf
[clxxv] Source: Oliver Wyman, 2020 https://www.oliverwyman.com/our-expertise/insights/2020/apr/insurance-brokers-face-covid-19.html
[clxxvi] Source: WNS, 2020 https://www.wns.com/insights/articles/articledetail/725/5-trends-in-insurance-broking
[clxxvii] Source: Law, 2020 https://www.law.com/international-edition/2020/03/24/big-four-law-firm-leader-says-covid-19-will-change-the-way-law-is-practiced/

[clxxviii] Source: Legal Cheek, 2019 https://www.legalcheek.com/lc-careers-posts/the-role-of-diverse-skills-in-the-radically-different-legal-services-of-the-future/
[clxxix] Source: Law, 2020 https://www.law.com/international-edition/2020/03/24/big-four-law-firm-leader-says-covid-19-will-change-the-way-law-is-practiced/
[clxxx] Source: Forbes, 2020 https://www.forbes.com/sites/markcohen1/2020/03/24/covid-19-will-turbocharge-legal-industry-transformation/#3d5500791195
[clxxxi] Source: Forbes, 2020 https://www.forbes.com/sites/markcohen1/2020/03/24/covid-19-will-turbocharge-legal-industry-transformation/#3d5500791195
[clxxxii] Source: Law, 2020 https://www.law.com/legaltechnews/2020/04/07/covid-19-pushed-legal-towards-tech-remote-work-there-may-be-no-going-back/?slreturn=20200401112246
[clxxxiii] Source: Which-50, 2019 https://which-50.com/online-retail-sales-to-exceed-6-trillion-by-2024-juniper-finds/
[clxxxiv] Source: Ecommerce News, 2019 https://ecommercenews.eu/ecommerce-uk-accounts-for-53-of-retail-sales-by-2028/
[clxxxv] Source: The National, 2020 https://www.thenational.ae/business/comment/coronavirus-social-distancing-puts-the-future-of-drone-delivery-to-the-test-1.991606
[clxxxvi] Source: Benzinga, 2019 https://www.benzinga.com/pressreleases/19/03/b13362143/1-6-billion-drone-logistics-transportation-market-by-2027-global-analy
[clxxxvii] Source: Digitalist Magazine (SAP), 2018 https://www.digitalistmag.com/digital-economy/2018/12/05/domo-arigato-partner-roboto-06193596
[clxxxviii] Source: Supply Chain Digital, 2020 https://www.supplychaindigital.com/logistics/mckinsey-what-future-automation
[clxxxix] Source: ABI Research, 2019 https://www.abiresearch.com/press/50000-warehouses-use-robots-2025-barriers-entry-fall-and-ai-innovation-accelerates/
[cxc] Source: Supply Chain Digital, 2020 https://www.supplychaindigital.com/logistics/mckinsey-what-future-automation
[cxci] Source: MIT Sloan, 2020 https://sloanreview.mit.edu/article/is-the-covid-19-outbreak-a-black-swan-or-the-new-normal
[cxcii] Source: Voice of Europe, 2020 https://voiceofeurope.com/2020/04/japan-begins-mass-manufacturing-exodus-from-china/
[cxciii] Source: VOXEU, 2019 https://voxeu.org/article/trade-effects-3d-printing
[cxciv] Source: Axios, 2020 https://www.axios.com/robotic-supply-chains-post-coronavirus-world-b5ab59cd-4f83-449e-b91d-e5bf3da89b64.html
[cxcv] Source: Forbes, 2020 https://www.forbes.com/sites/forbestechcouncil/2020/04/27/why-connected-worker-technologies-are-now-a-business-priority-for-industrial-companies/#51dcfc3c63c0
[cxcvi] Source: strategy+business, 2019 https://www.strategy-business.com/blog/Gain-trust-and-project-order-in-turbulent-times?gko=80c54&sf226248793=1
[cxcvii] Source: 3D Printing Industry, 2020 https://3dprintingindustry.com/news/100-3d-printing-experts-predict-the-future-of-3d-printing-in-2030-167623/
[cxcviii] Source: MIT Sloan, 2020 https://sloanreview.mit.edu/article/is-it-time-to-rethink-globalized-supply-chains
[cxcix] Source: MIT Sloan, 2020 https://sloanreview.mit.edu/article/is-the-covid-19-outbreak-a-black-swan-or-the-new-normal
[cc] Source: MIT Sloan, 2020 https://sloanreview.mit.edu/article/is-the-covid-19-outbreak-a-black-swan-or-the-new-normal
[cci] Source: Medium, 2020 https://medium.com/bcggamma/preparing-the-supply-chain-for-the-next-disruption-48bbbc63b79f
[ccii] Source: Medium, 2020 https://medium.com/swlh/a-peek-at-the-future-of-marketing-e30d3978693d
[cciii] Source: Guardian, 2020 https://www.theguardian.com/media/2020/apr/17/how-covid-19-turned-the-uk-news-and-entertainment-industry-upside-down
[cciv] Source: McKinsey, 2020 https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/how-marketing-leaders-can-both-manage-the-coronavirus-crisis-and-plan-for-the-future
[ccv] Source: Ad Exchanger, 2020 https://www.adexchanger.com/privacy/google-has-no-plans-to-postpone-killing-third-party-cookies-in-chrome/
[ccvi] Source: Gartner, via CMS Wire, 2020 https://www.cmswire.com/digital-marketing/why-gartner-thinks-most-marketers-will-abandon-personalization-by-2025/
[ccvii] Source: Forbes, 2019 https://www.forbes.com/sites/johnkoetsier/2019/02/09/83-of-consumers-believe-personalized-ads-are-morally-wrong-survey-says/amp/?__twitter_impression=true
[ccviii] Source: FT, 2019 https://www.ft.com/content/77e366da-dfb6-11e9-b8e0-026e07cbe5b4
[ccix] Source: MarTech Advisor, 2020 https://www.martechadvisor.com/articles/customer-experience-2/covid-19-marketing-strategy/
[ccx] Source: World Economic Forum, retrieved 2020 https://www.weforum.org/platforms/shaping-the-future-of-media-entertainment-and-culture
[ccxi] Source: Sky News, 2020 https://news.sky.com/story/coronavirus-britons-have-become-sadder-and-more-anxious-since-lockdown-poll-11977655
[ccxii] Source: Guardian, 2020 https://www.theguardian.com/media/2020/apr/17/how-covid-19-turned-the-uk-news-and-entertainment-industry-upside-down
[ccxiii] Source: Guardian, 2020 https://www.theguardian.com/media/2020/apr/17/how-covid-19-turned-the-uk-news-and-entertainment-industry-upside-down
[ccxiv] Source: Forbes, 2020 https://www.forbes.com/sites/bernardmarr/2020/04/03/9-future-predictions-for-a-post-coronavirus-world/#6293f45c5410
[ccxv] Source: VentureBeat, 2019 https://venturebeat.com/2019/11/10/ar-and-vr-will-make-spatial-journalism-the-future-of-reporting/
[ccxvi] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/04/covid-19-media-value/
[ccxvii] Source: MIT Technology Review, 2020 https://www.technologyreview.com/2020/01/27/276077/why-private-micro-networks-could-be-the-future-of-how-we-connect/
[ccxviii] Source: Amex Global Business Travel, 2019 https://www.amexglobalbusinesstravel.com/content/uploads/2019/09/2020-Global-Meetings-Forecast-Final-US.pdf
[ccxix] Source: Forbes, 2020 https://www.forbes.com/sites/andrewfilev/2020/03/30/covid-19-is-a-before-and-after-moment-in-the-digital-transformation/#6fd6e6cbd422
[ccxx] Source: Nieman Lab, 2020 https://www.niemanlab.org/2020/03/we-know-coronavirus-has-wrecked-the-events-business-for-media-in-2020-but-will-it-come-back-post-virus/
[ccxxi] Source: Northstar Meetings Group, 2020 https://www.northstarmeetingsgroup.com/News/Industry/Coronavirus-Events-Industry-Cancellation-Prevention-Hotels-Airlines-Convention-Centers
[ccxxii] Source: PCMA, 2020 https://www.pcma.org/covid-19-impact-events-industry-planners-survey-results/
[ccxxiii] Source: Congrex, 2020 https://congrex.com/blog/disruption-business-events-industry-challenges-covid-19/
[ccxxiv] Source: Reuters, 2018 https://www.reuters.com/article/us-health-mental-global/mental-health-crisis-could-cost-the-world-16-trillion-by-2030-idUSKCN1MJ2QN
[ccxxv] Source: Forbes, 2018 https://www.forbes.com/sites/sesilpir/2018/10/15/business-is-no-longer-an-island-four-trends-effecting-the-future-workforce/#686baf1b5b54
[ccxxvi] Source: Pew Research, 2018 https://www.pewresearch.org/internet/2018/04/17/the-future-of-well-being-in-a-tech-saturated-world/
[ccxxvii] Source: Forbes, 2020 https://www.forbes.com/sites/onemind/2020/02/03/at-davos-2020-mental-health-seen-as-a-social-and-economic-imperative/#6c6503b87d57
[ccxxviii] Source: Medscape, 2020 https://www.medscape.com/viewarticle/929058
[ccxxix] Source: Guardian, 2019 https://www.theguardian.com/lifeandstyle/shortcuts/2019/jan/02/woebots-ai-counselling-future-therapy-mental-health
[ccxxx] Source: MedicalXpress, 2019 https://medicalxpress.com/news/2019-06-facebook-diabetes-mental-health-demographic.html
[ccxxxi] Source: Fortune, 2019 https://fortune.com/2019/12/07/autism-aspergers-adhd-dyslexia-neurodiversity-hiring-jobs-work/
[ccxxxii] Source: End Gadget, 2017 https://www.engadget.com/2017/06/01/ibm-watson-cancer-treatment-plans/

[ccxxxiii] Source: McKinsey, 2020 https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/the-promise-of-digital-therapeutics
[ccxxxiv] Source: McKinsey, 2020 https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/the-promise-of-digital-therapeutics
[ccxxxv] Source: Bloomberg, 2020 https://www.bloomberg.com/news/articles/2020-04-01/coronavirus-vaccine-race-gets-unlikely-partner-big-tobacco
[ccxxxvi] Source: Wall Street Journal, 2020https://www.wsj.com/articles/a-spur-to-the-biotech-century-ahead-11585238908
[ccxxxvii] Source: O'Reilly, 2017 https://www.oreilly.com/ideas/how-synthetic-biology-startups-are-building-the-future-at-rebelbio
[ccxxxviii] Source: Wired, 2017 https://www.wired.com/story/biology-will-be-the-next-great-computing-platform/
[ccxxxix] Source: Deloitte, 2020 https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/understanding-covid-19-s-impact-on-the-real-estate-sector--.html
[ccxl] Source: Senior Housing News, 2020 https://seniorhousingnews.com/2020/04/07/how-covid-19-is-shaping-the-future-of-senior-living-architecture-and-design/
[ccxli] Source: Network World, 2018 https://www.networkworld.com/article/3309420/forget-smart-homes-the-new-goal-is-autonomous-buildings.html
[ccxlii] Source: Forbes, 2018 https://www.forbes.com/sites/angelicakrystledonati/2018/10/11/why-read-the-full-proptech-reports-when-you-have-this-review/#2d0def9b2308
[ccxliii] Source: BisNow, 2018 https://www.bisnow.com/london/news/technology/trad-real-estate-knows-proptech-will-be-big-just-not-what-to-do-about-it-93168
[ccxliv] Source: Conduit Street, 2020 https://conduitstreet.mdcounties.org/2020/04/28/chicago-to-require-ev-charge-capability-on-new-buildings/
[ccxlv] Source: BBC, 2020 https://www.bbc.com/news/business-52467965
[ccxlvi] Source: TechCrunch, 2020 https://techcrunch.com/2020/04/08/commercial-real-estate-could-be-in-big-trouble-even-after-this-is-all-over/
[ccxlvii] Source: Bain, 2017 http://www.bain.com/publications/articles/firm-of-the-future.aspx
[ccxlviii] Source: Economist Intelligence Unit, 2018 https://perspectives.eiu.com/infrastructure-cities/workplace-evolution-empowering-employees-flexible-work-environment
[ccxlix] Source: McKinsey, 2020https://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/commercial-real-estate-must-do-more-than-merely-adapt-to-coronavirus
[ccl] Source: Market Watch, 2020 https://www.marketwatch.com/story/neiman-marcus-is-just-the-start-analysts-expect-100000-stores-to-close-by-2025-2020-04-20
[ccli] Source: Axios, 2020 https://www.axios.com/coronavirus-future-economy-politics-f838d8f1-09e2-48cd-afa7-1481d2044e21.html
[cclii] Source: Money Control, 2020 https://www.moneycontrol.com/news/business/economy/coronavirus-pandemic-workers-may-lose-up-to-3-4-trillion-in-2020-income-over-covid-19-un-5048391.html
[ccliii] Source: The Drum, 2020 https://www.thedrum.com/news/2020/04/16/lazada-singapore-cmo-why-the-future-e-commerce-combining-livestreaming-entertainment
[ccliv] Source: CapGemini, 2020 https://www.capgemini.com/wp-content/uploads/2020/04/Covid-19-Consumer-Behaviour-in-CPR.pdf
[cclv] Source: strategy+business, 2020 https://www.strategy-business.com/article/Pessimism-dematerialized-Four-reasons-to-be-hopeful-about-the-future
[cclvi] Source: Fast Company, 2019 https://www.fastcompany.com/90431748/rent-the-runway-and-nordstrom-have-big-plans-to-reshape-retail
[cclvii] Source: Brookings, 2020 https://www.brookings.edu/blog/the-avenue/2020/03/24/covid-19-will-upend-retail-but-there-are-steps-we-can-take-to-save-it/
[cclviii] Source: McKinsey, 2020 https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/cautiously-optimistic-chinese-consumer-behavior-post-covid-19?cid=eml-app
[cclix] Source: Venture Beat, 2020 https://venturebeat.com/2020/03/08/the-future-of-commerce-is-shoppable-video/
[cclx] Source: Market Watch, 2020 https://www.marketwatch.com/story/neiman-marcus-is-just-the-start-analysts-expect-100000-stores-to-close-by-2025-2020-04-20
[cclxi] Source: RLI, 2020 https://www.rli.uk.com/covid-19-retail-technology-shopping-more-hygienic/
[cclxii] Source: Ship Technology, 2020 https://www.ship-technology.com/features/impact-of-covid-19-on-shipping/
[cclxiii] Source: Deloitte, 2020 https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/consumer-business/deloitte-nl-cb-global-port-trends-2030.pdf
[cclxiv] Source: Ship Technology, 2020 https://www.ship-technology.com/features/impact-of-coronavirus-on-shipping/
[cclxv] Source: Marine Insight, 2019 https://www.marineinsight.com/future-shipping/10-future-ships-that-would-change-the-face-of-the-shipping-industry/
[cclxvi] Source: FT, 2020 https://www.ft.com/content/2014e53c-531f-11ea-a1ef-da1721a0541e
[cclxvii] Source: Reuters, 2019 https://www.reuters.com/article/us-climate-change-un-shipping/shipping-sector-sets-course-for-zero-carbon-vessels-fuel-by-2030-idUSKBN1W81B8
[cclxviii] Source: Forbes, 2020 https://www.forbes.com/sites/simonchandler/2020/04/13/how-smart-cities-are-protecting-against-coronavirus-but-threatening-privacy/#14d452cb1cc3
[cclxix] Source: FT, 2020 https://www.ft.com/content/140ae3f0-1b6f-11ea-81f0-0c253907d3e0
[cclxx] Sources: Forbes, 2017 https://www.forbes.com/sites/quora/2017/12/20/which-areas-in-investment-banking-are-experiencing-talent-gaps/#2a9b6a0b5450 and IT Pro, 2018 http://www.itpro.co.uk/big-data/30541/smart-cities-to-become-the-norm-by-2025
[cclxxi] Source: Cognizant, 2019 https://www.cognizant.com/whitepapers/embracing-smarter-facilities-management-codex2931.pdf
[cclxxii] Source: Zawya, 2018 https://www.zawya.com/mena/en/business/story/Smart_cities_to_create_business_worth_2trn_by_2025-SNG_114004823/
[cclxxiii] Source: World Economic Forum, 2019 https://www.weforum.org/our-impact/forum-led-g20-smart-cities-alliance-will-create-the-first-global-framework-for-smart-city-governance
[cclxxiv] Source: Zawya, 2018 https://www.zawya.com/mena/en/business/story/Smart_cities_to_create_business_worth_2trn_by_2025-SNG_114004823/
[cclxxv] Source: Cognizant, 2018 https://www.cognizant.com/futureofwork/article/smart-cities-are-smart-business
[cclxxvi] Source: UBS, 2020 https://www.ubs.com/global/en/asset-management/insights/sustainable-and-impact-investing/2020/esg-a-game-changer.html
[cclxxvii] Source: BloombergQuint, 2020 https://www.bloombergquint.com/business/covid-19-may-change-sustainability-as-we-know-it-green-insight
[cclxxviii] Source: Bain, 2020 https://www.bain.com/insights/sustainability-is-the-next-digital/
[cclxxix] Source: The Guardian, 2020 https://www.theguardian.com/world/2020/apr/21/milan-seeks-to-prevent-post-crisis-return-of-traffic-pollution
[cclxxx] Source: ING, 2020 https://think.ing.com/uploads/reports/Rethinking_the_road_to_the_circular_economy_FINAL_RB1_(AP).pdf
[cclxxxi] Source: Material, Handling and logistics, 2019 https://www.mhlnews.com/global-supply-chain/article/22055806/circular-economies-to-replace-linear-economies-in-10-years
[cclxxxii] Source: The Guardian, 2020 https://www.theguardian.com/environment/2020/apr/08/scientists-create-mutant-enzyme-that-recycles-plastic-bottles-in-hours
[cclxxxiii] Source: PwC, 2020 https://www.pwc.com/us/en/library/covid-19/coronavirus-technology-impact.html
[cclxxxiv] Source: CIO Dive/Accenture 2020 https://www.ciodive.com/news/data-breach-accenture/571559/
[cclxxxv] Source: The Economist Intelligence Unit, 2019 https://eiuperspectives.economist.com/sites/default/files/eiu-_proofpoint_cyber_insecurity_.pdf
[cclxxxvi] Source: The Economist, 2020 https://www.economist.com/leaders/2020/04/03/big-techs-covid-19-opportunity
[cclxxxvii] Source: The Economist, 2017 https://www.economist.com/news/briefing/21721634-how-it-shaping-up-data-giving-rise-new-economy

[cclxxxviii] Source: The Market Mogul, 2017 https://themarketmogul.com/can-financial-services-industry-benefit-internet-things/
[cclxxxix] Source: KPMG, 2020 https://home.kpmg/xx/en/blogs/home/posts/2020/03/covid-19-impact-on-the-automotive-sector.html
[ccxc] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/china-covid-19-coronavirus-mobility-solutions/
[ccxci] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/china-covid-19-coronavirus-mobility-solutions/
[ccxcii] Source: Reuters, 2020 https://www.reuters.com/article/us-global-climate-change-cities/green-transport-set-to-overtake-cars-in-worlds-major-cities-by-2030-idUSKBN2041G5
[ccxciii] Source: Wired, 2020 https://www.wired.com/story/covid-19-bad-for-auto-industry-worse-for-evs/
[ccxciv] Source: CNBC, 2020 https://www.cnbc.com/2020/03/06/the-flying-taxi-market-is-ready-to-change-worldwide-travel.html
[ccxcv] Source: Deloitte, 2020 https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/understanding-the-sector-impact-of-covid-19---transport-organiza.html
[ccxcvi] Source: Deloitte, 2020 https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/understanding-the-sector-impact-of-covid-19---transport-organiza.html
[ccxcvii] Source: Daily Sabah, 2020 https://www.dailysabah.com/business/tourism/coronavirus-likely-to-cost-global-tourism-1-trillion
[ccxcviii] Source: Financial Times, 2020 https://www.ft.com/content/7c902798-4d90-4206-9fd4-bafa154ef1e1
[ccxcix] Source: eTurbo News, 2020 https://www.eturbonews.com/570364/travel-and-tourism-predictions-what-might-the-future-hold/
[ccc] Source: Reuters, 2020 https://news.trust.org/item/20200310175356-sjq0o
[cccci] Source: VentureBeat, 2020 https://venturebeat.com/2020/01/22/accenture-unveils-xr-event-planner-for-booking-hotel-events/
[cccii] Source: Travel Market Report, 2020 https://www.travelmarketreport.com/articles/2040-What-Does-the-Future-Hold-for-the-Travel-Industry
[ccciii] Source: Economist, 2020 https://www.economist.com/britain/2020/04/25/official-data-suggest-britons-are-learning-to-help-each-other
[ccciv] Source: McKinsey, 2020 https://www.mckinsey.com/industries/public-sector/our-insights/covid-19-investing-in-black-lives-and-livelihoods
[cccv] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/04/covid-19-coronavirus-social-intrapreneurship/
[cccvi] Source: Al Jazeera, 2020 https://www.aljazeera.com/news/2020/03/world-coronavirus-pandemic-200326055223989.html
[cccvii] Source: Campaign to End Loneliness, retrieved 2020 https://www.campaigntoendloneliness.org/understanding-loneliness-no-man-is-an-island/
[cccviii] Source: Evangelical Focus, 2020 https://evangelicalfocus.com/lifetech/5232/Searches_on_prayer_skyrocketed_amid_coronavirus_crisis_study_says
[cccix] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/04/religions-covid-19-coronavirus-collaboration/
[cccx] Source: Oxfam, 2020 https://oxfamblogs.org/fp2p/religion-and-covid-19-four-lessons-from-the-ebola-experience/
[cccxi] Source: The Conversation, 2020 https://theconversation.com/coronavirus-and-easter-lapsed-christians-unlikely-to-return-to-church-even-in-uncertain-times-134302
[cccxii] Source: The Economist, 2020 https://www.economist.com/international/2020/04/11/the-coronavirus-pandemic-has-exposed-fissures-within-religions
[cccxiii] Source: Brookings, 2020 https://www.brookings.edu/blog/order-from-chaos/2020/04/13/are-covid-19-restrictions-inflaming-religious-tensions/
[cccxiv] Source: The Salt Lake Tribune, 2020 https://www.sltrib.com/religion/2020/03/27/commentary-covid-could/
[cccxv] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/04/religions-covid-19-coronavirus-collaboration/
[cccxvi] Source: Bain 2019 https://www.bain.com/insights/whats-hot-and-whats-not-snap-chart/
[cccxvii] Source: ILO, 2020 https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_743036/lang--en/index.htm
[cccxviii] Source: World Economic Forum, 2020 https://www.weforum.org/agenda/2020/03/digital-platforms-gig-workers-labour-rights/
[cccxix] Source: Forbes, 2020.https://www.forbes.com/sites/bernardmarr/2020/03/17/how-the-covid-19-pandemic-is-fast-tracking-digital-transformation-in-companies/#9ae060aa8eed
[cccxx] Source: Bain, 2020 https://www.bain.com/insights/the-great-retooling-fm-blog/
[cccxxi] Source: The Mandarin, 2020 https://www.themandarin.com.au/128243-coronavirus-may-mean-automation-is-coming-sooner-than-we-thought/
[cccxxii] Source: MIT Sloan, 2020 https://sloanreview.mit.edu/article/is-the-covid-19-outbreak-a-black-swan-or-the-new-normal/