The Smart Analytics Future:
The importance of evidence-based decisions during Covid-19

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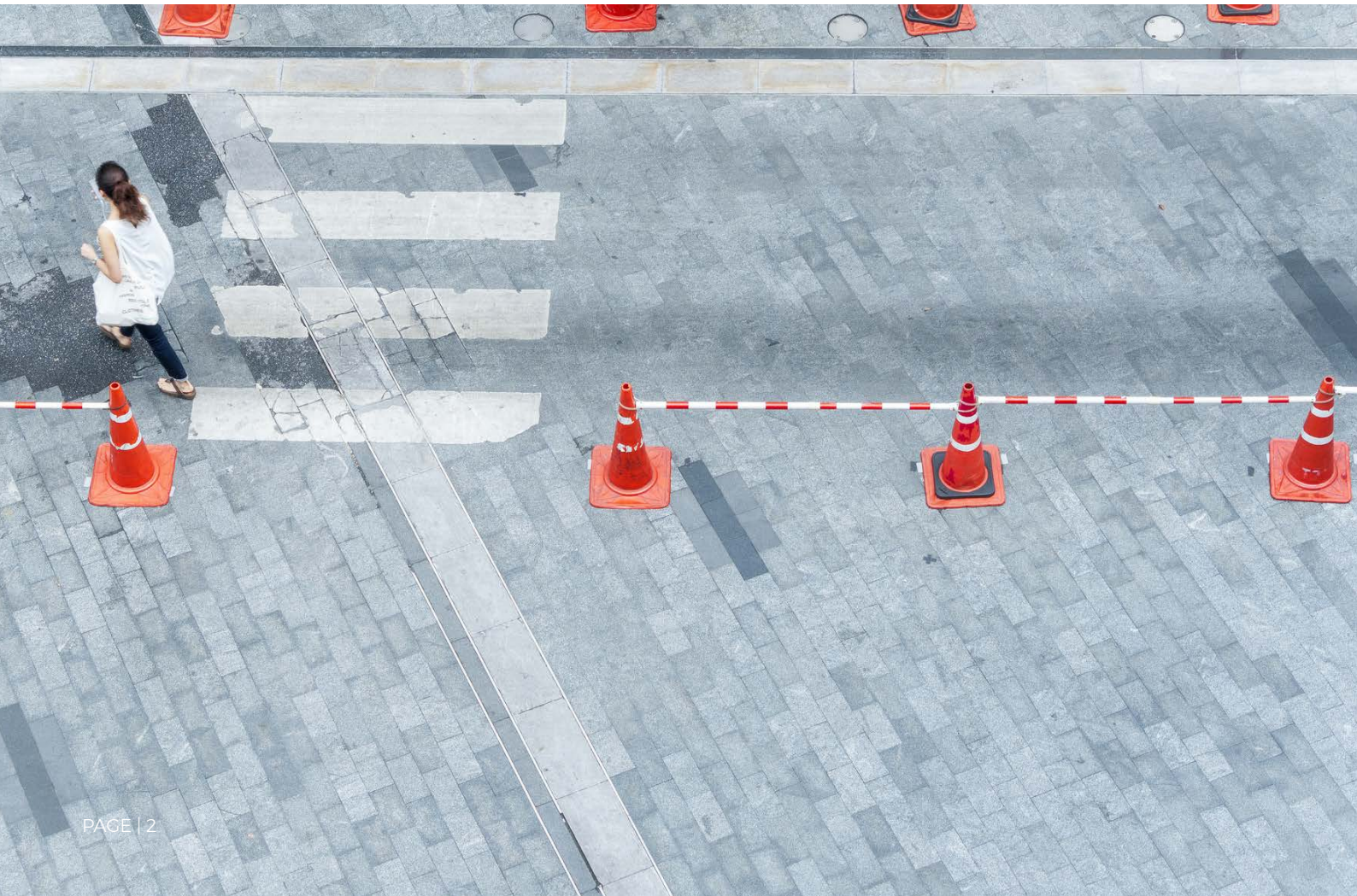
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ABSTRACT

The world's demand for data, information and knowledge to inform evidence-based decisions is growing exponentially. In 2020 the rapid rise of the Covid-19 pandemic has deeply challenged governments worldwide in their policy and investment responses. *Gut feel* remains a viable approach for decision makers even though there are so many global digital resources in people, process and technology at our disposal.

We have the choice to better utilise our data to inform much more than we currently do. Where there are shortfalls in core system reliability the opportunity is to establish what data matters most, develop standards, and build or restore data quality so that we are future ready.

This white paper provides a brief overview of the devastating impact of Covid-19, the digital opportunities to respond to the pandemic and a proactive example of where WSP has responded to Covid-19 aiding our clients to achieve better, smarter outcomes for their customers through the use of data insights.

PRESENTER PROFILE

Tim Cross is WSP New Zealand's Technical Principal - Business Intelligence; principal thought leader and project manager in digital services; data analytics and insights and other business-focused IT initiatives for clients. He holds two significant national roles in New Zealand Transport; co-lead to the Transport Data Knowledge Hub for the New Zealand Ministry of Transport and lead structures data systems analyst and IT enabler for Waka Kotahi, New Zealand Transport Agency.

Tim has over 20 years' experience in technology support areas including analysis and development of business systems and enterprise reporting with international consultancy experience across Australia and Malaysia.

Tim is committed to providing clients with smart, business-friendly direction on their Data, Information, Knowledge, Value (DIKV) investment journeys, and improving the overall efficiency, effectiveness and quality of computer use for people. His keen ability to work directly with clients on complex IT matters is well mastered; listening to client challenges, setting plans consultatively, and delivering end-to-end innovative solutions with ease and simplicity.

KEYWORDS

Covid-19, pandemic, future ready, business analysis, business intelligence, digital advisory PESTLE, data standards, Auckland Harbour Bridge, machine learning, analytics, descriptive, diagnostic, predictive, prescriptive, information design.

ACKNOWLEDGEMENTS

This paper is dedicated to the thousands of brilliant analysts and data scientists working 24/7 across international governments to produce evidence needed by our world leaders.

01 Introduction

As I write this paper in June 2020, our world is in crisis. The coronavirus (Covid-19) continues to extend its reach across the world; a disease unlike anything current generations have ever experienced.

The scale of initial financial responses to the pandemic from governments to support failing economies and health systems, is unprecedented and breath taking. Diverse policy directions are being formed across every government to meet the needs of their citizens.



Leaders' responsibilities are enormous and unenviable – the problems deeply complex.

This is an unmatched test of leaders' abilities to absorb the facts, results and trends in front of them and either to read and rely on them or pass them by. The investment risks leaders are prepared to take at pace, with the trust of stimulating desired outcomes now and in the future, is pivotal for citizens.

The quality of information used is critical to the future. *Gut feel* is an option amid chaos, however evidence-base decisions are needed by governments and businesses to respond with the best information possible. Anything less in volatile times could prove catastrophic.

How do we make sure that the information, knowledge and value (business intelligence) we have available at any level of government or business for any project holds reliability with so much variability right now?

02 The Value Journey through Covid-19

In Q2 2020 governments have made major decisions for their citizens in response to Covid-19. Social isolation through various lockdown measures, wage subsidies, quantitative easing, tax/rent/mortgage relief via banks, cash handouts, and TEST, TEST, TEST[1].

The reality for citizens is devastating.

Stories are emerging of stable business lines now on the brink of loss or already lost, life savings and invested work in jeopardy, lack of leadership leading to mixed messages, and political instability visible through indecision and citizen rebellion.

These are situations and outcomes on a global scale never seen before in our lifetimes.

Governments are nervous about their economies - reopening their countries and states for business, while their citizens grapple with major challenges: protecting their own personal and family health; wellbeing; social distancing, and demands for traceability of personal movement via government-sanctioned apps.

Whether predominately socially or economically focused in policy direction, the collective vision is a return of value for local people and business.

For all, in one shape or other, the diagram in Figure 1 represents a journey towards value return.

Some choose to ignore the data + information + knowledge path and consider pure process driven value and *gut feel*, while others take the opportunity to base decisions on reliable evidence from expert sources; including tested and tuneable data models.

We are in a place now where leadership is vital and defining for our everyday future.

How leaders respond now will impact future generations on an unparalleled level; from the holistic outcomes of decisions to the level of personal trust that citizens place in government.

Wisdom through a measured journey of learning and application will prove its value.

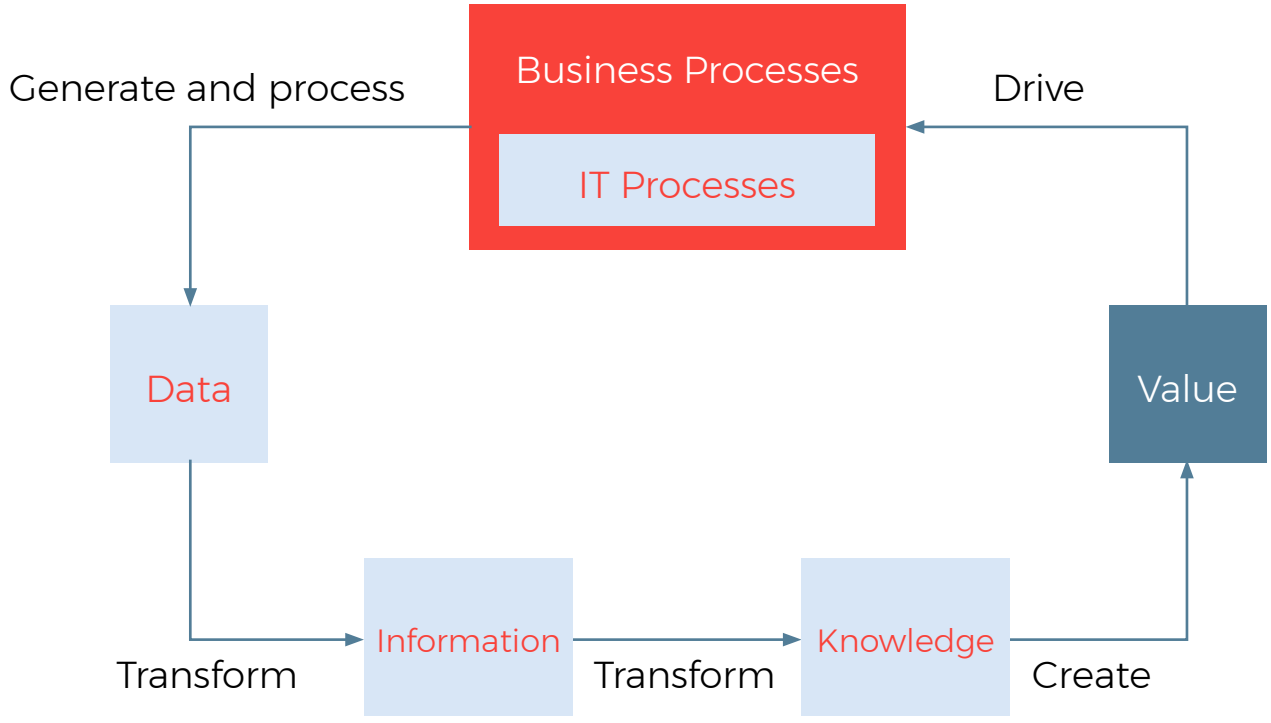


Figure 1: Value Generation Cycle[2]

[1]https://www.reuters.com/article/us-healthcare-coronavirus-who/test-test-test-who-chiefs-coronavirus-message-to-world-idUSKBN2132S4; March 17th, 2020, WHO Director General Tedros Adhanom Ghebreyesus.
[2]ISACA, "COBIT 5 Framework - COBIT 5 Metadata – Information Cycle" (2012), Page 81, Figure 3. Courtesy of ISACA

03 A Practical Response to Covid-19

As the effects of Covid-19 are being felt by local communities, just as much as it is at the highest echelons of government, how is WSP helping its clients and customers as we get back to business?

We are focused on supporting our clients to control the spread of Covid-19, maintain business continuity and ensure the health and safety of our communities, employees, colleagues, friends and families.

Our priority, like yours, is to keep everyone safe.[3]

From a project level, WSP has many active examples of how we are using data insights to make informed and responsible decisions. The Moveable Lane Barrier (MLB) Optimisation project for Auckland Harbour Bridge is actively aiding client decision making through the crisis, and a return to everyday life activity, through applying the Value Generation Cycle model to our approach.

Auckland Harbour Bridge connects Auckland's North Shore to Westhaven and the Auckland Central Business District. Auckland is home to one-third of New Zealand's population[4]. In 2017, Annual Average Daily Traffic (AADT) exceeded 170,000 vehicles and 36,000 passengers travelling by bus every day[5]. The bridge is managed by the Auckland Transport Operations Centre (ATOC), Auckland System Management (ASM) contract for Waka Kotahi, New Zealand Transport Agency.

To aid traffic movement north and south bound daily to the CBD, ATOC has a concrete moveable lane barrier with barrier transfer machines to move the barrier at strategically sensible times during the day, as traffic reaches peak levels in the morning, afternoon and night (in preparation for the next morning).

WSP's engagement will deliver an optimisation of the MLB, starting with the early afternoon traffic flow as customers exit the city to return home north, requiring an extra lane of available capacity. Currently the start time in the afternoon is set at 3:00pm by experience without any science or evidence applied.

Through using digital data, the project will switch that *gut feel* to real-time evidence.

The following charts demonstrate the significant changes in traffic flow experienced on Auckland Motorways during the Covid-19 Alert Level period. WSP has worked closely with our key stakeholders to make sure we were future ready in the short term. The evidence of Aucklanders' adherence to New Zealand Government requests through alert levels is clearly demonstrated.

Figure 4 on Page 8 shows our Version 0.1 solution to ASM and ATOC, which we prepared during Alert Level 4 Lockdown and Alert Level 3 Restrict in New Zealand[6] to help MLB restart timing.

The *gut feel* at the time was that this wouldn't need to happen for months, but New Zealand's rapid response to eliminating Covid-19 has meant a reopening of our economy much faster than any other nation in the world – and the return of heavy traffic in Auckland.

We are entering a "new normal" with a variability that does not match historic traffic models. We had to rethink and rebuild our fundamental information and knowledge base, designing it afresh for the benefit of better road customer outcomes. An important decision our project team has made in this is to keep our analysis, processes and presented solution very simple.

[3] https://www.wsp.com/en-NZ/campaigns/nz-rapid-responses-to-the-impacts-of-covid-19
[4] https://www.stats.govt.nz/information-releases/2018-census-population-and-dwelling-counts
[5] https://www.nzta.govt.nz/assets/projects/awhc/docs/BRI-1270-awhc-transport-modelling.pdf
[6] https://uniteforrecovery.govt.nz/covid-19/covid-19-alert-system/alert-system-overview/

Covid-19 Auckland Motorway Network – Time of Day Demand Comparisons

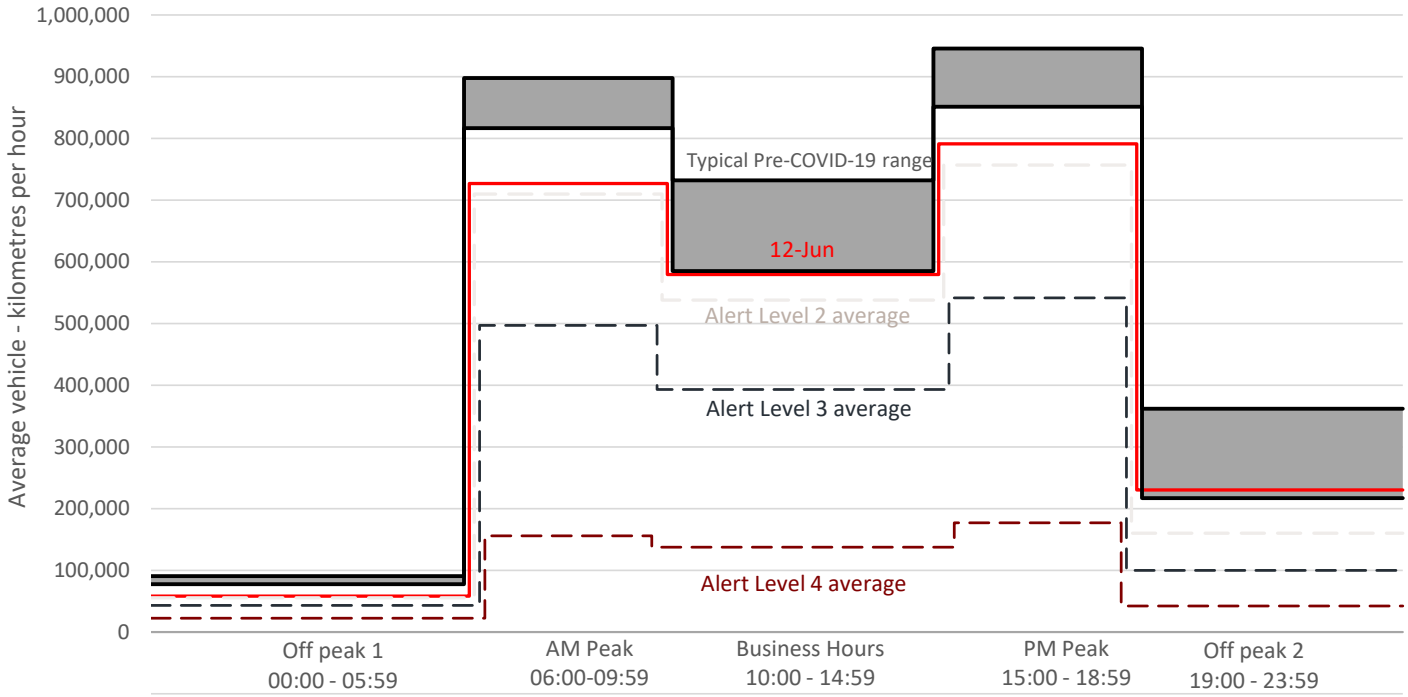


Figure 2: Covid-19 Auckland Motorway Network – Time of Day Demand Comparison

Auckland Motorway Network – Demand – Delay Curve
Lost Customer Hours (LCH)

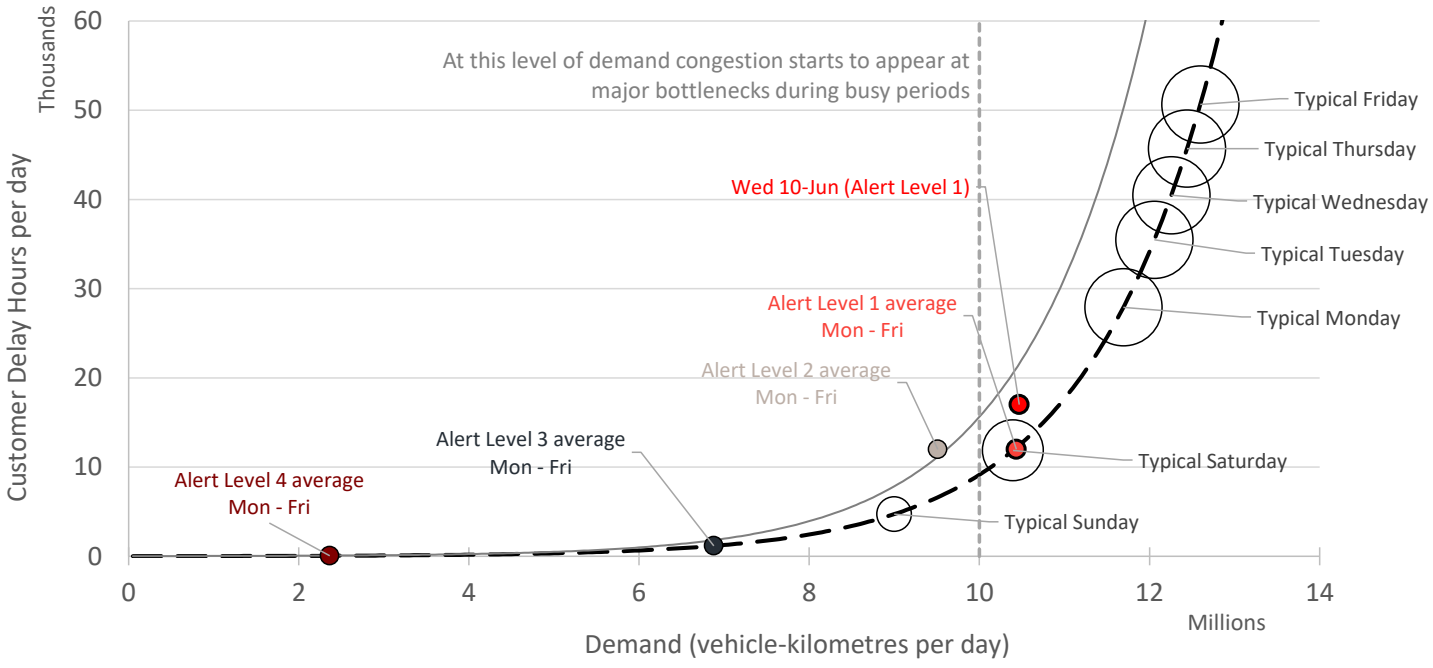


Figure 3: Auckland Motorway Network: Demand – Delay Curves during and comparing Covid-19

Covid-19 Auckland Motorway Network – Time of Day Demand Comparisons

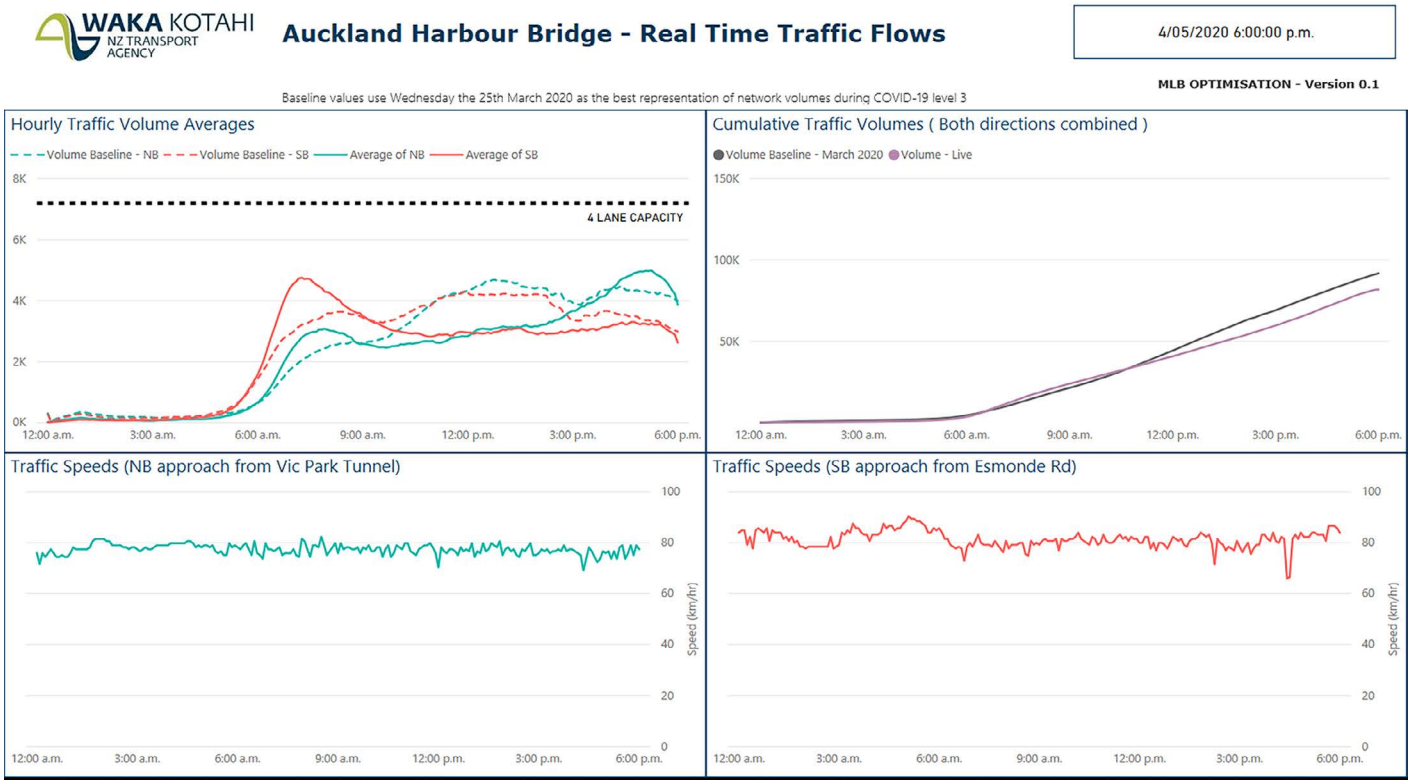


Figure 4: Auckland Harbour Bridge Covid-19 Alert Level 3 Dashboard (Version 0.1) – May 4th, 2020

Regular communication with our stakeholders during lockdown has been vital to our success. We have taken our stakeholders on the journey of development and worked to make this as easy as possible for our most important stakeholders: the MLB Crew who manage the movement of the barrier every weekday.

Our Go! Report is sent via Multimedia Messaging Service (MMS) to their mobile phones at an agreed, regular time every day, so the MLB Crew are made aware of what the start time decisions are, without the confusion of online accounts, passwords, available internet bandwidth.

Our project team would not have looked at this the same way in a pre-Covid-19 world.

Covid-19 has forced us to look deep at fundamental data and determine a positive way forward that is fit-for-current-purpose, and agile enough to change day-to-day.

There is interest to develop an interactive phone application for the Go! Report as part of Phase 2 of the project. WSP will be there to advise the development journey.

We are challenging the status quo and pressing out smarter solutions that are meeting the changing needs of our clients, with success driven from risk-focused management of the project, informed by reliable data.

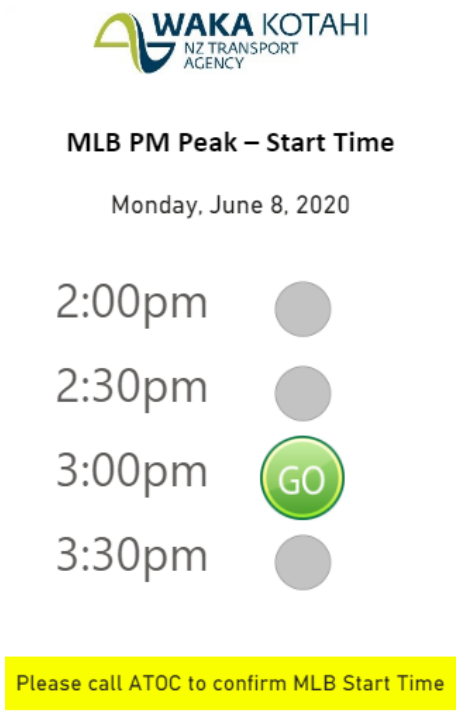


Figure 5: MLB Go! Report Example – designed for ASM standard Samsung S30 phones.

04 Managing the Risks

The MLB project presents several high-level risks because of the national profile and importance of Auckland Harbour Bridge.

As part of our business requirements process, WSP undertook the development of a PESTLE risk register, using the categories outlined in Figure 6.



Figure 6: PESTLE Risk Categories

In isolation every project undertaken holds some PESTLE risks, but often it is hard to think about them when we are so focussed on the task at hand.

The WSP Digital Advisory Team recommend the PESTLE method as a very simple yet effective way of taking time to reflect with stakeholders on why we are doing what we are doing, so we can figure out anything that could challenge our time working together, and the future of the product or service being delivered.

MLB OPTIMISATION - PESTLE RISK REGISTER		**Last Updated: 29/04/2020** **Version 1.01**		Authored By: Tim Cross Reviewed By: Andy Hooper, Soroush Rashidi
	Risk	**Consequence**	**Probability**	**Mitigation**
Political	The solution fundamentally fails. Bad decisions provided from the app leading to bad customer experience, bad press and business/political mistrust in a digital solution for MLB.	Extreme	Possible	We will use machine learning techniques to learn from each MLB run, so the system will in time make the best decision with all available data and historical knowledge. If all fails badly, we can swiftly go back to the current process.
Political	The solution has been developed during the Covid-19 pandemic, which may mean Alert Level restrictions still apply at the time of MLB Optimisation release.	Moderate	Possible	We will develop the solution fit for purpose based on the current Alert Level situation. If by early June we realise New Zealand will need to sustain Alert Level 2 or Alert Level 1 for months, then we deliver the solution on that basis. Ideally we are using "normal" data for the modelled analytics, but Auckland is not operating in a normal environment. We will do our best to deliver the best solution we can, adjustable to current environment.
Economic	Someone from Waka Kotahi, or other NZ Government person, requests a measure of the economic outcomes from MLB Optimisation.	Moderate	Possible	We get an understanding of what economic-specific information we could be asked to produce in future, and start collecting basic, fit-for-purpose data and metadata with Version 1.0. Likely such requests will be occasional, infrequent, one-offs. If anything regular is required we will build it into the "gold standard" system.

Figure 7: Moveable Lane Barrier Optimisation PESTLE Risks Example

05 Developing a Smart Analytics Future

Once we are clear on requirements and risks with reliable data, we are in a strong position to build a reliable evidence base.

It is common to focus on Descriptive Analysis where we collect data and see what happened through basic charts and tables. Figure 5 on page 8 demonstrates how achieving that is only scratching the surface of analytics and business intelligence potential. The deeper we go the more "data hungry" the processes become, but the quality of evidence improves with each step.

The MLB project is in a strong position to achieve all four stages of the analytics journey as we build our solution's machine learning capability and tap into multiple sources of data.

Table 1 outlines our plan and the key ingredients towards achieving this.

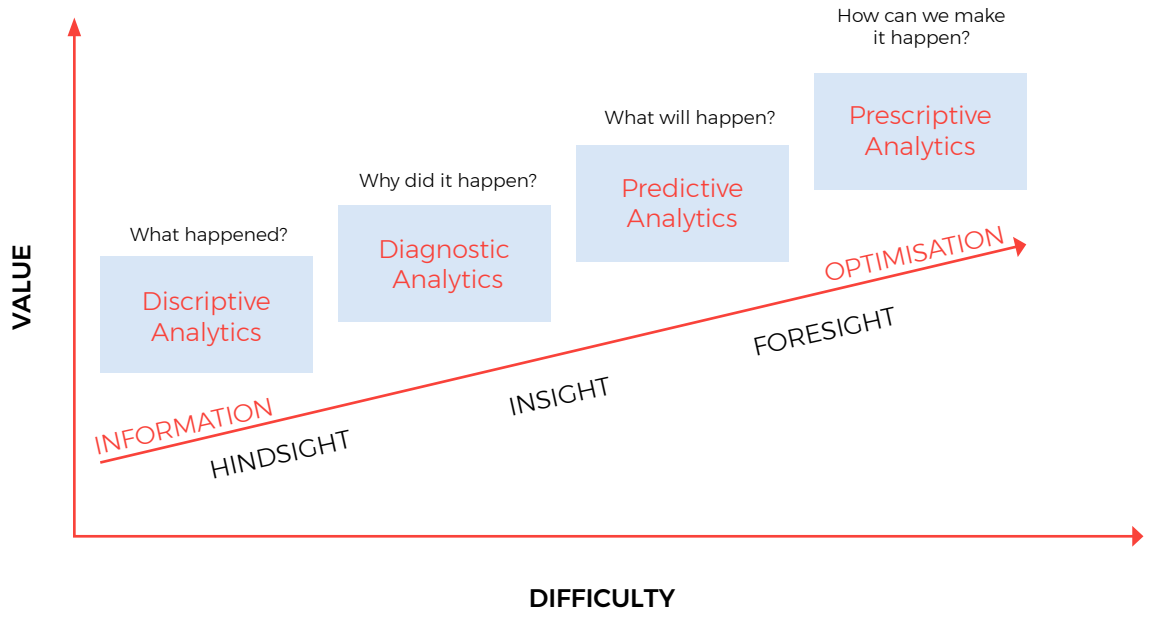


Figure 8: Analytics Journey[7]

Analytics	People	Policy	Process	Technology
Descriptive	Experienced Project Manager	MINISTRY OF TRANSPORT Transport Evidence Base Strategy[8] (TEBS) NZ TRANSPORT AGENCY Investment performance measures: benefits and measures[9]	Basic use of SSDF and Google data	SQL Server Power BI Power Apps R, Python
Diagnostic	ASM Network Performance Team – Data Scientists		Information pattern analysis	
Predictive			Data Model development	
Prescriptive			Machine Learning	

Table 1: Steps to Analytics Success

[7]Laney D, "Gartner Analytic Ascendancy Model" (2012)
[8]https://www.transport.govt.nz/mot-resources/transport-evidence-base-strategy/
[9]https://www.nzta.govt.nz/assets/P-and-I-Knowledge-Base/docs/Investment-performance-measures-for-download-update-2019-08.pdf

CONCLUSIONS

This paper demonstrates that a single data source or *gut feel* is insufficient to delivering our clients value. Broad, holistic thinking in consultation helps us to look at business problems in ways that help us better understand why and how we can achieve value from a trusted evidence base.

Half measures of success in the midst of a crisis may be accepted but are not acceptable given the people, policies, processes and technologies readily available. The more information and evidence we can yield to test and prove a solution, the better we can control and position the future.

Covid-19 may become this generation's Everest, but we can achieve the climbing of this mountain together if we are wise to the evidence in front of us. Our digital age offers so much more than what was on offer to our ancestors. We can find a trusted, reliable way forward.

Whether it is in the small scale of our local projects, or national / global policy and practice to improve our health and safety, together, we have an opportunity to influence positive change.

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