Business Decision Making

Ming Jie Li (Student no. 200836496)

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Tutor: Mahesha Samaratunga

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List of abbreviations

Goldman Sachs: A financial company that is studied in this report to evaluate how organisations adapt their decision-making models to improve and adapt during periods of uncertainty.

Weighted Sum Model: A multi-criteria decision-making model used to evaluate a number of alternatives against a set of criteria in order to identify the optimal one.

Abstract

This report aims to examine how organisational decision-making plays a key role in businesses through compare rational and intuitive decision-making styles, analysing how uncertainty affects organisations, interview with a team leader in industry to gain knowledge from a practical perspective and working through a decision using the Weighted Sum Model.

Firstly, Section A explores these topics through examining a range of existing literature. From this, the report found that organisations that make both quick and effective decisions through establishing a set of minimum satisfactory outcomes report better returns. Furthermore, it is identified that people who have built up their intuition through making rational, data-driven experiences perform better under pressure as they can quickly and accurately identify key factors of a problem. In addition, expanding the scope to whole organisations, it is discovered that businesses that have a demonstrated history of making decisions based on rationality performed better during the uncertainty presented by the pandemic.

Secondly, Section B interviews the manager of an engineering team at Goldman Sachs to explore their thoughts on what makes a good leader, views on the speed versus quality of decisions, rational versus intuition and how the pandemic has affected their decision-making style. From the interview, it is noted that a leaders' role is to manage relationships with key stakeholders while protecting the team from business pressure so that team members can focus on delivering technical solutions. To ensure both a decision's speed and quality, leaders must delegate responsibilities and tasks so they can focus on using their experience to tackle strategic problems while other members of the team also get to build their decision-making experience. Furthermore, the interview notes that intuition is more suited when managing individuals are harder to measure through data whereas technical problems and systems benefit more from a clear rationale. In addition, the interview found that the pandemic has been challenging for the engineering team in terms of communication with end users and establishing team chemistry however the silver lining has been the emergence of video conferencing software which allows colleagues located globally to become closer.

Lastly, Section C works through a practical decision made by engineers at Goldman Sachs which is how to approach a platform stability issue that impedes end users' ability to conduct business. Through analysing four alternatives with five criteria, the report concludes that engineers should focus on fixing the immediate system bug first as it is the most reliable and takes the least time whilst being relatively reliable. The report concludes by stating that in practice, engineers will be more pragmatic and rely more on their intuition and experience as issues vary in severity thus criteria prioritisation can differ.

Introduction

Decision-making is core to every organisation and ability to be decisive is becoming increasingly challenging as people are given more options than ever through technology. Uncertainty and ambiguity further pressures people when trying to predict the impact of their choices. This report firstly breaks down what makes a good decision, then compare and contrast different intuition and rational decision-making models and attempts to find room for interoperability and finally analyse how organisations have navigated the uncertainty presented by the Covid-19 pandemic. Then, to add a perspective from industry to topics discussed in Section A, Section B conducts an interview with a team manager at Goldman Sachs where further examples of good leadership, decision-making styles and the impacts of the pandemic are given. Lastly, Section C works through a decision carried out by engineers on a daily basis which is how to best resolve a platform stability problem using the Weighted Sum Model. Due to compliance, interview questions were generalised, personnel were anonymised, and data was hypothesised so no specific process could be identified.

Section A

Literature review topic: How do leaders make effective decisions in order to improve and adapt an organisation?

The aim of this literature review is to explore the key characteristics of a decisive leader making effective decisions and comparing rational and intuitive decision-making models to ultimately pivot an organisation's direction for the better. The review will analyse a range of articles and surveys in order to reach a comprehensive, evaluative and balanced conclusion. Firstly, this review is going to examine common themes amongst great, unique and critical decisions made by the core driver of an organisation: it's people. Secondly, the review is going to weigh the benefits and drawbacks of rational and intuitive decision-making models adopted by organisations' leaders and find possible room for interoperability between the two. Lastly, the review is going to expand its scope to analyse how whole organisations adapt in unfamiliar circumstances to improve the speed and quality of its decision making. While researching, the review notes a lot of research exists around different aspects of rational and intuitive decision-making however a gap is present when trying to investigate the effects of both ideologies coexisting and cooperating.

As advancements in technologies continuously surround people with an increasing number of decisions, being able to make good decisions, which are measured by speed and correctness, is becoming an invaluable skill (Woo, 2019). McKinsey (2019) supports this metric by demonstrating from an online survey of 1259 businesses representing a full range of sizes and industries that, although most report poor decision making at their organisations, the 20% that report their organisations excel at making decisions are ones that make quick decisions resulting in effective outcomes. Those organisations also often see better financial return. Furthermore, McKinsey (2019) argues that speed does not undercut quality, in fact faster decisions tend to be higher quality since most respondents report that on average of only 62% of decision-making time are spent effectively (McKinsey, 2019); it is the ability for stakeholders to commit and execute on decisions that ultimately lead to effective decisions. In addition, Thunholm (2009) further demonstrates the necessity of decisiveness through analysing the decision-making styles of 98 army captains and finds that what separates military leaders and followers is the ability to be more spontaneous and less rational when making decisions which represents their character as more forceful and decisive, fitting the general leadership culture. Therefore, the review finds that good leaders are not only able to make assertive decisions, which often result in higher quality, but it is also the ability for them to be effectively executed that ultimately affects an organisation.

However, Schwartz, Ben-Haim and Dacso (2010) argue that "most decisions in life involve ambiguity, where probabilities cannot be meaningfully specified, as much as they involve probabilistic uncertainty", people tend to intuitively aspire to make decisions which maximise beneficial outcomes and this self-deceptive wishful thinking leads to disappointment in actuality. Instead, key decision-makers in organisations should balance their hopeful intuition when faced with uncertainty through rationally implementing "robust satisficing" which aims to identify the minimum satisfactory outcome and then seeks it with the widest set of circumstances (Schwartz, Ben-Haim and Dacso, 2010). Therefore, although key characteristics of a good decision from organisational leaders entail speed with no sacrifices in quality, it is important to also balance wishful intuition with rational, robust satisficing.

"Both intuition and rationality can play important roles in strategic decision making" (Calabretta, Gemser and Wijnberg, 2016). The seemingly conflicting models with their own respective benefits and drawbacks, which this review briefly discussed previously, may complement each other when appropriately combined in decision-making. This review will now analyse each model, weighing the attributes and identifying if there is room for interoperability. From conducting interviews with executives from thirteen companies located in The Netherlands and Germany about their decision-making processes, Citroen (2011) concludes that an overwhelming number of organisations follow a rational decision-making process with re-emerging themes of well-defined phases and rigid structure; most executives recognise that the decision-making process often starts off with numerous uncertainties that evolve into more clarity with the aid of reliable information to rationalise with. The interviewees notably emphasise the importance of accurate and targeted data leading to decisiveness. Similarly, Power, Cyphert and Roth (2019) support the idea of using data to decrease uncertainty by arguing that advancements in data analysis technology present people with more information than ever which is an essential ingredient for rational decision-making. However, it also highlights the fact that the flood of new availability in data can easily lend to false information and biasness, which cognitive neuroscience research has uncovered human rationale to be potent to (Power, Cyphert and Roth, 2019). Therefore, with the emergence of big data analytics playing a crucial role in the rational decision-making model, rationality have clear benefits of removing uncertainties through concrete information, however inconsistent accuracy and false neutrality of these data are causes of concern.

On the other hand, when faced with tight deadlines, time-pressure and extreme uncertainty where information on past trends and alternatives may be unavailable or incomplete, rational decision-making is effectively limited to the task's complexity and decision-maker's capability to process and interpret information (Hensman and Sadler-Smith, 2010). Hensman and Sadler-Smith (2010) further demonstrates this by interviewing fifteen executives of a financial institution on their thoughts on intuition and rational decision-making to which most acknowledge "intuition as a necessary complement to rational analysis" and "neither intuition nor (rational) analysis is infallible". In addition, the interviewees agree that intuitive judgement is built upon prior experiences, learning and pattern recognition, which allow them to decisively distinguish important cues under time pressure in banking. However, although intuition is alluring, the interviewees note that intuitive decisions are perceived to have lower validity than rational analyses in business organisations. In addition, Dane, Rockmann and Pratt (2012) explain that although rational decision-making yield better results for decomposable tasks such as statistical problems compared to intuitive decision-making, for tasks that are non-decomposable, intuitive decisions often return more timely and superior results. Also, as intuition is largely based on experience, people do not necessarily have to be experts in order for their intuition to best rationality, a moderate level of expertise is usually the threshold (Dane, Rockmann and Pratt, 2012). Therefore, this review argues that although rational decisions backed by data is greatly beneficial for leaders making decisions at large organisations facing uncertainty as it provides a structured, evidence-based approach, intuition still plays a crucial role especially when leaders have the required experience to identify patterns when no data is available, for example during unprecedented scenarios.

Lastly, the report is going to examine how organisations adapt through decision-making to improve its ability to make both quicker and better decisions when faced with uncertainty. Decisions ranging from a small, one-off choice to large, complex strategic assessment are an intrinsic part of an organisation's activity; decisions are

the cultivation of having the right information at the right time with the right people, whether that be an individual or a group, in order to decide the best action to execute from a plethora of options (McKenzi, van Winkelen and Grewal, 2011). Jones (2017) argues that organisational decisions must be made consciously; a rational thought process of problem identification, factors consideration, options evaluation, plan execution and results communication should be followed such that it becomes instinct for both quick and prolonged decisions, where further deep analysis into the latter is recommended.

However, when reliable data is unavailable such as during the COVID-19 pandemic, Ioannidis (2020) argues that organisations, in this case governments, still need to follow rational thinking to quickly take decisive actions but they will need to rely on the fundamental scientific facts like masks and social distancing will prevent pathogens spreading instead of accurate testing data which may take months to produce. Furthermore, speed is of the essence for organisations in critical situations and their aim must be to prevent the worst-case scenario or, in other words, provide a minimum satisfactory outcome which can be suitably adjusted in the future when more data becomes available (Ioannidis, 2020). In addition, Deloitte (2020) demonstrates that organisations which are "insight-driven by default", meaning they practice decision-making using data analysis and reasoning every day, before the pandemic, have shown higher resilience and growing market dominance during the unprecedented situation as leaders can use their intuition supported by their rational, insightful and data driven experience. Therefore, organisations that practice a consistent culture of structured, rational decision-making harvest fruitful performance and make better decisions based on intuition when faced with uncertain scenarios where no reliable data is available.

In conclusion, this review firstly examines what makes up good decisions and concludes that they are made and executed in a timely manner while not undercutting quality. To achieve this, intuition has to be balanced with structured stages of rational analysis as to not fall into the trap of wishful thinking. Good leaders have the experiences to confidently follow their intuition shaped by rationality. Secondly, this review evaluates both the advantages and disadvantages of rational and intuition decision-making and seeks to find common ground between the two. The review finds rational thinking is suited for decomposable problems involving reliable data, especially with the growing technologies to analyse and produce data, whereas intuitive thinking is beneficial for non-decomposable tasks where experience is relied upon as no data is available. Also, the two models are able to complement each other when rich experiences in rational data analysis is paired with decisive intuition. Lastly, the review analyses how decision-making adapts in organisations during uncertain scenarios, taking the COVID-19 pandemic as an example. The review concludes that with the lack of data, organisations should take action to first achieve a minimum satisfactory outcome and adjust when more information becomes available. It is also discovered that organisations with a demonstrated history of rational decision making and decisive execution are able to navigate through the uncertainties, grow their market position and make better decisions based on intuition during the pandemic.

Section B

This section is based on an interview carried out with a manager of an engineering team at Goldman Sachs. The interviewee will be referred to as "the respondent" hereafter. The interview questions were designed to firstly explore the qualities of a good leader and how one would balance the speed and quality of a decision, then draw comparisons between intuitive and rational decision-making styles and lastly analyse how the respondent's decision-making process has changed since the

pandemic began. Due to compliance reasons, interview questions were generalised; a full list of the questions can be found in the appendix.

Qualities of a good leader

When asked about what makes a good leader, the respondent (2021) suggested that they should be able to apply their experience to guide and protect their team through managing relationships with key stakeholders of the firm in order to identify and avoid pain points. Amann et al. (2007) support this view by explaining that as a team grows, the number of key stakeholders and demands will increase so the leader needs to effectively leverage their team, manage issues and gain early awareness of opportunities and roadblocks as their corporate social responsibility grows.

The respondent (2021) also points out that leaders are ultimately responsible for the team's results and often have to make the hardest and most complex decisions. So, it is crucial to establish trust between the members of the team in order for the team to fully support their leader when handling pressure from the wider business while leaders must trust their team to execute and deliver. Wang, Chou and Jiang (2004) demonstrate this point of trust within the team through a survey from three hundred of the "Top 500 Largest Companies in Taiwan" that a team with a leader who can establish strong relationships with their team often show better team cohesiveness and thus overall performance. However, although interactions between managers and team members can improve team harmony, over-communication can lead to micromanagement which kills innovation in the team (De Jong and Den Hartog, 2007). Therefore, it is important for leaders to balance sufficient consulting with the team to make sure people are working towards the same goal while ensuring enough autonomy is given to individuals and recognise people's initiatives and innovative efforts.

Views on balancing speed with quality of a decision

In addition to good leadership qualities, the respondent (2021) argues that decision-making is a key responsibility of leaders. When discussing if it is possible to make a quick decision without undercutting its quality, the respondent (2021) suggests that leaders must understand that they cannot solve every problem at the same time so therefore must prioritise and delegate smaller decisions to their team and trust them to deliver. This allows for leaders to focus on making complex decisions of strategic nature while other members of the team also get to build up decision-making experience. As a result, decisions take less time to be made while quality is sustained as everyone is focussed on their own assigned tasks. Woo (2019) agrees that being able to make good decisions, which are measured by speed and correctness, is a crucial skill for leaders especially given the present society where technology is presenting people with more choices than ever. Furthermore, the respondent (2021) agrees that speed does not necessarily undercut the quality of decisions and that over-dwelling may in fact jeopardise projects' key timelines. This supports McKinsey (2019)'s survey of 1259 businesses from a comprehensive range of sizes and industries that companies which have a timely and effective decision-making process report better financial returns.

Views on rational and intuitive decision-making

The respondent (2021) argues that decisions of significant impact to the firm are usually rationally analysed and made by a team instead of an individual. These decisions are driven by data, experience and reached with consensus. The

respondent (2021) also mentions that when a decision can be clearly explained with sound rationale, it is more likely to be accepted by senior management. This is supported by Hensman and Sadler-Smith (2010)'s interview with fifteen senior executives at a financial institution where it is highlighted that although intuition built upon data-driven experiences is essential alongside rational thinking and can lead to critical decisions being correctly made under time pressure, rational decisions are perceived to be more acceptable in large, rigidly structured business organisations.

Furthermore, the respondent (2021) explains that complex solutions to grand decisions are rarely perfectly delivered the first time, there is always room for improvement. An iterative approach is utilised to continuously evaluate the results of previous attempts in order to form a feedback loop to improve the rationale and ultimately the solution. Also, if the solution fails the first time it is delivered, the iterative approach limits the impact and allows the team to carefully pivot to re-deliver. The "agile philosophy", which tackles problems by delivering incremental solutions in cycles and puts heavy focus on the product and customer, supports the respondent (2021)'s view and exemplifies the benefits of having flexibility in both the product specification and the team's dynamics (Yadav, Goyal and Yadav, 2015). However, Sharma, Sarkar and Gupta (2012) argue that in the context of software development, the agile methodology has several disadvantages. Firstly, due to the customer-centric ethos, delays can be caused if the customers do not provide feedback on time; secondly, a lack of development documentation due to heavy focus on product development can lead to new developers struggling to join the project at a later stage; and lastly, the final solution can lack focus due to constant changes to specification from customers' feedback in each cycle. Despite these drawbacks, Sharma, Sarkar and Gupta (2012) acknowledge the benefits of "agile" and concludes that it is a better approach when compared to the traditional "waterfall philosophy" given that the shortcomings are carefully managed.

On the other hand, the respondent (2021) suggests that when it comes to people, intuition and experience often are better suited as it is harder to measure people by data. Sometimes, leaders should veer off the path of rationality and allow individuals to take on more responsibility and face challenges they have never faced before in order for them to develop and grow.

There are two types of decisions where rationality takes precedence: decisions where options can be calculated with good data and decisions that have a long track record of behaviour (Marcus, 2015). However, sometimes data is just not enough to fuel a good decision; the data may be insufficient or erroneous, or problems with a proven history happen to behave differently in the future. The cruciality of accurate data is exemplified by the respondent (2021) reflecting on a recent incident where users reported system delays and the team produced a solution while examining data with inaccurate metrics resulting in the delays persisting despite the attempted fix. The respondent (2021) notes that although the data is faulty, it is important to not completely abandon rationality but leverage one's intuition backed by previous data-driven experiences to find the correct metrics and ultimately produce a rational solution.

How the Covid-19 pandemic has reshaped leadership and decision-making

When discussing how the Covid-19 pandemic has changed the respondent's decisions-making style, the respondent (2021) firstly states that it has been challenging not being able to recreate the same collaborative environment as in the office where

teams can physically get together to make decisions with seamless communication. McKenzi, van Winkelen and Grewal (2011) agree that collaboration without any barriers is crucial for organisational decision-making as decisions are essentially the cultivation of having the right information at the right time with the right people in order to decide on the best course of action from a plethora of choices. Secondly, the respondent (2021) points out that with engineers and end users being separated, it can take longer for engineers to analyse and understand issues reported by users via email since in the past engineers could be with the users and observing the problem happening live. The slower diagnosis process leads to delays in delivering solutions. Lastly, the respondent (2021) suggests that the lack of social events decreases the opportunities for colleagues to connect beyond work which makes it harder for teams to gel. This can be supported by Henttonen, Johanson and Janhonen (2014)'s survey of 76 work teams across 48 organisations where the importance for colleagues to bond and bridge relationships is identified as there is a strong positive correlation between it and teams' performance.

Despite the challenges, the respondent (2021) believes that it is paramount for teams to be able to adapt and believes that communication platforms have been the key, positive drivers in closing the virtual gap between team members. IP Office Live (2020) supports that the increased usage of video conferencing allows for more powerful and engaging communication between people as more can partake in conferences rather than getting second-hand memos. Also, Viswanathan, Myers and Fanous (2020) have found that through using digital communication platforms to provide support groups and individual counselling to front-line clinicians during the Covid-19 pandemic has significantly reduced their anxiety and stress levels based on feedback. In addition, the respondent (2021) argues that a big benefit of video conferencing is that it allows colleagues around the world to meet face to face for the first time despite having worked together for years, thus forming new connections which may have been previously overlooked.

Section C

Having explored the literature examining decision-making and gained insights from interviewing leaders from industry, the report is now going to examine a real-world decision-making scenario. Due to compliance, processes have been anonymised, values have been hypothesised and assumptions have had to be made.

The decision chosen for this section is how a software development team that is responsible for building and maintaining a business-critical platform at Goldman Sachs decides how to tackle issues with platform stability. The reason why the report has chosen to explore this is because stability is essential as a large number of users rely on the platform to carry out their everyday business functions. Since stability problems come in varying sizes and severity, for simplicity the report is going examine a hypothesised problem that is big enough to severely disturb end users' ability to conduct business.

The data that is generally available for engineers to evaluate stability issues are: end users' description on what the observed issue is, system logs showing where the issue is occurring, stakeholders involved, and number of users affected. There are numerous ways to evaluate the data and decide on the best. Here are four main alternatives this report will analyse and the reasons why they are chosen:

1. Restart system services
   As end users are eager for the issue to be fixed as soon as possible, services can be quickly restarted to attempt to flush out the issue when there are no obvious errors in the system's logs or while the engineers investigate the causes for instability. This approach is the quickest however cannot reliably solve the problem as engineers do not get a full understanding of the cause.

2. Fix the immediate bug
   When engineers locate the cause of the instability, they would analyse, develop and test a solution which will fix the issue. For simplicity, this report is going to assume that the solution to the issue examined takes a day's work (8 hours) to produce. This approach is relatively fast and reliable.

3. Redesign the system
   If the issue is recurring in the system, engineers may consider changing the way the system is built after comprehensively analysing it. This has a higher chance of fixing and preventing reoccurrences of the issue and similar variants. Furthermore, the redesign also gives engineers a chance to improve many other aspects of the system in general. This approach can take longer to deliver, report is going to assume a week's work (40 hours) but will often be effective at preventing issues in the future thus saving time in the long run.

4. Increase infrastructure capacity
   For certain stability issues, the team can choose to purchase more equipment to increase the capacity of the infrastructure. Also, the team can make the process more resilient by creating a fallback with new equipment so that if the primary process fails, the backup can seamlessly continue the process. The report is going to assume that this approach takes a week as purchasing equipment requires approval and securely setting up and deploying can take time too.

Following on from the possible alternatives, the report will examine criteria to compose a matrix model with the alternatives. The criteria are the main factors of consideration for the different proposals. The report proposes the following criteria alongside explanations to why they are chosen:

- User satisfaction
  End users play a big role in the platform's success as more users mean more attention and support from the firm. Therefore, user experience is important, and they are generally only concerned with getting the issue they are experiencing fixed as soon as possible so this criterion links closely with time taken.

- Time taken
  As the platform operates live, it is very time sensitive thus making this a very important factor. Generally, the faster an issue is fixed the better. However,

engineers have to balance that with making sure the solution is fully analysed and will prevent future occurrences.

- Protection against future risk
  Engineers have to consider and be responsible for the future impacts their solutions have. The best solutions not only guarantee a short-term fix but also a long-term solution which covers problems of similar nature from recurring.

- Cost Incurred
  The report has chosen to examine the cost of producing the solution; where physical purchases do not apply, the report will use the amount of time an engineer has to spend time producing on the solution.
  It can be argued that a more relevant criterion is stability issues impeding end users from doing business which costs revenue; however, due to the varying effects different issues can have, it is very complicated to model a criterion which encompasses all possibilities. Therefore, the report has chosen to examine the initial definition of the criterion.

- Reliability
  This is a crucial factor that engineers have to consider. If a solution is unreliable, then its value is significantly lowered and suggests that there is an insufficient understand of the problem so more time should be taken to establish the solution.

The initial model contains the alternatives plotted against the criteria with the quantitative data and qualitative data, ranging from low, medium and high, filled in.

			Criteria				
			Quantitative	Qualitative	Qualitative	Qualitative	Qualitative
			Time Taken (hours)	Cost Incurred	Reliability	User Satisfaction	Protection against future risk
Alternatives	1	Restart system services	0.5	Low	Low	Medium	Low
	2	Fix the bug	8	Medium	High	High	Medium
	3	Redesign the system	40	High	High	Medium	High
	4	Increase infrastructure capacity	40	High	Medium	Medium	Low

To clarify and organise the criteria, they will be categorised into either beneficial or non-beneficial. As the issue is hypothesised to be severe enough to cause major impediments to users' workflow, the main focus is to produce a reliable solution quickly; therefore, the beneficial criteria are reliability, user satisfaction and protection against future impact. The non-beneficials criteria are time taken and cost incurred.

Furthermore, in order to better compare the different quantitative and qualitative criteria, the qualitative criteria will be converted using the following scale:

Low = 1	Medium = 2	High = 3

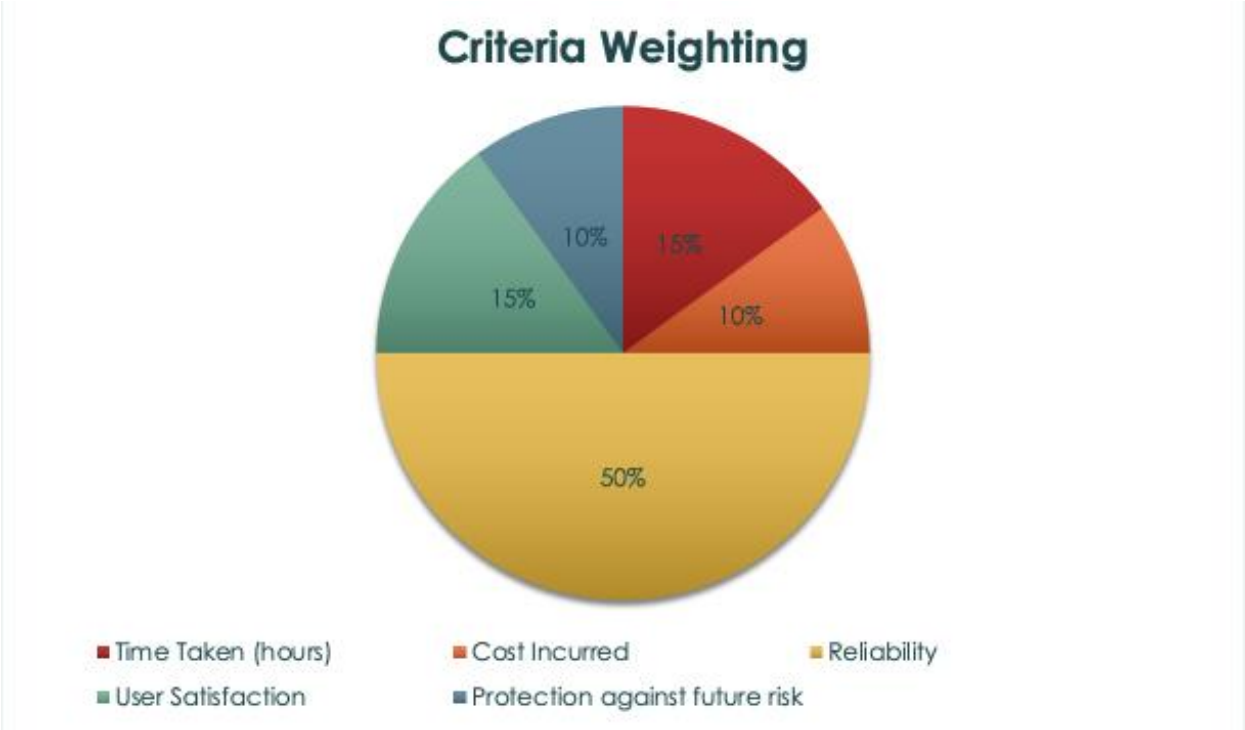
			Criteria				
			Non-beneficial	Non-beneficial	Beneficial	Beneficial	Beneficial
			Quantitative	Qualitative	Qualitative	Qualitative	Qualitative
			Time Taken (hours)	Cost Incurred	Reliability	User Satisfaction	Protection against future risk
Alternatives	1	Restart system services	0.5	1	1	2	1
	2	Fix the bug	8	2	3	3	2
	3	Redesign the system	40	3	3	2	3
	4	Increase infrastructure capacity	40	3	2	2	1

In addition, the values will be normalised to make them uniform against each other. For non-beneficial criteria, this is going to be completed through taking the minimum value of the column and dividing it by the value in each cell of that column. For beneficial criteria, normalisation is going to be done by dividing the value of each cell in the column by the maximum value of the column.

			Criteria				
			Non-beneficial	Non-beneficial	Beneficial	Beneficial	Beneficial
			Quantitative	Qualitative	Qualitative	Qualitative	Qualitative
			Time Taken (hours)	Cost Incurred	Reliability	User Satisfaction	Protection against future risk
Alternatives	1	Restart system services	0.5/0.5 = 1	1/1 = 1	1/3 = 0.333	2/3 = 0.666	1/3 = 0.333
	2	Fix the bug	0.5/8 = 0.0625	½ = 0.5	3/3 = 1	3/3 = 1	2/3 = 0.666
	3	Redesign the system	0.5/40 = 0.125	1/3 = 0.333	3/3 = 1	2/3 = 0.666	3/3 = 1

	4	Increase infrastructure capacity	0.5/40 = 0.0125	1/3 = 0.333	2/3 = 0.666	2/3 = 0.666	1/3 = 0.333

In order to identify and prioritise the criteria, the report will assign weightings to each criterion so those that are most important will have a bigger influence when calculating the final score. Each criterion's weighting and justification are as follows:



Criterion	Weighting	Justification
Time Taken (hours)	15%	As the platform is operating live, when critical issues occur, they are generally time sensitive as it can cause financial loss.
Cost Incurred	10%	Cost is a factor that has to be considered as with all operations in a business; however, this report argues that it is not as important in this context as solving the actual problem blocking business operation is the priority.
Reliability	50%	The most significant criterion as if the solution's ability to solve the problem is unreliable, then it significantly reduces its effectiveness and may cause the issue to recur in the future.

User Satisfaction	15%	End users are important to the platform gaining support from management though unreliable solutions should not be rushed to satisfy user satisfaction, which relates closely with time taken for issue to be fixed.
Protection against future risk	10%	Forward thinking solutions are generally better solutions although they would take longer to implement. For critical live issues that needs to be addressed as quickly as possible, futureproofing can be carried out with future iterations.

Next, the weightings will be applied to their corresponding criterion's values for each alternative by multiplying their score with the weighting.

			Criteria				
			15%	10%	50%	15%	10%
			Non-beneficial	Non-beneficial	Beneficial	Beneficial	Beneficial
			Quantitative	Qualitative	Qualitative	Qualitative	Qualitative
			Time Taken (hours)	Cost Incurred	Reliability	User Satisfaction	Protection against future risk
Alternatives	1	Restart system services	1 x 0.15	1 x 0.1	0.333 x 0.5	0.666 x 0.15	0.333 x 0.1
	2	Fix the bug	0.0625 x 0.15	0.5 x 0.1	1 x 0.5	1 x 0.15	0.666 x 0.1
	3	Redesign the system	0.0125 x 0.15	0.333 x 0.1	1 x 0.5	0.666 x 0.15	1 x 0.1
	4	Increase infrastructure capacity	0.0125 x 0.15	0.333 x 0.1	0.666 x 0.5	0.666 x 0.15	0.333 x 0.1

Lastly, each alternative's score against each criterion is summed up. The optimal solution is the alternative with the highest sum.

			Criteria					
			15%	10%	50%	15%	10%	
			Non-beneficial	Non-beneficial	Beneficial	Beneficial	Beneficial	
			Quantitative	Qualitative	Qualitative	Qualitative	Qualitative	
			Time Taken (hours)	Cost Incurred	Reliability	User Satisfaction	Protection against future risk	**Weighted Sum Score**
Alternatives	1	Restart system services	0.15	0.1	0.167	0.0999	0.0333	0.550
	2	Fix the bug	0.00938	0.05	0.5	0.15	0.0666	0.776
	3	Redesign the system	0.00188	0.033	0.5	0.0999	0.1	0.735

	4	Increase infrastructure capacity	0.00188	0.033	0.333	0.0999	0.033	0.498

From using the weighted sum model, the report concludes that the best alternative when a stability issue impeding end users' ability to conduct business occurs is to fix the immediate bug since it offers the best balance between reliability and time taken. Lower amount of time taken also increases user satisfaction and decreases cost incurred.

The report firstly argues that the alternative 'restart system services' offers the quickest solution, also making it the cheapest, however is unreliable to solving the root issue which is the most important criterion. Secondly, 'redesign the system' is effective at protecting against issue reoccurrence as well as reliably fixing the current bug however can take significantly longer to implement thus increasing the time taken and costs, and decrease user satisfaction. Lastly, 'Increase infrastructure capacity' can temporarily improve the platform however does not fix the underlying issue and can take long to implement since purchasing new equipment needs approval from management.

Overall, the report does not find it surprising that after using the Weighted Sum Model to evaluate the different alternatives, fixing the immediate bug is the optimal solution because it is often the most direct way to solve problems and achieve user satisfaction.

In industry, issues vary drastically so the criteria may have different weightings depending on the problem. Therefore, engineers would generally take a more pragmatic approach and rely on their intuition based on previous experiences to assess how best to resolve an issue. The ideal solutions are often iterative to firstly guarantee a solution which achieves the minimum satisfactory outcome and then iteratively improve on it in the future.

Conclusion

The report firstly aimed to establish how leaders make effective decisions to improve and adapt an organisation through analysing existing literature. The review analysed the characteristics of good decisions and found the key is a balance of speed and quality through establishing minimum satisfactory outcomes. Secondly, the review examined the benefits, drawbacks and interoperability of intuitive and rational decision-making. It concluded that rationality combined with data had the benefit of removing ambiguity however when data is unreliable or the decision is time-sensitive, intuition backed by data-driven experience is key; thus, exemplifying the importance of developing intuition through habitually making rational decisions. Lastly, the review investigated how organisations have adapted during uncertainty, taking the Covid-19 pandemic as example. It found that when data is unavailable, organisations must rely on fundamental facts to deliver a minimum satisfactory solution so to avoid worst-case scenarios. The review also demonstrated that organisations with a record of making rational decisions relied on their intuition to quickly execute and gain market share whilst uncertainty loomed.

Secondly, the report conducted an interview with a manager at Goldman Sachs to gain an industry perspective on the topics analysed in the literature review. The interview firstly concluded that good leaders guide and protect their team through managing relationships with stakeholders so team members can focus on delivering solutions. They ensure decisions are delivered quickly without undercutting quality through delegation and trusting their team. Secondly, the interview found that significant decisions are always made by a group and reached with consensus. It is acknowledged that decisions with sound rationale are generally more acceptable at large organisations. On the other hand, intuition is suited for managing people as data cannot perfectly reflect individuals. Leaders should use their experience and intuition to give opportunities to individuals to take on challenges and responsibility they have not experienced before so they can grow. Lastly, the interview concluded that remote working has brought challenges as communication degrades and team members cannot connect and bridge relationships as well. However, despite the challenges, video conferencing has had the benefit of drawing global teams closer and given colleagues the ability to support each other through the pandemic.

Lastly, the report used the Weighted Sum Model to examine four alternatives against five criteria of how engineers at Goldman Sachs approach a platform stability issue. From this, the report concluded that the optimal solution is to focus on fixing the immediate bug causing the issue as it is the most reliable and quick way of stabilising the platform, thus achieving user satisfaction. The report acknowledged that the best approach would be to use an iterative approach to fix the bug first and then improve it in the future to prevent the issue from reoccurring. In practice, stability issues vary in severity and cause therefore criteria weightings may change so engineers will rely on their intuition and experience to rationally decide how to solve the issue.

References

Amann, Wolfgang., Khan, Shiban., Salzmann, Oliver. and Steger, Ulrich. (2007). *Managing external pressures through corporate diplomacy*. [online] SAGE journals. Available at: https://journals.sagepub.com/doi/pdf/10.1177/0306307007033001O3 [Accessed 29 Mar. 2021].

Calabretta, Guilia., Gemser, Gerda. And Wijnberg, Nachoem M. (2016) *Interplay between Intuition and Rationality in Strategic Decision Making: A Paradox Perspective.* [online] SAGE journals. Available at: https://journals.sagepub.com/doi/full/10.1177/0170840616655483 [Accessed 7 Mar. 2021].

Citroen, Charles L. (2011). *The role of information in strategic decision-making*. [online] ScienceDirect. Available at: https://www.sciencedirect.com/science/article/pii/S0268401211000235 [Accessed 7 Mar. 2021].

Dane, Erik., Rockmann, Kevin W. and Pratt, Michael G. (2012). *When should I trust my gut? Linking domain expertise to intuitive decision-making effectiveness.* [online] ScienceDirect. Available at:

https://www.sciencedirect.com/science/article/pii/S0749597812000994 [Accessed 7 Mar. 2021].

De Jong, Jeroen P.J. and Den Hartog, Deanne N. (2007). *How leaders influence employee's innovative behaviour.* [online] Emerald Insight. Available at: https://www.emerald.com/insight/content/doi/10.1108/14601060710720546/full/html#idm45831345385280 [Accessed 29. Mar. 2021].

Deloitte. (2020). *Taking the right decisions during the COVID-19 crisis*. [online] Deloitte. Available at: https://www2.deloitte.com/de/de/pages/strategy/articles/decision-making-in-the-covid19-crisis.html [Accessed 7 Mar. 2021].

Hensman, Ann. and Sadler-Smith, Eugene. (2010). *Intuitive decision making in banking and finance.* [online] ScienceDirect. Available at: https://www.sciencedirect.com/science/article/pii/S0263237310000708 [Accessed 7 Mar. 2021].

Ioannidis, John PA. (2020). *A fiasco in the making? As the coronavirus pandemic takes hold, we are making decisions without reliable data*. [online] STAT. Available at: https://viruswaarheid.nl/wp-content/uploads/2020/06/Prod-45-Fiasco-in-the-making-3.pdf?__cf_chl_jschl_tk__=53ddae4d1ae073b8f8db0ddffa49b084f668c87a-1615542974-0-AWaEVSVWeKslHv6UthgwTvGB8qOMWEW36baEtXbI7D4P35ypEPwLQG2g0ukXp-VNUiKt1aAPAvM8RhHo7D6cdW-kZzladNZZk6hsurjWST29hXotenKeQ6Vyb8miuWvpMYn5upZyrg4B93kKkxm8eaJVCg-GzVfmVH44k7JmkGlqRseVHeR4V5YFFs21xT2EVPpzFppB1g7pdt0njoAepjUCXLyCbwnMNHNmZVrOjFGSEnQLKx14ZWA8upcwOY6LjN3ZRlaKwP_w5QNUmWahaEVD75PSaSgsaEeaiqlS3MNikcB_pkUaENMLhLaRcm6xaDFrMyVYt3D2HKtnij7WlyO40vPVxFpsRrX2Pze2Zj9RWGmNs651nzbh-liE6taTUzoDTdcG4vNnKJMqvlZs7ag [Accessed 7 Mar. 2021].

Jones, Paul. (2017). *Organisation decision making.* [online] The Business Improvement Network. Available at: https://www.bin.co.uk/organisational-decision-making [Accessed 8 Mar. 2021].

McKenzie, Jane., van Winkelen, Christine and Grewal, Sindy. (2011). *Developing organisational decision-making capability: a knowledge manager's guide*. Available at: https://www.emerald.com/insight/content/doi/10.1108/13673271111137402/full/html [Accessed 8 Mar. 2021].

McKinsey (2019) *Decision making in the age of urgency.* [online] McKinsey & Company. Available at: https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Organization/Our%20Insights/Decision%20making%20in%20the%20age%20of%20urgency/Decision-making-in-the-age-of-urgency.pdf?shouldIndex=false [Accessed 28 Feb. 2021].

Power, Daniel J., Cyphert, Dale. and Roth, Roberta M. (2018) *Analytics, bias, and evidence: the quest for raitonal decision making.* [online] Taylor & Francis Online.

Available at: https://www.tandfonline.com/doi/abs/10.1080/12460125.2019.1623534 [Accessed 7 Mar. 2021].

Schwartz, Ben-Haim and Dacso (2010) *What makes a Good Decision? Robust Satisficing as a Normative Standard of Rational Decision Making.* [online] Wiley Online Library. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1468-5914.2010.00450.x [Accessed 7 Mar. 2021].

Sharma, Sheetal., Sarkar, Darothi. and Gupta, Divya. (2012) *Agile Processes and Methodologies: A Conceptual Study.* [online] Amity School of Engineering & Technology. Available at: https://www.yashada.org/yash/egovcii/static_pgs/TC/IJCSE12-04-05-186.pdf [Accessed 20. Mar. 2021].

Thunholm (2009) *Military leaders and followers – do they have different decision styles?* [online] Wiley Online Library. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1467-9450.2009.00714.x [Accessed 2 Mar. 2021].

Viswanathan, Ramaswamy., Myers, Michael F. and Fanous Ayman H. (2020) *Support Groups and Individual Mental Health Care via Video Conferencing for Frontline Clinicians During the COVID-19 Pandemic.* [online] ScienceDirect. Available at: https://www.sciencedirect.com/science/article/pii/S0033318220302000 [Accessed 4 Apr. 2021].

Wang, Eric., Chou, Huey-Wen. And Jiang, James (2004) *The impacts of charismatic leadership style on team cohesiveness and overall performance during ERP implementation.* Available at: https://www.sciencedirect.com/science/article/pii/S0263786304000973 [Accessed 29 Mar. 2021].

Woo, Amanda (2019) *Decision-Making: The most Undervalued Skill in Software Engineering.* [online] Hackernoon. Available at: https://hackernoon.com/decision-making-the-most-undervalued-skill-in-software-engineering-f9b8e5835ca6 [Accessed 28 Feb. 2021].

Yadav, Monika., Goyal, Neha. And Yadav, Jyoti. (2015) *Agile Methodology over iterative approach of Software Development – A review.* [online] IEEE. Available at: https://ieeexplore.ieee.org/abstract/document/7100309 [Accessed 29 Mar. 2021].

Marcus, Bonnie (2015) *Intuition is An Essential Leadership Tool.* [online] Forbes. Available at: https://www.forbes.com/sites/bonniemarcus/2015/09/01/intuiton-is-an-essential-leadership-tool/ [Accessed 23 Mar. 2021].

Henttonen, Kaisa., Johanson, Jan-Erik. and Janhonen, Minna. (2014) *Work-team bonding and bridging social networks, team identify and performance effectiveness.* [online] Emerald Insight. Available at: https://www.emerald.com/insight/content/doi/10.1108/PR-12-2011-0187/full/html?journalCode=pr (Accessed 2 Apr. 2021).

IP Office Live (2020) *How does video conferencing help in building good relations in business?* [online] Available at: https://ipofficelive.wordpress.com/2020/06/08/how-

does-video-conferencing-help-in-building-good-relations-in-businesses/ [Accessed 2 Apr. 2021].

Appendices

Section B Interview Questions:

What are the qualities of a good leader in a business organisation?

Do you believe that the speed of a decision undercuts the quality, and can both coexist?

What are your thoughts on the rational and intuitive approaches to decision-making in a business environment, and can you provide some examples where each would be suitable?

How has your leadership style and decision-making process changed since the Covid-19 pandemic began?