MS-E2177 - Seminar on Case Studies in Operations Research

Decision Process Playbook for Consequential Decisions

Final Report

Team UPM Fibres

Tuomo Antikainen
Eero Heimonen
Perttu Jalovaara (Project Manager)
Alina Lind
Venla Lymysalo
Venla Valve

May 17, 2023

Aalto University
School of Science

Contents

1 Introduction

Effective decision-making has long been recognized as a critical component of organizational success, both for established enterprises and emerging businesses. However, with the rapid proliferation of data resources, decision-making processes have undergone a significant transformation. What were once decisions based on intuition and guesswork can now be grounded in empirical data, providing valuable opportunities for corporations. Nevertheless, this evolution has obstacles. As the volume and complexity of data continue to expand, decision-making has become increasingly intricate and demanding. Indeed, contemporary decision-makers face an array of challenges in navigating this data-driven landscape (Davenport et al., 2012; Agrawal et al., 2011).

Our client, UPM Fibres, represents the largest of the six business divisions of UPM-Kymmene Oyj (UPM). UPM was established in 1995 as a result of a merger between Kymmene Corporation and Repola Ltd (UPM, 2023), and has since evolved into a major global player in the forest industry. UPM Fibres is now one of the world's largest pulp manufacturers, producing over 3.5 million metric tons of pulp and 1.4 million cubic meters of timber annually (UPM, 2022b). In April 2023, UPM further expanded its global pulp production capacity by over 50% with the launch of a new pulp mill in Uruguay (UPM, 2022a). Simultaneously, UPM is committed to advancing sustainability and has set a goal of becoming a leading contributor to the circular economy (UPM, 2022b).

UPM — like any large business company — constantly makes decisions of varying scope and impact, ranging from small day-to-day decisions to large strategic ones. While data analysis has become an increasingly important tool in decision-making, it has not replaced other crucial factors of decision-making processes. Decision-making is a multi-step process that follows either corporate protocol or decision-makers' (DMs') individual standards, with steps ranging from simple voting to complex analytical tools. As UPM is navigating its way in the fast-changing forest industry and focusing on a fossil-free future, making the right decisions at any scope and impact level is critical to its success. In this project, we seek to support UPM in improving the quality of its consequential medium-impact decisions.

Medium-impact decisions fall between large strategic investments and small simple matters. At UPM Fibres, medium-impact decisions are defined as consequential in terms of time, money or other resources and as requiring commitment of at least one quarter year period. Opposed to large strategic investments, UPM does not enforce strict decision-making protocols on medium-impact decisions. For example, medium-impact decisions at UPM include decisions such as whether or not to switch sawmills' production

schedules to nights to save electricity. While medium-impact decisions are not the most impactful on their own, their cumulative effect can be significant. Therefore, efforts to improve decision-making processes for medium-impact decisions are worthwhile for the business.

UPM Fibres has a Decision Support and Analytics team dedicated to supporting DMs in decisions ranging from medium to high impact, using their tools and expertise in operations research (OR) and data science. While this facilitates data-driven decision-making, it does not remove other challenges DMs might face (Agrawal et al., 2011). So-called *soft*, non-data-related challenges such as "When to use data and when to trust one's own intuition?" and "How to avoid misunderstandings and errors in group settings?" remain (Khatri and Ng, 2000; Kahneman et al., 2021).

In this project, we identify pitfalls that UPM Fibres' medium-impact decision-making processes are susceptible to. Moreover, we introduce a playbook, or a collection of tools, to evade possible pitfalls. This complements UPM Fibres' existing expertise in analytics, addressing the often-neglected soft aspects of decision-making. The introduced tools can be implemented as such or used as frameworks to improve the quality of decision-making processes. Overall, the goal of the playbook is to help tackle the ever-growing complexity of decision-making with simple structures and habits.

2 Definitions

To clarify the concepts central to this project, we provide definitions for the following terms: decision process and playbook.

Decision process (i.e. decision-making process) refers to a series of steps that a decision-maker undertakes to determine the best option or course of action in a given situation. While every business and decision-maker has their own approach to decision-making, decision processes generally include the following fundamental steps: defining the problem, determining requirements, establishing goals, identifying alternatives, selecting a decision-making tool, making a decision, and validating solutions against the problem statement (Baker et al., 2001). However, these steps are not strictly defined and may vary between different decision processes.

In a rapidly changing business environment, it may be necessary to accelerate decision processes by combining some of the steps, such as evaluating potential solutions and making a decision based on limited information using unaided professional judgement. Similarly, in situations where the stakes are high or the consequences of making the wrong decision are severe, it may be necessary to spend more time gathering data, doing data analysis, and conducting other analyses. The steps may also vary based on the specific

decision-making approach or methodology being used. Ultimately, to achieve best possible outcomes, the key is to adapt decision processes to the scope, impact and nature of given decisions.

A playbook is a documented set of guidelines, strategies, and practices for completing a certain task or achieving a specific goal. In the business context, playbooks are often used to standardize processes between departments, teams, and individuals, as businesses can thereby improve efficiency and improve overall performance. Playbooks can be created for both routine tasks and more complex projects, and they typically include step-by-step instructions, business tools, and examples of successful outcomes.

3 Decision-making pitfalls

This section outlines decision-making pitfalls identified as most relevant based on interviews with UPM decision-makers. By design, the decision-making playbook is a tool to avoid given pitfalls.

3.1 Analytical processes

Effective decision-making requires careful analytical processes, as lack thereof increases the probability of several decision-making pitfalls (Parsons, 2016; Das and Teng, 1999):

1. *Narrow inspection of the decision frame*: Decision-makers tend to rely on their intuition too early in the decision-making process, neglecting a thorough analysis of the (often complex) decision context. This results in sub-optimal weightings of decision objectives, as well as inaccuracies in the estimation of trade-offs and risks of decision alternatives.

2. *Insensitivity to outcome probabilities*: Decision-makers are inclined to focus on the potential value of different outcomes without considering the probability of their actual occurrence. Probability estimates are disregarded due to a lack of understanding or mistrust in their validity in the specific decision-making context.

3. *Insufficient consideration of alternatives*: In situations where information is incomplete, decision-makers may adopt a sequential approach to identifying alternatives, focusing on a relatively small number of options that are supplemented by intuition rather than rational analysis. This can lead to a limited set of options that do not consider all relevant values and goals, resulting in sub-optimal outcomes for the organization.

4. *Biased information processing*: An array of cognitive biases can impair decision-makers' information processing, leading to non-optimal

decisions with respect to the set objectives.

(a) *Confirmation bias*: This is the tendency to seek out information that confirms existing beliefs and discounts information that contradicts them. Confirmation bias can lead to faulty decisions because it prevents decision-makers from considering all available evidence.

(b) *Anchoring bias*: This occurs when a decision-maker relies too heavily on the first piece of information they receive in the decision-making process, even if that information is not relevant or accurate.

Decision-makers at UPM show considerable individual differences in their analytical processes. Nevertheless, most decision-makers will benefit from adding structure to their analytical processes, as this reduces the likelihood of errors. Section 4.1 discusses *Documentation* as a tool to ensure that the decision context is sufficiently examined and understood, objectives are reasonable and clear, and a sufficient amount of relevant and reliable information is appropriately processed. Moreover, the *Systems Intelligence* framework given in Section 4.4 facilitates gaining clarity over the decision frame and possible tradeoffs of decision alternatives.

3.2 Group settings

Group decision-making can be a powerful way to harness diverse perspectives and expertise to make better decisions. However, group decision processes also have their own challenges (Lunenburg, 2010; Janis, 1972), including:

1. *Self-censorship*: The illusion of unanimity, i.e. group consensus, can lead decision-makers to dismiss the importance of and suppress their doubts or opposing viewpoints. This is a vicious circle in that self-censorship within a group is likely to strengthen the illusion of unanimity, making it even harder for decision-makers to voice their opinions. Self-censorship is reinforced by cultural or hierarchical pressure to conform, and especially affects employees that are less outspoken or lower in the organizational hierarchy.

2. *Groupthink*: Groups tend to make decisions without presenting, seeking, or considering alternative perspectives. Groupthink is especially common in cohesive groups, where self-censorship is the norm. Groupthink can lead to suboptimal decisions that are in line with the initial desires of decision-makers with higher authority and strong and outspoken personalities.

3. *Group polarization*: Decision-makers in cohesive groups often develop an illusion of invulnerability and inherent morality, and therefore be-

come irrationally optimistic and risk-seeking, as well as ignorant of the ethical repercussions of their decisions. Hence, groups tend to make decisions that are more extreme than the initial inclinations of individual decision-makers.

Group decision-making processes based on unstructured discussions, common at UPM among most other organizations, are most susceptible to groupthink and false perceptions of invulnerability, inherent morality and group unanimity. Implementing strict decision-making processes in meetings may initially be perceived as too burdensome or time-intensive. However, as better structuring the decision-making process can improve both its effectiveness and quality, we propose the *Mediating Assessment Protocol* presented in Section 4.2, especially for complex or high-risk decision-making contexts. Moreover, a wide-spread use of *Meeting roles*, an easier-to-implement methodology presented in Section 4.3, is likely to significantly reduce the negative effects of groupthink and group polarization on decision quality.

3.3 Effects of siloing

Siloing refers to an organizational problem where different organizational units work in isolation from one another, resulting in a lack of collaboration and communication (de Waal et al., 2019). This can lead to several decision-making pitfalls, the most relevant of which are

1. *Lack of information sharing*: When organizational units work in silos, they may not share critical information with one another. This can lead to incomplete or inaccurate information being used in decision-making, which can result in poor decisions.

2. *Focus on limited targets*: Silos can result in a narrow perspective, where decision-makers only consider their business unit's targets and objectives, rather than the organization's overall objectives. This can lead to decisions that benefit one department but harm others or the organization as a whole.

At UPM, siloing of business units is understood as a pressing challenge. There have already been efforts to avoid siloing between business divisions, an example of which was the organization of cross-divisional leadership meetings to advance information sharing in the evaluation and control of an external hazard with potential consequences on all business divisions. However, specific concerns relate to the lack of a company-wide perspective when determining the context and objectives of decisions, especially among employees lower in the organizational hierarchy. To tackle this problem, we propose utilizing the *Systems intelligence* framework described in Section 4.4.

4 Tools

4.1 Documentation

4.1.1 Overview of Documentation

Decision processes always include uncertainties which can never be fully eliminated. As a result, the outcome can never be guaranteed but the effect of these uncertainties can be minimized with a thorough decision process. A thorough process looks at the problem from many perspectives and gathers reliable information to back up the decision. By doing this it is possible to later reflect on the choice and understand why the decision was made. Documentation is required to enable proper reflection that can also be done by those who were not involved in the decision process. Documentation also increases the comprehension within the decision-makers. The document itself does not require multiple pages of formal writing, the text can also be informal and use graphics and figures to help visualize the decision process.

4.1.2 Documentation in practice

Parsons (2016) introduces the characteristics of a good decision. These characteristics can be condensed into a checklist to help the documentation of the decision process (Figure 1).

To help with later decisions, decision-makers should be able to use earlier decisions as background information. This requires reflection on the past processes and their outcomes. Reflection can only be done if the context in which the decision was made is understood. Thus, the decision frame should be clearly documented at the beginning of the process and extended throughout the process. An adequate decision frame describes both the external and internal environments clearly to provide the context and the main objectives that are to be accomplished. These should be described in a way that allows those that were not involved in the decision process to also use it as background information for similar and downstream decisions. For example, if there is a change in workforce it cannot be assumed that the new employees are aware of earlier decisions without providing any resources.

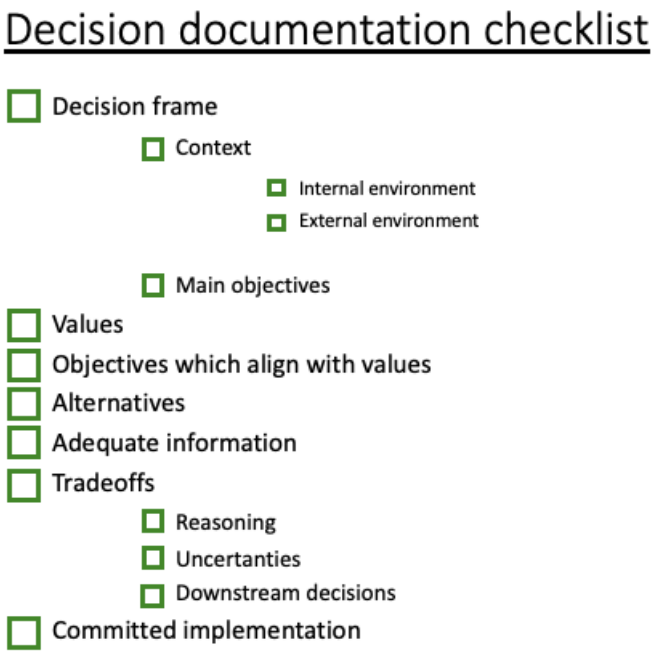


Figure 1: Checklist for a decision process

After providing the framework for the process, a set of values and objectives should be determined to help choose a proper alternative. The main objectives should have been determined in the decision frame and these objectives could be for example minimizing the excess product. These additional objectives should align with the chosen values, by doing this it is easier to understand later why the choice was the most adequate for the given context and best representation of the values. The objectives also determine the information that should be sought before making any decisions.

Alternatives can help look at the decision from different perspectives which is why it is better to have multiple bad alternatives rather than having only a few noteworthy alternatives. When creating alternatives, it should be noted that the choice should not be the best alternative and that the chosen alternative should always be one that has been considered thoroughly. All the left-out alternatives do not necessarily need a long explanation for why they were not chosen, even a short answer to why it was not an adequate choice is enough to prove that multiple alternatives were considered to support the quality of the decision.

After the goals and background of the decision process have been established, adequate information is needed to support the decision. The information

should be relevant and gathered based on the chosen objectives. As decisions concern the future, it is not possible to gather information on an upcoming situation, but data from the present and past can be incorporated to examine the possible outcomes of the decision. Thus, the uncertainties should be noted when examining the information.

Tradeoffs, which include multiple variables, are often one of the most challenging parts in a decision process. Different decision-makers might have different views on how much something is worth and what should be prioritized which is why it is important to be clear on which objectives have a greater value and the reasoning behind the tradeoffs. Tradeoffs also often lead to other downstream decisions and include many uncertainties. The documentation of the possible outcomes can be done with the help of graphical tools such as decision trees. The graphical tools can also be used to visualize the uncertainties involved in the tradeoffs of the decision process. The visualization of uncertainties can concretize the outcomes for the decision-makers and aid further analysis of the alternatives.

4.1.3 Visual problem structuring

Decision Tree

A decision tree represents the process in chronological order and as a result helps visualize the downstream decisions and tradeoffs. The diagram consists of two types of nodes: decision nodes (square) and chance nodes (circle). Figure 2 shows a simple decision tree which denotes the probabilities of the chance nodes' possible outcomes by P.

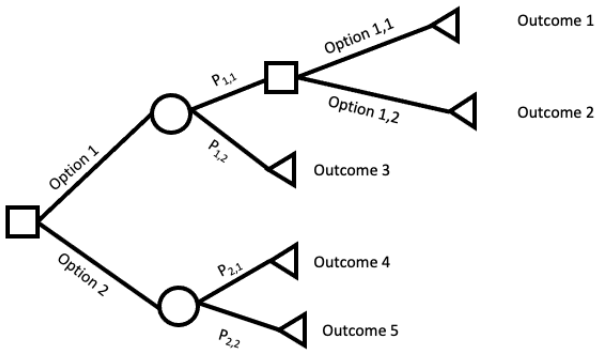


Figure 2: An example of a decision tree

All outcomes should be included before analysing and comparing the results. The outcomes are denoted by a value, a higher value should be given to the more preferred outcomes. The analysing is done by starting from the right and moving to the left. The outcome value is multiplied with all its probabilities (P). By summing up these values for all the outcomes of a decision, the expected value of the choice is received. As the decision tree includes the probabilities of the possible outcomes it is now easier to compare the choices by their expected values and use it as reasoning for the tradeoffs.

Influence Diagram

The influence diagram is similar to a decision tree, decision nodes are denoted by squares and chance nodes by circles, but it can be used to represent interconnections between the nodes. The outcomes are denoted by diamonds and the arcs connect nodes if they have directional influence. Figure 3 shows an example of an influence diagram.

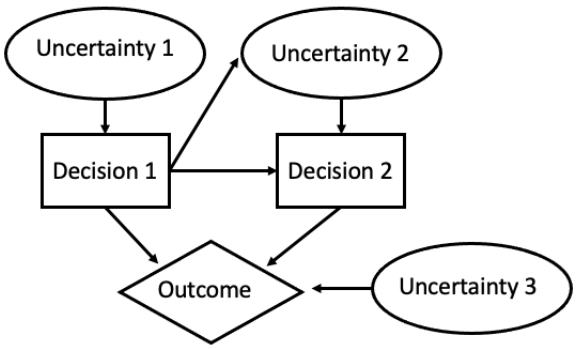


Figure 3: Influence diagram

4.2 Mediating Assessments Protocol (MAP)

4.2.1 Overview of MAP

The focus of this tool is to reduce errors in strategic decisions which are conducted in a group setting. While the focus of the playbook is on medium-impact decisions that do not include the big strategic decisions, many medium-impact decisions still follow the strategic pattern of turning a large amount of complex information into a single path forward. The used framework, Mediating Assessments Protocol (MAP), was developed for strategic decision-making by Nobel-winning psychologist and economist Daniel Kahneman, together with Dan Lovallo and Olivier Sibony (2019). Essential to the method are the *mediating assessments*, which are evaluations of pre-determined key

attributes that influence the decision. We define decision attributes as characteristics or qualities that are evaluated to compare alternatives in a decision-making process. The goal of the method is to use these mediating assessments of different attributes to delay the global evaluation until the end of a structured process. The method is easy to learn and use, it requires very little additional work and is applicable to both one-off and recurring decisions.

MAP can be used to tackle several issues that are the cause of variability in decision-making, perhaps most notably the bias towards excessive coherence. This bias is a tendency to ignore complexity and ambiguity of the problem and instead rely on pre-existing simplified mental models. For example, when several independent attributes have to be considered, a positive evaluation on one attribute makes the DM more susceptible to downplay negative evaluations on other attributes to conform to the initial positive image. Studies show that this phenomenon is even stronger in a group setting, as studied by Sunstein and Hastie (2015). The framework can also be used to mitigate confirmation bias and anchoring bias, both of which were introduced in Section 3.1. Moreover, MAP can be used to mitigate availability bias, in which recent or available information is given excessive weight.

MAP is a tool for supporting group decision-making and thus built to mitigate challenges that arise uniquely from a group setting. As a miniature of a larger society, a group has effects on individual behaviour that are hard to predict and control. Issues that compromise the quality of a group decision process include self-censorship due to internal pressure to conform to the current group consensus and group hierarchy, groupthink, and group polarization, as more elaborately described in Section 3.2. MAP addresses these issues by separating the mediating assessments to independent processes and by delaying the formation of a holistic view until the end. In some cases, it is also possible to incorporate anonymous voting into the process to further mitigate the negative effects described.

Finally, as opposed to an algorithmic framework that would leave all subjectivity out of decision-making, MAP aims to make room for intuition. Instead of assigning weights to different attributes, the method encourages the use of decision-makers' own judgement, provided that it is well-informed and saved until the very end. The aim of this is to best use the holistic view of the decision-makers and to keep the method compelling to use.

4.2.2 MAP in practice at UPM

The theory of MAP can be divided into five steps, as presented in the book *Noise: a Flaw in Human Judgment* by Kahneman et al. (2021). While very few decision processes at UPM can be simplified into a five-step process where

the moment of final decision can be pinpointed, MAP has many valuable elements that can be applied to more complex processes.

The framework consists of the following five steps:

1. *Define the mediating assessments*

   The first step of MAP is to decide which are the key attributes that need to be considered. Ideally, this is carried out in the first meeting with the DMs that also partake in the final meeting. The relative importance of the attributes is not yet considered at this stage. Ideally, the list is short, comprehensive and non-redundant. For recurring judgements, this only needs to be done once.

   Clarifying the attributes at the beginning of the process ensures that all key questions are answered before arriving at a consensus. Clearly defining the attributes influencing the current unique situation also reduces the risk of arriving at a familiar but ill-fitting solution. Moreover, having a pre-defined checklist makes the decision process more transparent and the DMs can better trace what their final decision is founded on.

2. *Conduct the analysis using outside view*

   In the second phase, the previously defined key attributes are considered using all relevant information. Depending on the case, this phase might be carried out outside of the group, by an analyst team. The analysis of alternatives might include e.g. acquiring relevant data, running risk analyses, building models and interviewing experts on the attribute in question. Based on the analysis, the team should arrive at a recommendation concerning the one specific attribute. The analysis team then builds a report of all relevant findings and the recommended course of action. While the team is encouraged to express their view on the topic, the review does not need to be unanimous. Instead, all ambiguities and uncertainties should be expressed transparently.

   Moreover, in the evaluation phase of MAP, the assessments should use calibrated scales, such as percentiles. The authors of MAP highlight the importance of using a comparable *reference class* to construct the scale. This might mean expressing a job candidate's programming skills as "in the top 25% of all candidates out there", instead of "good". Using relative evaluation instead of absolute statements makes the interpretation more precise and forces the DM to see the case from the outside, as a part of a larger instance of similar cases.

3. *Assure the independency of analytical processes*

   Ideally, independent analysis teams are assigned to research different

sub-problems. The teams are also advised not to communicate with each other. If that is not possible, people should be advised to complete one area before moving on to the next one, and try not to form a holistic view yet. This is done to ensure that the evaluations of different attributes do not influence each other, that is, to fight the early formation of mental models.

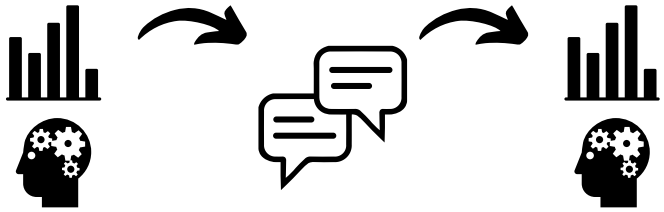


Figure 4: In the reviewing phase of MAP, each attribute is discussed using *estimate-talk-estimate*, in which the group is asked to take an anonymous vote on the reviewed attribute and the distribution is shown on screen. After discussing the subject further, another vote is taken.

4. *In the meeting: Review assessments independently and use estimate-talk-estimate.*

   Once all the mediating assessments have been analysed, the group of decision-makers gathers together to review each attribute and the report of the analyst team. The DMs should be reminded not to turn the discussion into a holistic evaluation yet, but instead to first discuss each attribute separately. This will keep the meeting structured and ensures that all attributes are given visibility.

   Depending on the attribute in question, there might be a possibility to take an anonymous vote on the subject. For example, the DMs might give their own rating on the mediating assessment. Continuing the example of hiring a new employee and considering programming skills as an attribute, the DMs could vote on who they consider to be the best coder after seeing the review of the analyst team. The histogram of answers is projected on the screen to show the initial "temperature" of the room. The group then discusses the subject further, taking into account the distribution of views and takes the vote again. This protocol is what Kahneman et al. refer to as *estimate-talk-estimate*, and

which we visualize in Figure 4. Using anonymity in and showing the distribution fights the negative social effects like pressure to conform and information cascade, in which people make the same conclusion in a chain.

In this phase of MAP, it might be of use to appoint a mediator who organizes the vote, guides the DMs through the mediating assessments and assures that the focus of the conversation stays solely on the attribute in question.

5. *Allow the use of intuition to choose the best course of action*

   In this final phase of MAP, we allow the DMs to use their own judgement and expertise to form a holistic view of the situation, using information obtained from the mediating assessments. This includes e.g. discussing the importance of different attributes and how they affect each other.

   By delaying the use of subjective judgement until this last phase, we can best benefit from the expertise of the DMs while being able to identify the factual base on which the decision is anchored on.

These five steps have also been summarized in Table 1 for a quick read.

Table 1: The five steps of mediating assessments protocol.

	step	*description*
1.	**Define the mediating assessments**	The group lays out key attributes in a comprehensive and non-overlapping list
2.	**Conduct the analysis and use outside view**	Data-driven analysis of attributes, using percentiles with comparable cases.
3.	**Keep the analyses independent**	The mediating assessments are researched in separated teams or as separated processes.
4.	**Review and use estimate-talk-estimate**	The group reviews the analyses and takes a vote before and after discussion for each attribute.
5.	**Allow the use of intuition**	A holistic discussion of all attributes is allowed, permitting the use of DMs own judgement.

4.3 Meeting roles

4.3.1 Overview of meeting roles

In today's fast-paced environment, organizations are increasingly recognizing the importance of effective decision-making to achieve their goals and remain competitive. One crucial aspect of this process is the way in which meetings are structured and conducted. As highlighted in the book *Decision Behaviour, Analysis and Support* by French et al. (2009), group decision-making can be a complex and challenging process, susceptible to various biases and dysfunctions. One way to mitigate these challenges and promote effective decision-making is by defining and assigning specific meeting roles to participants. By assigning specific roles to individuals, the group can achieve clear communication, active participation, and a focused discussion on the issues at hand. Meeting roles contribute to the overall success of the decision-making process by fostering a collaborative environment, encouraging critical thinking, and providing a framework for evaluating and exploring alternatives.

Group decision-making can be hampered by various pitfalls, including groupthink, overconfidence, and status effects, among others. These pitfalls can lead to suboptimal decisions and hinder the group's ability to achieve its objectives. By assigning meeting roles, organizations can address these challenges in the following ways:

- Preventing Groupthink: By assigning roles such as a devil's advocate or critical evaluator, the group can ensure that alternative perspectives are considered, and the discussion does not become dominated by a single viewpoint.
- Encouraging participation: Roles such as the facilitator or timekeeper can ensure that all members have an opportunity to contribute to the discussion, minimizing the risk of status effects and promoting a more inclusive decision-making process.
- Promoting clarity and focus: Roles such as the recorder or analyst help maintain a clear record of the discussion, keeping the group focused on the issues at hand and ensuring that critical information is not lost or overlooked.
- Enhancing creativity: By assigning roles that encourage brainstorming and the evaluation of alternatives, groups can avoid becoming overly focused on a single solution and instead explore a wide range of potential options.

Kristin Halvorsen and Srikant Sarangi article "Team decision-making in workplace meetings: The interplay of activity roles and discourse roles" (2015)

studies group decision-making in a detailed way. The authors state that activity roles and discourse roles have previously not been systematically analysed in the context of decision-making in workplace meetings. They try to achieve this by taking a systemic approach that captures the dynamics of role positioning. This study is relevant for UPM because it examines the meetings of similar-sized international oil and gas companies. They conclude: "The indeterminacy of discourse roles provides strategic means for participants in their pursuit of specific communicative goals, both individually and collectively." They also highlight the importance of the discourse roles in realising organisational roles (e.g., manager, engineer, specialist). While the article does not suggest specific tools to tackle the pitfalls related to group decision-making, it shows the importance of different discourse roles in workplace meetings.

4.3.2 Meeting roles in practice at UPM

1) Facilitator

In the pursuit of improving decision-making processes within a company, one essential role to consider is that of a facilitator, as described in the book *Decision Behaviour, Analysis and Support*, French et al. (2009). A facilitator is an individual who guides and manages the group discussion, ensuring that the meeting stays focused, inclusive, and productive. In this chapter, we look into how UPM can incorporate a facilitator into its meetings, the benefits and potential drawbacks of this practice, and some considerations for successful implementation.

To incorporate a facilitator into the UPM's meetings, the following steps are taken:

1. *Identify the need*: Recognize when a facilitator is necessary, typically when meetings involve complex decisions, diverse perspectives, or when past meetings have been unproductive.
2. *Select the facilitator*: Choose an individual with strong communication, leadership, and organizational skills. This person can be an internal team member or an external professional, depending on the specific needs and context of the meeting.
3. *Define the facilitator's role*: Clearly outline the facilitator's responsibilities and expectations, including guiding the discussion, maintaining focus, managing conflicts, and ensuring that all participants contribute.
4. *Train the facilitator*: Provide the facilitator with appropriate training in group dynamics, decision-making processes, and conflict-resolution techniques, if necessary.

5. *Communicate the facilitator's role to the team*: Ensure all participants understand the role and purpose of the facilitator to establish credibility and foster collaboration.

The addition of a facilitator to a UPM's meetings can yield several benefits:

+ *Improved focus and efficiency*: A facilitator keeps the discussion on track, minimizing distractions and ensuring that the meeting agenda is followed.
+ *Enhanced participation*: By encouraging input from all participants, a facilitator promotes a more inclusive and diverse decision-making process.
+ *Conflict resolution*: Facilitators can help navigate and resolve conflicts, ensuring that disagreements do not derail the decision-making process.
+ *More informed decisions*: By guiding the group through structured decision-making processes, facilitators can help ensure that all relevant information is considered, leading to more informed decisions.
+ *Increased commitment to outcomes*: A well-facilitated meeting can lead to greater buy-in from participants, as they feel heard and included in the decision-making process.

Despite the benefits, there are some potential drawbacks and considerations to be aware of when incorporating a facilitator into meetings:

– *Cost and time*: Training an internal team member can be time-consuming and costly.
– *Perceived authority*: In some cases, participants may perceive the facilitator as a decision-maker or authority figure, potentially undermining the collaborative nature of the meeting.
– *Resistance to change*: Integrating a facilitator into the meeting process may be met with resistance from team members who are accustomed to a more unstructured or informal approach.

To address these concerns, it is essential to carefully select and train the facilitator, communicate the purpose and benefits of their role, and monitor the effectiveness of the facilitation process, making adjustments as needed.

2) Devil's advocate

The devil's advocate approach is a valuable tool that companies can incorporate into their meetings to enhance decision-making processes. By challenging assumptions and presenting alternative perspectives, a designated devil's advocate can help uncover hidden flaws, biases, and blind spots in the decision-making process. This chapter will discuss how UPM can utilize

the devil's advocate role in its meetings, the benefits and potential drawbacks, and how this role differs from that of a facilitator.

While technically the role of the facilitator and the role of the devil's advocate could be assigned to the same person, here we treat them as separate. There are two key differences between these roles. The facilitator's primary responsibility is to guide the discussion and maintain focus, while the devil's advocate's primary role is to challenge assumptions and present alternative perspectives. Secondly, the facilitator should remain neutral and not advocate for specific positions or ideas. In contrast, the devil's advocate actively presents counterarguments to stimulate debate and critical thinking. The steps that are taken to incorporate the devil's advocate approach into meetings are the same as for the facilitator:

1. *Identify the need*: Recognize when a devil's advocate is necessary, typically in situations involving critical decisions or when groupthink tendencies are prevalent.
2. *Select the devil's advocate*: Choose an individual who can objectively challenge assumptions and present alternative viewpoints. This person should be skilled in critical thinking and able to separate their personal beliefs from their assigned role.
3. *Define the devil's advocate's role*: Clearly outline the responsibilities and expectations of the devil's advocate, including challenging ideas, presenting counterarguments, and stimulating debate.
4. *Communicate the role to the team*: Ensure all participants understand the purpose and benefits of the devil's advocate to promote acceptance and collaboration.

Incorporating a devil's advocate into UPM's meetings can lead to several benefits:

+ *Improved decision quality*: By challenging assumptions and presenting alternative viewpoints, the devil's advocate helps the team consider all relevant factors and risks, leading to more informed decisions.
+ *Mitigation of groupthink*: The devil's advocate can counteract the dangers of groupthink by encouraging critical thinking and diverse perspectives.
+ *Enhanced creativity and innovation*: By stimulating debate and challenging the status quo, the devil's advocate can foster an environment where new ideas and innovative solutions can emerge.
+ *Increased accountability*: The presence of a devil's advocate encourages participants to think more deeply and defend their positions, leading to greater ownership and commitment to the decisions made.

While the devil's advocate approach offers significant benefits, there are potential drawbacks and considerations to be aware of:

- *Resistance and defensiveness*: Some participants may feel threatened or defensive when their ideas are challenged, potentially leading to conflict or reduced collaboration.
- *Overemphasis on negativity*: If not managed carefully, the devil's advocate role may create an overly negative atmosphere, hindering creativity and problem-solving.
- *Misinterpretation of intent*: The devil's advocate's role may be misunderstood as personal disagreement, rather than an intentional effort to improve decision-making.

4.4 Systems intelligence

4.4.1 Overview of systems intelligence

Systems intelligence models the ability of individuals and groups to understand, adapt to, and shape complex systems in ways that are intelligent and effective. The theory of systems intelligence was introduced by Raimo P. Hämäläinen and Esa Saarinen in 2004. Systems intelligence extends and develops the ideas of systems thinking, popularly known as *the fifth discipline* from the work of Peter Senge (1990). Systems thinking is an approach that views the world as a complex system made up of interconnected and interdependent parts. The theory of systems intelligence provides a pragmatic and philosophical perspective to the insights of systems thinking. Systems intelligence is based on the idea that human intelligence involves the ability to interact effectively with complex social and environmental systems.

Hämäläinen et al. (2014) describe systems intelligence as consisting of eight dimensions: systems perception, attunement, reflection, positive engagement, spirited discovery, effective responsiveness, wise action and positive attitude. Systems perception represents the human ability to see the systems around us. Attunement refers to the capability of feeling and tuning into systems. Reflection is the capacity to reflect on one's own thoughts and think about one's thinking. Positive engagement refers to the character of communicative interactions between humans. Spirited discovery is defined as passionate engagement with new ideas. Effective responsiveness refers to the talent of taking timely and appropriate actions. Wise action is the ability to behave with understanding and a long time horizon. Positive attitude represents a constructive overall approach to life in systems. Table 2 summarizes the eight dimensions and separates them into four practical categories.

Table 2: The eight dimensions of systems intelligence.

category	*dimension*	*meaning*
perceiving	systems perception:	see the systems around you
	attunement:	tune into systems
thinking	reflection:	think about your thinking
	wise action:	behave with understanding
attitude	spirited discovery:	engage with new ideas
	positive attitude:	positive approach to life
acting	positive engagement:	communicate constructively
	effective responsiveness:	take appropriate actions

By using these dimensions as a framework for decision-making, decision-makers at UPM can develop a more comprehensive understanding of the business environment and the potential consequences of different decisions. Systems perception, effective responsiveness and wise action are particularly important and meaningful dimensions in the context of medium-impact decisions, which tend to be constrained by time and resources. Systems perception involves recognizing the existence of complex systems and being aware of how they operate. Decision-makers need to be able to see beyond the immediate consequences of a decision and understand how it will impact other parts of the business and the wider environment. Effective responsiveness involves being able to respond quickly and effectively to changes in the business environment, while wise action involves making decisions that are aligned with the strategic goals of the business and that take into account the needs and perspectives of all stakeholders. Considering these dimensions of systems intelligence while making a decision can lead to insights about the underlying systems, either within the business environment, the company or the team responsible for the decision.

However, systems intelligence is not merely a tool for making better decisions individually. The power of systems intelligence becomes evident in complex situations that require interpersonal communication and synthesizing of differing ideas. Attunement, positive engagement and spirited discovery are acquirable skills that greatly increase the effectiveness of communicative interactions between people. These three dimensions of systems intelligence can be associated with a positive and open organizational culture. Attunement plays an important role in meetings and interpersonal exchanges as it helps individuals to connect with each other on a deeper level and create a more productive and harmonious work environment. An attuned person has the ability to be sensitive and receptive to the feelings, needs, and perspectives of others. When individuals are attuned to one another, they are able to create a sense of empathy and understanding, which can lead to better

communication and collaboration. Attunement also can help individuals to identify and address any potential conflicts or misunderstandings that may arise during a meeting. In meetings, positive engagement and spirited discovery can help to generate new and innovative solutions to problems, as individuals are encouraged to explore different perspectives and approaches.

These three dimensions of systems intelligence can help individuals to build trust and establish rapport with one another. This can lead to a more open and honest discussion, where each person feels comfortable sharing their ideas and perspectives. Hämäläinen et al. (2014) present the concept of *inquiry* and *advocacy* modes as a method of understanding and cultivating positive engagement. Consider the following (fictional) exchange:

"We need to prepare for a strike, the workers are unsatisfied."
"No need, there have been no strikes in the last ten years."
"But inflation is higher than ever and we have heard rumours of a strike."
"We can not afford to throw money at rumours."

This an example of two decision-makers communicating in advocacy mode. Advocacy is about standing up for our position and attacking other competing positions. People conversing in advocacy mode tend to defend their own ideas without considering the viability of the ideas of others. Let us now consider an alternative version of the same conversation:

"Rumours of a strike are circulating. What do you think we should do?"
"Ideally, we would prepare for the strike but it would cost a lot of money."
"Maybe it is possible to find a cost-effective way of preparation."
"Hmmm... We could assemble a team to evaluate the probability of the strike and find an appropriate preparation strategy. What do you think?"

We immediately note the use of questions in the conversation. This is a characteristic of inquiry mode. Inquiry is about searching for differing opinions and listening to others. People in inquiry mode do not impose their own position on others. Instead, they ask questions and try to consider all the alternative perspectives, evaluating their viability objectively. In inquiry mode, one also actively searches for flaws in their own proposal through questions such as *"Is there something I have failed to consider?"* and *"What weaknesses can you identify in my idea?"*.

These examples may give the reader the false idea that inquiry mode is always preferable and that advocacy mode serves no purpose. Inquiry mode is valuable as it can promote open discussion, sharing of ideas and more generally, positive engagement as well as spirited discovery. However, we should not dismiss advocacy as the lesser of the two modes. Advocacy mode is particularly valuable in situations where an outlandish yet promising idea needs defending and standing up for to be taken seriously. Paying attention to our mode of communication allows us to notice when we are inquiring or

advocating. Most people spend too much time in advocacy mode, even in situations where inquiry mode would be ideal (Hämäläinen et al., 2014). Positive engagement can often be achieved simply by identifying the prevalent modes of communication.

4.4.2 Systems intelligence in practice at UPM

We propose two practical ways of using systems intelligence as a tool to improve medium-impact decision processes at UPM. These are 1) Perceiving UPM as a system and 2) Identifying modes of communication.

1) Perceiving UPM as a system

The decision-makers at UPM are experts in their respective fields and it is unlikely that we can significantly improve their domain understanding through the lens of systems intelligence. Moreover, UPM prioritizes customer satisfaction, so the decision-makers are always considering the effects of their decisions on their customers. However, the perception of UPM itself as a system is an area where there is a possibility of improvement. UPM is a massive corporation with over ten thousand employees working under different divisions, branches and teams. A complete understanding of such an organization is obviously infeasible but simplified models of UPM as a system might be useful in decision-making by reducing effects of *siloing*.

By educating the people at UPM about the different divisions, their shared resources and revenue streams, we can increase systems perception within UPM. Increased awareness of the interactions between divisions and teams at UPM could promote wise action and effective responsiveness. For example, a salesperson responsible for timber products at UPM Timber might be more inclined to hand over excess raw timber to UPM Fibres, if she has an understanding of the profit margins of pulp products, which fall outside of the scope of the Timber division. Thus, systems perception can increase interdivisional information sharing and widen the perspective of decision-makers, thereby impeding the adverse effects of siloing.

In one of our interviews, a decision-maker at UPM raised concerns about the incentive structure of the company. Monetary incentives guide individuals in making decisions at all levels in the company, but they are particularly meaningful at lower levels in the company hierarchy, for example in sales. Higher-level decision-makers tend to think more about the collective benefit of the company, partly because they are paid to do so. Salespeople might not have the luxury of considering the profits of other divisions or teams if they are only rewarded for reaching local sales targets. Incorporating the idea of UPM as a system into the incentive structure might prove useful in promoting interdivisional collaboration.

2) Identifying modes of communication

Decisions are practically never made alone and thus communication between decision-makers is required in a decision process. This interpersonal communication can take place in formal (e.g., scheduled meeting) or informal (e.g., conversation at the water cooler) settings. Regardless of the setting, the effectiveness of communication is crucial for making better and faster decisions. Effective communication mitigates the pitfalls associated with decision-making in group settings.

Different modes of communication (inquiry and advocacy) can convey the same information in vastly different ways. Learning about the concept of inquiry and advocacy modes can help people at UPM to identify their own mode of communication as well as the modes of their colleagues. Understanding the unique attributes of inquiry and advocacy modes can enable employees to actively switch from one mode to another when appropriate. Advocacy mode serves a purpose when dealing with competitors, but communication between colleagues may benefit from a conscious shift to inquiry mode. Advocacy mode is also associated with *confirmation bias* because one is only finding arguments that support one's own position. On the other hand, inquiry mode can be seen as a tool to prevent *group polarization*. Actively considering your mode of communication can cultivate positive engagement and thus improve the effectiveness of said communication.

5 End product: coasters

We set out to create a decision playbook, a collection of different useful tools that can aid decision-makers in making better decisions. In the final meeting with our contact persons at UPM, we realized that our academic report and an executive summary of it might not be enough to ensure that the tools we identified are widely spread and utilized at the company. Therefore, we decided to create coasters that summarize our work and serve as a constant reminder of the different decision support tools available.

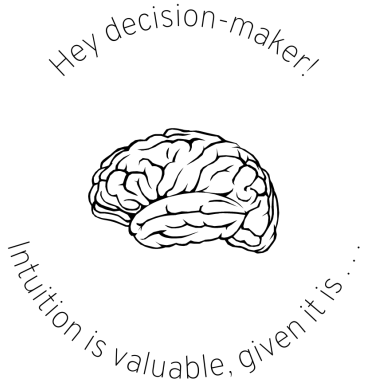
In total, we created four two-sided designs for coasters. Each coaster summarizes one of the four major tools outlined in this report. All of the designs adhere to the following format: One side (top) of the coaster is designed to intrigue and the other (bottom) to inform. The top side of the coaster starts with the slogan *Hey decision-maker!* and a drawn icon representing the respective tool of the coaster. The top side also has a custom question or incomplete sentence that utilizes a curiosity gap to entice the reader to turn the coaster around. The bottom side of the coaster features a concise, yet informative explanation of the represented decision support tool. Our aim was not to create dense packets of information, but to spark the interest of decision-makers who come across one of our coasters.

Assume the role of **Devil's Advocate** and question what others take for granted.

Challenge the group consensus and introduce alternative, even outlandish, solutions.

Figure 5: The two-sided coaster design summarizing the role of Devil's advocate introduced in Section 4.3, Meeting roles.

Our coaster designs featuring the concepts of Devil's advocate, delayed intuition, modes of communication and decision checklists are shown in Figures 5, 6, 7 and 8, respectively. The background color of the designs is removed in the figures for clarity. The designs were created using Canva, a popular graphic design program.



. . . well fed.

Before choosing your position, make sure to feed your intuition with data, expert analysis and alternative perspectives.

Compare the alternatives attribute-wise before forming a holistic view.

Figure 6: The two-sided coaster design summarizing the concept of delayed intuition introduced in Section 4.2, MAP.

One advantage of the coasters is that they are highly visible physical objects in the workspace. They are placed on the table or desk, where decision-makers can easily see them. By having these coasters in plain sight, decision-makers are constantly reminded of the different tools available to them.

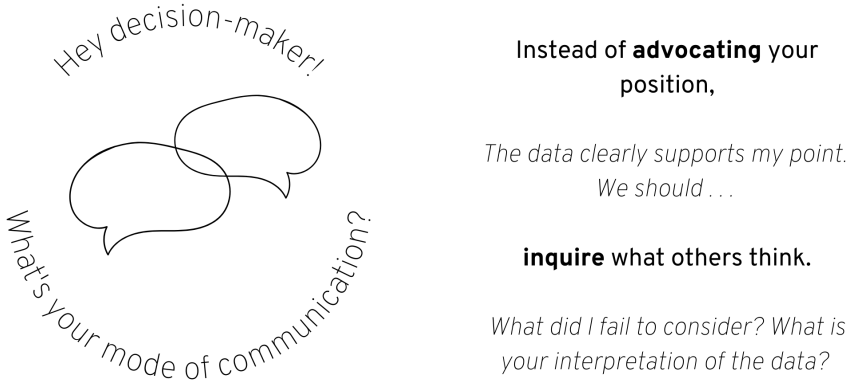


Figure 7: The two-sided coaster design summarizing the concept of inquiry and advocacy modes introduced in Section 4.4, Systems intelligence.

This reminder can be especially helpful during high-stress situations, where decision-makers might be more likely to fall back on their usual decision-making processes. A few hundred copies of the coasters will be manufactured on behalf of UPM, in time for the ending of this course.

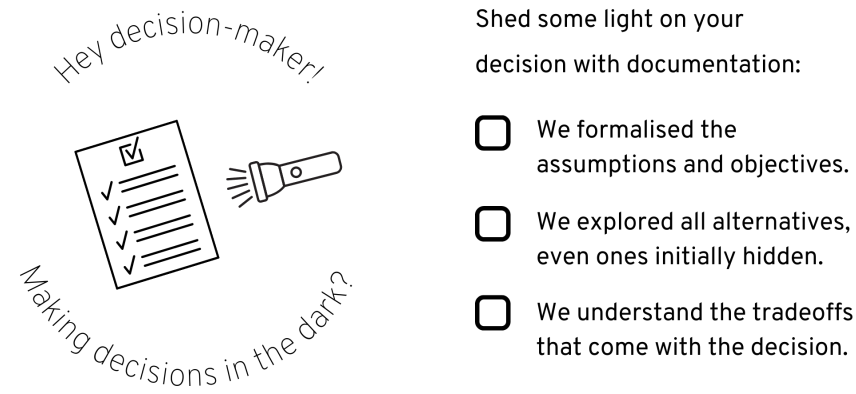


Figure 8: The two-sided coaster design summarizing the idea of a decision checklist introduced in Section 4.1, Documentation.

6 Conclusions

The aim of our team was to provide our client, UPM Fibres, with a customised playbook to improve the decision processes concerning medium-

impact decisions. We collaborated with several decision-makers at UPM to identify areas in decision-making that the playbook could address. The interviews revealed that UPM already has a strong expertise in analytics and has a culture of data-driven decision-making, allowing us to focus on often neglected but vital "soft" aspects of decision-making. Based on the interviews, we narrowed the scope of the project to the aforementioned soft tools that aid group decision-making.

In Section 3, we presented pitfalls in decision-making that we considered worth addressing based on the literature review and the conducted interviews. We divided these into common pitfalls in analytic processes, issues unique to group decision-making and the negative effects of siloing. We put special emphasis on the effects of siloing, i.e., the isolation of departments, and re-structuring group decision-making, as they were highlighted by many of the interviewed decision-makers as areas where UPM could improve.

The tools of the playbook were selected on the grounds of best supporting the identified areas of improvement. We composed a collection of four tools: Documentation, Mediating Assessments Protocol, Meeting Roles and Systems Intelligence, as presented in Section 4. Documentation was included to enhance the traceability and structure of decision processes at UPM. Mediating Assessments Protocol, a framework developed by Kahneman et al. (2019), was included to fight the fixation with early-formed mental models and the negative social effects present in a group setting. Moreover, the method has components that permit benefiting from the expertise and judgment of the DMs, which we considered to be of value at UPM. The third tool was chosen to be assigning different roles in a decision meeting. This tool was added to utilize the full potential of the team, no matter what the personalities and titles of the participants are. Finally, we introduced incorporating systems intelligence into the decision processes as a way to view UPM as a system and to identify modes of communication. This tool was included to bridge the gap between departments and to better the interpersonal communication at UPM.

Finally, to leave a lasting impact on our client, we scheduled a meeting with decision-makers at UPM to present our findings and introduce our end product. We chose the end product to be a set of coasters that summarize our collection of tools and how to use them in practice. Our aim is that these coasters will be scattered on meeting tables, coffee areas and other common places where they would be easily picked up by a decision-maker. Ideally, the coasters will inspire their users to act as a devil's advocate in their next meeting, practice inquiry instead of advocacy in their next tough conversation or simply become more perceptive of the decision processes and the systems they participate in at UPM.

References

Divyakant Agrawal, Philip Bernstein, Elisa Bertino, Susan Davidson, Umeshwas Dayal, Michael Franklin, Johannes Gehrke, Laura Haas, Alon Halevy, and Jiawei Han. Challenges and opportunities with big data 2011-1. *Purdue University Cyber Center Technical Reports*, 2011.

Dennis Baker, Donald Bridges, Regina Hunter, Gregory Johnson, Joseph Krupa, James Murphy, and Ken Sorenson. *Guidebook to Decision-Making Methods*, volume 45. Westinghouse Savannah River Company Aiken, SC, USA, 2001.

TK Das and Bing-Sheng Teng. Cognitive biases and strategic decision processes: An integrative perspective. *Journal of Management Studies*, 36(6): 757–778, 1999.

Thomas H Davenport, Paul Barth, and Randy Bean. How 'big data' is different. *MIT Sloan Management Review*, 2012.

André de Waal, Michael Weaver, Tammy Day, and Beatrice van der Heijden. Silo-busting: Overcoming the greatest threat to organizational performance. *Sustainability*, 11(23):6860, 2019.

Simon French, John Maule, and Nadia Papamichail. *Decision Behaviour, Analysis and Support*. Cambridge University Press, 2009.

Raimo P. Hämäläinen, Rachel Jones, and Esa Saarinen. *Being Better Better: Living with Systems Intelligence*. Aalto University Crossover, 4/2014. Espoo, 2014.

Irving Janis. *Victims of Groupthink: Psychological Studies of Policy Decisions and Fiascoes*. Houghton Miflin Company, 1972.

Daniel Kahneman, Dan Lovallo, and Olivier Sibony. A structured approach to strategic decisions. *MIT Sloan Management Review*, 2019.

Daniel Kahneman, Olivier Sibony, and Cass R Sunstein. *Noise: A Flaw in Human Judgment*. Hachette UK, 2021.

Naresh Khatri and H Alvin Ng. The role of intuition in strategic decision making. *Human Relations*, 53(1):57–86, 2000.

Srikant Sarangi Kristin Halvorsen. Team decision-making in workplace meetings: The interplay of activity roles and discourse roles. *Journal of Pragmatics*, 76:1–14, 2015.

Fred C Lunenburg. Group decision making: The potential for groupthink. *International Journal of Management, Business, and Administration*, 13 (1):1–6, 2010.

Jay Parsons. Seven characteristics of a good decision. *Cornhusker Economics*, 2016.

Esa Saarinen and Raimo P. Hämäläinen. Systems intelligence - discovering a hidden competence in human action and organizational life. *Systems Analysis Laboratory Research Reports*, A88, 2004.

Peter M. Senge. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Century Business, London, 1990.

Cass R Sunstein and Reid Hastie. *Wiser: Getting Beyond Groupthink to Make Groups Smarter*. Harvard Business Press, 2015.

UPM. The family tree of UPM-Kymmene Corporation, 2022a. URL `https://www.upm.com/siteassets/about-us/history/upm_kymmene_family_tree_032022.pdf`. accessed on 2.5.2023.

UPM. UPM Annual Report, 2022b. URL `https://user-fudicvo.cld.bz/UPM-Annual-Report-2022`. accessed on 2.5.2023.

UPM. UPM Interim Report January-March, 2023. URL `https://www.upm.com/siteassets/asset/investors/2023/upm-interim-report-q1-2023-en.pdf`. accessed on 2.5.2023.

Appendix A Self-assessment

In every project there is always room for improvement which applies to the UPM playbook project as well. A sufficient project plan was initially created which was then followed but the main problem with the project was the limited time that each team member was able to put into the project. As a result, the product is not as detailed and UPM-specific as would have been ideal.

When presenting the topic, the client did not have a definite outline which is why all the team members were initially unsure of what the end product would exactly look like. In our first meeting with the UPM representatives, we agreed to construct a text that would serve as a toolbox, it would introduce decision-making tools suitable for UPM. We decided to interview a few UPM decision-makers to get a clearer picture of what the decision process in the company looks like and to help us choose the tools that could be useful specifically for the client's decision processes. The implementation followed this initial plan quite well. The main pitfall that we had with it was that we never specified the topic further and thus, the product ended up being quite vague. The interviews with the employees were also left to the end of the project which is why the bottom-up approach did not generate the wanted results and the toolbox was not as UPM-centred as would have been ideal.

The teamwork within our group was very successful. We had a project manager who did most of the communication with UPM and planned the meetings while also taking into consideration the schedules of the other team members. Each of the team members had an equal workload which was finished within the given timeframe. In the team meetings, all the members contributed the same amount creating a pleasant atmosphere for all which made the communication smooth via Telegram as well. As a result, we as a team were able to find pitfalls in the company's decision-making process and choose suitable tools.

We were also in frequent contact with UPM. We had meetings every 2-3 weeks in which we discussed the status of the project and were able to address any concerns we may have had. The communication between our team and the UPM representatives was fluent, and we had excellent support from the client. Despite the frequent communication we had a lot of freedom to modify the topic and handle the project as we saw suitable.

The main cause for the improvements in the project was the scope of the problem. The initial topic that was introduced in the first lecture had a wider definition than the other projects. As stated earlier the initial plan was to conduct interviews with employees to acknowledge the problems the company might have in their decision-making. But as the interviews were left until the end and the interviewees were unable to pinpoint aspects in which

their decisions processes had been unsuccessful, the scope was left vague. This was also due to the fact that the company gave us a lot of freedom with the project, and we were puzzled about how the problem should exactly be tackled and what it should include. Now that the project is done, it can be noted that most of the issues could have been fixed with better time management. The project would have needed more in-depth reading which would have required an earlier start on the literature review. This would have allowed us to expand the possible tools and choose the best alternatives for the client. The sources for the tools would have also been expanded and upgraded with a wider literature review.

The writing of the text should have also been done earlier and not left until Wappu. The main cause for the delay was the workload each team member had from their jobs and/or other courses. By finishing the toolbox earlier, we would have been able to compare the tools in the text and make them more coherent. We could have also included an example of a decision process made in UPM which would have introduced the tools in practice. The absence of the example was also because the decision-makers did not discuss the decision processes in such detail which would have allowed us to create an adequate example.

Lastly, as stated earlier an improvement that would have been desirable from the client would have been a clearer topic with straightforward steps for a final product. This would have decreased the time that was used for trying to figure out an efficient project plan and allowed us to begin the literature review and conduct the interviews earlier. A more detailed and critical description of the past decision processes from the decision-makers would have also made the literature review more efficient.