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Maximizing the Effectiveness of Information Steering on Finnish Forest Owners

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Glossary

The Best Practices for Sustainable Forest Management in Finland	*Metsänhoidon suositukset*
Decisive decision-maker	*Päättäväinen päätöksentekijä*
Learning decision-maker	*Oppiva päätöksentekijä*
Managing decision-maker	*Johtava päätöksentekijä*
Multi-objective owners	*Monitavoitteiset metsänomistajat*
Pondering decision-maker	*Pohtiva päätöksentekijä*
Profit/security oriented	*Turvaa ja tuloja korostavat*
Recreationists	*Virkistyskäyttäjät*
The active doers	*Metsässä tekevät*
Trusting decision-maker	*Luottava päätöksentekijä*
Uncertain owners	*Epätietoiset metsänomistajat*
acreage	*metsäomistusten pinta-ala*
carbon sequestration	*hiilensidonta*
clearcutting	*avohakkuu*
forest stand	*metsäpalsta*
forestry	*metsätalous*
information steering	*informaatio-ohjaus*
silviculture	*metsänhoito*
stumpage earnings	*kantorahatulot*
thinning	*harvennus*

Contents

1 Introduction

Forestry is a major source of income for Finland, accounting for 18 % of Finnish exports in 2018 (Maa- ja metsätalousministeriö, 2025). Private forests make up approximately 60 % of forest land and over 80 % of stumpage earnings come from privately owned forests (Karppinen et al., 2020; Luonnonvarakeskus, 2024). There are more than 600,000 individual forest owners, meaning that a very large proportion of Finnish households own forests. Thus, the decisions that forest owners make have a large impact on the economy and nature of Finland, as well as the well-being of its citizens.

To direct forest owners towards decisions that benefit them and the Finnish society the most, the Finnish government employs three categories of measures: laws and regulations ("stick"), financial incentives ("carrot"), and information steering. In this work, we focus on the last. Information steering [1] refers to the dissemination and sharing of information, which aims to affect the behavior of the targets (Valtiovarainministeriö, 2006). Here, the targets are Finnish forest owners, and the shared information includes guidance on managing forests according to the owner's preferences as well as the government's (see *The National Forest Strategy 2035* (Maa- ja metsätalousministeriö, 2023)).

Tapio, our client, is a government-owned advisory and consulting firm on forest management related matters. It specializes in sustainable forest management, forest resources inventory, forest management planning, forest and bioeconomy policies, as well as climate change mitigation and adaptation (Tapio-konserni, 2025). One of its main advisory channels for forest owners is *The Best Practices for Sustainable Forest Management*. The guide, produced by Tapio and provided by the Ministry of Agriculture and Forestry, aims to guide and help individual owners manage their forests effectively (Tapio, 2023). It is also an important source of information for forest professionals and is thus used extensively in teaching forestry. *The Best Practices for Sustainable Forest Management* is part of the Finnish state's information steering.

1.1 Objectives

The objective of our report is to conceptualize the decision-making of Finnish forest owners and discover the best ways to influence it with information steering. The underlying goal is to help Tapio improve the effectiveness of *The Best Practices for Sustainable Forest Management*. More generally, our aim is to make the reader

[1] The concept of information steering (*informaatio-ohjaus* in Finnish) seems to be a Nordic one and we were only able to find very few English results. Information policy is a more widely used term, but it has a broader and somewhat different definition.

understand Finnish forest owners, decision-making as a psychological process, and finally, how to be the most effective in information steering with limited resources. Effectiveness will be discussed later in this report, but in short, we define it as the number of people reached with their behavior changed compared to the amount of resources put into the information steering effort.

This report is a balance between conciseness and complexity. We hope to offer as much practical value as possible for Tapio and therefore, the report should be easy to read and highly understandable. The findings in the scientific literature that we report will be used to make practical suggestions on how to improve information steering.

1.2 Structure

Our report follows a slightly unorthodox structure as it is not a comprehensive view of the scientific literature nor a technical report. We did not try to find gaps in existing knowledge or avenues for future research for the field as a whole. Instead, as stated in the previous subsection, our aim is to provide an introduction to decision-making as a psychological process and give recommendations for enhancing information steering that are supported by the scientific literature.

The report is structured as follows. The second section introduces the methods that we used for our research and in producing this report. In the third section, we give an introduction to the relevant scientific literature and present some conceptual models. Section 4 synthesizes our most important findings, discusses the limitations of our report, and proposes the next steps for Tapio on how to continue this research. The fifth section concludes the report. At the end, there is a short self-assessment.

2 Methods

To understand forest owners' decision-making and the impact of information steering on it, we approached the topic from three perspectives: 1) Finnish forest owners, 2) decision-making, and 3) information steering. This also served as a natural division of tasks with each author researching one topic and one keeping track of all three. Consequently, the following literature review is arranged accordingly.

As mentioned in the first section, we did not conduct a comprehensive literature review, such as finding all articles on `Scopus` that match certain keywords and then manually filtering relevant articles from thousands of results. Instead, each author was responsible for finding the most relevant articles about their topic in

regards to our work using tools such as Google Scholar and Connected Papers, as well as reading the most respected journals in their field.

The conceptual models that we introduce in Section 4 were developed collaboratively with each team member contributing his or her expertise. They represent a summary of our findings and also our own conclusions.

3 Literature review

The literature review approaches the research questions by separately analyzing forest owners, decision-making, and information steering. This section is structured into three subsections.

Subsection 3.1 outlines the characteristics and motivations of forest owners. Subsection 3.2 explores decision-making from both general psychological perspectives and forest-specific contexts. Subsection 3.3 focuses on how information steering influences forest owners' decisions.

3.1 Forest owners

Finland is unique among European nations in the extent of private forest ownership. Over 60 % of Finland's forests are owned by private individuals and families, not by corporations or the state. More than half of Finland's home forest industries are owned by privately held forests (Karppinen et al., 2020). As forestry and wood processing are both paramount to the economy of Finland, the actions of Finnish private forest owners are a central component to maintaining the nation's timber inventory at the current level. This group of private forest owners, however, is highly heterogeneous and overlooked.

Today's Finnish private forest owners tend to differ significantly from the "farmer-foresters" of earlier decades. Karppinen et al. (2020) show that the average owner is about 62 years old, and quite many live far from their forest holdings, sometimes even hundreds of kilometres away. Roughly 41 % of private forest owners are women, and overall educational attainment has risen in the last ten years. Although their academic credentials have increased, many owners now have little hands-on forestry experience. They often view their forests more as an investment, a place of relaxation, or a family heirloom than as a workplace.

A defining feature of Finnish forest owners is that inheritance dominates land transfer. Very few forest holdings are sold on the open market. Instead, most are passed down within families by inheritance, gifts, or private transfers (Karppinen et al., 2020). This ensures continuity and preserves family connections to the

land, but it can result in so-called passive ownership, meaning that heirs feel a strong duty to maintain a traditional landholding without necessarily having the knowledge, interest, or proximity to manage it actively.

3.1.1 Forest owner profiles

Given this background, researchers have sought to classify forest owners by their core values and ownership objectives. Based on large survey data, Karppinen et al. (2020) identify five principal owner profiles which we briefly describe here. The percentages behind the names indicate the proportion of owners who are of the given type.

1) Multi-objective owners (28 %) are the most balanced and flexible profile. They attempt to balance economic returns with ecological, recreational and cultural goals. They may like timber income but also care about maintaining biodiversity, enjoying nature-based recreation, or passing on forests to future generations in good condition. Their decisions tend to be well-informed, and they are most likely to be open to both traditional forest management and new opportunities such as ecosystem services or carbon sequestration.

Demographically, multi-objective owners are prevalent among rural residents and agriculture business entrepreneurs. They are more likely to have gained their property by buying from parents, indicating a long-standing connection with traditional land management policies. By chance, the percentage of multi-objective owners decreases with age, showing that there is a shift in forest ownership values over generations.

2) Recreationists (20 %) see the aesthetic, emotional, and recreational value of the forest. The forest is not a source of income for them, but a retreat of peace, memories, and refuge. They may hike, berry-pick, or hunt, but are less apt to engage in timber harvesting or intensive silviculture. Most within this group are urban dwellers who have inherited their forestland and have an emotional attachment to the land.

These owners would probably be wary of commercial forestry and less concerned with expert opinion apart from where it entails forest aesthetics or habitat preservation. Communication with these owners should respect their non-material relationship with nature and emphasize low-impact management options that align with their values.

3) The active doers (21 %) are hands-on forest owners, who enjoy getting their hands dirty with planting, thinning, or road building. Most of them live near their forest lands and consider themselves stewards of the land. They are driven by per-

sonal satisfaction from physical labor and independence, but not necessarily profit maximization. This group is older, more rural, and has longer-term knowledge or experience in forest activities.

Active doers benefit from clear, actionable guidance and tend to enjoy contact with forest professionals if it helps them implement their own plans. They are the most likely to engage in training, forest owner associations, or collaborative forestry initiatives and thus are effective agents of peer learning.

4) Profit/security oriented (20 %) group sees forests primarily as an economic resource. Generation of revenue, protection of investments, and increase in assets are the concerns they have. They are typically willing to accommodate professional forest planning, contract out management tasks, and utilize methods such as tax planning or forest investment calculations. Their association with the land is business-like and not emotional.

These owners can stake more and are generally interested in market trends, regulations, and financial instruments. To be successful in reaching this group, the approach would have to center on economic pragmatism, legal frameworks, and business opportunities, possibly tied to carbon markets or biodiversity compensation schemes as supplementary revenues.

5) Uncertain owners (11 %) are the most inactive or passive group. They do not have clear aims, forestry experience, or knowledge, and can be intimidated by decision-making. They often have inherited their forests and do not necessarily live near their properties. As a result, they avoid or delay forest decisions that result in abandoned forests, foregone economic opportunity, or less-than-optimal ecological results.

This target group is a challenge to information-based outreach, as they may not seek guidance or become members of forest owner networks. They are, however, also an ideal target for early intervention. Gradually, well-structured support materials, individual consultations, and simple recommendations could all help to encourage them and overcome their hesitation.

Understanding the forest owner categories can help advisors and policymakers tailor communication. For example, "Recreationists" respond best to visual guides on trails and habitat enhancement, while "Profit/security oriented" owners seek data on carbon credits, stumpage prices, or land valuation trends. Attempting to employ the same generic brochure for all owner types, as has often been done in the past, misses the mark. According to the findings of Karppinen et al. (2020), non-material forest values did not increase as expected, while financial motivations have become stronger among Finnish forest owners.

3.2 Decision-making

This subsection discusses decision-making from a general perspective first, whereafter it focuses on forest owner-specific decision-making. Firstly, the decision-making process is explained from a psychological and cognitive perspective, considering internal and external factors that affect the outcome. In the second part, the focus is on decision-making that is specific to forest management. The essential decisions a typical forest owner must make and the factors impacting outcomes during the forest owner's life and decision-making process are highlighted.

3.2.1 Decision-making as a process

Decision-making is defined as making a choice between two or more options (e.g. Morelli et al., 2022). Research in decision-making is vast and multidisciplinary, with meaningful contributions from disciplines such as cognitive psychology, philosophy, and neuroscience (Ajzen, 1996). Rational and irrational decisions have been studied separately, and the assumptions of rational choices have been widely challenged (Matilainen et al., 2023). The rational theory of choice assumes that a person makes decisions so that the subjective expected utility is maximized from several possible alternatives (Bell et al., 1977).

However, human thinking does not adhere consistently to rationality or careful deliberation. Kahneman (2011) claims that human thinking can be divided into two categories - *system 1* and *system 2*. *System 1* is fast and automatic, whereas *system 2* is intentional and calculated, using much more cognitive brain power than *system 1*. According to rational choice theory (Bell et al., 1977), people always use the burdensome *system 2* in decision-making. However, Kahneman disputes this by claiming that humans constantly make automatic and unconscious decisions to free up cognitive brain power with *system 1*.

Moreover, much research suggests that the decision-making process is further affected by various internal and external factors instead of pure logic (e.g. Alchian, 1950; Papadakis et al., 1998). The internal factors in decision-making depend on the person in question, while the external factors depend on the context and situation. **Internal factors** include the person's identity, values, mental models, neurochemistry, and emotions (Matilainen et al., 2023; Doya, 2008; Lerner et al., 2014). The first two are most likely factors that the person is aware of, as identity includes age, gender, and values. In other words, the person is conscious of these aspects. The latter internal factors may have a subconscious, fast impact on the decision-making, without the person realizing it. Mental models are perceptions of reality that are impacted by the person's former knowledge and experiences (van den Broek, 2018), skewing the decision-making process subcon-

sciously. Another subconscious factor is neurochemistry, the amount and type of neurotransmitters in the brain (Doya, 2008). This type of brain activity, such as the amount of dopamine and serotonin, has been shown to impact the decisions made (Doya, 2008). Similarly, subliminal emotions may also have a subconscious effect on decision-making (Lerner et al., 2014). Although a person is unaware of their feelings, they can impact decision-making.

External factors include the nature of the situation, norms around the decision, available information, time, and the capacity to weigh different options (Matilainen et al., 2023; Papadakis et al., 1998). An example of the situation's impact on decisions is the perceived stressfulness regarding the decision (Lerner et al., 2014). Behavioural norms and social pressures have been shown to impact how decisions are made (Karppinen and Berghäll, 2015). Furthermore, the amount of existing information on the alternatives and possible outcomes may affect the choice as well (Matilainen et al., 2023). However, the time and capacity of the person to consider the outcomes will significantly impact how the person chooses. Bell et al. (2019) argue that forest owners are likely to adhere to less complex decision-making processes and "rules of thumb" to make the process simpler and less time-consuming. On the other hand, decision-specific factors have a larger impact on what is chosen than situation-specific factors (Papadakis et al., 1998). For instance, the familiarity of the type of decision outweighs the external environmental factors, such as the number of people contributing to the decision.

3.2.2 The decision-making of forest owners

For forest owners, many critical decisions relate specifically to the use and ownership of the land. The forest owners must choose the forest management strategy, timing, and methods for the implementation. Typical decisions during a forest owner's lifetime may deal with the selling or procuring of the land, whether to pass it on to heirs, and what kind of forest management strategy to practice (Bell et al., 2019). The preferred management strategies for different owners may reflect the owners' value-based forest owner profiles, as mentioned in 3.1. Strategic decisions deal with harvest and timber sales, nature conservation, and timber stand improvement which includes thinning and clearing of forest vegetation (e.g. Hujala et al., 2007; Karppinen and Berghäll, 2015).

In addition to personal goals and values, different decision-making styles are identified for private forest owners (Hujala et al., 2007). The decision-making style represents the owner's attitude and interest in professional advice and different forest management activities. Hujala et al. (2007) have identified and categorized five decision-making styles in forest owners: Trusting, Learning, Managing, Pondering, and Decisive.

A) The Trusting decision-maker relies heavily on professional advice and management plans. This owner usually has limited knowledge or lack of interest in forest management. They tend to engage in some forestry activity with constant professional support, or they may be indifferent to the forestry details, as long as the best possible outcome is delivered. This type of owner prefers uncomplicated decision-making processes.

B) The Learning decision-maker wants to gain new knowledge on forest management and prefers an interactive approach when receiving advice and information from forestry professionals. This type of owner shows much enthusiasm about their forest and uses different management plans intensively for forest treatments. Additionally, this owner may wish for additional consultations on larger decisions, for instance, during final harvests or timber sales. The owner aims to gain independence in decision-making situations.

C) The Managing owner has a lack of time or capacity for the forest ownership. The decision-making style is similar to business ownership, where the decisions are usually made rapidly when needed. Furthermore, the decisions may be made based on the owner's knowledge and experience, without extensive consideration of potential consequences. In some cases, professional advice is used to make finding a solution easier or quicker. Hujala et al. (2007) suggest that rapid decision-making may be triggered by a need for money, available labor, or advice from a forest professional.

D) The Pondering owner is a balanced and considerate decision-maker. This type might have much knowledge on forestry, yet spends time comparing information from different sources before making the final decision. This type of owner enjoys wide-ranging conversations with professionals, but usually considers the opinions as an independent view amongst other sources. According to Hujala et al. (2007), pondering owners are more likely than other types to aim for sustainability over generations for their forest.

E) The Decisive type makes strong decisions on their own. Their decisions may stem from long experience in family forestry, and the owners' decisions are made self-reliantly. Although they might enjoy conversations and facts delivered by professionals, changing their minds on forestry subjects may be difficult. This owner is also likely to question strongly professionally delivered management plans. However, this owner is satisfied when agreeing with professionals regarding advice.

The types Learning (B) and Pondering (D) can be considered dynamic, whereas the others, trusting (A), Managing (C), and Decisive (E) are more stable (Hujala et al., 2007). This distinction stems from the fact that more stable owners tend to choose a specific forestry practice and follow it consistently, while those with

dynamic styles are more willing to develop their skills and understanding. Research suggests (e.g. Hujala et al., 2007; Kuipers et al., 2013) that for forestry professionals to impact the decisions of forest owners effectively, a comprehensive understanding of the diversity in attitudes towards professional advice is crucial. Given the diversity between forest owners, effective communication skills, and an extensive understanding of decision-making styles are essential for professionals and advisors. With this approach, the effectiveness of advisory services can be enhanced (Hujala et al., 2007; Kuipers et al., 2013).

In addition to decision-making styles, other internal and external factors that impact forest owner behavior and decisions have been identified. Decision-making can be further understood by analyzing the behaviors and attitudes of the different owner groups. Substantial variations are observed in factors such as gender, location, education level, and acreage.

Gender has shown differences in susceptibility to advice. Karppinen and Berghäll (2015) argue that women, especially young women, are more likely to adhere to norm pressures and professional advice than men when making decisions. Furthermore, Horne et al. (2020) argue that differences in attitude exist between genders. According to the authors, women often favor nature preservation and other nature-positive actions more than men. Moreover, men tend to favor activity that increases monetary value, such as wood production.

The forest owner's **location of residence** has also been shown to impact attitudes towards forest strategy (Horne et al., 2020; Karppinen and Berghäll, 2015). Urban owners rely more on external norm pressures during timber stand improvement decisions (Karppinen and Berghäll, 2015) and are less likely to accept different forest management strategies (Horne et al., 2020). For example, clearcutting is generally less accepted by urban owners. Rural owners, however, show higher acceptance towards monetary activities such as timber production (Horne et al., 2020).

The forest owner's **education level** may also reduce their likelihood of being influenced by external norms (Karppinen and Berghäll, 2015). The authors claim that the higher the education level, the more likely the owner is to adhere to their attitudes and knowledge to make managerial decisions about their forest.

Horne et al. (2020) and Karppinen and Berghäll (2015) found that the **acreage** correlates with certain attitudes. Horne et al. (2020) found that owners of larger forests are more satisfied with current management strategies and are more accepting of practices that aim at wood production, such as forest road construction and clearcutting. Karppinen and Berghäll (2015) found that when land size increases, the perceived norm pressures for decision-making decrease.

3.3 Information steering

3.3.1 What is information steering?

There are many ways in which governments (and other large institutions) can affect the public towards a desirable direction by so-called steering. To execute political decisions, steering methods are essential, according to Stenvall et al. (2007). The three main steering methods are regulations, economic incentives, and information steering. Bemelmans-Videc et al. (2017) explain that regulations are usually laws that citizens must follow, economic incentives are actions that will be rewarded economically, for example, with subsidies, and information steering means trying to steer the public by persuasion and by knowledge without any force or incentives. Information campaigns and information guidance are often used interchangeably, but information steering can be seen as a more comprehensive approach.

Information steering is the most modern form of government steering methods. It is seen as the most democratic one as it is voluntary to follow (Bemelmans-Videc et al., 2017). Information steering can also be seen as a problematic steering method, as propaganda, but Bemelmans-Videc et al. (2017, p.12) concludes that "the advantages of public-information campaigns justify their use as policy instruments when used appropriately."

Information steering and communication can be modeled as the interplay between multiple components. The relations between the components are modeled in Figure 1. The sender is the one who informs or persuades, for instance, a government, an organization, or a company (Wilkes-Allemann et al., 2021). The receiver is the target of the information steering, for example, the general public or something more specific, such as forest owners. Information steering can be done through one-way or two-way communication. Between the sender and the receiver, there are often many intermediaries, such as communication agencies in one-way communication or advisories in two-way communication (Wilkes-Allemann et al., 2021). Good information steering uses feedback from the receiver to create better communication (Stenvall et al., 2007). Adding a feedback loop to one-way communication makes it closer to two-way communication (Wilkes-Allemann et al., 2021).

One-way communication includes books, articles, newspapers, Internet information, and television programs. **Two-way communication** consists of one-on-one counseling, seminars, workshops, field tours, memberships in landowner organizations, peer-to-peer communication, and more. Often, two-way communication is more resource-intensive than one-way communication, which is probably why one-way communication is common in the forest sector in Europe (Wilkes-Allemann et al., 2021). On the other hand, Wilkes-Allemann et al. (2021) mention that two-way communication is essential for long-lasting changes in forest owners.

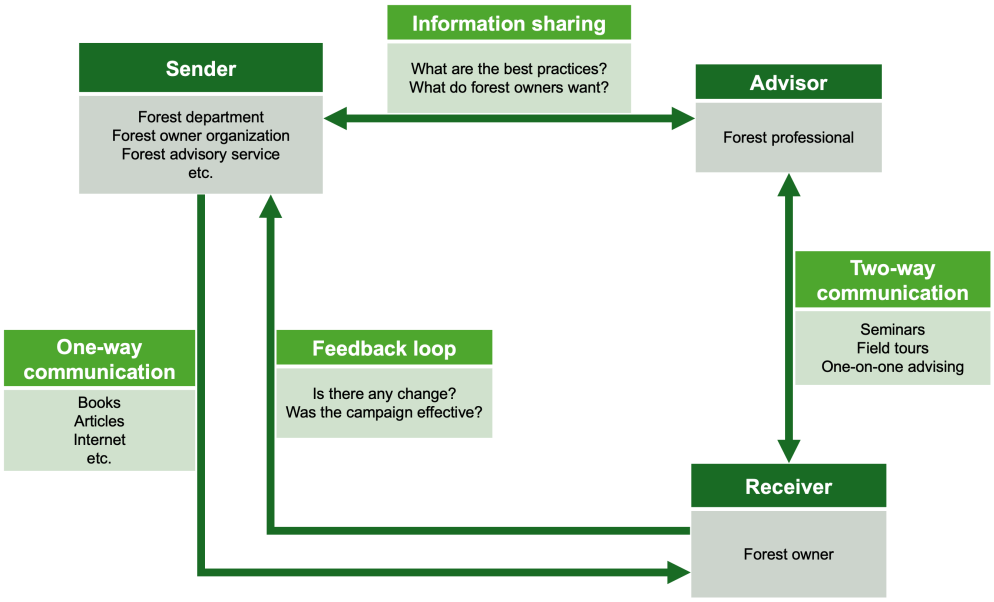

Figure 1: Sender, receiver, advisor -communication framework. Adapted from Wilkes-Allemann et al. (2021).

The purpose of information steering is either to inform or to persuade (Wilkes-Allemann et al., 2021). With the intent to inform, the purpose is to make the receiver more knowledgeable, in contrast to persuasive motives which try to influence action in some way. In two-way communication, the term asymmetric communication is used if it is persuasive, and the word symmetric if it is more informative (Tukia and Wilskman, 2011). Often, information steering is persuasive (Tukia and Wilskman, 2011).

For effective information steering, a person's communication network is considered. Usually, for forest owners, that network consists of **close contacts and institutional contacts**. According to Sund (2020), close contacts include family and friends, while institutional contacts include representatives from governments and organizations. The network can also be classified into **long-term contacts and temporary contacts**. Long-term contacts are the people that the forest owner contacts first if they come across a problem. Temporary contacts are people the forest owner contacts when there is something more specific that the long-time contacts cannot help with.

3.3.2 Examples from other sectors

In the information steering in Tampere surrounding the project to build a tramway, Niemeläinen (2022) noticed that the public would have desired more possibilities of interaction with the project and the information surrounding the project. This can be generalized, since two-way interaction is highlighted in many articles. For instance, Wilkes-Allemann et al. (2021) mention its strengths. Niemeläinen (2022) also brings up that multiple overlapping information sources can cause confusion and reduce the effectiveness of information steering. Tukia and Wilskman (2011) agree that if information steering is not coherent, it will not be effective.

In the energy sector, Ruokamo et al. (2020) noticed that timing of information steering is essential. Especially during the winter when households used more energy, they were more prone to take in information about energy usage. In the forest sector, the easiest time to inform is when someone has newly become a forest owner (Hysing and Olsson, 2005). In the study by Ruokamo et al. (2020), it was also noticed that the quality of the information was important for its effectiveness. Stenvall et al. (2007) also highlight the importance of the quality and truthfulness of the information in information steering.

3.3.3 Effective communication

Tukia and Wilskman (2011) note that economic incentives and regulations are usually more effective than information steering. Information steering should therefore be accompanied by other steering methods, such as economic incentives and regulations. Hysing and Olsson (2005) claim that accompanying certificates with information steering is effective, even without other economic incentives.

Figure 2 shows some key components of effective communication. The information and the counselling should be of **high quality** (Matilainen et al., 2023) and they should include concrete advice (Hysing and Olsson, 2005) and examples (Ikonen et al., 2020). **Examples** will give the forest owners a better scope of how to implement the changes and to see the benefits of them (Ikonen et al., 2020). The advice should be site specific so that forest owners get the most out of it (Hysing and Olsson, 2005).

Trust is one of the most important factors in effective communication and is emphasized in numerous articles (Kuipers et al., 2013; Stenvall et al., 2007; Wilkes-Allemann et al., 2021; Hujala and Tikkanen, 2008). It is important that the receiver finds the sender to be a credible source of information (Wilkes-Allemann et al., 2021), and also that the forest owner has mutual trust towards the advisor (Hujala and Tikkanen, 2008). Without trust, the communicated message does not get through to the receiver. Hysing and Olsson (2005) even go as far as to say that

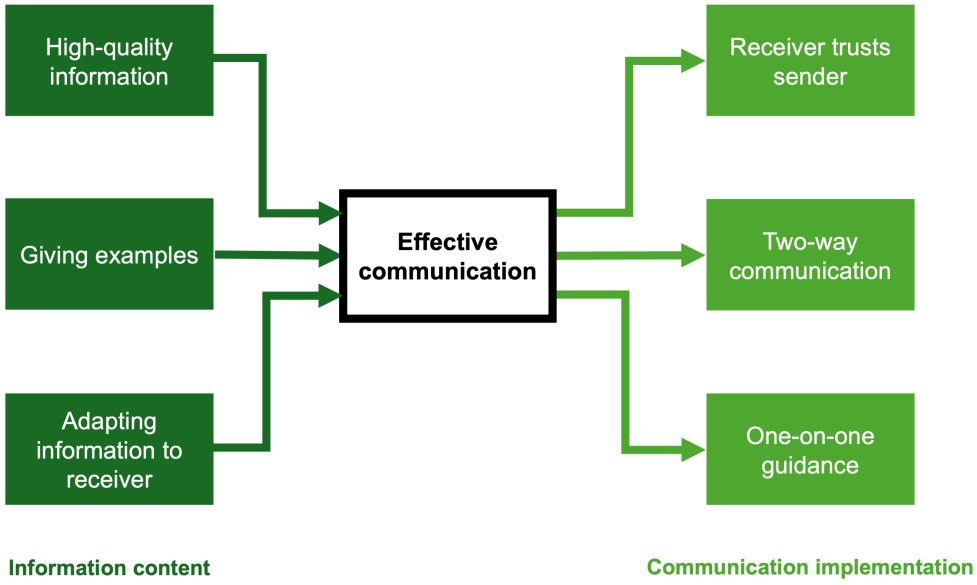

Figure 2: The most effective way to inform.

trust can compensate for the forest owners' lack of interest or even dislike towards a certain policy.

As mentioned before, two-way communication has positive long-term outcomes in information steering. Two-way communication means that the receiver has a possibility to react to the information in some way, either by discussion or via a feedback loop. A feedback loop evaluates an information campaign and the evaluation is then used to improve the information to be more effective or useful. Having the possibility to discuss and ask questions often makes the receiver trust the sender more (Sund, 2020).

One-on-one communication is a type of two-way communication and is highlighted as important for effective communication as feedback loops (Ikonen et al., 2020; Kuipers et al., 2013; Wilkes-Allemann et al., 2021). Counseling is one form of one-on-one communication, but it is resource-intensive (Kuipers et al., 2013). In the study by Hysing and Olsson (2005), forest owners were more likely to implement policies if it came from one of their close contacts with country rangers and timber buyers. Peer-to-peer contacts are another important form of one-on-one communication, but it can be difficult to control the information shared between peers, since it usually occurs naturally.

3.3.4 The importance of specifying the receiver

Since one-on-one communication is so resource intensive, it would be ideal to be able to reach forest owners with information that is specified towards a certain kind of forest owner (Kuipers et al., 2013). The importance of specifying the audience and tailoring the information for them has been highlighted (Kuipers et al., 2013; Wilkes-Allemann et al., 2021; Chung et al., 2020). Effective grouping can be made by forest owner objectives, communication wishes, and experience.

In a survey by Kuipers et al. (2013) in the United States, effective communication channels were sought for forest owners according to their motives. The authors found that, in general, the most effective means of communication were books, newsletters, field tours, newspaper or magazine articles, internet information, seminars, and workshops. They used the following grouping: multiple objective landowners, naturalist landowners, recreationist landowners, and consumptive-use landowners. They found that multiple objective landowners were most active information users and that 41% of all forest owners did not use any communication means in the survey.

In regards to what messages resonated with the different groups, they found that consumptive-use landowners valued economic benefits, recreationists valued their forest as a leisure place, naturalists valued sustainability, ecology and forest health and multiple objective landowners were interested in everything regarding their forest. As to how the information should be conveyed, consumptive-use landowners and recreationist landowners mostly liked publications, books, and newsletters, while naturalist landowners liked newspaper or magazine articles, and multiple objective landowners were most interested in field tours.

Connecting the forest owner objective categories used in Kuipers et al. (2013) with the categories we used from Karppinen et al. (2020) is difficult. Multiple objective landowners are the same as *multi-objective owners*, recreationist landowners are the same as *recreationists*, but the other categories are difficult to reconcile. The consumptive-use landowners could be partly *profit-oriented* and partly *multi-objective owners* and the naturalists could be partly *recreationsits* or *uncertain owners*. This is why this sort of study could be useful in the context of Finnish forest owners. In addition, the study by Kuipers et al. (2013) was conducted more than 10 years ago, so a new study with additional modern communication methods should be useful.

Hujala et al. (2009), on the other hand, categorize forest owners according to their learning styles. Three categories were found and used in the article; active learners, independent managers, and trusting realizers. These can be compared to the decision-making styles discussed in 3.2. Active learners are the same as forest

owners with a pondorous decision style, independent managers are usually decisive or managing, and trusting realizers are trusting or learning. Active learners are interested in learning and active in their forests, and Butler et al. (2007) call them model owners. Independent managers are also active in their forests, but not as susceptible to new information as active learners, and Butler et al. (2007) call them potential defectors. Trusting realizers are not very active in their forests or need strong advice and can be either susceptible to information (decision-making style: learning, what Butler et al. (2007) call prime prospects) or not (decision-making style: trusting, what Butler et al. (2007) call write-offs).

As active learners are more knowledgeable about forest issues and interested in guidance, the information given to them should be more advanced and in-depth (Hujala et al., 2009). Independent managers are not as interested in guidance. If they do search for information, it should be given in a straightforward manner, as they are not interested in discussion (Hujala et al., 2009). The best way to approach independent managers would be through peer-to-peer communication. Trusting realizers, who are interested in guidance (learners), should be of a high priority in information steering, since they are interested in learning, but not yet actively doing decisions on their own. Trusting realizers should be approached with basic information about forests, and not too in-depth.

Lastly, Chung et al. (2020) classify forest owners as pre- and post-decisional. **Pre-decisional** means that the forest owner has not yet made a decision about a certain topic and **post-decisional** means that the forest owner has already decided to take action and what action to take. Chung et al. (2020) write that for pre-decisional forest owners the information communication should be presented as storytelling, and to post-decisional forest owners informational advice works better. It could be attached to the notion of innovators, early adopters, majority adopters and late adopters, as Ikonen et al. (2020) has categories forest owners. They analyzed how the Finnish forest policy game-oriented forest management had been implemented and concluded that only innovators, early adopters, and some majority adopters had implemented it. If these categories can be identified, then storytelling could be implemented to the late adopters and maybe majority adopters, and the innovators and early adopters can be approached with informational advice.

3.3.5 The usefulness of information steering

Ikonen et al. (2020) found that even when forest owners were more informed, it did not mean that they adapted new ways. Forest owners' personal beliefs are difficult to change with information steering (Ikonen et al., 2020; Hysing and Olsson, 2005). In the study by Hysing and Olsson (2005), it was discovered that traditions were strong for forest owners and although professionals would give

them advice, they would not follow it if it was against forest owner norms. In the case of sustainable forest practices, Hysing and Olsson (2005) noticed that although forest advisors recommended to leave dead wood in the forests, forest owners removed it despite otherwise practicing sustainable forestry, since there was a strong tradition regarding removing dead wood. Hysing and Olsson (2005) suggest that information steering can affect forest owners by giving advice and raising awareness regarding values that the forest owner already has.

4 Discussion

This section discusses the best ways of communication and advice for different types of forest owners, as well as the limitations of our report and directions for future research. The section is structured into four subsections. Subsection 4.1 presents the timeline of forest owners' decision-making. Subsection 4.2 provides ways of targeting forest owners with information steering. Subsection 4.3 explains the limitations of this report and Subsection 4.4 describes the future research needs among these topics.

4.1 Timeline of forest owners' decision-making

Combining the findings from the literature review, a timeline based on Stankevich (2017) is shown in Figure 3. The timeline comprises information on forest owners, decision-making, and information steering. The decisions that are most likely to be made in a certain phase of the ownership are highlighted. This simultaneously underlines the potential effective points of contact between the forest owner and the forest professional or advisor. The important points of contact identified in the model are acquisition, ownership, need, information search, decision, and the assessment phase. The figure points out different factors affecting decision-making that are important to note while planning advisory or information steering strategies.

Forest advisors or information campaigns can best affect the values and knowledge of the forest owner at the beginning of the forest ownership (Karppinen and Berghäll, 2015). The pre-ownership phase is important, as the first ideas and attitudes towards forest ownership are crafted during this time. During the acquisition phase, the reason behind the acquisition and existing prior knowledge should be considered by advisors. Hujala et al. (2007) argue that the origins of the forest ownership are relevant to understanding the forest owner's decision-making and attitude towards forestry. For instance, inherited family ownership may heavily affect the attitudes and management strategies for the forest (Mostegl et al., 2019).

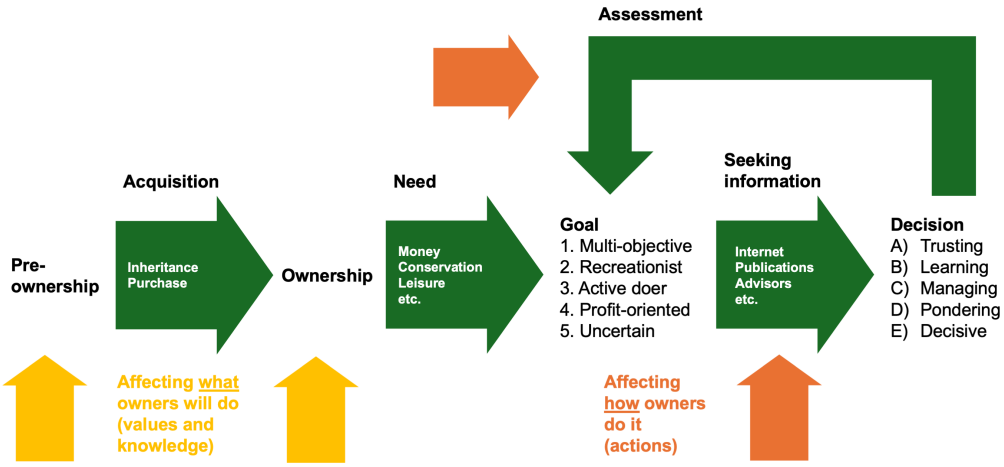

Figure 3: Timeline of forest management decisions and possibilities to impact them.

For effective impact on the actions of the forest owner, their needs and goals must be understood. It is assumed that some need will arise for the forest owner, for instance, a need for money or motivation for nature conservation. During the goal phase, the owner types, multi-objective, recreationists, active doers, profit/security oriented, and uncertain owners, should be considered. Next, the information search phase takes place, where the availability and quality of information play an important role, as is explained in 3.3. Naturally, the decision-making styles are in focus in the next phase, when the owner is choosing between different forest management alternatives. Lastly, according to Stankevich (2017), the decision is evaluated by the decision-maker which impacts future decision-making processes. This phase poses an additional opportunity for advisors to affect future decisions.

As Hujala et al. (2007) argue, it is crucial not to follow a "one-size-fits-all" approach during forestry advisory. Instead, professionals should carefully consider the needs and attitudes of the specific forest owner for effective results that impact the decisions. In addition to the decision-making style and forest owner type, other behavioral factors matter. Advisors and professionals can benefit from understanding the correlations between the forest owners' personal factors, such as identity, and their attitudes towards forestry practices, to give better advice.

Method	Resource use [1]	Reach [2]	Effectiveness [3]
Publication / book / newsletter	Low-Moderate	High	1
Field tour	High	Low	2
Newspaper or magazine article	Low	High	3
Internet information	Low	High	4
Seminar / workshop	Medium-High	Moderate	5

[1] Our estimation (Low: <3 minutes, Moderate: 3–60 minutes, High: 60 minutes per person reached)
[2] Our estimation (Low: <50 persons, Moderate: 50–1000 persons, High: >1000 persons)
[3] Ranking by forest owners in Kuipers et al. (2013) (1 = the most effective)

Table 1: The five most effective information steering methods according to (Kuipers et al., 2013). 1 = most effective, 5 = least effective

4.2 Targeting the information steering

For information steering, most important is that the receiver trusts the sender, that there is two-way communication, that the information is of high quality and includes examples, and that the information is adapted to the receiver. Some studies have been made on adapting information according to some categories, such as the decision-making styles, ownership objectives, or the decision process.

Table 1 shows the results obtained by Kuipers et al. (2013), with the five most effective mediums for informing forest owners. The effectiveness is measured as what the forest owners found most useful. As mentioned before, the study does not perfectly suit the Finnish forest owners, but can still be used as a guide for what seems to be the preferences among forest owners in general. It should also provide some indication of the usefulness of a study such as Kuipers et al. (2013) in the context of Finnish forest owners. In addition, we have estimated how much resources each communication channel uses and how many people that communication channel reaches for one communication campaign. For example, a newspaper article can be read by more than 1000 forest owners [high] and the hours per person reached thus amounts to less than 3 minutes [low], but a field tour will reach less than 50 people [low] and might need more than 1 hour per person [high] depending on the amount of people in the field tour. These are our estimates, so there is no literature backing up the amount of people that each communication channel

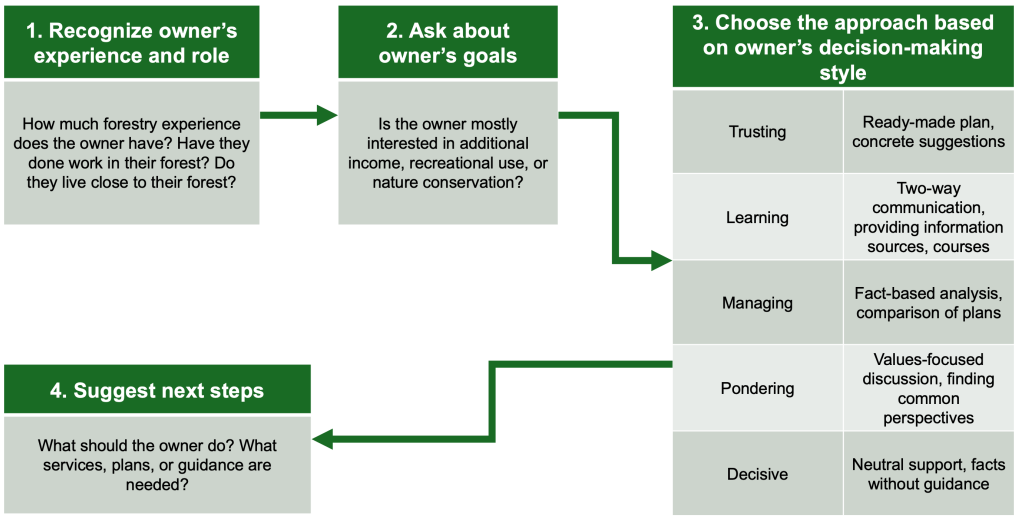

Figure 4: Providing advice to the forest owner.

reaches or how resource intensive they are.

Social media and other Internet-based communication tools are not present in Table 1, as the study Kuipers et al. (2013) is from 2013 and did not include these methods. The study done by Wilkes-Allemann et al. (2021) found that social media and other internet-based communication tools are a way to contact those forest owners that are difficult to reach. They write that it can be a good first step to contact, with the intent to then move to closer contact, as internet connections do not replace human contact.

Figure 4 and Table 2 together show the results from Karppinen et al. (2020) and illustrate a framework for providing targeted and effective advice to forest owners by considering their background, goals, and decision-making style. The model emphasizes getting past generic advice and employing owner-specific advice.

Figure 4 outlines a four-step process to communicate with forest owners. The first step involves determining the experience and role of the owner to help discover whether they are directly hands-on from a forestry or practical perspective, reside near their forest, or even actively manage their land. The second step involves asking about the objectives: getting income, recreational purposes, or conservation? Based on these two points of consideration, practitioners may then move to the third step, which is selecting an effective method of communicationthat is well-matched for the owner's decision-making profile. Hujala et al. (2007) have

Profile	Experience level (usually)	Core values and ownership goals	Suggested approach
Multi-objective	Moderate-high	Balance between economic, ecological, social, and cultural benefits	Provide tailored advice that supports diverse goals; emphasize sustainability and flexibility
Recreationist	Low-moderate	Aesthetic appreciation, emotional connection, leisure and legacy values	Avoid commercial framing; highlight beauty, continuity, and nature protection
Active doer	High	Hands-on management, independence, traditional stewardship	Offer concrete guidance and peer examples; support self-implementation
Profit/security oriented	Moderate-high	Financial return, investment security, low-risk income generation	Focus on financial tools, ROI, planning services, and cost-efficiency
Uncertain	Low	Undefined goals, low knowledge or confidence, often passive ownership	Use simple messages, personal outreach, and entry-level materials; reduce complexity

Table 2: Forest owners profiles and the suggested approach.

identified and categorized five decision-making styles in decision-makers: trusting (prefer clear instructions), learning (seek to be taught and consulted about), managing (seek to be compared and given evidence), pondering (guided by shared values), and decisive (fact-oriented and autonomous). Finally, the fourth step is to suggest concrete things to do, services, or plans that suit the owner's situation.

Table 2 complements the decision-making model by pairing each type of forest owner with a suitable communication strategy. Rather than repeating the detailed description of each owner category, as previously described in 3.1.1, this figure emphasizes how different levels of experience and different value profiles should guide counseling activities. The table highlights the fact that the more experienced owners are with particular goals, for instance, multi-objective, active, or profit/security types, are best met by concrete tools, professional aid, or tailored counseling. The rest, inexperienced or affect-based owners, such as recreationists and uncertain owners, must be handled in an empathetic and value-concerned manner.

This approach stresses the need to adapt outreach strategies both to what the forest owners are concerned about and how much confidence and ability they possess in deciding on the forests. It supports the broader report theme: one-size-fits-all advice does not work in a highly heterogeneous ownership environment.

However, despite the usefulness of this profiling framework, current communication tools, such as *The Best Practices for Sustainable Forest Management in Finland*, often fall short in effectively reaching all owner types. The guide is written specifically for owners who already possess forestry knowledge or have a primary concern with monetary returns. As such, the guide may seem distant or unimportant to less experienced owners, especially to those who are psychologically involved in their forests or unsure about their role.

For uncertain owners or recreationists, in particular, it is difficult even to understand what sections of the guidelines they fit into. The materials tend to assume a proactive stance and technical familiarity that not all owners possess. A more effective approach would have improved entry points for new participants, value-based language for owners motivated by feelings, and module-based content so that readers may engage at varied levels. Graphic media, narrative experience, and interactive resources would also lower participation barriers.

4.3 Limitations

We did not conduct a systematic literature review using an established methodology due to our limited knowledge of such methods as well as the breadth of topics; we did not have the resources to screen thousands of articles. Therefore, our results should be taken as an introduction to the topic and strategic guidance, not as the absolute truth. Furthermore, some of the results we present are our (educated) estimates or opinions. Thus, it is possible that our work has missed some relevant articles or even areas of research.

The most common limitation in most studies we analyzed is their qualitative nature. Quantitative data are often not available, or the data are analyzed qualitatively. Some studies are quite old or conducted outside of Finland, limiting their relevance. Second, sometimes it is not just the forest owner who makes the decisions, as pointed out by Butler et al. (2007). The prominent example of an influential person is the owner's spouse. Many decisions will likely be made jointly or at least with a lot of influence from the closest relatives, and almost no studies have taken this into account.

4.4 Future research

One of our most important conclusions is that information steering should be made with forest owner types in mind. The information should be different according to the Finnish forest owner types, either according to forest owner objectives or learning styles. With this in mind, we suggest that similar studies as the one made by Kuipers et al. (2013), should be made in the Finnish context. Furthermore,

future research should establish what information is relevant to each group and through which medium each group prefers information content.

We suggest that all information campaigns should be assessed, such that feedback loops can be made. This includes continually assessing the effectiveness of *The Best Practices for Sustainable Forest Management in Finland* and the information steering on Finnish forest owners. This will improve the effectiveness of the guide.

We conclude that research about the role of social media and large language models will be crucial for finding the best use of them in regards to promoting *The Best Practices for Sustainable Forest Management in Finland*. Research about the use of social media in information steering is scarce, and therefore is it hard to make definitive conclusions. We did not find any research on the role of large language models in information steering.

5 Conclusion

In this report, we gave a summary of the latest information on Finnish forest owners as well as an introduction to decision-making as a process. Furthermore, we introduced the concept of information steering and highlighted important principles for its effectiveness. We proposed a timeline-based framework for identifying the best occasions to influence forest owners' decisions. Finally, we provided concrete suggestions on how to reach different types of forest owners and improve *The Best Practices for Sustainable Forestry in Finland*.

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Self-assessment

6.1 Following the plan

The project itself followed the original project outline in broad terms, but the emphasis changed somewhat significantly as the project progressed. The project originally aimed to find out about decision-making among forest owners. With further meetings with the client, the focus slowly shifted to explore how forest owners can be affected or guided by information-based recommendations and communications.

Regarding the planning and delegation of tasks, the project proceeded largely according to plan, although the initial timeline and task allocation were a little fuzzy at the outset. As the project progressed, tasks and deadlines were more clearly established, and we could keep our momentum without major interruptions. Generally, while the content emphasis shifted, the process itself was still efficient and well-organized, and we feel that the result is well-aligned with the overall goals of the initial plan.

6.2 Project success

We found that the project was successful in many ways. Although the topic seemed quite broad at first, we were able to create a coherent report in the end. Also, the three categories that we had set up for ourselves, the forest owner, human decision-making and information steering, connected smoothly. We have found correlations between forest owners and actions, and have found the broad themes in the literature about forest owners and information steering.

Tapio seems to be satisfied with our results. Even though they already knew a lot of what we found in the report, one purpose of the project was to get some "common knowledge" written down and find publications that support it. This can then be used to argue for starting a new project or conducting further research.

Our group work has been successful, everyone has been dedicated to the project, and we have stayed on schedule. We have found a good balance between independent work and coordinating the project to get to a good result.

6.3 Failures

Although most of the project was on track, some aspects could have been improved from the beginning. The topic and the goal of the work were unclear at the beginning. We experienced the instructions as ambiguous, which caused some confusion. After our second meeting with Tapio's contact person, the project's

aim gained more clarity. However, the project topic was still quite vague, and the research questions as well as the instructions given from Tapio and course staff were contradictory. Due to confusion in the research question, this project did not manage to answer the question of why forest owners make the decisions that they do.

Regarding the teamwork, finding a suitable routine and starting the project took longer than we wished. The group's motivation and dedication to the project could have been higher in the beginning. For the project to have had a more efficient and effective start, the project manager could have been more active and demanding at the beginning. At the end of the project, finding suitable meeting times was extremely difficult, and we ended up choosing meeting times where not all members could attend. In retrospect, we realized that scheduling meetings well in advance could have been useful.

6.4 Improvements

In hindsight, the project and course facilitation could have been improved in many ways. To achieve a better result for the project, we could have used more effort in trying to reach Tapio's contact person. With more communication, the project topic could have been clarified earlier, and our work could have had higher quality from the start. In other words, we should have asked for feedback earlier in the project. Furthermore, since our team members all studied separate, we would have benefited from knowing more about the other members' project work status, for instance, their most relevant and recent findings. This could have been implemented by using a shared document, where each member could have written down relevant findings and other thoughts on their current work.

Regarding the teamwork and the working climate, an unofficial and casual meeting could have been facilitated before we started working on the project. This way, we could have got to know each other better and gained more trust, motivation, and commitment to the project.

Concerning course practicalities and execution, some improvements could also have been made. The time slot chosen for the seminar could be later in the afternoon. As most lectures and exercise sessions end at 12:00, arriving on time for the seminars was impractical. If the seminars started at, for instance, 13:00, students would not have to leave their classes early and could have time to eat lunch before the seminar. Additionally, during the second seminar, the schedule could have had fewer changes, and the presentations could have been on time.