HAW HAMBURG

BACHELOR THESIS

Which contents and empiricism from Shared Mobility Hub projects, as well as formats for sharing them, are relevant for the development of a digital learning platform?

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Abstract

Shared mobility can be a solution to prevent unnecessarily frequent car trips by single persons and to counteract other problems related to high traffic density and high CO2 emissions in cities. This solution can be promoted and offered to the public through shared mobility hubs. To disseminate the knowledge about shared mobility hubs to the public and mobility stakeholders, this paper analyses and evaluates what contents and its display formats are relevant to understand and implement shared mobility hubs. To achieve this, a research survey and stakeholder analysis was conducted with stakeholders of the EU-funded Interreg NSR project *ShareDiMobiHub*. These methodologies have proven to be promising and contribute reliably to assessing the interests and preferences of stakeholders regarding shared mobility hub content and thus their needs. In this paper the results have been evaluated and the needs of shared mobility hub stakeholders have been assessed.

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Table of Abbreviations

SMHs	Shared Mobility Hubs
RQ	Research Question
RS	Research Survey
StAna	Stakeholder Analysis

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1 Introduction

1.1 Motivation

Nowadays, the ride to work, the ride to a leisure activity, or the ride to friends and family is often a solo car ride. With many people taking their ride this way, traffic density in cities increases significantly. As a result, urban traffic density is too high and needs to decrease (Loder et al., 2019). One way to solve the problem is to avoid having only one occupant per vehicle by sharing rides since shared mobility has the advantage to reduce traffic density (Li et al., 2021; Tirachini et al., 2020). Shared mobility has therefore become increasingly important, especially in the last ten years (Figure 1).

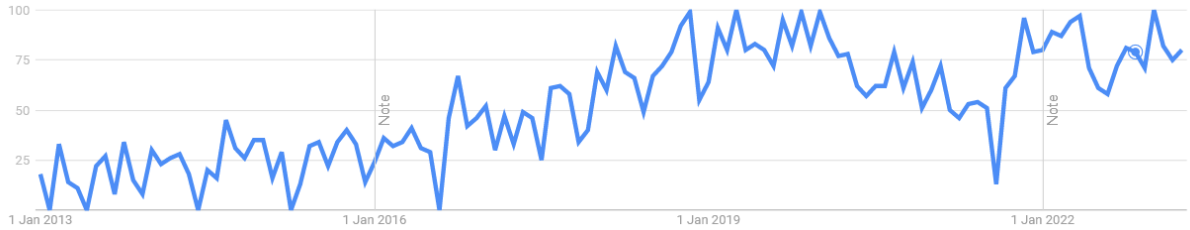


Figure 1: Google Web Search Frequency of Shared Mobility in the last ten years
Source: Google Trends

Shared mobility needs to be brought closer to the user, for which Shared Mobility Hubs (SMHs) offer a solution as they are a convenient way to access shared mobility services and stay mobile. SMHs have been identified to address problems such as a range of transport related environmental, social, and economic challenges, as well as high traffic density and air pollution (Arnold et al., 2023). SMHs help for the uptake of shared mobility and sustainable modes of public transport.

1.2 Goals & research question

The overall goal is therefore to disseminate shared mobility, both the possibility to use it and the knowledge about it. Through SMHs, the use of shared mobility should become user-friendly, means that the spreading of SMHs is goal oriented. Thus, general knowledge about SMHs and their implementation need to be disseminated, especially to the responsible authorities. The knowledge dissemination should promote the construction of new SMHs. The Interreg V NSR project *ShareDiMobiHub* aims to develop a digital learning platform about SMHs. For this platform, it is necessary to find out what information should be shared and how to share it. The main objective of this paper is to answer the research question (RQ) “Which contents and empiricism from Shared Mobility Hub projects, as well as formats for sharing them are relevant for the development of a digital learning platform?”.

1.3 Methodical approach

To achieve the goal, information must be collected. This information is thematically specific; therefore, the information should be gathered from people who are interested in the topic. In cooperation with the *ShareDiMobiHub* project, this paper presents the conduction and results of a research survey (RS) followed by a stakeholder analysis (StAna) to prioritise them.

A RS can transfer useful and accurate information from respondent to inquirer (Stone, 1993). For Ponto (2015), RS is a legitimate approach, with the purpose of obtaining information quickly that describes the characteristics of a large sample of interested individuals. RS helps to describe and explore variables and constructs of interest. In social and psychological research to explore human behaviour RS is in regular use and has been proven.

With the StAna, the results of the RS can be evaluated and prioritised. Furthermore, the positions and importance of the different actors and interest groups can be understood and highlighted (Brugha et al., 2000). With the opinions of the most powerful stakeholders, the *ShareDiMobiHub* project can be shaped in the right direction (Thompson, 2012). The aim of the StAna is to find the optimal fit for the stakeholders' needs and the project (Brugha etal., 2000). Through proper prioritisation and the resulting support of powerful stakeholders, the success of the project is more likely (Thompson, 2012).

2 Methods in theory

2.1 Research Survey

Why use a questionnaire for a survey?

Why a questionnaire is conducted and what is the purpose behind it? Ponto (2015) defines survey research as “the collection of information from a sample of individuals through their responses to questions”. Stone (1993) emphasises that for the collection of useful information the questionnaire’s question or series of questions must be clearly posed, comprehensible and appropriately formulated. If this is the case, the respondent can formulate, articulate, and transmit the answers.

Ponto (2015) distinguishes between quantitative and qualitative strategies in survey research. A RS is called quantitative if the size of the sample is too large to obtain detailed answers from each individual. In such questionnaires, the answers are predetermined, or the questions are posed in such a way that the answer is merely numerically rated. Qualitative surveys, on the other hand, are used when the sample is small enough and a manageable number of answers can be expected, so that each response can be processed and assessed. In such surveys, mainly open-ended questions should be asked, as this allows each participant to answer individually and in no way be tempted to give an certain answer.

Apart from research, Stone (1993) mentions other uses of questionnaires. These include screening, audit, administration, and public relations, which will not be relevant on this paper, but which demonstrate the

versatility of questionnaires. In this paper, due to a large number of expected participants, a quantitative questionnaire is used to gather shareholders' opinions to answer the RQ.

Carrying out an online survey

Questionnaires can be performed face-to-face, by telephone or by post. Taherdoost (2016) describes these methods on the one hand as very time-consuming and on the other hand as possibly unpleasant for the respondent if he or she is more introverted or even suffers from social phobia. This could cause self-confidence problems for the respondent and negatively affect anonymity. Ponto (2015) describes online questionnaires as very low-cost to cost-free and emphasises their practicability for large samples. In conclusion, online questionnaires are suitable for quantitative research strategies. Furthermore, an online questionnaire requires the least amount of time compared to the other ways mentioned by Taherdoost (2016). Online tools ensure a quick and easy creation of a questionnaire. Some tools have the function of evaluating the questionnaire and displaying it in diagrams after the participation period has expired.

Unfortunately, there is no perfect practice, and the online questionnaire approach also conceals disadvantages. Taherdoost (2016) named these disadvantages starting with the exclusion of people from the sample who do not meet the technical requirements, for example, due to lack of internet access. Answering questions online is undoubtedly more impersonal compared to an interview, so emotions and concerns cannot be captured (Taherdoost, 2016). Due to the lack of personality, if the questions are incomprehensible, there is no accessible explanation, which means that misunderstandings, should they occur, are either impossible or extremely difficult to avoid. These circumstances can lead to a distortion of the results of the RS. To prevent this, the RS should be well explained, and the questions asked appropriately.

Aware of the disadvantages, the RS in this paper is nevertheless conducted online, as the advantages outweigh the disadvantages.

Guidelines for successful questionnaires

To develop an appropriate questionnaire that is the least error-prone, there are guidelines for formulating questions, answers and help or introductory texts. It helps the reader and respondent to introduce and explain the content of the RS (Ponto, 2015).

For Taherdoost (2016), questions should be clear and concise and should not include technical or specialized language. Negatives and double negatives should be avoided. The motto is “better simple than complex” (Taherdoost, 2016). The simpler a question is asked, the less susceptible it is to misinterpretation. A question must not lead the respondent to an answer, so that their opinion does not become biased. There should be no possibility of readers feeling addressed, confronted, or offended by the question. In any case, there should be no irritation since no feedback can be given directly online. When formulating the questions, care should be taken to ensure that the question does not directly contain two options, especially in the case of multiple-choice questions. “Are you more in favour of A or B?” should

accordingly be rephrased as “What are you in favour of?” with A and B as possible answers. Particular attention should be paid in multiple choice questions to keep the answer options clear and indicating distinctly whether more than one or only one answer may be selected. Fortunately, most online tools help to allow multiple answers and single answers as desired (Taherdoost, 2016).

Stone (1993) had similar ideas for the formulation of the questionnaire since it should still be self-explanatory but “A good questionnaire is one that works”. Furthermore, according to him, it works well if the questionnaire is appropriate, intelligible, unambiguous, unbiased, capable of coping with all possible responses, satisfactorily coded, piloted, and ethical.

A questionnaire is *appropriate* if it can provide answers to the questions asked. For example, it would not be useful to ask a pathologist how he establishes a rapport with his patients or to ask a general practitioner when he starts his ward rounds.

A question is *intelligible* if the respondent can comprehend it. This means that the language the sample speaks should be used. Stone (1993) emphasizes that when mentioning a survey in which mothers were asked about the consequences of circumcision. The statements were in English, and a large part of the sample were first-generation immigrants who barely understood English.

A question is *unambiguous* if the respondent and the questioner would interpret it in the same way. Should a mixed group of psychoanalysts and statisticians define the term “regression analysis”, the answers will differ greatly.

A question may be considered *unbiased* until one tries to interpret the answers. For example, the question at American airports as to whether one is a terrorist will only be answered with “No”. Stone (1993) also mentions the so-called recall bias, which appears when the answers of the respondents depend on their memory. It is important that the respondent must not be talked into a certain answer.

A question should be *omnicompetent-capable of coping with all possible responses*. This is an expectation that is almost impossible to achieve, if following Stone (1993). For qualitative surveys, the range of possible responses is the number of people answering the questionnaire. For quantitative surveys, there might still be answers that were not predetermined. Therefore, a category “other” should be added there to cover all answers. Often the answer option “I don't know” is neglected, which could be needed especially for “yes/no” questions. Human uncertainty and indecisiveness may be troublesome for the RS but cannot be ignored.

For a question to be *satisfactorily coded* the answers to it should be mutually exclusive, in the case of single-answer questions. For example, when asking for an age range, the range should be clearly defined. When subdividing the age in 10-20, 20-30, etc., it must be clear which category 20-year-olds fall into. At best, the answers are coded in such a way that single or multiple choice is a prerequisite to save time and resources, as well as to eliminate a source of error.

A questionnaire should be *piloted* before use. The purpose of this is to eliminate the last design flaws that were overlooked, of which there are usually surprisingly many according to Stone (1993), and to make it feasible and operational.

Finally, a questionnaire should be *ethical*. In the past, ethics committees had no real interest in RSs unless they used invasive or potentially dangerous procedures. Now, however, almost all research is considered potentially harmful. Certainty about the need for the research, its scientific rigour, the sensitivity with which it is conducted, and the consent of the subject should be ensured.

If the questions are formulated according to the pattern, the questionnaire, in which errors and misinterpretations from the respondent's point of view should hardly or not at all occur, will lead to pleasing results (Stone, 1993). The answers given should be recorded, coded, and analysed and evaluated without bias, and errors, if any, should be evaluated to interpret the results correctly.

The paper's RS follows these points to benefit from the advantages, avoid mistakes and be as successful as possible.

Uses of multiple-choice questions

A few times already multiple-choice questions were mentioned. The advantages of them were that the answers are predetermined, and a selected set of answers is available, apart from an “Other” answer option. Multiple choice questions are not only useful for opinion polling but also as knowledge polling. According to Nicol (2007), many researchers discourage the use of multiple-choice questions. On the one hand, they are supposed to improve memorisation skills and factual recall, but on the other hand, they do not require high-level cognitive processes to answer.

Bull and Danson (2004) describe the basics of human physiology in a case study that discusses how students are prepared for their second year. After 3 midterm assignments are passed by most students in the first year, a large proportion eventually fail the exam. By using multiple choice questions, the teachers were able to quickly identify which topics the students were still lacking in and repeat them. This was called “just in time teaching” by Novak et al. (1999).

In another case study by Gardner-Medwin (2006), “confident based marking” was introduced for online multiple-choice questions, in which a scale of one to three was used to indicate how confident the respondent was with his or her answer. The more confidently a respondent gave a correct answer, the more points were gained. On the other hand, the more confident a respondent was in giving an answer that was wrong, the higher the penalty for doing so. With this system, a wrong answer can have much greater consequences, forcing students to reflect on their answer and assess their own reasoning. Figure 2 shows this weighting.

Degree of Certainty	Low	Medium	High	No reply
Mark if correct	1	2	3	0
Penalty if wrong	0	−2	−6	0

Figure 2: Scoring regime for certainty-based marking.
Source: Nicol (2007)

In one case study discussed by Nicol (2007), it was found that multiple choice questions simply require students to select an answer rather than write an answer themselves. According to Bloom's (1956) Taxonomy, this is the learning method with the least value. Thus, multiple choice questions are best developed by the students themselves to gain the most value according to the said taxonomy.

Zhao (2006) pursued a different problem. He worked out the probabilities of getting a certain score on multiple choice questionnaires by pure guesswork. Particular attention was logically paid to the score needed to pass a test. By dealing with probabilities, it is obviously significant to consider the number of answers. For questions with only 2 possible answers, the chance of passing by pure guesswork, i.e., answering half of the questions correctly, would be 50%. A conversion from the score achieved to the mark score would then look like this: only above a score of 50% does the mark score increase. Zhao (2006) deals with the case where a mark score of 40 is considered a pass, which corresponds to 50% correctly answered questions. Zhao`s (2006) conversion for two, three, four and five answer choices looks as in Figure 3:

	Mark					Mark					Mark			
Score	(2)	(3)	(4)	(5)	Score	(2)	(3)	(4)	(5)	Score	(2)	(3)	(4)	(5)
≤20	0	0	0	0	47	0	22	35	43	74	38	60	69	75
21	0	0	0	2	48	0	23	36	44	75	40	61	71	76
22	0	0	0	4	49	0	25	38	46	76	41	62	72	77
23	0	0	0	5	50	0	26	39	47	77	43	64	73	78
24	0	0	0	7	51	2	28	41	48	78	45	65	74	79
25	0	0	0	9	52	3	29	42	49	79	47	66	75	80
26	0	0	2	11	53	5	31	43	51	80	48	68	76	81
27	0	0	3	12	54	6	32	45	52	81	50	69	77	82
28	0	0	5	14	55	8	33	46	53	82	52	70	78	83
29	0	0	7	16	56	9	35	47	55	83	54	72	79	84
30	0	0	9	17	57	11	36	49	56	84	56	73	80	84
31	0	0	10	19	58	12	38	50	57	85	58	74	81	85
32	0	0	12	20	59	14	39	51	58	86	60	76	83	86
33	0	0	14	22	60	15	41	53	59	87	62	77	84	87
34	0	1	15	24	61	17	42	54	61	88	64	79	85	88
35	0	3	17	25	62	18	43	55	62	89	66	80	86	89
36	0	4	18	27	63	20	45	56	63	90	68	81	87	90
37	0	6	20	28	64	22	46	58	64	91	70	83	88	91
38	0	8	21	30	65	23	48	59	65	92	72	84	89	92
39	0	9	23	31	66	25	49	60	66	93	74	86	90	92
40	0	11	25	33	67	26	50	61	67	94	77	87	91	93
41	0	12	26	34	68	28	52	62	69	95	79	89	92	94
42	0	14	28	36	69	30	53	64	70	96	82	90	93	95
43	0	16	29	37	70	31	54	65	71	97	85	92	95	96
44	0	17	31	39	71	33	56	66	72	98	88	94	96	97
45	0	19	32	40	72	35	57	67	73	99	92	96	97	98
46	0	20	34	41	73	36	58	68	74	100	100	100	100	100

Figure 3: Conversion table for multiple-choice questions with two, three, four, or five answer choices, corresponding to columns indicated by (2), (3), (4), and (5)
Source: Zhao (2006)

This conversion makes passing through pure guesswork less and less likely the more questions are asked. However, since the questionnaire should not be too long, it makes sense to also increase the answer options to make it even less likely. Zhao (2006) concluded that four answer options would be sufficient most of the time, as more options would not decrease the probability significantly further. To get a mark

score above 40 by pure guesswork, the chance is less than 5% for eight questions, less than 1% for 18 questions and less than 0.01% for 48 questions.

Since multiple choice questions can be used to collect many answers quickly (Bull and Danson, 2004), they are very promising for a questionnaire with many respondents, which has already been dubbed a quantitative survey. Multiple choice questions are used in the RS of this paper, so that the answer options are limited and predetermined, the stakeholders' needs can be quickly identified, and the stakeholders will answer reflectively because of their interest in the project, even without certainty-based marking, since opinions cannot be right or wrong. A solution for the fact that multiple choice questions do not require high level cognitive processes can be found in the principles of good feedback practice.

Multiple Choice Questions are purposeful

According to Nicol (2007), a multiple-choice question requires only the selection of an answer, and this selection can often be due to the recognition of an answer, making them easy to understand and answer, which was one of the requirements of Taherdoost (2016) and Stone (1993). Nicol (2007) speaks of seven principles of good feedback practice, which mainly refer to the learning process in general.

Good feedback practice:

1. Helps clarify what good performance is (goals, criteria, standards)
2. Facilitates the development of self-assessment and reflection in learning
3. Delivers high-quality information to students about their learning
4. Encourages teacher and peer dialogue around learning
5. Encourages positive motivational beliefs and self-esteem
6. Provides opportunities to close the gap between current and desired performance
7. Provides information to teachers that can be used to help teaching

Further Nicol (2007) applies these principles from the general learning process to multiple choice questions:

1. **Clarifying goals, criteria, and standards:**
   In this scenario, students not only engage with multiple-choice questions as test takers but construct the tests themselves. This ensures that they are actively involved in creating the criteria for the tests and the triggering questions.

2. **Self-assessment and reflection:**
   In this scenario, multiple-choice questions can be worked on in an open-book situation (students can look up the answers). This allows students to self-assess and self-correct during a test session (Honey & Marshall, 2003). The quality of the questions would be important here; they should go beyond simply selecting words from texts. An example of additional reflection would be for students to give a confidence rating alongside their answer to the multiple-choice question. This encourages students to take a step back and reflect on their thinking behind their answer (Gardner-Medwin, 2006).

3. **Delivers high-quality feedback:**
   Students often receive teacher prepared feedback for multiple choice questions, but this is limited as it is given while the test is being prepared. However, tutor feedback can be improved by linking it to other activities in the classroom. For example, in seminars or

tutorials, tutors could go over the areas where students had difficulties based on their performance on previous multiple-choice questions (Bull and Danson, 2004).

4. **Encourages dialogue around learning:**
   Peer dialogue is an important way to support learning, but multiple-choice questions are usually designed as individual tasks. The validity of tests can be increased by having students work in small groups to create tests or comment on certain aspects of previously constructed tests (e.g., multiple-choice questions in a previous exam paper). Another strategy is to have students discuss their answers to the multiple-choice questions as they work through the test (e.g., by randomly distributing the questions so that each student gets a different test) or to initiate a group discussion about the answers to the tests.

5. **Feedback and motivation:**
   In this scenario, students are given repeated opportunities to take multiple-choice tests, often throughout the course. Research shows that this is very motivating (Zakrzeski & Bull, 1999). Therefore, motivation seems to be further enhanced when this formative procedure is combined with summative tests of a similar format.

6. **Closing the gap:**
   In this scenario, students can work repeatedly on multiple-choice questions and check answers until they have achieved satisfactory performance. This provides an opportunity to close the gap between current and desired test performance.

7. **Feedback shaping teaching:**
   Multiple-choice questions can be set before attending a lecture and even linked to homework. Based on the test results, the teacher can then identify areas of learning difficulty and decide where to focus in class or further online assignments (just-in-time teaching by Novak et al. (1999)).

These principles are adapted to multiple choice questions designed to teach learners, some of them can still be applied to multiple choice questions for opinion polls used in the RS of this paper. As in principle two, a respondent should reflect on his or her answer. If there are answer options that the respondent has not yet considered, he or she may gain new insights into the topic, automatically reflecting on their perspective on the question. With a high number of questions, several new insights could be gained, whereby principle five can be effective, as these insights can increase the respondents' motivation to deal with the topic again in a more focused different perspective. The seventh principle applies because the purpose of the RS is to obtain answers to answer the RQ in a suitable and differentiated way since a RS is conducted based on a RQ and the answers should help to answer it.

By using multiple choice questions in the RS to answer the RQ, the requirements for a well-functioning RS by Stone (1993) and Taherdoost (2016) are pursued. Furthermore, by considering the principles, reflective, thoughtful, and differentiated responses can be expected (Nicol, 2007).

Likert scale based answers

Possible answers for multiple choice questions are those created based on the Likert scale. What is a Likert scale and how is it used in RSs? According to Gritsch (2012), a Likert scale is a rating scale that offers many advantages and is easy to use. It was developed by Rensis Likert in 1932 and is often used

in surveys to collect data. The scale allows respondents to indicate the extent to which they agree or disagree with a statement, usually on a five-, seven- or eleven-point scale. The scale usually ranges from "strongly agree" to "strongly disagree", with a neutral option in the middle.

The Likert scale is used in surveys to measure people's attitudes or opinions on a particular topic. It is a reliable and valid tool and is often used in academic research, market research and social science research (Gritsch, 2012).

When designing a Likert scale, it is important that the questions are clearly and precisely worded and that the answer options are balanced and cover the full range of possible answers. It is also important to ensure that respondents are not influenced by previous questions or by social desirability. Researchers can achieve this by randomising the order of questions and ensuring that questions are asked in a neutral and non-judgmental way.

To finally evaluate the answers on the Likert scale, a numerical value can be assigned to each answer option, for example from zero to five or from minus two to two. If all answers are then added together, the answer can be interpreted and by using a self-defined threshold, the answers could be evaluated as positive, neutral, or negative.

Overall, the Likert scale is a valuable tool for collecting data on attitudes and opinions and is frequently used in a variety of research areas. It is also used as a response option in this paper's RS to assess the certainty of the answers and not to pressure respondents to give a specific answer, thus making the RS unbiased. This also considers the requirements of Stone (1993) and Taherdoost (2016).

Create a survey questionnaire

To develop a successful questionnaire, Stone (1993) follows a step-by-step plan. He lists ten steps in that plan:

1. Decide what data you need
2. Select items for inclusion
3. Design individual questions
4. Compose wording
5. Design layout and presentation
6. Think about coding
7. Prepare the first draft and pretest
8. Pilot and evaluate
9. Perform the survey
10. Start again

He elaborated on these ten steps as follows:

1. **Decide what data you need** - This depends on what goal is being worked on. If there are complications in formulating the goals precisely, they need to be worked on before the development can start. The results should be imaginable, and it may help to create dummy tables to ensure that the desired data can be obtained. Possible variables (e.g., age, gender) should be listed for this and can be inspired from existing standard questionnaires, of which there are plenty on the

topic of health, for example. “There is no point in reinventing the wheel “, as Stone (1993) stated.

2. **Select items for inclusion** - This is an elaboration of the list of variables created in step one. Creating a list for the specific information to be collected is recommended to check whether each item can be linked to one or more goals. If the latter is not the case, either the goals or the specific information/ items are wrongly chosen. Considering the experiences of others can be helpful, but one's own knowledge and goals should be trusted. In addition, it may be useful to include a few decoy questions to divert attention from a potentially sensitive topic.

3. **Design individual questions** - The questions depend on whether the RS is conducted by post, as a face-to-face interview, by phone or online, but also whether it is quantitative or qualitative data collection. Open questions are more suitable for qualitative research and closed questions for quantitative research, which usually require a selection from dichotomous answers, e.g., “yes/no”, from alternative statements, from a checklist or from a rating scale. The answers to a question or their scale values depend on whether the answer options can be classified categorically (e.g., religious affiliation) or continuously (e.g., blood pressure). Answers should not be forced into categories if they can only be accurately described on a continuous basis. To assess an opinion, the Likert scale is a useful tool with the answer range: strongly agree, agree, undecided, disagree, strongly disagree.

4. **Compose wording** – Stone’s (1993) golden rule says: if in doubt leave it out. Specific language, as found in medical jargon, should be avoided. Precision is essential, so that the respondent should have no doubt about what is requested of him or her. Suggestive and partheistic questions should not occur. The more specific the question, the easier it is to interpret. An answer to the question “Have you seen a doctor in the last month?” is easier to find than to “Have you seen a doctor recently? “.

5. **Design layout and presentation** - A polite manner must be used from the beginning of the RS. Starting with a short introduction explaining the purpose of the study is pleasing, even if a previous writing has already covered this information. The questions should be arranged from the general to the specific. The first part of the questionnaire nevertheless needs to be designed in an interesting way in order not to lose the respondent's attention. The questions about demographic characteristics, if needed, should be asked at the end. The visual impact of the form is crucial. The font should be clearly recognisable by its size and colour. A study by Eastwood (1940) found that yellow and pink as design colours achieved the highest response rates. Lastly, donnot forget to thank the respondent for taking the time to complete the form.

6. **Think about coding** - Advanced coding saves time and prevents errors, even if it is not always successful with an unpredictable range of responses. If the survey is self-coded, it is faster and cheaper than separate coding and reduces the risk of transcription or other errors. Nevertheless, if errors might occur, respondents should be able to explain their answer.

7. **Prepare the first draft and pretest** - Even a carefully designed questionnaire may contain errors that are not detected by the designer. First, the draft should be shared with a small circle of trusted people - colleagues, friends, or family. These are asked to return comments and criticism, and the designer processes the responses. The feedback is evaluated, the form revised, and the process repeated until satisfactory results are achieved.

8. **Pilot and evaluate** - Responses from a small sample of the target group are evaluated by technically assessing validity and reliability. Stone (1993) understands validity as the extent to which a measurement instrument can measure what it is there for. Validity can be assessed by

comparing the data obtained with independent data sources or "gold standards", which, since the purpose of the research would fade, should not exist. Reliability should be created with which the form provides consistent results. Test-retest reliability can be determined by regularly repeating the test with the same people.

9. **Perform the survey** - If interviewers are used, they need to be correctly selected, briefed and trained. If the survey is conducted online, the questions must be technologically error-free when answered. Furthermore, a high response rate must be ensured and, if necessary, the form must be sent a second or third time. The non-respondents should not be harassed, but rather it should be emphasised how important their cooperation is for the success of the study.

10. **Start again** - Good research results in learning from mistakes. If time and resources allow, the survey should be repeated at least once to validate, better select the sample, and optimise the questionnaire.

With these steps, Stone (1993) advises when designing a questionnaire to "take a deep breath and jump. The landing will not be as hard as [it is feared] ". These steps were followed in a suitable way when creating the RS for the RQ of this paper.

Sampling

Stone's (1993) steps require a sample group for the RS. The goal of sampling is to find a sufficient target group that is representative of the population of interest. Since it is not feasible to target the entire population of interest because of its quantity, choosing a sample is inevitable.

The sample of the RS was chosen from the partners of the *ShareDiMobiHub* project who have a great interest in the project and in answering the RQ. This is likely to be a reliable sample.

Possible errors

Creating a perfect survey is a near impossible ambition. There are many possible sources of error, of which Ponto (2015) has listed the most common ones that advanced practitioners look for in advance to eliminate these potential sources.

Coverage error occurs when there is an unknown or no chance that individuals from the population of interest are included in the sample due to missing (possibly technical) requirements. To prevent this, a multimode design of the RS is recommended.

The *sampling error* means that individuals included in the sample do not match the characteristics of the population of interest. The population of interest should be clearly identified, and various recruitment strategies applied to create the largest possible random sample to prevent this error.

Measurement error deals with the questions or instruments that do not accurately reflect the desired topic and thus the questionnaires and interviews do not elicit concrete and correct answers. The questions and instruments must be reliable and should be tested before use. In addition, user-friendly graphics and visual characteristics help to make the topic of interest clear to the respondent.

The *nonresponse error* stands for a lack of responses from the sample respondents. This can have various causes, especially in online surveys, and to rule out the possibility that it is due to the questionnaire, a user-friendly design for the questionnaire should be in place, as well as possible follow-up plans for nonresponses.

Taherdoost (2016) mentioned strategies to encourage the sample to answer the questionnaire to prevent the non-response error. The participation in the questionnaire could be rewarded with money, prizes, or a raffle. This reward must outweigh the cost of participation (e.g., time, money, and effort). It is also very important that the survey is trustworthy and handles the data obtained sensitively, about which the respondent must be informed and insured.

Due to the reliably chosen sample for the RS from this paper, the errors, excluding the measurement error, should hardly or not at all occur. Measurement error is also prevented by Stone's (1993) seventh and eighth step by piloting the RS.

2.2 Stakeholder analysis

What is a stakeholder?

Clarkson (1995) defines stakeholders as "persons or groups that have, or claim, ownership, rights, or interest in a corporation and its activities, past, present, or future". Brugha et al. (2000) distinguishes between primary and secondary stakeholders. Primary stakeholders are essential for the survival and wellbeing of the organisation. These include shareholders, employees, customers and those with regulatory authority or other types of power over the organisation. Generally, they are intended project beneficiaries and others who are directly affected positively or negatively by the project. Secondary stakeholders interact with the organisation but are not essential to its survival. These include intermediaries who can influence the project outcomes.

Secondly, Brugha et al. (2000) distinguishes between internal, interface and external stakeholders. Internal stakeholders are operating within the bounds of the organisation. Interface stakeholders do not interact within the organisation, but with its external environment. And External Stakeholders are those who may either contribute to, compete with, or have a special interest in the functioning of one's organisation, just like other organisations.

For individual stakeholders, values/beliefs, power, cooperative potential, and issues are likely to be of particular concern. Through the influence noted by managers, policy makers and researchers of the central role of stakeholder individuals, groups, and organisation, it is important to recognise that parties who have an interest (stake) often also have the potential to influence the actions and aims of an organisation, project or policy direction as described by Mason and Mitroff (1981), Crosby (1992) and Walt (1994).

Knowing what constitutes a stakeholder helps to identify them. The identified stakeholders of the *ShareDiMobiHub* project were a good source for answers contributing the RQ.

Benefits of a stakeholder analysis

"Stakeholder analysis encompasses a range of different methodologies for analysing stakeholder interests and is not a single tool" (Crosby, 1992). When conducting the analysis, questions are asked about the position, interest, influence, interrelations, networks, and other characteristics of stakeholders, which can also be related to their past, present positions, and future potential (Brugha et al., 2000).

There have been various approaches to this, which have also been titled differently, such as "stakeholder approaches, frameworks and issues" by Clarkson (1995), "stakeholder-focused criteria" by Thomas and Palfrey (1996), "stakeholding" and "stakeholder society" by Thompson (1996), "stakeholder-agency theory" by Hill and Jones (1992), "stakeholder power matrices and bunching" by Winstanley et al. (1995) and "stakeholder values" and "how to involve stakeholders in decision making" by Gregory and Keeney (1994).

As stated by Freeman (1984), the rationale for paying attention to stakeholders is that they are able to influence the wellbeing of an organisation or the achievement of its objectives. It is therefore important to understand the position and importance of the different stakeholders, especially in politics. Lasswell's (1958) definition of politics "the study of the process of Who Gets What, When and How..." or more pragmatically by Lindenberg (1981) "What Do I Want? Who Has It? And When and How Can I Get It?" can be related to approaches to stakeholders.

As Brugha et al. (2000) describes, the focus of the StAna is the organisation, and the purpose is to predict changes in the relative importance of stakeholders. Furthermore, StAna is used to assess the likelihood of success of specific projects and collaborations. Once the key issues and components of a programme have been identified, StAna is used to find out who is concerned by or affected by the issues and to assess their level of interest and influence.

Stakeholder mapping is used to map the key relationships of an organisation. The information about the objectives and underlying motives of major organisations and individuals must therefore be collected. Stakeholder representatives can be encouraged to disclose their organisation's views and explain their interests, as this can lead to a more coherent dialogue between stakeholders and a transparent process of policy or project development (Brugha et al., 2000).

The strength and at the same time major limitation of StAna lies in its prospective dimension, whereby it can be used to make predictions and provide information that could influence the future. Therefore, the timeframe of a prospective analysis must not be too long, and the study results must be applied after a short time, especially in complex and potentially unstable settings, otherwise the relevance of the analysis on how the future could be managed decreases rapidly.

Thompson (2012) notes that a stakeholder approach can further improve the quality of the project. A good relationship with the powerful stakeholders can help to attract new resources that will make it even more likely that the project will be successful.

Through early and regular communication with stakeholders, you can ensure that they fully understand what is being worked on and are aware of its benefits. This means they can actively support if necessary. Reactions to the project can be anticipated and it is possible to include actions to gain people's support in the plan (Thompson, 2012). Furthermore, Elias et al. (2002) states that performing a prototype test with stakeholders can confirm whether their identified concerns are true.

He also mentions Dutch studies that show that bringing together different types of stakeholders is essential for success. According to Tipping et al. (1995), various stakeholder groups have different interests and perspectives on an innovation process. Miller (1995) describes that the involvement of multiple stakeholders can lead to a learning process and an alignment of stakeholder values.

In a StAna assessed by Hammel et al. (2013), the focus was on people with mobility disabilities. They had different backgrounds, different limitations, and different degrees of limitations. On the one hand, they learned from each other through physical meetings and on the other hand, an assumption that they would not like to use mobility technology because it might be embarrassing, was more than invalidated and made clear that these people feel back in life precisely through mobility technology.

For the *ShareDiMobiHub* project, a stakeholder approach would be suitable to adapt the project to the stakeholders' needs. Especially with the project partners, the exchange is essential for the project's success.

What classified stakeholders?

Stakeholders are classified by certain attributes. The presence or absence of the attributes Power, Legitimacy and Urgency, named by Elias et al. (2002), describes the stakeholder and lays the foundation for the stakeholder typology by Mitchell et al. (1997) (Figure 4).

Stakeholder with one attribute:

1. **Power only**: These are *dormant stakeholders* who can influence the organization but are not currently engaged. They may become active if their interests are threatened.

2. **Legitimacy only**: These are *discretionary stakeholders* who have a legitimate interest in the organization but do not have the power to influence decision-making. They may be ignored by the organization without consequences.

3. **Urgency only**: These are *demanding stakeholders* who have an urgent need or claim on the organization but may not have the power or legitimacy to enforce their demands. They may be vocal and persistent in their demands. Examples include local communities affected by environmental issues.

Stakeholder with two attributes:

4. **Power and Legitimacy**: *Dominant stakeholders* have high power and legitimacy, but low urgency. They are critical to the success of the organization and can influence decision-making. Examples include shareholders, investors, and major customers.

5. **Legitimacy and Urgency**: *Dependent stakeholders* have high legitimacy and urgency, but low power. They rely on the organization to meet their needs and may be vulnerable if the organization fails to act. Examples include employees, suppliers, and local communities.

6. **Power and Urgency**: *Dangerous stakeholders* have high power and urgency, but low legitimacy. They may use threats or coercion to achieve their goals and can pose a significant risk to the organization. Examples include activist groups and competitors.

Stakeholder with three attributes:

7. **Power, Legitimacy and Urgency**: These are *definitive stakeholders* which have all three attributes and a significant and immediate impact on an organization's activities, decisions, and outcomes. These stakeholders are crucial for the survival and success of the organization, and their needs and expectations must be addressed with high priority.

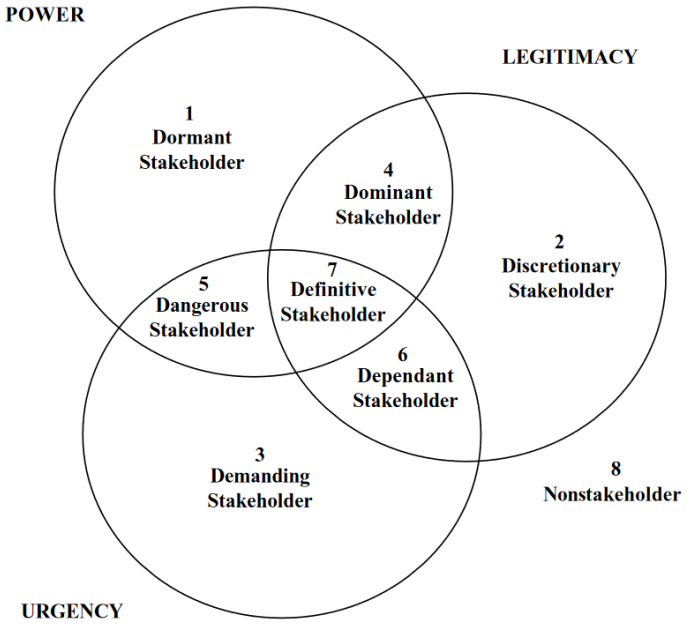


Figure 4: Stakeholder typology.
Source: Elias et al. (2002)

Thompson (2012) has compiled a list of individuals, organisations and authorities that often act as stakeholders of projects or organisations. These include: Your Boss, Senior executives, your Co-workers, your Teams, customers, prospective customers, your family, shareholders, alliance partners, suppliers, lenders, analysts, future recruits, government, trades association, the press, interest groups, the public and the community.

Classifying stakeholders lays the foundation for assessing them. This allows to prioritise the possible stakeholders of the *ShareDiMobiHub* project and decide how to deal with their concerns.

Prioritise and evaluate stakeholders

Prioritising stakeholders based on their power and interest is an imperative part of stakeholder management. Therefore, Thompson (2012) summarised how stakeholders should be prioritised based on these attributes.

High power interested people: It is crucial to fully engage with them and make the greatest efforts to satisfy their needs and expectations. They can be critical to the success of the project or organization, and their support is essential. The organization must communicate regularly with them, listen to their feedback, and act on their concerns.

High power, less interested people: These people need to be kept satisfied by putting enough work to ensure that they are not dissatisfied, but not so much that they become bored with your messages. The organization must communicate with them regularly, but not excessively, and provide them with relevant information that is tailored to their interests and concerns.

Low power interested people: It is important to keep them informed and talk to them to ensure that no major issues are arising. They can often be very helpful with the detail of the project, and their support can be valuable. The organization must communicate with them regularly and listen to their feedback but should not make excessive demands on their time.

Low power, less interested people: They should get monitored, but not be bored with excessive communication. The organisation should provide them with relevant information, when necessary, but should not make significant efforts to engage with them.

Overall, prioritizing stakeholders based on their power and interest requires a careful balance of communication and engagement, tailored to the specific needs and expectations of each stakeholder group. With reference to Thompson (2012) the organisation must regularly review its stakeholder engagement strategy and adjust it as necessary to ensure that it is meeting the needs and expectations of all stakeholders. To represent the different stakeholders clearly and visually, a power/interest diagram can be helpful in deciding how to act (Figure 5).

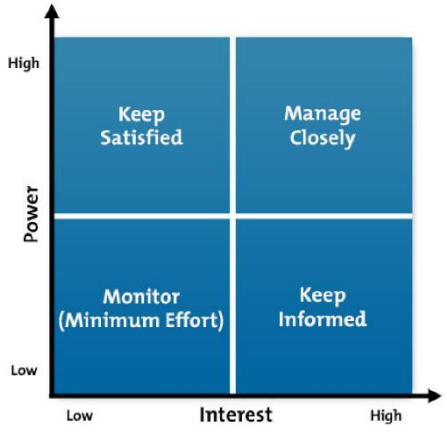


Figure 5: Power-Interest chart
Source: Thompson (2012)

In addition, she suggests leading questions to help prioritise key stakeholders.

> *What financial or emotional interest do they have in the outcome of your work?*
> *Is it positive or negative?*
> *What motivates them most of all?*
> *What information do they want from you?*
> *How do they want to receive information from you?*
> *What is the best way of communicating your message to them?*
> *What is their current opinion of your work?*
> *Is it based on good information?*
> *Who influences their opinions generally, and who influences their opinion of you?*
> *Do some of these influencers therefore become important stakeholders in their own right?*
> *If they are not likely to be positive, what will win them around to support your project?*
> *If you don't think you will be able to win them around, how will you manage their opposition?*
> *Who else might be influenced by their opinions?*
> *Do these people become stakeholders in their own right?*

Once stakeholders have been prioritised accordingly, dealing with them is simple. The stakeholders' needs can be weighted according to the prioritisation and the *ShareDiMobiHub* project can be shaped in the desired direction based on the weighting.

Conduct a stakeholder analysis step by step

Elias et al. (2002) studied StAna for R&D projects. R&D stands for *Research and Development* and describes the process by which a company works to obtain new knowledge that can lead to the company developing new technologies, products, services, or systems that can either be sold or used in-house. Eight steps are outlined to carry out a StAna:

1. Develop a stakeholder map of the project
2. Prepare a chart of specific stakeholders
3. Identify the stakes of the stakeholders
4. Prepare a power versus stake chart
5. Conduct a process level stakeholder analysis
6. Conduct a transactional level stakeholder analysis
7. Determine the stakeholder management capability of the R&D project
8. Analyse the dynamics of stakeholders

Elias et al. (2002) conducted a StAna using a road pricing R&D project in New Zealand as an example and explained the steps with references related to this project.

1. Develop a stakeholder map of the project: Identify and list all possible stakeholder groups who may be affected by the project, including internal and external individuals, organizations, and communities. Arrange the stakeholder based on their involvement in the project and put similarly assessed stakeholders' side by side in the map for a better overview (Figure 6).

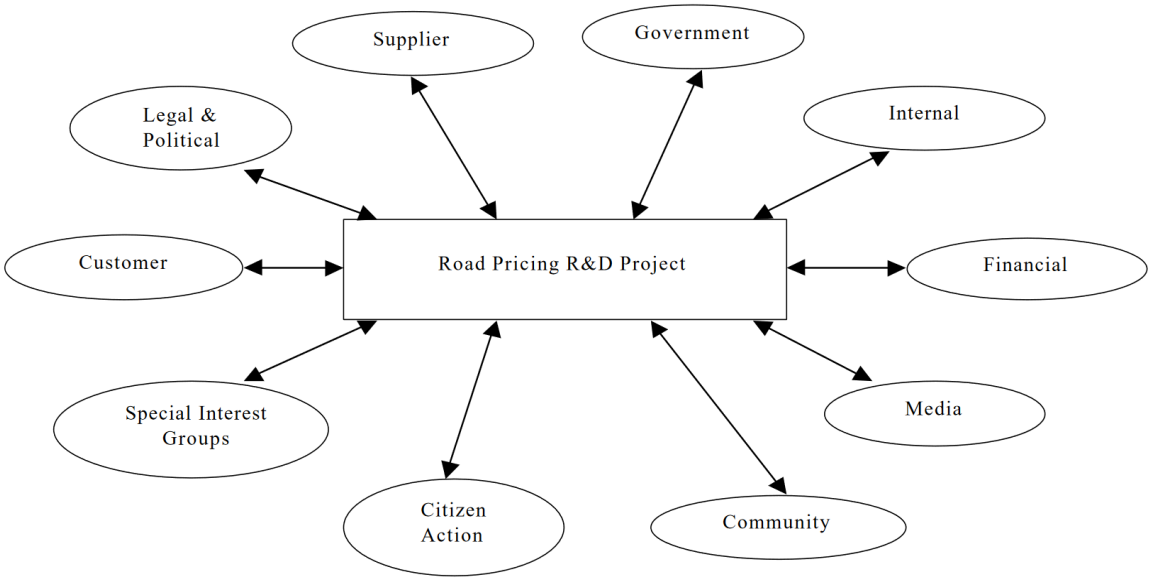


Figure 6: Stakeholder map of New Zealand's Road Pricing R&D project
Source: Elias et al. (2002)

2. Prepare a chart of specific stakeholders: Create a chart or spreadsheet that includes the specific stakeholders. Specific stakeholders should be elaborated from the identified stakeholder groups (Figure 7).

Internal Wellington regional councillors Regional land transport committee members Passenger transport committee members Environment committee members WRC environmental management department	Financial Commercial banks Private companies funding companies Transfund New Zealand The Treasury Inland revenue department
Media The Dominion newspaper Evening Post newspaper TV New Zealand Radio New Zealand Other local newspapers	Community IWI group - Ngati Toa IWI group - Te Ati Awaki Whakarongotai Farming Community: Pastoral Farmers at Horokiri Valley Forestry: Land Management Group, WRC Property Owners Wellington regional residents
Citizen Action Transmission gully action council Paremata residents association Pukerua bay residents association Plimmerton residents association Mana Esplanade action committee Save Paremata inlet committee Pauatahanui residents association Tawa progressive and ratepayers association Waikanae progressive and ratepayers association Guardians of Pauatahanui inlet	Special Interest Groups Department of Conservation Campaign for Better City Cycle Aware Friends of Patenui inlet Transport 2000 Haywards action group Gully alternatives information network Regional Park Users & Officials Tranz Rail Porirua Gun Club Officials
Customer Commercial road users association Regional chamber of commerce Public transport users association Other road users	Legal/Political New Zealand police Labour party National party Alliance party Greens party ACT party New Zealand First party
Government Ministry of Transport Wellington Regional Council Wellington City Council Hutt City Council Upper Hutt City Council Kapiti Coast District Council Porirua City Council Transit New Zealand	Supplier Booz. Allen & Hamilton-Consultants Beca Carter Hollings & Ferner Ltd.-Consultants: McDermott Miller Ltd. - Consultants

Figure 7: Specific stakeholder chart of New Zealand's Road Pricing R&D project
Source: Elias et al. (2002)

3. Identify the Stakes of the Stakeholders: Determine the interests and concerns of the stakeholders and how they may be impacted, what they stand to gain or lose by the project (Figure 8). The stakes usually only need to be concluded for each stakeholder group from the stakeholder map, as the group often pursue similar interests.

Regional Land Transport Committee	Transfund New Zealand	Transit New Zealand
Responsibility for regional transport development	Allocation of available funds	Safe and efficient state highway system Management of the needs of road users and communities
Commercial Road Users Association	**Transmission Gully Action Council**	**Regional Chamber of Commerce**
High users of the road	Construction of the Transmission Gully at the earliest Needs of local community	Regional business development Profits of member business groups

Figure 8: Stake chart of New Zealand's Road Pricing R&D project
Source Elias et al. (2002)

4. Prepare a Power versus Stake Grid: Plot each main stakeholder on a grid based on their level of power compared to their stake in the project (Figure 9). This is for clarity and helps to prioritise the different stakes. Stakes of powerful stakeholders should be prioritised in terms of engagement and management.

	Power		
Stake	Formal or voting	Economic	Political
Equity	Wellington Regional Council		
Economic	Transfund New Zealand	The Treasury Inland Revenue Department	
Influencers	Regional Land Transport Committee Transit New Zealand Regional Chamber of Commerce	Private funding companies Commercial banks	Labour Party Alliance Party National Party

Figure 9: Power vs. Stake chart of New Zealand's Road Pricing project
Source: Elias et al. (2002)

5. Conduct a Process Level Stakeholder Analysis: Assess the stakeholders' needs and expectations in terms of project processes, such as decision-making, communication, and involvement. To

do this, the needs and most desirable outcomes must be identified, and the best package selected. With the package, the projects and policies can be confirmed to be promising.

6. Conduct a Transactional Level Stakeholder Analysis: Analyse the transactions and interactions between the company and the stakeholders, including any conflicts or opportunities for collaboration. This involves assessing the collaboration between the project/company and the stakeholders as well as their transactions. Check whether the stakeholders' concerns are covered or at least plans are in place to cover them. In addition, if concerns are covered, it is important to check whether there are conflicts of interest between different stakeholders.

7. Determine the Stakeholder Management Capability of the R&D Project: Evaluate the project teams' ability to effectively manage and engage with stakeholders. First, it should be assessed whether the project management can correctly interpret the stakeholder map and operates accordingly. Then the organisational process and transactions for dealing with stakeholders can be assessed in a diagram (Figure 10).

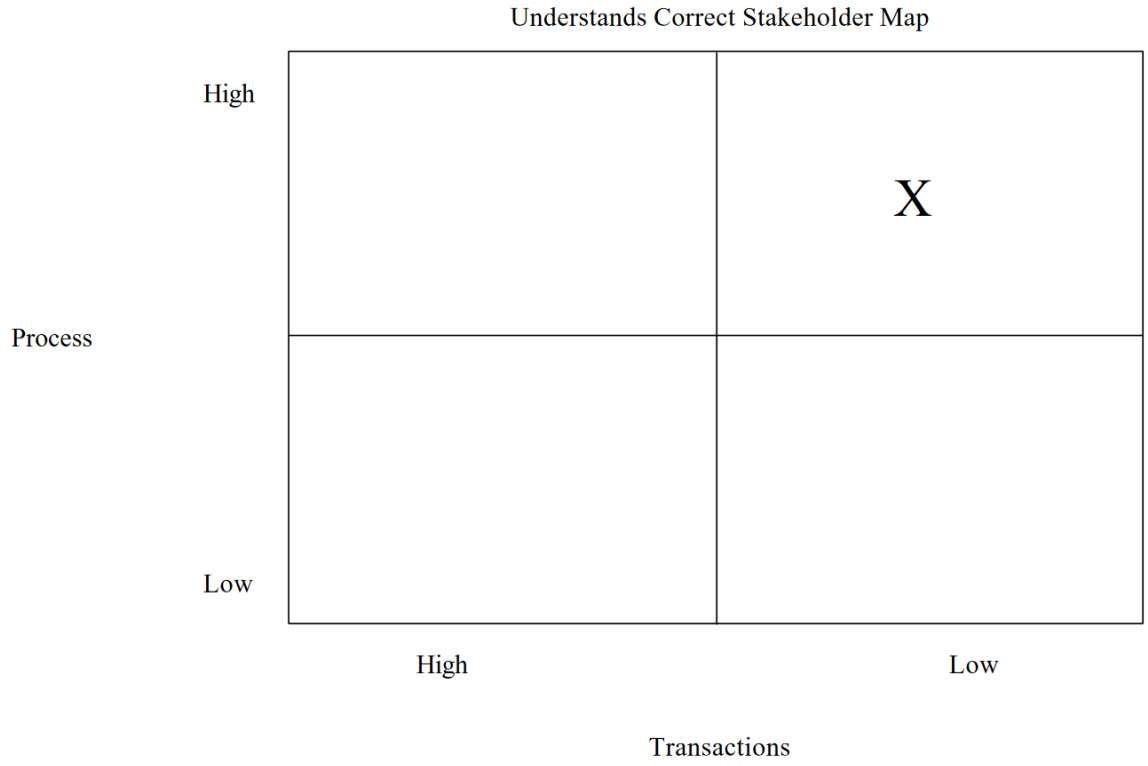


Figure 10: Process and Transaction chart of New Zealand's Road Pricing R&D project
Source: Elias et al. (2002)

8. Analyse the Dynamics of Stakeholders: Assess the evolving relationships and dynamics with and between the stakeholders over the course of the project, including changes in interest, power, and influence. The attitudes of stakeholders and their salience in the eyes of the project manager change with respect to time. The stakeholder typology by Mitchell et al. (1997) (Figure 4) can be used for this purpose. Project managers should continuously update the typology model (Figure 11).

Dormant (Power only)	*Discretionary (Legitimacy only)* Booz. Allen & Hamilton McDermott Miller Consultants Commercial banks Private funding companies	*Demanding (Urgency only)*	*Dominant (Power & Legitimacy)* The Treasury Inland Revenue Department
Dangerous (Power & Urgency)	*Dependent (Legitimacy & Urgency)* Transmission Gully Action Council Iwi group – Ngati Toa Transport 2000	*Definitive (Power, Legitimacy & Urgency)* Regional Land Transport Committee Transit New Zealand Transfund New Zealand Wellington Regional Chamber of Commerce	*Non-stakeholder (No Power, Legitimacy or Urgency)*

Figure 11: Stakeholder Typology chart
Source Elias et al. (2002)

According to Elias et al. (2002), by following these steps you can conduct a comprehensive StAna that can shape a project's stakeholder management strategies and help ensure the success and satisfaction of all parties involved. Thompson (2012) summarises a stakeholder approach that stakeholders should be identified and prioritised according to their power and interest. To visualise this, a power/interest grid should be created and used to assess what motivates stakeholders and how they can be won over to the project.

By following the steps with the stakeholders of the *ShareDiMobiHub* project, a lot of information can be gathered about the needs of the stakeholders and partners of the project. The evaluation of the StAna is feasible with this information and the chances of success increase.

3 Conduction and evaluation of the methods

3.1 Research Survey

This section focuses on the RS. How it was developed and conducted. In the following, it is explained why these questions were used, why they were formulated in such a way and what the purpose of the RS was. This RS was created with the RQ in mind, in constant exchange with Prof. Dr. Tessa Taefi and Franziska Wolf and is entitled “Assessment of Stakeholder Needs”.

3.1.1 RS Conduction

To plan and conduct the RS effectively, the ten steps presented by Stone (1993) were followed as suitably as practical.

Decide what data you need

First, it must be clarified what the goals of the RS are (Stone, 1993). The RS aims to collect information to answer the RQ. The RQ consists of two sub-questions. What content is relevant to the respondents and how should the content be presented? Therefore, the goals for the RS are to find out what content is needed and how users prefer to consume it. It must also be possible to assess what relevant content means to the respondents.

Thereupon, a variable list for answers to the goal-directed questions looks as follows. What stakeholders need depends on how well they know about SMHs and how they relate to them. The variables for this were different levels of knowledge and different affiliations to stakeholder groups (Table 1, Table 2).

Table 1: Knowledge level dummy table
Source: Own representation

How do you rate your knowledge about shared mobility hubs?	**Respondent A**	**Respondent B**	**Respondent C**
Expert knowledge	X		
Good knowledge			
Average knowledge			X
Some knowledge		X	
Not existent			
No Opinion			

Table 2: Stakeholder affiliation dummy table
Source: Own representation

To which of the following stakeholder groups do you count yourself/ your organisation?	**Respondent A**	**Respondent B**	**Respondent C**
Local and regional public authorities	X	X	
Public transport authorities, MaaS operators and shared mobility provider			X
Interest groups, including NGOs and third-party interested organisations			X
General public	X	X	X
Research/academia			
Other			
Don’t want to answer			

The thematic content of the platform can be inferred from the user's intentions. There are to many more variables to collect in one table if the respondents were given infinite choices about what content they would like to see. Some variables are learning certain information, practical training with plans, learning from others' experiences and sharing their own, building or maintaining a network in this area and raising their own awareness on this topic.

Table 3: Stakeholder's intention dummy table
Source: Own representation

Why would you access an information and learning platform dedicated to shared mobility?	**Respondent A**	**Respondent B**	**Respondent C**
To gain a general overview on the topic		X	
To read up on other stakeholders' experiences			X
To receive detailed expert information		X	X
For training purpose			X
To share my experiences with other stakeholders			X
To grow my personal network			X
Other			
Don't want to answer	X		

The content might get subdivided in different ways. Possible subdivisions might be different goals of SMHs, different levels of user experience, user affiliation to specific stakeholder groups, individual information goals and intentions, and different local origins. E.g., the level of experience and knowledge of a user can thus be estimated from experts to people who are not familiar with the topic.

Table 4: Content subdivision dummy table 1
Source: Own representation

Should there be options to access different content based on…?	**Respondent A**	**Respondent B**	**Respondent C**
… level of experience	X	X	
… affiliation with certain stakeholder group			X
… information goal	X		X
… regional location		X	
None show all content at once			
Other			
Don't want to answer			

Assigning certain content to a goal of a shared mobility hub implementation is another way for categorisation. Accordingly, the content for certain goals can be found under a category or provided with a tag. Whether goals, at all and to what extent some goals should receive their own category are the variables in this case (Table 5, Table 6).

Table 5: Content subdivision dummy table 2a
Source: Own representation

Should content be categorised/ tagged for different goals?	**Respondent A**	**Respondent B**	**Respondent C**
Yes	X	X	X
No			
Don't want to answer			

Table 6: Content subdivision dummy table 2b with Likert scale answer options
Source: Own representation

Which goals of shared mobility hubs should have their own category/ tag?	**Respondent A**	**Respondent B**	**Respondent C**
Reduction of enviromental pollution	Agree	Strongly agree	Agree
Improvement of climate protection	Strongly agree	Strongly agree	Agree
Reduction of inhabitants' vehicle ownership per capita	Undecided	Disagree	Undecided
Reduction of automotive traffic density for private transport purpose	Agree	Undecided	Strongly agree
Reduction of automotive traffic density for urban goods delivery	Undecided	Agree	Disagree
Improvement of personal mobility and connectivity	Strongly disagree	Strongly disagree	Undecided
Reduction of mobility poverty	Disagree	Disagree	Strongly disagree
Other	N/A	N/A	N/A

Variables for the second sub-question of the RQ are different formats to present the content. The knowledge can be provided in many ways, such as information texts, real-time and/or real-time delayed exchanges with other users of the platform, and physical meetings in which users can participate. Many people learn best in their own ways and therefore there might be a lot more variables than these which the RS must be able to deal with. Common variables with the most expected responses were listed in Table 7.

Table 7: Learning types dummy table
Source: Own representation

In which ways do you like to learn?	**Respondent A**	**Respondent B**	**Respondent C**
Consumption of presented knowledge	X	X	X
Non-simultaneous online exchange	X		
Simultaneous online exchange		X	
Physical meetings		X	X
Other			
Don't want to answer			

Select items for inclusion

To select the right items, the variables from *Decide what data you need* get linked to the goals and it is evaluated which variable contributes to the fulfilment of which goal. The variables of the different users' intentions with the platform are purposeful for deciding which thematic content and which features the platform should offer. The numerous possibilities for content help determining the desired content of the platform.

For the segmentation of the content, the variables are crucial for how the thematic content is subdivided and thus displayed. This, therefore, tracks how content is seperated, but also how the content is displayed.

By evaluating variables related to the experience and knowledge levels of users, it is possible to find out what it takes to satisfactorily educate respondents on the topic, so that the relevance of contents becomes measurable (Bookstein, 1979).

With the different ways in which users like to learn and prefer to be informed, the most demanded ways and media of information providing can be determined.

Each of the possible variables thus pursues the fulfilment of one or more goals. Either the variables help to estimate which content is relevant, which content is desired or how the content should be displayed on the platform.

Design individual questions

The first draft of the RS`s questions were created, and all boundary conditions were clarified. This RS, due to the current state of technology, was conducted online. As Taherdoost (2016) judged, conducting a survey by post as well as in person or by telephone is advantageous in case of misunderstandings, but it also requires a lot of time and effort. But conducting the RS online might bring disadvantages which could lead to falsification of the results (Taherdoost, 2016).

Nevertheless, the advantages outweigh the disadvantages, especially with many participants. The time and effort required is significantly less due to tools on the internet. A relatively high number of participants was expected for this RS, which strengthened the advantages and resulted in the development of a quantitative RS. In this quantitative RS, multiple choice questions are used because they have often proven to be promising for opinion polling, which was required in this case (Nicol, 2007).

The first draft of the questions, answers and information texts of the questionnaire were different from the final version, since feedback on them regarding the wording, aiming and meaningfulness was collected in the later pretests. Thus, the questionnaire was revised, and feedback was collected for the next draft version until it was ready for use. For the sake of clarity, the results of *Prepare the first draft and pretest* are brought forward and applied directly.

Through the feedback, expert opinions came together from Prof. Dr. Tessa Taefi, Franziska Wolf, and Daniel Herrera, with whose cooperation the questions, answers and information texts were promisingly formulated and chosen.

The RS started with an introduction (Figure 12) of the topic, introducing the implementers, demonstrating trustworthiness, and thanking them for their participation, since an explanation of the RS`s content is recommended (Ponto, 2015).

Figure 12: Survey Introduction
Source: Screenshot from LimeSurvey

Since this is an online RS, uncertainties on the part of the respondents had to be expected. Therefore, for each question, the option was given to choose an own answer or no answer. Therefore, options such as “Other”, which must be specified by the respondent, and “Don`t want to answer” were provided.

To get the answers to the variables for the users' intentions, the participants should reflect themselves to be clear about their own level of knowledge and the reasons why they would use the platform. Prof. Dr. Tessa Taefi advised two types of questions for self-reflection, through which participants should assess their knowledge and assign themselves to a stakeholder group.

The first question is about the respondent’s knowledge and the associated response options were based on the Likert scale with five possibilities for self-assessment (Figure 13).

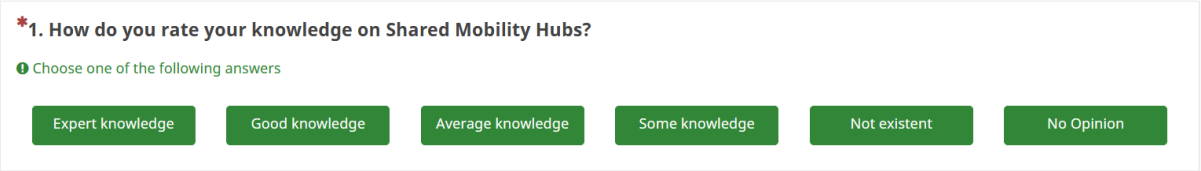


Figure 13: Survey question 1
Source: Screenshot from LimeSurvey

The second question asks respondents to assign themselves to a stakeholder group and the answer options cannot be represented by a Likert scale but are represented with predefined stakeholder groups (Figure 14).

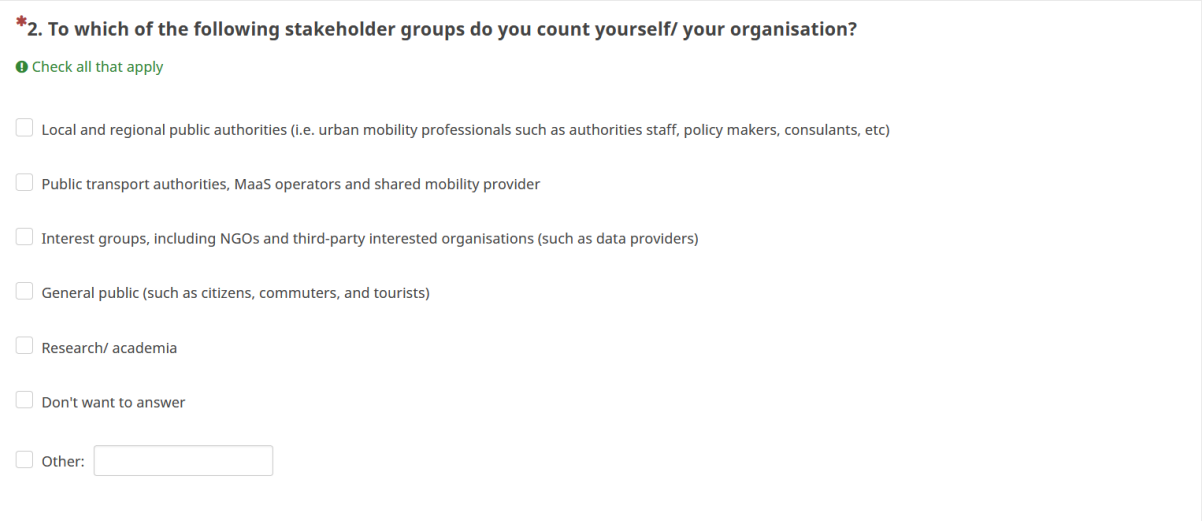


Figure 14: Survey question 2
Source: Screenshot from LimeSurvey

These questions provide a clean introduction to the RS without diving too deeply into the topic. With the third question about the specific intentions of the participants with the platform, it becomes more concrete, and the goal of which content the platform should contain is pursued (Figure 15). Here, predetermined answers are given in addition to the “Other” and the “Don't want to answer” option. These predetermined answer options are not yet specific but by selecting these answers, further sub-questions to each answer option were logically revealed with the help of the online tool.

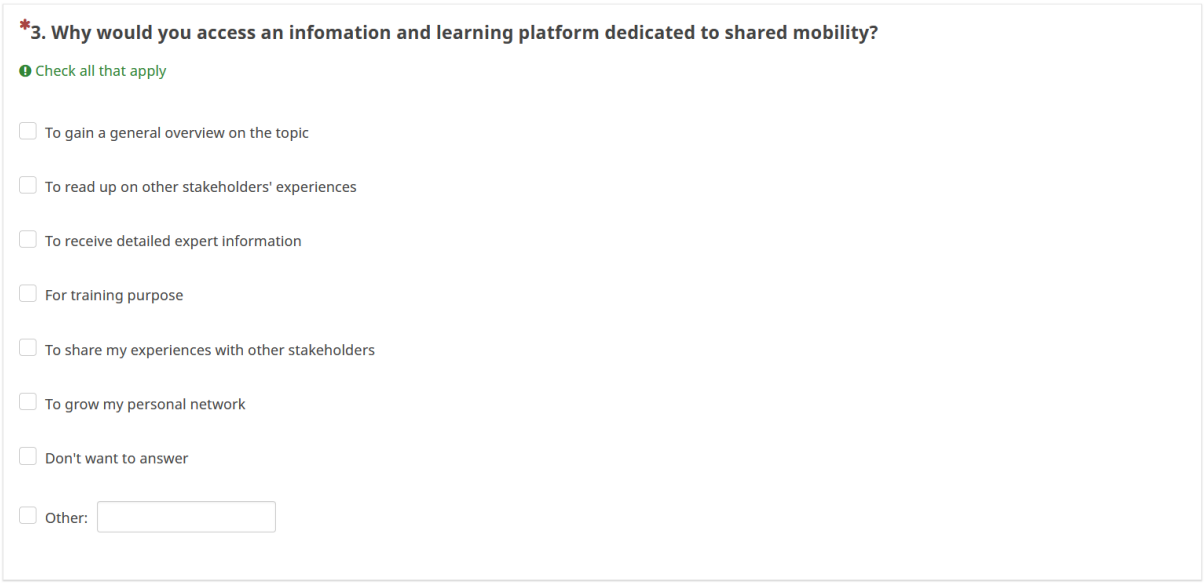


Figure 15: Survey question 3
Source: Screenshot from LimeSurvey

If “To gain a general overview on the topic” was selected, the following sub-question and new answer options were displayed (Figure 16).

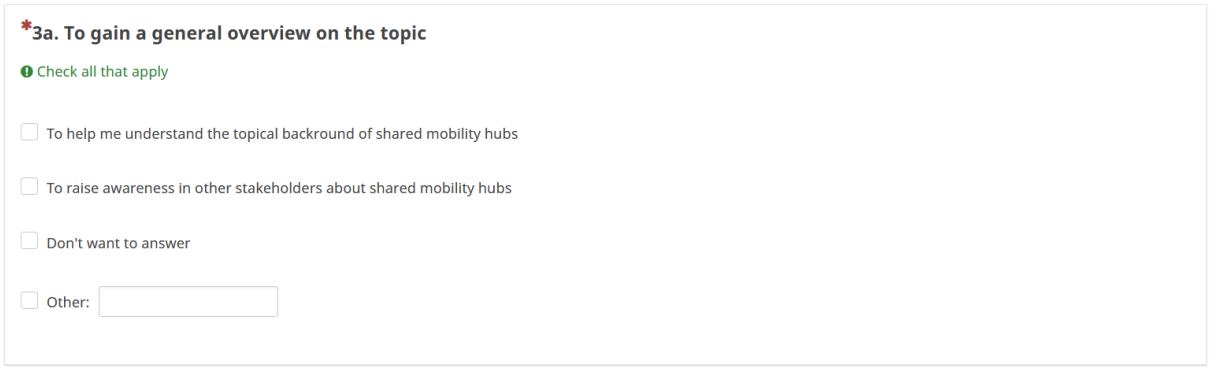


Figure 16: Survey question 3a
Source: Screenshot from LimeSurvey

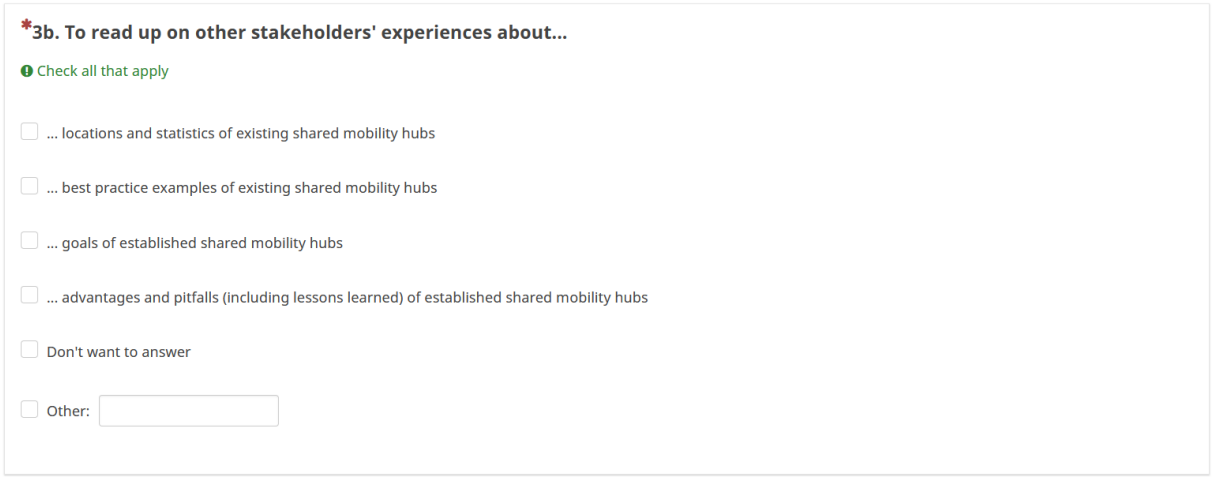


Figure 17: Survey question 3b
Source: Screenshot from LimeSurvey

If “To read up on other stakeholders' experiences” was selected, the sub-question and new answer options were displayed like in Figure 17.

If “To receive detailed expert information” was selected, the following sub-question and new answer options were displayed (Figure 18).

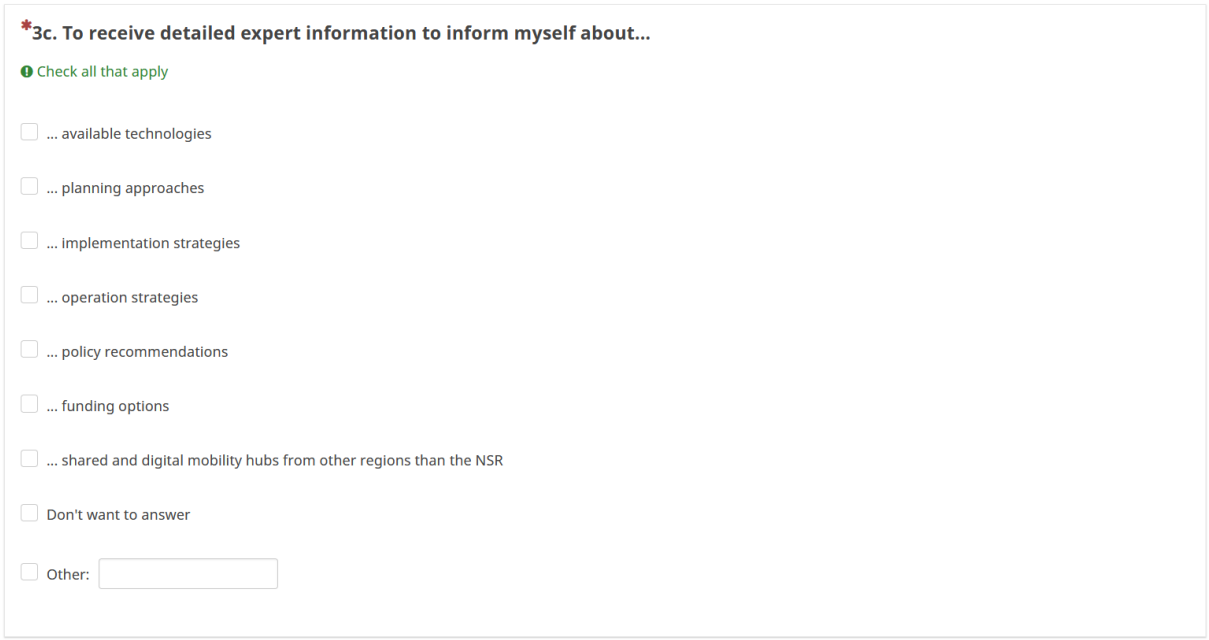


Figure 18: Survey question 3c
Source: Screenshot from LimeSurvey

If “For training purpose” was selected, the following sub-question and new answer options were displayed (Figure 19).

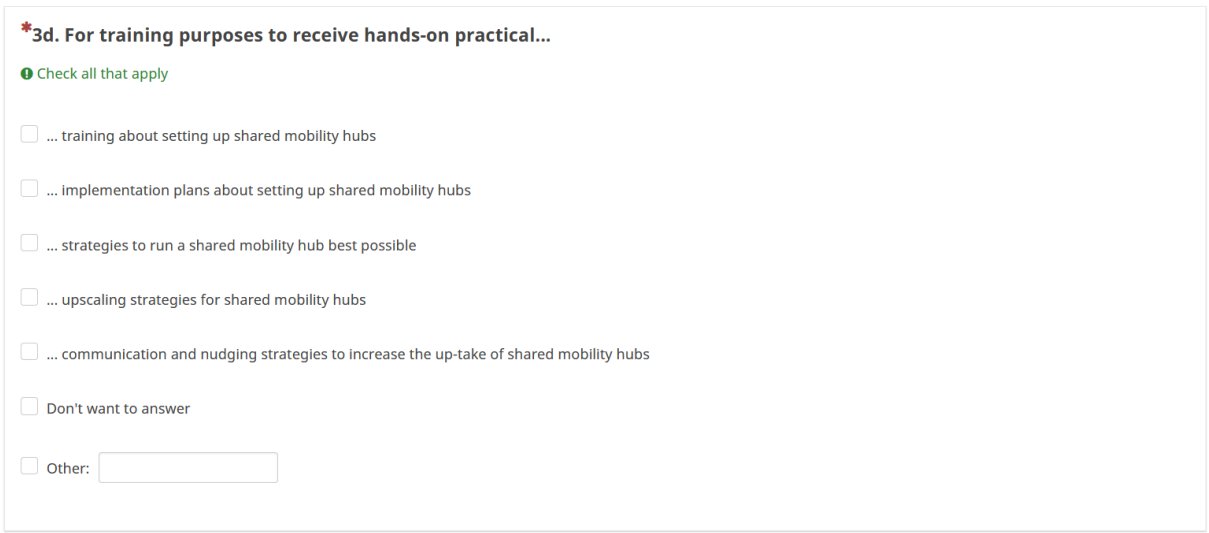


Figure 19: Survey question 3d
Source: Screenshot from LimeSurvey

If “To share my experiences with other stakeholders” was selected, the following sub-question and new answer options were displayed (Figure 20).

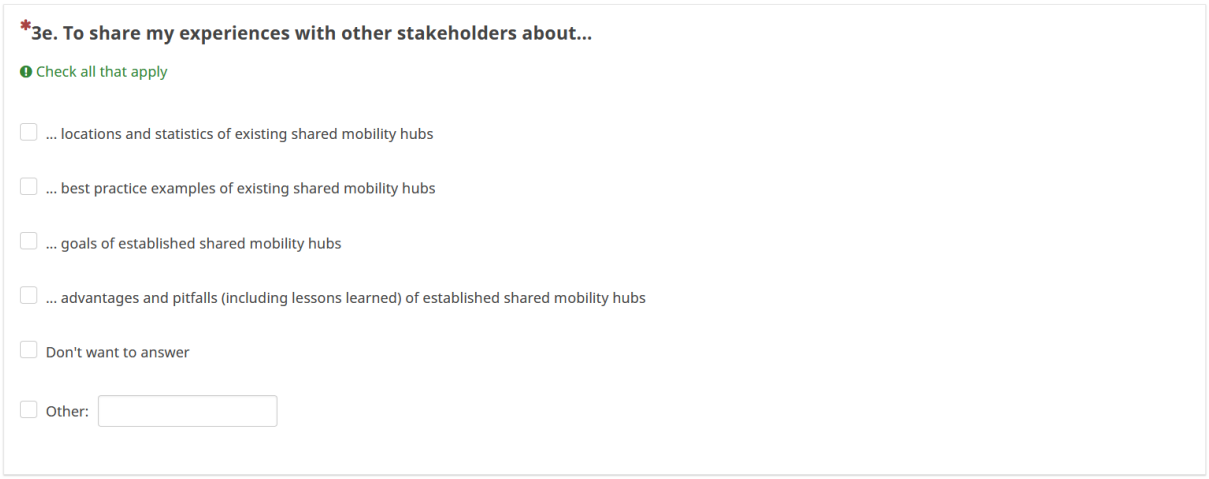


Figure 20: Survey question 3e
Source: Screenshot from LimeSurvey

If “To grow my personal network” was selected, the following sub-question and new answer options were displayed (Figure 21).

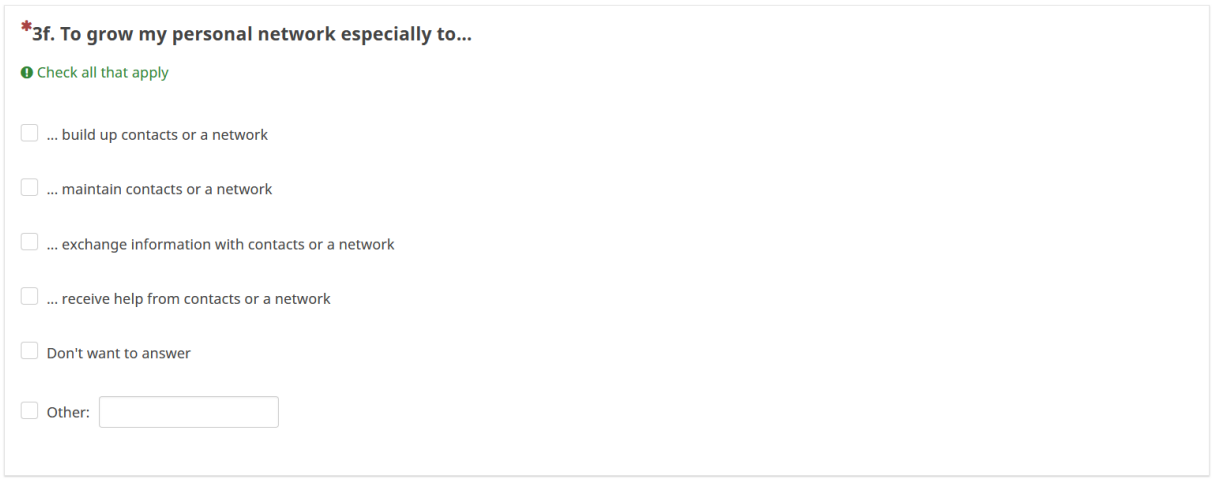


Figure 21: Survey question 3f
Source: Screenshot from LimeSurvey

The same logic was used to address the fourth question, which aims to determine how the content should be presented on the platform. A short introductory text was provided for this purpose (Figure 22).

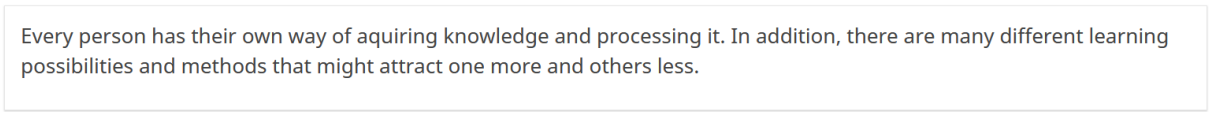


Figure 22: Survey information text for question 4
Source: Screenshot from LimeSurvey

For the goal, in which formats the content should be presented, the respondents were asked to indicate the ways in which they prefer and are best at learning (Figure 23). As for the third question (Figure 15) the answer options consist of additional specific answers to sub-questions. The sub-questions were displayed as soon as an answer option was selected.

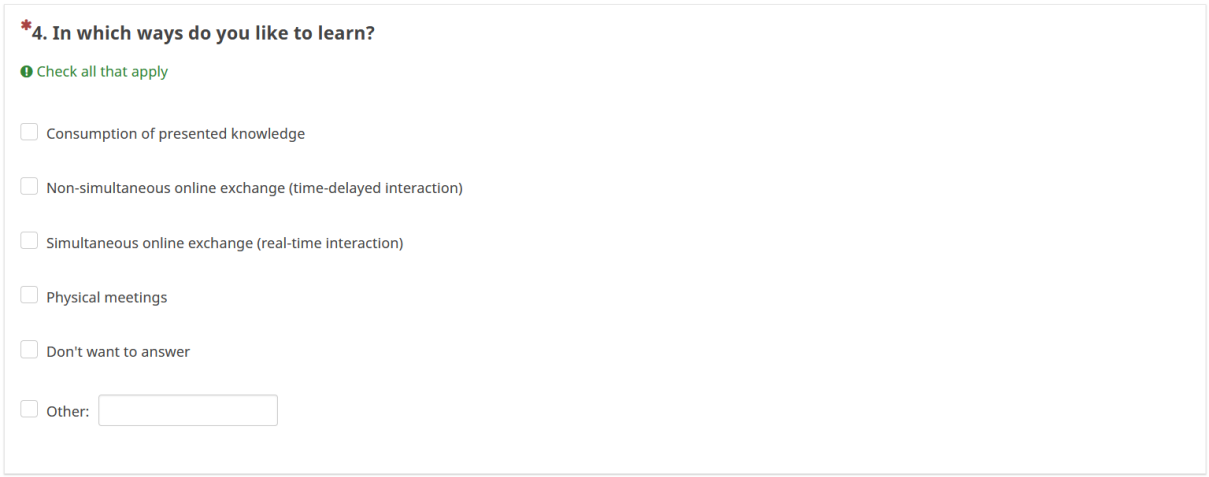


Figure 23: Survey question 4
Source: Screenshot from LimeSurvey

If “Consumption of presented knowledge” was selected, the following sub-question and new answers appeared for this type of learning (Figure 24).

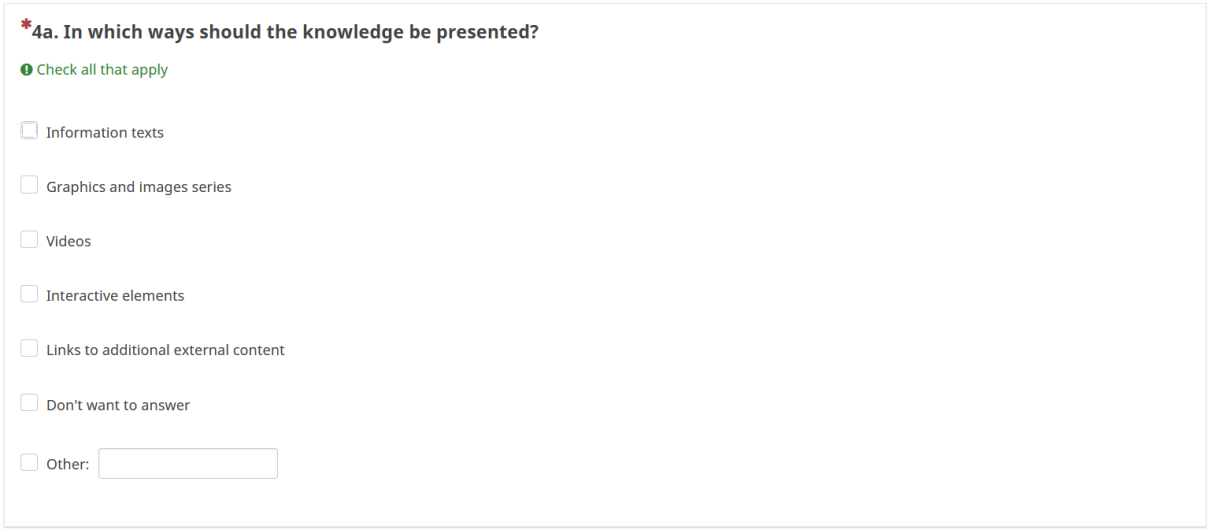


Figure 24: Survey question 4a
Source: Screenshot from LimeSurvey

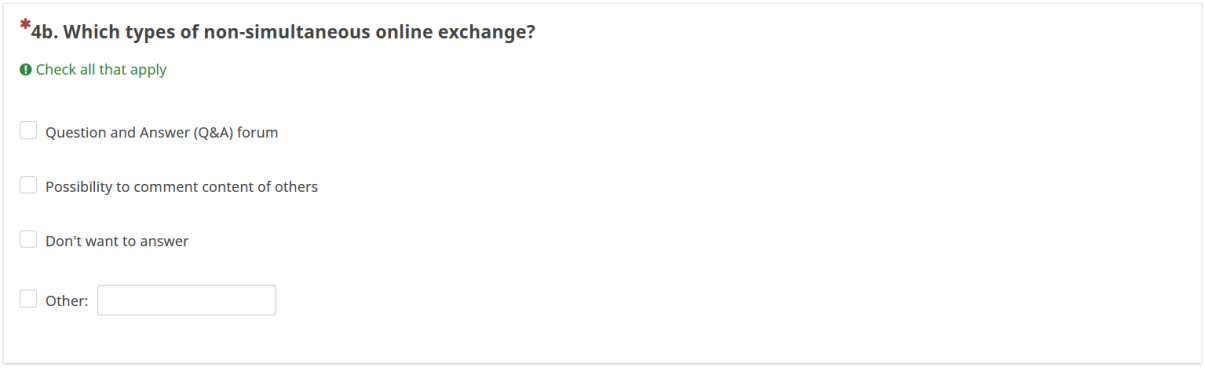


Figure 25: Survey question 4b
Source: Screenshot from LimeSurvey

If “Non-simultaneous online exchange” was selected, the sub-question and new answer options were displayed like in Figure 25.

If “Simultaneous online exchange” was selected, the following sub-question and new answers appeared for this type of learning (Figure 26).

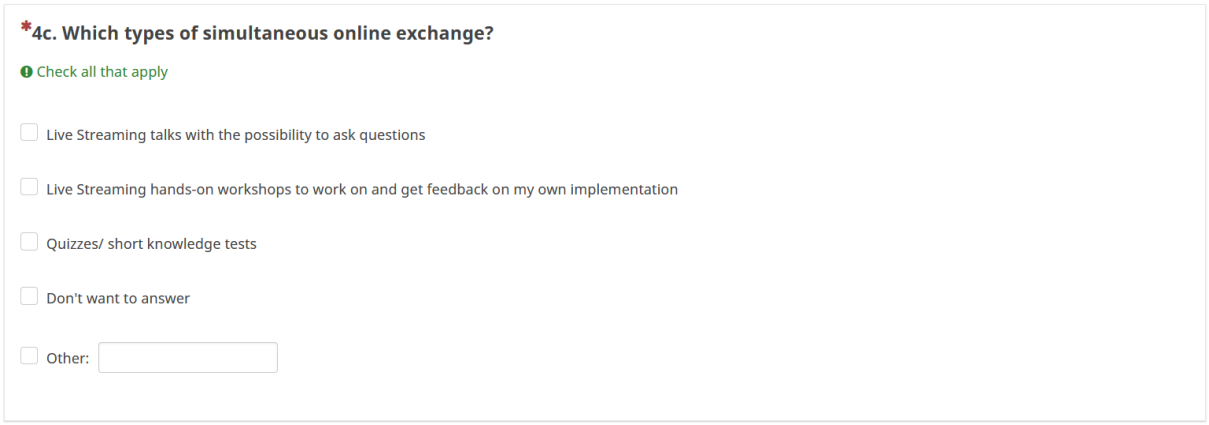


Figure 26: Survey question 4c
Source: Screenshot from LimeSurvey

And if “Physical meetings” was selected, the following sub-question and new answers appeared for this type of learning (Figure 27).

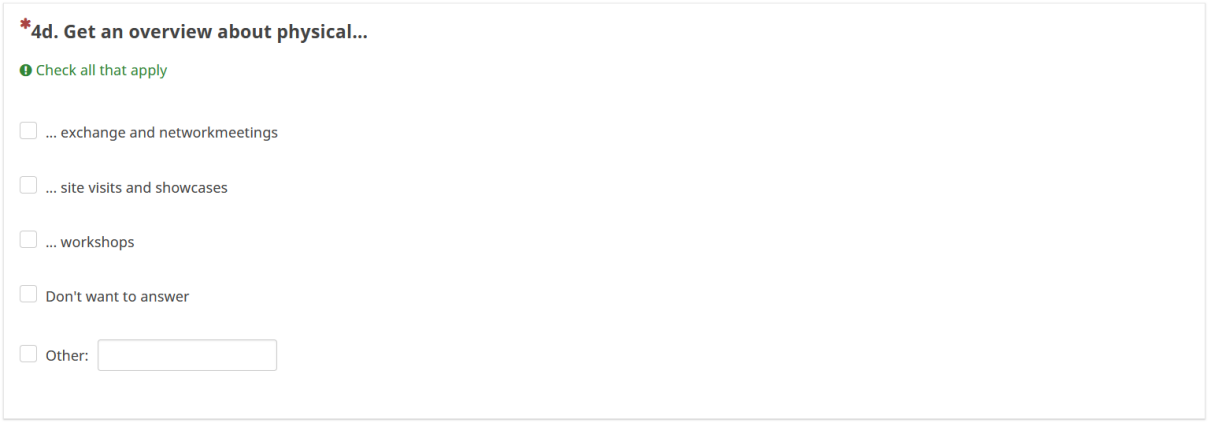


Figure 27: Survey question 4d
Source: Screenshot from LimeSurvey

These questions and sub-questions (Figure 23 to Figure 27) were used to reveal stakeholders' preferences on how they like to consume and learn knowledge and information. At the same time, general ways as well as a variety of predetermined specific types of learning were offered, so that the “other” option was perhaps not needed too often.

For the goal of “what content should be displayed“, there are very many variables, and an equally large number of possible contents stakeholders could have asked for. As it would have gone beyond the scope of the answer options, a multiple-choice question was not suitable for this. Contrary to a quantitative survey, an open-ended question was used as the fifth question and likely to be more effective. The effort

to evaluate this open-ended question with a highly estimated number of participants was nevertheless less than to work out appropriate answer options for all stakeholders. Moreover, an open-ended question naturally covered all possible answers, and respondents were able to write a self-formulated textual answer (Figure 28).

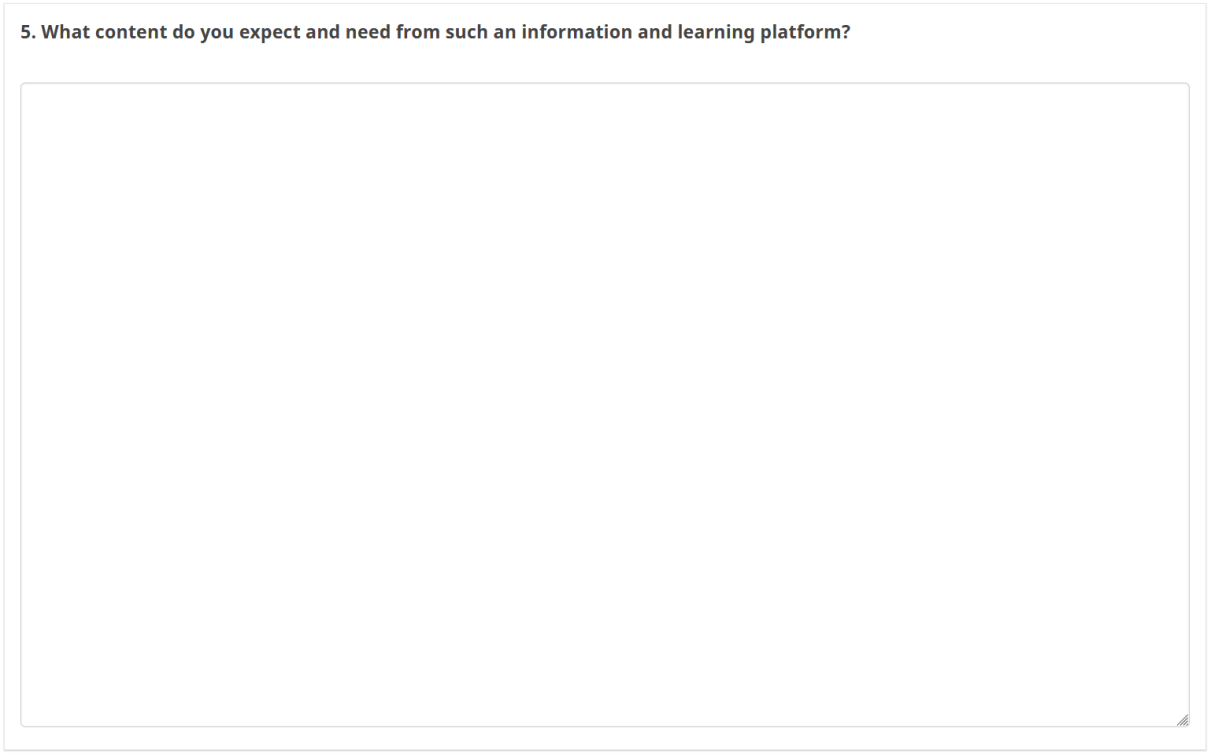


Figure 28: Survey question 5
Source: Screenshot from LimeSurvey

After the stakeholders had reflected on what content they would like to see, a way to classify the content was offered. To clarify and introduce this option, classification reasons were shortly explained (Figure 29). Thereupon followed the sixth question with its answers (Figure 30).

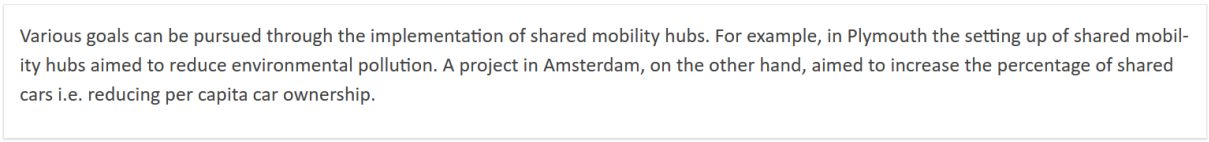


Figure 29: Survey information text for question 6
Source: Screenshot from LimeSurvey

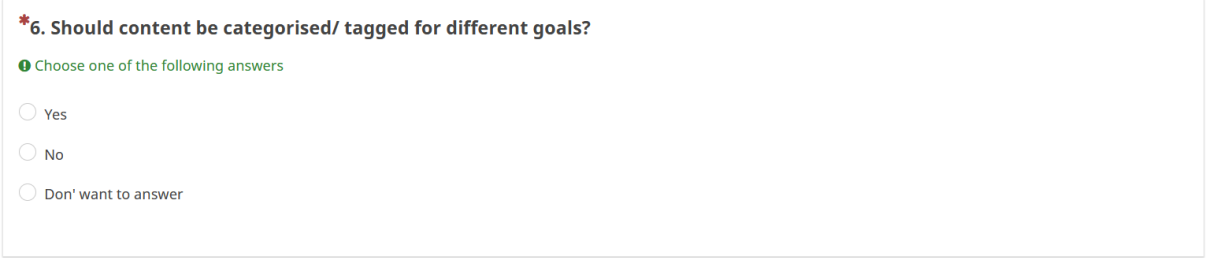
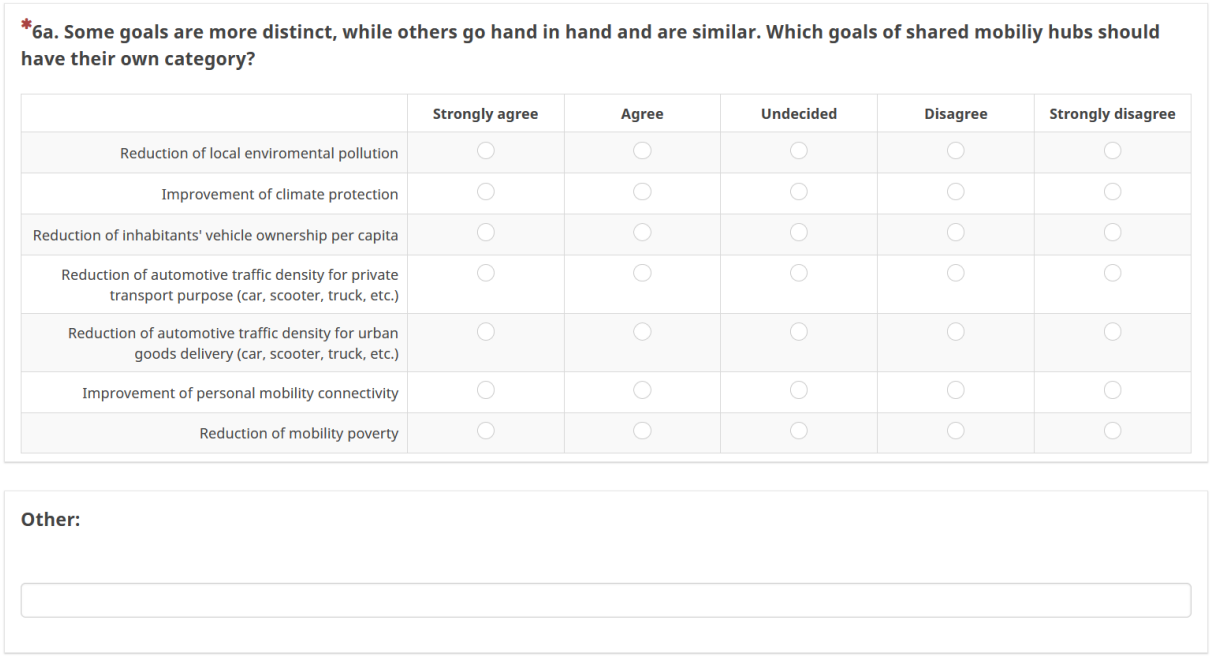


Figure 30: Survey question 6
Source: Screenshot from LimeSurvey

It was a simple yes/no question offering to categorise the content based on different goals of the implementation of SMHs. If this question (Figure 30) was answered with “Yes”, a new sub-question was displayed (Figure 31).



*6a. Some goals are more distinct, while others go hand in hand and are similar. Which goals of shared mobiliy hubs should have their own category?

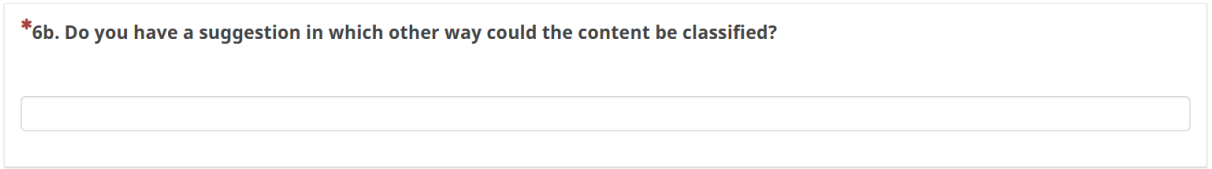
	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Reduction of local enviromental pollution	○	○	○	○	○
Improvement of climate protection	○	○	○	○	○
Reduction of inhabitants' vehicle ownership per capita	○	○	○	○	○
Reduction of automotive traffic density for private transport purpose (car, scooter, truck, etc.)	○	○	○	○	○
Reduction of automotive traffic density for urban goods delivery (car, scooter, truck, etc.)	○	○	○	○	○
Improvement of personal mobility connectivity	○	○	○	○	○
Reduction of mobility poverty	○	○	○	○	○

Other:

Figure 31: Survey question 6a
Source: Screenshot from LimeSurvey

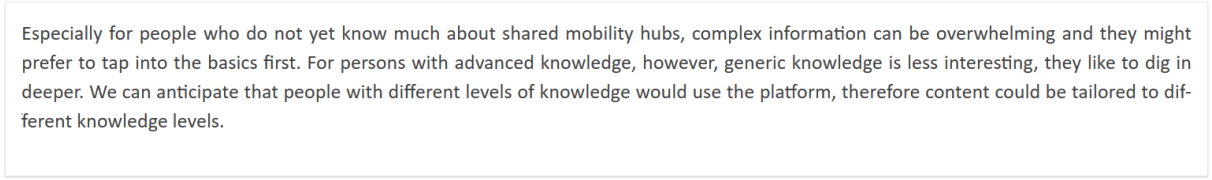
These goals could to some extent be duplicated in the eyes of some stakeholders and therefore these goals were not simply selectable, but they are rateable with a Likert scale as to whether they have the relevance for their own category/tag. In this case, “Undecided” represented the “Don't want to answer” option but an “Other” option remains, which was rated “Strongly agree” if used.

However, if the previous question (Figure 30) was answered with “No”, the respondent could formulate his or her own answer to the question (Figure 32).



*6b. Do you have a suggestion in which other way could the content be classified?

Figure 32: Survey question 6b
Source: Screenshot from LimeSurvey



Especially for people who do not yet know much about shared mobility hubs, complex information can be overwhelming and they might prefer to tap into the basics first. For persons with advanced knowledge, however, generic knowledge is less interesting, they like to dig in deeper. We can anticipate that people with different levels of knowledge would use the platform, therefore content could be tailored to different knowledge levels.

Figure 33: Survey information text for question 7
Source: Screenshot from LimeSurvey

Finally, to round off the RS, it was explained to the respondents that not all respondents and users of the platform might have the same level of knowledge through an information text (Figure 33).

This was followed by the seventh question as to what the platform should consider in terms to display different content (Figure 34).

Figure 34: Survey question 7
Source: Screenshot from LimeSurvey

The RS was then finished and to inform the participant of this and to thank them again, an outroductory text was shown (Figure 35).

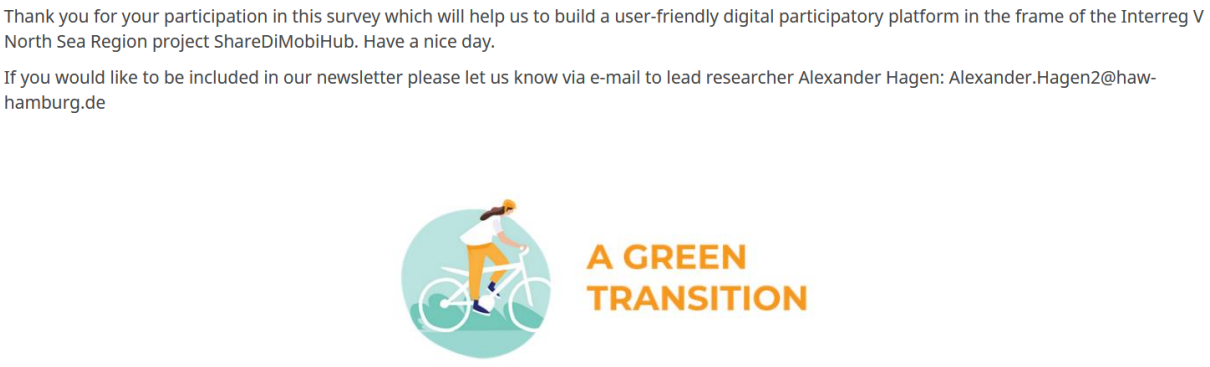


Figure 35: Survey end screen
Source: Screenshot from LimeSurvey

The questions and the wording of these had changed frequently during the development of the RS. With the expert opinions of Prof. Dr. Tessa Taefi, Ms. Franziska Wolf and Mr. Daniel Herrera, the above-mentioned questions, answers, and information texts were developed and formulated for the RS to lead to the desired success in the best possible way.

Compose wording

The wording of the questions, answers and information texts is fundamental for the perception of the RS on the participant. A survey should be appropriate, intelligible, unambiguous, unbiased, capable of coping with all possible responses, satisfactorily coded, piloted, and ethical (Stone, 1993). Some of this can be achieved with the wording.

For a survey to be appropriate and ethical, respondents must not feel offended by questions, answers, or information texts. Thus, a polite tone must be observed, and it must be considered whether respondents could feel attacked, especially in the case of critical topics. To this end, particular attention was paid to an appropriate tone in the introductory and closing texts.

To make the RS intelligible, the words used were chosen to be simple. Technical terms or terms that could be defined differently can be a source of misunderstanding. Thus, instead of “empiricism” from the RQ, “experiences” was chosen, instead of “subdivision”, “level” or “category” was chosen and the chosen words persisted for the whole RS, so the respondents did not think about the choice of words, but about the topic. For example, after the response " Reduction of local pollution " from Figure 31, the following responses also begin with "Reduction of…" instead of, for example, "Reducing...".

Furthermore, the wording of each question and answer was chosen to be unambiguous. This means that a question should not offer several possibilities by asking if “A or B?”, for example, just as an answer could not cover several answers. With every answer to a question, the respondent and the creator of the survey were supposed to mean the same thing.

Finally, the wording can be used to ensure that no question, answer, or information text leads to an answer, so that the RS was unbiased. For this purpose, only facts were mentioned in the information texts and not evaluated, the questions were posed neutrally and none of the answers were emphasised or formulated as indispensable or useless.

Design layout and presentation

To design a layout a roadmap for the RS was created. There were five super categories in the roadmap: *Introduction*, *Introductory Questions*, *Thematic-Content Question*, *Layout Questions* and *End of the Survey*.

For the *Introductory Questions*, Stone (1993) advised starting with an icebreaker question. This should not yet be very thematic in content but should arouse interest. In this super category the focus was on the respondent, he should reflect how he stands on the topic. Therefore, the question asked about the respondent's level of knowledge and goals (Figure 13, Figure 14). The entire third and fourth questions also belong to this super-category (Figure 15 to Figure 27). These go a little deeper into the topic and prepare the transition for the *Thematic Content Question*.

In the super category *Thematic-Content Question*, the focus was on the answers to the specific topics. This super-category contained only one open question, but this covers the purpose of finding out what content the stakeholders need and want.

The RS was rounded off with *Layout Questions* that asked how the content might get arranged. This category was positioned there because it should logically come after the thematic content question, so the respondents were clear about what they expect from the platform.

Finally, the *End of the Survey* was reached with a closing text thanking the respondents for their participation. The "boring demographic questions" (Stone, 1993) could also be asked at the end of the RS, but these were not relevant to the goals of the RS.

Think about coding

The RS was conducted and developed using LimeSurvey (https://www.limesurvey.org/). The logic of the implemented questions and answers were defined with it.

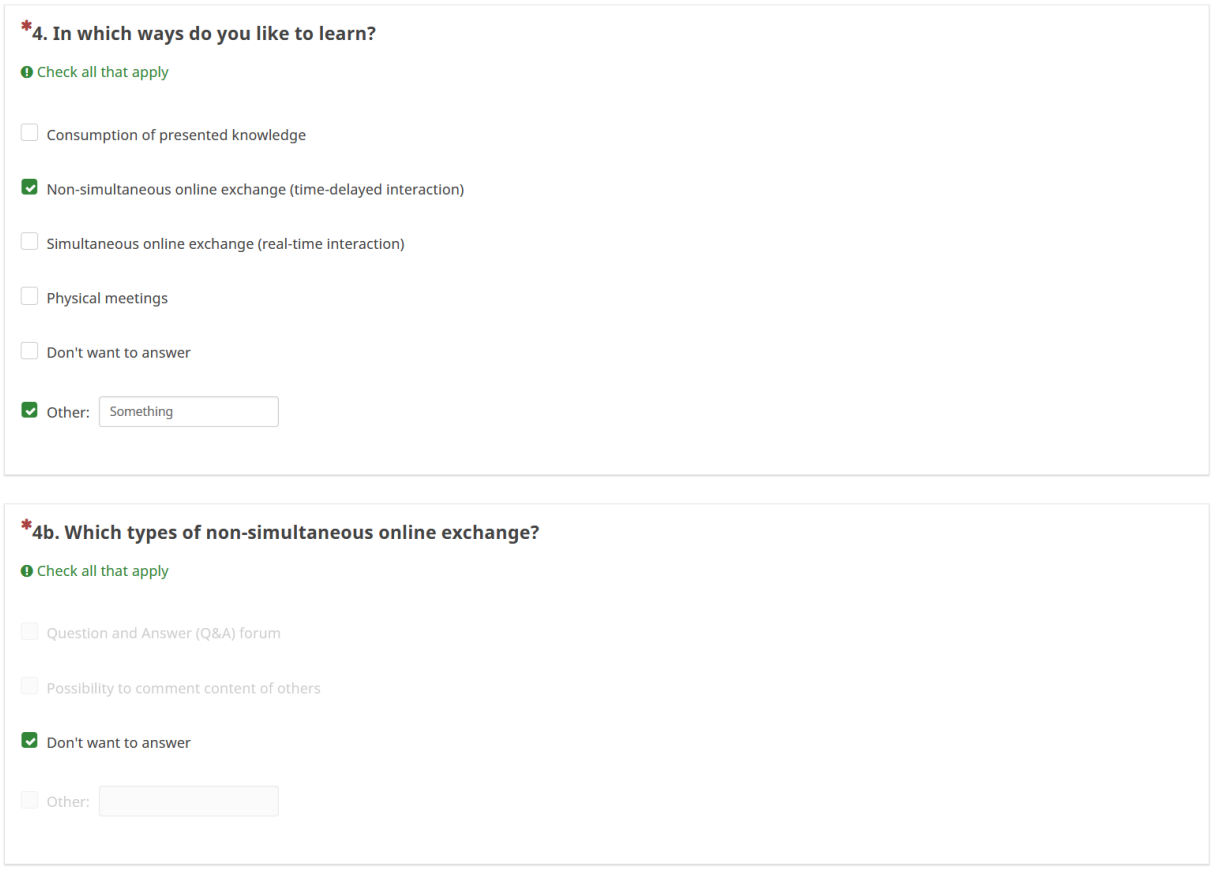


Figure 36: Question coding example
Source: Screenshot from LimeSurvey

In Figure 36 you can see that by selecting the answer "Non-simultaneous online exchange (time-delayed interaction)" the corresponding sub-question is displayed below. If "Consumption of presented knowledge" would also be selected, the sub-question for this answer would first be displayed under this question.

Furthermore, the “Other” option is selected, which can only be chosen if it is specified next to it in the text box and which also allows the RS to be described as a capable of coping with all possible responses, which was one of Stone's (1993) criteria.

The red star at the top left of the question means that this question is a mandatory question. However, if you still do not want to answer, the option “Don't want to answer” can be chosen which, if selected, will disable all other options, as can be seen in the sub-question below.

Under the question it says, “Check all that apply”, which clarifies that several answers can be selected. If it is a question where only one answer can be selected, it says “Choose one of the following answers” under the question.

The design used is the Fruity Theme, which is a template from LimeSurvey. To tick off another of Stone's (1993) criteria, the RS is also satisfactorily coded with LimeSurvey to prevent errors and to be user-friendly.

Prepare the first draft and pretest

The results of the pretests have been mentioned in *Design individual questions* and brought forward. The expert opinions of Prof. Dr. Tessa Taefi, Franziska Wolf and Daniel Herrera shaped the formulation and selection of questions, answers, and information texts, as well as the basic building blocks of the RS's objectives. This step also included sampling the participants. Since this RS related to the *ShareDiMobiHub* project, the sample was limited to the project partners and thus important stakeholders.

Pilot

The piloting was carried out on a small scale. The RS was only presented to a few people as a pretest in the previous step. Due to the effort and time lost detailed piloting nearly left out since the RS was regularly accompanied by experts. The last pretest was seen as the piloting with the final draft in LimeSurvey. The focus was on logic to assure satisfactorily coding.

Perform the survey & start again

Finally, the RS was performed online for a period of three weeks. The RS was not carried out for a second time in this frame due to the time component since the data should be evaluated in a timely manner.

3.1.2 RS Evaluation

After three weeks the RS was closed and a total of 46 stakeholders took part. Of the 46 participants, 31 fully submitted the RS completely and 15 participants dropped out and did not answer all the questions. The results of the questions were illustrated by pie charts. The most frequently selected answer is the most relevant. Answers that have been chosen similarly often are also similarly relevant. From this RS,

the two most frequently selected answers will be used to answer the RQ. If more than two answers have been chosen similarly often, all similarly relevant answers will be considered.

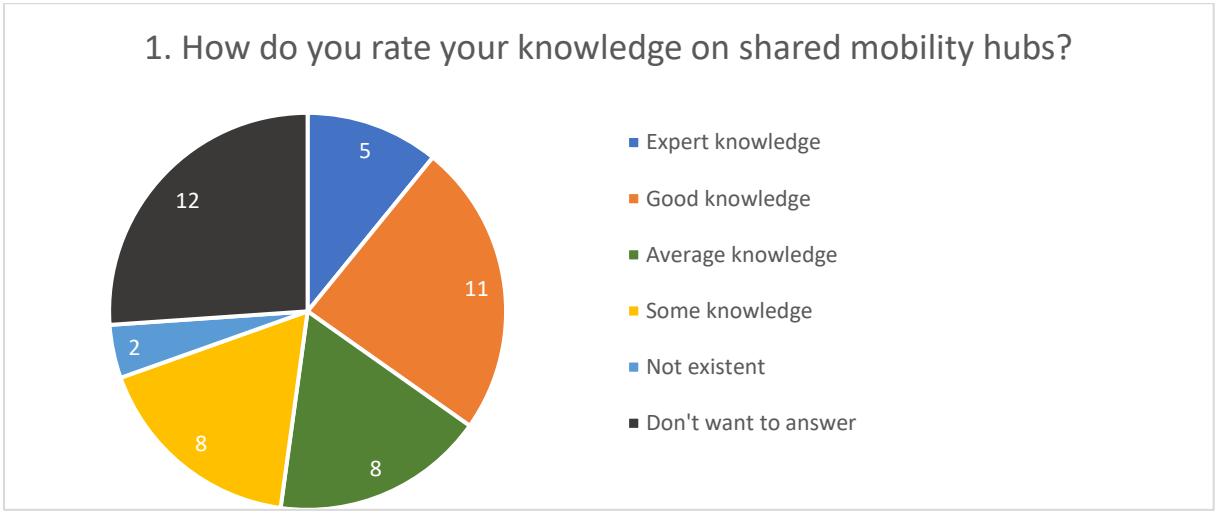


Figure 37: Pie diagram for answers to question 1
Source: Own diagram

From the results of the first question (Figure 37), the stakeholders and users of the platform will involve many different levels of knowledge. This means that both newcomer content and expert content will be relevant to satisfy the users' learning needs (Bookstein, 1979).

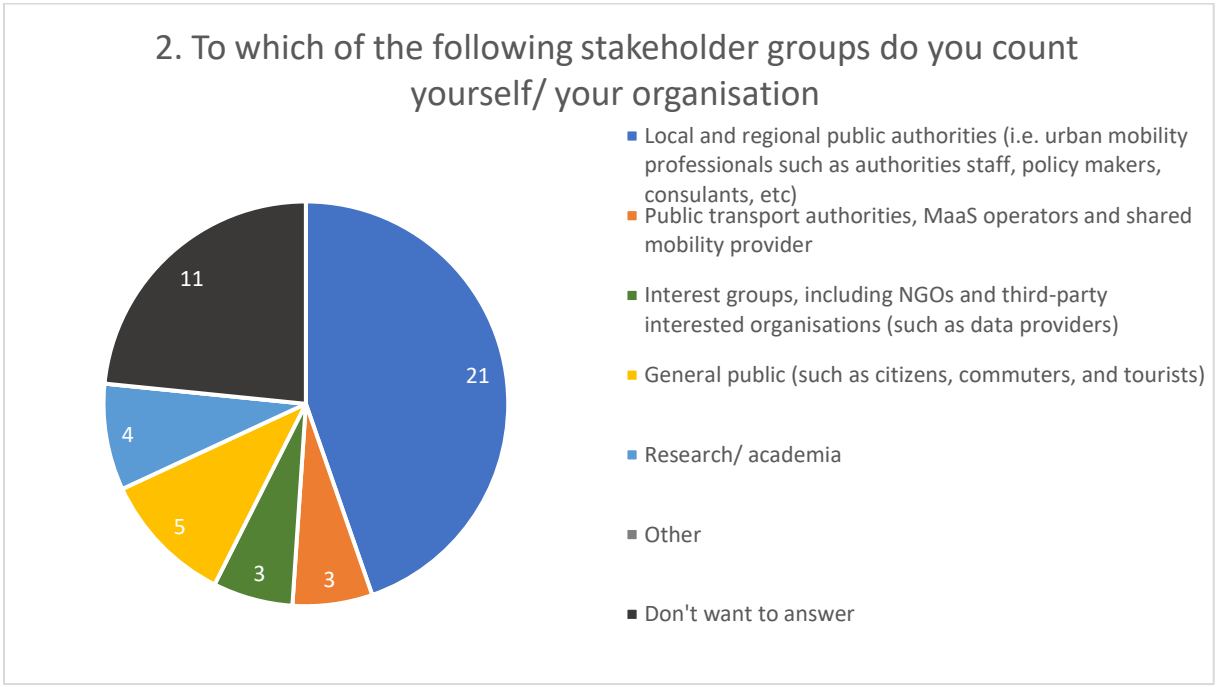


Figure 38: Pie diagram for answers to question 2
Source: Own diagram

Figure 38 shows that either a large proportion of the project partners and thus the sample belong to the first stakeholder group, which may be a sign of sampling error, or this is due to the interest of the respective stakeholder groups.

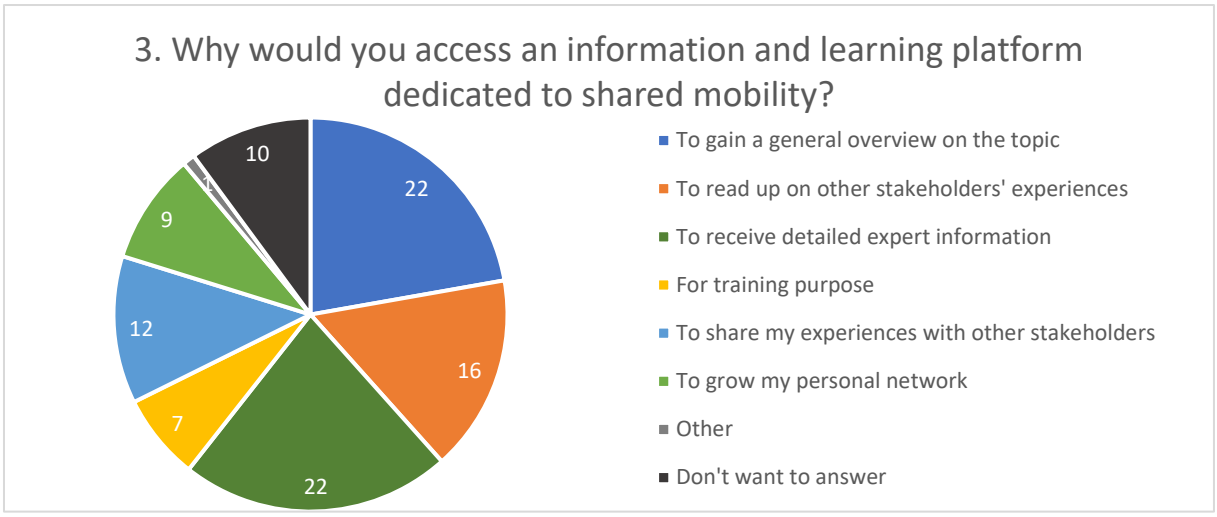


Figure 39: Pie diagram for answers to question 3
Source: Own diagram

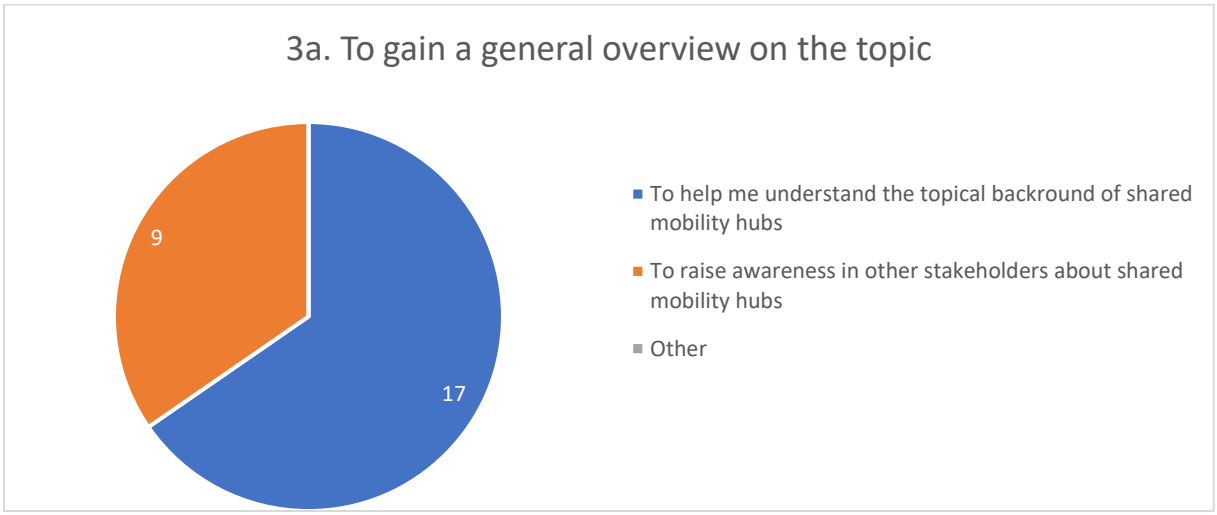


Figure 40: Pie diagram for answers to question 3a
Source: Own diagram

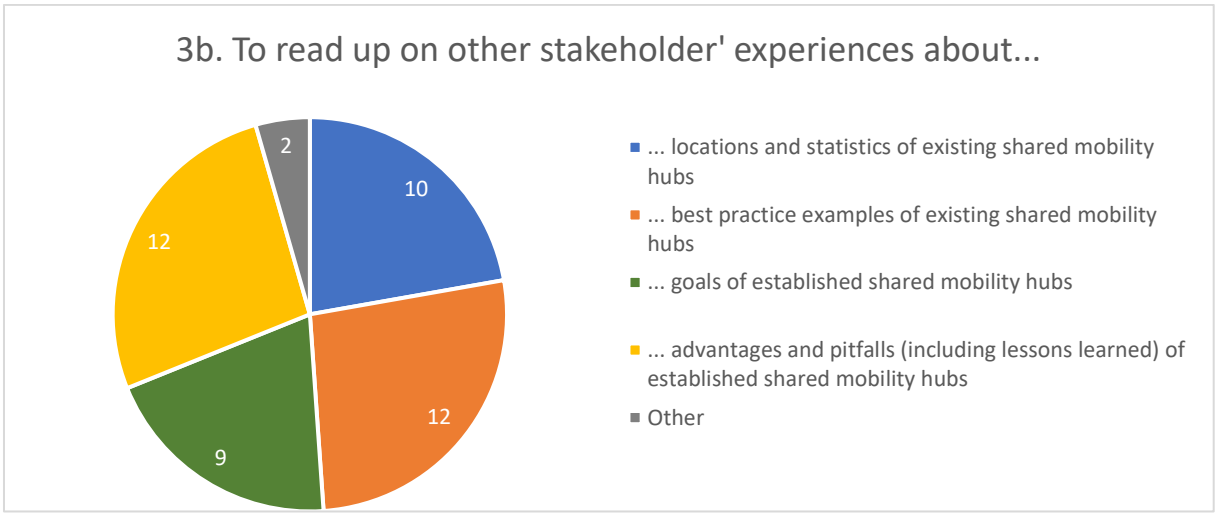


Figure 41: Pie diagram for answers to question 3b
Source: Own diagram

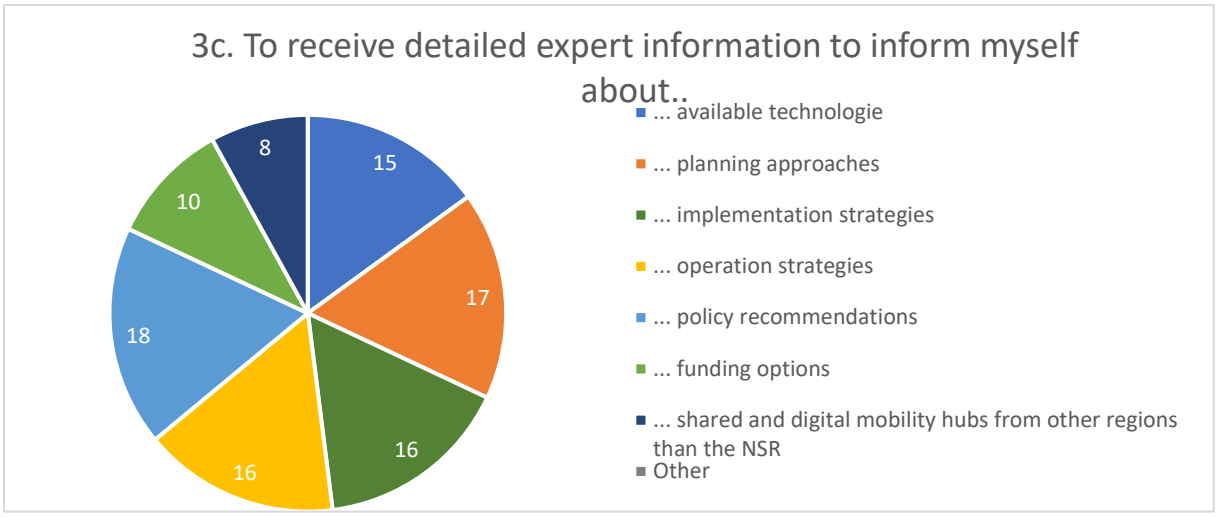


Figure 42: Pie diagram for answers to question 3c
Source: Own diagram

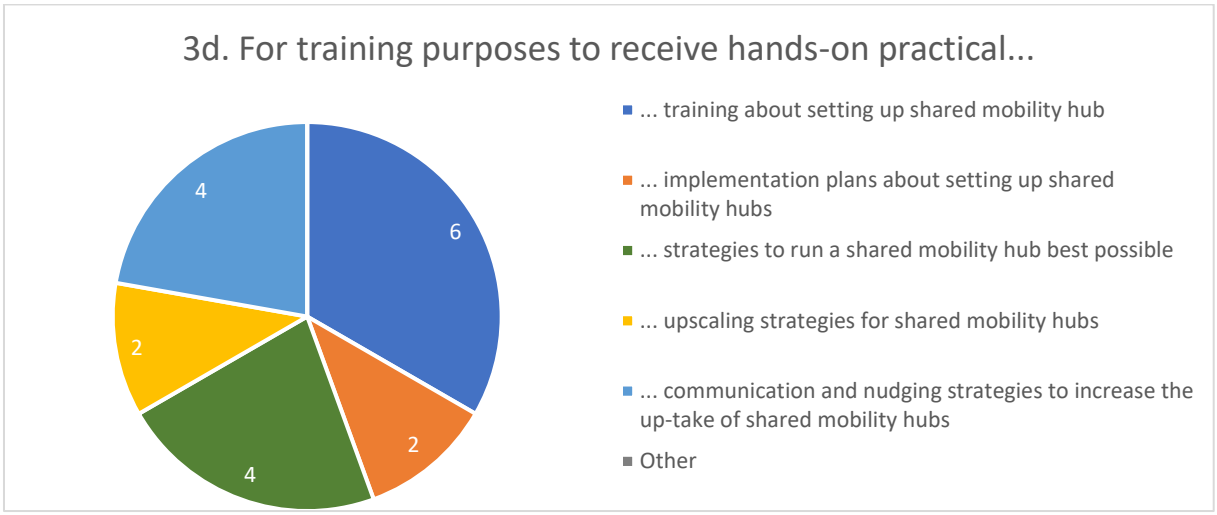


Figure 43: Pie diagram for answers to question 3d
Source: Own diagram

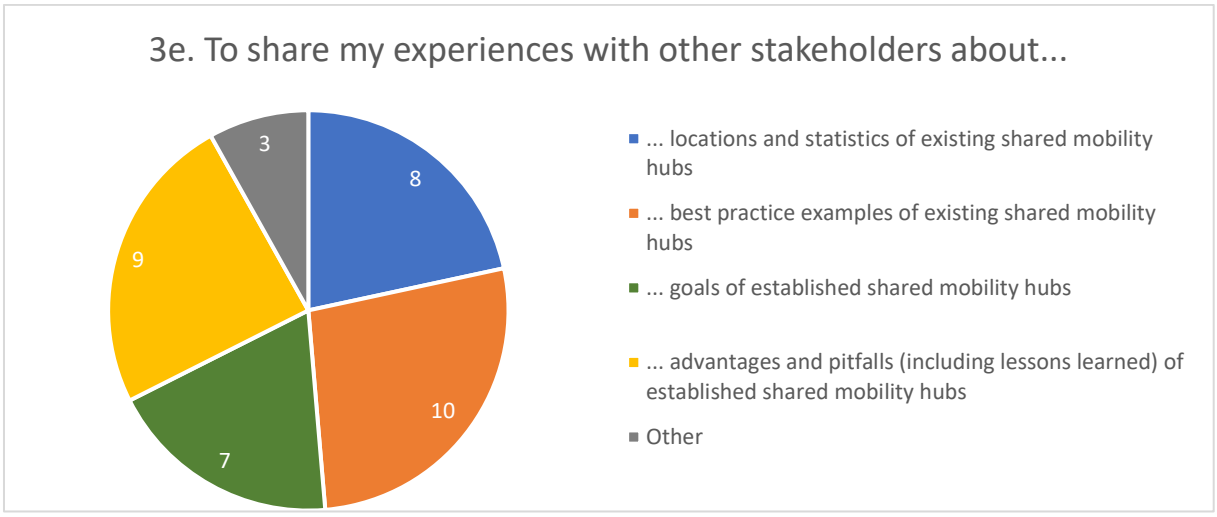


Figure 44: Pie diagram for answers to question 3e
Source: Own diagram

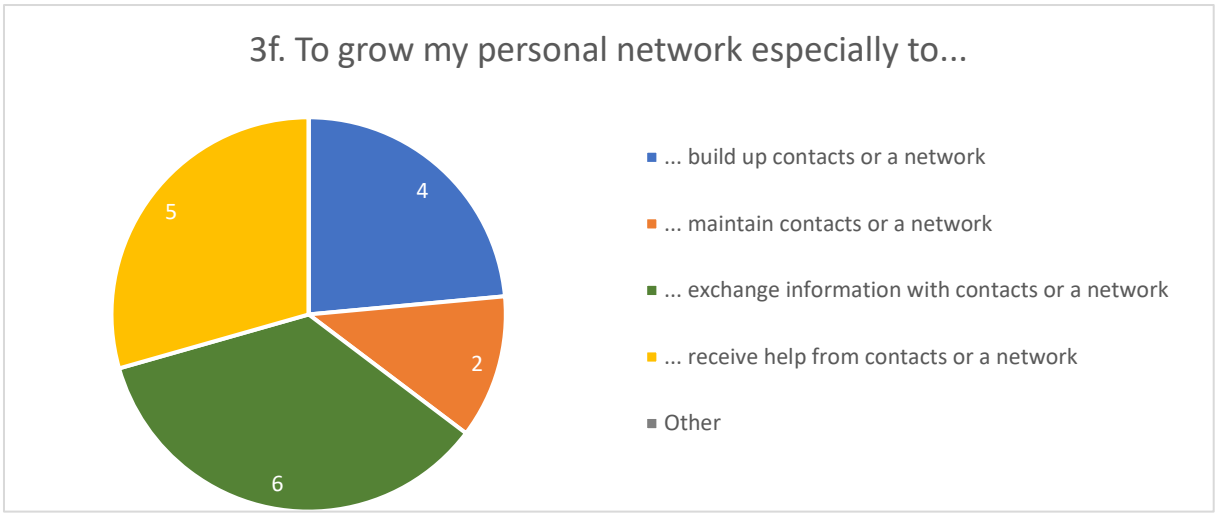


Figure 45: Pie diagram for answers to question 3f
Source: Own diagram

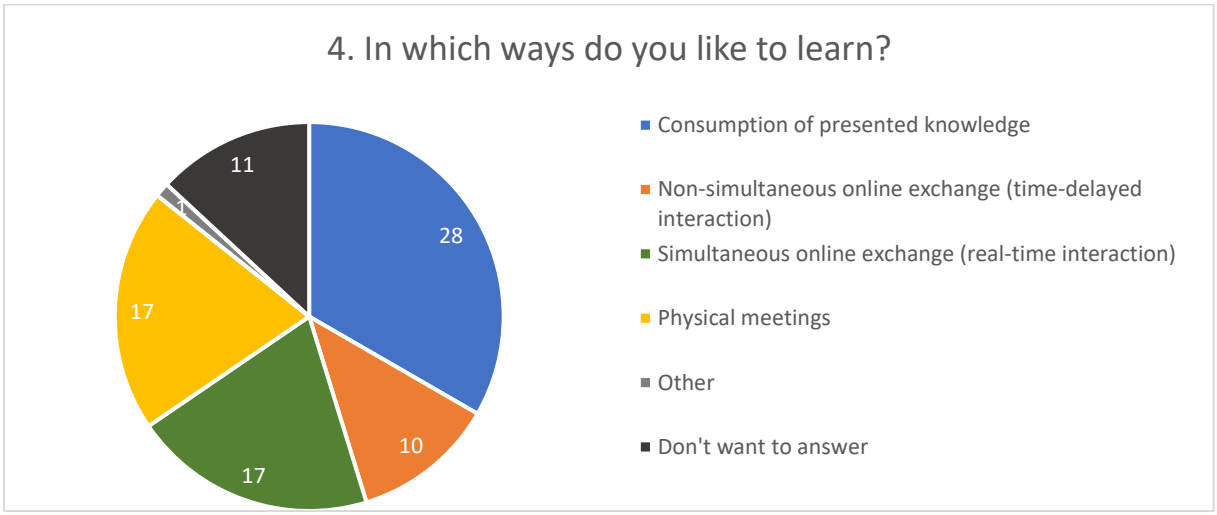


Figure 46: Pie diagram for answers to question 4
Source: Own diagram

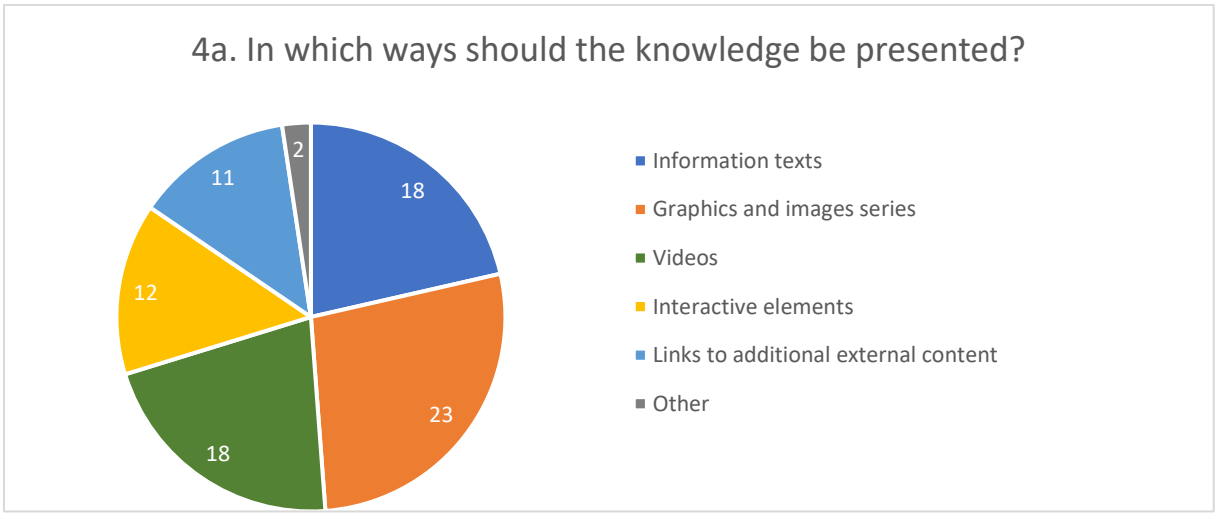


Figure 47: Pie diagram for answers to question 4a
Source: Own diagram

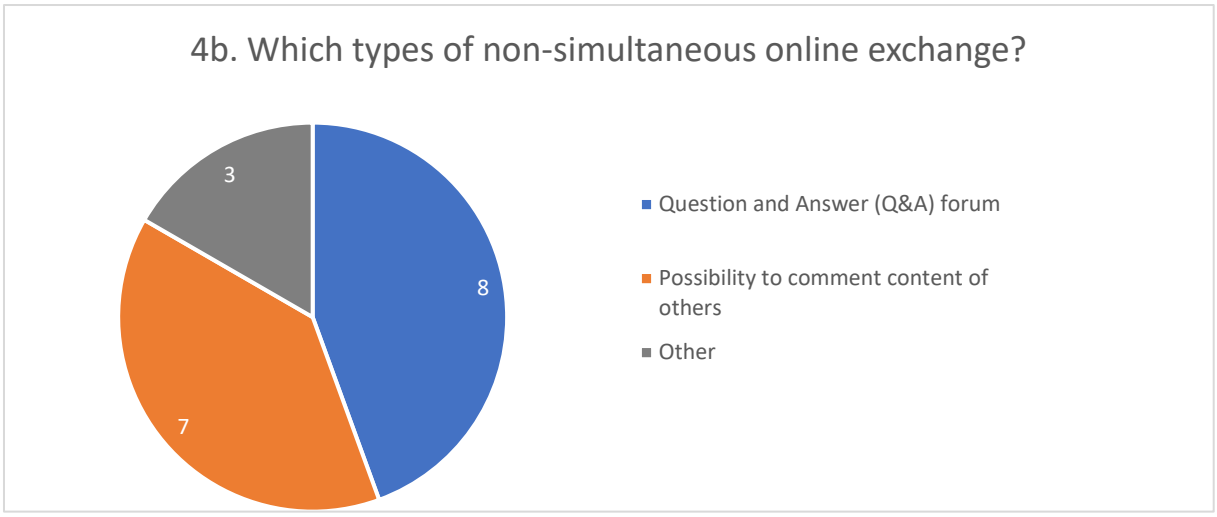


Figure 48: Pie diagram for answers to question 4b
Source: Own diagram

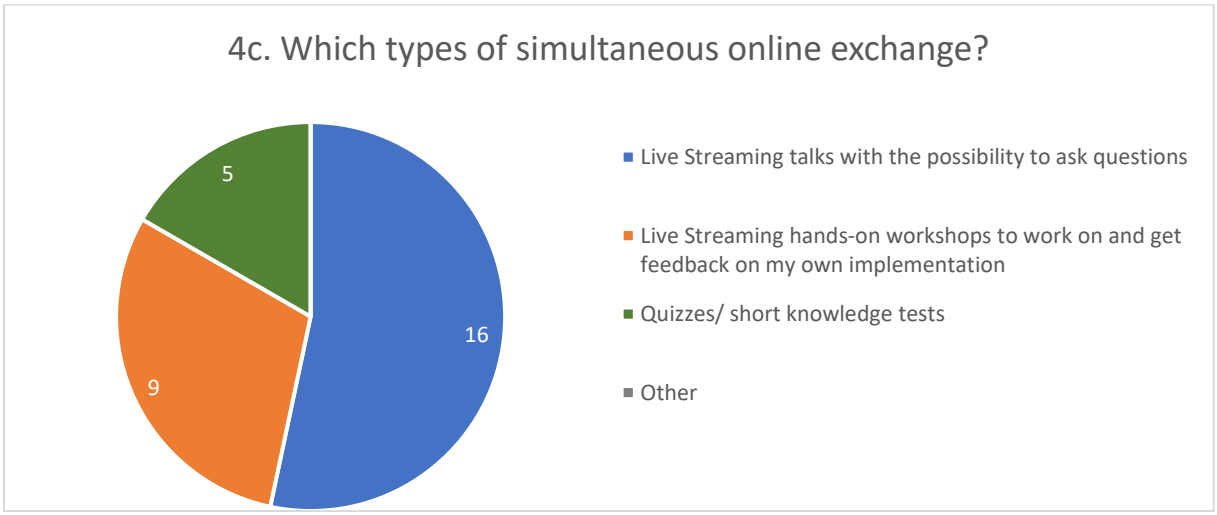


Figure 49: Pie diagram for answers to question 4c
Source: Own diagram

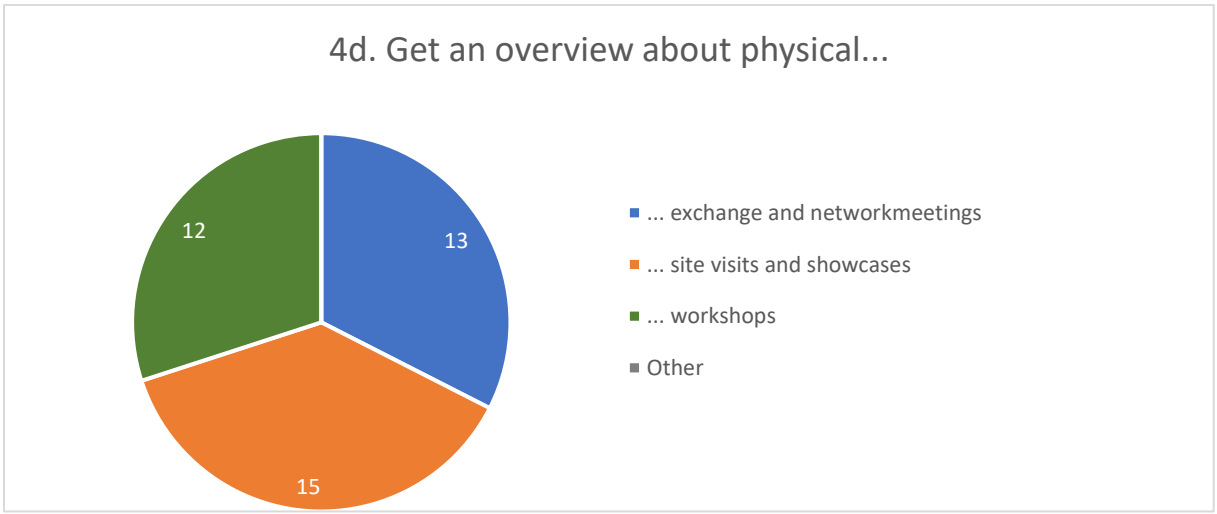


Figure 50: Pie diagram for answers to question 4d
Source: Own diagram

The previous diagrams (Figure 39 to Figure 50) show the most desired content and learning types of all. These results are further prioritised in the StAna Conduction and summarised in Answer to the RQ.

To the fifth question (Figure 28) 13 answers were collected. Detailed information is desired to get an overview of the topic. Such information should include arguments, statistics and stats that can be used to sell the implementation of SMHs. Among them could be the importance of the ecological benefits of SMHs, articles and reports, case studies and best practice examples. These project examples can be presented on regional maps to show their implementation in different areas. Furthermore, the problems encountered, and the lessons learned should be described. Business models, implementation plans and blueprints are expected, including cooperation with local government and private providers. Most of the requested content is based on first hand experiences, to which a Q&A facility, a way to get in touch with other stakeholders, is needed.

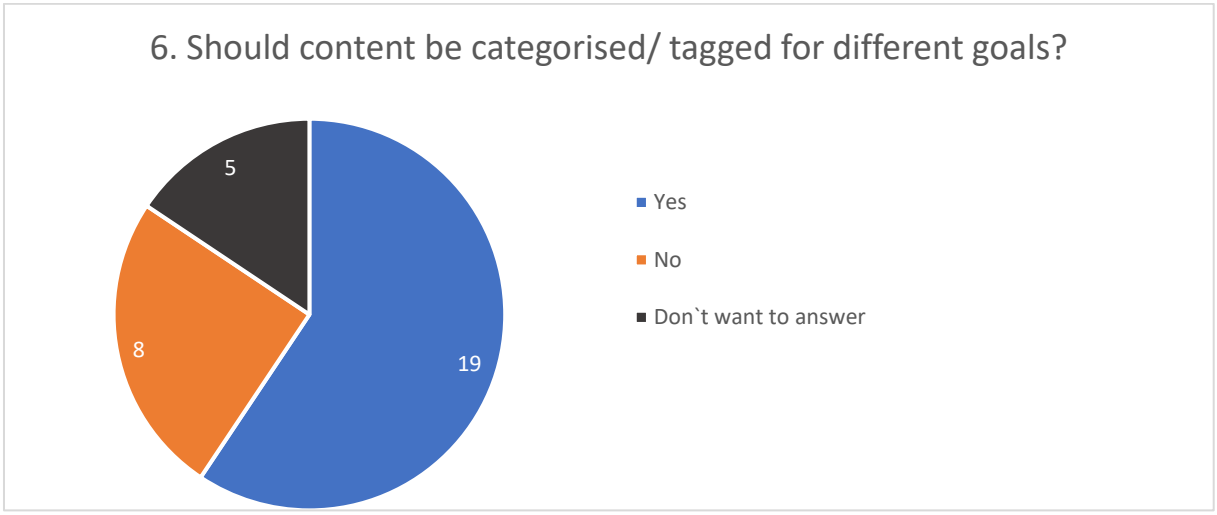


Figure 51: Pie diagram for answers to question 6
Source: Own diagram

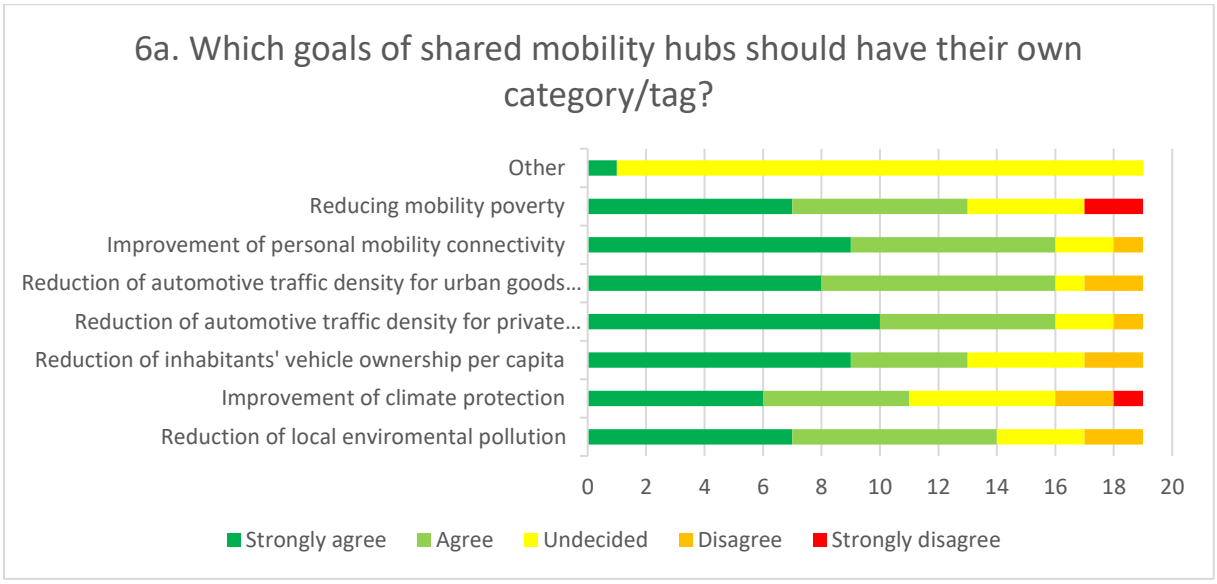


Figure 52: Pie diagram for answers to question 6a
Source: Own diagram

Due to the clear result from Figure 51, it is a must to evaluate the answers to the Likert scale of question six a (Figure 31). Therefore, a value is assigned to each option, as recommended by Gritsch (2012). The value two was assigned to “Strongly agree” while the value minus two was assigned to “Strongly disagree”. If the value of the summed responses divided by the number of responses is above a threshold of one, then consideration to assign a separate category or tag should be given to this goal.

In this case with the results from Figure 52, “Improvement of climate protection” (0.68), “Reducing mobility poverty” (0.84) and “Reduction of local environmental pollution” (1) were below or exactly at this threshold. The values of “Reduction of inhabitants' vehicle ownership per capita” (1.05) and “Reduction of automotive traffic density for urban goods delivery” (1.16) were slightly above it, and “Improvement of personal mobility connectivity” (1.26) and “Reduction of automotive traffic density for private transport purpose” (1.32) scored highest and should therefore be worked on primarily. The last four objectives mentioned must be considered for their own category or tag, and the last two objectives mentioned should be prioritised first.

The answers to question six b (Figure 32) mainly revolved around a spatial classification of the SMHs. Size and area (city centre/residential area/mixed use area/commercial area) played the most important roles and a classification into different technologies and types of mobility offered was also noted. Often the classification of goals in general was questioned and considered not useful, rather than suggesting a different type of classification. For some, classification is inappropriate, and tagging is conceivable.

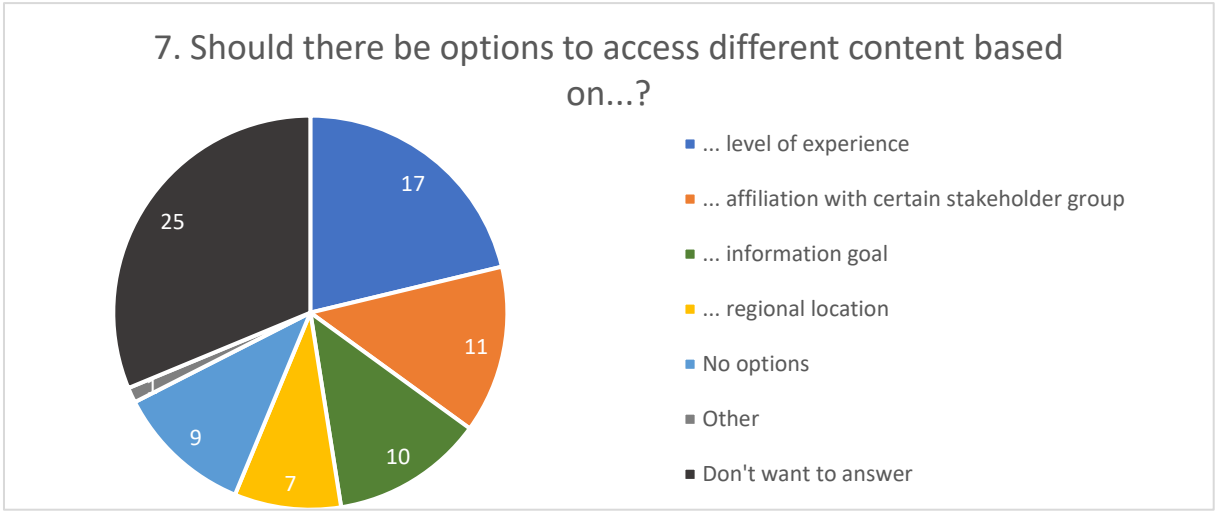


Figure 53: Pie diagram for answers to question 7
Source: Own diagram

All the answers to the “Other” options were mostly similar to previous existing or following answer options. This could indicate that there were misunderstandings, possibly due to the wording of the questions and answers. Meaningful “Other” answers were given to the question “To share my experiences with other stakeholders about...” in that data standardisation knowledge and the impact on modal shift could also be shared. To the seventh question (Figure 34) it was suggested to provide information

specific for the user, which on the one hand would be costly to implement and on the other hand would require a lot of data about the user to be collected.

3.2 Stakeholder analysis

3.2.1 StAna Conduction

The StAna was carried out with the partners of the *ShareDiMobiHub* project, who were also the sample of the RS. Thus, the stakeholders dealt with are primary, external stakeholder (Brugha et al., 2000). Some results and data from the RS are further analysed through the StAna, which is based on the steps presented by Elias et al (2002).

Develop a stakeholder map of the project

First, the stakeholders were identified. For a better overview, the stakeholders are grouped in a map (Elias et al., 2002). Similar stakeholders were marked by colours for a stakeholder group. These stakeholder groups have already been mentioned in question two (Figure 14).

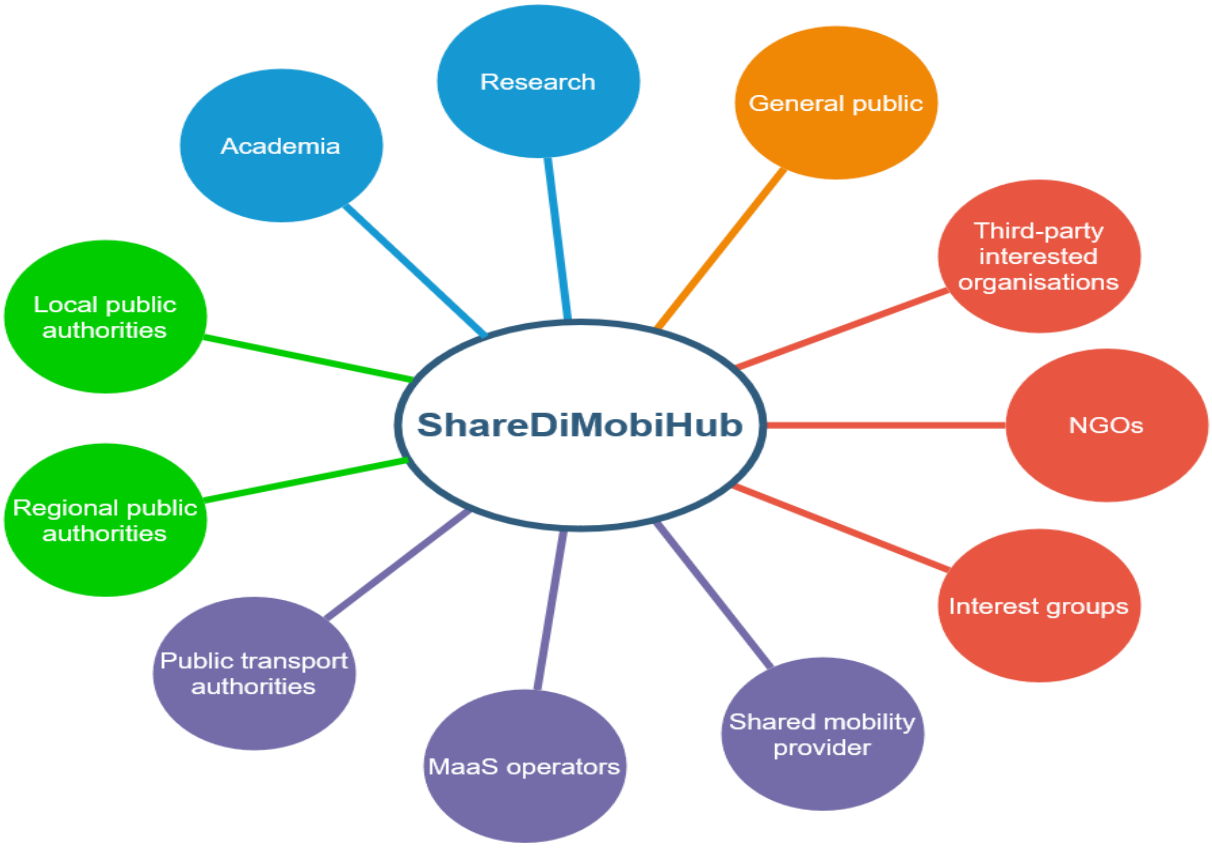


Figure 54: Stakeholder Map
Source: Own map

Prepare a chart of specific stakeholder

Listing all possible specific stakeholders of this project is beyond the scope of a StAna, so Table 8 is limited to the project partners for whom data is submitted and the general public as an additional.

Table 8: Specific stakeholder table
Source: Own representation

Local and regional public authorities	- Province of Utrecht - Capital Region of Denmark - City of Leuven
Public transport authorities, MaaS operators and shared mobility provider	- Autodelen.net - POLIS - Vervorregio Transport Authority for the Amsterdam Region
Interest groups, NGOs and third-party interested organisations	- Mpact vzw
General public	- Citizens of Cities in the NSR
Research and academia	- Department of Transport and Regional Economics at the University of Antwerp - University of Applied Sciences Utrecht - University of Applied Sciences Hamburg

Identify the stakes of the stakeholders

Table 9: Stakeholder-Stake table
Source: Own representation

Stakeholder	Stake
Local and regional public authorities	Gain a general SMH overview Receive detailed SMH expert information Read other stakeholders' SMH experiences Share SMH experiences
Public transport authorities, MaaS operators and shared mobility provider	Receive detailed SMH expert information Share SMH experiences
Interest groups, NGOs and third-party interested organisations	Receive detailed SMH expert information Grow a personal network for SMHs SMH Implementation Training
General public	Gain a general SMH overview Read other stakeholders' SMH experiences Grow a personal network for SMHs
Research and academia	Gain a general SMH overview Receive detailed SMH expert information Share SMH experiences

In Table 9, the stakeholder groups are associated with their stakes. The identified stakes are important to fully satisfy the interests of the prioritised stakeholders (Thompson, 2012). The data in Table 9 is based on the results of the RS conducted, so that the most frequently stated intentions (Figure 15, Figure 39) of the participants of stakeholder groups (Figure 14, Figure 38) have been summarised.

Prepare a power versus stake/interest chart

Elias et al. (2002) advises to create a power vs. stake chart, which has been replaced in this paper by a power interest chart (Thompson, 2012), since the interest of the stakeholders makes it easier to prioritise them, thus fulfilling the same purpose of finding out which stakes have priority. From Figure 38, the level of interest can be derived with the number of participants in each stakeholder group. Thompson (2012) has divided the grid into four areas, each of which tells how stakeholders should be dealt with. Based on the results and participants of the RS, the power interest chart is shown in Figure 55.

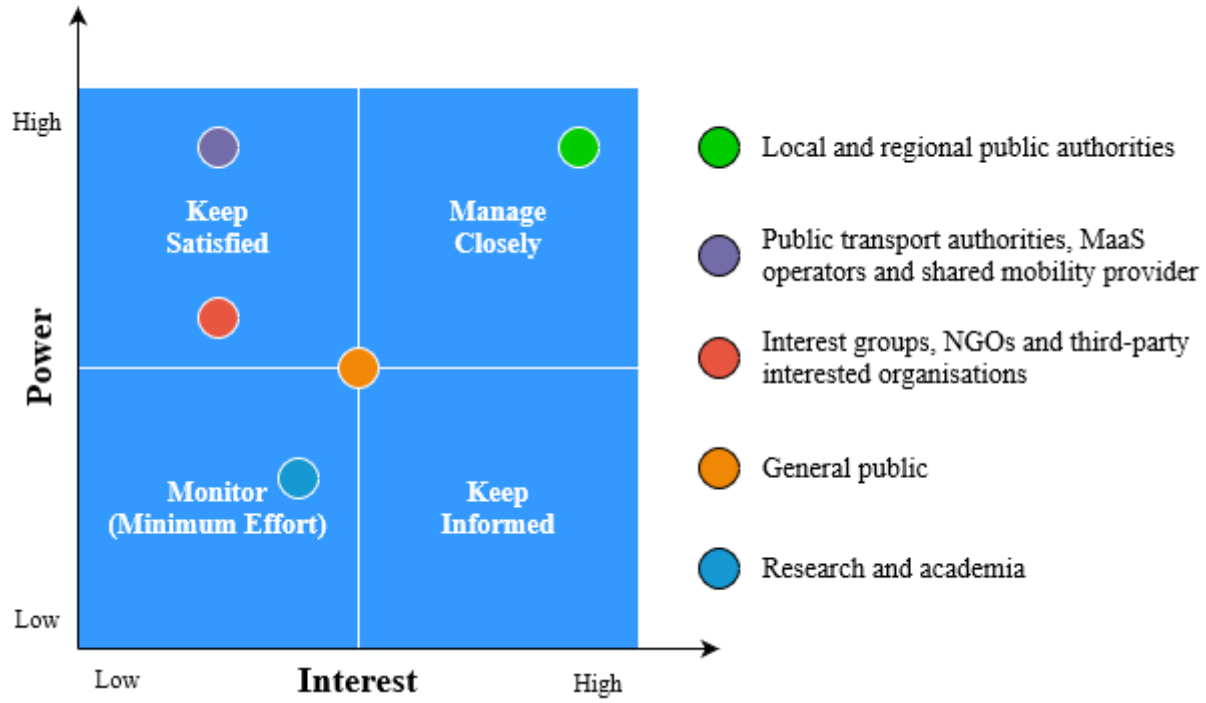


Figure 55: Power-Interest chart
Source: Own chart

Conduct a process level stakeholder analysis

The stakeholder groups mentioned certainly want to see their needs, which were identified through the RS, fulfilled. Through the RS, for example, the stakeholders are involved and communicated with. With the involvement and communication with stakeholders, they play an important role in decision-making. The results of the RS demonstrate how they fulfil this role. From the majority answers to each question, the “best package” can be selected so the needs of the stakeholders are considered in project processes and the project can be looked at promising (Elias et al., 2002).

Conduct a transaction level stakeholder analysis

It is difficult to assess the transactions and interactions between the stakeholders and the project managers, as the project is in its initial phase. So far, the interactions are limited to surveys and meetings. The concerns of the stakeholders could be identified but not yet fulfilled. Through surveys in particular, work is being done to cover the concerns and develop plans for them. These plans are followed by the transactions, so repeating this step in the future to assess them will be worth it. Collaborations between stakeholders and the project are already in place with the project partners named as specific stakeholders in Table 8.

Determine the stakeholder management capability of the *ShareDiMobiHub* project

To assess in detail the project teams' ability to effectively manage and engage with stakeholders, the data and information on the management of the project are missing. The process, however, could be considered high with the interactions such as the RS and the transactions are low in terms of the implementation of the platform considering that the project is at the beginning. Accordingly, the Process-Transaction chart (Figure 56) recommended by Elias et al. (2002), related to the *ShareDiMobiHub* project, would have low transactions and high processes.

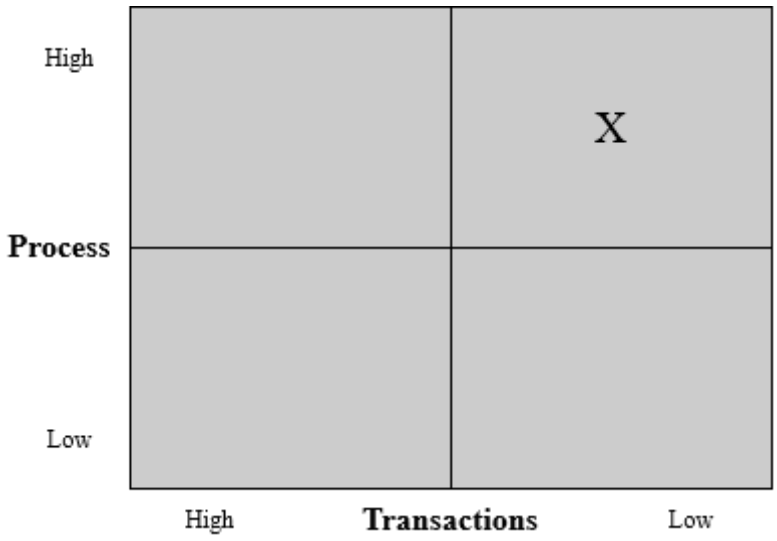


Figure 56: Process-Transactions chart
Source: Own chart

Analyse the Dynamics of Stakeholders

According to Mitchell`s et al. (1997) typology, all stakeholders have one or more attributes: Power, Legitimacy and Urgency. The attributes of the stakeholder groups are assigned in Table 10 based on the data already gathered (Figure 55).

“Local and regional public authorities” are definite stakeholders, as they represent all the attributes to the project and want to, could and will influence it. “Public transport authorities, MaaS operators and

shared mobility providers" are dominant stakeholders, they have the power to influence the project and a legitimate interest in its success, but according to the results from Figure 55 their interest is not urgent. "Interest groups, NGOs and third-party interested organisations" are dangerous stakeholders, as they have an urgent need to benefit from the project and have the power to influence the course of the project. Their legitimate interest will only increase if their need is not met. The "General public" is a discretionary stakeholder, as they have a legitimate interest in the project and thus in the sustainable development of urban transport but have neither urgency nor the power to significantly influence it. "Research/academia" is a dependent stakeholder, as they have a legitimate interest in the project and an urgent need to research, learn, etc. about the content of the platform.

Table 10: Stakeholders typology attributes
Source: Own table

	Power	Legitimacy	Urgency
Local and Regional public authorities	X	X	X
Public transport authorities, MaaS operators and shared mobility provider	X	X	
Interest groups, NGOs and Third-party interested organisations	X		X
General public		X	
Research/Academia		X	X

3.2.2 StAna Evaluation

After the steps, the StAna can be evaluated to manage the handling of the prioritised stakeholders' stakes. Considering the data of Figure 55 and Table 10, "Local and Regional public authorities" should have the highest priority. Followed by "Public transport authorities, MaaS operators and shared mobility provider" as the second highest priority. "General public" and "Interest groups, NGOs and third-party interested organisations" are third and "Research/ Academia" has the lowest priority.

The handling of the stakeholder groups from Figure 54 and the specific stakeholders from Table 8 can be seen from the location of the associated coloured dots in Figure 55 (Thompson, 2012) and the processes with the prioritised stakeholders must be kept high. Their stakes from Table 9 can be worked through in sequence with the prioritisation of the stakeholders. The stakes can be identified even more specifically through the answers to questions 3a to 3f (Figure 40, Figure 41, Figure 42, Figure 43, Figure 44, Figure 45). For the prioritised specific stakes, plans need to be drafted and transactions need to follow. At the appropriate time, the step "Conduct a transaction level stakeholder analysis" should be repeated. In addition, "Analyse the Dynamics of Stakeholders" should be repeated frequently to check and, if necessary, renew the prioritisation.

Despite the prioritisation, it should be noted that each stakeholder group is important for the project and their needs should not be ignored. Through the StAna, the needs have been weighted and an order and scope of working through the needs can be targeted.

4 Conclusion

4.1 Reflexion of the approach

The approach from this paper has served the purpose of answering the RQ in a goal-oriented way. As Ponto (2015) said, the RS provided a lot of information from a large sample in a short time. The conduction was easy to implement using online tools such as LimeSurvey (Taherdoost, 2016), and Stone`s (1993) steps were purposeful and successful implemented.

The StAna prioritised the results of the RS and identified the most important stakeholders and needs (Thompson, 2012). The step-by-step conduction of the StAna by Elias et al. (2002) gave the StAna a meaningful structure, which made the prioritisation of needs and stakeholders comprehensible. Furthermore, the steps brought plans for the future of transactions within the project and its partners. With these plans, the optimal fit can be realised (Brugha et al., 2000).

4.2 Answer to the research question

This methodological approach made it possible to answer the RQ “Which contents and empiricism from Shared Mobility Hub projects, as well as formats for sharing them are relevant for the development of a digital learning platform?”. Figure 37 shows that the level of knowledge of stakeholders and potential users of the platform differs greatly. From experts to newcomers, there will be many levels of knowledge. Therefore, a wide range of content is relevant, as it should meet the needs of both newcomers and experts (Bookstein, 1979).

From Figure 46, the formats for sharing can be concluded that knowledge about SMHs should be conveyed through presented knowledge in the form of information texts, graphics and image series, and videos (Figure 47). Furthermore, simultaneous online exchange and physical meetings should be offered. These should include live streams in which questions can be asked or hands-on workshops in which feedback on the own implementation can be given (Figure 49). On the other hand, an overview of physical exchange, network meetings, site visits and showcases, and workshops should be available (Figure 50).

The content of the platform results from the answers to question 3 and 3a to 3f (Figure 39, Figure 40, Figure 41, Figure 42, Figure 43, Figure 44, Figure 45). These answers were prioritised and evaluated with the StAna (Table 9). With the content it should be possible to get a general overview about SMHs, to get detailed information about SMH from experts, to read experiences about SMH from other

stakeholders and the possibility to share their own. To create a general overview, a topical background on SMHs should be presented and awareness should be raised (Figure 40). The detailed expert information should cover available technologies, planning approaches, implementation & operation strategies, and policy recommendations (Figure 42). The stakeholder experiences that can be informed about should include locations and statistics, best practice examples, goals, and advantages and pitfalls (including lessons learned) of existing SMHs (Figure 41). Accordingly, it should be possible to share the same experiences on the platform (Figure 44).

The content should be tagged for different goals of SMHs (Figure 51). “Reduction of automotive traffic density for private transport purpose” and “Improvement of personal mobility connectivity” are the goals that should be given a tag, while “Reduction of automotive traffic density for urban goods delivery” and “Reduction of inhabitants' vehicle ownership per capita” are other possibly tagged goals if feasible (Figure 52). According to Figure 53, the content does not necessarily have to be accessible due to a characteristic of the user but a content division for different levels of experience if at all can be realised.

4.3 Critical consideration & outlook

The results for the RQ should be viewed with a critical eye. Although the RS sample was large and diverse, it only included partners of the *ShareDiMobiHub* project, which could have introduced biases in the answers, for example in the assessment of knowledge about SMHs. Furthermore, the number of participants was very limited for some stakeholder groups (e.g., public transport authorities, MaaS operators and shared mobility providers) see Figure 38. This was attributed to interest but may also have been due to the sample and a possible *sampling error*. For the StAna, some pieces of information were missing that did not influence the prioritisation of the stakes but could change the plan for future stakeholder management (information for step “Conduct a transaction level stakeholder analysis” and “Determine the stakeholder management capability of the *ShareDiMobiHub* project”, see StAna Conduction).

Looking into the future, it would make sense to conduct another RS after the first transactions to capture the interests of the stakeholders, should these have changed over time or through progress. Furthermore, the “Dynamics of Stakeholders” should be kept in sight and re-analysed at the same time as the next RS. To begin with, the results developed in Answer to the research question will be relevant and should be considered for a learning platform dedicated to SMHs.

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Annex

Excel chart with the raw results of the RS:

ResearchSurveyResults.xlsx

Declaration of Authencity

I declare that I completed the Bachelor thesis entitled:

_____

independently and used only these materials that are listed. All materials used, from published as well as unpublished sources, whether directly quoted or paraphrased, are duly reported.
Furthermore I declare that the Bachelor thesis, or any abridgment of it, was not used for any other degree seeking purpose.

Date	Signature