

MANUAL ARIADNE 3.0

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1 Introduction to Concept Mapping

1.1 Introduction

Concept Mapping is a group-based method designed to support decision-making. It makes complex and diffuse topics manageable. Concept Mapping allows us to better understand a topic, and to decide which of its aspects are of greater or lesser importance. The final result is a 'map' showing the opinions of the group of participants.

The *Concept Mapping* method is supported by the computer programme *Ariadne*. *Ariadne* combines the views of individual group members and presents them as a group product. Computer support facilitates the use and the understanding of the method, and makes it more efficient. Only one meeting with 15-20 participants is required to get insight to a specific topic.

1.2 Applications and advantages of Concept Mapping

Concept Mapping can be used for research in general as well as for supporting decision-making.

The method is extremely well suited to policy development, for example to assess and define the 'quality' of services from the points of view of people who play different roles within (or outside) an organization. For instance, when faced with the term 'quality of General Practitioner (GP) care': one person might think of the diagnostic expertise of the GP; a second might focus on his/her communication skills; and a third on how often the GP wrongly refers patients to a specialist. Another application of *Concept Mapping* could be to clarify the objectives of a new joint venture. The method has also been used to design the programme for a major international AIDS conference, and to explore government policy priorities in the field of mental healthcare.

Concept Mapping can also be used as a preliminary investigation before developing a questionnaire, for example to measure patient satisfaction with the care they receive. *Concept Mapping* can also be used at the beginning of an evaluation project, in order to decide on the assessment criteria with all of the people involved.

The method is suitable for:

a) *complex and vague topics.*

Complex means that the topic contains many different aspects within it. Vague means that all of those aspects and the relationships between them are not yet clear.

b) *topics about which differences of opinion exist.*

Concept Mapping is ideally suited to topics not associated with an objective, absolute truth; where there are different perspectives on a problem, perhaps informed by different norms and values. The method lists the different opinions, making them visible, and seeks to establish their 'common denominator'.

- c) *cases where players need to find a common basis for future activities, despite differences of opinion.* If the objective were to test quality, it would not be possible to investigate all the possible aspects of quality at once. A choice must be made of the most important aspects.

Concept Mapping offers several advantages in such situations.

- a) *It is a relatively fast method.*

The whole *Concept Mapping* process can sometimes be completed within a week, and even the most complex topics can be assessed within a few weeks. The individual participants are only required to invest a single day.

- b) *The method usually achieves great commitment to the result from everyone.*

Because the method is particularly transparent to all players, and because every opinion is given equal weight, those involved are more likely to accept the result and view it as a basis for common decisions or actions.

- c) *It is an 'honest' method, because everyone has an equal influence on the outcome.*

In other situations, for instance at regular company meetings, some people may have more impact on the outcome than others, due to their personal authority or negotiating skills. Weaker negotiators sometimes have difficulty making their voice heard. *Concept Mapping* gives every voice equal importance. Participants are not required to have special skills or knowledge.

1.3 *A short description of the method*

Concept Mapping is divided into six phases:

Phase 1: Choosing participants and establishing a focus

Phase 2: Brainstorming

Phase 3: Structuring

Phase 4: Processing the statistics

Phase 5: Interpretation

Phase 6: Implementation

Phase 1 is a preparatory phase which is executed 'behind the scenes', whilst phases 2 and 3 take place in a group setting. Once the answers have been statistically processed (phase 4), the results are discussed by the group, after which further steps may be agreed (phase 5). In phase 6, the implementation phase, the results of *Concept Mapping* are put into practice.

The order of these phases is fixed, but each one can be worked out in different ways. In this section we will briefly discuss the essence of each phase. In chapter 2, we will further explain the phases and suggest some variations in the ways they are designed.

Phase 1: The choice of participants and establishing a focus

In the preparatory phase we must decide what the focus for *Concept Mapping* will be and who will be invited to take part.

The *focus* is the question which will be put to the participants in the brainstorming phase (see below) in order to provoke as many statements as possible about the subject in question. A focus might be: 'What criteria should be used to judge the quality of a GP?'; or, 'What should this joint venture achieve?'.

The choice of *participants* is closely linked to the objective of *Concept Mapping*. That applies both to the number of participants and their backgrounds.

Phase 2: Brainstorming

In this phase participants are invited to use the focus as a starting point for free association and to generate as many ideas as possible. Participants may not confer with each other at this stage: every statement - provided it is clearly formulated - is added to the list, up to a maximum of 98 statements.

The essence of the brainstorming phase is that participants associate freely. There are various ways to encourage them to do so. Besides the classic group setting, in which participants spontaneously put forward their ideas as they come to them, often in response to each other, the organizer could also opt for individual interviews or a written questionnaire. If so, the group session is put back to phase 3, with the participants being individually approached in phase 2.

The brainstorming session results in a set of statements which will form the input for subsequent phases. During the brainstorming session, all statements are entered into the computer, which then prints them out on cards: one card for each statement. The participants are then each given a complete set of

cards/statements. This helps people to literally grasp the statements, making them easier to work with, to select, to discard etc. in subsequent phases.

Phase 3: Structuring

In the next phase of *Concept Mapping*, participants have to rank the statements. This means grouping them according to importance (prioritization) and content (clustering). Both tasks are carried out by each participant individually.

For this phase, every participant is given a complete set of numbered statements, each printed on a separate card.

Prioritization. The participants are first asked to judge how relevant each statement is to the subject chosen, by giving each one a rating between 1 and 5. Each participant does this independently of the others. Again, the task of setting priorities cannot be carried out until a focus has been established. The focus can be decided either in consultation with the group or by the organizer(s) in the first phase, before the group session. The participants might be asked which quality requirements they consider to be absolutely central, and which relatively unimportant.

Clustering. Next, participants are asked to divide the statements into groups with similar or related content. Each participant forms his own clusters of statements. He or she might put the statements '*patients should be treated in a friendly manner*' and '*patients should be fully informed about the treatment they are to receive*' into a group called 'patient-friendly approach'. Another might put the two statements (and others) into two different groups called 'personal treatment' and 'providing information'. The labelling of the clusters is left to the individual participants; they are not influenced in the number of clusters they choose, nor in the criteria they use to classify the statements.

Once the results of phase 3 have been collected, they are registered and entered into *Ariadne*.

Phase 4 Processing the statistics

In this phase, *Ariadne* combines the individual clusters and priorities to form a group product.

The programme starts by counting how often participants have placed statements into a single category (clustering). The more often two statements are placed into the same category, the smaller the imaginary distance between them, which means that participants see a strong link between them in terms of content.

Next, *Ariadne* represents these imaginary distances visually on a two-dimensional graph, the so-called *Concept Map*. Statements often placed in the same category are projected close together; statements which are rarely or never linked by participants are shown far apart.

Statements which lie close together on the map are combined to form clusters of related statements, using a cluster analysis, and a box is drawn around them. Finally, *Ariadne* calculates the average rating for each statement and for each cluster, using the information from the prioritization task. *Ariadne* also displays the results of these calculations, this time as differences in height. The width of the line which defines the 'cluster box' indicates the relative importance which participants attached to each cluster.

The *Concept Map* is the graphical representation of the group's views. It provides an at-a-glance guide to the different aspects which participants recognized in the problem with which they were presented, and shows how those aspects are related. The *Concept Map* may be thought of as a real map, with distances reflecting how closely related the different statements/clusters are in terms of their content, and differences in height reflecting the relative importance of the different aspects.

Ariadne supplies more specific results, such as variance and the average importance of each statement, as separate output. *Ariadne* can also break the participants down into sub-groups or compare individual participants.

Phase 5: Interpretation

In the previous phases the basic associations from the brainstorming session were combined to form clusters of related statements. The task in the fifth phase of *Concept Mapping* is to label the clusters: What is the common theme of these statements? Why did participants frequently place them in the same category? The participants give each cluster a label which they feel best describes the content of the statements in the cluster.

As before, the interpretation phase can be organized in a number of different ways. As *Concept Mapping* was originally designed, this phase is structured as a group discussion chaired by the process supervisor. This method produces greater commitment to the outcomes, since the process supervisor can verify the results by asking the group whether they agree with them. Moreover, in a group discussion there is no risk of deviating from the terminology used by the participants. However, the process supervisor may instead choose to interpret the results alone or in consultation with a sub-group of the participants.

Phase 6: Implementation

Now that it is clear which themes and aspects the people involved consider relevant to the subject in question, it is time for the final phase of *Concept Mapping*: putting the results into practice. In this phase, the process

supervisor and/or the participants must take stock of the implications of the results produced. They must then agree how these results will be used in practice.

For example, they may decide that certain quality aspects will be made subject to testing, or that particular new services must be given priority. Participants may draw up a phased plan to tackle a number of problems one by one. In the case of more scientific applications, the result is used by the researcher to decide which questions are suitable for a questionnaire (or other measuring tool).

It will be clear that *Concept Mapping* does not give any pointers as to the procedures to be followed for implementation. The results of *Concept Mapping* shed light on the views and priorities of those involved, thus establishing a basis for responsible decision-making. Translating this information into concrete measures is a task which falls outside the scope of the method.

1.4 *Using this handbook*

This handbook describes the *Concept Mapping* method in detail, including the different variants possible in each phase.

Appendix 1 is a technical guide to *Ariadne* for *Concept Mapping*.

Those who are interested in the statistical techniques on which *Ariadne* is based can consult *appendix 2*. However, it is not necessary to read this appendix to use either the method or *Ariadne*.

Appendix 3 is a checklist for the organization of *Concept Mapping* meetings. This checklist is included mainly as an example: the different phases and requirements may vary, depending on the design and objective of the project.

Appendix 4 is an example of the standard forms which can be used during phase 3 (structuring) to record the results of the tasks carried out by participants (setting priorities and forming clusters). These forms make it easier to input the data.

2 Preparation (phase 1)

2.1 *Establishing the focus*

The focus for the brainstorming session should be established ahead of the group meeting. A good focus is important, as it will prompt the right type of statements. The focus must be clear, simple, and neither too general nor too specific.

For example, the focus ‘what help do old people require?’ could elicit too many different types of statements. Some participants would list healthcare provisions, other welfare provisions, still others housing or financial help. To some, ‘help’ might include the support of family or neighbours. Clearly then, this is not a ‘simple’ focus. We need to consider in advance whether such diverse interpretations of the word ‘help’ are useful.

This focus could lead to another kind of confusion. Some participants may list general types of care (GP, home help, sheltered accommodation, a day centre for social contacts, hot meals for pensioners). Others might be more specific (a visiting service for single widows, diagnostics for old people with dementia, physical aids for old people who are infirm). Some people will be most concerned with quality requirements (housing associations should give priority to old people when small, two-person, ground-floor apartments become available; GPs need special training in diagnosing dementia; home helps should attach more significance to social contact with the old people in their charge, instead of limiting themselves to housework). Again, a broad focus may produce many dissimilar statements during the brainstorming session.

It is difficult for participants to form clusters or set priorities when faced with such diverse statements. In the example given, the word ‘help’ may have been too vague. Depending on the object of the exercise, it may be useful to specify whether the question refers to *all* old people (perhaps everyone over 65 years) or more narrowly to old people with health problems.

Examples of a better focus (again, depending on the goal of *Concept Mapping!*) are:

- ‘the following provisions are necessary if old people are to take a full part in society:’
- ‘in order to provide for the specific health problems of old people, it is necessary that healthcare institutions and carers.....’.

As these examples demonstrate, it can be useful to formulate the focus for the brainstorming session as a sentence which the participants have to complete. This makes it more likely that the statements will have a similar structure.

On the other hand, the focus must not be so narrow that the participants are denied the space to express their own points of view. If you want to know what people consider important to the quality of GP care, the focus *should not* be: ‘what do you expect from GP care?’. In this case, other aspects of quality (the GP’s interpersonal skills, the appointments system used) are wrongly left out of the equation. A better focus would be: ‘what requirements should a good GP fulfil?’ This question may well produce different statements during the

brainstorming session than ‘what requirements should the *care* provided by a GP meet?’ or ‘what requirements should a GP’s *practice* meet?’.

Usually, a fairly broad focus is chosen. In order to stimulate the participants’ thought processes at the brainstorming session, it may be useful to put up a number of examples (on a whiteboard or on ‘display sheets’, large sheets of paper) before the session. The purpose of this is definitely not to guide participants in a particular direction - this must be pointed out clearly during the meeting. The participants are completely free in what they put forward during the brainstorming session. The idea is simply to stimulate their imagination, and to prevent them from approaching the subject in too narrow a way.

Which people are chosen to take part in the *Concept Mapping* depends very much on the final application. The choice of participants is a question which deserves careful consideration. It may be the most important phase in the whole process, as, after all, the results will be determined by the participants! Generally speaking, two issues require particular consideration.

- *variation*: are all the different players involved with the subject represented? Or, if there are very different parties or interest groups: are all the different perspectives represented?
- *number of representatives of each party*. Because *Concept Mapping* gives every voice equal weight, it is important to ask whether different parties or perspectives are properly represented (by enough people).

For example, if the aim is to establish quality criteria for assessing healthcare institutions, it is important to invite not only carers but also patients and perhaps the institution’s management, the Medical Inspectorate, health insurance companies and/or GPs. There is little point putting together a group with 15 carers and 1 patient, because the patient’s voice will carry little weight on its own.

When it comes to *decision-making support*, it is usually obvious who should be invited to take part. The participants should include (representatives of) everyone who will soon be involved in applying the results; everyone who will feel their consequences, and everyone needed to put the planned measure(s) into effect. This is especially important if one objective of the *Concept Mapping* project is to gain the support of the people involved. This means winning their commitment to the results and to the measures taken on the basis of those results.

For *research applications*, other considerations may apply. In one case it may be desirable to have a room full of experts for the brainstorming session, in another a broad sample of ‘ordinary’ people might be more appropriate. Generally speaking, a *stratified sample* is desirable.

Concept Mapping does not make special demands of the participants. They need only be able to work in a structured manner for a three-hour period. Experience has shown that almost everyone can carry out the tasks they are set, be they professors or housewives, psychiatrists or psychiatric patients.

Closely connected to the number of participants to be invited are the variables to be used in the analysis. When the data are processed, one can enter not only the participants' details but also enter which groups of participants should be included in the analysis. In order to select groups of participants, it is necessary to input characteristics such as age, type of function, etc. *Ariadne* can accept five distinguishing characteristics for each participant. This makes it possible, for instance, to contrast the management's perspective with that of the carers, men's views with women's, old people's with young people's.

2.2 Choosing participants

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2.3 *Choosing variables*

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2.4 *The number of participants*

There is no upper limit to the number of participants for *Concept Mapping*, but the minimum number is around 8 or 10. The process is not impossible with fewer people, but it is much less effective. When there are few participants, *Concept Mapping* has little added value compared to other methods. After all, there is not much point in calculating group averages for only four people.

The number of participants does have consequences for the design and implementation of the various phases of the process. If phase 2 (brainstorming) and phases 5 and 6 (interpretation and implementation) are carried out in a group context, the maximum number of participants will be roughly 15.

However, if the brainstorming session is replaced by interviews or a written consultation round, and if the interpretation and implementation can be carried out by a smaller core group, it is possible to involve many more people in the project.

There is no maximum number of participants for phase 3 (structuring). Even so, if a great many people are taking part, a group session can seem very impersonal. To avoid this, it would be possible to split the structuring exercise into several sessions, each with a limited number of participants. The only condition is that the participants are given the same input to form clusters and set priorities in each of the sessions. Thus phase 2, the brainstorming session (possibly replaced by written consultation or interviews) must be completed before phase 3 can start. This ensures that the participants receive the same set of cards/statements in each session.

2.5 *Concept Mapping with few participants*

As was indicated above, if *Concept Mapping* is carried out with a limited number of participants (8-15), the whole process can be completed by the entire group together. The meeting begins with the brainstorming session, usually lasting between 45 and 60 minutes, in which the participants generate as many statements

as possible. Because *Ariadne* can print the statements onto cards in just half an hour, the participants can have a break and then go straight on with the next phase, ordering the statements according to content and relevance.

Another break, this time lasting two hours, is needed whilst the answers are entered into *Ariadne* and the *Concept Map* is worked out. Depending on the circumstances, the supervisor can bring the group back together later on the same day, or at a later date, in order to discuss the results and to think through their implications. The agenda for such a meeting might be as follows:

9.00 A.M.	introduction
9.15 A.M.	brainstorming session
10.00 A.M.	break for participants
10.30 A.M.	prioritization exercise
11.15 A.M.	clustering exercise
12.00	break for participants
	outcomes are processed by the computer to form a <i>Concept Map</i>
2.00 P.M.	interpretation of the <i>Concept Map</i>
4.00 P.M.	close

In the process described, two advantages of *Concept Mapping* come out clearly: the process is clarified in a very short space of time, and with maximum involvement from the participants. The content and interpretation are left entirely to the group. Moreover, the whole process is transparent to all participants, which can only enhance their confidence in the outcome. These benefits are particularly relevant when *Concept Mapping* is used to support decision-making on internal matters, as the participants will be directly involved in putting the results into effect.

2.6 *Concept Mapping with many participants*

If more than fifteen people are to be involved in the *Concept Mapping* process, it is a good idea to split the main group into a number of sub-groups. For instance, the supervisor might choose to hold a separate meeting for each region, or for each 'interest group' within an organization. He or she must, however, ensure *that all sub-groups structure (prioritize and cluster) the same statements*. Only if all participants are given the same statements can the outcomes of the different sub-groups be integrated to form a single *Concept Map*. If this rule is not followed, a separate *Concept Map* will be generated for each of the groups, with statements, clusters and cluster labels which are specific to that group. Of course it would be possible to lay these 'maps' side by side and try to compare them, but *Ariadne* offers much more refined opportunities for comparison, provided the inputs (statements) are the same for all participants.

The process plan described in the previous paragraph cannot be executed in one meeting. Phase 2 (the brainstorming session) and phase 3 (structuring) must take place at different times, which leaves several alternatives. The two phases do not necessarily have to take place with the same groups, and the supervisor might even choose to dispense with groups altogether. An alternative to the brainstorming session, for example, could be to collect statements through interviews or a small written survey. Moreover, in theory at least it is possible that the participants could form clusters and set priorities at home. If all participants are given the same set of statements, a *Concept Map* can then be constructed for the whole group.

It is less clear what is the range of numbers of participants for which a useful interpretation of the results (phase 5) is possible. When *Concept Mapping* was applied to the debate about 'Choices in Care', a group of 25 people led by an experienced supervisor proved feasible, although this probably was the upper limit. The practicability may be influenced by the composition of the group as well as its size. The more homogenous the group, the less debate the labelling of clusters is likely to provoke, and thus the bigger the group can be.

3 Brainstorming (phase 2)

During the brainstorming session, those present make statements in response to the focus they have been given. Each statement is immediately fed into the computer, in some cases after it has been clarified or defined more narrowly (in consultation with the supervisor and the other participants). The only requirement for each statement, before it is entered into the computer, is that it is clear, simple and understandable to everyone. The content of the statement is not discussed at this stage.

3.1 *The form of the brainstorming session*

The brainstorming session can take one of several forms. The first is *free association*: each participant may contribute statements at any time, which are then added to the list of previous statements. The advantage of this set-up is that the participants react to each other, prompting associations which they would not have made individually. A disadvantage is that the less assertive participants tend to be pushed into the background. The supervisor can watch for this, and occasionally invite people who have not yet made a suggestion to do so.

An alternative is the *structured brainstorming session*. Here, the participants are asked to take turns in making a statement. At the start of the session, the group may be given a few minutes to think about the focus and to make notes. They are then each given the chance to make a statement, either based on their notes or in response to previous statements by other participants. Once everyone has had a turn, the procedure begins again.

The disadvantage of too structured an approach is that it restricts free association. It can be frustrating for participants who are 'at the end of the queue' if someone else makes a point they had planned to raise. The animated character of the session is generally lost, and the group does not attain a sense of the collective.

The brainstorming session can also be limited to a *group discussion*. Afterwards, the supervisor uses his or her notes (or an audio recording) to frame a number of statements. This may, for example, prove a good solution for psychogeriatric patients who are difficult to approach.

As was mentioned above, the group brainstorming session can also be completely replaced by a written consultation, individual interviews or by study of the literature. The results are then presented to the group in phase 3.

3.2 *Duration of the brainstorming session*

If the brainstorming session goes on for too long, the statements can become far-fetched, and will subsequently receive a low rating in the *Concept Mapping* process. It is therefore advisable to put a time limit

on the session at the start. The usual time taken for a brainstorming session is 45 to 60 minutes. An average group can generate between 40 and 90 statements in that time, which is enough for *Concept Mapping*.

3.3 *The form and content of the statements*

The precise form and content of the statements are crucial to the eventual result. Poorly-formulated items lead to a meaningless *Concept Map*, which points to an important task for the supervisor (see also 3.5). It may be worthwhile giving a second person responsibility for the precise form and content of the statements that are fed into the computer. If a projection screen is available, the statements inputted into *Ariadne* can be displayed immediately. The advantage of this is that all the participants have another chance to see the statement, and to ask for clarification if necessary. The supervisor may choose to reserve some time at the end of the brainstorming session to run through the statements with the whole group. However, a good supervisor will not need to use such devices.

The content of the statements

The statements must of course match the focus. They must also:

- *have a similar level of abstraction*
i.e. be similarly specific or general in the light of the chosen focus;
- *be simple:*
contain only one aspect (formulate an item for each aspect);
- *be clear:*
have only one meaning for all participants. Avoid 'difficult' words or jargon.

Statements which are *facts or truisms* must also be avoided, for example: 'the service meets all the requirements' or 'the service should be qualitatively good'.

The form of the statements

Try to avoid:

- *long sentences*;
- *conditional formulations* (if..., then...);
- *comparisons* (... is better than ...);
- *double negatives*;
- *value judgements* (I think it would be good if...)

The level of abstraction of the statements

It is important that the statements are not too abstract. Abstract statements often form whole areas on the *Concept Map*. This is undesirable because one of the advantages of *Concept Mapping* is that it produces new abstractions from fairly concrete statements (by clustering those statements). If the level of abstraction of one statement does not correspond to that of the others, then that particular statement often becomes difficult to classify. Abstract statements are also unclear and thus mean different things to each of the participants. Examples of over-abstract statements are: 'the level of service must be high', 'care must be well organized', etc.

Too-concrete statements are also undesirable. Examples are: 'counter staff must not drum their fingers on the counter when a customer needs to think', 'the carer should call back within fifteen minutes of a request for help', etc. Such statements should be reformulated during the brainstorming session before they are fed into the computer. Slightly more general formulations might be: 'counter staff should make customer feel that they are welcome to present their problems', and: 'the carer should respond to telephone requests for help within a time period specified and monitored by the healthcare organization'. Similarly, where statements imply quantitative standards ('call back within 15 minutes', 'maximum of 10 appointments per course of treatment', etc.), the supervisor should look for a slightly more general formulation together with the participants. Very concrete statements are often too personal, or so specific that they do not really fit into any part of the *Concept Map*.

Statements which are too specific or too abstract cause problems when it comes to setting priorities: items which are too concrete are often given low ratings because they only apply to a very small area, and sometimes because participants don't agree with them in their specific form (for example: they may consider calling back within 15 minutes unrealistic). Yet participants may endorse the general sentiment (they may agree that calls should be returned within an agreed, fairly short time period).

Too-abstract statements are often rated highly, because they apply so broadly that everyone can fill in the details themselves. The best statements are therefore those with a similar level of abstraction; neither too specific nor too abstract.

Some *Concept Mapping* supervisors have difficulty steering the brainstorming session in such a way that it produces items with a useful level of abstraction. In one project the items were so poor that the process had to be repeated.

Simple statements

Participants often mention several aspects in a single breath. For instance: 'a patient must always have sufficient information to be able to choose from the range of care available'. The supervisor should split this statement in two: 'carers should give patients sufficient information about the range of care available and possible alternatives' and 'the patient must be given the opportunity to choose among various care alternatives'.

Unambiguous statements

Unclear and vague statements are not desirable. Different participants interpret them in different ways, which causes problems when it comes to setting priorities and forming clusters. This can also apply to 'difficult' words and jargon. Here too, the supervisor has an important role to play. He or she should make sure that every statement is understood by the whole group, and if necessary press for a more precise formulation (see also 3.5).

3.4 *The number of statements*

The largest permissible number of statements is 98. *Ariadne* cannot cope with more, and forming clusters and setting priorities based on more statements than this would be a thankless task for the participants. Between 40 and 70 statements is a far more manageable number.

If the brainstorming session produces too many statements, some will need to be removed, possibly in consultation with the participants. This can take up a lot of time, certainly more than the half-hour break available between the brainstorming session and the structuring phase if they are held on the same day. 'Rationalising' the stock of statements (which may only mean removing those statements which are repeated) is therefore only possible if the brainstorming and structuring sessions are held on separate days.

This makes it advisable to stop the brainstorming session once a previously established maximum number of statements has been reached, even if this happens well within the time limit. The maximum may only be 70 (or even fewer), depending on the subject, the objective of the *Concept Mapping* process and the

capacity of the group. The supervisor must inform the group shortly before the time limit or the maximum number of statements is reached.

3.5 *The supervisor's role*

The first point on the agenda is an explanation of the meeting's purpose by the supervisor. This will include: a broad outline of the *Concept Mapping* method and the results it produces, the objective of the meeting and the final application of the results, and the tasks which the participants will be set (in general terms at this stage. Each task will be explained in more detail during the meeting). Usually, the supervisor will have chalked up information (or prepared display sheets) on the agenda of the meeting, the various phases of *Concept Mapping* and an example of a *Concept Map*.

It is important that the supervisor stays slightly detached from the participants during the brainstorming session. He or she must, however, facilitate and support the group process and not lose sight of the goal of the session. If the supervisor fails to give any guidance, there is a danger that the group will concentrate too much on one topic. Participants sometimes let their dissatisfaction speak for them; they only raise things which are deficient or lacking, not those which are satisfactory. Moreover, some participants draw on very specific experiences of their own which cannot be generalized to take in the more appropriate aspects of the subject. In such cases, the supervisor must make his voice heard. Provided the supervisor gives participants the freedom to decide the content of their statements, he/she can point up anomalies in the group process.

Allowing participants to determine content means that the supervisor cannot make statements of his/her own. Moreover, he/she must accept every statement made by the participants, provided they are clear and fit within the focus. The supervisor may help participants clarify their statements. He/she can make suggestions about translating an over-specific statement to a more general level. Or conversely, translating a too-general statement into several, more specific ones. The participant who made the original statement should be asked if they agree with the 'translation', and whether it sufficiently covers their intended message.

In 2.4 we noted that the supervisor must ensure that each statement is understood by all the members of the group, and if necessary must press for a more precise formulation.

One aid which can be used in the brainstorming session is the display sheet: various aspects of the subject can be highlighted as an *aide-mémoire* for the participants. This can prevent them from following each other in a particular line of thought. The display sheet remains in view during the entire session, and the supervisor can draw attention to it if he/she feels that certain themes are being overlooked. The supervisor may also choose to send participants some information in advance of the meeting, setting out points of specific interest.

To ensure that these aids do not push the debate too much in one direction, the topics supplied in advance must be described generally and not too specifically. The participants must be clearly told that they

need only contribute what they want to. They can make statements which are not related to one of the listed topics, and are free to skip topics if they wish: the topics on the display sheet are only meant to prompt ideas, not to guide them.

4 Structuring (phase 3)

In the structuring phase, the participants are first asked to rank the statements in order of importance, and then to group the same set of statements according to content.

After the previous phase (the brainstorming session) the statements are printed onto cards and a complete set distributed to each of the participants. The structuring exercise involves them moving the cards around and making piles of them. If separate meetings have been planned, the *Concept Mapping* organizers can make the cards themselves in advance.

Whereas the brainstorming session was a group process, setting priorities and forming cluster is really a task for the individual. In theory, the participants could do it at home on their own. The advantage of conducting this stage in the group setting is the transparency it gives all participants, which helps to strengthen confidence in the result. Another benefit is that the process supervisor can help participants who don't immediately understand the task they have been set.

4.1 *Setting priorities*

This task requires that participants divide the statements into *five piles of equal size, in ascending order of importance* (ranking). It is useful to indicate the range of alternatives in words on a display sheet (pile five = most important, pile one = relatively least important). The participants are also required to *make each pile the same size*. How big each pile should be can again be shown on the display sheet.

This avoids the oft-noted tendency of participants to regard all the statements as equally important and to shy away from making a choice. It is advisable not to call the lowest category 'unimportant', but '*relatively least important*'. This avoids a situation where participants refuse to place statements in the lowest category because they still consider them important.

A separate *focus* can be devised for the prioritization stage. Put this focus on the display sheet, so that all the participants can see it. Possible examples are: 'Which aspects contribute most to successful partnership?' and 'Which aspects will be decisive in assessing the viability of a part-time clinic?'. It is usually worthwhile considering the focus of prioritization in advance (and possibly to discuss it briefly with the participants). After all, 'importance' can be judged in many different ways.

If the *Concept Mapping* process is based on the quality criteria for hospitals, it will probably not be enough to ask the participants to rank the quality criteria in order of importance. It may be difficult for participants to decide whether highly essential, but generally uncontroversial (i.e. well-regulated) quality criteria such as fire safety and qualified staff should be listed as very important or not. On the one hand, such matters are basic requirements for a properly-functioning hospital; on the other, hospitals will probably not vary on these criteria because, as basic conditions, they will be met across the board. In such a case, a good focus might be:

'If you were permitted a limited number of questions to assess the quality of a hospital, which would be the most important?'. This formulation ensures that the quality criteria which are judged to be 'important' will be those which participants consider to be essential *and* which vary from one hospital to another. This might be an adequate focus if *Concept Mapping* is being used to prepare a quality testing programme.

In theory, the participants could either group the statements according to content first (see next paragraph) and then according to importance, or vice-versa. However, letting participants set priorities first and then form clusters has produced good results in the past. Tackling the problem of what is important first, before asking participants to group statements according to content, is preferable because people may otherwise let judgements about the relative importance of different statements play a role in assigning them to clusters.

When the participants have finished this task, they each note their own results down on a separate form (see appendix 4). These forms are collected and are later used as the input for the computer. For some groups, it is helpful if the supervisor walks around the room whilst they are filling in their forms, in order to help them if they run into difficulties and make sure that they do not make any mistakes.

4.2 *Forming clusters*

In this exercise, the participants have to divide the statements into related groups which they define themselves. Because the statements have been printed onto cards, they can make piles of them.

Generally speaking, participants are first asked to form piles of statements which belong together and then to think up names to describe what links the statements in each pile. The order in which these two tasks are carried out can be reversed, although the first method is neater in methodological terms. By first grouping the separate statements by association, the material can inspire ideas in the participants. They can discover new aspects which they had not considered originally, in contrast to the second method.

Usually, participants are given three quarters of an hour for this sorting exercise, which is usually enough time.

Participants must not feel hurried, but it is advisable not to give them too much time. If there is no time limit, participants may become too involved in their task, without the results improving. After all, this is an associative process, which does not call for too much reflection. It was also found that participants in a *Concept Mapping* project who were allowed to take the assignment home and work at their own pace experienced some difficulties.

It is good to provide an example before the participants start work. When explaining the clustering process, a number of cards could be used to show that some statements are related and others are not. It must be emphasized that this is a matter of opinion.

Participants are not limited in the number of piles (clusters) they form, nor in the number of statements in each pile. However, *Ariadne* sets an upper limit of 25 clusters per participant, each of 40 statements per cluster.

5 Processing the data (phase 4)

5.1 *Selecting the statements*

Ariadne can be told which statements to include in the analysis. The importance of this is that some statements may prove to be very unclear, or too specific, or too abstract when it comes to the interpretation phase. If a statement is repeatedly placed in different clusters, each with a very different content, it may be that the statement has been misunderstood, or was not clearly interpreted. Such statements drift somewhere in the middle of the *Concept Map*.

5.2 *Selecting (groups of) participants*

Groups of participants may be compared in two ways. In the first method, the results are analysed separately. Individual participants may be selected, or alternatively the selection may be based on the characteristics (variables) defined by the participants. The result is a separate *Concept Map* for each of the groups. This procedure clearly brings out the differences between groups, but the results are difficult to compare.

Another method is to first let the computer calculate a *Concept Map* and then to look at the 'Latent Preferences'. This kind of illustration shows up the differences between individual participants and between categories of participants. For example, a participant who has got the prioritization exercise back to front can be filtered out. The *Concept Map* could then be recalculated, omitting his or her answers. Consult appendix 1 for more information on 'Latent Preferences'.

5.3 *The number of clusters*

The *Concept Map* is the result of statistical calculations based on the clustering assignment in phase 3. This map represents the 'distances' between statements: the more often participants put statements on the same pile, the smaller the distance between them on the map. On the *Concept Map*, these 'distances' are translated into spatial relationships.

The next step is to distinguish statement clusters: boxes are drawn around groups of statements which lie close together. *Ariadne* normally makes 8 clusters, but this number can be varied at the organizer's discretion. A good number is one which produces a meaningful classification of statements. If two of the clusters of an 8-cluster solution seem to be related, a 7-cluster solution can be tried instead. Conversely, if further divisions seem logical within a large cluster, a 9- or 10-cluster solution might be more appropriate.

What the best (most meaningful) cluster solution is cannot be established purely on statistical grounds, but will depend on the interpretation of content by those who assess the Concept Map.

6 Interpretation (phase 5)

After the clustering and prioritization round, the organizers enter the information into the computer, and *Ariadne* calculates the *Concept Map* and marks out clusters of statements. The labelling of these clusters is an important qualitative moment in the *Concept Mapping* procedure.

The *Concept Map* is often interpreted together with the participants. However, this is sometimes done by the researchers alone, or by a core group made up of *Concept Mapping* organizers.

Interpreting the *Concept Map* together with the participants is particularly important if one objective of the process is to win their commitment for changes etc. The results should be produced in partnership with the participants so that they feel as involved as possible.

6.1 *Two methods of interpretation*

The first way of interpreting the clusters is to base the explanation on the content of the statements. *Ariadne* supplies a summary of the statements in each cluster.

A second method which may be used in concert with the first is to observe the location of the statements on the map. By looking at the map we can see not only which statements belong together but also which ones certainly do not. The statements on the northern part of the map refer to a topic which contrasts with the statements on the southern part. The same is true for the eastern and western parts. For instance, at one pole of the map we often find statements which relate to organizational matters, and at the opposite pole those which describe more personal relationships. We may also find, for example, limiting conditions in one quadrant and the intended effects in another. We can therefore use the contrast between the four points of the compass (or extremities on the map) to guide us in the interpretation and labelling of the clusters.

6.2 *Interpreting and labelling the clusters*

Once the *Concept Map* has been shown to the participants, they can together work out which statements belong in the same cluster. The clusters are then labelled: the labels should indicate the underlying 'dimension' of the various statements in the cluster (a brief description or title). After everyone has taken turns to suggest a label, the group discusses the alternatives until agreement is reached.

In the interpretation phase it is important that the supervisor has additional information with respect to the participants, so that he or she can make suggestions if the group gets stuck. A certain amount of preparation is essential: the supervisor must have a clear idea of the statements, their place on the map, and possible links between them before the group starts to interpret them. If a group gets stuck, or makes slow progress, the supervisor can pre-empt frustrations by making a suggestion. Some groups have trouble thinking beyond

the statements, whilst others tend to lose sight of them. If the group cannot reach a decision, the supervisor must play an active role. However, some groups are highly creative in devising labels.

The *Concept Map* offers more interesting possibilities for analysis and interpretation besides cluster-labelling. Once the distances between the items have been clearly plotted in two dimensions, it is interesting to see what extremes exist, i.e. which statements are shown far apart, at the edges of the map. The analogy of the four points of the compass has already been used and we can distinguish four large areas (north, south, east and west), which in pairs represent a contrast: structure versus content, internal versus external contacts, limiting conditions versus effects, and so on.

The interpretation of the *Concept Map* can provide important extra insights into the breadth and range of the subject. It can also shed light on an initially obscure grouping of statements in particular clusters. Some statements may seem to belong in another cluster close by. Sometimes a cluster does not lend itself to interpretation at all. Understanding the two dimensions of the *Concept Map* (north-south and east-west, or top-bottom and left-right) can help to explain such features.

6.3 *The final application*

Once the subject has been charted with the help of clusters, its composition will be clearer (which aspects belong to the concept of 'quality', what the objectives of cooperation are, etc.).

The final application of Concept Mapping often requires that a choice be made from all of those aspects. The results of the prioritization exercise are important here. The computer calculates both the average importance of each statement individually, and the average importance of each cluster (this is the *Concept Map* in visual terms).

We may now choose to make a questionnaire to measure an abstract concept, begin activities to develop a project or evaluate the objectives of a policy programme. Whatever the case, the organizers will usually wish to focus attention on the really important aspects, whilst leaving the less important ones aside initially, or even permanently. After all, a questionnaire cannot consist of hundreds of questions, nor can a project tackle scores of new activities at once. And similarly, when it comes to evaluating policy, the project organizers will have to limit themselves in the evaluation criteria which are to be measured or operationalized.

In the interpretation phase, the organizers (alone or with the group) can use the *Concept Map* to underline the results which are important for the future. No general guidelines can be given for making those choices: they will depend on the objective and the subject of the *Concept Mapping* process. Some possible strategies are:

- 1 *Choose all the statements from the most important clusters.*

A selection is made from the clusters: all but the most important are discarded. Once this is done, all the remaining statements (partial facets) are incorporated in the follow-up process.

- 2 *Choose the most important statements from all of the clusters.*

None of the clusters are discarded. However, within each cluster, all but the most important statements (partial facets) are discarded.

- 3 *Choose the most important statements from the most important clusters.*

This produces the most conservative selection, advisable if the follow-up activities have to be limited for practical reasons.

- 4 *Choose the most important statements, regardless of the clusters they belong to.*

A selection is made from all the statements. All but the most important statements (partial facets) are discarded, regardless of the clusters they belong to.

7 Implementation

The implementation phase is not part of the *Concept Mapping* process in its strictest sense. However, the implementation is of course the ultimate objective of a *Concept Mapping* project. The whole project will be based on decisions about how the results are to be used. The final application will, in large measure, determine the choice of participants, the focus and the structure of the meetings.

General commitments can sometimes be made about the implementation phase at the end of the interpretation session (who will perform particular actions, work aspects out further, monitor the process, inform the others, etc.). Such commitments are mainly important for the more practically-based applications; for instance, if the results are to be used for quality measurement, or to begin or expand a partnership project.

In the case of more scientific applications, the researcher will implement his or her own plan on the basis of the results. He/she will develop a measurement instrument, or an evaluation plan in order to study a particular policy programme.

No general guidelines can be given for the implementation phase but two

matters are generally of importance:

- 1 Proper consideration should be given to the *final application* of the *Concept Mapping* results at the outset, and the project should be planned around them. For instance, the final application should determine who is involved in the process.
- 2 It must also be clear, *who* will use the results and how.

Participants at *Concept Mapping* meetings often ask for information about this. Some are only prepared to take part if it is clear that the results will not be used in an irresponsible manner. Others want to be sure that the results will really be used before agreeing to take part.

Appendix 1

HANDBOOK FOR ARIADNE CONCEPT MAPPING

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STEP 0: GETTING STARTED

- Go to <http://www.minds21.biz>
- Go to 'Organizers only'



- Enter your username and password
- Hit enter



NOTE

During a concept mapping session:

- Make sure you prepare as many laptops as participants
- Use your own login code on every laptop

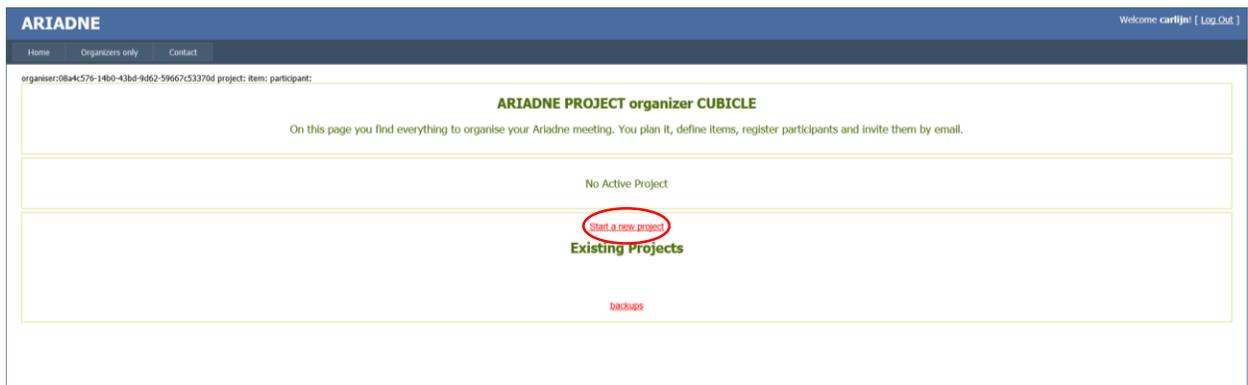
STEP 1: CREATE PROJECT

CREATE A NEW PROJECT

- Go to 'Organizers only'



- Go to 'start a new project'



- Enter the name and description of the project under 'name to identify the project and description'
- Hit 'Add'

NOTE

- Default the system collects information about importance and mapping
- The fields 'rate definitions and categories' can be used for different rating definitions
- If you add rating definitions, make sure you add importance if you want to collect this information
- The first column is used to define the rating definitions, the second through sixth column is used to define rating categories (response options)
- Hit 'add' to save your changes in rate definitions and categories

NOTE

- If you have many statements it is possible to randomize a set of statements to participants
- The field ‘maximum number of items to show to respondents’ allows you to determine how many statements a participant will approximately need to cluster and rate
- Click on ‘add’ to save

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

[<< Back to projects <<](#) [New Project Definition](#)

Name to identify the project and description

testproject manual

Rate Definitions and categories

priority	very important	important	neutral	unimportant	very unimportant
feasibility	very feasible	feasible	neutral	unfeasible	very unfeasible
rate definition 3	category 1	category 2	category 3	category 4	category 5
rate definition 4	category 1	category 2	category 3	category 4	category 5
rate definition 5	category 1	category 2	category 3	category 4	category 5

maximum number of item to show to respondents: 100 (Items will be randomly selected)

[Add](#) [Cancel](#)

- If you want to change your project name, rating definitions and/or randomization of statements at this stage click on ‘name & edit description’

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

[<< Back to projects <<](#) Current Active Project: testproject : manual [Edit name & description](#)

LOCK ITEMS BEFORE STARTING A PROJECT

[Show items](#) [lock items in this project](#)

[New Participant](#)

Existing project participants;

- Use the function 'update' to save changes in project name, project description, and rate definitions and categories
- Use the function 'cancel' to not save changes the project

ARIADNE Welcome carljiel [Log Out]

Home Organizers only Contact

organiser:08a4c57b-14b0-43bd-9d02-59667c53370d project:adfe5568-a280-47d4-a731-d322b8c9166 item: participant:

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

[<< Back to projects <<](#) Current Active Project: testproject : manual

LOCK ITEMS BEFORE STARTING A PROJECT

[lock items in this project](#)

Name to identify the project and description

testproject | manual

Rate Definitions and categories

priority	very important	important	neutral	unimportant	very unimportant
feasibility	very feasible	feasible	neutral	unfeasible	very unfeasible
rate definition 3	category 1	category 2	category 3	category 4	category 5
rate definition 4	category 1	category 2	category 3	category 4	category 5
rate definition 5	category 1	category 2	category 3	category 4	category 5

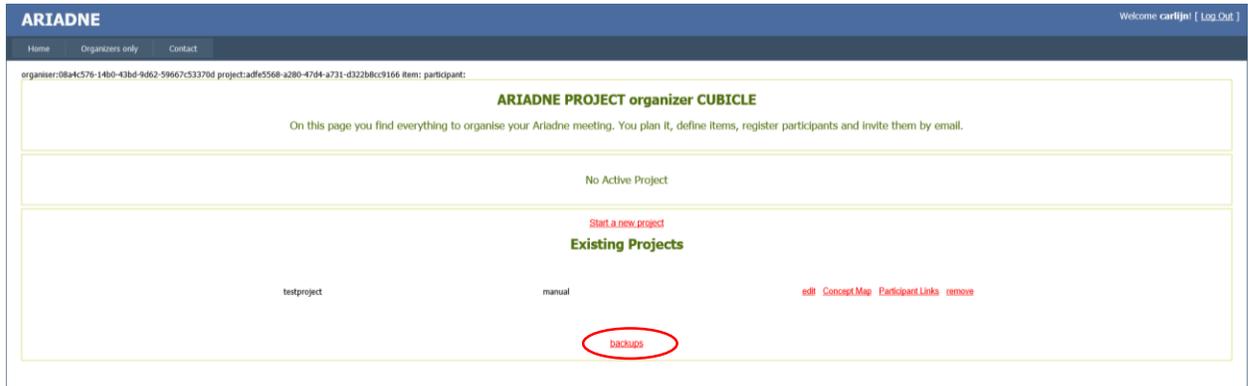
maximum number of item to show to repondents: 80 (Items will be randomly selected)

[Update](#) [Cancel](#)

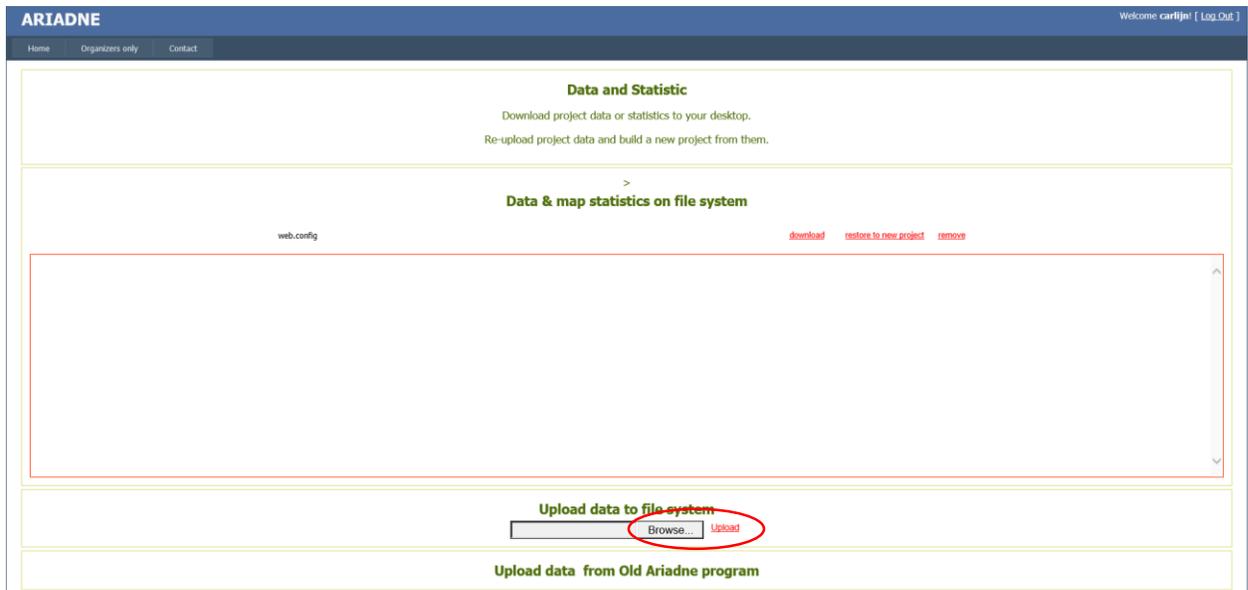
UPLOAD AN EXISTING PROJECT

It is possible to upload an existing project from excel or an ARP file.

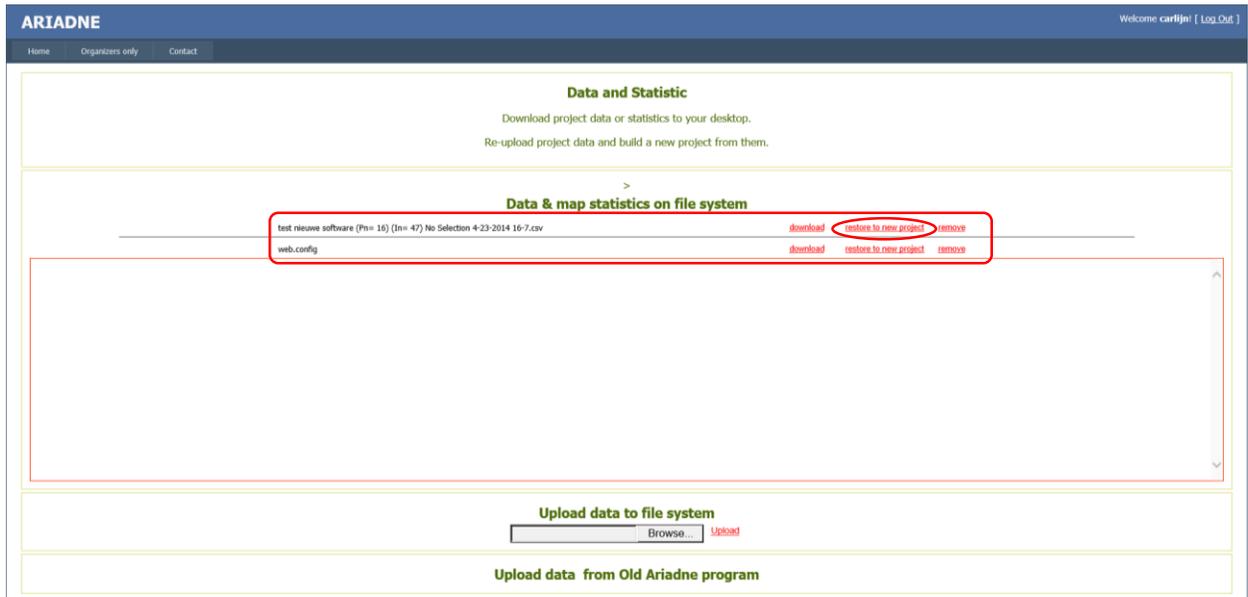
- Go to 'Organizers only'
- Go to 'backups'



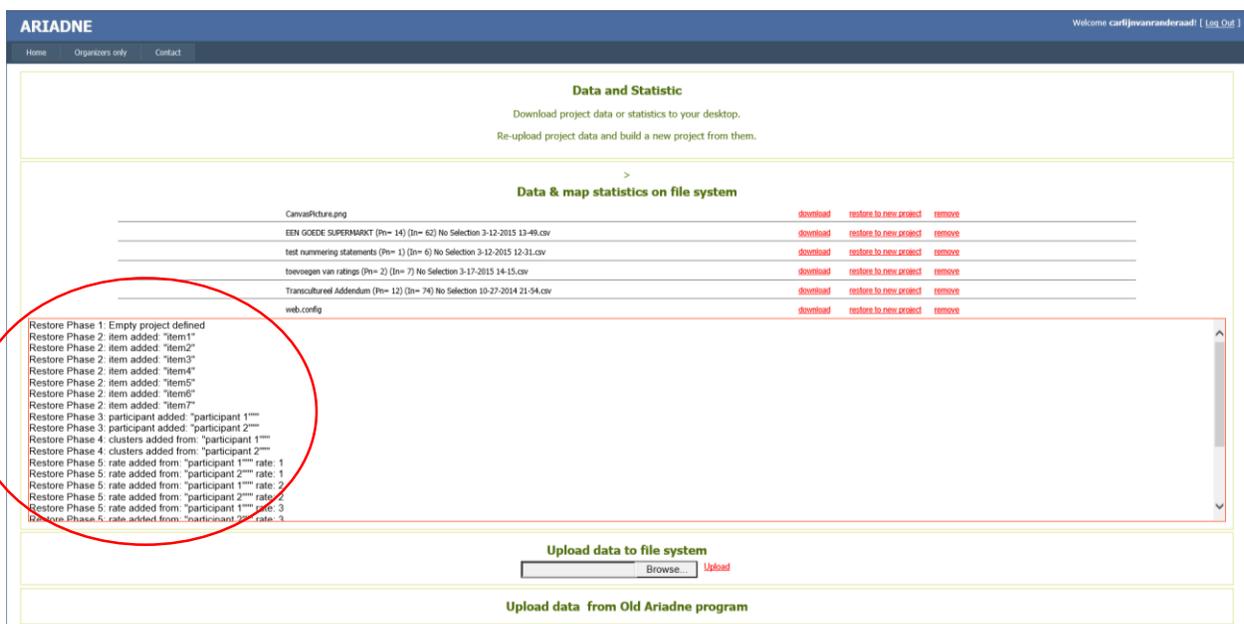
- Go to 'browse'
- Find your file
- And click 'upload'



- It will appear in the box below Data & map statistics on file system
- Click on 'restore to new project'



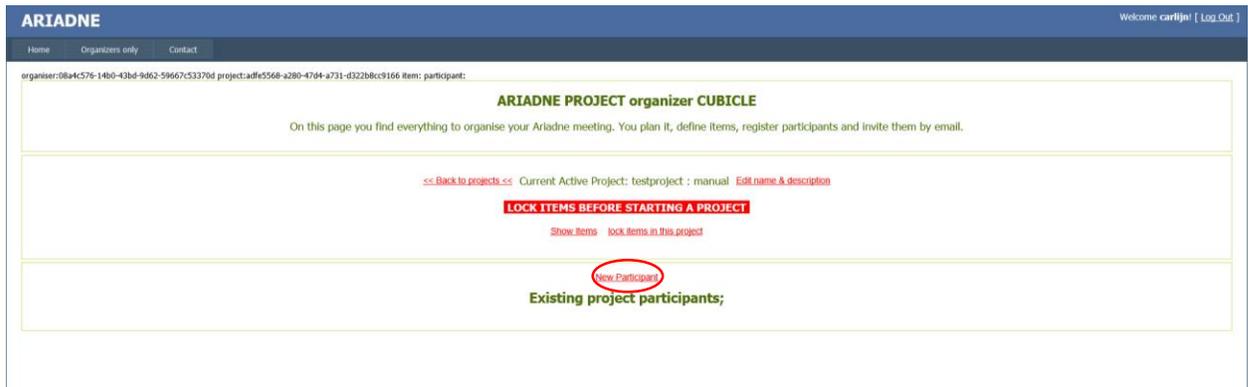
- Project will be restored and places into existing project once all statements appear in the box below



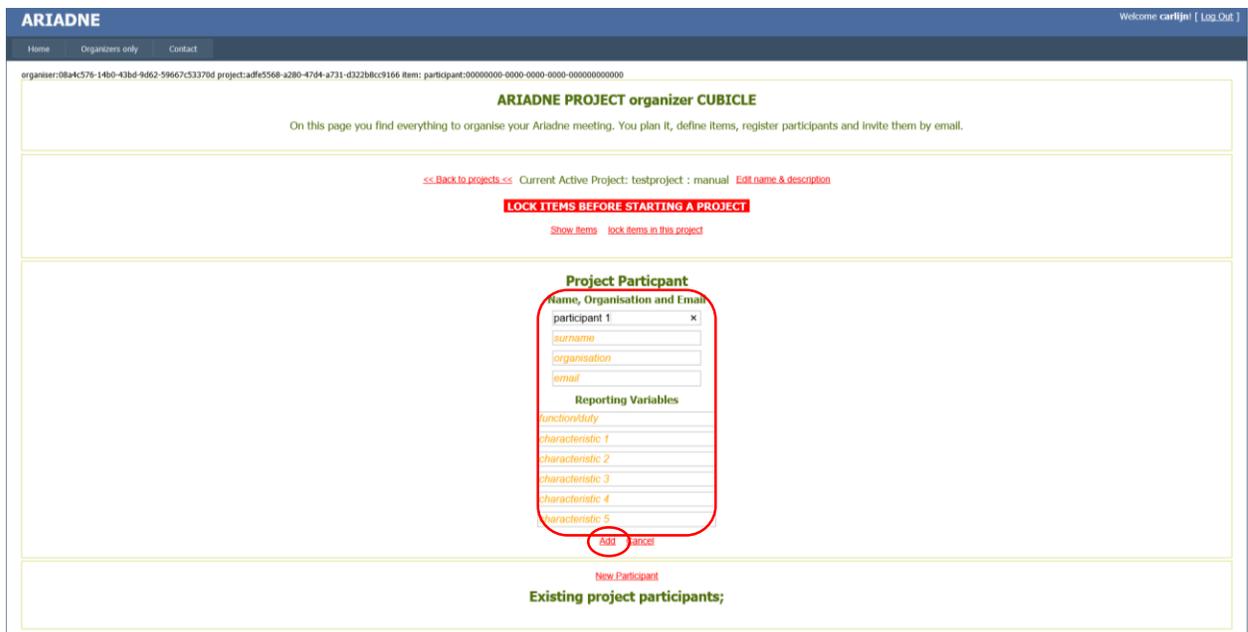
- Click on organizers only and find your project in existing projects

STEP 2: ADD PARTICIPANTS

- Enter participants by clicking 'new participant'



- Fill out all fields that you need
- Click 'Add'



- Add new participants by clicking 'New Participant'

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

<< Back to projects << Current Active Project: testproject : manual Edit name & description

ITEMS LOCKED

Show items unlock items in this project

New Participant

Existing project participants;

participant 1	edit	remove
---------------	------	--------

- Repeat all above steps
- An overview of participants is created

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

<< Back to projects << Current Active Project: testproject : manual Edit name & description

LOCK ITEMS BEFORE STARTING A PROJECT

Show items lock items in this project

New Participant

Existing project participants;

participant 1	edit	remove
participant 2	edit	remove
participant 3	edit	remove
participant 4	edit	remove
participant 5	edit	remove
participant 6	edit	remove
participant 7	edit	remove

- Use the function 'edit' to edit participant information
- Use the function 'remove' to remove participant from the project

The screenshot shows the ARIADNE web application interface. At the top, there is a blue header with the text 'ARIADNE' on the left and 'Welcome carljini [Log Out]' on the right. Below the header is a navigation bar with 'Home', 'Organizers only', and 'Contact' links. The main content area is titled 'ARIADNE PROJECT organizer CUBICLE' and contains the following text: 'On this page you find everything to organise your Ariadne meeting. You plan it, define Items, register participants and invite them by email.' Below this, there is a link '<< Back to projects <<' and the text 'Current Active Project: testproject : manual' followed by a link 'Edit name & description'. A red box highlights the text 'LOCK ITEMS BEFORE STARTING A PROJECT' with the sub-links 'Show Items' and 'lock items in this project'. Below this, there is a link 'New Participant' and the heading 'Existing project participants;'. A table lists seven participants, each with 'edit' and 'remove' buttons. The 'remove' button for 'participant 1' is circled in red.

Existing project participants;	
participant 1	edit remove
participant 2	edit remove
participant 3	edit remove
participant 4	edit remove
participant 5	edit remove
participant 6	edit remove
participant 7	edit remove

STEP 3: ADD STATEMENTS

- Click 'show items'

The screenshot shows the ARIADNE web application interface. At the top, there is a blue header with the text 'ARIADNE' on the left and 'Welcome carlijn! [Log Out]' on the right. Below the header is a navigation bar with 'Home', 'Organizers only', and 'Contact'. The main content area has a title 'ARIADNE PROJECT organizer CUBICLE' and a subtitle 'On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.' Below this, there is a red button labeled '<< Back to projects <<' and a link 'Current Active Project: testproject : manual Edit name & description'. A prominent red button labeled 'LOCK ITEMS BEFORE STARTING A PROJECT' is centered. Below it, a red button labeled 'Show Items' is circled in red, with a link 'lock items in this project' next to it. Further down, there is a link 'New Participant' and a section titled 'Existing project participants;'. This section contains a table with 7 rows, each representing a participant from 'participant 1' to 'participant 7'. Each row has 'edit' and 'remove' links on the right side.

- Click on 'new item'

This screenshot is similar to the previous one, showing the same ARIADNE web application interface. The 'LOCK ITEMS BEFORE STARTING A PROJECT' button is present. Below it, there is a link 'Show Participants' and a link 'lock items in this project'. The 'Existing project items' section is now visible, and a red button labeled 'new item' is circled in red.

- Enter item and click on 'Add'

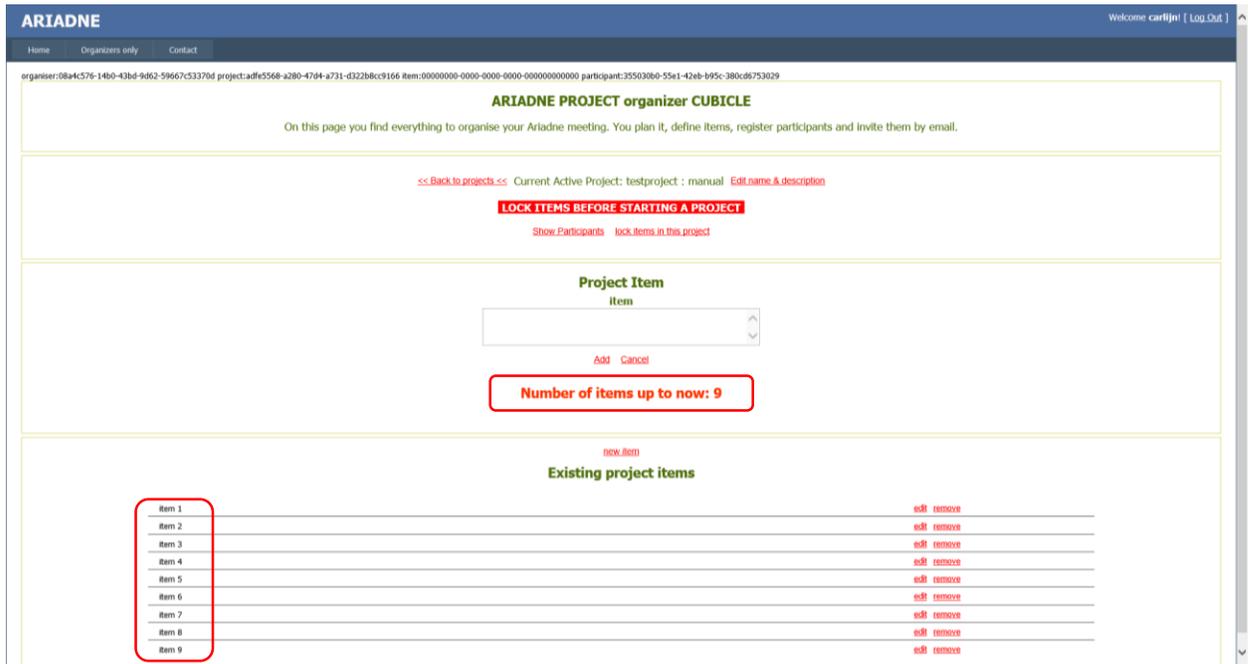
The screenshot shows the ARIADNE PROJECT organizer CUBICLE interface. At the top, there is a navigation bar with 'Home', 'Organizers only', and 'Contact'. Below this, a header section contains the text 'ARIADNE PROJECT organizer CUBICLE' and a sub-header 'On this page you find everything to organise your Ariadne meeting. You plan it, define Items, register participants and invite them by email.' A red box highlights the 'Add' button in the 'Project Item' section. The 'Project Item' section contains a dropdown menu with 'item 1' selected and an 'Add' button. Below the dropdown, it says 'Number of items up to now: 0'. At the bottom, there is a 'new item' link and the text 'Existing project items'.

- Add new statements by clicking 'new item'

The screenshot shows the ARIADNE PROJECT organizer CUBICLE interface. At the top, there is a navigation bar with 'Home', 'Organizers only', and 'Contact'. Below this, a header section contains the text 'ARIADNE PROJECT organizer CUBICLE' and a sub-header 'On this page you find everything to organise your Ariadne meeting. You plan it, define Items, register participants and invite them by email.' A red box highlights the 'new item' button in the 'Existing project items' section. The 'Existing project items' section contains a list with 'item 1' and an 'edit remove' link.

- Repeat until all items are entered

- An overview of items is created
- The software counts items



- Use the function 'edit' to edit items
- Use the function 'remove' to remove items from the project



- After the last item click 'lock items in this project'

The screenshot displays the ARIADNE web application interface. At the top, there is a navigation bar with 'ARIADNE' on the left and 'Welcome carlijn! [Log Out]' on the right. Below the navigation bar, there are links for 'Home', 'Organizers only', and 'Contact'. The main content area is titled 'ARIADNE PROJECT organizer CUBICLE' and contains the following elements:

- A header section with the text: 'On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.'
- A section with a red warning box: 'LOCK ITEMS BEFORE STARTING A PROJECT'. Below this box are two links: 'Show Participants' and 'lock items in this project' (which is circled in red).
- A 'Project Item' section with a text input field labeled 'item' and 'Add' and 'Cancel' buttons below it.
- A status message: 'Number of items up to now: 9'.
- A 'new item' link above a section titled 'Existing project items'.
- A table listing 9 items, each with 'edit' and 'remove' links.

Existing project items	
Item 1	edit remove
Item 2	edit remove
Item 3	edit remove
Item 4	edit remove
Item 5	edit remove
Item 6	edit remove
Item 7	edit remove
Item 8	edit remove
Item 9	edit remove

STEP 4: INVITE PARTICIPANTS

DURING CONCEPT MAPPING SESSION

- Click on 'back to projects'

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

<< back to projects << Current Active Project: testproject : manual Edit name & description

ITEMS LOCKED

Show Participants unlock items in this project

Project Item

Item

Add Cancel

Number of items up to now: 9

Items locked

Existing project items

Item 1	edit remove
Item 2	edit remove
Item 3	edit remove
Item 4	edit remove
Item 5	edit remove
Item 6	edit remove
Item 7	edit remove
Item 8	edit remove
Item 9	edit remove

- Find your project
- Click 'Participant Links'

ARIADNE PROJECT organizer CUBICLE

On this page you find everything to organise your Ariadne meeting. You plan it, define items, register participants and invite them by email.

No Active Project

Start a new project

Existing Projects

testproject	manual	edit Concept Maps Participant Links remove
-------------	--------	--

backups

- Click on 'URL' in front of the participant's name to get the URL for that participant

ARIADNE Welcome carlji! [Log Out]

Home Organizers only Contact

ARIADNE LINKS FOR PROJECT PARTICIPANTS

On this page you find the participants URL links to the sort and rating task. You can add the link (URL) for a participant to an email to that participant.
When a participant clicks on the provided link he will log in to minds21.com and he will be shown his rate and sort task.

[click on "URL" get the URL to a participants page](#)

project participants

URL	participant 1	sort results	rate results	rate results
URL	participant 2	sort results	rate results	rate results
URL	participant 3	sort results	rate results	rate results
URL	participant 4	sort results	rate results	rate results
URL	participant 5	sort results	rate results	rate results
URL	participant 6	sort results	rate results	rate results
URL	participant 7	sort results	rate results	rate results

- Click on the URL that appears above

ARIADNE Welcome carlji! [Log Out]

Home Organizers only Contact

ARIADNE LINKS FOR PROJECT PARTICIPANTS

On this page you find the participants URL links to the sort and rating task. You can add the link (URL) for a participant to an email to that participant.
When a participant clicks on the provided link he will log in to minds21.com and he will be shown his rate and sort task.

[~/Web_Code/participate.aspx?project=adfe5568-a280-47d4-a731-d322b8cc9166&participant=bf68b64c-954a-4c87-990c-6baf5cb1bf9&username=7fa8e11f-a3b7-4c77-a77b-e1f5796e7295&passname=a240357c-132f-4fe2-a390-65ef918a47f2](#)

project participants

URL	participant 1	sort results	rate results	rate results
URL	participant 2	sort results	rate results	rate results
URL	participant 3	sort results	rate results	rate results
URL	participant 4	sort results	rate results	rate results
URL	participant 5	sort results	rate results	rate results
URL	participant 6	sort results	rate results	rate results
URL	participant 7	sort results	rate results	rate results

- The participant is ready for rating and mapping

ARIADNE Welcome 7fa8e11f-a3b7-4c77-a77b-e1f5796e7295! [Log Out]

Home Organizers only Contact

<

Welcome to Minds21
participant 1

to participate click first on Rate to rate the items. Then click on Map to map the items

Importance

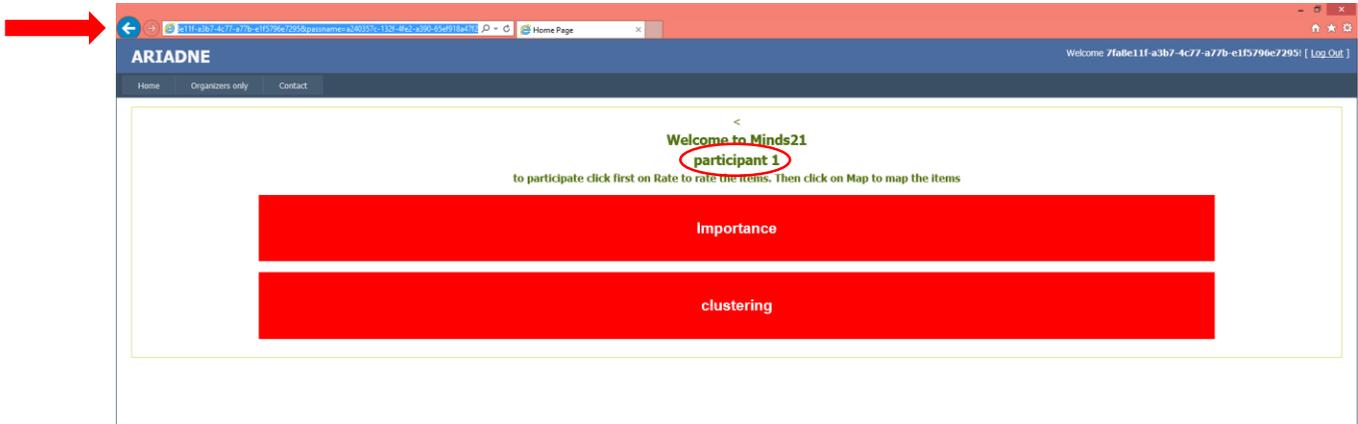
clustering

NOTE

- When running a concept mapping group: make sure to help participants to find their own link

BY E-MAIL

- Copy the URL in your browser into an e-mail
- Send the e-mail to that specific participant using this link



- Log out



- Log in again on your own account and repeat this for the other participants
- All participants have their own unique URL

NOTE

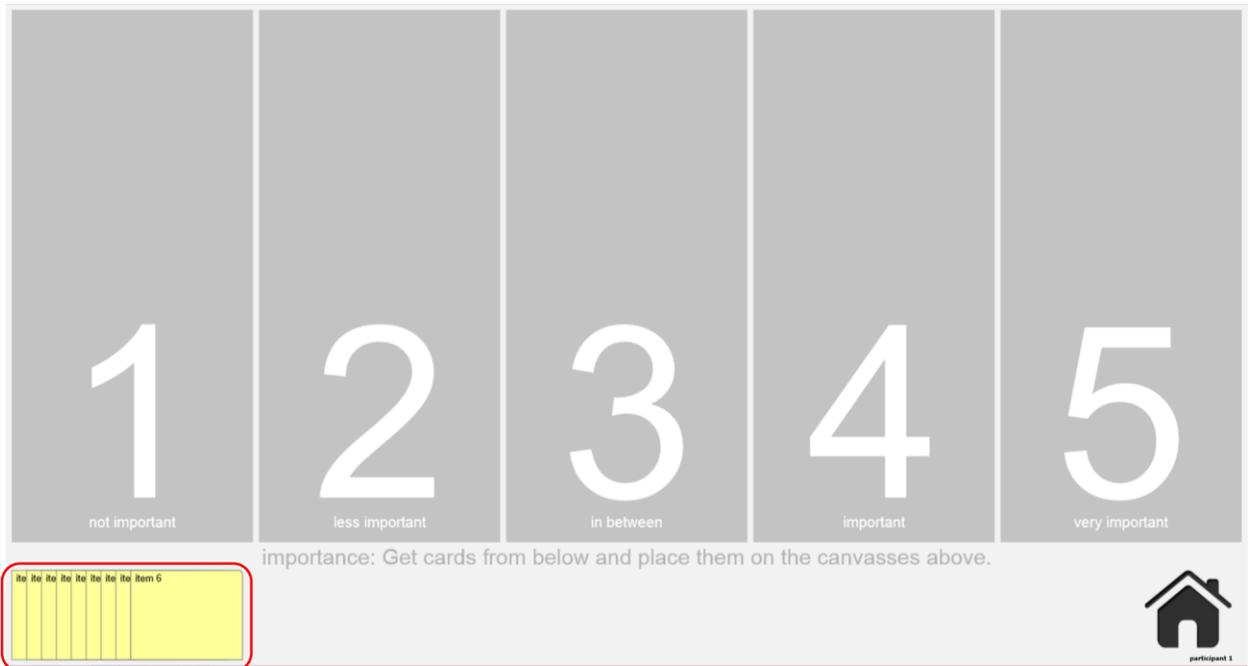
- If you do not want to copy all those links from your browser but take them directly from Ariadne, please make sure that you put www.minds21.biz instead of ~

STEP 5: RATE STATEMENTS

- Click on 'Importance'

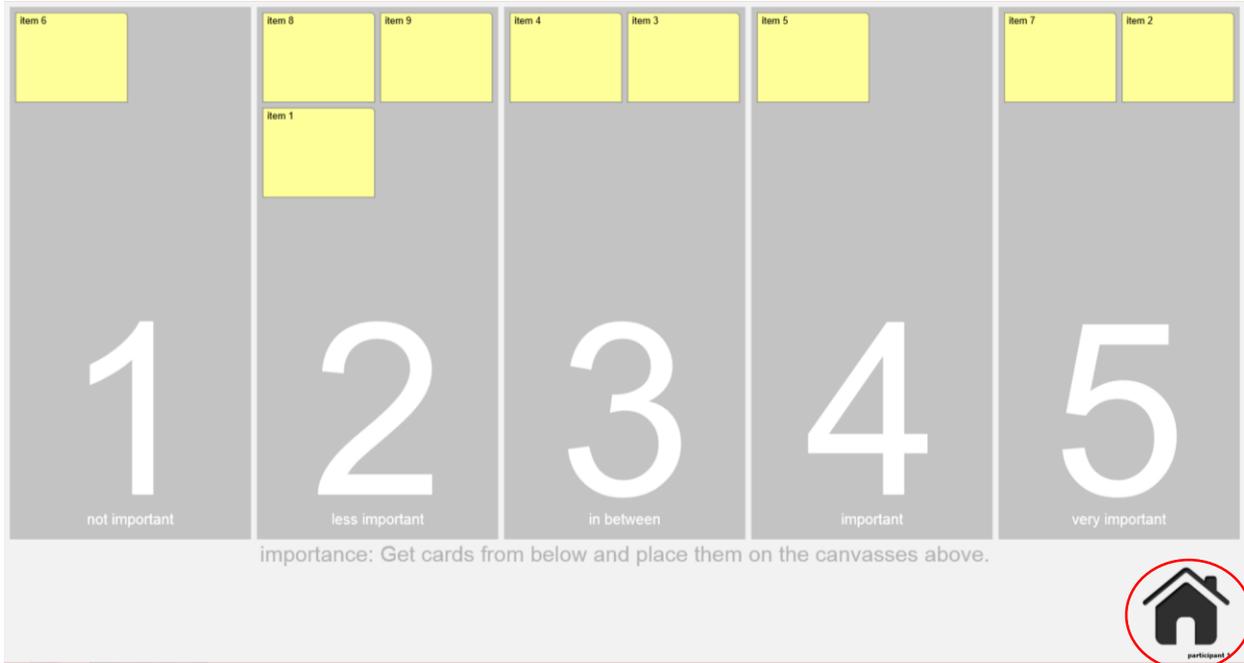


- All cards with statements are placed below (or in case of randomization: a randomized set of cards will be shown)



- Move all cards one by one into one of the 5 columns (based on importance) by clicking on it with your left mouse button, holding it and moving it into the right column
- Once you got the card in the right column, you can release the mouse button
- Instruct participants to evenly distribute statements over the 5 rating options

- Ariadne saves automatically
- Click on  when finished



NOTE:

- When you have a lot of cards and the cards don't fit into the column, make sure you place it in grey area in order to include in the analysis. Otherwise the statement will be placed back in the bottom area

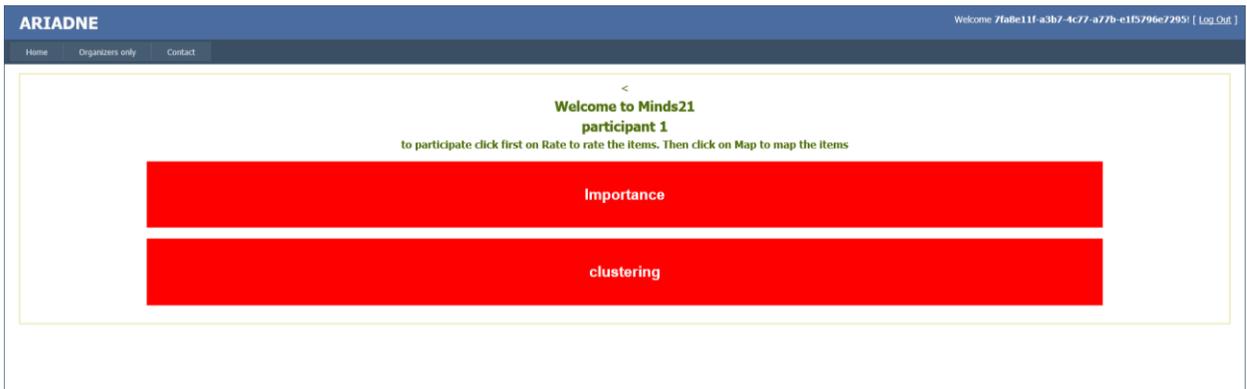


- When you fully use the 5th column or even place more cards in the 5th column, it is not possible to use the  button to save. It will replace cards on the bottom of the page and cards will not be included in the analysis. In this case make sure you use the back button of your browser.

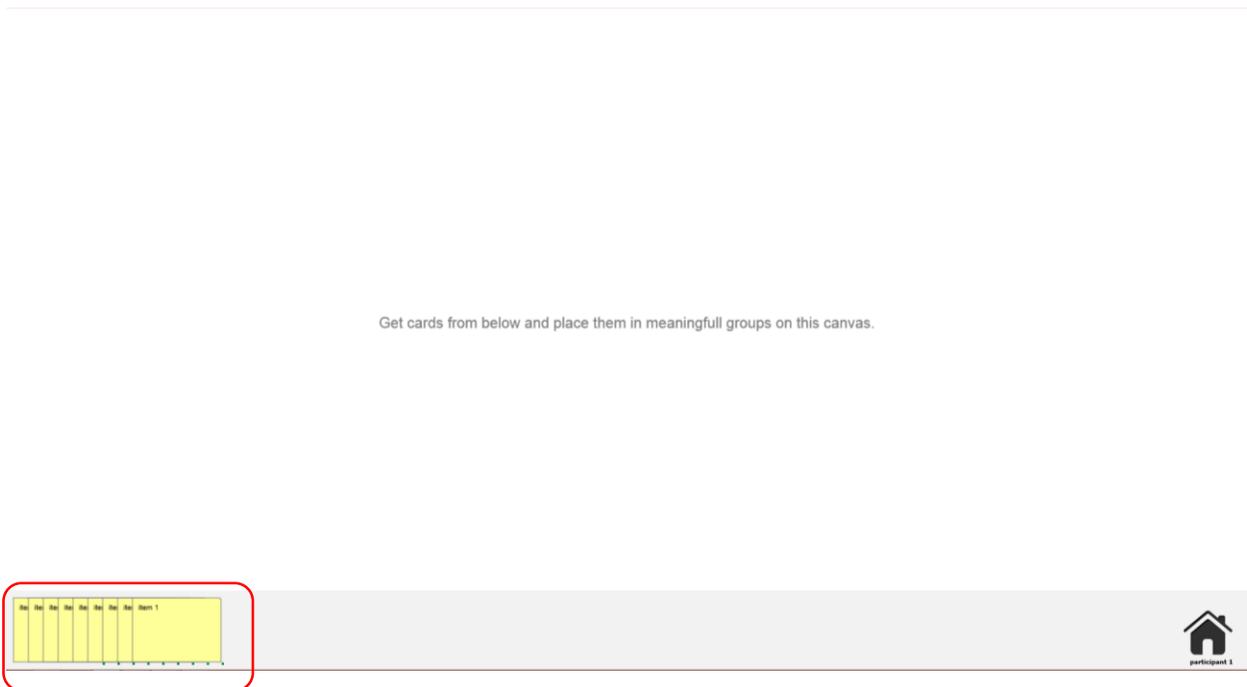


STEP 6: CLUSTER STATEMENTS

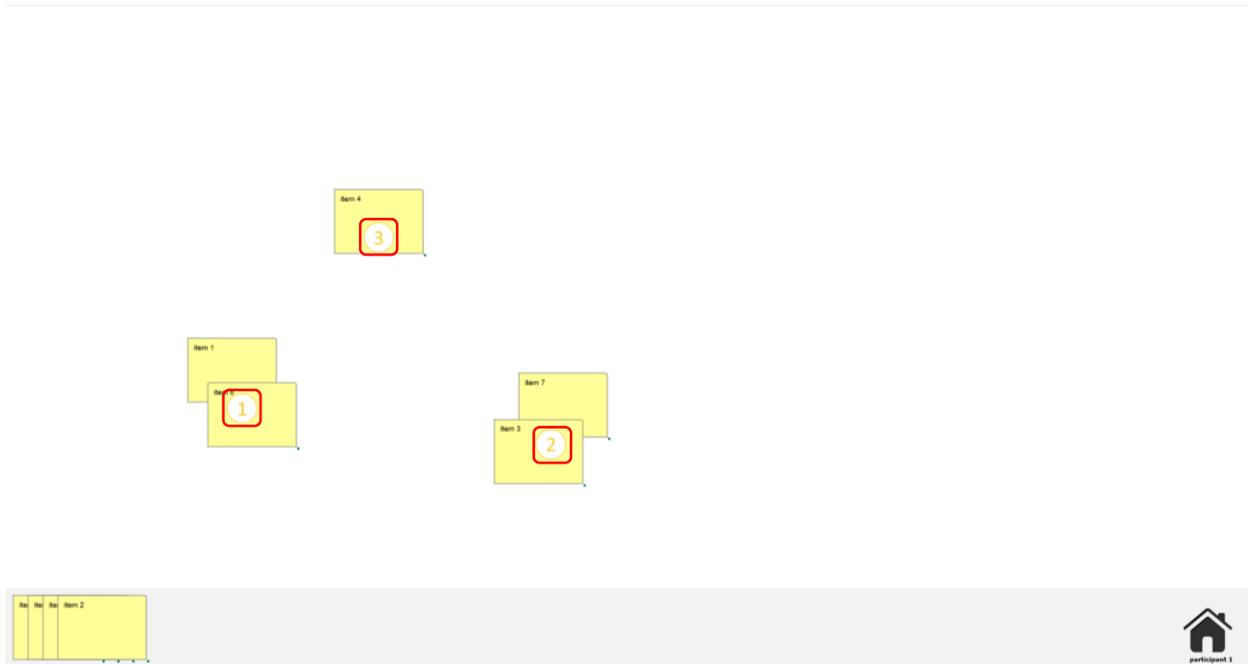
- Click on 'clustering'



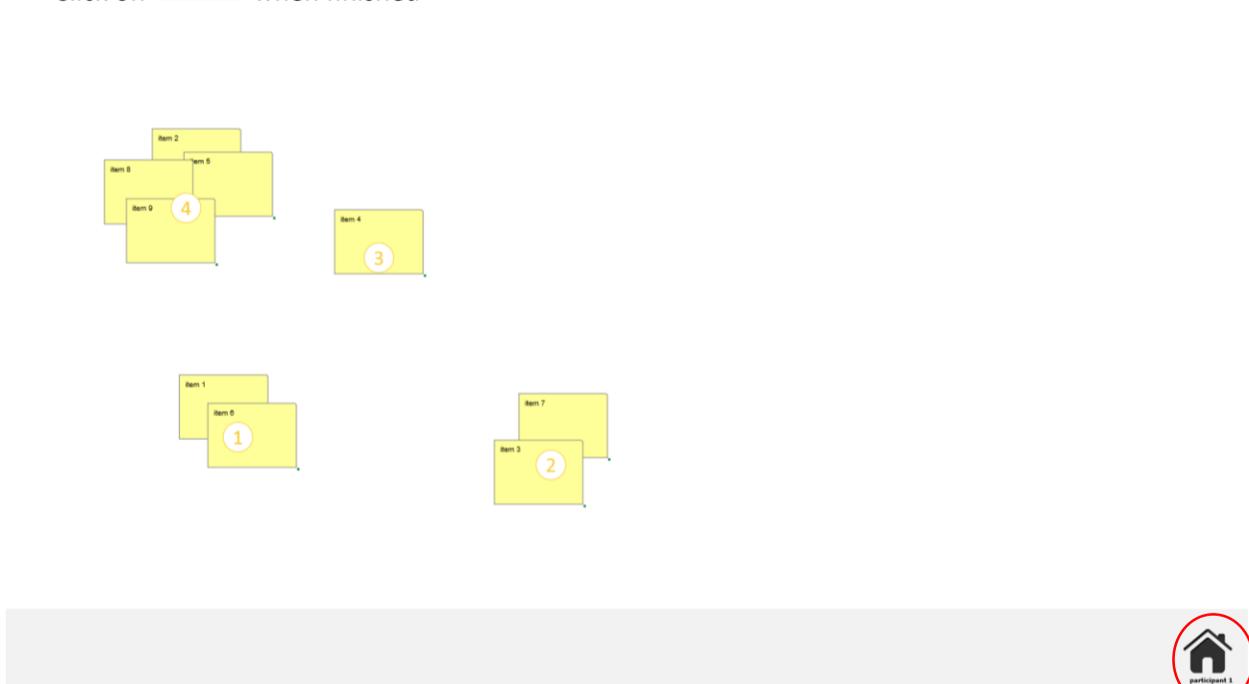
- All cards with statements are placed below (or in case of randomization: a randomized set of cards will be shown)



- Move all cards one by one into piles/ clusters (based on content) by clicking on it with your left mouse button, holding it and moving it
- Create groups by placing the cards into the same group, a number appears over the group

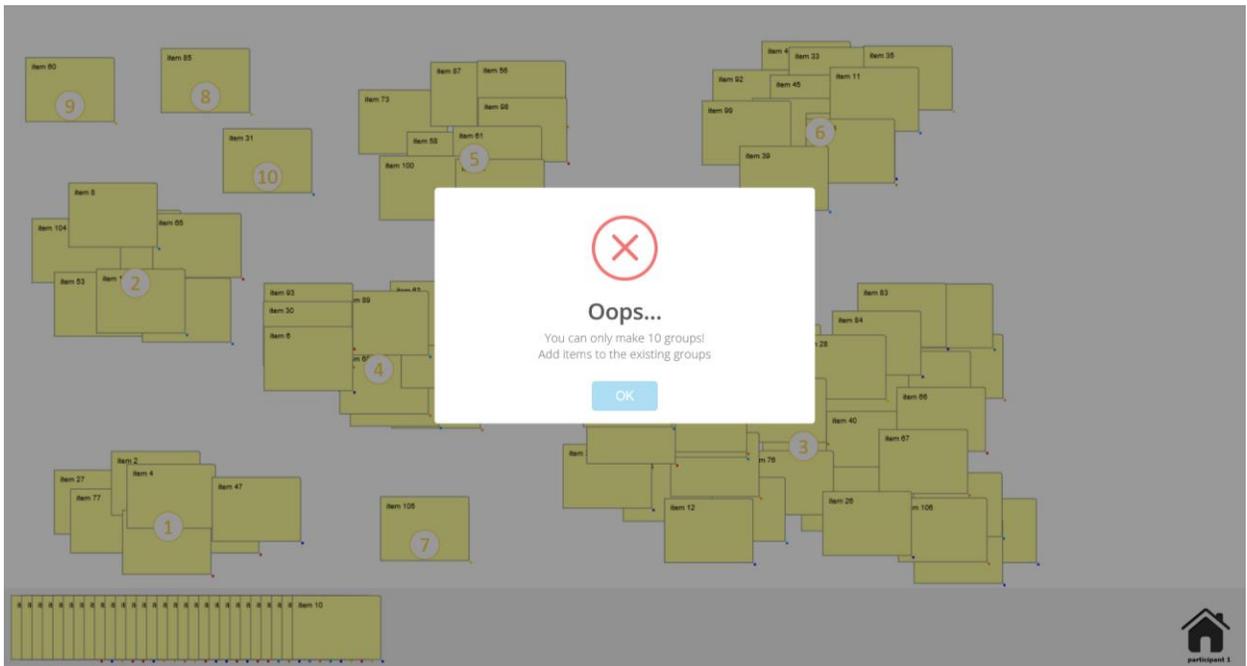


- Ariadne saves automatically
- Click on  when finished



NOTE

- Make sure not to create over 10 groups. The system will give you the following error:



- To name clusters:
 - Click on the cluster number



- Remove 'group 2'



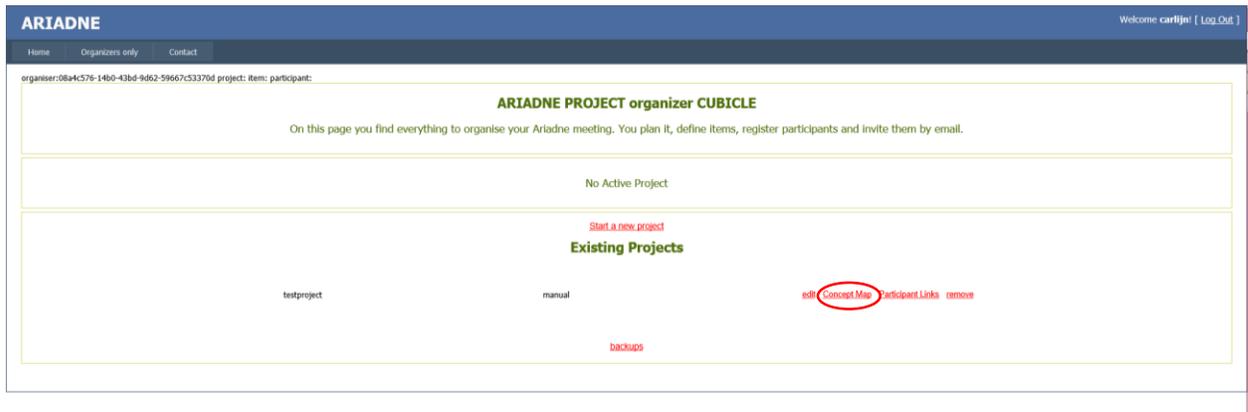
- To name that cluster, type your text



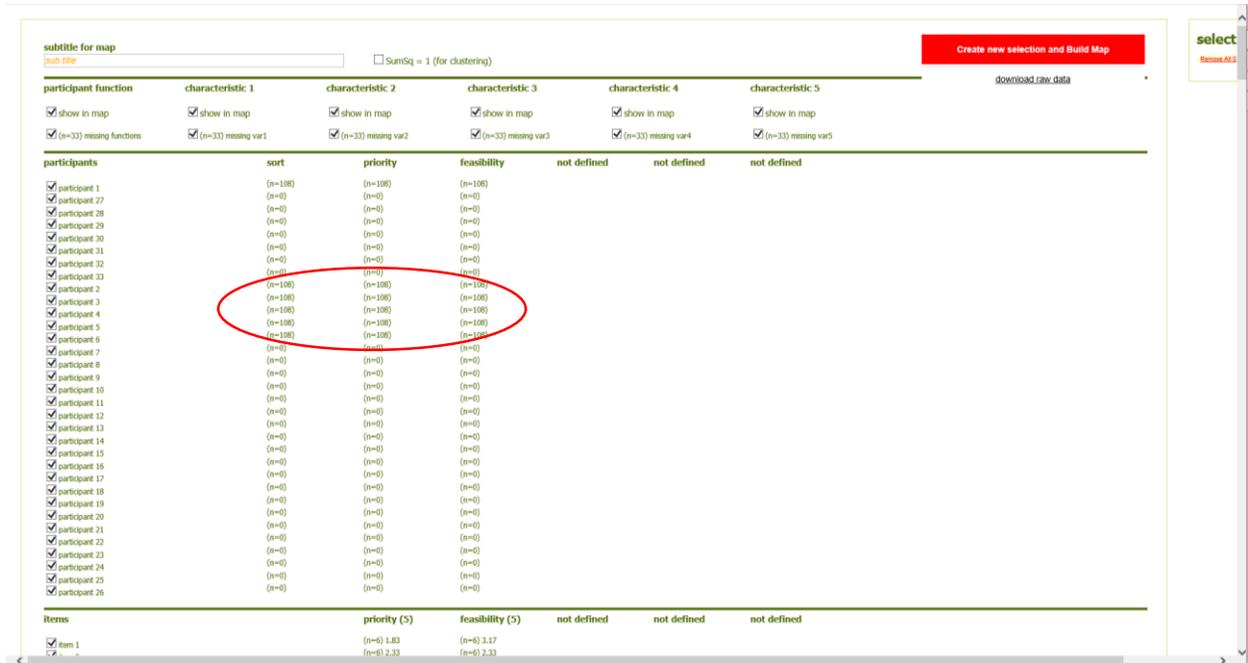
- Make sure your mouse doesn't move when you name it
- Once you move your mouse, changes are saved
- Be careful with the backspace key!
- Ariadne saves automatically
- Click on  when finished

STEP 7: CREATE MAP

- Click 'Concept Map' in your project



- This screen allows you to check how far participants are sorting and rating the statements



- This screen allows to select information you want to be included in your concept map

subtitle for map SumSq = 1 (for clustering) Create new selection and Build Map

download raw data

participant function	characteristic 1	characteristic 2	characteristic 3	characteristic 4	characteristic 5
<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map
<input checked="" type="checkbox"/> (n=33) missing functions	<input checked="" type="checkbox"/> (n=33) missing var1	<input checked="" type="checkbox"/> (n=33) missing var2	<input checked="" type="checkbox"/> (n=33) missing var3	<input checked="" type="checkbox"/> (n=33) missing var4	<input checked="" type="checkbox"/> (n=33) missing var5

participants	sort	priority	feasibility	not defined	not defined	not defined
<input checked="" type="checkbox"/> participant 1	(n=108)	(n=108)	(n=108)			
<input checked="" type="checkbox"/> participant 27	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 28	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 29	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 30	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 31	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 32	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 33	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 2	(n=108)	(n=108)	(n=108)			
<input checked="" type="checkbox"/> participant 3	(n=108)	(n=108)	(n=108)			
<input checked="" type="checkbox"/> participant 4	(n=108)	(n=108)	(n=108)			
<input checked="" type="checkbox"/> participant 5	(n=108)	(n=108)	(n=108)			
<input checked="" type="checkbox"/> participant 6	(n=108)	(n=108)	(n=108)			
<input checked="" type="checkbox"/> participant 7	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 8	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 9	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 10	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 11	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 12	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 13	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 14	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 15	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 16	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 17	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 18	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 19	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 20	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 21	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 22	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 23	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 24	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 25	(n=0)	(n=0)	(n=0)			
<input checked="" type="checkbox"/> participant 26	(n=0)	(n=0)	(n=0)			

items	priority (5)	feasibility (5)	not defined	not defined	not defined
<input checked="" type="checkbox"/> item 1	(n=8) 1.83	(n=8) 3.17			
<input checked="" type="checkbox"/> item 2	(n=8) 2.33	(n=8) 2.33			
<input checked="" type="checkbox"/> item 3	(n=8) 2.50	(n=8) 2.83			
<input checked="" type="checkbox"/> item 4	(n=8) 3.17	(n=8) 4.17			
<input checked="" type="checkbox"/> item 5	(n=8) 3.00	(n=8) 3.67			
<input checked="" type="checkbox"/> item 6	(n=8) 2.33	(n=8) 2.67			
<input checked="" type="checkbox"/> item 7	(n=8) 3.67	(n=8) 3.00			
<input checked="" type="checkbox"/> item 8	(n=8) 2.83	(n=8) 2.83			
<input checked="" type="checkbox"/> item 9	(n=8) 3.00	(n=8) 3.83			
<input checked="" type="checkbox"/> item 10	(n=8) 2.33	(n=8) 3.50			
<input checked="" type="checkbox"/> item 11	(n=8) 2.67	(n=8) 3.00			
<input checked="" type="checkbox"/> item 12	(n=8) 2.83	(n=8) 3.00			
<input checked="" type="checkbox"/> item 13	(n=8) 3.00	(n=8) 4.33			
<input checked="" type="checkbox"/> item 14	(n=8) 2.83	(n=8) 2.17			
<input checked="" type="checkbox"/> item 15	(n=8) 3.00	(n=8) 3.33			
<input checked="" type="checkbox"/> item 16	(n=8) 2.83	(n=8) 3.50			
<input checked="" type="checkbox"/> item 17	(n=8) 4.00	(n=8) 3.00			
<input checked="" type="checkbox"/> item 18	(n=8) 2.00	(n=8) 2.67			
<input checked="" type="checkbox"/> item 19	(n=8) 2.17	(n=8) 3.33			
<input checked="" type="checkbox"/> item 20	(n=8) 2.83	(n=8) 2.17			
<input checked="" type="checkbox"/> item 21	(n=8) 3.17	(n=8) 2.83			
<input checked="" type="checkbox"/> item 22	(n=8) 3.50	(n=8) 3.00			
<input checked="" type="checkbox"/> item 23	(n=8) 3.17	(n=8) 3.17			
<input checked="" type="checkbox"/> item 24	(n=8) 2.83	(n=8) 2.50			
<input checked="" type="checkbox"/> item 25	(n=8) 2.33	(n=8) 2.83			
<input checked="" type="checkbox"/> item 26	(n=8) 3.17	(n=8) 2.00			
<input checked="" type="checkbox"/> item 27	(n=8) 3.83	(n=8) 3.00			
<input checked="" type="checkbox"/> item 28	(n=8) 2.83	(n=8) 2.67			
<input checked="" type="checkbox"/> item 29	(n=8) 2.67	(n=8) 2.00			
<input checked="" type="checkbox"/> item 30	(n=8) 3.67	(n=8) 3.17			
<input checked="" type="checkbox"/> item 31	(n=8) 2.33	(n=8) 4.17			
<input checked="" type="checkbox"/> item 32	(n=8) 2.17	(n=8) 3.33			
<input checked="" type="checkbox"/> item 33	(n=8) 4.00	(n=8) 3.50			
<input checked="" type="checkbox"/> item 34	(n=8) 3.83	(n=8) 2.33			
<input checked="" type="checkbox"/> item 35	(n=8) 3.50	(n=8) 2.67			
<input checked="" type="checkbox"/> item 36	(n=8) 2.33	(n=8) 2.00			
<input checked="" type="checkbox"/> item 37	(n=8) 2.50	(n=8) 3.50			
<input checked="" type="checkbox"/> item 38	(n=8) 2.83	(n=8) 2.17			
<input checked="" type="checkbox"/> item 39	(n=8) 2.83	(n=8) 3.17			
<input checked="" type="checkbox"/> item 40	(n=8) 3.33	(n=8) 3.17			

- Selections will be saved at the right side of the screen

subtitle for map SumSq = 1 (for clustering) Create new selection and Build Map

download raw data

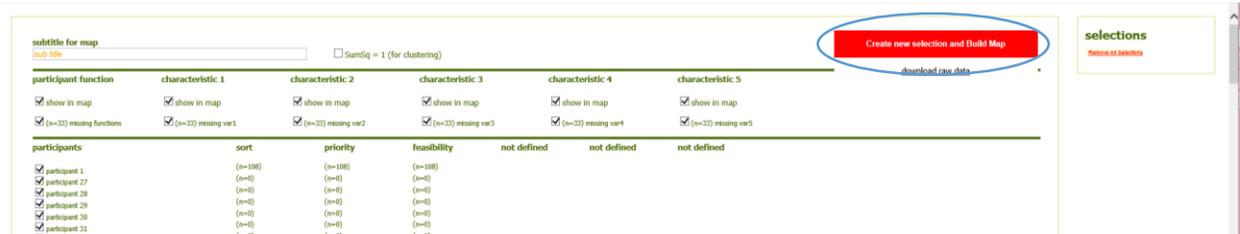
participant function	characteristic 1	characteristic 2	characteristic 3	characteristic 4	characteristic 5
<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map	<input checked="" type="checkbox"/> show in map
<input checked="" type="checkbox"/> (n=33) missing functions	<input checked="" type="checkbox"/> (n=33) missing var1	<input checked="" type="checkbox"/> (n=33) missing var2	<input checked="" type="checkbox"/> (n=33) missing var3	<input checked="" type="checkbox"/> (n=33) missing var4	<input checked="" type="checkbox"/> (n=33) missing var5

participants	sort	priority	feasibility	not defined	not defined	not defined
<input checked="" type="checkbox"/> participant 1	(n=108)	(n=108)	(n=108)			

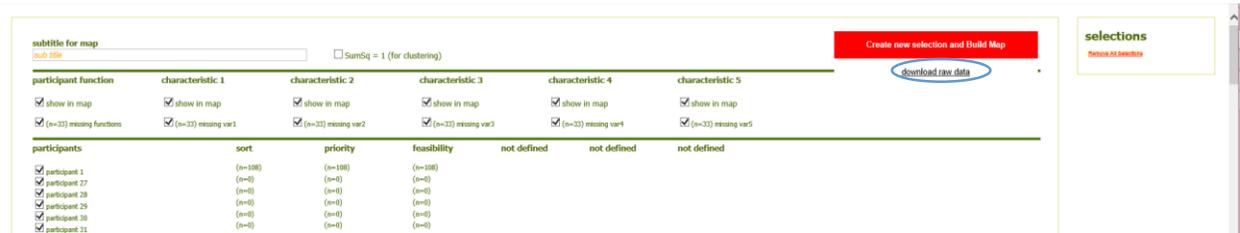
selections

TOTAL: 41 SELECTIONS

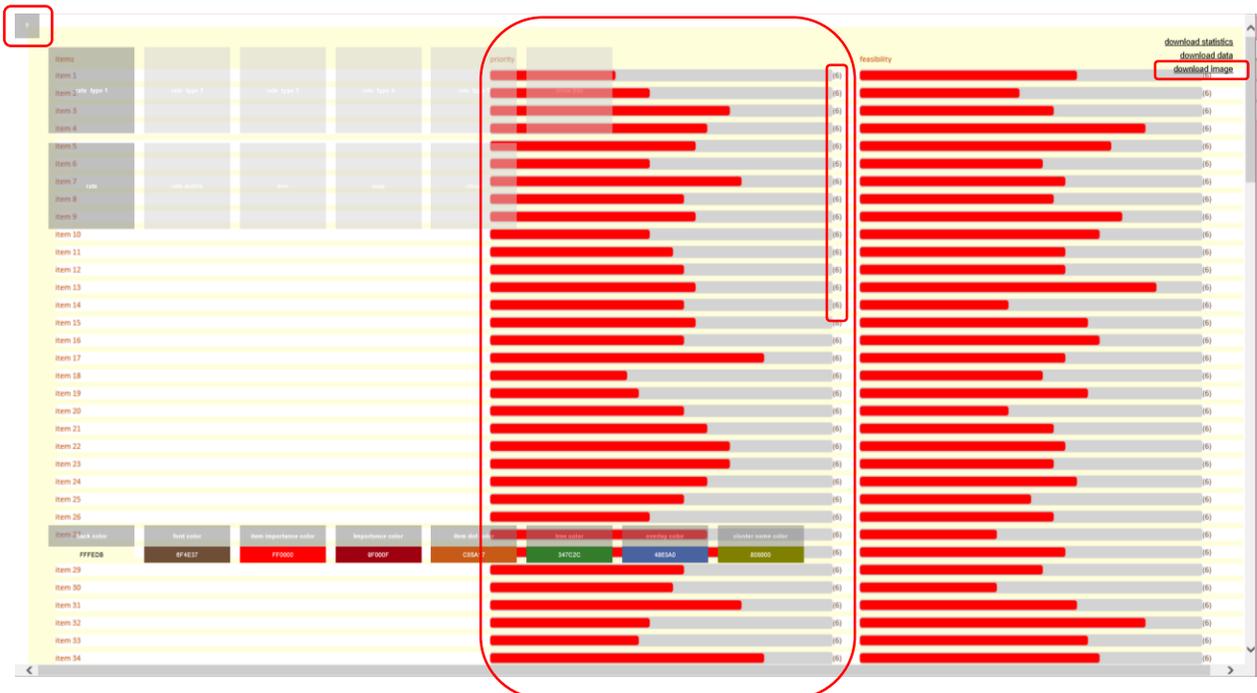
- Click on 'Create new selection and Build Map'



- Download raw data gives all inserted data in excel

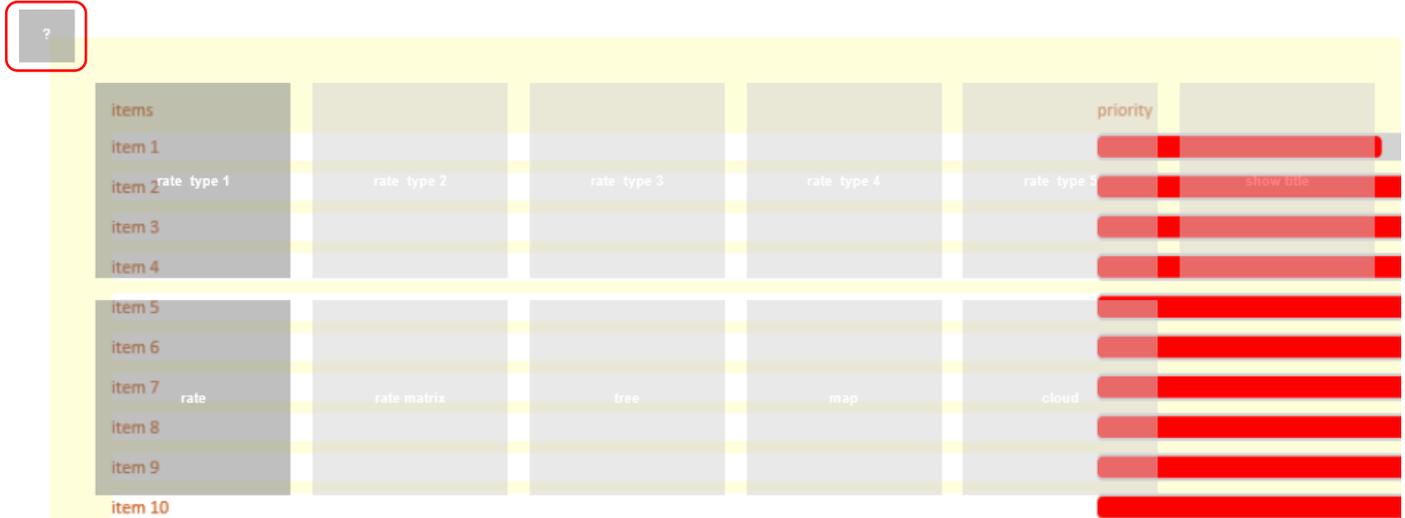


- This screen shows the average rating score for each item and each rating. The number of participants who rated the item are behind the bar.
- SHIFT+H or the question mark in the upper left corner allows you to remove the help menu
- The 'download image' allows you to save the average rating per item for that rating type.

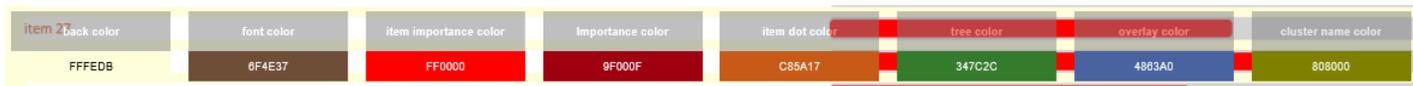


THE HELP MENU

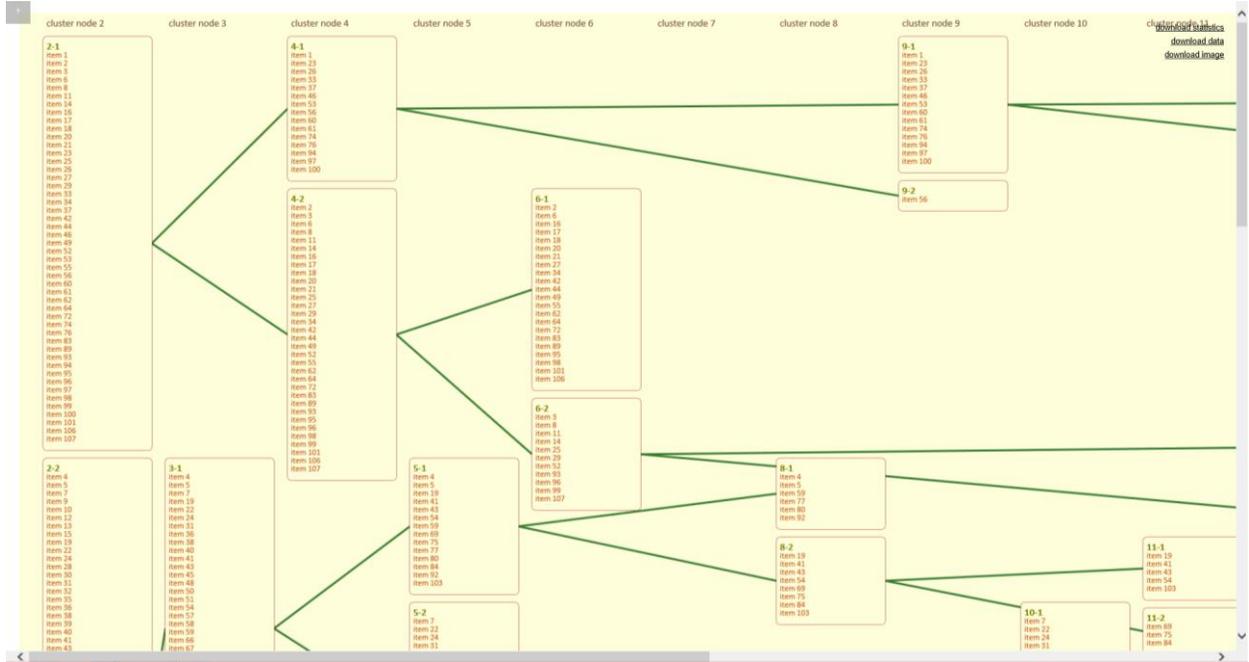
- SHIFT+H or the question mark in the upper left corner makes these tools appear and disappear
- The upper row allows you to switch between rating types and the possibility to show the title of the concept map
- The second row allows you to switch from rating to tree matrix to tree to map and to cloud



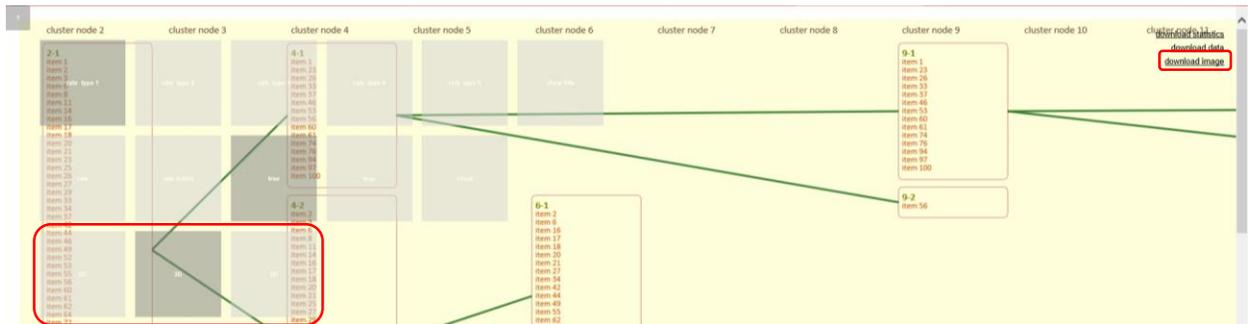
- It is possible to change the colors of the background, front, items importance, importance, item dots, tree, overlay and cluster names by clicking on it



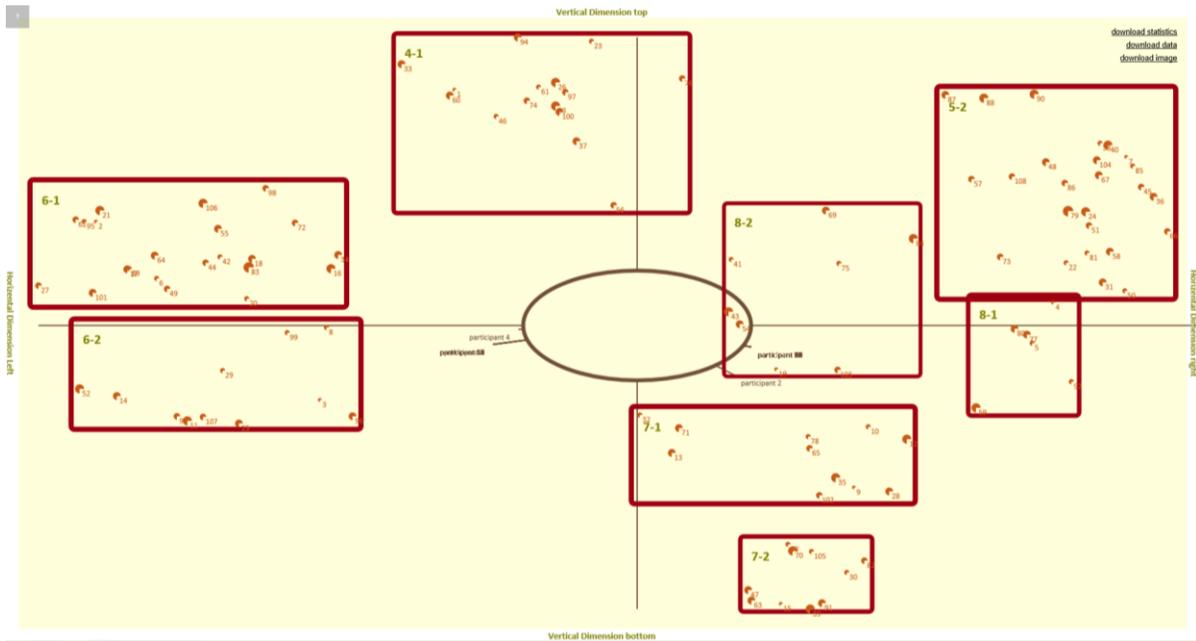
- The tree diagram gives you the possibility to inspect which cluster splits up when you decide to increase the number of clusters in your concept map, or which clusters merge when you decide to decrease the number of clusters. Cluster node 2 up to 18 is given.



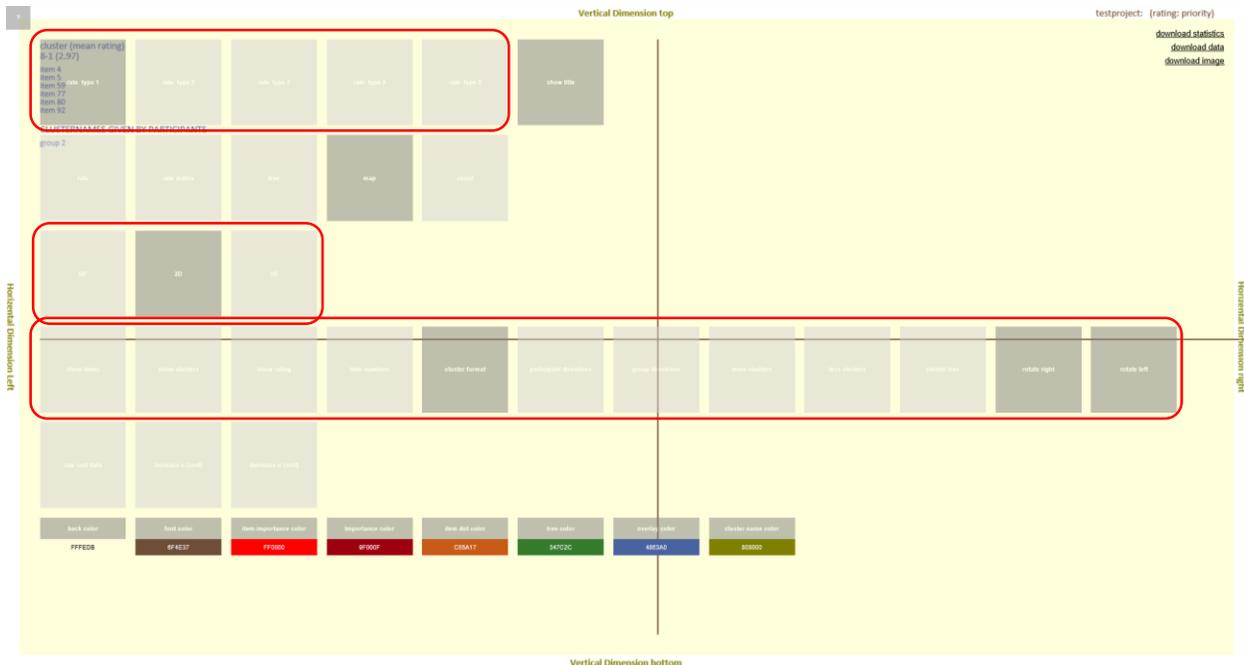
- The help menu allows you to switch from 2D to 2D' and 3D
- Download image allows you to save the tree diagram



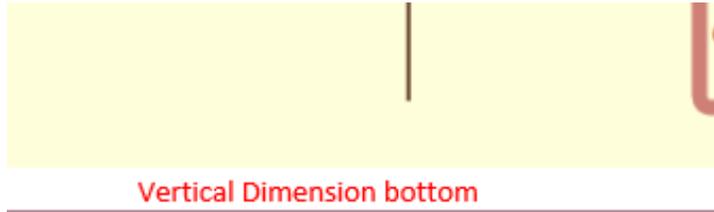
- When you click on map, the concept map appears



- The first row of the help menu allows you to switch between rating types
- The third row allows you to switch from 2D to 2D' and 3D
- The fourth allows you to show items, show clusters, show ratings, show item numbers, change cluster format, show participant directions, show group directions, increase and decrease the number of clusters, to show the cluster tree, to rotate the map to the right or to the left



- It is possible to name axes (vertical dimension top, vertical dimension bottom, horizontal dimension left, horizontal dimension right) by clicking on it
- It is possible to name axes (vertical dimension top, vertical dimension bottom, horizontal dimension left, horizontal dimension right) by clicking on it. When it turns red, you can use the backspace key to delete 'vertical Dimension bottom' and you can name it whatever you like.
hbgvvv



EDITING THE PROJECT

Changing project name and description

- Click on 'edit' for the concerning project
- Click on 'edit name & description'
- Change name and description and click on 'update'
- Click on 'back to projects'

Randomizing statements

- Click on 'edit' for the concerning project
- Click on 'edit name & description'
- Change 'maximum number of items to show to respondents' and click on 'update'
- Click on 'back to projects'

Adding ratings

- Click on 'edit' for the concerning project
- Click on 'edit name & description'
- Change rate definitions and categories and click on 'update'
- Click on 'back to projects'

Adding participants

- Click on 'edit' for the concerning project
- Click on 'new participant'
- Enter name and click on 'add'
- Click on 'back to projects'

Adding statements

- Click on 'edit' for the concerning project
- Click on 'unlock items in this project'
- Click on 'show items'
- Click on 'new item'
- Enter name and click on 'add'
- Click on 'lock items in project'
- Click on 'back to projects'

Appendix 2 The statistical techniques of Concept Mapping

Concept Mapping uses a combination of statistical techniques: Principal Component Analysis and cluster analysis.

Forming clusters of statements

Ariadne makes a matrix of zeros and ones representing the similarity between the items for each participant. If two items are put in the same group, 'their' cell is assigned a one. The values on the matrix's diagonal are therefore always equal to one.

A participant might divide 5 items into the following two groups:

group 1: items 1, 3, 4

group 2: items 2, 5

The similarity matrix would then be as follows:

item

All the individual matrices are then transformed into one matrix representing all the individuals. *Ariadne* uses this matrix as the input for a Principal Component Analysis. PCA is a technique for translating the distances (or in this case the correlation) between items or other entities into coordinates in a multi-dimensional space. The dimensions are not directly represented by fixed x- and y-axes.

Ariadne represents the first two dimensions of the PCA solution in the *Concept Map*. The dimensions can be interpreted from the items which score on them. The plot can be rotated between 0 and 360 degrees.

Ariadne then classifies the items further by completing a cluster analysis with the coordinates of the items. You can specify yourself how many clusters should be formed. The clusters are represented graphically in the PCA plot by outlines around the items.

Prioritization

The item scores are entered for each participant. *Ariadne* uses the scores for the whole group to calculate average ratings for each item and cluster. It also gives the standard deviation of all the averages. If this figure is large, the participants did not agree on the rating for a statement or cluster.

The ratings are thus not used for the PCA or the cluster analysis themselves.

The average cluster scores are shown on the *Concept Map* as the thickness of the outline around each cluster. The thicker the outline, the higher the average priority given to the statements in that cluster.

Ariadne also calculates the correlation between the priority of each item and its position on the *Concept Map* (in other words: the scores on the plotted dimensions) for the individual participants and the categories of participants. These are displayed in the 'Latent Preferences'. The dots within the red area are not significantly related, those in the yellow area may be significantly related. The dots outside these areas are significantly different. The direction of the line connecting each dot with the origin can be regarded as the 'direction of thought' of the participant or group of participants.

Appendix 3 Checklist for Concept Mapping meeting

Preparation

- context and nature of the problem;
- suitability for *Concept Mapping*;
- possible participants;
- final application;
- responsibility for interpretation and application of the results;
- planning;
- location.

Planning the meeting

- number and type of participants;
- agenda;
- reserving a room;
- inviting participants - appendices to letter of confirmation;
 - * directions to *Concept Mapping* location
 - * focus of the meeting
 - * introduction to the *Concept Mapping* method
 - * list of participants, programme
- catering.

Preparing the content

- defining the subject;
- focus for the brainstorming session;
- focus for prioritization.

Materials

- (name cards);
- pens and paper for the participants;
- computer;
- powerpoint presentation about *Concept Mapping*, including:
 - * explanation of the procedure
 - * agenda
 - * focus for the brainstorming session
 - * focus for prioritization
 - * felt-tip pens.

For back-up

- prioritization forms;
- clustering forms;
- printer.

Introduction

- aim of the meeting;
- phases and agenda;
- results, reporting and implementation;
- reasons for the choice of participants (optional);
- results are confidential/will be published;
- reporting back to the participants.

Brainstorming session

- explaining the focus;
- clearly formulate the statements;
- suggestions for areas which have not yet been considered;
- check that everyone understands the statement;
- encourage quiet participants or groups;

Coffee break - brainstorming results are processed

- edit statements if necessary;
- print;
- copy;
- (cut out cards);
- distribute prioritization and clustering forms (and scissors);
- serve soft drinks/coffee/tea.

Prioritization

- (ask participants to cut out cards);
- explain focus;
- give instructions on completing the prioritization form ("don't forget to put your name on it");

Clustering

- help participants to get started if necessary (sit with them);
- give instructions on completing the clustering form ("don't forget to put your name on it");

Entering the replies

- sort reply forms;
- (ideally) one person reads out replies whilst another inputs them;

Interpretation

- Calculate *Concept Map*;
- identify extreme participants;
- identify unreliable items;
- label clusters;

- rotate if required;
- describe the axes.

Summing up

- repeat arrangements for reporting back;
- evaluation;
- thank participants for coming;
- refund travel costs (if applicable) and/or distribute gifts.

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