Multicriteria Mapping Manual - Version 2.0

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Multicriteria Mapping

Manual

Version 2.0

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SPRU – Science Policy Research Unit

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Contact: support@multicriteriamapping.com

Don't worry!

Multicriteria Mapping is ready to play with, without reading this Manual! The online tool is supported by easy pop-up help boxes at each stage of the process:

http://www.multicriteriamapping.com/

SUMMARY OF CONTENTS

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1 INTRODUCTION

1.1 The Purpose of this Multicriteria Mapping Manual

This Manual offers basic advice on how to do **_multicriteria mapping_** (**_MCM_**). It suggests how to: go about designing and building a typical MCM project; engage with participants; and analyse results – and get the most out of the online MCM tool. Key terms are shown in **_bold italics_** and defined and explained in a final glossary.

The online MCM software tool provides its own operational help. So this Manual is more focused on the general approach. There are no rigid rules. MCM is structured, but very flexible. It allows many more detailed features than can be covered here. MCM users are encouraged to think for themselves and be responsible and creative.

But there are some key underlying **_MCM values_**. The most crucial are as follows:

1) **Inclusion**: MCM aims to promote more inclusive, equitable and accessible appraisal. This means engaging in a respectful and balanced way, with a diversity of relevant **_perspectives_** – especially those most often marginalized.

2) **Opening Up**: MCM aims to help '**_open up_**' **_appraisal_**. This means giving balanced attention to exploring and illuminating contending views. Using MCM just to aggregate a single final view has the effect instead of '**_closing down'_**.

3) **Agency:** MCM aims to '_put **participants** in the driving seat_'. An MCM project should be designed, implemented and analysed to maximise the agency of participants over the ways in which their own perspectives are represented.

4) **Transparency:** MCM only '**_opens up_**', if results are conveyed fully and clearly to all parties with an interest in debates over the **_focal goal_**. Depending on context, this means publishing results and giving reasonable access to data.

This Manual gives advice on how these values can best be realised in practice. But there are so many detailed ways of doing this, that it is impossible fully to cover all. For instance, the basic steps described here apply equally to small student exercises or large research projects; conducted as face-to-face or remote engagements; in 1-to-1 interviews or small groups; or as some combination of these kinds of process.

For purposes of illustration, however, this Manual directly addresses the use of MCM only in a typical individual interview (rather than a small group session) and assumes that interviewees are 'specialists' with a broad familiarity with quantitative appraisal, comfort with computer tools and confidence in at least some of the issues at stake.

The same basic steps are involved in engaging with other kinds of participant in different ways. But the approach needs to be adapted to be used with non-specialist members of the public. This is especially important, in relation to Principle (2) above.

This Manual is intended mainly for members of an MCM project team (designers, researchers, interviewers, facilitators and analysts). So, it is quite technical in places. Although it might usefully be made available in some way to them, participants are likely to need briefer and simpler guidance, tailored to the particular project.

This Manual should be read in conjunction with other available MCM materials, which include many published reports and academic articles. These cover in more detail, the underlying rationale, and issues of wider project design and different modes of usage. A selection can be found on the MCM website.

1.2 Overview of the MCM Method

The MCM method makes use of a dedicated web-based software tool to enable collection and analysis of data. This is called 'MCM software' or 'the **MCM tool**' in order to distinguish it from the wider process in which it is embedded – which is called the 'multicriteria mapping method', '**multicriteria mapping**' or just '**MCM**'.

In making use of the MCM tool, it is important to bear in mind the overall context and aims of the MCM method as a whole. The overarching purpose is to represent as authentically as possible a range of different **appraisals**, conducted from diverse perspectives, concerning the best ways to achieve some broadly shared **focal goal**.

A typical **MCM project** will undertake this through a number of **MCM engagements**. In all their different forms, both MCM engagement and subsequent **MCM analysis** are quite highly structured. But they are also quite clear and accessible. The reason is to provide a basis for comparability, transparency and common understanding.

Subject to the values discussed above, ten key specific aims of MCM are as follows.

1: To identify and illuminate a rich diversity of relevant **perspectives**, reflecting a full and balanced range of divergent social values, experiences, understandings and interests bearing on different ways to achieve some broadly shared **focal goal**.

2: To enable in-depth **appraisal** of a complete array of whatever are considered under this range of **perspectives** to be a full set of salient practices, policies, strategies or technologies – variously seen as '**options**' for achieving this goal.

3: To enable **participants** from different **perspectives** to appraise these **options** in ways that are as consistent, fair, accessible and accommodating as possible, with symmetrical attention and unbiased consideration across a full array of **options**.

4: To identify a broadly representative subset of '**core options**' that collectively cover the full envelope of key dimensions of variation across relevant **options** in wider debate and define these consistently for comparison across different perspectives.

5: To use these **core options** to help participants identify an even wider array of **additional options** and so enable more grounded deliberation within and beyond an MCM process, on a full range of variously-defined pros, cons and wider issues.

6: To allow **participants** to define and apply their own **principles** and **criteria** for appraising **options**, in ways that are (in context) appropriately free of interference, but enabled by provision of what participants judge to be relevant information.

7: Throughout this process, to spend as much attention on eliciting the qualitative (discursive and textual) reasons, conditions and contexts for **perspectives** expressed in appraisal, as for their quantitative or graphical representations.

8: To ensure at the end of each **MCM engagement** that the individual interviewee or small group in question is broadly satisfied with the process and comfortable that the resulting picture fairly expresses their own **perspective** on the **focal goal**.

9: To fully explore **qualitative** as well as **quantitative** results in **MCM analysis** – in ways that illuminate a full diversity of **perspectives** (and associated **framings**, contexts and reasons) and convey these fully, clearly, fairly for wider debate.

10: To hold available (as appropriate and possible in context) for audit or further analysis by others, all quantitative and qualitative data concerning **participants' options**, **criteria**, **principles**, **scores**, **uncertainties, weights** and **ranks**.

In order to help achieve all this, MCM is based around a simple quantitative method. But – given the undue emphasis and presumptions of 'concreteness' that can often become attached to quantitative techniques – it is important to remember at all times that MCM is a '**heuristic**' (rather than a **prescriptive**) approach to appraisal.

In other words, the aim of MCM is to **explore** the ways in which different pictures of strategic choices change, depending on the view that is taken – not to **prescribe** a particular 'best choice'. Accordingly, the numbers and graphical representations that are used in MCM should always be seen as the '*servant rather than the master*'.

One consequence of this '**heuristic**' approach is that (unlike some other multicriteria techniques), the qualitative information that is elicited in an MCM engagement is (if anything) **more important** than the quantitative information. After all, it is this information which informs the way in which the numbers are to be interpreted.

It is therefore essential that as much effort is taken in eliciting, analysing and explaining qualitative information as is devoted to the quantitative elements in the appraisal. This is important, because it is easy to become unduly fixated by the apparent authority of numerical results and clarity of their graphical representations.

This is also the reason why it is so important that an MCM analyst should always bear in mind – and be sure to convey to others – the conditions, constraints and qualifications that apply to any given quantitative or graphical picture of results.

MCM approaches this complex and demanding set of aims and values in a simple sequence of five basic steps. It is these that will be described in detail in this Manual:

select options > define criteria > assess scores > assign weights > review ranks

This is not a linear mechanical process, but *iterative, interactive* and *cyclical*. It is <u>*iterative*</u> because participants can move freely in any direction between each step. It is <u>*interactive*</u>, because this is governed by the participants' own interaction with the process. And it is <u>*cyclical*</u>, because the process as a whole can be freely repeated.

The aim of this structure is not to impose a particular rationality, but enable requisite consistency for fairly comparing a full diversity of perspectives. It is therefore crucial that all key elements ([options](), [criteria](), [principles](), [scores](), [uncertainties](), [weights]() and [ranks]()) be used to *enable,* not *constrain,* the expression of particular viewpoints.

This means in practice that: **additional options** may be freely selected and defined; **criteria** and **principles** are open to individual definitions by participants; **scoring** and **uncertainties** are also matters of participants' judgement; and criteria **weights** and **orderings** of **principles** are also determined wholly by the participants.

If participants are uncomfortable with a particular array of **scores** (or a final **ranking** picture), it is essential they be able to revisit any earlier stage of appraisal and make any changes that they may wish to make – duly explaining the reasons for qualitative documentation. This is a key sense in which the participant is '<u>*in the driving seat*</u>'.

It is essential that all MCM **facilitators** and **interviewers** always conduct themselves in a fashion that is open, sensitive and neutral. Expressions of individual opinion (explicit or implicit), should be avoided. Interventions should be framed as questions, rather than as statements, and be open-ended (rather than closed or loaded) in form.

The priority should be emphasized, that **participants** freely express their own views. An MCM **facilitator** or **interviewer** may challenge participants only as required to ensure clear and faithful documentation of reasons for participants' expressed views.

1.3 Using this Manual

In order to cover a fairly full range of issues and queries that may arise in conducting MCM engagements (interviews or group sessions) and analysing MCM data, this Manual is necessarily a long and quite detailed document. At first sight, this might be a little daunting but please don't worry. It is all really just common sense! Remember, the online *MCM tool* contains its own operating help as pop-up boxes as well.

To ensure that MCM fulfills the aim of being enabling (rather than constraining), it is important that an engagement be conducted in as fluid, flexible and spontaneous a fashion as possible. To explain the basic approach in a brief and straightforward manner, this Manual will focus only on the example of an MCM *interview*. The same principles apply more widely in other settings, like small *homogeneous groups*.

The detailed features described in this Manual should <u>*not*</u> be taken as a rigid template for use, even in a directly comparable interview setting. The most crucial issue is compliance with the general values and aims of MCM as explained above.

Within this, practice should be standardized in whatever ways or degrees best allow consistency across different *MCM interviewers* and help individual interviewers fully to internalize the requirements of MCM in advance of an interview programme.

In the end, there is no substitute for practical experience. *Interviewers* should practice '*pilot MCM sessions*' with colleagues. In conjunction with this Manual and the help provided in the MCM tool, this process of practice and discussion should be all that is needed to achieve the necessary level of proficiency and confidence.

To provide an easy practical reference point, a one-page summary checklist of the main tasks for the MCM interviewer to prepare in advance is provided in Section 0.

The basic procedures and ideas behind the *MCM analysis* process are also quite simple – and are repeated across different parts of the process. So the separate sections on defining '*perspectives*', '*issues*' and '*clusters*' and on displaying '*ranks*', '*uncertainties*', '*weights*' and '*scores*' are all very similar. Once you have mastered one of these procedures, then the others will follow quite naturally.

An overview of the basic stages in *MCM analysis* is provided in Section 17. More detailed discussion of the individual steps covered in each of these stages is given at the end of the Manual in Section 30, which is indexed to the relevant sections. The detailed table of contents at the front assists in locating any further specific points.

The MCM team would welcome detailed feedback on the clarity, adequacy or completeness of this Manual – and on any specific gaps, problems or suggestions that may arise in real-world MCM design, engagement or analysis, which are not yet sufficiently well covered. Please contact us.

Subject to the aims and values described above, don't be afraid to develop your own detailed ways of using the *MCM tool*. Any resulting suggestions for improvements to this Manual or to the software tool itself would also be welcomed by the MCM team – as would information or publications reporting successful applications. Please contact us.

2 THE MCM SOFTWARE TOOL

2.1 Background

MCM software has taken many previous forms. The current web tool was designed from this experience in collaboration with DabApps.

The present tool was funded by the University of Sussex and will be made available as a subscription service run as a University Enterprise. It is hoped that subscriptions will allow the tool to be developed and improved, continually to enhance the service. Background and updates will be posted on the MCM website.

2.2 System Requirements

To use the web-based MCM tool, you will need internet access and a web browser (like Internet Explorer, Chrome, Firefox or Safari) to be able to access the MCM website. To use the desktop MCM tool, you will need at least 50MB of free storage space to store the downloaded application and the data that you generate.

For updates, please see the MCM website.

2.3 Accessing the web-based MCM software tool

This is linked through the MCM website.

2.4 Operation

The MCM software tool is operated by a few self-explanatory menus and pop-up help boxes. There are a few general points that it is useful to note here.

MCM software does not feature a 'save' command for *scoring* or for adding ***notes***. This is because it routinely saves scores and notes, as soon as the 'focus' moves out of the data field in question. However, there is a 'save' button for building elements of an MCM project including options and criteria and it is important to click this button every time you add an option or criterion. Otherwise unsaved options or criteria may be lost.

Please also see the list of "known issues" on the MCM website.

To aid further development of MCM software, notification of snags and suggestions for improvement would be welcomed by the MCM team. Please contact us. Some of those that have already been noted for future attention can be found in Section 2.5 below.

2.5 Snags needing Attention

Please also see the list of "known issues" on the MCM website.

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DESIGNING AN MCM PROJECT

The following 3 chapters (3, 4, and 5) provide a detailed description of how to design an MCM project, including:

- Creating and editing an *MCM project* using the *MCM software* [#3]
    - Setting up an account, creating a project and managing researchers
- Building an MCM project [#4]
    - Defining key concepts such as the *focal goal* and *core options*
    - Recruiting *participants*
    - The three initial tasks of defining a *focal goal* and *core options,* and reruiting *participants* are mutually dependent. Different goal definitions imply disparate options. Different participants will favour or disfavour different options. Contrasting options will hold divergent implications for different groups. MCM values require these tasks to be conducted as inclusively and transparently as possible.
- Preparing for *MCM interviews* [#5]
    - Conducting *scoping interviews* to ensure that participants and well-informed and comfortable with the process and to fine-tune the design of the project
    - Paying attention to confidentiality, anonymity and representativeness
    - Organizing all necessary interview materials including this manual, a computer, paper, pens/pencils, an audio recorder and a note of the MCM website address: http://www.multicriteriamapping.com/

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3   CREATING AND EDITING AN MCM PROJECT

3.1   Creating a new project

The first step for creating a new project is to set up an MCM account. An MCM account can be set up easily by following instructions on the MCM website.

Once logged in, the Dashboard page will be displayed, as shown below. The Dashboard shows recent activity and lists all projects associated with the account.

A new project can be created by clicking on the black button on the right side of the Dashboard page, or by going to 'My Projects' at the top of any page and choosing 'Create new project'. Fill in the name of the project and a short description and click 'Create Project'. These details will be displayed on the front page of the project.
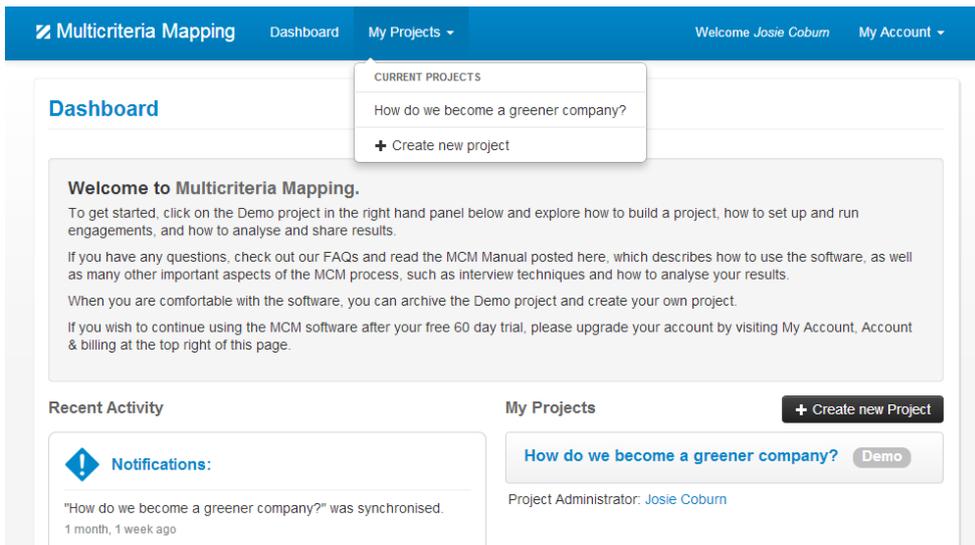
Figure 1: Creating a new project in the MCM software.

3.2   Project Admin
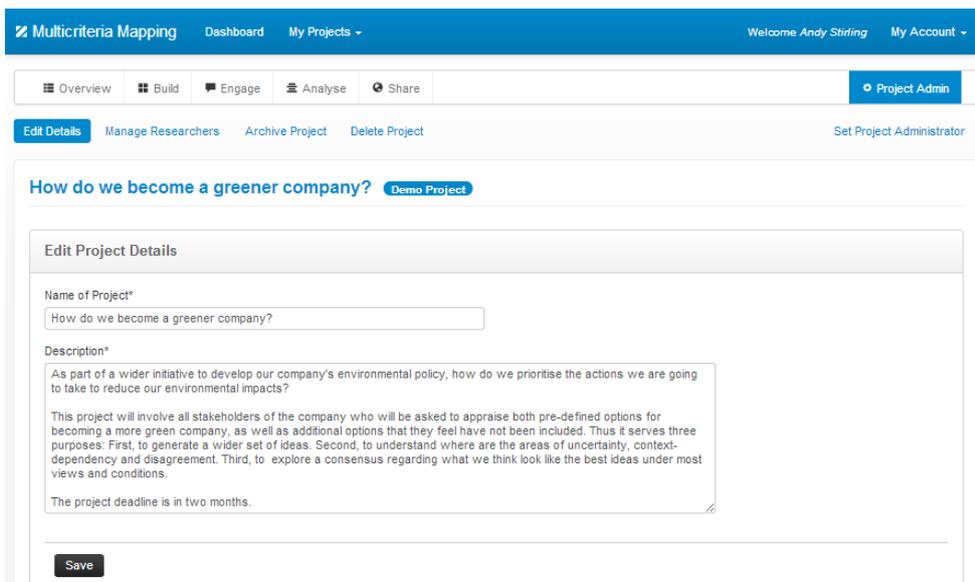
Figure 2: The Project Admin page.

From within a project, the project administrator can click on 'Project Admin' in the top right corner of the page to edit the details of the project, manage the researchers associated with the project, and archive, delete, unarchive or undelete the project. Researchers who are not the project administrator will not be able to see this area of the project.

In the 'Manage Researchers' section of the project, illustrated below, the project administrator can also choose whether a researcher on the project can see other researchers' engagements or not, and whether a researcher on the project can see the Analyse and Share sections of the project or not. These options are defined for each researcher by ticking and unticking simple check boxes. Clicks to these check-boxes will update automatically.
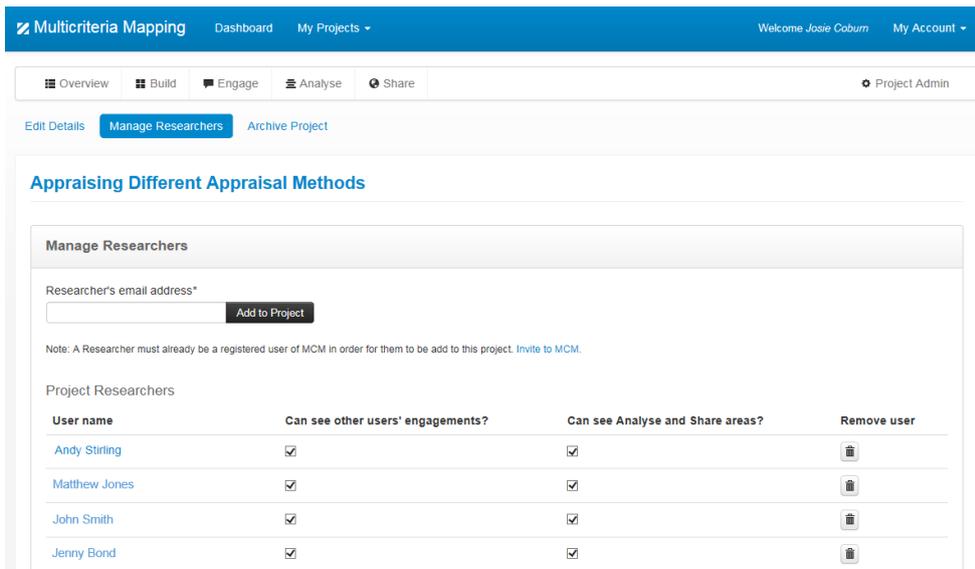
Figure 3: The Manage Researchers page

4   BUILDING A PROJECT

4.1   Getting Ready to Build a Project

After creating a project, the project administrator can build the project. In the Build section of the MCM software, the project administrator can define core and discretionary options, and if they wish, initial project criteria (see Sections 4.2 to 4.5 below).
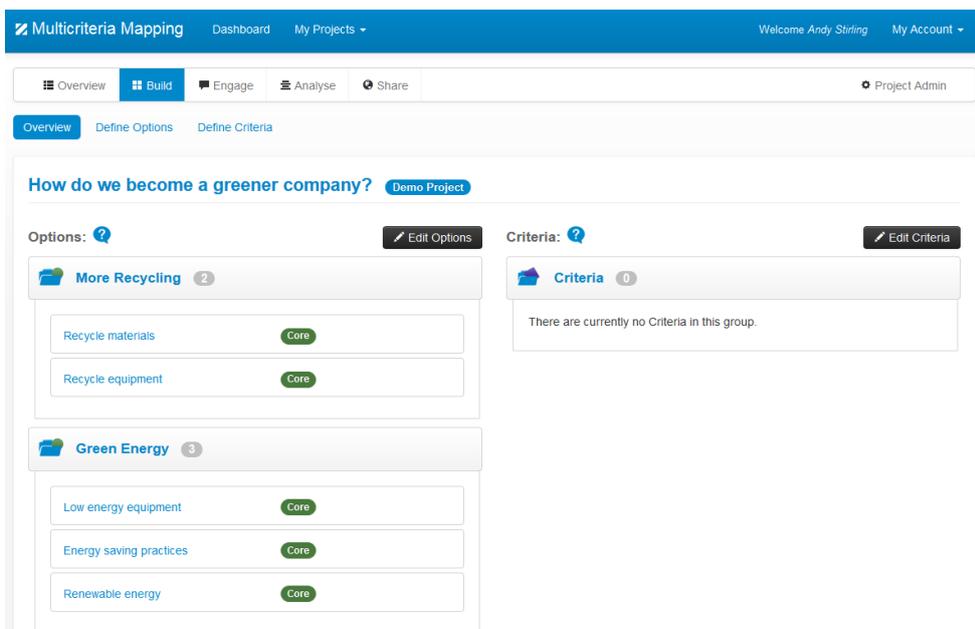
Figure 4: The Build section of the MCM software

4.2 Options, Participants and Focal Goal

Like any appraisal, a multicriteria mapping project focuses on contrasting ways to fulfil some broadly shared societal aim, function, quality or value. This is defined at a sufficiently general level that it is in principle equally reasonable and meaningful across a diversity of different perspectives – though each may define it differently.

This shared aim is called a *focal goal*. The set of practices, policies, strategies or technologies that are held under different perspectives to be broadly salient (directly or indirectly) to achieving this focal goal, are called *options*. It is important to define a focal goal in such a way that it is not regarded as biased under any perspective.

For example, a *focal goal* might be: "*how can this city manage its waste in more sustainable ways?*"; "*how can we become a greener company?*"; "*how might society best go about managing its food [or: energy / transport] needs?*"; "*what are the best ways to address the growing incidence of end-stage kidney failure?*". And so on…

In general, the broad social process of answering such queries is called *appraisal*. As in any method, the most crucial elements in the framing of a multicriteria mapping appraisal exercise and in determining its results, lie in the choice of those possible actions that are included or excluded from scrutiny and those particular perspectives (knowledges and values) that are included and excluded from the process.

So, the three initial tasks of defining a *focal goal* and *core options,* and recruiting *participants*) are mutually dependent. Different goal definitions imply disparate options. Different participants will favour or disfavour different options. Contrasting options will hold divergent implications for different groups. MCM values require these tasks to be conducted as inclusively and transparently as possible.

So, fine-tuning a *focal goal*, defining *core options* and recruiting *participants* should all be undertaken together in an iterative and mutually co-constituting way. In an especially complex or demanding case, a subsequent more detailed and complex MCM exercise may base these factors on a simpler earlier *pilot MCM* exercise.

Where appropriate, one way to aid balance and accountability in the framing of an MCM project – and to help ensure legitimacy for a policy-relevant MCM exercise – is to enable 'stakeholder oversight' over design, implementation and analysis. This might involve an *oversight panel*, recruited in a similar way to the participants. This will typically involve fewer people and may or may not include participants.

4.3 Defining Core Options

Defining a set of *core options* for all *participants* to appraise, is the key necessary compromise on the principle that an MCM participant is '*in the driving seat*'. Although participants can define any *additional options* they wish in their own *appraisal*, rigorous comparison requires that some options be defined consistently for all.

This set of '*core options*' can be defined by prior analysis or engagement process and/or careful attention to relevant literatures. These should collectively cover a full envelope of key dimensions of variation across the different *perspectives* taken on the *focal goal* itself, and the *options* for relevant actions by which to achieve it.

All else being equal, it is a good idea to keep the number of options as low as possible. This increases the time available to participants to give their full attention – and thus hopefully help produce richer and higher quality results. The main counterpoint to this,

is the need to be able to compare systematically (by means of the **core options**) a relatively comprehensive envelope of relevant parameters variously prioritised under different perspectives for defining salient options.

Seeing each relevant parameter as a dimension in a notional space, then, the idea is that this space for core options is accommodated by as small a number of options as can reasonably be achieved. A rule of thumb in a typical MCM exercise involving non-specialist participants, is an upper bound of six for the number of core options.

Various methods can be used to assist this process of defining core options for an MCM appraisal. These might include (or combine) text analysis, stakeholder analysis, in-depth interviews, group deliberations, Q method, or an earlier iteration in MCM itself. Either way, some key considerations to bear in mind when defining core options by reference to this envelope of relevant parameters is as follows:

- In larger or more sensitive MCM projects, an external oversight panel can be convened to reflect relevant perspectives in advising on this process.

- What are the principal features of the **focal goal** and associated options as seen under the perspectives of those who are most interested and affected?

- By means of which key ideas are different candidate core options and associated issues divided up in relevant analytical literatures?

- What are the other key relevant features of different candidate core options (if any) that are evidently important to the research team as analysts?

- What set of candidate core options is most clearly definable among different permutations of characteristics according to all these features?

- Which of these candidate core options are most salient under relevant stakeholder perspectives and analytical literatures?

- Are there any obvious gaps among these most salient candidate core options, in terms of perspectives, settings, or other aspects of the context?

- Are these most salient candidate core options, comparably mutually disparate from each other, according to the most relevant characteristics?

- Can these most salient candidate core options be clearly distinguished from one another by means of a few lines of accessible text?

- Is the emerging set of core options defensible against reasonable concerns about imbalance or bias? What is the single most obvious excluded option?

- The six or so candidate core options that most reasonably fulfil these criteria, are likely to be the most robust set of core options for the MCM exercise.

- Remaining candidate salient options can be defined as a set of **discretionary options**, by a second iteration of a procedure much like that described here.

Example: choosing options for a project on agricultural strategies

The ESRC STEPS Centre's Kenya Maize Project illustrates the process of defining a focal goal and a set of core options. Maize is central to food security in much of eastern and southern Africa. The aim of this project was to identify and analyse alternative 'pathways in and out of maize' in a context of environmental, social and technological change. In an initial phase in 2007-2009, the project used a 'pathways approach' to engage stakeholders about challenges they face and how they respond. This covered the main issues described in this manual for defining core options.

It was on this basis that the research team prepared an **MCM** exercise during 2009–10, to explore the potential and constraints of alternative 'pathways in and out of maize' in Kenya. Earlier fieldwork findings were distilled into a set of 'innovation pathways' used as the starting point for discussions with key stakeholders.
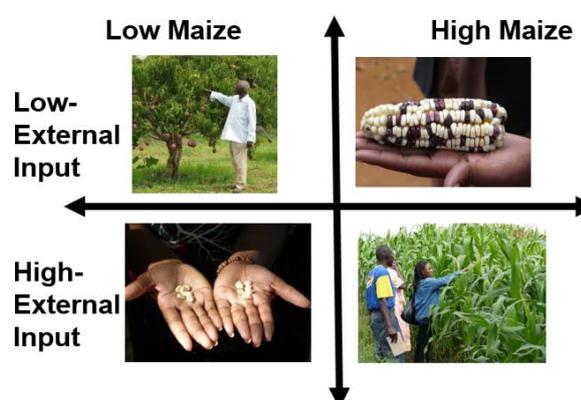
The **focal goal** for all options, was about 'which innovation pathways might best serve the livelihoods of interested and affected people?'

As a result, a typology of nine core 'pathways in and out of maize' was developed from the fieldwork in Sakai (a risk-prone, low-potential area in Mbooni District, Eastern Province), where considerable effort by various agencies has focused on fostering local adaptation responses to climate change. These encompassed institutional as well as technical aspects of different innovation trajectories variously centered on – or alternative to – maize. In each case, strategies were also distinguished depending on whether they involved high or low external inputs.

Once the core and discretionary options have been developed in this way, with advice from an oversight panel where appropriate, they can be set up in the Build section of the MCM software tool. To set up the options, click on 'Build' and then 'Define Options'. Click on 'Add new Option' and fill in the title, key features, description, and type of option (core or discretionary). Repeat this for each option.

4.4   Recruiting Participants

An initial set of candidate **participants** is identified, as defined by prior analysis or engagement process and/or careful attention to relevant literatures. Together, these should be associated with as wide as possible an envelope of key dimensions of variation across all relevant **perspectives** in wider debate around the **focal goal**.

Depending on context, this initial set of candidate **participants** might be approached for a **scoping interview**, in which a key question might mention other identified candidates and ask each to point out any gaps, redundancies or other issues. A final set of participants can then be arrived at through this kind of **snowballing** process.

A set of candidate participants can also be checked by reference to literature and/or scoping discussion concerning the likely 'winners' and 'losers' associated with different **core options**. The importance of values of *opening up* and *inclusion* require that strong efforts be made to include all such relevant perspectives in the MCM.

4.5 Defining Core Criteria

For convenience, the 'Build' section of the MCM tool also allows the definition in advance of a set of **initial criteria**, which will then be included as a default in appraisals of all participants. Participants remain able to delete these and can define their own additional or alternative criteria during the course of their appraisal.

It is crucial to realize that this definition of **initial criteria** to be shared across all participants is <u>not necessary</u> for the purposes of rigorous comparison. Even if approached flexibly, the presence of these initial criteria may implicitly constrain or bias participants' appraisals. It is <u>not generally recommended</u> to build initial criteria.

If you do choose for other reasons of research design, to take up the option of defining criteria in advance, then click on 'Build' and then 'Define Criteria'. Click on 'Add new Criterion' and fill in the title, key features, description, and type of criterion (criterion or principle). Repeat this for each initial criterion.

4.6 Research Ethics

It is increasingly common that higher education and other organisations apply detailed protocols concerning the appropriate design and conduct of engaged research like MCM. Although often also motivated by other internal management pressures, these protocols are routinely referred to as '**research ethics**' procedures.

In such cases, it will typically be necessary that an MCM project be compliant with whatever are the required **research ethics** provisions. These can offer useful inputs to the detailed design and conduct of a robust **MCM exercise**. But care should be taken that they do not infringe on the present guidance of good practice in MCM.

Especially close attention will often need to be paid to the discussion of issues of confidentiality and anonymity below [#5.2]. Where research ethics provisions follow a simple 'medical model' or reflect instrumental management pressures, they may neglect crucial issues around the dilemmas of researching powerful social actors.

So, what counts as 'ethical research' may depend on perspective and context and need not be self-evident. For instance, respect for the agency of a participant from a powerful organisaton that wishes to control the outcome of MCM research, may present tensions with ethical principles upholding the independence of research.

Despite impressions often given by pro forma research ethics protocols, the ethical qualities of any research (including MCM) lie more in the **responsibility**, **reflexivity** and **accountability** of researchers, than in any bureaucratic procedures. Alongside **MCM values**, these are the qualities that this Manual seeks to encourage and enable.

5   PREPARING FOR AN INTERVIEW

5.1   The Scoping Interview

Once key perspectives have been identified and participants recruited [#4.4], it is important that each individual be contacted well in advance of the MCM interview – usually by telephone – in order to discuss the general context and aims of the MCM exercise as a whole and to be sure that these are both understood and satisfactory.

These '*scoping interviews*' are essential in ensuring that participants are as well-informed and comfortable as possible about what is expected of them and the uses to which their inputs will be put, as well as in saving precious time in the engagement process. It also gives a chance to fine-tune particular design features of the exercise.

The precise content of the *scoping interviews* will depend on the context. However, it may be useful to summarise in _indicative_ checklist form some of the key issues that should be clarified in advance of a typical MCM interview or small group engagement – either in the scoping interview or in some other prior communication.

- Introduce the project: context, aims, scale, duration, team, funding, mode of reporting etc.
- Explain the basis for recruitment of this individual interviewee.
- Establish the basis for the interviewee's experience of the topic under scrutiny.
- Ask for interviewee's ideas on key strategic options (for consideration as *core options* [#4.3]).
- Ask for interviewee's ideas on key stakeholders (for consideration in snowballing other participants [#4.4]).
- Request any comments or queries on information materials already provided.
- Ask for any general questions or observations about the project as a whole.
- (If interviewee asks) address issues of anonymity / confidentiality [#5.2]).
- (If interviewee asks) address basis for engagement [#8.2].
- Confirm subsequent consignment of an interview briefing package (to include an introduction to MCM, containing '*core*' and '*discretionary options*').
- Make arrangements for an MCM interview at a venue convenient for the interviewee (making sure sufficient time is available – two hours likely, three as a maximum – depending on scope and detail of interviewee's appraisal).
- Ensure availability of a suitable location for the MCM interview at this convenient venue (quiet, away from desk/computer, no risk of interruption from colleagues or telephones)

5.2   Confidentiality, Anonymity and Representativeness

A key issue that may arise in the *scoping interview* concerns the confidentiality and anonymity of participants in MCM. Subject to the above discussion of *research ethics* [#4.6], it is _not advised that these issues be negotiated in detail_ in the scoping interview. It is recommended that the *MCM researcher* instead give a general undertaking (see below), to be finalised in detail after the MCM process is clearer.

The interviewee can be informed both of relevant **research ethics** provisions and of **MCM values**. An distinctive feature of MCM, is that it strives to 'open up' and render **appraisal** more transparent to third parties – as well as respecting the agency of all those who participate in the process. The way in which these issues are addressed is potentially delicate – and subject to diverse national, cultural and legal conditions.

Sensitivities are typically especially acute at a stage before participants have gained confidence in the method, team and project – and before they become familiar with the precise basis for engagement [#8.2]. If detailed commitments are made at this stage, they may compromise key **MCM values** – for instance 'opening up' [#1.1].

So, the general undertaking that may be given at the outset is that: <u>participants will not be personally identified in any publication unless they give explicit permission and may reserve the right to agree how their results are labelled</u>. The personal names (and even specific organizational affiliations) of participants are in any case not as illuminating in presenting results, as more anonymous sectoral associations.

This means that participants can be fully reassured that neither their own name nor that of their particular organisation will be published unless they expressly agree. Instead what will be used are general labels like 'government official', 'industry executive', 'academic scientist' or reference to demographic identifiers.

Where sensitivities are expressed, such labels may take successively more opaque forms, ranging from naming the position and precise type of organisation, through to naming a broad kind of organisation but not a position, to simply identifying the general sector. The main factor in deciding this will be the nuanced differentiations of **perspectives** that will only emerge at the end of detailed **MCM analysis**. This is why the detailed label to be used in sensitive case is best left until the end.

In some MCM projects (like doctoral research), it is necessary that a private record be kept of personal identities and exact affiliations of participants. Depending on the context, this may be subject to private communication (for instance with examiners) or various kinds of formal provision for access. This can be addressed without scoping interviews becoming unduly elaborate, by referring simply to 'publication'.

Where sensitivities around a **focal goal** or associated political debates are especially acute, particular participants may be concerned about the detailed way in which their own results are labelled. In the context of a specific issue, even a general label like 'government scientist' might be regarded as uncomfortably illuminating. This is why detailed labels are best agreed, if necessary, at the end of an MCM process.

Another issue that can arise is whether MCM results can in some way be interpreted as 'representative' of any particular position. This relates to the advice given below on 'basis for engagement [#8.2]. Even when anonymous, participants may be concerned – especially those with more sensitive political positions – that their appraisals might be read as more generally representative than is the case.

Here, it can be a significant reassurance for the more sensitive participants, that publication of MCM results will be accompanied by general disclaimer. A possible format for such a disclaimer is reproduced below. For reasons given above, it is not recommended that this be used in advance of participants becoming familiar with the project and method. However, it may be useful in exceptional circumstances.

"The research team are indebted to the many individuals who gave their time for this research. All have been fully anonymised. The reported appraisal results are simply

personal viewpoints at a particular point in time. As such, they are subject to the constraints imposed by the MCM research process and to review and change over time. The detailed results presented here should therefore not be taken to reflect the formal positions of any organisations with which individuals may be associated."

5.3   Interview Materials

The basic interview tool is a desktop or notebook computer, with internet access to the web-based MCM software tool. The interviewer should have set up the project, as described in sections 2 – 4 of this document.

If the interview will be carried out offline, a 'template file' should also be created for use in all interviews. This contains definitions for all core and discretionary options. P Prior to the interview the researcher downloads [#7.2], the offline engagement tool with this 'template' file.

Taken together, a convenient checklist of materials for the interview is as follows:

- This manual as aide memoire in advance of interview.
- Computer or tablet with MCM software, transformer, and extension lead.
- Mouse, mouse mat and keyboard (optional)
- A note of the web address for the MCM software, in case the interviewee wants to further explore their results after the interview. In this case, they can open a free trial account and populate it with their own data to play around with.
- Tape or other audio recorder, microphone, batteries and blank tapes or disks.
- Pencils, rubber, sharpener and note paper for participants to write their own notes

CONDUCTING AN MCM ENGAGEMENT

The following chapters (6 - 14) provide a detailed description of how to conduct an MCM engagement including:

- Summary checklist of key tasks for the interviewer [#6]
- Setting up an MCM engagement using the MCM software [#7]
    - Engagements can be conducted with the MCM software either online or offline
    - If you are conducting an offline engagement, download the offline engagement software and the engagement template file and set up the engagement before the interview
- Starting an MCM interview [#8]
    - Make introductions and respond to any queries
    - Explain the 'basis of engagement'
    - Outline the MCM Method
- Running an MCM engagement including:
    - Identifying options [#9]
    - Defining criteria [#10]
    - Assessing scores [#11]
    - Assigning weights [#12]
- Winding up an MCM interview [#13] including:
    - Closing the MCM process
    - Reflecting on the MCM process
    - Briefing on the ongoing process
    - After the interview
- Guidelines for using MCM Remotely [#14]
    - It is possible to use the MCM tool remotely, with the MCM interview conducted over the telephone, by Skype, by Google Hangouts, or by other teleconferencing tools
    - It is important to be clear, however, that this is **<u>not recommended</u>**, since the lack of direct face-to-face interaction is likely to result in the loss of some important qualitative aspects of the interview.
    - Also, the MCM tool does not currently support two people (the interviewer and the interviewee), entering data at the same time. If this does happen, data may be lost. So, in the event that the tool is used in a remote interview, only one person should enter the data, while the other person looks on and engages on this basis.

6 SUMMARY CHECKLIST OF KEY TASKS FOR THE INTERVIEWER

6.1 Before the Interview Starts

- Check the engagement is properly prepared in the **MCM tool**, including the definitions of **core options** and **discretionary options** (and that these latter are, if wished, set to a default of '*exclusion from assessment*' [#9.2]).

- Dispatch and confirm in advance by phone receipt of MCM interview briefing package (containing 'introduction to MCM' including pre-defined 'core' and 'discretionary options').

- Confirm in advance by phone date / time / venue for MCM interview.

- Check audio recorder and computer, switch-off / disconnect phones, open MCM software, either online or offline version.

6.2 During the Interview

- Enter additional options, criteria, principles, scores, weights and annotations into software as interview proceeds. Remember to click the save button to save notes.

- Give particular attention in note-taking to:
  - General comments, queries relating to exercise as a whole
  - Clarification of definitions of options and formulation of individual criteria, including framing assumptions.
  - Clarification of conditions bearing on assignment of specific scores.
  - Focus especially on conditions for low and high scores under each criterion.

- Turn over or change audio tapes/disks as necessary.

- Ensure interviewee is comfortable that the final option ranks do reflect their perspective.

6.3 At the End of the Interview

- Confirm that final ranking picture provides a reasonable picture of the interviewee's view and return to previous stages if necessary.

6.4 After the Interview

- Appropriately label all tapes or audio files.

- Edit, clarify and elaborate notes as necessary as soon after interview as possible.

- Archive and prepare audio recordings for transcribing (if necessary).

- Reflect on interactions during interview and make additional notes accordingly.

7 SETTING UP AN MCM ENGAGEMENT

The Engage section of the MCM software is where the data elicited during interviews is recorded during (and after) the interview. The interviewer can choose to start a new Engagement either online or offline (which can be uploaded at a later date).

7.1 Starting a new Online Engagement
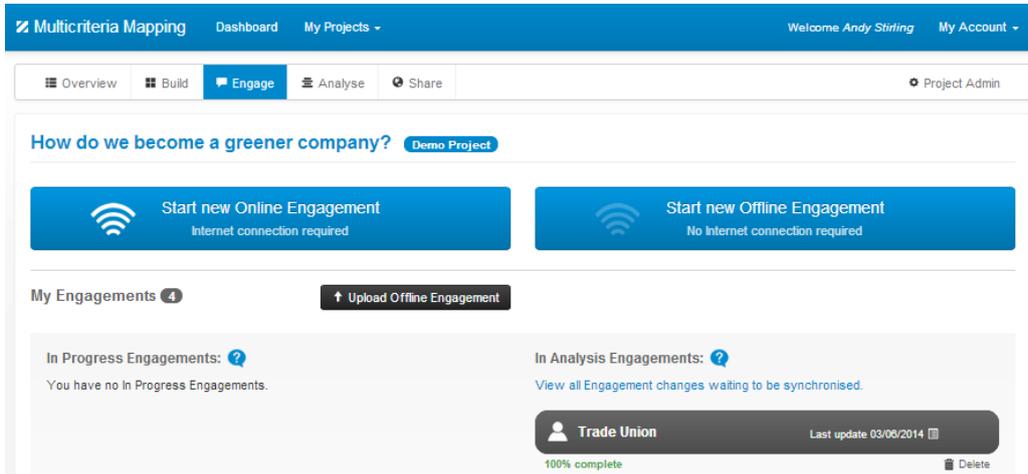
Figure 5: The Engage section of the MCM software

To start a new Online Engagement, click on 'Start new Online Engagement', enter the name of the interviewee and click 'Start Engagement'.

7.2 Setting up a new Offline Engagement

To start a new Offline Engagement, click on 'Start new Offline Engagement' and follow the instructions to download the offline version of the MCM tool.
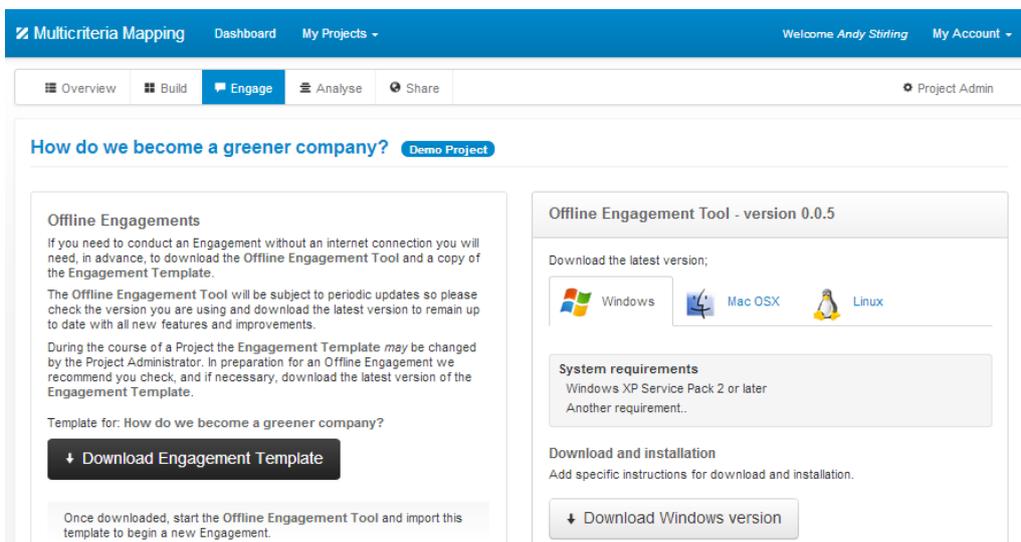
Figure 6: Downloading the MCM Offline Engagement Tool

When the files have been downloaded, create an MCM folder on your computer to store the software application itself and the data which it generates. Put the downloaded files in the MCM folder. Double click on the mcm zip file and extract the files, making sure the extracted files are in your MCM folder. Next, double click on the mcm application file and click on 'Run'. The following page will appear.
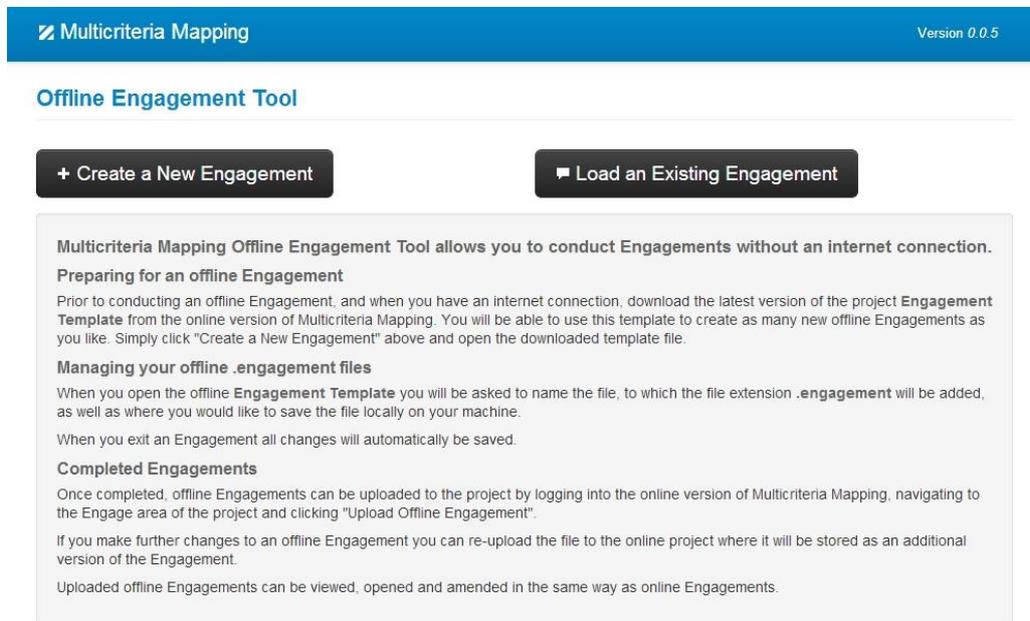
Figure 7: The MCM Offline Engagement Tool

Click on 'Create a New Engagement' and select the downloaded template file for your project. Enter the name of the participant, and click on 'Create and Save the Engagement'. Next, re-enter the name of the participant as the file name, choose where to save the file, and click on save. From this point on, the offline engagement works in the same way as the online engagement, except that the offline engagement must be uploaded after it is completed [#15.

If an engagement has already been created, click on 'Load an Existing Engagement' within the offline version of the MCM software and browse to the relevant engagement to load the existing engagement. Researchers may wish to load an existing engagement to edit the engagement and add notes after the interview.

8   STARTING THE INTERVIEW   (10-20 minutes)

8.1   Introductions

- Introduce the interviewer and put the interviewee at their ease.

- Confirm that the interview venue is suitable – quiet, away from work-desk/computer and without risk of interruption from colleagues or telephones (including mobile phones!).

- Ask interviewee if they are happy that session be audio-recorded. Explain that this is simply to ensure accuracy of notes and subsequent interpretation in analysis.

  - NB: if interviewee declines recording, notes will need to be made with correspondingly greater care and detail. Explain that this may require more time for the interview.

- Ensure that there is sufficient time available for the interview (two hours likely, three absolute maximum – depending on the scope and detail of the interviewee's appraisal).

- Participant will already have confirmed receipt of an interview briefing package [#6.1], so warm up by asking for any queries or comments on this package.

8.2   Explain the 'Basis for Engagement'

This may already have been raised in a query by the interviewee in the scoping interview [#5.1]. It relates also to issues of confidentiality and anonymity, detailed resolution of which should ideally be left until later [#5.2]. It concerns the exact capacity in which interviewees are being asked to engage in the MCM interview.

This is very simple. The interviewee is being asked to conduct their MCM appraisal *in a personal capacity*. As they will see, the level of detail in which their assessment will be conducted will very quickly move beyond anything that their own (or indeed any) organization might be expected formally to have adopted a position.

So, there is no sense in which an interviewee's appraisal results might be considered to reflect a formal detailed position or policy. However, it may nonetheless be useful in their own personal appraisal, to bear in mind their institutional context as a reason why are being approached – as someone engaging *from a particular perspective*.

In other words, when analysing and interpreting MCM results across all interviewees, the research team hopes and expects to be able to identify certain consistent patterns that reflect key differences in the broad strategic perspectives taken by different specialist or stakeholder groups. Where an individual interviewee is unsure of some specific detail in their appraisal, they might usefully take this into account.

Another related issue that can arise, concerns the typically differing depths of knowledge on different relevant aspects. Just because an issue is considered important in appraisal, does not mean an interviewee will feel sufficiently informed on it. It is therefore also important to be clear that it does not matter if an interviewee is not an expert on many of the issues that they may consider to be important.

8.3   Outline the MCM Method

- Explain the basic sequence of five steps:

- select options > define criteria > assess scores > assign weights > review ranks

- Emphasise that MCM is an iterative process, so they will be free to return to review earlier steps at any stage.

- Remind the interviewee of the purpose of this MCM exercise. This will have been defined in the interview briefing package in a paper giving an 'introduction to MCM' in terms of the *focal goal* which the 'options' are intended to address.

- Draw attention to the blank sheet of paper and pencil on which the interviewee may make personal notes in their own handwriting, if they wish. The interviewer will ask to take these notes as a record at the end.

- As set out earlier in this Manual [#1.2], explain that – although MCM is a quantitative technique – the numerical results are a less important part of the process than the associated qualitative reasons. Emphasise that the objective of the exercise is *not* to come up with a single 'best option' – either from their own point of view, or from the perspectives of all the participants taken together. Explain that the MCM process is instead intended simply as a 'heuristic' – to elicit and explore contrasting views in a systematic and balanced way. As such, the results will provide an important means to help inform decision-making, but are unlikely to prescribe particular decisions in any unconditional way.

- Be clear that the computer (and especially graphics) may be used as much or as little as necessary by the interviewee. It is up to them how much they rely on the interviewer to mediate the interaction with the software tool.

- Be sure to make an appropriate arrangement for the seating of the interviewer and interviewee. The best arrangement is usually for both to sit side-by-side at a desk so that both can see the computer screen. If the interviewer is right handed, then it is usually best that they sit on the left hand side.

- It will most likely be the interviewer who operates the MCM software and makes the written inputs. But the interviewee will be able to see these inputs being made and so typically quickly come to understand the process and so better be able to correct any errors or misapprehensions in the way that notes are formulated.

9 MCM STEP ONE: IDENTIFY OPTIONS   (10-20 minutes)

Figure 8: The MCM software 'Review Options' page

The left hand panel of the 'Review Options' page shows some pre-defined core options in a folder. The researcher can define any number of these. The definition for the highlighted core option appears in the right hand panel. During the interview, the interviewee can also add their own 'additional options'.

9.1 Define the 'core options'

Reiterate that the 'options' represent a range of possible strategies, technologies, policies or other courses of action that might be pursued in order to achieve the particular strategic aim that is the focus of this appraisal.

Explain that the project team has reviewed the positions taken under a wide range of viewpoints over the available options. A set of '***core options***' has been defined by the research team for appraisal *by all interviewees*. These common definitions for a diverse set of options will allow a basic level of consistency for later comparison across the perspectives of all interviewees. Explain that – at a minimum – it is essential that the interviewee please appraise each of these core options.

If there is an objection here, in that one or more of these core options look to be unacceptable or irrelevant for some reason, then clarify that an opportunity will arise later for the interviewee explicitly to reject any of these, if they wish, by expressing their reasons in a definition for a relevant issue of **principle** under which to exclude.

Take the interviewee through each of the **core options** and clarify their general reaction and interpretation. _Make a note in the right hand panel any minor elaborations, qualifications or other observations that they may wish to make in relation to the definition arrived at by the project team_.

If any of these interpretive assumptions substantively change the sense of a core option definition, then suggest that the interviewee retain for their appraisal the definition given by the research team for this core option, but that they can add their own 'additional option' with the particular detailed definition that they are developing.

Ask the interviewee if they see any obvious gaps in the set of core options. This may already have arisen in relation to a concern over the precise way in which one of these core options is defined. Or it may instead relate to a type of option that is entirely absent.

- If an interviewee is broadly content with the sufficiency of the set of core options as an initial basis for the appraisal, then the appraisal may move on to the definition of criteria, ensuring that it is made clear that the interviewee may return at any stage to define additional options if this seems appropriate.

- If an interviewee is concerned about a gap in the **core options** or has concerns over one or more of the detailed definitions, then make it clear that they can select one of the discretionary options right at the outset, or define their own additional option. This can either be done at the beginning of the interview, or later after experience has been gained in appraisal of all the core options.

9.2   Introducing the 'discretionary options'

Where discussion of the **core options** makes this advisable (see above), explain that **discretionary options** offer a range of other options that the project team has identified, which reasons of time prevent being included as a default in all interviews. However, they are defined here in the same detail as the core options in order to stimulate the imagination of interviewees and ensure consistency where more than one interviewee decides to select one of these discretionary options for appraisal.

If an interviewee wishes to appraise one or more of these discretionary options, they can open the discretionary options folder and choose which options to include or exclude from the assessment. As a default, the software includes all discretionary options in appraisal. So an interviewer can ensure discretionary options intended only for possible appraisal, are excluded by clicking '_exclude from assessment_'.

Again, as with the core options, note in the right hand panel any minor elaborations, qualifications or other observations that they may wish to make in relation to the definition arrived at by the project team.

If any of these interpretive assumptions substantively change the sense of the option definition, then point out that the interviewee will not be appraising this as a discretionary option, but as an 'additional option' of their own, which will not be directly comparable with the options defined by other interviewees.

Discretionary options will normally be concealed at the outset in an unopened folder in the left hand panel of the MCM 'Review Options' page. Where there are a large number of these, it will not be advisable to take the interviewee through each one in turn, but instead to refer to these only if the interviewee themselves identifies a gap in the core options that corresponds to one of these discretionary options.

9.3   Consider 'additional options'

Before moving on to develop criteria, be sure to explain that the interviewee may – either at this stage or later – define further '**additional options**' of their own choosing. These may involve slight permutations on some of the **core options** or **discretionary options** specified by the research team. Or they may be entirely different. Of course, the performance of these additional options will not be directly comparable with that of the additional options defined by other participants.

If an interviewee wishes to define one or more additional options, then a new Options Group should be created by clicking on the blue folder icon at the top of the left hand panel. The additional options should be entered as part of this new group, with their definitions noted in as much detail as possible in the right hand panel.

9.4   Winding up the 'identify options' step

It is advisable that the MCM interview does not proceed with too many options right from the outset.

An initial set of seven to nine options is probably best, leaving space for more to be defined later, if necessary. Of course, this is flexible, depending on the context.

If time seems to be running thin for this stage of the appraisal, it may help moving on if it is reminded that further options can be defined at any stage later in the appraisal.

Before moving on to the scoring stage of the interview, it will be necessary if this has not already been done as a default, to exclude all discretionary options that the interviewee does not wish to appraise, as described above in section 9.2.

The interviewer should remember to phrase all prompting as open-ended questions of clarification.

If you are running an offline engagement, remember to back-up the engagement file at the end of 'option identification' and give it a suitable file name to identify the stage, such as 'person name option'.

If you are running an online engagement, all data is saved on the web and therefore it does not need to be backed up.

10 MCM STEP TWO: DEFINE CRITERIA   (10-20 minutes)

Figure 9: The 'Define Criteria' page in the MCM software

The left hand panel of the 'Define Criteria' page shows the criteria defined by the interviewee. The right hand panel shows the interviewees definition for the highlighted criterion. During the interview, the interviewee can define their own criteria.

10.1 Getting Started with Criteria

Explain that '***criteria***' are the different factors that the interviewee has in mind when they choose between, or compare, the pros and cons of different ***options***. These may address any issue that has relevance to their assessment of the performance of <u>any</u> of the options. But the criteria will be applied equally to assessing <u>all</u> the options.

On the basis of considering the MCM briefing package, interviewees often have ready a set of their own criteria. If not, then ask them to talk in general terms about the kind of factors that might make the different options better or worse at fulfilling the central aim of the appraisal. Typically, their answer to this question will include – either as negative or positive aspects – a number of candidate criteria.

If the interviewee still has trouble getting started with criteria, then points they have made during the scoping interview or introductory questions may be a useful basis for prompting as a starting point. For this reason, it may be useful for the interviewer to have considered these in advance.

Only if all the strategies above fail to prompt an initial set of criteria, should the interviewer consider prompting with their own criteria as examples. If so, these should only be mentioned in the most general of terms – for instance (depending on the context) involving broad '*public health*', '*cost*' or '*ethical*' aspects, rather than specific issues.

10.2 Clarifying Criteria Definitions

Be clear that the interviewee is entirely free to identify and define his or her own *criteria* as he or she thinks fit. However, emphasise that it is important to be as specific as possible in their definitions, to be clear about the differences between criteria and to minimise any overlaps or dependencies.

- For instance, if 'cost to industry' has been singled out for attention as a criterion in its own right, then the criterion 'cost to wider society' should be defined to exclude cost to industry.

- Any residual minor overlaps or dependencies between criteria can be dealt with as uncertainties in the assigning of scores (see below).

One query that sometimes arises, is how it is that criteria can be applied to all *options*. This is discussed in more detail under the *scoring* step below [#11.6].

- For the moment, the interviewer can clarify this by pointing out that, even if they may seem irrelevant, criteria are often more applicable to different options than may at first seem the case.

- But if an option genuinely seems neither good nor bad under a given criterion, this can be dealt with by assigning a neutral or radically uncertain score later in the appraisal [#11.6].

- The reason MCM asks people at least to consider criteria in a balanced way for all options, is to avoid a situation where certain options are artificially favoured or disfavoured by simply excluding particular options from being assessed under specific criteria.

Although rare, a significant task for the interviewer is to keep an ear open for whether any of the participant's criteria seem to display a *dependency* on another.

- Only in the event that this appears so, should the interviewer ask whether the performance of options under any one criterion _depends on_ performance under any other. Explain this is not the same as 'correlation', 'association' or 'overlap'.

- Correlation, association or overlap simply mean that performance under different criteria will tends to vary together, according to some pattern – perhaps because they are related by some deeper causal structure. A dependency, on the other hand, is where it is performance under one criterion, which somehow _determines_ the performance under another in a direct causal fashion.

- An example of this might be where different government policies are being assessed as options in terms of criteria of 'equality' and 'transparency'. An interviewee who favours social differentiation may regard promotion of equality as a negative feature of the performance of different policies. But there may be recognition that this position might look bad to others. So, this rather cynically tactical position may hold the transparency of a policy to be positive if the equality performance is high, but negative if the equality performance is low. In other words, whether transparency is good or bad, _depends on_ equality performance.

- Where such a dependency is shown, it can be addressed by using the uncertainty intervals in scoring [#11.6]. Here, a high or low performance can readily be noted to depend on the relevant wider conditions.

This is a rare and rather subtle phenomenon, so there is no reason to worry unduly.

10.3 Criteria and Principles

Although this will probably only become important in scoring, it is important to point out at this stage that appraisal may be undertaken in two quite different ways, according to '***criteria***' that can be traded off, or '***principles***' that cannot.

- Most ***criteria*** will typically involve aspects of option performance that can be 'traded off' in some way against other aspects of performance.

  o For instance, there may be a willingness under some perspectives to gain higher performance in terms of public health at the expense of higher costs to industry.

  o As explained at the beginning of the interview, these types of ***criteria*** will be assessed using quantitative scores in the next stage of the appraisal, and then weighted according to the interviewee's own ideas of the relative importance of the different criteria.

- However, option performance may alternatively be judged as an issue of ***principle.***

  o Here, judgements over option performance involve absolute decisions, over whether each given option is 'acceptable' or 'unacceptable', rather than assessed according to quantitative trade-offs.

  o This may be because there exist absolute ***thresholds*** in performance under a criterion like public health, below which options may not be tolerated. In this case, public health will be an issue of principle below this threshold, but above this threshold will be a criterion suitable for trading off against other criteria.

  o Alternatively, a principle may reflect a fundamental ethical issue under which certain options may display properties that are judged to warrant their being entirely ruled out. Another example might be if an option is thought illegal.

- The MCM software allows a distinction to be made between criteria and principles in the right hand panel on the 'Define Criteria' page when you set up or edit a criterion. These are handled in different ways in subsequent stages of the exercise. _But both criteria and principles are equally applied to the assessment of all options_.

10.4 Winding up the Criteria Definition Step

It is advisable to begin with a relatively modest number of criteria – between four and six might be good for a start. More criteria can be added as assessment proceeds.

The practical limit on the total number of criteria that is manageable in a typical interview is about twelve. Above this, the scoring process becomes too exhausting for one sitting. Also, the least important criteria are more likely to become of trivial in their significance or confused with one another and the scoring more prone to error.

Conversely, if there are too few criteria (two or three), then it is more likely that the criteria will be very broad in their definitions and become more vague in the scoring and subsequent analysis. Unless a participant is definite that they wish to group many issues together under one criterion, despite in other ways being able readily to distinguish them, then it is usually helpful to prompt them to divide such broad criteria up into one or more subordinate issues – each one a criterion in its own right

Be sure to phrase all prompting as open-ended questions of clarification.

If you are running an offline engagement, back up the engagement file at the end of 'criteria definition' and give it a file name that will help if you need to open the file later, e.g. 'person name criteria definition'.

If you are running an online engagement, the data is saved on the web and it is therefore not necessary to create a back-up.

11 MCM STEP THREE: ASSESS SCORES   (60-90 minutes)

Figure 10: The MCM software 'Assess Scores' page

The top of the 'Assess Scores' page shows a chart of option performance under the highlighted criterion.

The lower left hand panel shows the options to be scored under the current criterion. The lower right hand panel shows where the interviewer can add notes for the highlighted performance score. The interviewer can scroll between criteria using the arrows at the top.

11.1 Getting Started with Scoring

Explain that, having defined his or her criteria, the interviewee can now evaluate the relative performance of the different options under each of these criteria. Point out that, because it involves looking at all options under all criteria, this is typically the most time-consuming part of the MCM interview.

The performance of options under each individual criterion can be expressed by using numbers to rate option performance under some intuitive personal scale. These numerical ratings of performance are called performance '***scores***'. A high score indicates good performance. A low score indicates poor performance [#11.2].

The interviewee can use any scale they wish for scoring. For instance, this may run from one to ten, or one to one hundred. It does not matter for the MCM tool if different scales are used for different criteria, although it is usually psychologically easier if the interviewee gets into the habit of starting with the same scale for each criterion. If asked, the interviewer might recommend a scale of 1-100.

If, later in the assessment, an interviewee should discover that a newly considered option might score more highly than the maximum value on their chosen scale (or lower than the minimum value), this does not matter.

- What is important is the intervals between the scores, not their absolute values, so scores can be entered that are higher (or lower) than the scale end-points and this will be corrected by the software.

- Only integer values may be entered for scores, so a longer scale (like 1-100) gives better resolution.

- Even negative values – though not to be encouraged – will not disturb the process.

Typically, it is the assigning of the very first score that presents the greatest challenge, and this is so to a lesser extent under each criterion.

- Here, it is usually best for the interviewee to start by identifying the best or worst performing option and choosing a value near to the end of their scale to reflect this – say one (near to a minimum of zero) or ninety (near to a maximum of one hundred).

- The assessment may then proceed by filling in further scores by reference to these initial values.

- An alternative is sometimes to take the present *status quo* or a relatively neutral option as a 'mid-range' reference point and relate relatively high- and low-performing options to this.

11.2 The Basis for Scoring

- The business of scoring follows a very simple rule: high scores represent 'more preferred performance', low scores represent 'less preferred performance'. It is the intervals (differences) between the score values that are important.

- Explain that scoring is a *relatively technical* part of the appraisal. The interviewer will be asking the interviewee explicitly to explain and justify their scoring, by reference to analytical arguments or available evidence, rather than to the purely

personal subjective values that are expressed later and less rationalistically as 'weights' (section 12).

- This said, it is important to be clear that scoring does also involve an important element of personal judgement. Scores do not simply reflect externally published data in a purely mechanical way. They also express the degree to which one score value is 'preferred' to another, by the interviewee. For this reason, established measures of cost, risk or impact should not be used directly, but must be deliberately converted into appropriate scores.

- In technical terms, the scoring approach used in MCM is an 'ascending interval scale'.

  o In other words, a difference in score of four reflects a performance difference that is judged to be twice as significant as an interval of two on the same scale.

  o Any given scoring interval is equivalent at both the top and bottom ends of the scale.

  o For a scale that begins at zero, an option that is assigned a score of eight is judged to perform twice as well under that criterion as an option that is assigned a score of four.

- Usually, interviewees are entirely happy to express such technical performance evaluations using this kind of intuitive personal scale under each criterion. However, an interviewee may sometimes wish directly to consult or reflect on a body of evidence that they consider to provide relevant performance data for one or more criteria (like monetary 'cost').

  o In this event, it is important to ensure that the interviewees scores also take account of their own evaluative judgements over 'how much better' one option is than another.

  o In the case of cost, for instance, the same difference of ten thousand currency units may matter more at the low end of the scale than at the high end of the scale. It is also important to remember that monetary cost data relate inversely to the associated performance scores (low costs are good, high costs are bad).

  These detailed considerations are not specific features of the MCM method, but general characteristics of appraisal, of a kind that must be dealt with in any approach (whether explicitly, as here, or not).

- To ensure arithmetic consistency and avoidance of inadvertent bias in the calculation of final ranks, the raw values of the scores as entered by interviewees are automatically 'normalized' by the MCM software. This leaves unchanged, the relations between option scoring intervals as shown in the graph (see Figure 10). The mathematical basis for this simple normalization process is given in ANNEX X - EQUATIONS.

11.3 Dealing with Uncertainty, Variability and Sensitivity

Explain early on in introducing the *scoring*, that the MCM method asks for two score values for each option under each criterion, not one. This is so that the interviewee has a way to reflect a number of factors that may obscure their picture of performance and so make it difficult to assign a single score.

- It may be that they are **uncertain** about the correct score to assign, due to inadequate available information on the particular option or criterion in question.
- It may be that the appropriate score will be highly **variable,** depending crucially on the context. For instance, the efficacy of a given policy option may depend on the wider political or economic environment: under high economic growth it may be positive but under a low growth scenario, it may be negative.
- It may be that the interviewee's judgement displays a significant **sensitivity** to certain particular assumptions that might seem equally reasonable. For instance, it may depend on whether or not – or the extent to which – there is compliance with prevailing regulations or principles of best practice.

In any of these cases, the provision in MCM for the eliciting of two scores for each option under each criterion allows the interviewee to register two different 'scenarios' – 'pessimistic' (the 'minimum' score) and 'optimistic' (the 'maximum' score).

Where there is no uncertainty, variability or sensitivity, then there is no reason why the interviewee may not assign the same value to the minimum and maximum scores.

In some cases, the question may arise as to how to constitute these 'pessimistic' and 'optimistic' scenarios. How plausible do they have to be? Should an interviewee envisage the most extreme possible contingencies in either case?

- Usually, the question is not posed, so the resulting scoring ranges can be understood to represent a (perhaps tacit) reflection of what the interviewee considers to be the most reasonable assumptions under the circumstances.

- Where such questions are explicitly raised, the answer should be that 'minimum' and 'maximum' scores should be assigned such as to reflect the interviewee's own judgment as to what is 'reasonably likely' as a possible performance scenario.

- If the interviewee wishes to adopt a quantitative understanding of the subjective probabilities underlying their own scoring ranges, then they should be invited to specify this (for instance, as a 75% confidence interval) and a note taken accordingly. If they query what the appropriate confidence value should be, the response should simply be *"that which seems to them to be most reasonable under the circumstances"*.

11.4 Taking Notes in Scoring

The table in the lower right hand panel of the MCM scoring pages provides **note** icons for both lower and higher scores. This allows the interviewer to document the specific reasons why each score takes the particular value that it does.

- In practice, it is not necessary that a note be entered for every single score. Several options may receive identical scores under a particular criterion for similar reasons, and it is not necessary to repeat the same note in each instance.

- However, it is important that note taking be used to give as much detail as possible on the qualitative reasons and conditions that underlie the various quantitative judgements in scoring. These notes will be crucial (with the audio recording or transcript) in informing the interpretation of different criteria and options in analysis.

- Notes are saved automatically, in the same way that scores are saved automatically

In particular, it is important briefly to note the specific understandings of uncertainty, variability and sensitivity introduced above [#0].

- Where there is ***uncertainty***, it will be important to note the conditions and/or circumstances that define the pessimistic and optimistic bounds to the range of possible scores.

- Where there is ***variability,*** it will be important to note the precise contexts or circumstances under which performance is judged to be at its best and worst.

- Where there is ***sensitivity*** to different possible assumptions in scoring, then it is important to note particular assumptions associated with the assigning of maximum and minimum scores.

Although as emphasized repeatedly in this Manual, it is crucial that the interviewer adopt a neutral and open manner, it is also important that opportunities be taken to document the reasons for apparent tensions or inconsistencies in the emerging patterns of scoring.

- This may involve cases where options that are scored similarly under one criterion are judged to display different performance under an apparently related criterion. Here, it would be appropriate to ask for clarification of the specific reasons for the difference.

- It may involve cases where a verbal comment appears to contradict an assigned score. Here, it would be appropriate to ask for a more discursive account of the reasons for the assignment of a particular score.

- It may involve cases where two options are assigned the same maximum scores under a particular criterion, but are given different minimum scores without an explicit reason. Again, it would be appropriate to prompt the interviewee as to why this is so.

It is an important feature of the MCM process that the interviewee has the chance to look over the interviewer's shoulder and comment on the appropriateness or adequacy of any particular note. With care, this can provide an important aid to quality control. The interviewer should periodically check that the interviewee is checking in this way and reassure them that this is alright.

As already stated, it is not essential that a note be made under every score. Indeed, where this is repetitive this can unhelpfully impede the momentum of an MCM interview. However, the MCM software does actively prompt, at the very least, for completion of a note documenting the reasons for the extreme minimum and maximum scores under each criterion. It is important that time be taken to complete these notes in each case.

- The reasons for this relate to a technical issue in multi-criteria analysis that is discussed later in relation to weighting [#12.3]. Without documenting the conditions

associated with these extreme ends of the scoring range under each criterion, then technical questions may be raised about the basis or consistency of the later criteria weighting process.

As detailed later in this Manual [#13.4], it is useful to bear in mind when taking notes during the interview that these notes can (and often should) be elaborated and clarified by the interviewer as shortly as possible after the close interview (ideally during the return journey).

11.5 Assessing Principles
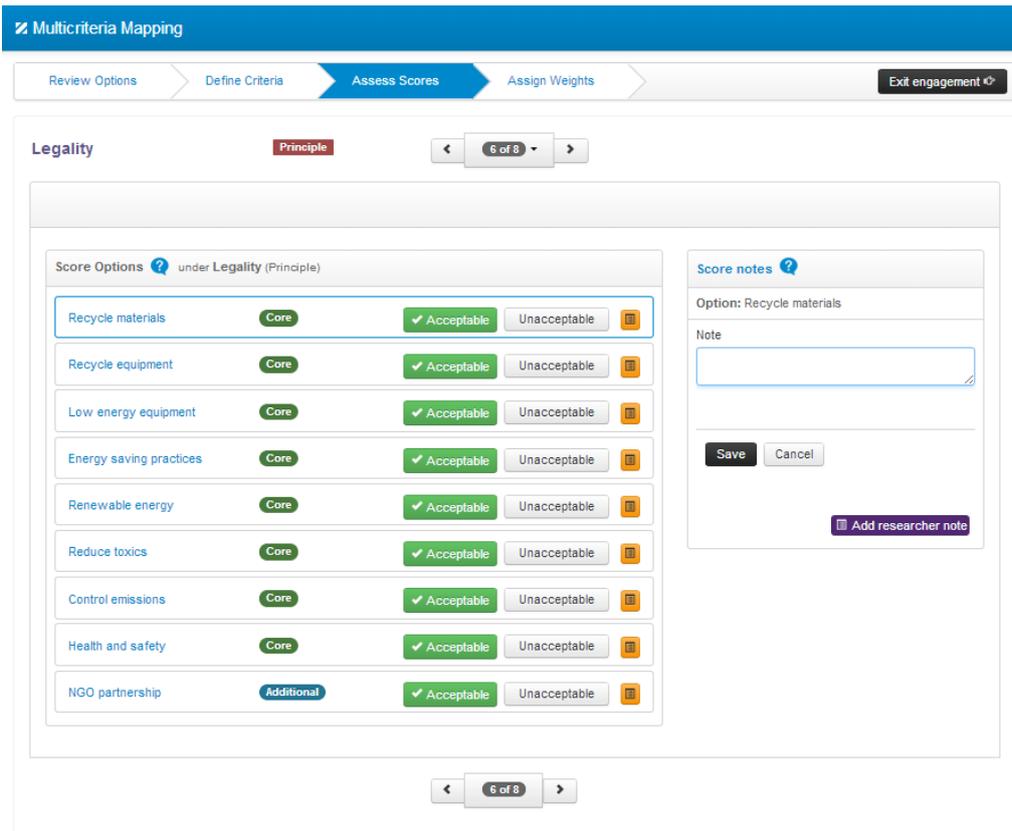
Figure 11: The MCM software 'Principle' page

The top of the page shows the criteria defined by the interviewee. The current item is an issue of principle, rather than a normal criterion. The left hand panel is a checklist registering the acceptability of each option under this principle, with a note icon provided in each case. (There is no chart on this page because there are no scoring ranges under a principle).

Where an interviewee has defined one or more '*principles*' [#10.3], then the assessment process does not involve the assigning of numerical scores, but simply the registering of each option as either 'acceptable' or 'unacceptable' under that principle.

- To this end, instead of a scoring table, the MCM software displays a list of check boxes for each option under the principle in question.

- Where an option is deemed 'unacceptable' under a particular principle, then the corresponding box should simply be unchecked and an annotation made as to the precise reasons why this is so.

As already mentioned, these 'principles' may be applied for a number of different reasons.

- They may reflect over-riding ethical issues, which together determine absolute boundaries to what might be considered to be acceptable performance. Such principles are likely to be quite different in character to other criteria.

- They may reflect performance 'thresholds' under a criterion that is otherwise assigned scores. Below this threshold, performance is considered to be intolerable. In this case, the principle in question will be identical to a criterion under which scores have been assigned.

Under some influential views (for instance on the part of many economists), the adoption of this kind of absolute judgement – especially on an ethical question – is intrinsically irrational and problematic. In these terms, it might be taken as a shortcoming of the MCM method. If challenged on these grounds, it is important to be clear about the justification for allowing interviewees to invoke such absolute issues of principle in MCM.

- The reason is founded in the understanding that the 'utilitarian' trade-offs embodied in the scoring and weighting procedure at the heart of most multi-criteria analysis do not represent the only legitimate form of rationality.

- An illustration of this may be found in the ordering of words in a dictionary (or 'lexicon'). A word beginning with the letter A will always appear before a word beginning with the letter B, irrespective of the number of Z's that may follow later in each word. The position in the dictionary does not represent the average over the number of As, Bs and Zs. This might be referred to as a 'lexical' form of rationality.

- Just as this is an entirely rational way to order words in a dictionary, so too, in principle, is it an entirely rational way to order the performance of options according to a structured sequence of different principles. Even the most utilitarian of thinkers, will typically concede, for instance, that no amount of torturing of children could be justified by a profit motive. The relationship between these criteria is 'lexical'.

Options that are deemed 'unacceptable' under even just one principle will be indicated as being 'ruled out' in the final ranking results.

If an interviewee defines more than one principle of this kind, then it is important to document the order of priority that they would assign to each principle – i.e.: to order principles in sequence of their relative importance.

11.6 Trouble-Shooting in Scoring

It was emphasised in introducing **criteria** that a criterion must be applied to all options, not just to those that seem obviously relevant. This is a fundamental part of the value of MCM, as an elicitation technique that promotes reflection and deliberation on the part of interviewees in a balanced way.

However, the query is sometimes raised as to how to handle cases where a particular criterion appears *not* to be relevant to a particular option. Such apparent irrelevance can take three forms, each of which might be handled slightly differently.

- First, it may be that a particular option appears to the interviewee to be so self-evidently favourable under a particular criterion that it hardly seems worth pointing this out. In other words, they are only thinking of 'scoring down' those options that display disadvantages under this criterion. In such cases, the criterion is indeed relevant, and the option concerned should simply be given an appropriately high score and a note made on the conditions under which this would be the case.

- Second, it might be that a particular option is entirely neutral in its performance – neither positive nor negative. In this case, the option should simply be scored somewhere in the middle of the chosen range for that criterion. This might be a very precise judgment (with 'maximum' and 'minimum' scores taking the same value), or reflected more broadly with some suitable mid-scoring range (eg: 40-60 on a scale from 0-100). A note should be made concerning the neutral quality of this scoring.

- Third, it may be that the performance for a particular option is highly uncertain, variable or sensitive under the criterion in question. In this case, the criterion is still in fact very relevant. Here, the scoring should be approached by defining some appropriate range to capture the full extent of the uncertainties, variabilities or sensitivities [#0]. At the extreme, this might extend from the lowest possible to the highest possible score values. The conditions under which the option would score so low and high should be carefully noted.

As noted above [#10.2], it is important to keep alert for the (very rare) cases in which the scoring under one criterion **depends on** the performance under some other criterion.

- If a relatively minor effect, then this can be addressed by treating this as a 'sensitivity' [#0] and making an appropriate note on the conditions relating to the maximum and minimum scores under the criteria in question.

- If a relatively major effect, then it may require that the criteria in question be reformulated in order to eliminate the dependency. The obvious way to do this, is to adopt an explicit assumption under one of the criteria concerning performance under the other.

If the MCM software behaves strangely at any stage, the most likely reason is that scores have been omitted under one or more criteria. The first response should therefore be to check that scores have been entered under all criteria.

11.7 Winding up the 'Assess Scoring' Step

When the scoring process is complete under each criterion, the attention of the interviewee should be drawn to the chart in the top right panel of the scoring page displaying the performance scores for that particular criterion.

- It should be confirmed that the pattern of scores on the chart does provide a reasonable reflection of the interviewee's own judgements.

- If the interviewee notices an anomaly, they should be questioned as to what this is and why they think it might have arisen, making notes accordingly.

- If the interviewee is content to treat any apparent anomaly as a positive feature, then the interview should proceed to the next criterion.

- If the interviewee is concerned that the anomaly needs to be remedied, then the scores should be revisited to achieve this, with a note made of any particular score that is changed and the earlier value from which it was changed and why.

If notes have not already been entered for the extreme minimum and maximum scores under any given criterion, then the MCM software will provide a prompt for this information before allowing the interview to leave that criterion.

Remember to phrase all prompting as open-ended questions of clarification. If necessary, allow the interviewee to return to earlier stages in the MCM process.

If you are running an offline engagement, it is advisable to back up the engagement file after scoring each criterion, but certainly after scoring all the criteria. The resulting back-up files should be given titles reflecting the specific criteria whose scoring they follow.

12 MCM STEP FOUR: ASSIGN WEIGHTS   (10-20 minutes)
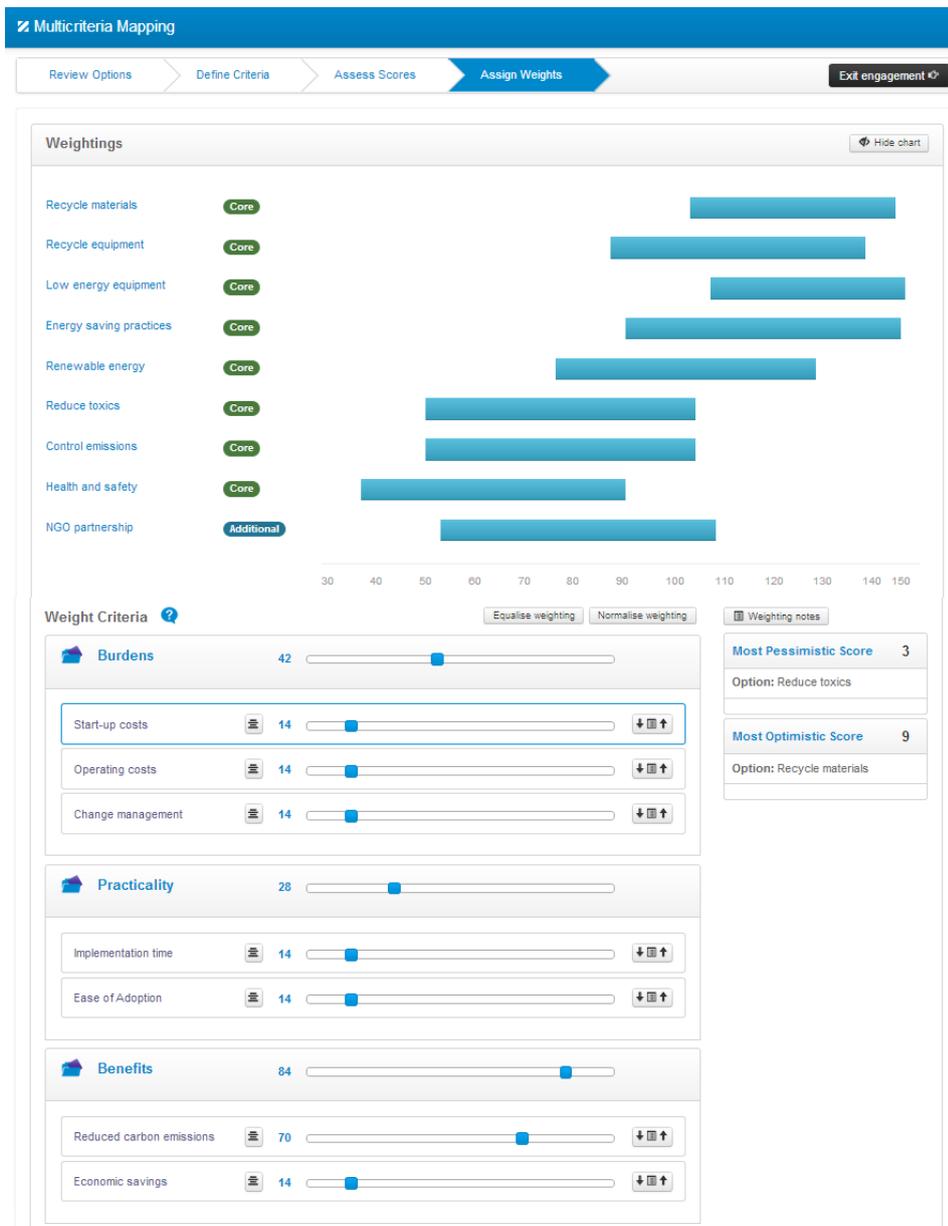
Figure 12: The MCM software 'Assign Weights' page

The upper panel of the 'Assign Weights' page contains a chart showing the overall ranks for each option under all the criteria taken as a whole, subject to the weights assigned in the lower panel. A red symbol in the chart would show that an option is ruled out under at least one principle. The lower panel provides both a sliding scale and direct numeric input for assigning criteria weights. Weights can also be assigned for groups of criteria using the corresponding slider or numeric input.

Weights can be normalized in percentage terms and equalized using the buttons at the top. The 'weighting notes' button allows notes to be taken on the weighting process. The icons next to each criterion display a reminder of the worst and best performing options under each criterion.

12.1 Getting Started with Weighting

The process of assigning importance **weights** to the different criteria is a very different business to assessing the scores. It involves thinking about subjective values rather than technical judgements.

- For this reason, it is a good idea deliberately to engineer a short break between the scoring and weighting stages in MCM. This may be a chance to visit the toilet, take a drink, or have a quick chat. However, care is needed not to give a false signal that the session is over or that the interviewee might briefly return to work.

When first opening the weighting page in the MCM software, it is advisable initially to minimise the top panel containing the ranking chart.

- This will help avoid confusion, since the ranking chart will at this stage reflect an artificial assumption of equal weights on all criteria, and will have no meaning until all the criteria have been deliberately weighted.

The ranking chart is best opened properly when all the criteria have been assigned weights for the first time [#12.5].

The simple arithmetic behind the calculation of ranks from weights and normalized scores is explained in ANNEX X - EQUATIONS. Put simply, a rank is the sum of the weighted scores.

12.2 Explaining the Weighting Process

Explain that **weights** are very different things to the scores that will by this stage already have been assessed.

- **Scores** express judgments over the technical performance of each option under specific criteria – reflecting only one part of the full range of relevant issues.
- **Weights** express subjective values concerning the relative importance of the different criteria – together reflecting the full range of relevant issues.

If the interviewee needs an example to illustrate this, pick on two of his or her own criteria as a basis. For instance, how much something costs (a score) is a very different matter to the general importance of cost compared to public health (which concerns their weights).

- For example, if cost is more important than public health, this might be reflected by a weight on cost of 24 and a weight on public health of 12.
- Likewise, if public health is more important than cost, this might be reflected by a weight on public health of 24 and a weight on cost of 12.
- NB: be sure to give examples in a symmetrical fashion, so as not to give the impression of prompting or prejudging the interviewee's own weighting scheme.

It is by establishing both the scores and the weights that the MCM process is able to produce the final ranks for the different options, reflecting their overall performance under all the criteria taken as a whole. These will be shown in the chart in the upper panel of the MCM weighting page.

12.3 A Technical Point on Weighting

There is one further issue underlying this weighting process that is usually not raised by the interviewee. However, this is sufficiently important to the underlying basis for weighting, as to warrant the interviewer briefly pointing it out. This concerns the query as to exactly what is being compared with what, when weights are assigned?

- For instance, a judgement over whether cost is more important than public health will depend on "how much cost?" and "how much public health?"

- Even if public health is felt to be the higher priority issue in general terms, it is still possible that a tiny improvement in public health, may nonetheless be judged <u>less</u> important than a massive improvement in cost.

- The weighting therefore depends not just on the general importance of the criteria being compared, but also on how big is the difference in the performance of the options under these different criteria.

- In other words, the key point to bear in mind in weighting is that 'a lot' of an unimportant thing can have a higher priority than a 'little' of an important thing.

- For this reason, MCM considers weights to reflect judgements over the *importance of the differences in performance between the best and worst options under each criterion*. In technical terms, it is the relative importance of these performance differences that are being compared and weighed.

- In any event, even if this is not explicit, this might be considered to be in the background of the interviewee's judgements over the weights.

- However, in order to assist in bringing this key issue more into the foreground, the MCM software provides icons next to each criterion, which give a reminder of the worst and best performing options under each criterion and of the particular assumptions made by the interviewee in assessing these scores.

There is no need to spend a lot of time on this issue. The bottom line is simply that the interviewee has been informed how the MCM works.

If the interviewee is interested or concerned about the basis for weighting, the following further points may be useful in responding.

- No technique is without formal mathematical problems, so the idea behind the MCM approach is to be as flexible, transparent and straightforward as possible and to leave as much control as possible in hands of the interviewee.

- The key point here is that weighting is a 'heuristic' process. In other words, it is a way of exploring and structuring the consideration of priorities, rather being final definitive answer in itself.

- The final safeguard against this detailed feature leading to significant discrepancies, is that MCM does not use weights to determine final ranks in some invisible way, but allows the interviewee to see the effect on ranks and adjust weights accordingly. So, it is the pattern of ranks that constitutes the final picture.

12.4 Practical Approaches to Weighting

There is no single 'correct' approach to the assigning of weights. Interviewees typically launch quite happily into this process and – if anything – complete it surprisingly quickly. This a common feature in many multicriteria techniques.

- The task of the interviewer is more often to encourage taking time for appropriate reflection rather than working to speed things up or assist in completing the task.

Once the weighting process has been explained, the best outcome is that the interviewee proceeds in his or her own terms. However, if the interviewee requires guidance, two concrete procedures may be useful as a prompt. Both are equally valid. Choice is a matter of preference.

- Method 1 **(recommended)** Identify the <u>least important</u> criterion. Start by assigning a weight of ten to this. Then move on to the next most important and so on. Iterate and re-adjust freely.

- Method 2 Identify one particular criterion, which provides a reference point. In some cases, for example, this may be monetary cost. Assign this some arbitrary intermediate weight such as 50. Then go through each criterion in order of their relative importance and establish their priority relative to this anchor. Iterate and re-adjust freely, including changing the weight on the reference criterion if necessary.

Whatever approach is taken, one useful way to think about the end result is as a business of sharing out some round number – say 100 – of 'importance points' across all criteria.

- At any time, the MCM software allows the interviewer to 'rescale' the raw weights that have been entered, to preserves the same ratios, but display these as proportions of a total of 100 'importance points'. Rescaled 'weights' leave ranking patterns unchanged and have the same function as raw 'weights'.

- It is important to remember that 'rescaling' weights in this way is just an optional matter of convenience in the interview – raw weights can total to any number at all. Rescaling is different to the normalization used to calculate ranks from scores and weightings (see ANNEX X - EQUATIONS).

If the interviewee wishes to start afresh, the 'equalise' button allows the weights to be shared out equally across the criteria.

Since they reflect aspects of performance that are not subject to trade-offs with other criteria, any principles that may have been defined are not included in the weighting process [#10.3].

- As mentioned earlier, where there is more than one principle, it is crucial that a note be taken to record the relative priority ordering of the different principles.

12.5 Reflecting on the Final Ranks

The chart in the upper panel of the MCM weighting page displays the final ranks taken by the different options, according to the performance scores and criteria weightings assigned by the interviewee.

- This chart looks much like the scoring charts under each criterion.

- It is therefore important to explain that the ranks shown here differ from the scores, in that the ranks express the overall performance of each option across the entire range of issues that have been considered by the interviewee.

- As such, the ranks are a key practical output of the MCM interview.

It is recommended above [#12.1] that the interviewer initially close down the upper panel in the MCM weighting page, in order not to distract the interviewee with a ranking chart, which will initially reflect an artificial assumption of equal ranks.

Once the interviewee has deliberately assigned a weight to each criterion, then this upper panel should be opened again, to focus attention on the patterns of performance as reflected in the ranking chart.

- Here, the interviewer asks the interviewee if this initial pattern of ranks holds any surprises for them. Are some options ranked higher than they might expect? Are others lower?

- If so, then ask why they think this might be? Typically, they will be quick with their own reflection on this, and usually positive about the reasons.

- Whatever the issues, be sure to note these down under the note icon provided in the MCM weighting page.

- If the interviewee is in some way curious about, or dissatisfied with, the final ranks – or if they have thought of some other reason to reconsider their weighting scheme – it is important that the interviewer emphasise that they are entirely at liberty to experiment with alternative weighting schemes.

- This approach in MCM sometimes requires a little justification. The reason is that the weighting – like the whole MCM process – is a 'heuristic' (a way of exploring an issue).

- In other words, MCM is a way to help the interviewee to reflect on the implications of their own values and understandings and so come to a final view that they are content is meaningful for them.

- Unlike some other approaches, the idea in MCM is *not* to use a formal rationalistic mathematical procedure to 'teach' the interviewee what their view 'should be'.

This said, it should also be clear if the question should arise, that dissatisfaction with the final ranks should not, in itself, be taken as grounds to return to revisit the scoring of options under individual criteria.

- There are perfectly legitimate reasons for an interviewee to wish to return to an earlier stage in the appraisal – including the scoring stage.

- But these should rest on concrete reasons relating to issues that, on reflection, the interviewee considers to have been forgotten or treated in an inappropriate way.

- In such cases, it is crucial that the interviewer make full notes as to the reasons for any such return to scoring.

In the end, it is a key feature of MCM that interviewees have the right to express their own appraisals, as they feel most appropriate.

- Even if the interviewer suspects that a return to scoring is in some way influenced by a 'strategic' desire to influence the final ranks, they should not seek to restrict this.

- Instead – as in other stages of the MCM process – the task of the interviewer is to question the interviewee as to why they are making a particular input and document this as fully as possible for later analysis.

- Given the sensitive nature of this issue, explicit documentation of any impressions of such 'strategic behaviour' are best made by the interviewer in a separate document after the close of the interview.

12.6 Winding up the Weighting Process

The final objective of the weighting process is that the interviewee arrives at a final ranking picture, which satisfies them as a reasonable expression of their own particular view on the relative merits of the different options.

- The interviewer should make it clear that we realise that this will be limited by the nature and quality of the information that they have available at this particular moment.

- It should also be made clear that we realise that this simply represents a 'snapshot', and is subject to change with developments and further reflection over time.

The MCM interview should not be concluded until the interviewee is satisfied that they have arrived at this point.

- Typically, any significant reservation on this score can be addressed by returning to earlier stages in the appraisal.

- In the unlikely event that this is not judged to be the case, then the interviewer should be sure to make full notes on any qualifications or reservations expressed by the interviewee. If not subsequently resolved, these must be fully reflected in reporting.

12.7 The Role of the Interviewer in the Weighting Process

Typically, the interviewee will quickly take the initiative in guiding himself or herself through the weighting process. However, there are a number of roles that it is important that the interviewer also play.

First, it is important to listen carefully for qualifications or conditional statements relating to the values given to the weights. Clarify and note these under the note icon provided on the MCM software 'Assign Weights' page.

Second, it is crucial (as elsewhere in the MCM process) to **phrase all prompting as open-ended questions of clarification.**

Third, subject to the qualifications discussed above [#12.5], the interviewer should always be ready to prompt a return to an earlier stage in MCM process, if necessary in the light of some new issue.

13 WINDING UP THE INTERVIEW (10-20 minutes)

13.1 Closing the MCM Process

As emphasized above, the key task of the interviewer before closing the structured MCM process, is to confirm that the interviewee has arrived at a final ranking picture, which satisfies them as a reasonable expression of their own particular view on the performance of the different options, given the available information at that point in time.

13.2 Reflecting on the MCM Process

A second important task is to ask the interviewee for feedback on the nature of the MCM process.

- How reasonable does it seem as a way to elicit and explore their views?

- Were there any particular aspects that they especially liked or disliked?

13.3 Briefing on the Ongoing Process

- All MCM interviews take place in the context of a wider research or consultation exercise.
  - o This has already been discussed in the interview briefing package, but there may be further issues to discuss in the light of the MCM interview.

- It may be at this stage that issues arise over the final form of the analysis and publication, including questions of confidentiality or anonymity (see section 5.2).
  - o In this event, given the typically exhausted and time-constrained state of both parties – it is usually better to reassure the interviewee of the opportunities to finalise such issues at later stages in the process.

13.4 After the Interview

- If you are running an offline engagement:
  - o Ensure that all the engagement files have been saved to a dedicated sub-directory – one directory for each individual interview.
  - o Ensure that all the engagement files have also been saved to a removable back-up disk or USB chip.

- If you are running an online engagement, the data is saved on the web and therefore it should not need to be backed up.

- As soon as possible after the interview (for instance on the train home), the interviewer should make a point of taking supplementary notes in a separate file.
  - o These might concern reflective thoughts concerning their overall impressions of the interview.

- o They might elaborate on specific points that are touched on in the MCM notes, but which there was not time to elaborate in sufficient detail.

- o They might also concern issues (such as perceptions of 'strategic behaviour' – see section 12.5), whose sensitivity would have made it difficult to note in the presence of the interviewee.

- In addition to these supplementary notes, there is usually great value in the interviewer reviewing the notes made during the MCM interview and ensuring that they are sufficiently comprehensive and clear.

  - o The guideline here is to achieve a set of notes that will complement the interview recording (and, where taken, transcript) in enabling the interviewer confidently to answer key questions in the analysis, such as:

  - o "What did s/he mean by that?"

  - o "How does this criterion/option differ from that similar criterion/option?"

14 GUIDELINES FOR USING MCM REMOTELY

It is possible to use the MCM tool remotely, with the MCM interview conducted over the telephone, by Skype, Google Hangouts or by other teleconferencing tools.

It is important to be clear, however, that this practice is **not recommended**, since the lack of direct face-to-face interaction is likely to result in the loss of some important qualitative aspects of the interview. Unless stringent efforts are made to compensate for the loss of deliberation, the result would be a reduction to a kind of survey tool.

It is also important to note that MCM **does not at the moment support two users entering data at the same time. S**o if it is chosen to conduct MCM interviews remotely, it is important to ensure that participants understand that they cannot enter data themselves at the same time as the researcher. A remote interview therefore requires just one person (either interviewer or interviewee) to enter all the data.

A remote interview would most likely involve the interviewee remotely 'looking over the shoulder' of the interviewer, rather than being able to make entries themselves. Alternatively, it could be the interviewee who enters the data, with the interviewer looking on. Either way, the protocol has to be very clear in advance of the interview.

If an interview is undertaken remotely, then it is the responsibility of the researcher to set it up in such a way as to be as faithful as possible to the conditions in a face-to-face interview. Provision should be made to reduce (and compensate for) any the less rich experience of the interviewee when compared with a face-to-face interview. For instance, as much time as possible should be made for recording comments.

We will call participants using the tool in this way *remote interviewees*.

Additional Guidance for Researchers Doing Remote Interviews

Although not recommended, there can be circumstances where it is justifiable, with suitable reasons and preparation, to use the MCM tool with remote interviewees. Where such conditions apply, there are three main possible ways to do this.

14.1 Using a Remote Desktop Application

First, the MCM tool can be used with a remote desktop application (such as the 'show screen' function under 'options' in Google Hangouts) to allow participants to see the MCM interface as displayed on your computer.

An advantage of this approach is that remote interviewees can see the MCM tool being used in real time and see the scores and notes being added corresponding to their responses. A disadvantage is that this is reliant on a third party remote desktop application, which assumes the interviewee has sufficient IT skills to operate this software and that the remote location has a sufficiently good internet connection.

14.2 Using the Researcher MCM Account

Second, an MCM researcher can give the participants with whom they are collaborating their own login details, so that both researcher and remote interviewee can login and navigate the tool from within the same account. It is good practice to

change the password for the MCM account for the duration of the collaboration and to change it again for each subsequent collaboration. This limits the participants' access to project data to the period of their collaboration. They are of course free to set up their own trial account if they hold their own interest in trying the MCM tool.

It is important to be aware that for as long as the remote interviewee has the account details, they can access all parts of the tool, including any notes added during that period. To change the password for an MCM account, click on 'My Account' in the top right corner of the page and 'change password'. Add the new password, as below.
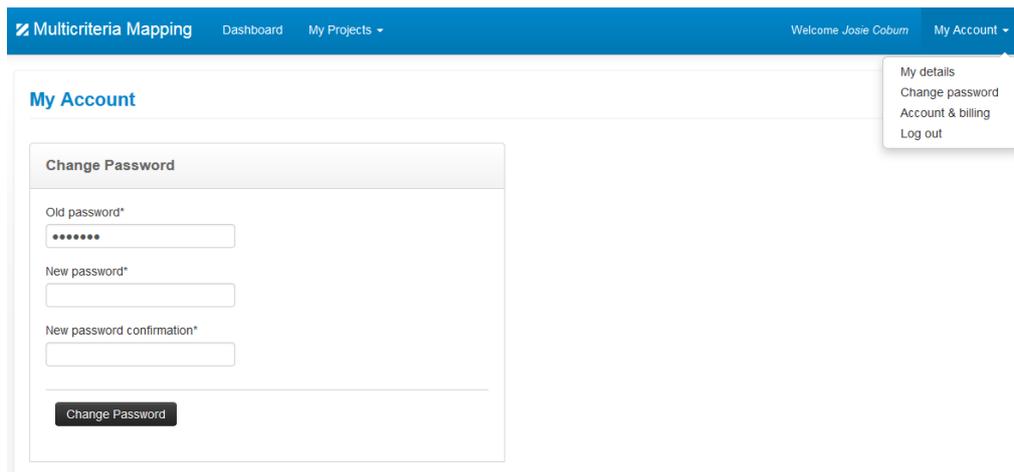
Figure 13: Changing your password in 'My Account'

An advantage of this approach is that it does not rely on a third party remote desktop application. A disadvantage of using MCM in this way is that data entered by one party (whether interviewee or interviewer) does not automatically refresh for the other party who is not entering data. If the MCM tool is used in this way, we recommend that the researcher operates the MCM software and enters data and the remote interviewee presses F5 to refresh the page periodically to see the data being added.

Additionally – and crucially – the MCM tool does not support two people entering data simultaneously. ***Data may be lost if an attempt is made to use it in this way***.

14.3 Using a Remote Interviewee MCM Account

Third, the researcher can set up a free MCM trial account for a remote interviewee and then add them to the MCM project. With the remote interviewee's consent, the researcher can set up a trial account using the remote interviewee's email address. Their login email address can then be used to add them as a remote interviewee. In this case, add the remote interviewee as a 'researcher' for the duration of the collaboration and then remove them once the collaboration has finished.

To add a researcher to a project, go into the project and click on 'Project Admin' in the top right corner of the page and then 'Manage Researchers' and enter the email address of the remote interviewee, as shown below.
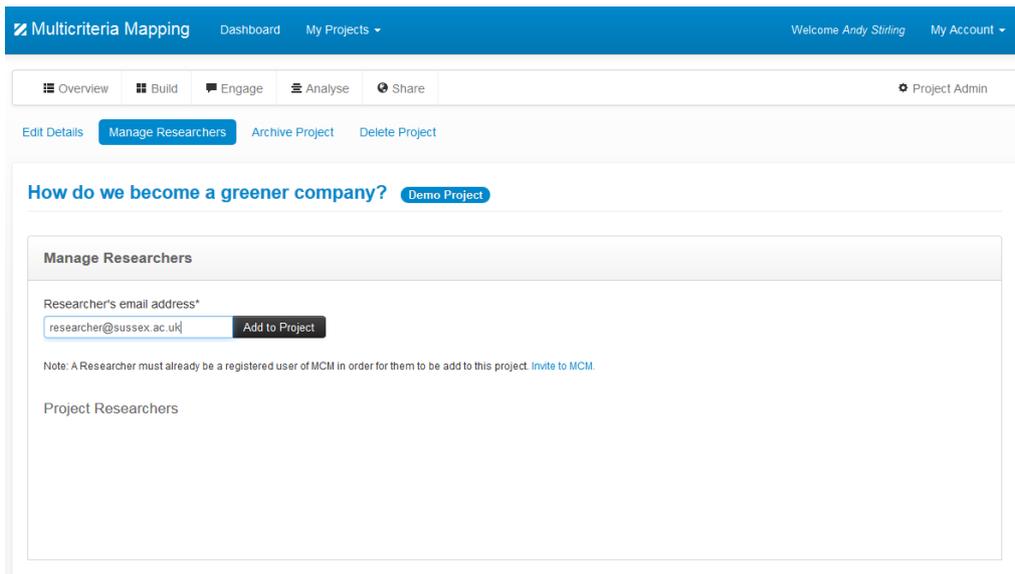
Figure 14: Adding a remote interviewee in 'Manage Researchers'

Once the remote interviewee has been added to the project, they will be listed as one of the Project Team on the Overview page of the project, as shown below.
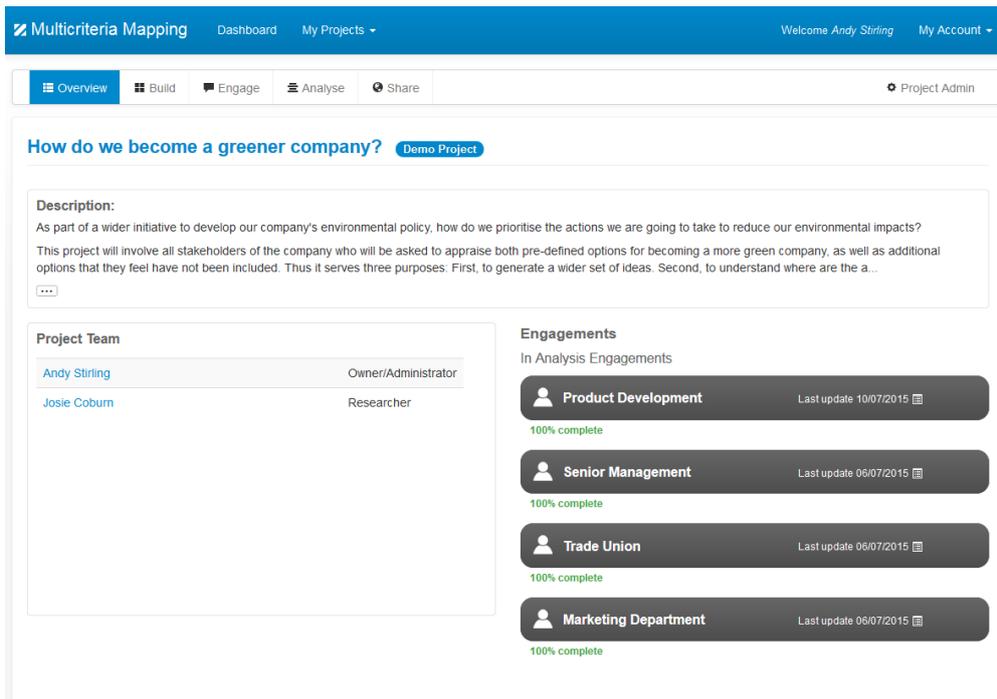
Figure 15: Viewing your remote interviewee as one of your project team

An advantage of this option is that the researcher can choose which parts of the project the remote interviewee can see from the Manage Researchers section of the project in Project Admin [#3.2]. From this page, the researcher can choose whether a remote interviewee can see other interviewees' engagements or not, and whether a remote

interviewee can see the Analyse and Share parts of the project or not by ticking and unticking simple check-boxes. These check-boxes update automatically.

A disadvantage of this option is that the engagement within the software belongs to the remote interviewee and if the researcher subsequently logs in on their own account, they will not be able to edit the engagement, for example to add additional notes. However, if the researcher logs back in as the interviewee, they can of course edit the engagement. This requires clearly confirming arrangements in advance.

If this option is used for remote interviewing, then once the remote interviewee has access to the MCM project, the researcher and the remote interviewee both need to login to MCM using the remote interviewee's login details so that the researcher can operate the MCM software on the remote interviewee's behalf.

As with other options for remote interviews, it is most likely best if the researcher enters the data. If the MCM tool is used in this way, then, the researcher needs to operate the MCM software and the remote interviewee needs to press F5 to refresh the page periodically to see the data being added. This is because the MCM tool does not refresh automatically for the remote interviewee who is not entering data.

Additionally – and crucially – the MCM tool does not support two people entering data simultaneously. ***Data may be lost if an attempt is made to use it in this way***.

14.4 Conducting the interview

Once the MCM tool has been set up in one of these three ways, proceed with the interview as per the instructions and guidance set out in this MCM Manual.

14.5 Potential Pitfalls

The MCM software tool does not support two users entering data at the same time. If the remote interviewee enters data such as scores or notes at the same time as the researcher, only one set of scores or notes will be saved.

14.6 Finally

The following pages provide a set of suggestions for instructions to send to remote interviewees to help them to get started with MCM.

Indicative Guidelines for Interviewees Using MCM Remotely

The MCM Process

You have agreed to take part in an MCM appraisal. MCM is an interactive, multicriteria appraisal method for exploring contrasting perspectives on complex, uncertain and contested issues. It aims to help 'open up' technical assessment by systematically 'mapping' the practical implications of alternative options, knowledges, framings and values.

There are some key underlying **MCM values**. The most crucial are as follows:

1. **Inclusion**: MCM aims to promote more inclusive, equitable and accessible appraisal. This means engaging in a respectful and balanced way, with a diversity of relevant **perspectives** – especially those most often marginalized.

2. **Opening Up**: MCM aims to help '**open up**' **appraisal**. This means giving balanced attention to exploring and illuminating contending views. Using MCM just to aggregate a single final view has the effect instead of '**closing down'**.

3. **Agency:** MCM aims to '*put **participants** in the driving seat*'. An MCM project should be designed, implemented and analysed to maximise the agency of participants over the ways in which their own perspectives are represented.

4. **Transparency:** MCM only '**opens up**', if results are conveyed fully and clearly to all parties with an interest in debates over the **focal goal**. Depending on context, this means publishing results and giving reasonable access to data.

MCM uniquely bridges qualitative and quantitative approaches, and enables more participatory analysis. It allows great flexibility, offering an appraisal method that is strongly grounded in theory but highly unconstrained in practice. This versatility has been reflected in its use internationally to explore contentious decisions in the fields of energy strategy, agricultural production, food safety, environmental policy, radioactive waste management and public health.

The MCM process consists of 5 steps, which will be explained in more detail in this manual:

select options > define criteria > assess scores > assign weights > review ranks

During the MCM interview, you will be asked to consider a range of options for achieving a focal goal according to a set of criteria. You will be given a list of core options but you can add to them if you wish to. You will develop your own set of criteria to use for evaluating the options and then assign optimistic and pessimistic scores to each criterion for each option. At each stage you will be asked to explain your reasons so that the researcher can make notes in the software accordingly. This captures qualitative details – for instance about uncertainties – which are often glossed over in quantitative appraisal methods. You will then be asked to assign weights to the criteria to reflect your overall priorities. This will be aided by a visual representation of the scores and weights to help you to remember the issues involved and see the implications for how options end up being ranked compared to each other.

The MCM process
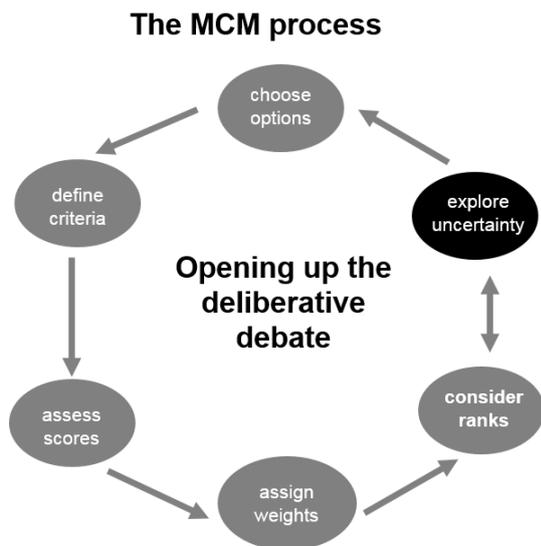
As shown in the diagram above, MCM is not a linear mechanical process, but *iterative, interactive* and *cyclical*. It is *iterative* because participants can move freely in any direction between each step. It is *interactive*, because this is governed by the participants' own interaction with the process. And it is *cyclical*, because the process as a whole can be freely repeated.

Accessing the MCM Tool

There are three ways of using the MCM tool as a remote interviewee.

First, the researcher with whom you are collaborating may ask you to use a Remote Desktop Application to enable you both to see the MCM tool remotely (such as the 'show screen' function under 'options' in Google Hangouts).

Second, the researcher with whom you are collaborating can send you their login details and you can both login and both navigate the tool from within the same account. To login to MCM, go to http://www.multicriteriamapping.com/ and click on 'Login/Register' in the top right corner. Enter the login username and password you've been given and click 'Log in', as shown below.
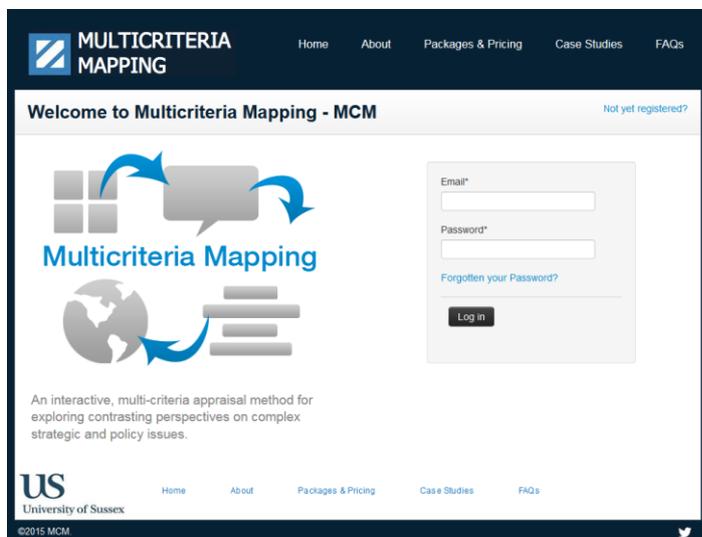
The third option is to set up your own free MCM trial account so that the researcher with whom you are collaborating can add you to their MCM project. The researcher will need your login details (email and password) to add you as a remote interviewee and then conduct the remote interview with you.

To register on the MCM tool for your free MCM trial account, go to https://app.multicriteriamapping.com/accounts/register/, fill in your details, and click 'Register', as shown below.

Once registered, you need to send your email address to the researcher with whom you are collaborating so that they can add you to their project. Once they have added you, you will see their project as one of the projects listed on your Dashboard page, as shown below.

Setting up an Online Engagement

To get started, click on the project you are participating in and click on 'Engage' in the top menu. You can participate in an MCM engagement either online or offline. To start a new online engagement, click on 'Start new Online Engagement'.

Fill in your name and click on 'Create Engagement', as shown below.

Setting up an Offline Engagement

Please see the more detailed MCM Manual for how to set up and participate in an offline engagement.

Doing an MCM Engagement

The MCM Manual is comprehensive and it contains a great deal of detail about how to complete an MCM engagement. You are very welcome to read it and it may be helpful to be familiar with the process. However, you should not need to read the

manual. The software itself provides easy pop-up help boxes at each stage of the process and the researcher will be available remotely to guide you through.

Potential Pitfalls

During the interview, it is extremely important that you allow the researcher to operate the software tool. The MCM software tool **<u>does not support two users entering data at the same time</u>**. If two users try to enter data at the same time, one set of data will not be saved. So, if you choose to take part in an MCM interview remotely, you must allow the researcher to operate the software. If you are logged into MCM rather than using a remote desktop application, you can view what they are entering at any time by pressing F5 to refresh your browser.

15 PREPARING AND LOADING DATA FOR MCM ANALYSIS

15.1 Introduction

It is a fundamental principle of MCM analysis, that qualitative and quantitative data are considered together, such that the interpretation of each is mutually informed by the other. Either type of data may be generated within the MCM session itself, or may originate from external sources. Both types of data have a crucial role to play in MCM analysis and the forming of final conclusions. Each will be described in turn in the following sections. A summary of the preparation and loading process is provided at the end [#15.9]).

15.2 Qualitative MCM Data

For the purposes of MCM analysis, *qualitative MCM data* comprises three main forms:

- The *names* and *definitions* developed by the research team for the 'predefined options' – standard options that are made available for appraisal by all participants. Predefined options include both the 'core options' (that all participants appraise) and the 'discretionary options' (for which appraisal is optional). These will be the same for all participants.
- Deliberate statements made by participants during the elicitation process and recorded by the interviewer or facilitator as text *notes* in the MCM software. These concern perspectives on the names and definitions of predefined options, the

development of additional options, the characterising of criteria, the assumptions underlying scoring and weighting, and the reactions to the emerging picture. Notes will be different for different participants.

- Audio *recordings* of verbal discussions during MCM sessions. It is recommended that these later be transcribed verbatim as text *transcripts*, one for each MCM session.

It is important to note that the software implicitly assumes that interviewee enters the data. Therefore, it is useful to adopt a convention to distinguish notes made by the interviewer, either during the interview or afterwards, by putting these notes in square brackets. This highlights the difference between notes added by the interviewee or interviewer, and also provides a basis for searching through the notes at a later date.

15.3 Quantitative MCM Data

The quantitative *MCM data* elicited and structured using the MCM software takes four main forms, all of which are recorded in the software in collaboration with the participant within the MCM session itself.

- Numerical values for pessimistic and optimistic *scores* for individual options under particular criteria.
- The intervals between these pessimistic and optimistic scores constitute the *uncertainties* associated with individual options under particular criteria. (These are implicit in the scores).
- The *weights* attached by each participant to each of their criteria, as a reflection of the relative priority that they attach to different issues.
- The *ranks* that are computed within the MCM software to express the overall performance of each option under all criteria taken together.

An additional quantitative datum that is sometimes collected, is in cases where more than one *principle* is identified. This is the *importance order* of different principles.

15.4 External Data

In addition, there exist a series of other potentially significant sources of *external data*, which (though drawn from outside the MCM process itself), may nonetheless bear directly on the interpretation of the MCM appraisals conducted by an individual participant. With care, these external data may also be used to clarify or substantiate different aspects of the appraisal. Wherever such external data are referred to in analysis, they should be clearly distinguished from information elicited in the MCM process itself and the source rigorously documented.

- Any incidental *communications* produced by participants during, or in association with, the elicitation process. These may include informal notes that may have been made during the MCM session but not entered in the software, or letters, emails or telephone conversations conducted with the researchers during scoping or follow-up.
- Additional *documents* that are produced, or referred to, by participants themselves as contributing to the substantiation of any aspect of their MCM appraisal, including informal.

- Any *memos* made by the MCM interviewers or analysts either during or immediately following the MCM session – or during subsequent analysis – concerning the appraisal of a particular participant or perspective.
- Other *materials* produced by the participants themselves, by members of similar perspectives (who may not have undertaken an MCM appraisal), or by commentators on the debate in question. Suitably qualified, these may be relevant to MCM analysis if they help clarify or elaborate aspects of the appraisals of MCM participants.

Some of these external data may take a quantitative form. However, this will in no event be directly compatible with, or substitutable for, the forms of quantitative data elicited and structured using the MCM software tool itself.

15.5 Preparing the Qualitative Data

Qualitative MCM data in the form of names, definitions and notes will be automatically loaded into the Analysis section of the MCM software alongside the quantitative MCM data without the need for further preparation when you synchronise the data (see section 15.9 below).

Additional qualitative data from recordings or transcripts and from relevant external sources can be loaded into the MCM software by cutting and pasting narrative statements and inserting them as notes in the relevant notes boxes in the engagement. As suggested above (section 15.2), it is useful to adopt the convention of putting notes in square brackets if they are entered by the interviewer or analyst rather than the interviewee.

As discussed in Section 15.4 above, there are many possible sources of notes. However, far and away the most important source is the transcript of the MCM session itself. In order to familiarize the analyst with the nature of the raw material with which they are dealing, it is vital that every transcript be read carefully in advance of the analysis. During the reading of these transcripts, the analyst should highlight passages in the transcript where the participant makes statements that seem likely to be relevant to the later interpretation of analysis. Ideally each individual person who is to be involved in the analysis should go through this process for each transcript.

The relevance of the notes that are highlighted in this way take a number of forms. There is no definitive way to categorise the precise manner of this relevance. As with other aspects of the analysis, the judgement of the analyst will be crucial. However, it is possible to anticipate some of the most likely forms of this relevance:

- Notes may reveal pre-conceptions or assumptions concerning the likely performance of different options or the attributes of different criteria.
- Notes may reveal the meanings or definitions that people give to the options or the criteria.
- Notes may reveal more detailed reasons why particular values have been assigned to scores, uncertainties or weights.
- Notes may express interesting comments concerning the relationship between criteria or options.
- Notes may record salient responses to the picture emerging as the MCM process unfolds.

- Notes may indicate the general disposition or perspective of the participant in question, or their expectations of other participants.
- Notes may report reactions to the structure of the MCM process itself.

The analyst should feel free to highlight in the transcript as many of these notes as they wish. It is better to err on the side of being comprehensive. As a very rough rule of thumb, between ten and twenty five such notes might be expected to be highlighted in each transcript.

15.6 Entering Notes

Notes that have been prepared as described in Section 15.5 above can be typed, or copied and pasted, directly into the relevant notes text box within an engagement. These notes text boxes take three forms, each relating to a different way in which qualitative and external data may help illuminate the MCM analysis. In each case, the passage of text which constitutes the note in question is simply typed, or copied and pasted, into the relevant notes text box.

First, notes may be relevant to the interpretation of particular criteria. The text box for notes on criteria may be found on the right hand side of the 'Define Criteria' stage of an engagement. Click on the relevant criterion and then add the relevant note in the notes text box. Remember to save all notes as you add them.

Second, notes may contain reflections on the nature of individual options. The text box for notes on options may be found on the right hand side of the 'Review Options' stage of an engagement. Click on the relevant option and then add the corresponding note.

Third, notes may relate very specifically to the appraisal of particular options under particular criteria. Text boxes for notes on options under particular criteria may be found in the relevant section of the 'Assess scores' stage of the engagement.

Notes may be very brief, or they may involve quite extensive passages of text. The relevant notes are displayed automatically in the reports generated during MCM Analysis [#21].

15.7 Uploading engagements (optional)

If engagements have been conducted using the offline MCM software tool, they must be uploaded to the online version of the MCM tool to be able to analyse the data.

To upload an offline engagement, click on 'Upload Offline Engagement' in the Engage section of the MCM software, as illustrated in Figure 16.

15.8 Moving engagements to Analysis

When all of the necessary data has been entered and an engagement has been completed, the analyst can move the engagement to Analysis by clicking on the grey arrow next to the engagement, as shown in Figure 16. The engagement will be moved from the left column to the right column. Engagements must be moved to analysis so that they can be analysed in the Analyse section of the MCM software.
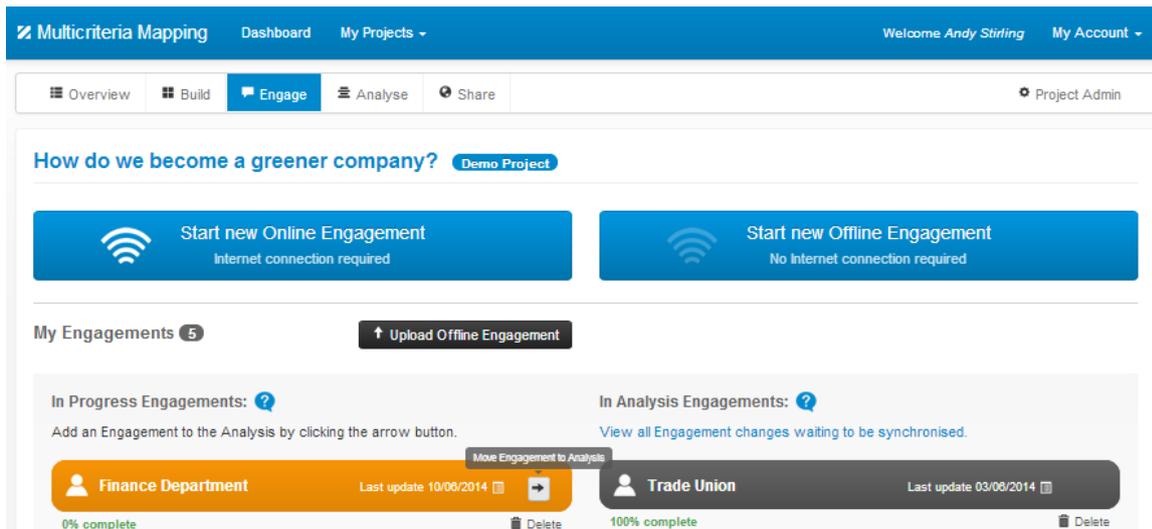
Figure 16: Moving engagements to Analysis

It is important to note that engagements must be 100% complete to be included in MCM Analysis. Engagements are shown as 100% complete when a score has been entered for all core options according to all criteria defined by the interviewee.

Researchers can still open and edit an engagement when it has been moved to Analysis if they need to enter missing scores or add additional notes.

15.9 Summary of Procedure for Preparing and Loading Data

The procedure for preparing and loading data discussed in this section can be summarized as a series of eight steps.

1. Check that all qualitative MCM Data is correctly recorded in MCM engagements (**names** and **definitions** for predefined options, **notes** on additional options, criteria, scores or weights) [#15.2].

2. Check that **transcripts** have been prepared, as appropriate, from the audio **recordings** of MCM sessions [#15.2].

3. Check that all quantitative MCM Data is correctly recorded in MCM engagements (pessimistic and optimistic **scores** and **weights**) [#15.3].

4. Assemble appropriate forms of external data (**communications** or **documents** relating to particular participants, **memos** made by MCM analysts, or other **materials** reflecting relevant perspectives) [#15.4].

5. Identify in transcripts and external data any relevant notes for inclusion in the MCM analysis [#15.5].

6. Enter notes [#15.6].

7. Upload offline engagement (optional) [#15.7].

8. Move engagement(s) to Analysis [#15.8].

When these steps are complete, you are ready to undertake an MCM analysis session.

16 SETTING UP AN MCM ANALYSIS SESSION

16.1 Open the MCM software

An MCM analysis session can be run from a web browser (like Google Chrome, Microsoft Internet Explorer, Mozilla Firefox or Apple Safari).

Start up the web browser. Go to the MCM website and log in to your account. Go to the 'Analyse' section.
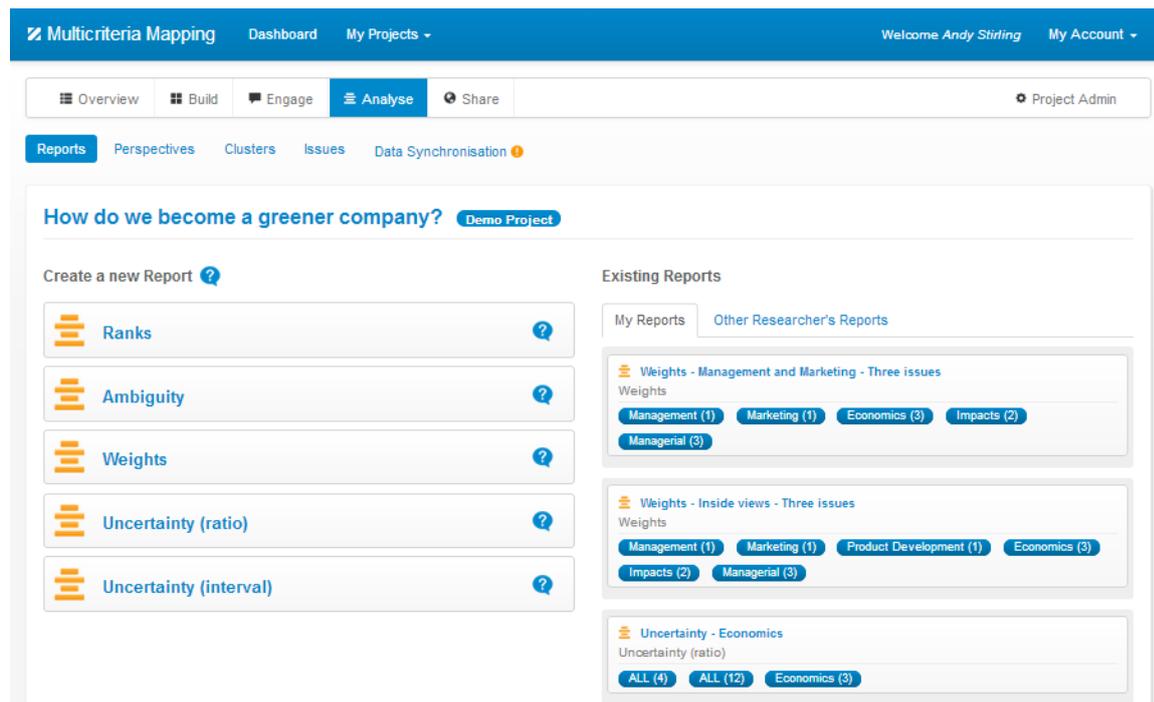
Figure 17: The Analyse section of the MCM software

16.2 Update the data to be used in the Analysis

To be able to analyse the data, the analyst must ensure that completed MCM engagements are synchronised. This is the stage in which all the quantitative and qualitative data contained in the individual MCM engagements is loaded into the Analyse section of the MCM software.

To synchronise data, click on the 'Data Synchronisation' link at the top of the Analyse page in the MCM software, as shown below. If the data has not been synchronized, there will be an orange exclamation mark to remind the analyst to synchronise. This will disappear once the data has been synchronised.

Figure 18: Menu options within the Analysis section, including Data Synchronisation

At any stage in the analysis, the data used in the Analyse section of the MCM software can be updated with any new engagements. The data should also be updated before each analysis session. To do this, click on the 'Data Synchronisation' link at the top of the Analyse section.

17 THE ELEMENTS OF MCM ANALYSIS

17.1 Aims

The basic aims in MCM analysis are to explore different possible pictures of the results obtained in an MCM appraisal [#1.2]. These have two kinds of value.

- The first is as a direct way of informing policy debates or practical decision making by revealing the patterns in the **performance** of the different types of option under different types of perspective or conditions.

- The second is as less direct, but no less valuable, background 'understanding' concerning the particular **reasons** why specific types of option tend to be viewed relatively favourably or unfavourably under different types of perspective or conditions. This involves a rich body of qualitative and quantitative information concerning the nature of the relevant criteria, options, scores, uncertainties and weights associated with different perspectives.

17.2 Grouping Participants, Options and Criteria

The means by which these two basic tasks can best be realised, is by freely experimenting with different ways of **grouping** the various types of data collected in MCM, and critically viewing the kind of picture that emerges. There are three main kinds of groupings.

- Groupings of the different types of **participant** that have been involved in the appraisal. These are termed '**perspectives**'.

- Groupings of the different types of **options** that have been appraised by participants. These are termed '**clusters**'.

- Groupings of the different types of **criteria** used by participants to appraise the options. These are termed '**issues**'.

17.3 The Consequences of Different Groupings

Depending on the way in which participants, options or criteria are grouped, different patterns may emerge in various key types of data.

- Different perspectives may display contrasting patterns:
  - in the ranks, scores or uncertainties associated with different clusters, or
  - in the scores, uncertainties or weights assigned under different issues.

- Different clusters may display contrasting patterns:
  - in the ranks, scores or uncertainties assigned under different perspectives, or

- in the scores, uncertainties or weights assigned under different issues.

- Different issues may display contrasting patterns:
    - in the ranks, scores or uncertainties assigned under different perspectives, or
    - in the ranks, scores or uncertainties associated with different clusters.

17.4 Informing the Grouping of Data

There are two main ways in which the MCM analysis can be used to include or exclude participants in perspectives, options in clusters or criteria in issues.

- The first is on the basis of 'external categories' (categories drawn from outside the analysis itself). These may have been developed prior to the analysis – as is the case, for instance, in the recruiting of a reasonable array of participants to a particular MCM exercise, or in the selection and definition of core and discretionary options in advance of the appraisal.

    External categories may also be conceived as the analysis proceeds, on the basis of intuition or independent bodies of research or information that become available.

- The second type of grounds for grouping participants, options or criteria, is on the basis of 'internal categories' (categories drawn from inside the analysis itself). These may be informed, for instance, by observing the way in which a group of participants tends consistently to develop similar types of criteria, or different options tend to display certain types of feature, or different criteria tend to share specific kinds of attribute in common.

    Internal categories may also be informed by emerging patterns in other types of data, such as the scores, uncertainties, weights or ranks.

In practice, MCM analysis will typically iterate between the use of external and internal categories as a basis for developing different possible groupings of participants, options and criteria. The important thing to remember is that there can be no 'objective' or 'definitive' way of defining perspectives, clusters or issues.

The value of different ways of defining such groupings, lies entirely in the light that they cast either on the *performance* of the options themselves, or the *reasons* for this picture of performance.

17.5 The Main Stages in the Analysis

MCM Analysis essentially revolves around an iteration between the grouping of data, and the representation of the resulting patterns. The main stages in the conduct of MCM analysis are described in detail in Section 0 of this Manual – after more detailed discussion of the individual elements of the analysis in Sections 18 - 0.

However, by way of introduction to the sections that follow, the following offers a simplified guide to the general process.

- Become familiar with the material

- Take an early look at the grouping of data

- Explore the consequences of different assumptions

- Keep a complete and systematic record

- Form and test explicit hypotheses

- Investigate detailed features

- Check the qualitative data for different groupings using reports

- Take a measured and cautious approach to representing findings

- Involve participants in reviewing interim results

In order to keep track of the overall picture when reading through the detailed discussion that follows, it may be useful to bear this relatively simple series of basic stages in mind.

Although the analysis part of this MCM Manual provides sufficient detail to carry out an MCM analysis, we hope to improve these sections to further help researchers carrying out MCM projects. We would welcome your input and feedback to help this process. Please email us.

18 DEFINING PERSPECTIVES

18.1 Creating Perspectives

A *perspective* is a grouping of *participants*. Create a perspective by filling in a suitable short name in the text box on the left side of the page and clicking 'Create', as shown below. Analysts can create any number of perspectives.
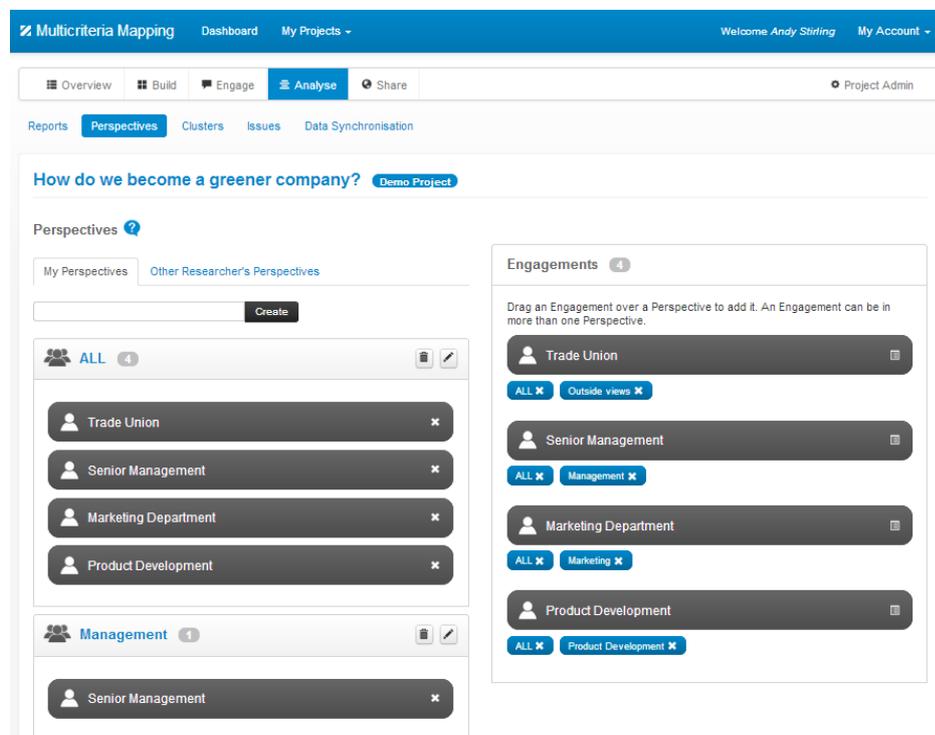
Figure 19: Creating perspectives

18.2 Editing Perspectives

The name of the *perspective* can be edited at any time by clicking on the pencil icon and entering new text in the text box. This will change the specification for the perspectives in question, without altering the way in which participants are assigned to perspectives. Editing like this is a useful way to refine the definitions or labeling given to established perspectives.

If the editing will change the definition of the perspective in such a way that some of the assignments of participants are no longer valid, then it is better to first delete the perspective in question and create a new one [#18.3].

18.3 Deleting Perspectives

A *perspective* can be deleted by clicking on the rubbish bin icon next to the perspective.

18.4 Assigning Participants to Perspectives

To assign *participants* to *perspectives*, click on the relevant engagement and then drag the engagement to the desired perspective using the mouse.

18.5 Deleting Assignments of Participants to Perspectives

Click on the 'x' next to the participant to delete them from a perspective.

18.6 Experimenting with Different Perspective Schemes

MCM analysis requires that a variety of different schemes of *perspectives* are experimented with. The analyst can create as many perspectives as are needed during analysis and engagements can be added to multiple perspectives. Perspectives need to be labelled in such a way as to help the analyst to manage this process and the analyst may wish to make additional notes to remind themselves of the evolving perspective schemes.

19 DEFINING ISSUES

19.1 Creating Issues

An *issue* is a grouping of criteria. Create an issue by filling in a suitable short name in the text box on the left side of the page and clicking 'Create', as shown below. Analysts can create any number of issues.
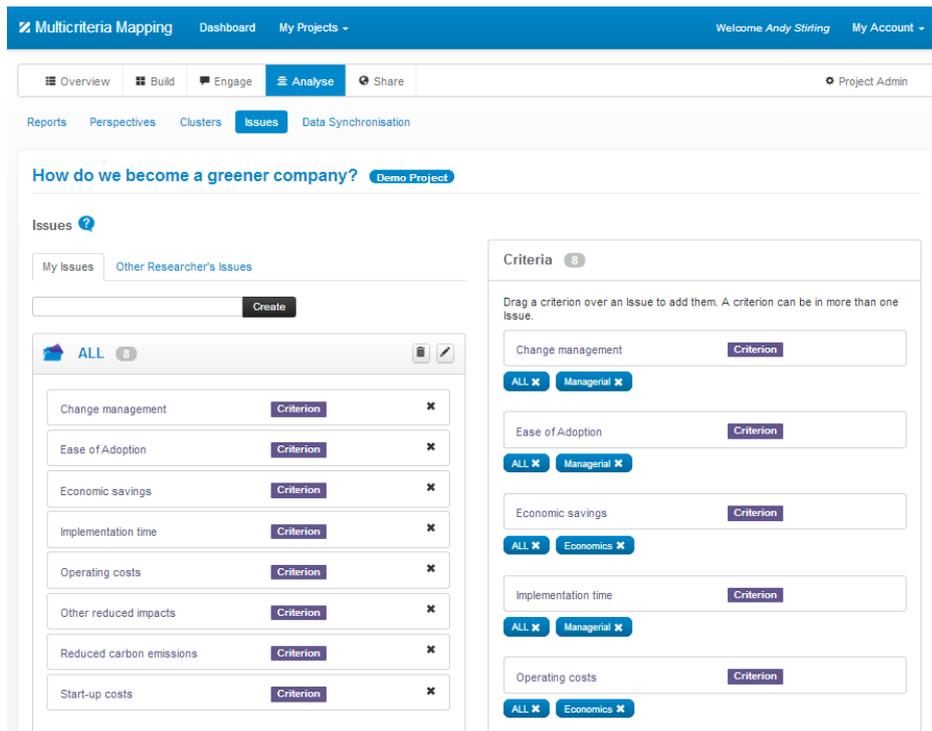
Figure 20: Creating Issues

19.2 Editing Issues

The name of the *issue* can be edited at any time by clicking on the pencil icon and entering new text in the text box. This will change the specification for the issue in question, without altering the way in which criteria are assigned to issues. Editing like this is a useful way to refine the definitions or labeling given to established issues.

If the editing will change the definition of the issue in such a way that some of the assignments of criteria are no longer valid, then it is better to first delete the issue in question and create a new one [#19.3].

19.3 Deleting Issues

An *issue* can be deleted by clicking on the rubbish bin icon next to the issue.

19.4 Assigning Criteria to Issues

To assign *criteria* to *issues*, click on the relevant criterion and then drag the criterion to the desired issue using the mouse.

19.5 Deleting Assignments of Criteria to Issues

Click on the 'x' next to the criterion to delete it from an issue.

19.6 Experimenting with Different Issue Schemes

MCM analysis requires that a variety of different schemes of *issues* are experimented with. The analyst can create as many issues as are needed during analysis and criteria can be added to multiple issues. Issues need to be labelled in such a way as to help the analyst to manage this process and the analyst may wish to make additional notes to remind themselves of the evolving issue schemes.

20 DEFINING CLUSTERS

20.1 Creating Clusters

A *cluster* is a grouping of *options*. Create a cluster by filling in a suitable short name in the text box on the left side of the page and clicking 'Create', as shown below. Analysts can create any number of clusters.
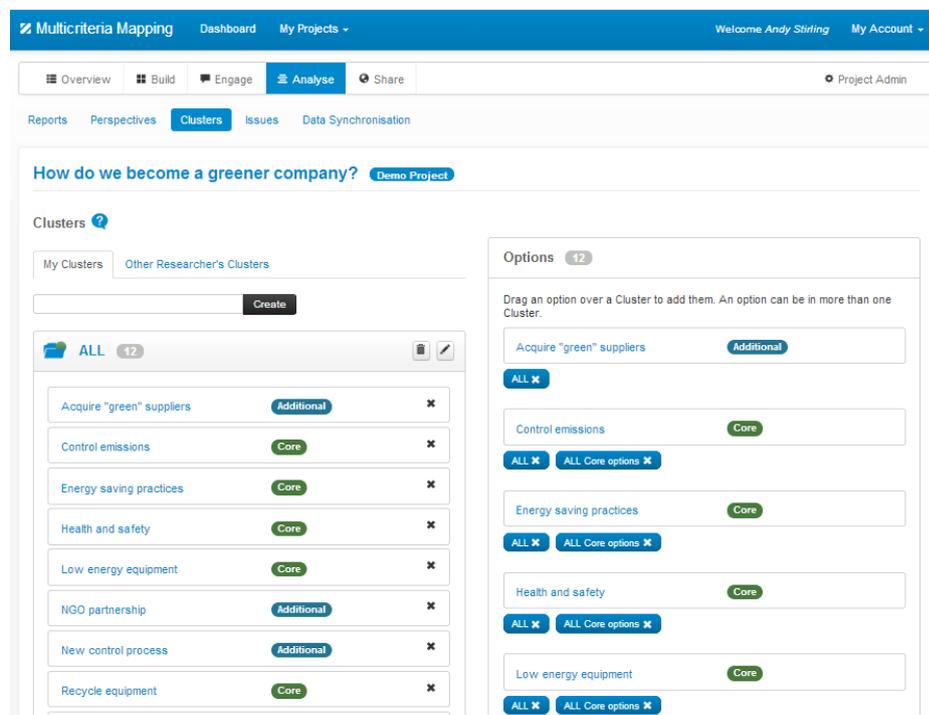

Figure 21: Creating clusters

20.2 Editing Clusters

The name of the *cluster* can be edited at any time by clicking on the pencil icon and entering new text in the text box. This will change the specification for the cluster in question, without altering the way in which options are assigned to clusters. Editing like this is a useful way to refine the definitions or labeling given to established clusters.

If the editing will change the definition of the cluster in such a way that some of the assignments of options are no longer valid, then it is better to first delete the cluster in question and create a new one [#20.3].

20.3 Deleting Clusters

A *cluster* can be deleted by clicking on the rubbish bin icon next to the cluster.

20.4 Assigning Options to Clusters

To assign *options* to *clusters*, click on the relevant option and then drag the option to the desired cluster using the mouse.

20.5 Deleting Assignments of Options to Clusters

Click on the 'x' next to the option to delete it from a cluster.

20.6 Experimenting with Different Cluster Schemes

MCM analysis requires that a variety of different schemes of *clusters* are experimented with. The analyst can create as many clusters as are needed during analysis and engagements can be added to multiple clusters. Clusters need to be labelled in such a way as to help the analyst to manage this process and the analyst may wish to make additional notes to remind themselves of the evolving cluster schemes.

21 GENERATING AND USING REPORTS AND CHARTS

21.1 Introduction

Reports contain charts and text.

The text provides the main means by which the analysis team can study the way in which features of the qualitative data change with different ways of grouping *participants* in *perspectives*, *options* in *clusters* and *criteria* in *issues*. The text should be used in an iterative fashion to check the consequences of different groupings and to inform hypotheses concerning other possible groupings. Text for any particular grouping should be interpreted in conjunction with the corresponding charts for that grouping (see Sections 22 - 28).

Charts provide the main means by which the analysis team can study the way that patterns in the quantitative data change with different ways of grouping participants, options and criteria. They should be used in an iterative fashion to check the consequences of different groupings and to inform hypotheses concerning other possible groupings. Charts for any particular grouping should only be interpreted in conjunction with the corresponding text for that grouping.

21.2 Preparing Data for Reporting

In order to ensure that a report contains all relevant data, it is important to ensure that the following tasks have been completed in the Analysis section of the MCM software

- all participants should be assigned to perspectives [#18].
- all criteria should be assigned to issues [#19].
- all options should be assigned to clusters [#20].

21.3 Generating Reports
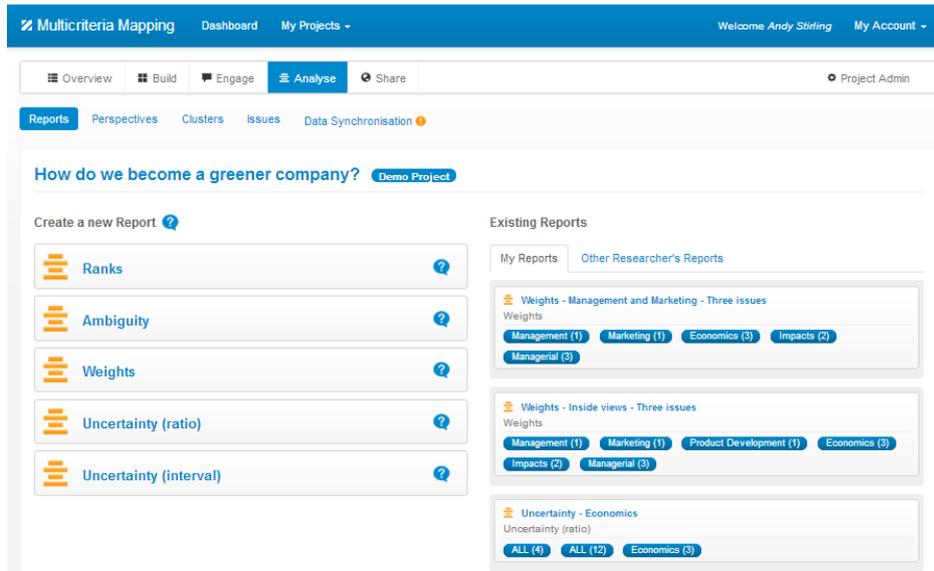
Figure 22: MCM Reports

Choose which type of report to generate from the list on the left hand side of the Reports page, as shown above.

Once created, all reports will be listed on the right hand panel of the Reports page, also shown above. A report can be displayed at any time by choosing the report from the list on the right hand side.
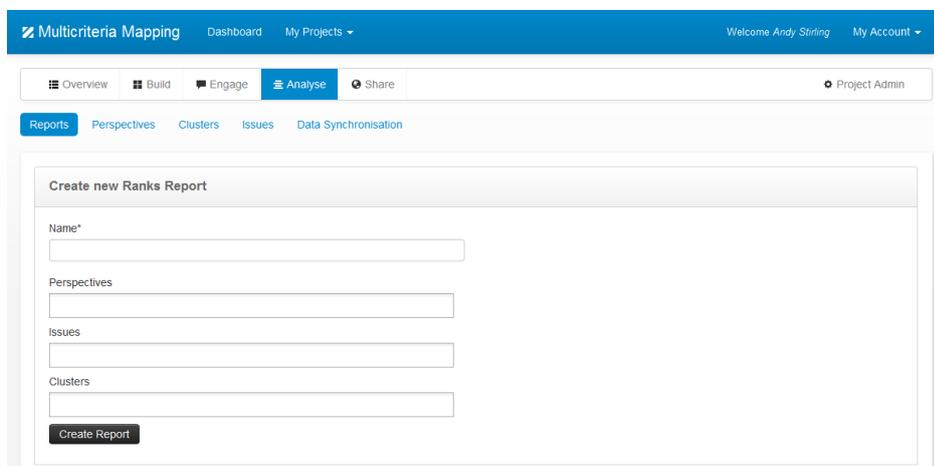
Figure 23: Creating a new Ranks report

To view a report containing all of the qualitative data for all of the engagements, choose to create a Ranks chart, include all perspectives and issues, and click on 'Create Report. A chart will appear at the top of the page with all of the associated qualitative data listed below.
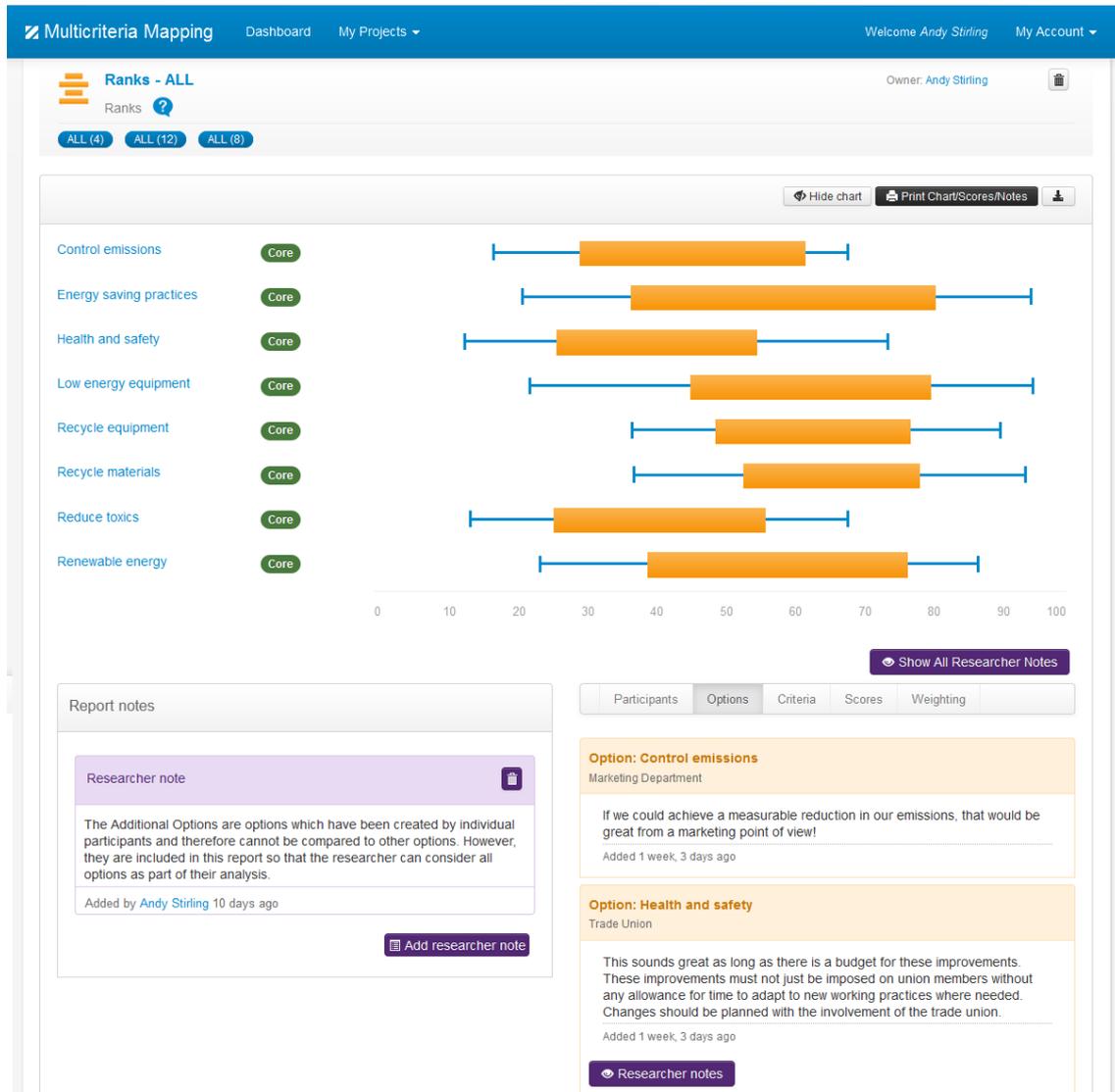
Figure 24: A Ranks Report consisting of a chart with qualitative data listed below (this report would normally display a long list of qualitative data but for illustrative purposes only one set of notes for a particular set of scores is shown).

21.4 Selecting a Perspective for Reporting

To display a qualitative data report for a particular perspective, choose a Ranks chart, choose the relevant perspective, and all issues, and create the report.

If reports are required on individual participants, or on all participants taken together, then new perspectives can be defined accordingly [#18].

21.5 Using a Report

By defining perspectives, issues and clusters in appropriate ways, reports can be used to group together all relevant data in a potentially powerful fashion.

- All comments relating to a particular criterion can be found grouped together under this criterion, alongside parallel comments made on related criteria within the same issue.
- All comments relating to a particular option can be found grouped together under this option, alongside parallel comments made on related options within the same cluster. This includes notes and on the option itself and notes on the scoring under different criteria.
- By defining perspectives appropriately, this data can be viewed for individual participants, or for all participants taken together.

In this way, valuable information may be quickly assembled in order to inform the process of grouping participants into perspectives [#18], criteria into issues [#19] and options into clusters [#20].

21.6 Saving a Report

Reports are automatically saved within the MCM software and listed on the right hand side of the Reports page. To display a report, click on the report on the right hand side.

To save a report outside the MCM software, click on 'Print Chart/Scores/Notes' at the top of the report and choose 'Save page as…' to save the page that is generated. This page includes the chart and the associated qualitative data. Alternatively, the entire text can be cut and pasted into a word processing file (like Microsoft Word).

This is done as follows:

1. Press ctrl + a to 'select all' page content
2. Go to the menu for the page and click 'Copy'
3. Open a new word processing file
4. Paste the selected text into the word processing file

This file can then be named and annotated to record the nature of the particular groupings involved, the role in the analysis process, and any interpretive observations that emerge.

21.7 Refreshing Reports with New Data

At any stage in the analysis, the data in any of the reports can be refreshed with any relevant new features that may have been entered in the engagement. To do this, ensure that the data has been synchronised [#16.2], create a new report [#21.3] and give it a name to help identify the point in the analysis when the report was created, e.g. 'Ranks report after John Smith engagement was added'.

If scores or notes are edited within an engagement, or if an engagement is deleted, the reports will refresh automatically once the data has been synchronized. If entire

new engagements are added, on the other hand, they will need to be added to the relevant perspectives, issues and clusters before they appear in a report.

To keep track of the iterative MCM analysis process, it is useful to save reports [#21.6] before and after the changes.

21.8 Storing and Comparing Charts using Archive Files

In order to compare results obtained for different participants, perspectives, issues or clusters, charts can be copied and pasted to a separate archive file.

- This file should be given a name and annotated to clearly document the exact definitions for the perspectives, clusters or issues involved.
- Charts may be exported to Microsoft Word or Powerpoint files, but Powerpoint is likely to be more flexible as an archive.
- The resulting archive files allow detailed comparative analysis of results under different schemes of perspectives, issues and clusters and for a source for subsequent reports and presentations.
- To ease management of charts, put one chart on each slide of a Powerpoint file.

Figure 25: An example of a Powerpoint archive file for comparing charts

- Order sequence, compare and print charts using the < View > Slide Sorter > commands on Powerpoint toolbar.
- It is likely that the easiest way to conduct visual comparisons between associated charts will be to print out these archive files with one chart per sheet. This allows the charts to be easily grouped and examined using a large desk space.

21.9 Downloading chart data

Chart data can also be downloaded as a csv file by clicking on the button at the top right hand side of the chart.

Figure 26: Downloading chart data in csv format.

21.10 Formatting Charts in Excel

It will often be the case that a number of charts are produced according to the same format (e.g.: a series of ranking charts for different perspectives, with all options in the same order). Where each chart needs to be formatted in the same way, this may be easier to do in an Excel spreadsheet (where only the source chart needs to be formatted), than in a powerpoint file (where each copy would need to be formatted separately).

One typical example where formatting of the chart in an Excel spreadsheet may be useful, is in the colour-coding of options in ranking, uncertainty or scoring charts, in order to represent different clusters. Here the individual 'bars' in the chart may each be coloured, and other editing changes achieved, using the 'drawing' menu provided in Excel. This general editing of charts is well covered in the Excel 'help' facility and so is not elaborated here. If there are any doubts, the advice must be to avoid making any changes to the charts in a spreadsheet that cannot be restored easily!

22 DISPLAYING RANKS FOR AN INDIVIDUAL PARTICIPANT

22.1 Overview

This report begins with the simplest of charts, showing the overall *ranks* obtained by the selected participant for each of the *options* that they assessed, taking account of all the *criteria* that they thought relevant.

The picture in this chart is the same as the one produced at the end of the 'assign weights phase in the 'engage' stage of the MCM project.

Below the chart are displayed all the associated notes, ordered by tabs for notes respectively on 'participants', 'options', 'criteria', 'scores' and 'weighting'.

22.2 Selecting a Participant to Display

Create a perspective containing only the relevant participant [#18].

To create a report for the selected participant, go to the Report section and select Ranks. Select the perspective you created for the single participant and select all issues. Remember to name the report appropriately to help in further analysis.

Create a Ranks report for that participant by clicking 'Create Report'.

22.3 Interpreting the 'Ranks for Participant' Chart

An example of a 'ranks for participant' chart is shown below.
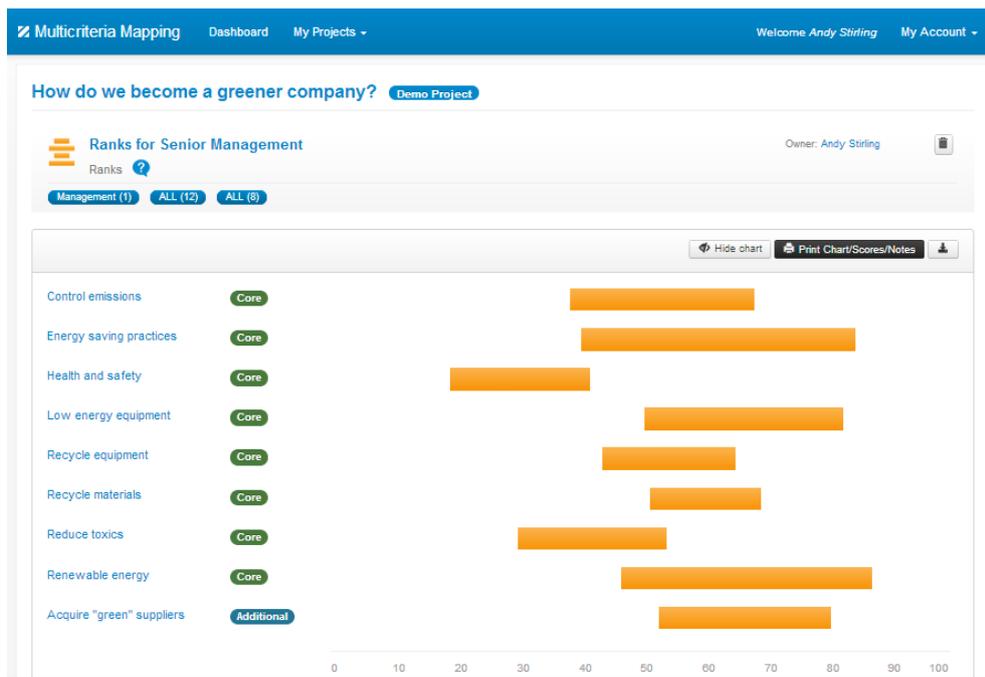
Figure 27: A ranks chart for one participant.

On the vertical axis, the chart displays all the 'predefined options' that were defined for use by all participants in the MCM exercise, as well as any 'additional options' that were defined by this individual participant alone.

- The options are displayed in the sequence determined when the options were defined [#9]
- Options are labelled as 'Core', 'Discretionary', or 'Additional'
- If an option was not appraised during the MCM process, there will be no data displayed for that option.
- The following notation: ⊘ at the front of an option name indicates that this option was ruled out by this participant under at least one principle.

On the horizontal axis, the chart displays an arbitrary scale from 0 to 100 expressing the ranks assessed for each option by the participant in question.

- Higher values indicate higher performance.

The coloured bars in the chart indicate the ranks assessed for each option by the participant in question.

- The left hand end of the bar indicates the rank assessed under the most pessimistic assumptions.
- The right hand end of the bar indicates the rank assessed under the most optimistic assumptions.
- The length of the bar indicates the degree of uncertainty or variability associated with the ranking of each option.

The simple arithmetic behind the calculation of ranks from weights and normalized scores is explained in ANNEX X - EQUATIONS. Put simply, a rank is the sum of the weighted scores.

22.4 Refreshing the Data Used in the 'Ranks for Participant' Chart

At any stage in the analysis, the data can be refreshed by following the procedure described in Section 21.7.

23 DISPLAYING RANKS FOR A SELECTED PERSPECTIVE

23.1 Overview

This report begins with a chart showing the overall *ranks* for all *core options* assessed by *participants* included in the definition of this *perspective*. This gives a sense of the overall positions on different options across this perspective.

Below the chart are displayed all the associated notes, ordered by tabs for notes respectively on 'participants', 'options', 'criteria', 'scores' and 'weighting'.

23.2 Selecting a Perspective to Display

Go to Report, select Ranks report and choose a perspective or perspectives to display. Select all issues. Remember to name the report appropriately to help in further analysis. Click 'Create Report'.

If this report is created for a subset of criteria (rather than all criteria), then it produces the more complex aggregate scores charts discussed in section 27.

23.3 Rank Extrema and Rank Means

The MCM software generates a chart which displays two types of ranking data. '*Rank extrema*' are shown as thin blue lines with a T-terminus. '*Rank means*' are shown as solid orange bars. Each is expressed for the selected perspective analysis.
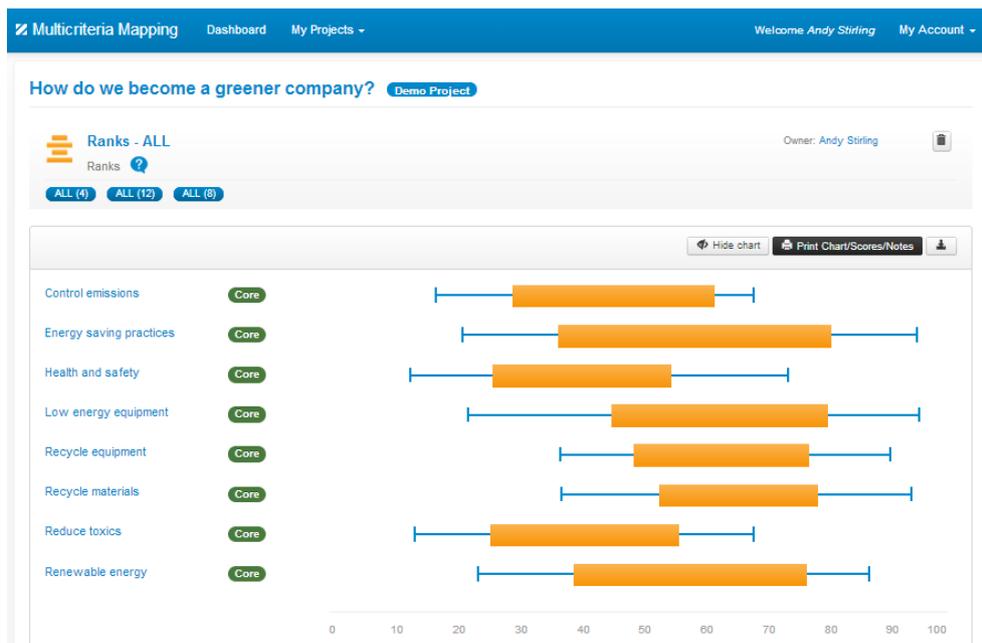
Figure 28: An example of a Ranks chart showing rank extrema (blue lines) and rank means (orange bar)

- The rank extrema data gives a full picture of the variability in the ranks assigned by different participants in the defined perspective.
  - The left terminus of the blue lines indicates the lowest rank assigned to each option by any participant included in that perspective.
  - The right terminus of the blue lines indicates the highest rank assigned to each option by any participant included in that perspective.

- Rank extrema give no indication of the distribution of participants' ranks within the ranges defined by the extrema.

- The rank means data gives an indication of the distribution of participants' ranks within the ranges defined by the extrema.
  - The left ends of the orange bars indicate the means of the pessimistic (low) ranks assigned by each participant included in that perspective.
  - The right ends of the range indicate the means of the optimistic (high) ranks assigned by each participant included in that perspective.

- Rank means can exaggerate the agreement over ranks in a perspective, by giving no indication of the full scale of the range between outlying ranks under that perspective.

23.4 Interpreting the 'Rank Extrema' and 'Rank Means' Charts

On the vertical axis, the charts display all the 'predefined options' that were defined for use by all participants in the MCM exercise. 'Additional options' that were defined by individual participants are not displayed because they are not comparable across participants.

- The options are displayed in the sequence determined when the options were defined [#9]
- Options are labelled as 'Core', 'Discretionary', or 'Additional'
- If an option was not appraised during the MCM process by any of the participants in the chosen perspective(s), there will be no data displayed for that option.
- The following notation: ⃠ at the front of an option name indicates that this option was ruled out under at least one principle by at least one of the participants included in this perspective. The number of participants who ruled out this option is indicated at the end of this notation with the hash sign ('#2').

On the horizontal axis, the chart displays an arbitrary scale from 0 to 100 expressing the rank extrema or rank means assessed for each option by the participant in question.

- Higher values indicate higher performance.
- The differences in rank scales for rank extrema and rank means are given in Section 23.3.

The simple arithmetic behind the calculation of ranks from weights and normalized scores is explained in ANNEX X - EQUATIONS. Put simply, a rank is the sum of the weighted scores.

23.5 Refreshing the Data Used in the 'Rank Extrema' and 'Rank Means' Charts

At any stage in the analysis, the data can be refreshed by following the procedure described in Section 21.7.

24 DISPLAYING UNCERTAINTIES BY PERSPECTIVE

24.1 Overview

This report begins with a chart showing the aggregate degree of *uncertainty* associated with the overall *rankings* according to the appraisals of all *participants* in the selected *perspective*.

Below the chart are displayed all the associated notes, ordered by tabs for notes respectively on 'participants', 'options', 'criteria', 'scores' and 'weighting'.

This chart expresses the extremes and means for largest and lowest degrees of *uncertainty* displayed in the *scores* and resulting *ranks* of *individual* *participants*. It does not reflect the degree of disagreement between scores and ranks *across* participants. This latter parameter is shown as a separate *ambiguity* chart [#0].

To address two different kinds of bias often neglected in appraisal, *uncertainties* can be displayed in two ways – as *ratio uncertainties* or *interval uncertainties*.

- *Ratio uncertainty* is expressed as a ratio to the median score. This measure corrects for differing magnitudes of scores. In other words, it interprets that a given value of uncertainty is of greater significance if it is displayed in a low score than if

displayed in a high score. This avoids overstating uncertainties for low-ranking options and under-stating uncertainties for high ranking options.

- **_Interval uncertainty_** is expressed simply as the interval between highest and lowest score. This measure disregards differing magnitudes of scores. In other words, it interprets that a given value of uncertainty is of the same significance when displayed in a low score than when displayed in a high score. This avoids misinterpreting assessments made as particular intervals, irrespective of scores.

  In order to avoid over-stating uncertainties for options appraised by more participants, both kinds of uncertainty are represented as a mean value for all participants in the selected perspective.

The arithmetic behind calculation of uncertainties from weighted scoring intervals is explained in ANNEX X - EQUATIONS. This also explains in more technical terms, the difference in the calculation of ratio uncertainties and interval uncertainties.

24.2 Selecting a Perspective to Display

From the Analyse section, select Reports. Select either 'Uncertainty (ratio)' or 'Uncertainty (interval)'. Give the report an appropriate name and select the perspective to include. Select all issues. Click on 'Create Report'.

24.3 Interpreting the 'Ratio Uncertainty for Perspective' Charts
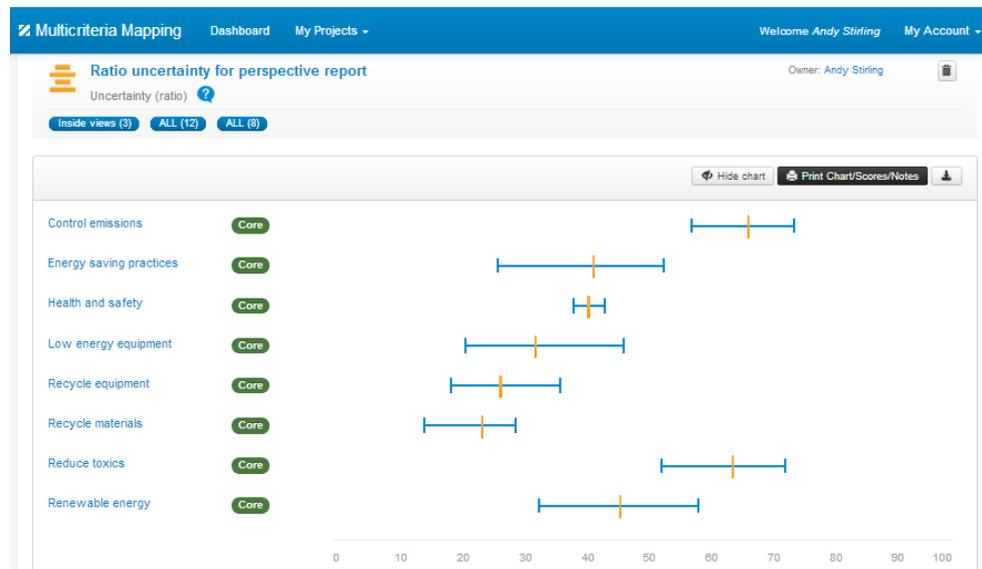
Figure 29: Uncertainty (ratio) chart

Looking at the chart above, on the vertical axis, the chart displays all the 'predefined options' that were defined for use by all participants in the MCM exercise. 'Additional options' that were defined by individual participants are not displayed because they are not comparable across participants.

- Options are labelled as 'Core', 'Discretionary', or 'Additional'
- If an option was not appraised during the MCM process by any of the participants in the chosen perspective(s), there will be no data displayed for that option.

- The following notation: ⊘ at the front of an option name indicates that this option was ruled out under at least one principle by at least one of the participants included in this perspective. If you move the mouse to the option, the software will display the names of the participants who ruled out this option.

On the horizontal axis, the chart displays an arbitrary scale from 0 to 100, expressing the same scale of values used in displaying participants' ranks.

- The further the blue horizontal line extends to the left, the greater the ratio uncertainty in the collective rankings obtained for that option under that perspective.
- The orange cross-line indicates the mean of this ratio uncertainty for this perspective.
- The uncertainties that are displayed in this chart are computed using the **means** of the pessimistic and optimistic ranks across all criteria applied by participants included in the selected perspective.
  - This gives a good idea of the general view taken under the selected perspective.
  - However these mean values understate any extreme uncertainties that may have been assessed by individual participants

The issues here are essentially the same as those discussed in more detail for rank means and rank extrema in Section 23.3.

The arithmetic basis for the calculating of ratio uncertainties is given in ANNEX X - EQUATIONS.

Overall, uncertainty reflects how the individual participants that are included in the analysed perspective, express how unsure they are in their own scoring intervals. This differs from ambiguity, which expresses the degree to which scoring ranges differ across participants included in the analysed perspective.
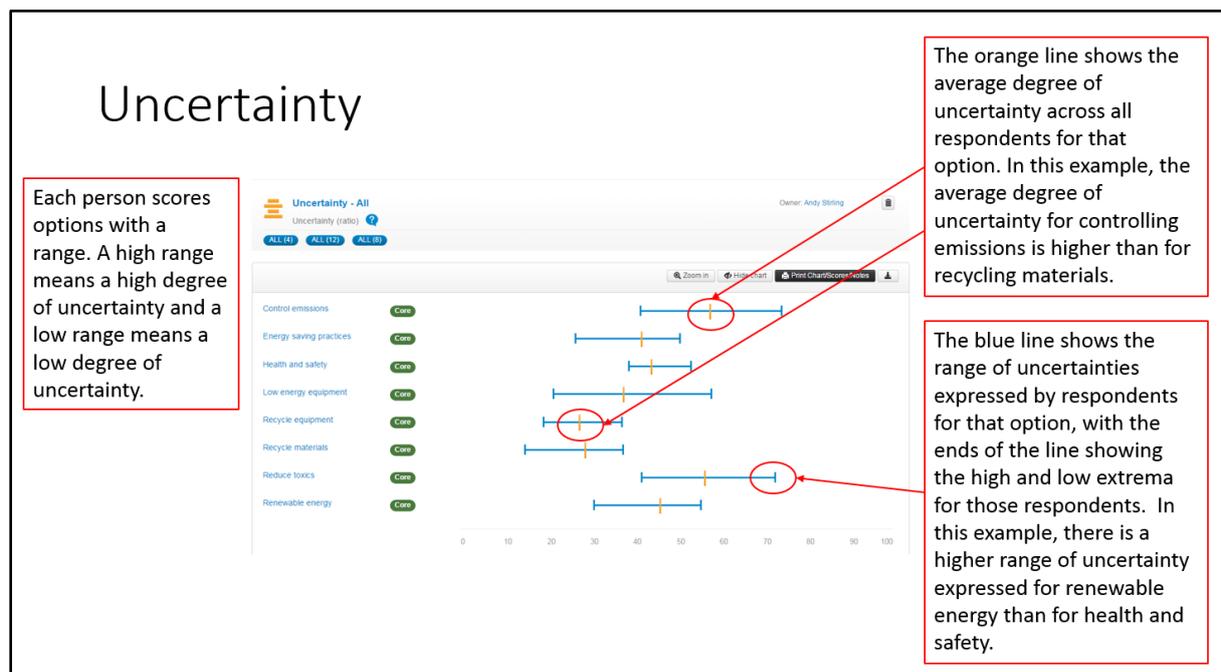
Figure 30: How to interpret a ratio uncertainty chart.

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24.4 Interpreting the 'Interval Uncertainty for Perspective' Charts
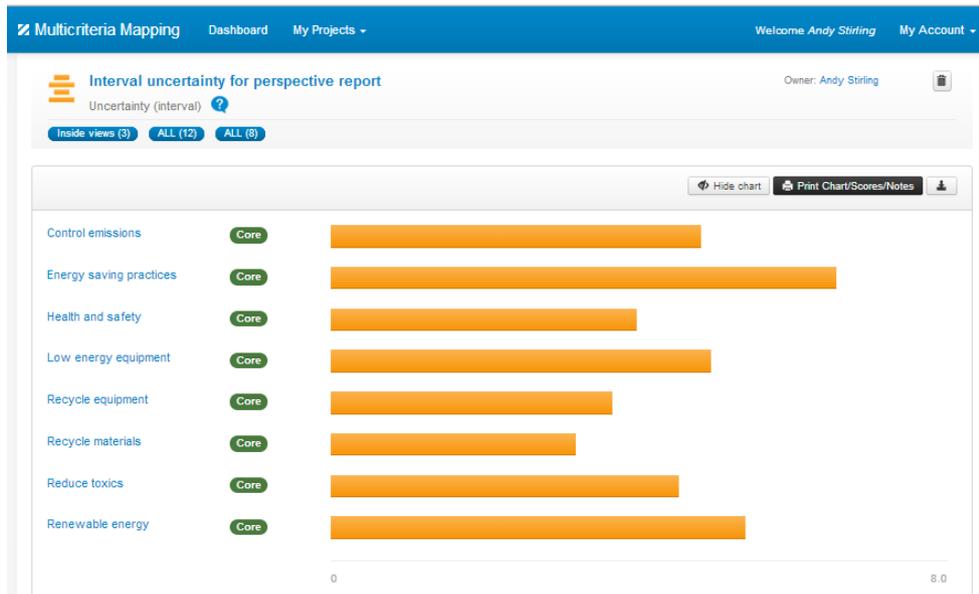
Figure 31: Uncertainty (interval) chart

As displayed here, the interval uncertainty chart is simpler to interpret than the ratio uncertainty chart. The axes are coded and scaled in the same way as for ratio uncertainty. This time, the further the orange bar extends to the right, the greater the interval uncertainty in the collective rankings for each option under that perspective.

The arithmetic basis for the calculating of interval uncertainties is given in ANNEX X - EQUATIONS.

Overall, uncertainty reflects how the individual participants that are included in the analysed perspective, express how unsure they are in their own scoring intervals. This differs from ambiguity, which expresses the degree to which scoring ranges differ across participants included in the analysed perspective.

24.5 Refreshing the Data Used in the 'Uncertainty for Perspective' Charts

At any stage in the analysis, the data can be refreshed by following the procedure described in Section 21.7.

25 DISPLAYING AMBIGUITIES FOR PERSPECTIVES

25.1 Overview

This report begins with a chart showing the aggregate degree of *ambiguity* associated with the overall *rankings* according to the appraisals of all *participants* in the selected *perspective*.

Below the chart are displayed all the associated notes, ordered by tabs for notes respectively on 'participants', 'options', 'criteria', 'scores' and 'weighting'.

These charts express the relative degrees of disagreement over scores and ranks assigned by different participants in the selected perspective. This is distinct from the uncertainty charts, which relate to differences between optimistic and pessimistic scores as assigned by individual participants [#24].

These charts show the overall degree of ambiguity associated with aggregate scores under criteria from particular issues by all the participants included in the selected perspective.

- By comparing a series of these charts, it is possible to explore the way in which the ambiguities under particular issues differ from overall ambiguities for the selected perspective.
- Exploring a series of these charts also makes it possible to compare uncertainties under particular issues for different perspectives.

25.2 Selecting a Perspective and an Issue to Display

From the Analyse section, select Reports. Select Ambiguity. Give the report an appropriate name and select the perspectives and issues to include. Click on 'Create Report'.

25.3 Interpreting the 'Ambiguity for Perspective and Issue' Charts
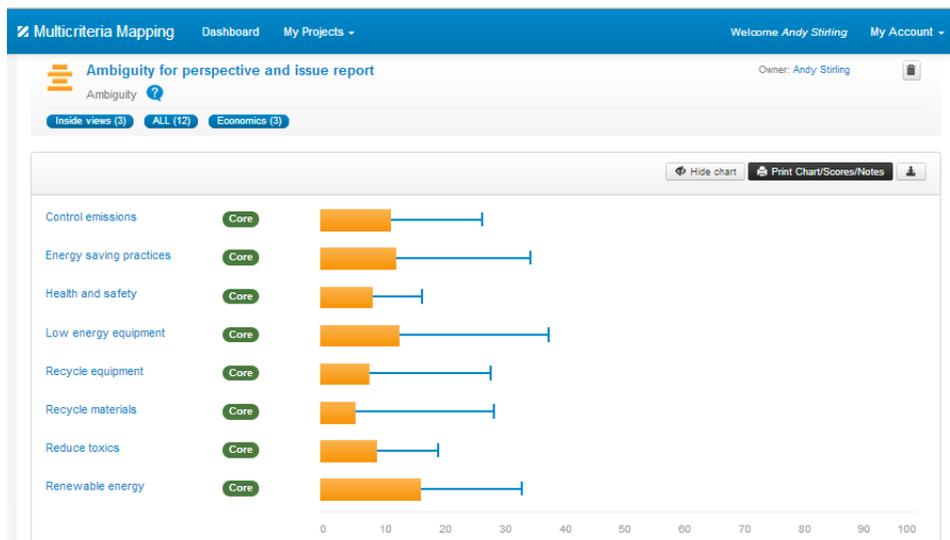
Figure 32: An Ambiguity chart for a perspective ('inside views') and an issue ('economics').

An 'Ambiguity' chart is shown above.

On the vertical axis, the charts display all the 'predefined options' that were defined for use by all participants in the MCM exercise. 'Additional options' that were defined by individual participants are not displayed because they are not comparable across participants.

- The options are displayed in the sequence determined when the options were defined [#9]
- Options are labelled as 'Core', 'Discretionary', or 'Additional'
- If an option was not appraised during the MCM process by any of the participants in the chosen perspective(s), there will be no data displayed for that option.
- The following notation: ⊘ at the front of an option name indicates that this option was ruled out under at least one principle by at least one of the participants included in this perspective. If you move the mouse to the option, the software will display the names of the participants who ruled out this option.

On the horizontal axis, the chart displays an arbitrary scale from 0 to 100, expressing the same scale of values used in displaying participants' ranks.

The orange horizontal bars display the ambiguity across the mean scores assigned under the selected issue by all participants included in the selected perspective.

The right terminus of the blue lines, show the ambiguity across the extreme scores under the selected issue by all participants included in the selected perspective.

The arithmetic basis for the calculating of ambiguities is given in ANNEX X - EQUATIONS.

Overall, ambiguity expresses the degree to which scoring ranges differ across those participants that are included in the analysed perspective. This differs from uncertainty, which reflects how the individual participants that are included in the analysed perspective, express how unsure they are in their own scoring intervals.
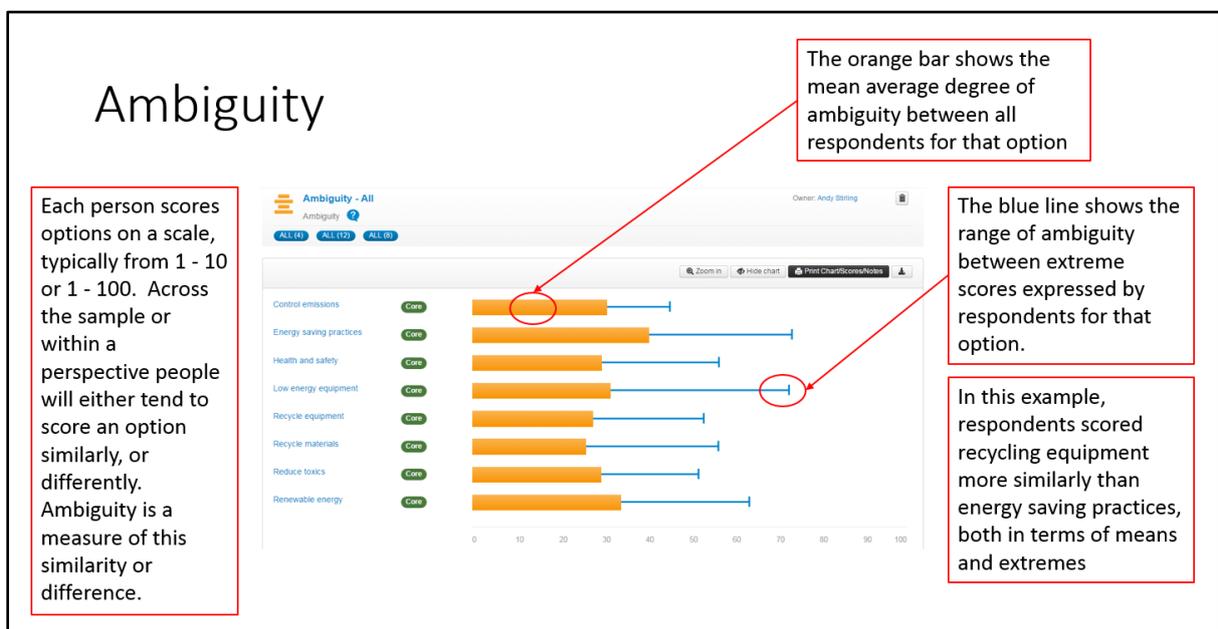
Figure 33: How to interpret an ambiguity chart

25.4 Refreshing the Data Used in the Chart

At any stage in the analysis, the data can be refreshed by following the procedure described in Section 21.7.

26 DISPLAYING ISSUE WEIGHTINGS

26.1 Overview

This report begins with a chart showing the pattern of weightings associated with a selected perspective, by displaying the range of weights attached to different issues by participants included in that perspective.

Below the chart are displayed all the associated notes, ordered by tabs for notes respectively on 'participants', 'options', 'criteria', 'scores' and 'weighting'.

26.2 Selecting a Perspective and Issues to Display

From the Analyse section, select Reports. Select Weights. Give the report an appropriate name and select the perspective and the issues to include. Click on 'Create Report'.

26.3 Interpreting the 'Weightings' Chart
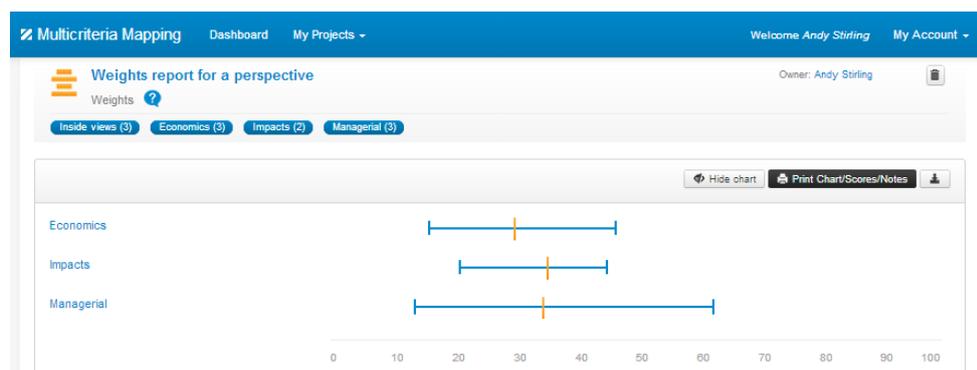
Figure 34: Weights chart for a particular perspective ('inside views')

An example of a 'Weights' chart is shown above. For illustrative purposes there are only three issues but typically there would be many more.

On the vertical axis, the chart displays all the issues that have been developed in analysis to cover all the criteria included by the participants included in the selected perspective.

On the horizontal axis, the chart uses a scale from 0 to 100 to express (in percentage terms) the overall value of the weights attached to each issue.

- The blue horizontal lines show the ranges between the lowest and highest weights attached to the issue in question, across the range of participants included in the selected perspective. In other words:
  o The low issue weight at the left hand end of the bar expresses the sum of all weights attached to criteria in this issue by the participant for whom this issue weighting was lowest.
  o The high issue weight at the right hand end of the bar expresses the sum of all weights attached to criteria in this issue by the participant for whom this issue weighting was highest.

- The orange cross-line shows the mean value of the weightings on this issue across this perspective.

- This chart is intended to display the relative magnitudes of weightings assigned to different issues under a selected perspective. It should **not** be interpreted as an indication of the degree of difference in weightings attached by different participants to each issue.
    - This is because the length of the bars is due both to the differences in weightings and to the number of participants defining criteria in the issues concerned.
    - For instance, where the weighting bar displays no range at all, this is not a suggestion of strong agreement, but an indication of the opposite. Only one participant has developed a single criterion for the issue in question, with others excluding this issue altogether.

The arithmetic behind the ways in which weights relate to scores and ranks is explained in ANNEX X - EQUATIONS.

26.4 Refreshing the Data Used in the 'Weightings' Chart

At any stage in the analysis, the data can be refreshed by following the procedure described in Section 21.7.

27 AGGREGATING SCORES OVER PERSPECTIVES AND ISSUES

27.1 Overview

The ranking report discussed earlier [#23] also allows flexible displays of aggregated scores for particular **options** in a selected **cluster**, for particular **criteria** included in a selected **issue**, by particular **participants** in a selected **perspective**.

It follows the same procedures as used to generate a ranking chart for a particular perspective [#23]. But this time, specific criteria are selected rather than all of them.

The report begins with a chart showing the aggregate scores for this particular cut of options, criteria and issues. Below the chart are displayed associated notes, ordered by tabs respectively on 'participants', 'options', 'criteria', 'scores' and 'weighting'.

Creating and saving a series of these charts also makes it possible to compare scoring patterns across unlimited permutations of options, criteria and participants.

27.2 Selecting a Perspective and an Issue to Display

From the Analyse section, select Reports. Select Ranks. Give the report an appropriate name and select the perspective and the issue to include. Click on 'Create Report'.

27.3 Interpreting the 'Aggregate Scores' Chart

An example of an 'Aggregate Scores' chart is shown below.
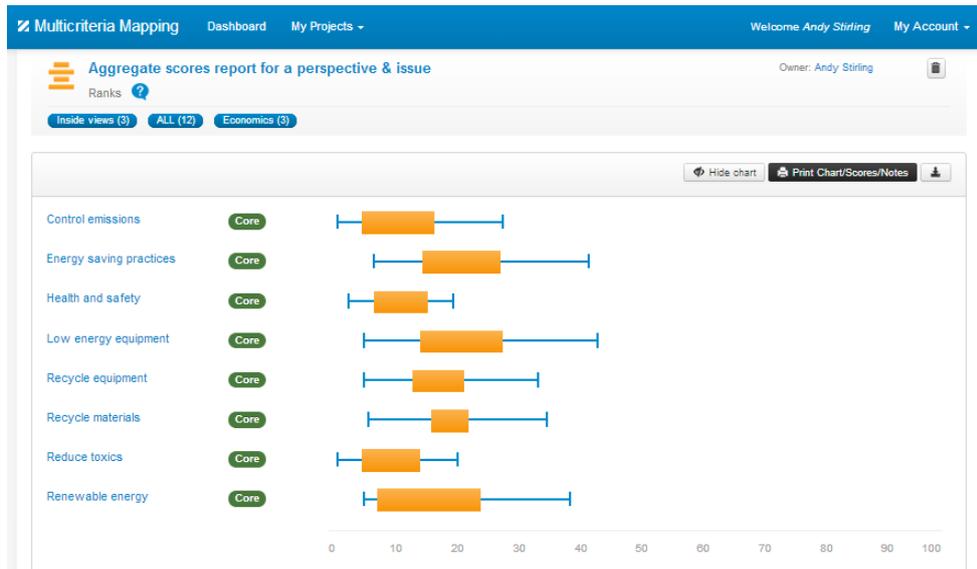
Figure 35: Aggregate scores chart for one perspective ('inside views') and one issue ('economics').

On the vertical axis, the chart displays all the 'predefined options' that were defined for use by all participants in the MCM exercise. 'Additional options' that were defined by individual participants are not displayed because they are not comparable across participants.

- Options are labelled as 'Core', 'Discretionary', or 'Additional'
- If an option was not appraised during the MCM process by any of the participants in the chosen perspective(s), there will be no data displayed for that option.
- The following notation: ⊘ at the front of an option name indicates that this option was ruled out under at least one principle by at least one of the participants included in this perspective. If you move the mouse to the option, the software will display the names of the participants who ruled out this option.

On the horizontal axis, the chart displays the same 0 to 100 scale used to express ranks, in order to express the relative magnitudes of aggregate scores for all criteria included under the issue in question. Higher values indicate higher performance.

The orange horizontal bars indicate the interval between the lowest and highest aggregate scores for the issue and perspective in question.

- The left terminus of the blue lines indicates the lowest aggregate score assessed across the selected issue by any participant included in that perspective.
- The right terminus of the blue lines indicates the highest aggregate score assessed across the selected issue by any participant included in that perspective.

See ANNEX X - EQUATIONS for detailed calculations.

27.4 Refreshing the Data Used in the 'Summed Scores' Chart

At any stage in the analysis, the data can be refreshed by following the procedure described in Section 21.7.

28 UNCERTAINTIES AND AMBIGUITIES IN AGGREGATE SCORES

28.1 Overview

In the same way that 'rank reports by perspective' [#23] can be used to display more fine-grain pictures for differently-aggregated scores [#0], the same is true of uncertainty [#24] and ambiguity [#0] charts, which can also display more fine-grain pictures for particular selected participants, issues and clusters.

These reports are generated by following the same instructions as given in Section 24 for uncertainty and Section 0 for ambiguity, but selecting more specific appropriately-defined selections of clusters, issues and perspectives.

By comparing a series of these charts, it is possible to explore unlimited permutations in the ways that uncertainties and ambiguities play out across different clusters, issues and perspectives.

The interpretations of the charts are the same as given in Sections 24 and 0.

29 SHARING MCM ENGAGEMENTS AND REPORTS

MCM reports and engagements can be shared with other researchers.
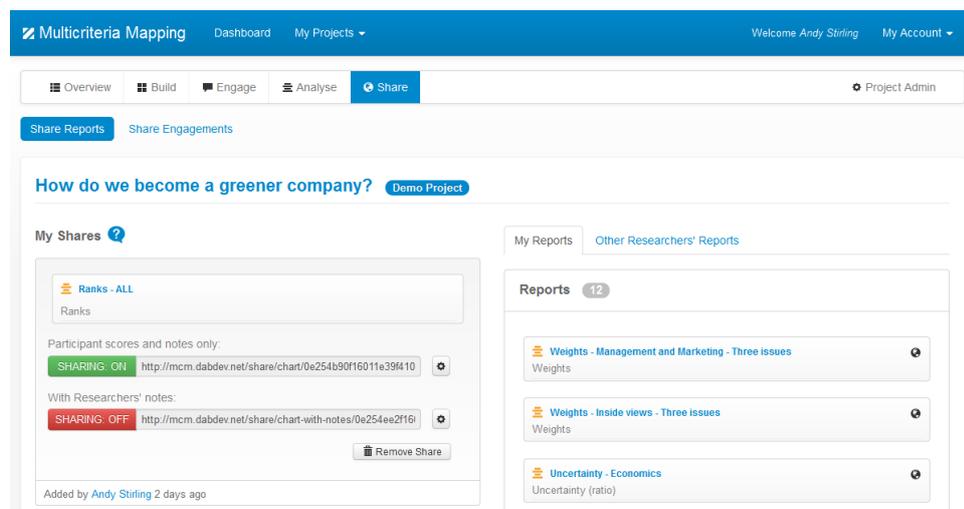
Figure 36: Sharing a report

To share a report, click on the Share section of the MCM software and choose 'Share Reports'. A list of reports is displayed on the right hand side of the page. Click on the globe icon next to the report title to share the report. The report will appear on the left side of the page with a unique URL generated for that report.

Researchers can choose to share only the participant notes and scores, or to share their own notes as well. To share the report, copy and send the unique URL. The share can be turned off temporarily by clicking the green button, or removed entirely by clicking the 'Remove Share' button at any time.

Single engagements can be shared in a similar way.
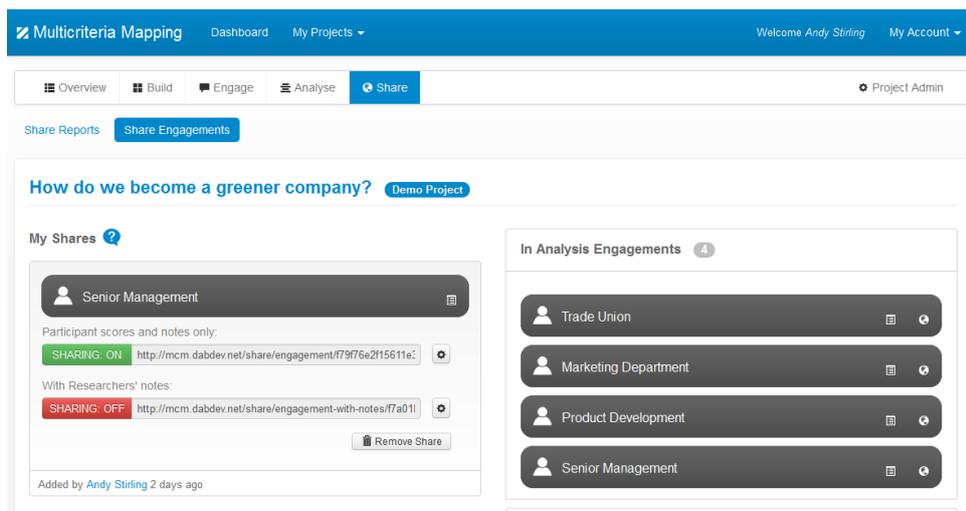
Figure 37: Sharing an engagement

30 PUTTING IT ALL TOGETHER

30.1 Overview

MCM analysis is an iterative, inductive process in which – like other appraisal techniques – the judgement of the analyst plays a crucial role. No amount of disciplinary protocol can remove this essentially contingent role of judgement. This is a key reason for upholding the MCM values discussed earlier in this Manual [#1.1].

A particular distinguishing feature in MCM analysis, is that the subjectivity and conditionality of inevitable judgements are rendered unusually transparent by the relatively open framing, the multiple finely-specified parameters and the clear way in which sensitivities can be displayed and explored in interrogating associated results.

Although MCM analysis does not proceed in a linear or mechanical fashion, it is possible to identify a series of distinguishable stages, which inform each other in an iterative way until a satisfactorily robust picture is produced. These are not fixed 'rules' for conduct of MCM analysis, but rather a framework of sensible provisions.

As anticipated in Section 0, these main provisions in MCM Analysis are as follows:

- a. Become familiar with the material
- b. Take an early look at the grouping of data
- c. Explore the consequences of different assumptions
- d. Keep a complete and systematic record
- e. Form and test explicit hypotheses
- f. Investigate detailed features
- g. Check the qualitative data
- h. Take a balanced approach to representing findings
- i. Involve participants in reviewing interim results

In the light of discussion in intervening sections (17 - 28), this outline of basic stages can now be elaborated with more detailed specific steps, which make reference to the most relevant technical discussions provided in earlier sections of this Manual.

For convenience in referencing, these are each grouped into the different stages and indexed with their own number, but – as emphasized above – they may be undertaken at the discretion of the analyst in a more iterative and organic fashion.

30.2 A: Become Familiar with the Material

(A)1   Arrange for all members of the analysis team to read through all transcripts so that they are familiar with the qualitative insights contained there concerning the viewpoints of different participants. Ensure also that all relevant and illuminating statements are marked up from the transcripts as notes in the relevant MCM engagements for inclusion in MCM Analysis. This process is described in Section 15.

30.3 B: Take an Early Look at the Grouping of Data

(B)2   Identify an initial plausible scheme of perspectives and assign participants on the basis of the (provisional) external criteria used in the recruiting of participants. This process is described in Section 18.

(B)3   Identify an initial plausible scheme of issues and assign criteria on the basis of the labels and notes contained in the MCM data, as well as key elements in the verbal discussion recorded in any notes. This process is described in Section 19.

30.4 C: Explore the Consequences of Different Assumptions

(C)4   Examine the patterns in comments on options, criteria definitions and assumptions revealed in scoring (as revealed in the text in the reports) – as well as ranks, weights and uncertainties that result from these groupings (as revealed in charts in the reports). This process is described in Sections 21 - 28.

(C)5   On this basis, explore the effect of re-assigning participants whose membership of a perspective is marginal, ambiguous or problematic – either on external criteria, or in terms of the qualitative or quantitative data elicited in MCM. Do the same for criteria and issues. This process is described in Sections 18 and 19.

(C)6   Arrange for different members of the analysis team to undertake these tasks, explore using the analysis tool and discuss any differences that emerge. On this basis, decide on a provisional scheme of perspectives and issues to form the starting point for more detailed analysis of the patterns in weights, scores and uncertainties. These processes are described in Sections 0 - 28.

30.5 D: Keep a Complete and Systematic Record

(D)7   Compile a systematic series of reports containing text (recording qualitative comments grouped according to perspective, criteria and options) and charts (revealing the patterns in ranks, scores, uncertainties and weights obtained under these initial series of perspectives and issues).

Use these to identify any apparent commonalities and anomalies. Involve all members of the analysis team in keeping an *Analysis Log-book*, recording notable features that emerge during this process and which might warrant further attention.

30.6 E: Form and Test Explicit Hypotheses

(E)8   Use apparent commonalities and anomalies as a basis for posing hypotheses about the distinctions between different perspectives, issues and options. Investigate these by re-reading relevant sections of the transcripts and add to the notes accordingly. Arrange for all members of the analysis team to meet regularly to discuss the emerging findings and reframe any questions that may result.

30.7 F: Investigate Detailed Features

(F)9   Use the results of the analysis thus far to inform the grouping of options into clusters. Repeat the previous steps in the analysis, this time with the options grouped in these clusters. This process is described in Section 20.

(F)10 Review the totality of results at an in-depth meeting and discuss point-by-point the arguments for and against some of the key hypotheses that emerge over the grouping of participants, criteria or options. Also review emerging findings concerning

the apparent performance of particular options and/or clusters under different perspectives and issues. Note any residual queries, anomalies and qualifications.

30.8 G: Check the Qualitative Data

(G)11 Investigate the notes as aggregated in relevant reports for any further information that may be relevant to residual queries, anomalies and qualifications. Use this to test and reform hypotheses – where necessary returning to the transcripts or relevant external material for any illuminating input (which may then be entered as MCM analysis notes as described in section 15.6.

(G)12 On this basis, draw up a draft analysis report containing the key findings in relation to the overall performance of the different options and clusters, the commonalities and differences between perspectives and key features in the more detailed patterns arising in weights, scores and uncertainties.

Ensure that this pays adequate attention to the qualitative data, and is illustrated where appropriate with excerpts from the notes.

30.9 H: Take a Balanced Approach to Representing Findings

(H)13 Be careful to pay as much attention to seeking counter-examples as examples. Be careful to test and substantiate any candidate findings. Focus greatest attention on those findings in which there can be greatest confidence – avoiding over-interpretation. Other less substantiated findings may form the basis for questions and recommendations for further research.

30.10 I: Involve Participants in Reviewing Interim Results

(I)14   Ideally, a draft report of interim findings should be circulated to participants, with identities coded anonymously and each recipient knowing only their own coding. Though any feedback is not binding, the resulting comments may be very useful in challenging, substantiating and augmenting the emerging picture.

This step depends on the scale of the project. And it is more likely to be viable on a one-to-one basis. But, depending on circumstances, a later face-to-face workshop may form a useful follow-up if a critical mass of participation can be assured.

30.11 The 'Bottom Line'

Of course, in any MCM exercise on an issue of practical strategic importance to decision making, there is likely to be great interest in the 'bottom line' results – the clusters or individual options that look best and worst overall, taking into account all the different criteria assigned under the viewpoints of all the various participants.

There is no immediate reason why the MCM software cannot address this interest. The results for an exercise taken as a whole may readily be combined by assigning all participants to a single perspective, thus revealing associated aggregate ranks (as well as aggregate uncertainties, weights and scores).

However, particular caution should be adopted in interpreting and representing such an aggregate picture. In common with all other forms of appraisal, which produce aggregated quantitative results (like risk assessment, decision analysis and cost-benefit analysis), such a practice raises a series of intractable theoretical problems.

In short, it is a matter repeatedly confirmed in rational choice theory, that there can be no guaranteed single definitive 'rational' way to aggregate divergent values, preferences and perspectives. As such, any technique that purports to do this – no matter what the sample size – is potentially highly misleading.

Associated with this fundamental theoretical problem of aggregation, there is a series of more practical methodological difficulties.

- Have the different perspectives captured the full range of salient viewpoints?
- To what extent do the viewpoints of individual participants reflect those of the broader perspectives to which they are assigned?
- What is the appropriate weighting to place on the viewpoints of individual participants, both within and between perspectives?
- How representative are the numbers of participants assigned to the different perspectives?
- How should factors such as intensity of attitudes, magnitude of vested interests and quality of knowledge be factored into such an aggregate picture?

The default position is simply to treat each participant equally and assume the composition of perspectives to be definitive. But this is just one among many reasonably possible positions, each one of which would likely yield different results.

Although they tend to be neglected, all these issues apply as much to comparable appraisal techniques as to MCM. It is for this reason that MCM is proposed as a 'heuristic' approach to appraisal (see Section 1.2). Indeed, this is the reason for the use of the term 'mapping' in the name.

By concentrating on representing a reasonable 'envelope' of views (rather than a 'representative' sample) – and by paying as much attention to sensitivities and framing assumptions, it can be argued that MCM goes a long way towards mitigating many of these difficulties. This is a key feature in the presentation of results.

30.12 A Note on the Use of Statistical Analysis

The quantitative nature of key elements in the MCM data often encourages questions over the utility of statistical methods as a means to inform analysis. Such questions apply especially where a full scale MCM exercise has involved a significant number of participants, eliciting large quantitative datasets (of scores, uncertainties, weights and ranks). In such cases, it is possible that such techniques – if cautiously applied – may offer some relevant insights. However, experience shows that great care is needed on this for the following reasons.

- Although certain data (like scores) may be produced in apparently large numbers in MCM, those data that relate to any one unit of analysis (a particular perspective, issue or cluster) are typically rather small. Likewise, the numbers of participants involved in any single exercise are almost inevitably too small to admit statistical treatment as a 'sample'.

- Many of the most common statistical techniques are intrinsically aggregative in nature, and so raise the intractable issues discussed in Section 30.11. For instance, multivariate, regression, significance and cluster analysis all tend to address 'aggregations', rather than 'envelopes', in the sense discussed there. Although the results are often presented as concrete, they are typically quite sensitive to a series of methodological choices or other framing assumptions. The more systematic and transparent – but more openly judgemental – form of analysis described in this Manual helps to minimise these issues.
- The results obtained in any statistical analysis will be highly sensitive to the way in which the data are categorized, and it is this central task which forms the focus of MCM analysis – so statistical treatment is likely to be more robust as an output, rather than as an input to this. (In this respect, MCM is more comparable with the statistically-informed 'Q-methodology', than it is to other forms of "r-statistic").
- Statistical treatment can compound the problem already remarked upon in this Manual, and to which MCM is intended as a response. This is that the apparently clear and definitive status of quantitative techniques can obscure crucial qualitative insights. In this regard, statistical analysis of MCM results are likely in principle to resolve relatively few questions, and to beg and raise many others.

To conclude, it is possible that certain statistical techniques may have an interesting or significant contribution to make in a secondary role, or as an element in the meta-analysis of different MCM studies. The issues raised here suggest that this role will be subordinate to the style of analysis described here. Any such potential applications therefore remain outside the scope of this Manual.

31 ANNEX X - EQUATIONS

31.1 Normalisation and Aggregation Procedures in MCM

Notation

	Criterion 1		Criterion 2		…	Criterion j		…
Option 1			2	4				
Option 2			4	6				
…			1 C_2^{min}	7				
Option i			3	8		P_{ij}^{min}	P_{ij}^{max}	
…			6	9 C_2^{max}				
Option m			5	6				
Weight	n_1		n_2			n_j		

$P_{ij}^{min}, P_{ij}^{max}$:   nominal minimum/maximum performance score for option i under criterion j (as entered in MC-Mapper)

C_j^{min}, C_j^{max}:   nominal minimum/maximum performance score across all options under criterion j (as entered in MC-Mapper)

n_j: nominal weighting for criterion j (as entered in the MCM software tool)

$$C_j^{min} = \min(P_{1j}^{min}, P_{2j}^{min}, \cdots, P_{mj}^{min})$$
$$C_j^{max} = \max(P_{1j}^{max}, P_{2j}^{max}, \cdots, P_{mj}^{max})$$

Normalisation of performance scores and weights

$$s_{ij} = P_{ij}^{normalised} = \frac{P_{ij} - C_j^{min}}{\left(C_j^{max} - C_j^{min}\right)} (\min = 0, max = 1) \quad\quad [1]$$

$$w_j = n_j^{normalised} = \frac{n_j}{\sum_j n_j} (sum = 1) \quad\quad [2]$$

Aggregation of normalised performance scores using normalised weights

(All apply equally to ranks derived from minimum and maximum scores)

$$r_i = \sum_j w_j . s_{ij}$$ [3]

Where:

r_i :   overall performance rank for option i   cf: [3]

w_j :   normalised criteria weighting for criterion j   cf: [2]

s_{ij} :   normalised score for option i under criterion j   cf: [1]

31.2 Calculation of Outputs in MCM Analysis

Narrative Explanation of Successive Steps in Calculation

1   for each participant in the selected perspective;
         for each criterion in the selected issue:

2   multiply pessimistic normalised scores by normalised weights;
         this is 'pessimistic subrank'.

3   multiply optimistic normalised scores by normalised weights;
         this is 'optimistic subrank'.

4   subtract pessimistic subrank from optimistic subrank;
         this is 'delta'.

5   sum half delta with pessimistic subrank;
         this is 'median'.

6   divide delta by median;
         this is 'ratio uncertainty'.

Mean Ratio Uncertainty

7   across each criterion in the selected issue;
         across all participants in the selected perspective:

8   take mean of ratio uncertainties;
         this is 'mean ratio uncertainty'.

Mean Interval Uncertainty

9   across each criterion in the selected issue;
         across all participants in the selected perspective:

10   take mean delta;

this is 'mean interval uncertainty'.

Mean Ambiguity

11   across each criterion in the selected issue;

across all participants in the selected perspective:

12   take mean of pessimistic subranks;

this is 'mean pessimistic subrank'.

13   take mean of optimistic subranks;

this is 'mean optimistic subrank'.

14   subtract mean pessimistic subrank from mean optimistic subrank;

this is 'mean ambiguity'.

32 GLOSSARY

This glossary provides a comprehensive alphabetical list of definitions for terms that are used in a precise fashion in this MCM Manual. Terms in bold italics are cross-referenced between definitions.

Additional Documents	A form of *external data* that are produced, or referred to, by participants themselves as contributing to the substantiation of any aspect of their *MCM appraisal*. Extracts from additional documents can be included in *MCM analysis* as *notes.*
Additional Option	An option that has been defined by an individual *participant* to address a possibility that has been omitted in the selection of *pre-defined options*. Because details of the definition are specific to this participant, *additional options* cannot be compared across participants.
Aggregate Score	The sum of all *scores* assessed by a particular participant, or group of participants, under all criteria included in a particular issue, each *weighted* by the appropriate criterion weight.
Ambiguity	A property distinct from *uncertainty,* which relates to the differences between the *viewpoints* taken by different *participants* within (or between) *perspectives*. For *ranks*, it is given as the interval between extreme pessimistic and optimistic ranks as assessed by all participants included in that *perspective*.
Analyst	A *researcher* involved in the *MCM analysis* part of an *MCM appraisal.*
Appraisal	The process of assessing the pros and cons of a range of *options* under an array of *criteria* according to a variety of *perspectives*. The term is intended to imply a broader process than purely quantitative *assessment* (eg: in assessing *scores*), since it includes equal consideration of a wide range of qualitative issues. *MCM* offers just one approach to this broader process of appraisal.
Assessment	An aspect of a broader process of *appraisal*, which implies more tightly-structured quantitative procedures, such as those employed in assessing *scores* in *MCM*.
Audio Recording	An audio recording of an *MCM session*, which may be *transcribed* for use in later *MCM analysis*.
Chart	An output of the *MCM analysis* tool which systematically orders and represents a body of *quantitative data* relevant to particular selected perspectives, issues or clusters.

Cluster	A *grouping* of *options* that may be seen on the basis of *MCM* results to display certain features in common. Like *core options* and *discretionary options*, a cluster may be relevant across a number of *perspectives* – but may highlight entirely different features than were used to define initial sets of core and discretionary options. The different cross-cutting ways to group options into clusters will form a key focus in the analysis of MCM results.
Communications	A form of *external data* produced by participants during, or in association with, an *MCM appraisal,* but which are not recorded in the *MCM engagement* process. These may include informal notes made during the MCM session, but not entered in the MCM software, or letters, emails or telephone conversations conducted with the researchers during scoping or follow-up. Communications can be included in *MCM analysis* as *notes*.
Core Option	An *option* that has been defined in a standardised fashion by the research team to enable consistent and comparable appraisal by all *participants*, and which all participants are asked to appraise.
Criterion	A factor influencing a *participant*'s judgements over the performance of a range of different *options* for achieving a particular *focal goal*. This is defined freely by the participant and need not be standardised in advance.
Deliberative Mapping	A broad process of *appraisal* that involves the use of *MCM* as one element in a deeper and more extensive participatory deliberative framework. The acronym is *DM*.
Dependency	A relationship between *criteria* that goes beyond mere correlation, association or overlap, involving instead a situation where *performance* under one criterion is directly determined by performance under another criterion. An example is whether performance under a *transparency* criterion is good or bad depends on whether performance under another criterion is good or bad.
Discretionary Option	An *option* that has been defined in a standardised fashion by the research team to enable consistent and comparable *appraisal* by all *participants*, but which may or may not be selected by a participant for appraisal, at their own discretion.
External Data	Data that may be used in *MCM analysis*, but which are not directly elicited or recorded in the *MCM Engagement*. This may take the form of *communications*, *additional documents*, *memos* or *other materials*. It contrasts with *MCM data*, which are produced during the *MCM appraisal* itself. External data can be included in *MCM analysis* as *notes*.

Facilitator	A *researcher* involved in facilitating group discussion and *MCM* as part of a more extensive *DM* process.
Focal Goal	A broadly shared aim, in itself clear and uncontroversial across a range of diverse *perspectives*, which forms the common aim for a variety of alternative *options*. This may be a particular social function or objective, the options for achieving which form the focus of an *MCM* exercise. For clarity, this might be expressed in the form of a question, like: "*by what policies can society best reduce obesity?*".
Group MCM Session	An *MCM session* in which an *MCM researcher* uses the *MCM tool* in order to help facilitate an appraisal by a small (usually *homogeneous*) group of *participants*.
Groupings	The collective term for groups of *participants* (*perspectives*), *criteria* (*issues*) or *options* (*clusters*).
Heuristic	A form of appraisal tool whose primary aim lies in facilitating the systematic, transparent and accurate exploration of a challenging policy or decision problem. This contrasts with a more prescriptive approach, whose primary aim lies in delivering apparently clear results, even if these conceal hidden conditions, constraints or sensitivities. *Multicriteria mapping* is a heuristic.
Homogeneous Groups	A group of *MCM participants* meeting face to face, gathered on the basis of some perceived common shared attribute that makes them homogenous with respect to some hypothetically key issue in defining *perspectives*.
Importance Order	An ordering of *MCM principles,* in diminishing sequence of importance as viewed by the participant defining them.
Initial Criteria	An optional group of criteria that may be defined by the research team in building an MCM project and which are presented as a default to all participants to appraise. It is generally recommended that no initial criteria are defined.
Interviewee	A *participant* who is engaged by means of an interview-based *MCM*.
Interviewer	A *researcher* involved in the conduct of *MCM* through interview.
Issue	A *grouping* of *criteria* that may be seen on the basis of *MCM* results to display certain features in common. Unlike a criterion, an issue may extend across a number of *perspectives*. There will be different cross-cutting ways to group criteria into issues, and these will form a key focus in *MCM analysis*.

MCM Appraisal	A particular approach to *appraisal*, which follows a *multicriteria mapping* process in order to facilitate a relatively accessible, flexible, unconstrained and transparent form of appraisal, that is well-focused on the practical task of informing decisions.
MCM	The acronym for the *multicriteria mapping appraisal* process.
MCM Analysis	The systematic process of collating, analysing and interpreting the quantitative and qualitative findings generated in an *MCM appraisal*.
MCM Data	Data elicited as part of an *MCM appraisal*. This may take *quantitative* or *qualitative* forms. It contrasts with *external data*, which arise from outside an *MCM appraisal*.
MCM Interview	An *MCM engagement* in which an *MCM researcher* uses the *MCM tool* to aid a one-to-one *interview* of a *participant*.
MCM Engagement	A discrete stage in a process for conducting an *MCM appraisal*, during which the *MCM tool* is used to elicit the *viewpoint* of an individual or small group of *participants*. This may take the form of an individual *MCM interview* conducted by an *MCM researcher*, or a *group MCM session* facilitated by an *MCM researcher*.
MCM Tool	The short name for the *multicriteria mapping* software tool, which facilitates an *MCM engagement* and the analysis of the results obtained over an *MCM appraisal*.
MCM Values	A set of broad values intended to guide the practice of MCM appraisal and analysis. Described in Section 1.1 of this Manual, these are: inclusion, opening up, agency and transparency. MCM also places great importance on the exercise and *responsibility*, *reflexivity* and *accountability* by MCM researchers (as discussed in Section 4.6).
Memos	A form of *external data* produced by the *MCM interviewers* or *MCM analysts* themselves, either during or immediately following the *MCM session* or during subsequent *MCM analysis*. Memos contain comments on the *appraisal* of a particular *participant* or *perspective*, which bear on the interpretation of results. Memos can be included in *MCM analysis* as *notes.*

Multicriteria Mapping	A process enabling individual deliberation and transparent exploration of ways in which technical judgements, quantitative ***assessments***, qualitative assumptions and subjective values interact to yield divergent possible ***appraisals*** of the best way to go about achieving a particular ***focal goal***. The process may be undertaken by means of individual ***interviews*** or in ***group*** sessions. In either case, the process makes use of the ***MCM software*** tool to record ***MCM interview*** data and conduct ***MCM analysis*** of the results. The acronym is ***MCM***.
Normalisation	A calculation performed in ***MCM analysis*** to convert the raw ***weights*** elicited from individual ***participants*** in ***MCM*** into normalized ***weightings*** that may be compared across participants. This is calculated for each individual weight as the ratio of that weight to the sum of weights for all ***criteria*** defined by that participant. The ***MCM tool*** contains a function to perform this normalisation.
Notes	A form of ***qualitative MCM data***, which concerns the detailed characterisation of ***options***, ***criteria*** or other aspects of an ***MCM appraisal***. Also a category of data used in ***MCM analysis*** which includes statements or extracts from documents which are judged by the ***MCM analyst*** to have a bearing on an ***MCM appraisal*** and so are selected by the analyst for inclusion in the ***MCM analysis*** database. Notes may include ***MCM data*** (in the form of excerpts from ***transcripts***) as well as being drawn from ***external data***.
Opening Up	An alternative approach to conventional decision and policy making, in which political pressures for justification force the 'closing down' of plural, equally reasonable perspectives on a given ***focal goal***, such that only one (or a small subset) appears to be rational or credible.
Option	A specific way to achieve a particular ***focal goal***, which is judged by at least one ***participant*** or the research team to be appropriate for ***appraisal*** as part of an ***MCM*** exercise. Depending on the context, options may include diverse kinds of practices, policies, strategies or technologies.
Other materials	A form of ***external data*** produced by the ***participants*** themselves, by members of similar ***perspectives*** (who may not have undertaken an ***MCM appraisal***), or by commentators on the debate in question. Suitably qualified, these may be relevant to ***MCM analysis*** if they help clarify or elaborate aspects of the appraisals of MCM participants. Extracts from these other materials can be included in ***MCM analysis*** as ***notes.***

Participant	An individual person, with a particular *viewpoint* at any given moment who is engaged in a *MCM appraisal* either by means of an interview or group-based *engagement*.
Perspective	A *grouping* of *viewpoints* that may be seen on the basis of *MCM analysis* to display certain features in common. There will be different cross-cutting ways to group the viewpoints of individual participants into perspectives. Indeed, the participants will have been recruited in the first place on the basis of some provisional ideas about this. However, the exploration of a variety of different possible perspectives will form a key focus in MCM analysis.
Pilot MCM session	A smaller, quicker, more simple and less onerous MCM exercise, used to help shape and design a more elaborate and rigorously-designed project.
Pre-defined Option	The collective term for *core options* and *discretionary options*. An option that has been defined in a standardised fashion by the research team to enable consistent and comparable appraisal by all *participants*.
Qualitative MCM Data	Forms of data recorded using the *MCM software* tool and used in in *MCM analysis* that are textual (rather than numerical) in nature. These comprise the *names* and *definitions* developed by the research team for the *predefined options,* as well as the *notes* entered into the *MCM software* tool and the *notes* that are extracted from *transcripts* of *recordings* of an *MCM session*.
Quantitative MCM Data	Forms of data recorded using the *MCM software* tool and used in *MCM analysis* that are numerical in nature. These comprise the *scores* and *weights*, as well as the derived *uncertainties* and *ranks*.
Remote Interviewee	A *participant* being interviewed using the *MCM tool* remotely, with the *MCM interview* conducted over the telephone, by Skype, Google Hangouts or by other teleconferencing tools.
Rank	The overall performance of a particular *option* under the complete range of *criteria* that have been developed by an individual *participant*. It is calculated automatically by the *MCM tool* as the sum of the *scores* under individual *criteria*, each multiplied by the *normalized weighting* for that criterion. With caution, ranks may also be aggregated across different participants within a *perspective*. Details of the arithmetic behind the calculation of ranks are given in Annex X.
Report	An output of *MCM Analysis* which contains a *chart* and *text*.
Rescaling	The process of adjusting raw weights as entered by a *participant,* in order to express them as proportions of 100.

This leaves associated ranking patterns unchanged. It is different to the normalization of weights to give weightings and to calculate ranks from weighted scores.

Researcher

A member of the team involved in designing, implementing and interpreting an *MCM* exercise.

Scoping interview

An initial interview with a prospective MCM *participant*, carried out to check some basic design features of the ensuing *MCM* and inform the participant in advance of what the process will involve.

Score

The performance *assessed* by a participant for an individual *option* under a specific *criterion*. Where this is aggregated across groups of criteria, the component scores are weighted according to the appropriate criteria *weightings*. Details of the arithmetic governing how ranks are calculated from weighted scores are given in ANNEX X - EQUATIONS.

Snowballing

A process in which an initial set of potential MCM participants are consulted concerning possible further candidates that might help address gaps or redundancies in the initial set.

Text

An output of *MCM Analysis* which systematically orders all *qualitative data* relevant to particular selected *perspectives*, *issues* and *clusters*.

Transcripts

A verbatim written text recording the contents of an *audio recording* of an *MCM session*, for use in later *MCM analysis*

Uncertainty

The range between lowest and highest *score* for a particular *option* or *cluster* of options under an individual *criterion* or *issue*. Where this is aggregated, the scores defining the uncertainties are *weighted* according to the appropriate criteria *weightings*. This includes elements of both the *incertitude* and *variability* associated with individual *viewpoints*, but contrasts with *ambiguity*. Details of the arithmetic behind this are given in ANNEX X - EQUATIONS.

Variability

This relates to the *uncertainty* due to context-specific dependencies, as expressed in scoring by individual participants. In other words, this relates to the "it depends" factor (such as different scenarios or assumptions on geographical location, good or bad practice and so on). Variability differs from incertitude in that the participants do express knowledge over the conditions concerned.

Viewpoint

The totality of features of the *appraisal* elicited in an *MCM session* for a particular *participant* (or small group of *participants*), including all forms of resulting *quantitative MCM data* and *qualitative MCM data*.

Weight	The raw stage of a form of quantitative data elicited in *MCM*, reflecting the relative degree of importance assigned by a *participant* to different *criteria*. This may be expressed by the participant using whatever numbers they feel appropriate or *rescaled* to express these raw weights as proportions of 100.
Weighting	The *normalized* form of the raw *weights* assigned in the *MCM* process, reflecting the relative degree of importance assigned by a participant to different criteria. Weightings preserve the ratios of the raw weights, but sum to one for each *participant*. Details of the normalization process are given in ANNEX X - EQUATIONS.

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