Title	Trial of Multicriteria Mapping process and software in SEPA – SEWeb report		
Author	Melanie van Niekerk		
Version	1.0	**Date**	04/09/2015

LIFE10 ENV-UK-000182

Trial of Multicriteria Mapping process and software in SEPA

Using MCM to assess the most effective interventions for combatting or reducing waste related crime

Report to SEWeb on the trial of the Multicriteria Mapping process and software tool

Executive Summary

Multicriteria mapping (MCM) is a decision aiding tool that has been selected to meet part of Action 10 of the SEWeb LIFE project. This concerns developing a method to assess the effectiveness of environmental measures. MCM was chosen from a range of decision aiding tools, and the justification for this is described in a separate document[1].

MCM was trialled to establish the scope of its utility to SEPA and the SEWeb partnership. This was achieved through collaboration with SEPA's LIFE SMART waste project, with a focal goal to determine "what interventions are most effective in combatting or reducing waste related crime?" This document reports on the MCM process and software tool and discusses its potential usefulness to SEPA.

The findings of the trial to assess the effectiveness of measures to combat waste related crime are described more fully elsewhere[2].

The MCM software tool was well received and the MCM approach has many applications for decision aiding. Within the LIFE SMART waste project MCM could help deliver on identifying barriers to collaborative working and creating an interventions menu. It is also possible that MCM could be part of the next round of the State of Environment reporting process.

---

[1] Assessing the effectiveness of environmental improvement measures. Developing a toolkit to rank success and inform policy (CREW 2015)

[2] Trial of Multicriteria Mapping process and software in SEPA – using MCM to assess the most effective interventions for combatting or reducing waste related crime (SEPA 2015)

1. Introduction

Scotland's Environment Web (SEWeb) is an ambitious project that aims to be a one stop shop for all environmental matters in Scotland. It is also the means by which Scotland reports on the state of the environment. As part of this project there is a commitment (Action 10) to develop a method to assess the effectiveness of environmental measures. A measure is defined as any action put in place to achieve an environmental objective. SEPA commissioned the Centre of Expertise for Waters (CREW) to research the range of existing decision aiding methodologies and tools and put forward a recommendation for a product that would meet the SEWeb brief. This work is set out in a separate report[1] that includes a literature review of decision aiding tools, a description of the four shortlisted tools, a justification for the selection of Multicriteria mapping (MCM) and a description of MCM.

Multicriteria mapping[3] was selected from recommendations made in that report and has been used for a trial in SEPA. The subject area selected for the trial was waste crime as it offered the opportunity to link with another major project running in SEPA. This is LIFE SMART Waste, which sets out to find innovative methods to tackle waste related crime, and MCM could be used to assess the effectiveness of some of the measures. A team including representatives from both projects was established (Table 1) and the aims of the trial were agreed:

I. To use MCM for assessing the effectiveness of measures used to combat waste related crime; and
II. To work through an MCM process using the manual and software to determine whether it has potential for wider use.

The first aim is described in a separate report and this document sets out the findings of the second aim.

Table 1. Project team	
Melanie van Niekerk	State of Environment (SoE) Unit (SEWeb)
Nathan Critchlow-Watton	Manager SoE Unit (SEWeb)
George Hope	Intelligence analyst (LIFE SMART waste)
Cath Preston	Principal policy officer (LIFE SMART waste)

Summary of methods and results of the waste crime trial

The question being addressed in the MCM trial was **"What interventions are most effective in combatting or reducing waste related crime?"**

Seven participants were interviewed, representing perspectives from regulation, academia, local authority, waste management professionals and waste policy.

Interviews were arranged at a time and location to suit each participant and a briefing pack was sent to each participant beforehand. This contained a short description of MCM and a summary of the project.

---

[3] http://www.multicriteriamapping.com/

During the week of the interview most of participants were contacted by telephone to discuss the information in the briefing pack and address any queries regarding the interview process. Three participants did not receive this contact because they were not available before the interview date.

Interviews were carried out using the offline facility of the MCM software and then uploaded to the online project later. The MCM manual recommends recording the interviews and producing a transcript of each to be added to the analysis. This element of MCM was not used for the trial because resources were not available for transcribing the recordings. Wherever possible the interviewer made notes during the interviews to capture some qualitative information.

Participants were asked to assess six pre-selected waste crime interventions against criteria, which they had chosen. Overall, participants scored traditional, "hard" options of enforcement more highly than "soft" options of voluntary measures and education. Participant comments demonstrated concerns over the likely effect of measures at the top of the waste hierarchy suggesting a more nuanced approach to waste prevention and recycling and recovery may be needed. The results of the trial are written up in full elsewhere.

Summary of the MCM process and software tool

After the interview each participant was sent a questionnaire to rate their experience of the MCM process. Five of the seven participants returned the questionnaire. When asked about the pre-interview information four of the five were happy or neutral. One participant felt that the preparation was not adequate and crucially this person did not receive a phone call before the interview but relied only on the briefing pack. Whilst this briefing information was given positive reviews by other participants, it is clear that its value lies in combination with a discussion where the process can be clarified and specific uncertainties addressed.

Once the software had been downloaded it was simple to carry out the interview offline and then upload it to the online project later. The software is robust, intuitive and straightforward to use. All participants commented positively about the software tool. All were also happy that their perspectives had been captured by the process. Four of the five participants would be happy to take part in another MCM interview and the fifth was neutral on this question.

At the end of the interview participants were asked how they would have felt about the interview being recorded. The general feeling was neutral though there were some comments suggesting they would have felt less able to voice thought processes and less free to share some thoughts. The interview might therefore have taken longer and the data may have been less insightful as a result of self-censorship. Conversely it would have captured an extra narrative that may have been useful in itself. The MCM manual recommends that the interviewer makes notes during the interview. In practice this was difficult as it disrupted the flow where the participant was operating the software and it is recognised that recording interviews could be useful to capture this level of detail.

The MCM manual was more useful for the preparation and interview stages than for the analysis and more guidance by example could have been provided for the analysis work.

The results demonstrated a very wide range of uncertainty and variability between participants limiting the strength of any conclusions that could be drawn. With the benefit of hindsight it may have been useful to have framed the question more narrowly to allow participants to express a greater degree of certainty in their scores.

Minor issues with the software and general feedback on using MCM are has been sent to Sussex University (the developers of the system).

Benefits of MCM

The flexibility offered by MCM and the value it places on qualitative information are major advantages of this methodology over other decision aiding tools considered for the trial. MCM encourages project teams to explore conditions under which people agree or disagree about what is important and it opens up the decision making process rather than closing it down. Other factors in its favour are the low cost of a licence and the lack of any contract tie in. This means that SEPA could hold a licence only when running a project. The MCM team at Sussex University also undertake to archive projects so that they can be revisited. The MCM website gives an aim of offering this service permanently but they reserve the right to delete accounts that have been inactive for a year. All project data can also be exported.

One alternative approach to this work would have been to hold a workshop to which all participants were invited. Participants were asked at the end of the MCM interview if they would have preferred a workshop and all commented that the structured interview approach of MCM was preferable. They felt that their perspective was captured more fully than would have been the case in a workshop. Also some of the participants remarked that it is usual for managers rather than operational staff to attend workshops and this would not have elicited the range of opinion gathered using MCM.

Limitations

MCM interviews for this trial took between one and half hours and two and a half hours with the six core options. The time commitment on the interviewer necessary to assess a longer set of options with a larger group of participants might prove to be excessive and this must be taken into account when deciding whether to use MCM. The nature of the focal goal must be carefully considered to determine whether MCM is the best means of addressing the issue. For the purposes of the SEPA trial all engagements were carried out as one to one interviews and it has not been tested in a group or workshop format.

The range of analysis offered by the MCM software is limited, for example it does not generate rankings of combinations of options or criteria. However the overall effect is to encourage the researcher to adopt a conservative approach so that conclusions drawn from the data do not exceed their statistical confidence limits. Conclusions from this analysis are good for shedding light on alternative ways forward and developing understanding rather than generating "an answer".

Although the individual nature of the process eliminates the need to organise workshop dates to suit a large number of people, it can be more time consuming for the interviewer to meet with each

participant individually and this must be factored in at the project planning stage. Multiple times and venues also place an extra pressure on the project team.

Conclusions and next steps

Multicriteria mapping offers a transparent and cost effective way of gathering and analysing combinations of qualitative and quantitative data. It was selected for trial in SEPA as it met the criteria of Action 10 of the SEWeb project - to find a means of assessing the effectiveness of environmental measures. Although certain caveats have to be recognised (see above) the outcomes of the MCM trial in SEPA have proved very positive and the recommendation is that it could be used more widely. Within the LIFE SMART waste project MCM could help deliver on identifying barriers to collaborative working and creating an interventions menu. It is also possible that MCM could be part of the next round of the State of Environment reporting process. Thus although we have not assessed the effectiveness of all environmental measures in Scotland as originally proposed in the SEWeb LIFE bid, we have taken a more targeted approach that is providing a better quality end product for longer term and wider application of the methodology.

MCM fills a gap in providing a systematic means of collecting and analysing qualitative data that is transparent and robust yet simple to use and inexpensive. MCM is flexible enough to be used to rank and prioritise existing measures and also to consider which measures might be most likely to succeed in future. In this respect it offers a very attractive way of approaching both types of decision in a consistent and transparent fashion. It encourages a deliberative approach to decision making and problem solving and recognises that there may not be a single "answer". For some decision makers this may require a departure from their usual decision making methods and time to work with them on this transition should be built into a project if necessary.