Getting Started with Cognitive Mapping

By Fran Ackermann[1], Colin Eden and Steve Cropper

Abstract

Cognitive Mapping is a technique which has been developed over a period of time and through its application has demonstrated its use for Operational Researchers working on a variety of different tasks. These tasks include; providing help with structuring messy or complex data for problem solving, assisting the interview process by increasing understanding and generating agendas, and managing large amounts of qualitative data from documents. Whilst Cognitive Mapping is often carried out with individuals on a one to one basis it can be used with groups to support them in problem solving.

This tutorial aims to:

- explain why Operational Researchers might wish to use Cognitive Mapping

- give some ideas as to how it has been used

- provide participants with practical experience of the technique

Introduction

Cognitive Mapping may be used for a variety of purposes although a "problem" of some sort usually forms the focus of the work. It is a technique used to structure, analyse and make sense of accounts of problems. These accounts can be verbal - for example, presented at an interview, or documentary. Cognitive mapping can be used as a note-taking method during an interview with the problem owner and provides a useful interviewing device if used in this way. Alternatively, it can be used to record transcripts of interviews or other documentary data in a way that promotes analysis, questioning and understanding of the data.

The technique is founded on George Kelly's theory of personal constructs (Kelly 1955) and the principles of cognitive mapping indicated below reflect our reading of that theory. The theory suggests that we make sense of the world in order to predict how, all things being equal, the world will be in the future, and to decide how we might act or intervene in order to achieve what we prefer within that world - a predict and control view of problem solving.

---

[1]Fran Ackermann is a Professor in the Department of Management Science and Colin Eden is a Professor in the Graduate School of Business at the University of Strathclyde. Dr Steve Cropper is a Reader in Manaement in the Centre for Health Planning and Management at the University of Keele.

Why might Operational Researchers use Cognitive Mapping

Regardless of the Operational Research technique being applied, being able to understand the client's perception of the problem is vital to the success of an OR intervention. Cognitive mapping, by producing a representation of how the client thinks about a particular issue or situation, can thus act as a valuable technique for helping Operational Researchers. The technique's ability to help structure, organise and analyse data enable both the client and the analyst together to begin to negotiate a suitable direction forward. Whilst being an integral part of the SODA methodology (Eden 1990) creating a map of the perceptions of the client or group may act as a precursor to other forms of analysis with great effect.

As mentioned above, Cognitive Mapping allows users to structure accounts of problems. As such it may provide valuable clues as to the client's perceptions of the problem giving indication as to where the "nub(s)" of the issue may lie. Aims and objectives can be identified and explored, options examined to see which are the most beneficial and whether more detailed ones need to be considered. Dilemmas, feedback loops and conflicts can be quickly distinguished, explored and worked upon. Moreover, it may increase the user's understanding of the issue through the necessity of questioning how the chains of argument fit together and determining where isolated chunks of data fit in. Finally, it may act as a cathartic medium for interviewees who, through the process of explaining the ideas and how they fit together, begin to gain a better understanding of the issue.

The technique has thus been seen as aiding the interview process. Through capturing the chains of argument and linking the together insights into the nature of the issues are acquired. In addition the technique can help set an agenda for the interview. If an idea is isolated - either due to a change in direction of the discussion or the mapper missing the clue - it can be easily identified and act as a prompt for further questions. This is a clear benefit over linear notes which can often contain ideas with little in the way of explanation as to why they were raised. Maps may also act as prompts when attempting to capture individual or organisational aims or objectives.

Using the technique in a group environment the facility to "weave" together with the ideas and views captured in the individuals' maps acts as a powerful device. Members are able to see their ideas, in the context of others, thus increasing their understanding of others' points of view, alternative options and belief systems. Producing these "group" maps so that the ideas are presented anonymously can help the group judge ideas on merit alone rather than their proponent's status or charisma. Furthermore the increased understanding from a group map provides the group with an emerging common language through which they can begin to agree a view of the problem.

Interviews using cognitive mapping have often been used to facilitate data collection especially for those problems which involve messy problems around internal issues - for example dealing with the management of a central service. By informing group members that the map will be treated in confidence and all the data kept anonymous, members feel more able to raise those issues they feel are important without having to consider the political ramifications to the same extent. Maps have also been used for strategy development (Eden and Ackermann 1992) and individual problem solving (Eden 1991). Both these benefit from being able to structure the data, analyse the maps and provide potential action plans. Although maps may appear strange initially to the interviewee, "ownership" of the data helps considerably in understanding the map format. Where cognitive mapping has been used for document analysis (Cropper et al 1990, Ackermann et al 1990) it has been possible to identify emergent key issues, check for possible loops and explore the structure and thus test coherency.

What are some of the difficulties?

Cognitive Mapping like any skill, for example riding a bicycle, takes time to learn and first attempts are often time consuming, messy and discouraging. From observations gained from teaching cognitive mapping to a large number of people, certain traits have become evident and some of these will be discussed below to (hopefully) encourage future mappers.

Firstly the mapper often finds it difficult to both listen and understand what is being told him/her whilst trying to remember all the guidelines for creating maps. The result usually is either giving up with the map and making straightforward notes or missing important points of view. One suggestion often made to counter-act this is to try practising mapping in environments where the outcome is not important - for

example an informal meeting between colleagues. This will give valuable experience whilst keeping it in a low risk environment. Another trait is the length of time taken to create a map - this is especially the case if the mapper is practising from documents - which may lead to discouragement. This is also normal and with practice reduced although some of the time spent is through getting a better understanding of the issue. Controlling the speed of verbal information rather than being overwhelmed is also important. Feeding back the ideas to the client/interviewee not only provides the mapper with a chance to catch up with the map but also acts as a useful validating process to ensure that the views have been captured correctly.

Another difficulty experienced by novice mappers is, that attempting to write everything said by the interviewee verbatim, leads to several appearances of a single idea. This happens when the interviewee, in elaborating an issue, mentions the issue itself several times (sometimes with slightly changed wording) which is then duly recorded. Rather than writing the issue down several times - a time consuming activity - it is more beneficial to link all the strands into the one issue. This provides the mapper with a map in which a quick look will identify those areas which have been elaborated - key points - useful especially when summarising. Care nevertheless needs to be taken to ensure that the interviewee is talking about the same issue.

Paper management is also important. Whilst it is recommended to place concepts into rectangular blocks of text and to start mapping two thirds up the page (see guideline 12) trying to keep the map on one piece of paper and maintaining a single direction of writing are also important. Keeping the map on one sheet of paper allows all the cross links to be drawn rather than having to try to move between different pages - again time consuming - and increasing the chance of missing things. If the mapper writes in fairly large script, although A4 paper is recommended (it is easier to manage), using a sheet of A3 rather than two A4 sheets may well facilitate the mapping process. Writing in the same direction, whilst sounding trivial, is often eschewed as mappers squeeze ideas into the map writing at all angles. Whilst this might facilitate getting all the data onto one page, reading the ideas becomes difficult if not impossible.

We often suggest that the map be shared with the interviewee. This is often met with incredulity as the maps, especially at the beginning, are messy and complex. However, it has been noticed that where the data belongs to the client/interviewee then the "mess" becomes immaterial as soon as the structure is explained. From being able to share, not only is the map validated and elaborated, but also the client/consultant relationship is enhanced as the map becomes a shared document rather than a set of notes belonging to the mapper. As such sending a copy of the map generated from a meeting/interview has often provided the stimulus for further work and is used quite explicitly by some consultants as a means for getting a foot in the door.

How to "map"

The technique works by applying the following disciplines:

> an account of a problem is broken into its constituent elements - usually distinct phrases of 10-12 words which retain the language of the person providing the account. These are treated as distinct concepts which are then reconnected to represent the account in a graphical format. This reveals the pattern of reasoning about a problem in a way that linear text cannot.

> a pair of phrases may be united in a single concept where the one provides a meaningful contrast to the other; i.e. where the contrast allows the user to make and retain a better sense of the other phrase. These phrases are constructs: meaning is retained through contrast.

> the distinct phrases are linked, each to related others, to form a hierarchy of means and ends. This involves deciding on the status of one concept relative to another. There are a number of categories or levels defined in a notional hierarchy that help the user to make such decisions. Meaning is retained through the context.

The application of these disciplines to accounts of problems requires practice and an adherence to the guidelines set out below. These are intended to help both new and existing users of the technique.

These guidelines however, are not a recipe which will allow any user to produce the 'right' model of any given account of problem. There is no definitive map of an account. Models of an account of a problem

produced by different users will differ according to the interpretation of the data made by each individual user. Mapping is in this sense an inexact science. Cognitive mapping and the guidelines set out below merely form a prop to individuals' interpretations of the data they have available. Nevertheless it provides a powerful way of thinking about, representing and asking questions of an account.

Whether the information is generated through an interview or is provided in a documentary form, the same basic guidelines apply when using cognitive mapping for problem solving purposes. Using the text below as an example this guide will try to demonstrate some of the guidelines employed by those using Cognitive Mapping. The most important guidelines have been extracted throughout the text and highlighted. They are listed at the end of the guide.

Example (taken from an interview transcript)

> "We need to decide on our accommodation arrangements for the York and Humberside region. We could centralise our service at Leeds or open local offices in various parts of the region. The level of service we might be able to provide could well be improved by local representation but we guess that administration costs would be higher and, in this case, it seems likely that running costs will be the most important factor in our decision. The office purchase costs in Hull and Sheffield might however be lower than in Leeds. Additionally we need to ensure uniformity in the treatment of clients in the region and this might be impaired by too much decentralization. However we are not sure how great this risk in this case; experience of local offices in Plymouth, Taunton and Bath in the south-east may have something to teach us. Moreover current management initiatives point us in the direction of greater delegation of authority."

The above information could have been the basis of a verbal discussion or part of a written note. In this case it is an extract from an interview. In interviews we build up a map as we go and the emerging map is an integral part of our interviewing technique. In the case of documents it is generally helpful to first read through the entire text before starting to map in order to gain an overall understanding of the issue. There are two important acts of analysis to which the mapper should attend in starting work on interview or documentary data. Firstly, mapping works by representing the problem or issue of concern as a series of short phrases, each of these essentially a single idea, or concept. The first act, then, is to separate the sentences into distinct phrases.

Guideline 1

Separate the sentences into distinct phrases. These phrases are likely to be no more than about 10-12 words long.

Secondly, mapping is most effective when the mapper has a way of sorting the concepts into types of concept - we use the idea of layers in a hierarchy to sort concepts. The layers we often use are simply Goals (at the top), Strategic Directions, Potential Options

Guideline 2

Build up the hierarchy. Get the structure of the model right. By placing the goals (often motherhood & apple-pie type statements e.g. increase profit and growth) at the top of the map and supporting these first with concepts indicating strategic direction and further on with potential options.

In practice, this is perhaps best achieved by identifying, first of all, those concepts which you feel are "goals" (often inevitably broad statements of intent, all encompassing, or 'motherhood and apple-pie') at the "top of the hierarchy". Goals are those things that are regarded as 'good things per se' by the problem owner, that is they are not seen as an option. Goals are often spotted from the non-verbal language of the problem owner such as intonation and body language - they become more emphatic and express them as if there were no discussion about their 'goodness'. They are thus often relatively difficult to spot when working with text. Goals are useful to the mapper because they act as points of integration and differentiation. These points of reference provide structure to the cognitive map as it is built up. It is Important to note that although these are of primary interest they are not usually mentioned in the beginning of the discussion/text and therefore need to be identified and extracted further on.

Guideline 3

Watch out for goals. These will end up at the 'top' of the map - the most superordinate concepts. It can help to mark them as goals when writing them down.

In the above text it seems likely that "improved level of service" and something other than "higher administration costs" are goals.

Supporting these goals are usually a set of key, often "strategic" directions, which usually relate to one or more of the goals [see diagram 1]. The example text is very short and it is therefore difficult to distinguish strategic directions from options with confidence. It is likely that the location of the offices ("centralise service at Leeds" rather than "open local offices") is not a goal but a direction that has strategic implications and would need to be supported by a portfolio of options [see diagram 1].
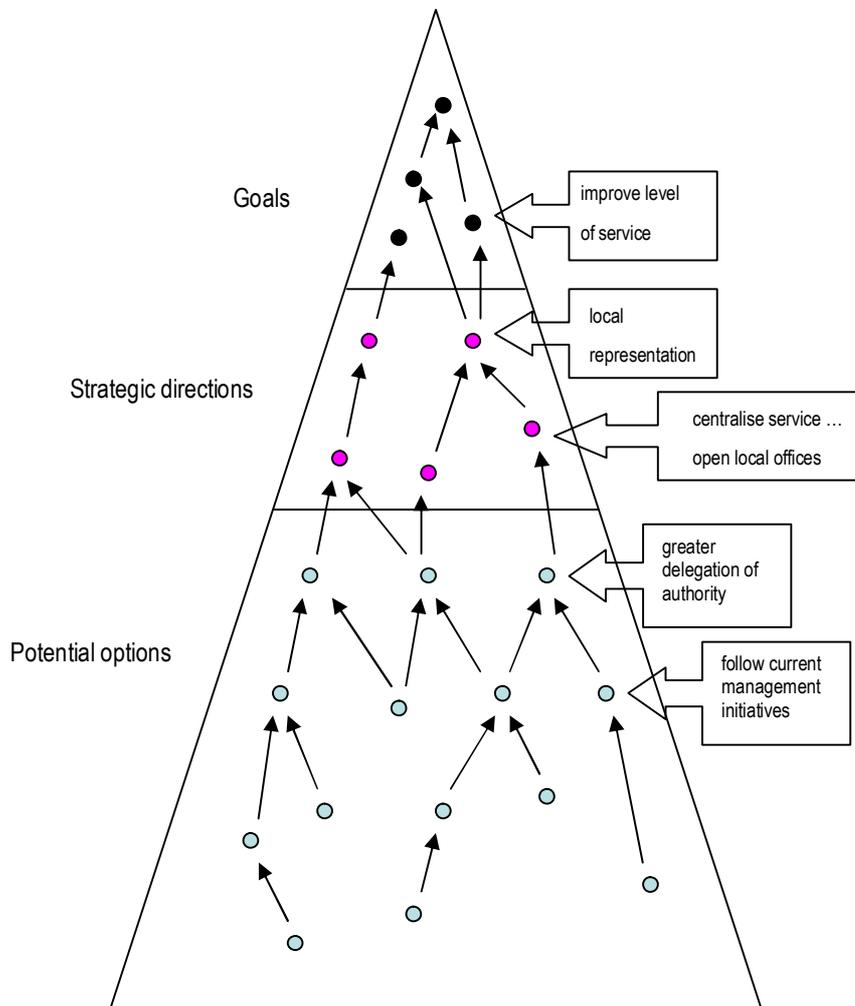
Diagram 1: An example of the structure of a Cognitive Map

Guideline 4

Watch out for potential "strategic directions" by noting those concepts that have some or all of the following characteristics: long term implications, high cost, irreversible, need a portfolio of actions to make them happen, may require a change in culture. They often form a flat hierarchy themselves but will be linked to Goals (above) and Potential Options (below).

Beneath these key issues are portfolios of potential "options" which explain (and thus suggest potential solutions to) the key issues to which they are linked. Further 'down' the map these options will become

increasingly detailed. The links joining the concepts together should be interpreted as 'may lead to', or 'may imply'. One concept will thus explain how another might come about or be a possible means of achieving an option. For example, "night" may lead to "put lights on"; or "press switch" might lead to "put lights on".

Below, we have marked the example text following what we have found to be a useful initial coding technique. Slashes show where the text has been broken into its constituent concepts - a single slash / indicates the start of a phrase; a double slash // indicates the end of a phrase. Possible goals are italicised and marked with a "G".

"We need to decide on our accommodation arrangements for the York and Humberside region. We could /centralise our service at Leeds// or /open local offices// in various parts of the region. The /level of service we might be able to provide could well be improved G// by /local representation// but we guess that /administration costs would be higher// and, in this case, it seems likely that /running costs// will be the most important factor in our decision. The office /purchase costs in Hull and Sheffield// might however be lower than in /Leeds//. Additionally we need to /ensure uniformity in the treatment of clients// in the region and this might be /impaired// by /too much decentralization//. However we are not sure how great this /risk// in this case; /experience of local offices in Plymouth, Taunton and Bath in the South East may have something to teach us//. Moreover /current management initiatives// point us in the direction of /greater delegation of authority//."

The translation of an account like this into a map is not always totally straightforward. We talk and write in ways which need to be "interpreted" into map form. For example, concepts will often be adaptations of the phrases we initially identify. This translation is a central part of the technique. There are guidelines which explain this translation process below. But the following list of concepts illustrates how we have tackled the example text.

- centralise our service at Leeds...open local offices

- improve the level of service we provide

- local representation

- higher administration costs

- [increased] running costs

- lower purchase costs of offices in Hull and Sheffield and Harrogate...higher cost in Leeds

- ensure uniformity in the treatment of clients

- [lack of understanding about risk]

- too much decentralization

- use experience of local offices in SE eg Plymouth, Taunton and Bath

- follow current management initiatives

- greater delegation of authority

We are now in a position to start developing a map. Firstly, though, it is worth explaining some aspects of our coding into phrases.

We have taken our starting phrase as

<div align="center">
centralise our
service at Leeds
</div>

Although the first part of text mentioned the need to decide on the accommodation arrangement for the York and Humberside region we have taken this to be the 'title' of the discussion and therefore have not included it in the map itself. It might be used explicitly as the title of the map. Or it might conceivably be a part of another map focusing on issues to do with the process of deciding. We have concentrated in this map on the considerations that are being brought to bear in this decision since that is what this snippet of text contains.

Further on in the text it becomes apparent that there is an alternative to "centralise service at Leeds" which is "open local offices in various parts of the region". Mapping is designed to highlight such contrasts since they can represent significant choices. The concepts which form the basis of a map are bi-polar - that is, they will contain two phrases, each phrase forming a "pole". The contrasting pole is not always mentioned immediately alongside the first pole but may be emerge later on in the discussion. The convention of a series of three dots (an ellipsis) is used to represent the phrase "rather than" and to separate one pole from the other.

With the choice here seemingly about local offices rather than centralisation, this is represented as

centralise our
service at Leeds …
open local offices

Guideline 5

Look for opposite poles. These clarify the meaning of concepts. Contrasting poles may be added to the concept later on in the interview when they are mentioned. In cases where the meaning of a concept is not immediately obvious, try asking the problem owner for the opposite pole. Alternatively put the word 'not' in front of the proffered pole. In interviews we ask the question "rather than" - doing so often suggests the more likely psychological contrast implied by the problem owner.

The first concept "Centralise the service at Leeds rather than open local offices" has been captured in an imperative form. Mapping is intended to impose an "action oriented perspective" onto the concept thus making it something that the problem owner can go and do as a possible part of the solution to the problem. The meaning of a concepts stems in part from the actions it suggests you should take. In principle, all concepts can be thought of as an option - something which could be done or which suggests action. Thinking about a problem in this manner therefore invokes a more dynamic representation. This dynamism is achieved by placing the verb at the beginning of the concept for example "ensure ..., provide ..., increase ....". However, where no action is specifically mentioned or the concept is lengthy it is possible to make the concept actionable without the verb. The action is simply implied. Thus the action orientation of mapping is as much as a way of interpreting, firstly the raw data, and secondly the map itself as an explicit modelling technique to be followed with care. An example of this is in the case of "local representation". Although the concept does not have a verb attached to it, it is easy to understand that moving to local offices may lead to improved level of service.

Guideline 6

Add meaning to concepts by placing the concepts in the imperative form and where possible including actors and actions. Through this action perspective the model becomes more dynamic.

An important point is to abbreviate the constructs as little as possible. In particular, do not leave out the name of the person, group or organisation responsible for or affected by the option. This not only reduces misunderstanding but also increases the problem owner's ownership of the map by using his/her natural language.

Guideline 7

Retain ownership by not abbreviating but rather keeping the words and phrases used by the problem owner. In addition identify the name of the actor(s) who the problem owner states and incorporate them into the concept text.

Having captured the first concept, in a bipolar manner and using an action orientation, let's develop the map further. We will start now to make links between concepts to form chains of reasoning about the problem.

The next sentence in the example mentions that the level of service could be improved by local representation ... There seems to be an implication that "centralise service" rather than "open local offices" is one possible way of achieving "[not] local representation". "Local representation" is seen as the

desired outcome, and "open local offices" as a possible option to achieve it. This can therefore be mapped as:

local representation

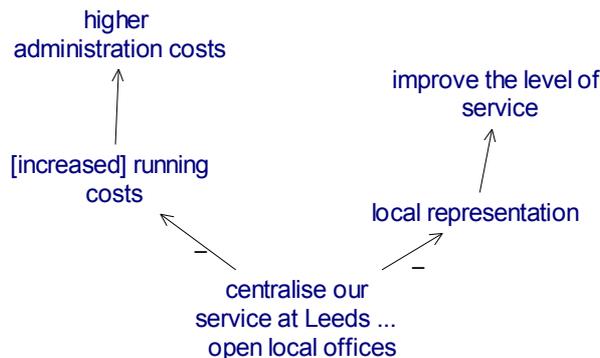centralise our
service at Leeds ...
open local offices

Guideline 8

Identify the option and outcome within each pair of concepts. This provides the direction of the arrow linking concepts. Alternatively think of the concepts as a 'means' leading to an 'desired end'. Note that each concept therefore can be seen as an option leading to the superordinate concept which in turn is the desired outcome of the subordinate concept.

When coding, it is important to try to avoid phrases beginning with 'need...', 'ought...', 'must...' or 'want...'. These cause problems later, when deciding which of a pair of concepts is the means and which is the end. For example, "we need a new computer to sort production problems" might suggest that buying a new computer is a goal, whereas it is more likely to be one option for sorting production. Rather than use these words which imply "desires", write concepts as actions.

Moving further on with the example, it continues: "administration costs will be higher". Through admitting that "running costs" are the most important factor it is possible to infer that one of the goals of the problem owner is to reduce or keep low administration costs because running costs contribute directly to administrative costs. Opening local offices may lead to higher administration costs as seen below:

higher
administration costs

improve the level of
service

[increased] running
costs

local representation

centralise our
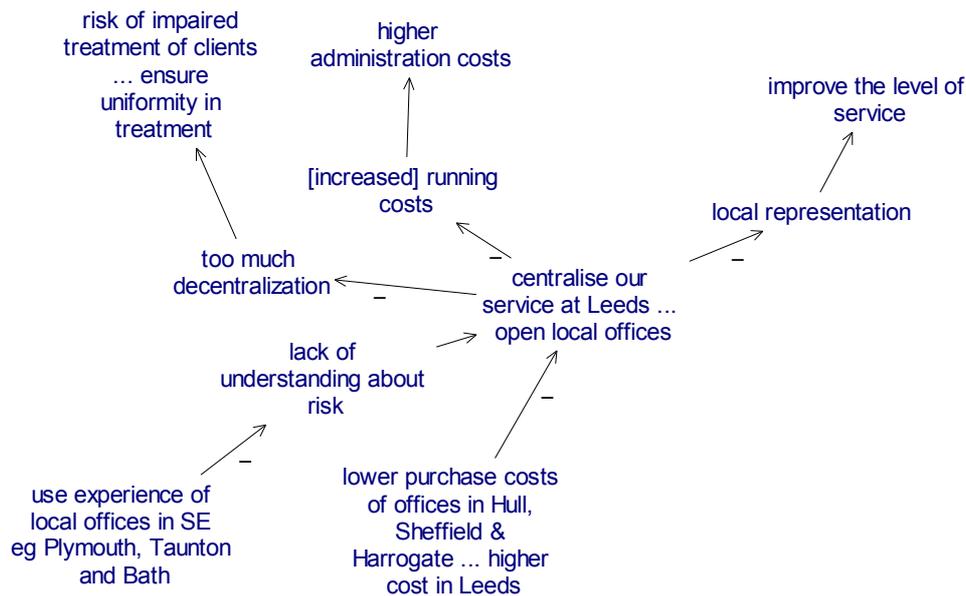service at Leeds ...
open local offices

Guideline 9

Ensure that a generic concept is superordinate to specific items that contribute to it. Generic concepts are those for which there may be more than one specific means of achieving it. This follows Guideline 8 and helps ensure a consistent approach in ordering the data into a hierarchy.

Next it is mentioned that office purchase costs in Hull and Sheffield may be lower supporting the move to "open local offices". This provides the problem owner with an explanation whereas both "local representation" and "higher administration costs" were consequences of "open local offices". Again it is possible to add to this new concept the contrasting pole of "higher cost in Leeds".

A new topic is now introduced into the text, uniformity of treatment. The text suggests that this may be impaired through decentralisation however there is little understanding about the risk that may be encountered but they could learn from the experience in the South West. This is mapped as over the page:

risk of impaired
treatment of clients
... ensure
uniformity in
treatment

higher
administration costs

improve the level of
service

[increased] running
costs

local representation

too much
decentralization

centralise our
service at Leeds ...
open local offices

lack of
understanding about
risk

use experience of
local offices in SE
eg Plymouth, Taunton
and Bath

lower purchase costs
of offices in Hull,
Sheffield &
Harrogate ... higher
cost in Leeds

The link between "use experience of local offices" and "lack of understanding about risk" is a negative link. It is suggesting that "use experience of local offices" leads to [not]"lack of understanding about risk". As with the concept "open local offices" the concept concerning "uniformity" is bipolar as both poles have been stated in the text. Keep the first-stated phrase as the first pole of a concept even if this means that some negative links are required. It is sometimes interesting and informative to look at the list of concepts one pole at a time. We sometimes distinguish between two types of person - those for whom the world is "tumbling down" and those who have a clear vision of where they want to be. Those whom the world is "tumbling down" upon usually describe their problems in a negative manner mentioning aspects such as overwork. An example from the text may be "too much centralisation". Those having a clear vision of where they want to be tend to express their ideas in a more positive form for example improve level of service. A look at the first poles of the concepts can help to identify whether the person to whom the map belongs is of one type or the other.

Guideline 10

It is generally helpful to code the first pole as that which the problem owner sees as the primary idea (usually this is the idea first stated). The first pole of a concept is the one that tends to stand out when reading a map. A consequence of this is that links may be negative even though it would be possible to transpose the two poles in order to keep links positive.

Finally the last sentence concerning current management initiatives pointing in the direction of greater authority. Although the text states that "following current management initiatives" may lead to "greater delegation of authority" it does not suggest why the problem owner may want this delegation. The two concepts would therefore become an island, a group of isolated concepts linked together. This island could

be further explored in an interview and cross-linked into the rest of the map where appropriate. In the case of documentation however, some judgement by the mapper has to be made as to why this statement has been made and in this case it has been interpreted as an explanation for "open local offices". The map is now complete and looks like this:
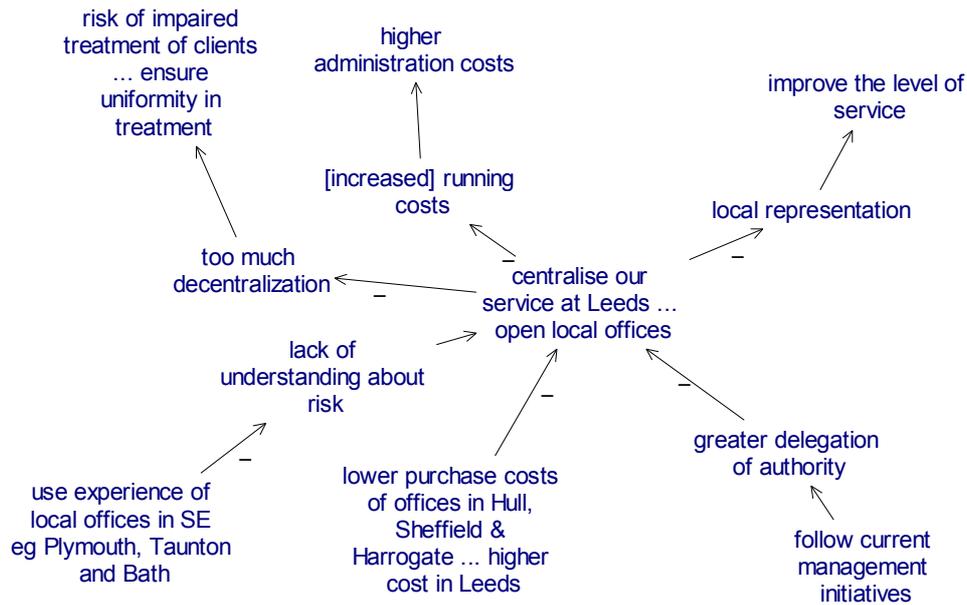
This linking of islands or isolated concepts is important as it ensures a more integrated picture of the problem. However the problem owner often doesn't say, or even know, how some parts of what he/she says are linked.

Guideline 11

Tidying up can provide a better more complete understanding to the problem. But ensure that you ask why isolated concepts are not linked in to the main part of the map - often their isolation is an important clue to the problem owner's thinking about the issues involved.

Guideline 12

Practical Tips for Mappers. Start mapping about two thirds of the way up the paper in the middle and try to keep concepts in small rectangles of text rather than as continuous lines of text. If it is possible ensure the entire map is on one A4 sheet of paper so that it is easy to cross link things (30-40 concepts can usually be fitted onto a page). Thus pencils are usually best for mapping and soft, fairly fine (e.g. 0.5mm) propelling pencils are ideal.

References

Ackermann, F., Cropper, S., Cook, J. and Eden, C (1990) "Policy Development in the Public Sector: An Experiment, Working Paper No 89/2, Department of Management Science, University of Strathclyde.

Cropper S., Eden, C. and Ackermann, F. (1990) "Keeping Sense of Accounts Using Computer-Based Cognitive Maps", Social Science Computer Review, 8 345-366.

Eden, C. (1990) "Using Cognitive Mapping for Strategic Options Development and Analysis (SODA)" in J. Rosenhead (Ed) Rational Analysis for a Problematic World. Wiley: Chichester.

Eden, C. (1991) "Working on Problems Using Cognitive Maps" in Shuttler and Littlechild (Eds)

Eden, C. and Ackermann, F. (1992) "Strategy Development and Implementation - the role of a Group Decision Support System" in S. Kinney, B. Bostrom and R. Watson (Eds) Computer Augmented Teamwork: A Guided Tour. Van Nostrand: New York.

Kelly, G. (1955) The Psychology of Personal Constructs. Norton: New York.

Getting Started with Cognitive Mapping

By Fran Ackermann, Colin Eden and Steve Cropper

Guideline 1

> Separate the sentences into distinct phrases. These phrases are likely to be no more than about 10-12 words long.

Guideline 2

> Build up the hierarchy. Get the structure of the model right. By placing the goals (often motherhood & apple-pie type statements e.g. increase profit and growth) at the top of the map and supporting these first with strategic direction type concepts and further on with potential options.

Guideline 3

> Watch out for goals. These will end up at the 'top' of the map - the most superordinate concepts. It can help to mark them as goals when writing them down.

Guideline 4

> Watch out for potential "strategic issues" by noting those concepts that have some or all of the following characteristics: long term implications, high cost, irreversible, need a portfolio of actions to make them happen, may require a change in culture. They often form a flat hierarchy themselves but will be linked to Goals (above) and Potential Options (below)

Guideline 5

> Look for opposite poles. These clarify the meaning of concepts. Contrasting poles may be added to the concept later on in the interview when they are mentioned. In cases where the meaning of a concept is not immediately obvious, try asking the problem owner for the opposite pole. Alternatively put the word 'not' in front of the proffered pole. In interviews we ask the question "rather than" - doing so often suggests the more likely psychological contrast implied by the problem owner.

Guideline 6

> Add meaning to concepts by placing the concepts in the imperative form and where possible including actors and actions. Through this action perspective the model becomes more dynamic.

Guideline 7

> Retain ownership by not abbreviating but rather keeping the words and phrases used by the problem owner. In addition identify the name of the actor(s) who the problem owner states are implicated and incorporate them into the concept text.

Guideline 8

> Identify the option and outcome within each pair of concepts. This provides the direction of the arrow linking concepts. Alternatively think of the concepts as a 'means' leading to an 'desired end'. Note that each concept is therefore can be seen as an option leading to the superordinate concept
>
> which in turn is the desired outcome of the subordinate concept.

Guideline 9

> Ensure that a generic concept is superordinate to specific items that contribute to it. Generic concepts are those for which there may be more than one specific means of achieving it. This follows Guideline 8 and helps ensure a consistent approach to building the data into a hierarchy.

Guideline 10

It is generally helpful to code the first pole as that which the problem owner sees as the primary idea (usually this is the idea first stated). The first poles of a concept tend to stand out on reading a map. A consequence is that links may be negative even though it would be possible to transpose the two poles in order to keep links positive.

Guideline 11

Tidying up can provide a better more complete understanding to the problem. But ensure that you ask why isolated concepts are not linked in - often their isolation is an important clue to the problem owner's thinking about the issues involved.

Guideline 12

Practical Tips for Mappers. Start mapping about two thirds of the way up the paper in the middle and try to keep concepts in small rectangles of text rather than as continuous lines of text. If it is possible ensure the entire map is on one A4 sheet of paper so that it is easy to cross link things (30-40 concepts can usually be fitted onto a page). Thus pencils are usually best for mapping and soft, fairly fine (e.g. 5mm) propelling pencils are ideal.

Near the beginning of this guide, we stated that

"the guidelines are not a recipe which will which will allow any user to produce the 'right' model of any given account of problem. There is no definitive map of an account. Models of an account of a problem produced by different users will differ according to the interpretation of the data made by each individual user. Mapping is in this sense an inexact science. Cognitive mapping and the guidelines set out below merely form a prop to individuals' interpretations of the data they have available. Nevertheless it provides a powerful way of thinking about, representing and asking questions of an account.

On the next page you will find another block of text on which to practice the mapping technique. Have a shot at building a map from the text. As a rough guideline, it is possible to find as many as 50 concepts in the text, although many people who are new to mapping find considerably fewer. Good Luck.

Sample Text

A specialist in corporate identity can not advise on criminal law reform. But he or she can at least point to the problems, and consider how the police could better distinguish their own identity from the unwelcome law they enforce: especially when government throws miners' and printers' disputes and 'New Department of Transport Crackdowns' at the collective helmeted head of the unfortunate Met.

Added to concern about the tasks that our police take on, is concern about the way some are performed. That officers can be gratuitously offensive and sometimes take 'short-cuts' is widely believed. I was taken aback to find, among lawyer friends, that none doubted that the Met sometimes fabricate evidence. Most added that the police only do this when they are sure (usually correctly) that the suspect is guilty of something. This view has gained ground just when (the Met believe) the problem is diminishing. But what can Wolff Olins do? 'Polish up the coppers' tarnished image' was the remit the newspaper headlines suggested. It's doubtful whether a new logo, a soft cloth and a tin of Brasso are powerful enough to fit the bill.

To these underlying problems we shall return; but are there 'cosmetic' hints that Wolff Olins could give that might still be helpful? Robin Goodfellow mentioned vehicle livery. But what about uniform? Ironically, the uniform is almost the most positive part of whatever 'corporate identity' the police already have. The public likes it - especially the helmet - but officers don't. Everyone, without exception, had a criticism. The men said that, although their 'picturesque' helmets may be the epitome of the friendly copper's image, they were hopelessly impractical. 'Try running in one: it falls off!' Another said that, given the constricting uniform, it was hard to run at all, let alone fast enough for the helmet to fall off: "The trouser-cuffs are useful though: they are so wide you can knock people down with them!"

A woman officer objected to the obligatory handbag: 'Useless! Men have pockets. But when I face trouble the first thing I must do is look for somewhere to put my bag.' All complained about the personal radios: 'Battery-packs are heavier than truncheons. They injure you if you fall on them'. One officer was told to carry the pack on her waist rather than on her back, as 'a hip injury isn't so serious as a damaged spine'. Sometimes a conflict surfaces between how officers want to see themselves and how the public prefers to see them: a worrying undercurrent illustrated by the junior who told me he admired the 'more businesslike' uniform of the New York cops.

This conflict also arises in the appearance of police stations. They look and feel like barracks, not points of public service. Many are in the most unlikely places, yet it is rare to find signs pointing the way. Older stations display little more than the words 'Metropolitan Police' in tiny soiled letters: and, perhaps, a small, blue, dust-covered lamp.

Lack of proper waiting area in many stations reflects the approach. At one, I saw people huddled together, peering through a doorway. The researcher who waited half an hour was lucky. Many wait longer. Delays may be unavoidable but there must be a case for better use of the Met's civil staff handling straightforward cases. Rectifying such problems could be one of Wolff Olins' easier recommendations. Rectifying the inward-looking and defensive attitude which has led to them could be harder.

Even within the organisation there are outsiders: a huge body of civil staff whose office-work for the Met goes mostly unnoticed. One constable told me they are regarded as inferior: not full members of the Met team. Andrew Brown, whose book Watching the Detectives analyses his four-month stint with London's police, speaks of a stone-age attitude to 'pen-pushers'. Many officers have to type, but can't and won't learn. This gritty, one-fingered image wastes hours. And I do mean one-fingered!' Apparently, only pansies use two. The same macho image can undermine the status of women officers.

This military atmosphere stems partly from the hostility that officers inevitably encounter and the dangers they face. It raises barriers, which, though they look unfriendly, do protect internal morale. Public criticism, even when meant constructively, can reinforce those barriers. It cannot be said too often that the Met feels deeply misunderstood.

Perhaps the 'closed-team' atmosphere is inevitable. But teams can be happy and Wolff Olins must consider why the Met are not.