# Concept Mapping Workshop: Sydney Community Group

Project C7 (Development of an Evaluation Framework for Community Safety Policy and Programs for Bushfire) team members:

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Concept mapping workshops have been held across Australia with the aim of eliciting the views of fire agency personnel and community members views on what changes and improvements should occur to make residents and their neighbourhoods safer from bushfires. The Project C7 team thanks all who participated in these workshops.

# Concept Mapping: Method

## The Overall Concept Mapping Process

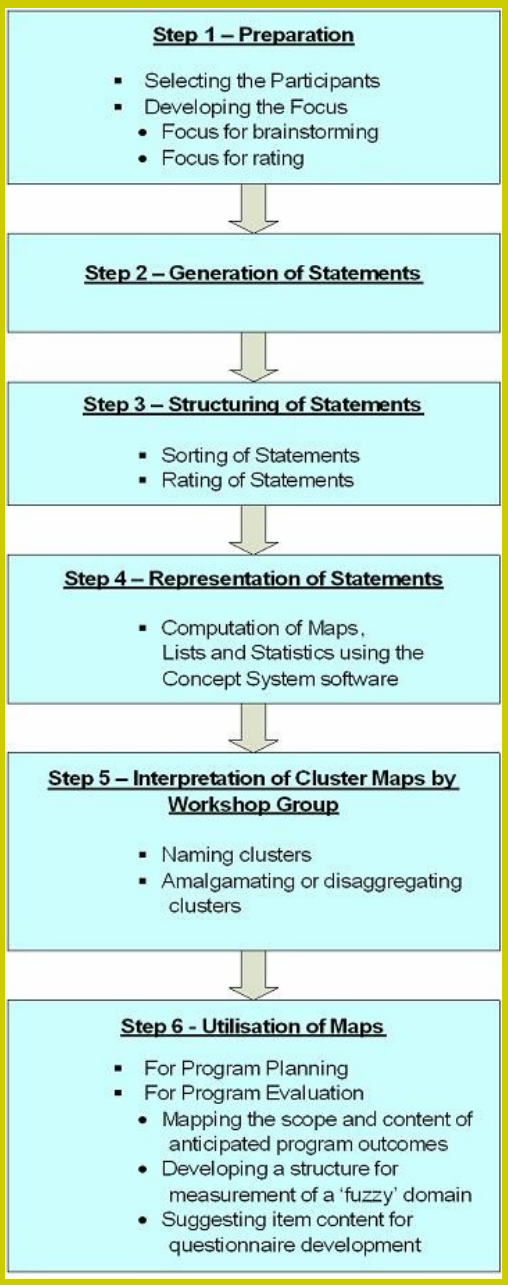



**Chart 1**

## How Your Concept Map was Created

- The researchers involved in project C7 used a technique known as 'concept mapping' to identify outcomes for bushfire safety policies and programs that stakeholders consider important. The particular method of concept mapping used was developed by William M.K. Trochim of Cornell University. Trochim's concept mapping process, as it relates to the workshop conducted with members of the Sydney community is outlined below.

- Step 1: Six community members from the Sydney area were invited to attend a concept mapping workshop by the State Coordinator of the Community Fire Unit program. The workshop took place at NSWFB Greenacre offices.

- Step 2: Participants were asked to brainstorm ideas in response to the statement 'Thinking as broadly as possible, generate statements that describe specific changes or improvements you think need to be achieved to make households and neighbourhoods safer from bushfires'.

- Step 3: Participants sorted all statements in a way that made sense to them as well as rating (on a scale of 1 to 5) each statement for its <u>importance</u> and <u>difficulty of implementing it</u>.

- Step 4: Computer assisted analysis of the sorted statements (multi-dimensional scaling and cluster analysis) produced a representation of how each statement related to all others (the Concept Map). Clusters of statements that had similar ideas were formed.

- Step 5: Participants were asked to individually name each cluster of statements. This was followed by a group discussion where consensus was reached on cluster names as well as highlighting any changes the participants felt should be made to the concept map.

## Here is the statement list your group generated:

***Clusters***

1. House's that back onto a bush area are careful about dumping garden waste over the back fence
2. Councils and national parks and wildlife need to regularly inspect areas where houses back onto land they are responsible for
3. People keep fire trails clear (eg. Building rubble)
4. Neighbourhood compliance with keeping fire hydrants clear and visible
5. People are educated about what is appropriate/safe behaviour during a fire (eg. Standing on roof in shorts with a hose)
6. Greater community awareness and participation in maintaining buffer zones between properties and bushland
7. Community activities (whole community) for hazard reduction
8. Empower residents to understand 'asset protection zones' and how to create them around their house
9. Road edges have a minimal vegetation buffer
10. People understand that bottles (and other refuse) can cause fires
11.The community support clearance and property preparation for older people (or people who are otherwise incapable)
12. People understand how to prepare their house in the event of a fire
13. Residents in urban/bushland areas are given educational opportunities on how to take steps to minimise the effects of a bushfire individually
14. Residents in urban/bushland areas are educated about the advantages of planning and working with neighbours to minimise the effects of a bushfire
15. Local government should have a much greater role in promoting fire safety to those who live adjacent to bushland
16. Hazard reduction burning used effectively
17. People are more aware of weather impacts on fire risk 9able to identify high risk days)
18. People are educated about what types of trees and vegetation are more susceptible to burning fiercely and quickly
19. Made less bureaucratic to conduct hazard reduction burns or slashing
20. Problem with older housing in fire prone areas that don't comply with current standards (educate owners)
21. Harsher penalties for people who deliberately start fires
22.Incentives for owners of older homes to upgrade fire protection capacity (include financial support if required) – eg. Water tanks
23. Nurseries have and provide information about suitability of particular plants for fire prone areas
24. More fire awareness programs at community events (eg. Local agricultural show)
25. More fire awareness programs in schools
26. People are made aware of use, costs and limitations of rooftop sprinkler systems
27. Greater co-ordination, co-operation and communication between emergency services during a fire
28. Improved access to properties in fire prone areas and also access BETWEEN properties
29. Councils are able to mandate certain preventive/defensive requirements for houses in very high risk zones (eg. Static water supply, sprinklers)
30. Councils don't make it too difficult to take down trees that pose a risk
31. Greater co-operation between government bodies (eg. National parks, water board)
32. Water board addresses water pressure and supply issues
33. Residents are better educated and have a better understanding as regards the 'stay or go' issue
34. Children and young people educated about fire-risk and risky behaviours
35. People are made aware of safe chemical storage practices
36. Media communicates correct information rather than disinformation during a fire
37. Mechanisms for ensuring communication to all people in a neighbourhood about approaching/nearby fires
38. People have an understanding/attitude that bushfires are not a spectator sport
39. Better signage (compulsory) relevant to fire protection/fighting (eg. Static water supplies)
40. Need a process to ensure that councils, government, national park authorities manage their own land property
41. Councils and other agencies have clearly designated responsibility for particular areas of land
42. Fire, police and emergency services understand the role of Community Fire Units

# An Explanation of the Workshop

The initial stage of the computer assisted analysis uses a technique known as multi-dimensional scaling. The concept map is constructed by amalgamating the sorted statements of each participant. Each point (statement) is positioned on the map in relation to all the others, with statements sorted together by more participants (similar in meaning) appearing closer together and those that were not sorted together (dissimilar in meaning) being further apart.

Following the multi-dimensional scaling an additional analysis is conducted to form clusters (Map 1). The data analysis process groups statements that are close together (have a similar meaning). For example, in Map 1, cluster 1 consists of statements 1, 3, 4, 7 and 11. Participants, individually, then as a group name each cluster based on what they believe to be the common theme in each of the statements making up the cluster. To continue with the earlier example, all the statements in cluster 1 were concerned with ways in which the community can act to maintain the environment.

In addition to naming individual clusters, participants identified groupings of clusters that were related. The identification of these broad themes and the more specific cluster names will provide a starting point for the researchers to ascertain the importance of various interventions.

It is important to recognise that cluster analysis is not as robust a process as multi-dimensional scaling. As there is no, one, 'correct' method used to determine the number of clusters, or which points belong in which cluster (our data analysis program starts with approximately the number of clusters equal to 1/5 of the number of statements). For this reason, an important step in the construction of a concept map is for participants to have the opportunity to change parts of the map with which they do not agree.

# The generation of 3-dimensional concept maps

Following the concept mapping workshop, the researchers used the raw data that had been collected to gain a greater understanding of what community members and agency personnel believe is important to improve bushfire safety.

The researchers used a program developed by David Wishart of St. Andrews University to analyse the data. Clustan™ allows data to be presented in three dimensions, producing a more accurate representation of how the statements are related to each other than a two dimensional concept map.

After the three-dimensional concept maps had been produced the researchers named the clusters and dimensions (where possible broad themes were identified at each of the x and y axes), using the same process as that in the workshop. That is, each researcher named the clusters and dimensions, then as a group consensus was reached.

After three-dimensional concept maps had been constructed for each workshop (eleven in total) a broad range of themes related to community safety outcomes were identified. To identify and clarify these themes the researchers, as a group, sorted the pool of cluster names from individual workshops according to the similarity of the ideas represented in each. This enabled a combined solution of all the workshops to be formed.

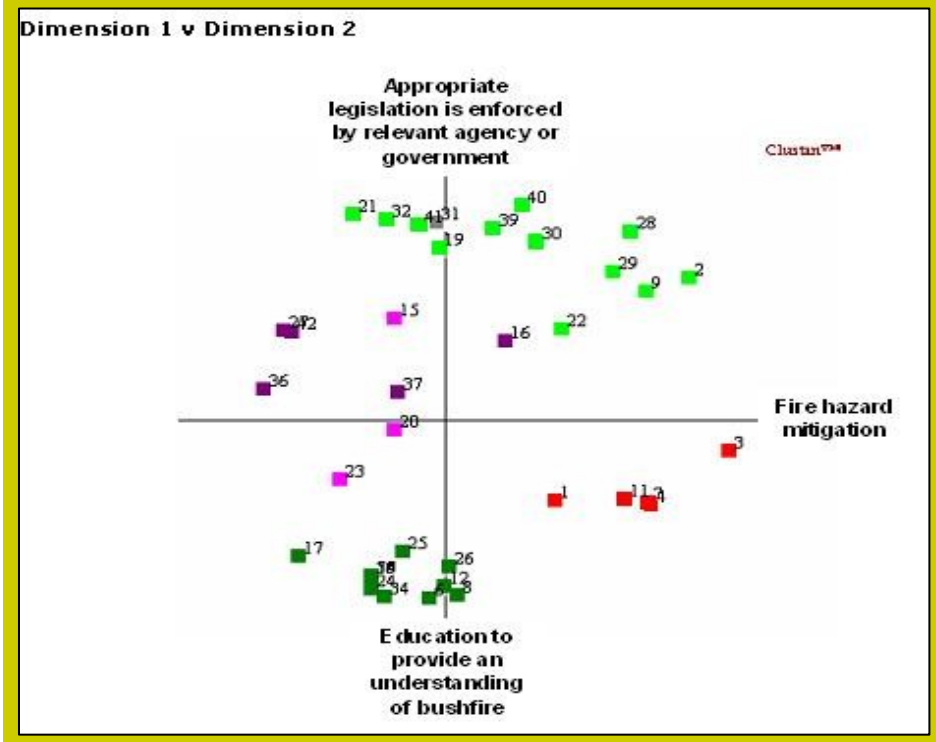
Broad themes were identified in the 3-dimensional maps. They were:

- Dimension 1 (right: Maps 1 & 2): Fire hazard mitigation
- Dimension 1 (left: Maps 1 & 2): Theme not identified due to spread of statements
- Dimension 2 (top: Map 1):Appropriate legislation is enforced by relevant agency or government
- Dimension 2 (bottom: Map 1): Education to provide an understanding of bushfire
- Dimension 3 (top: Map 2): Risk reduction and protection for high risk houses
- Dimension 3 (bottom: Map 2) Communication/co-operation between government, agencies and community

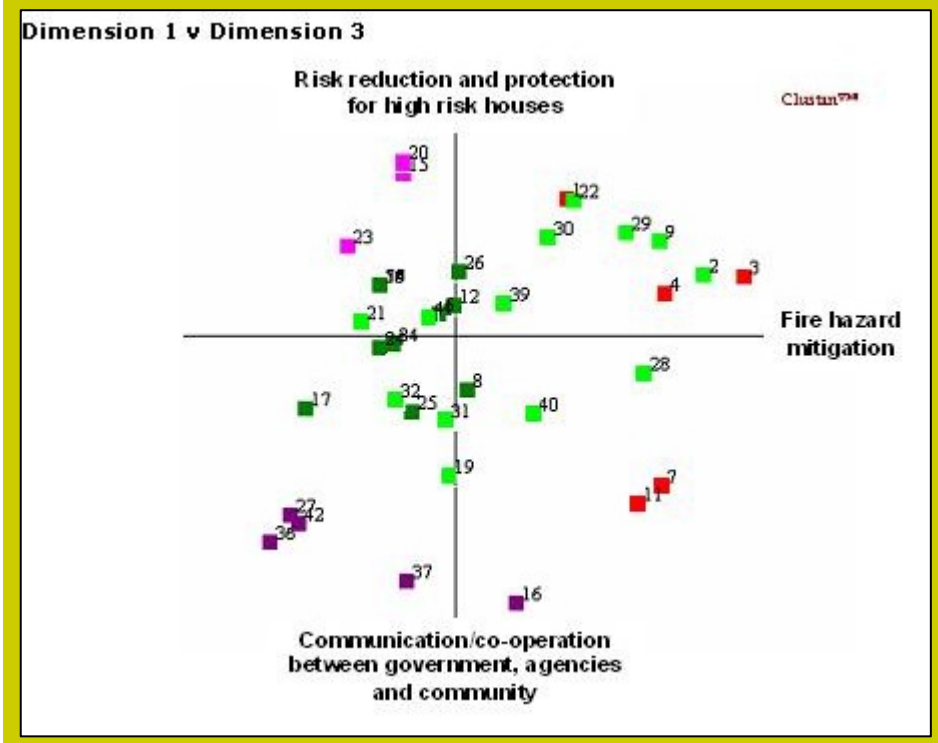
The dimensions are an amalgamation of a number of clusters and statements they represent the high-level or overarching ideas that are important when trying to make communities safer from bushfire. The clusters and statements can be seen as different aspects of the more general themes, whether they are the identification of an important outcome or the means of implementing a that outcome. The dimensions can be seen in terms of processes and outcomes. For example 'Effective communication and education' is one process whereby the outcome of 'Individual/household planning' can be achieved.

Beginning with these broad categories and working back down to the individual statements, it is hoped participants and researchers will gain a clearer understanding of what they believe will help improve community safety programs for bushfire.

# 3-Dimensional Concept Maps




**Map 1**




**Map 2**

### Cluster Names

- Cluster 1 (Statements 1, 3, 4, 7 & 11: Community responsibility for maintenance of environment
- Cluster 2 (Statements 5, 10, 13, 14, 18, 33, 35, 38, 6, 12, 26, 8, 25, 24, 34 & 17): Education to provide understanding of bushfire
- Cluster 3 (Statements: 15, 20 & 23): Fire safety measures for homes in high fire risk areas/ situations
- Cluster 4 (Statements 2, 9, 29, 22, 28, 40, 30, 39, 19, 31, 32, 21 & 41): Government/agency responsibilities
- Cluster 5 (Statements 16, 37, 27, 42 & 36): Communication between all stakeholders

# Importance and Difficulty Ratings

During the workshop participants were asked to rate, on a five point scale, each statement for its importance (in making people and neighbourhoods safer from bushfire) and the difficulty of implementing the changes or improvements suggested by those taking part in the workshop. Following the workshop the mean importance and difficulty for each statement was calculated. These data were sorted and the mean calculated for each cluster.

The means for each cluster were entered into an SPSS spreadsheet and a scatterplot showing importance by difficulty was created for the three (Chart 2) dimensional solution.

The scatterplots allow the researchers to identify actions or ideas that could be used as a starting point in community safety programs. Clusters in the top left-hand corner of the scatterplot are perceived as important in making people safer from bushfire while being relatively simple to implement.

In relation to the planning and implementation of community safety programs for bushfire the scatterplots raise some interesting questions. For example, do current programs address those areas that community members feel are important? Are community members focusing on unimportant or less important areas of bushfire safety? Are these messages reaching the whole community, or only sections? What role has bushfire education played in supporting or creating these perceptions? And if community members are focusing on the 'right' messages are they putting them into practice?

# Importance by Difficulty Based on the 3-Dimensional Concept Map

**Cluster Names Derived from the Three-Dimensional Concept Map**

Cluster 1: Community responsibility for maintenance of environment

Cluster 2: Education to provide understanding of bushfire

Cluster 3: Fire safety measures for homes in high fire risk areas/ situations

Cluster 4: Government/agency responsibilities

Cluster 5: Communication between all stakeholders

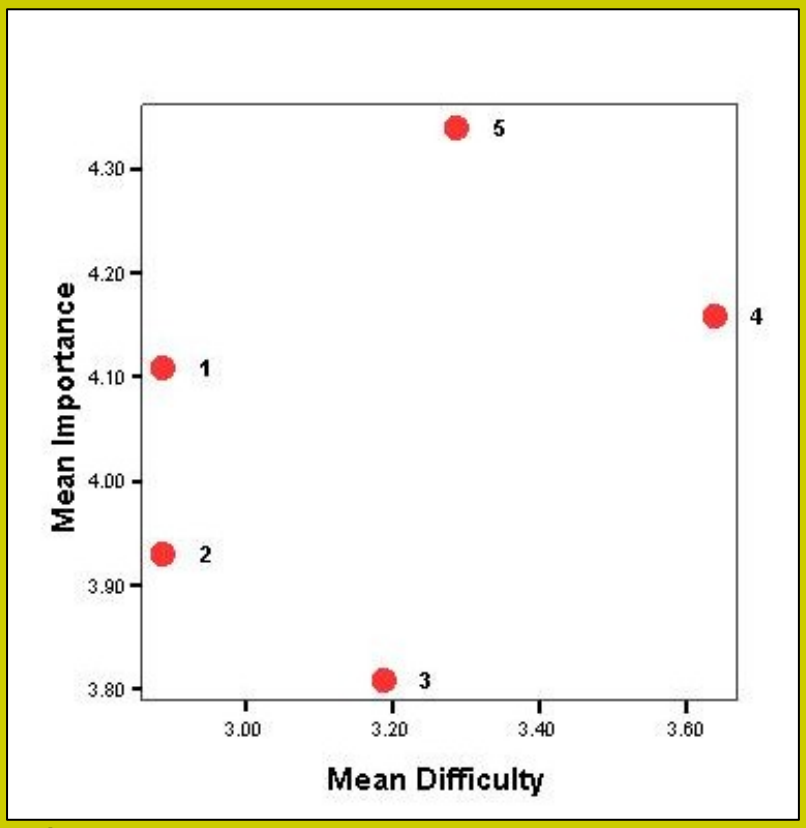



**Chart 2**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 4.1 | 2.9 |
| 2 | 3.9 | 2.9 |
| 3 | 3.8 | 3.2 |
| 4 | 4.2 | 3.6 |
| 5 | 4.3 | 3.3 |

| Importance Scale | |
|---|---|
| 1 | Unimportant |
| 2 | A little important |
| 3 | Moderately important |
| 4 | Very important |
| 5 | Essential |

| Difficulty Scale | |
|---|---|
| 1 | Very easy or already achieved |
| 2 | Not difficult |
| 3 | Moderately difficult |
| 4 | Very difficult |
| 5 | Extremely difficult |

# Statistically Significant Differences Between Clusters: 3-Dimensional Concept Map

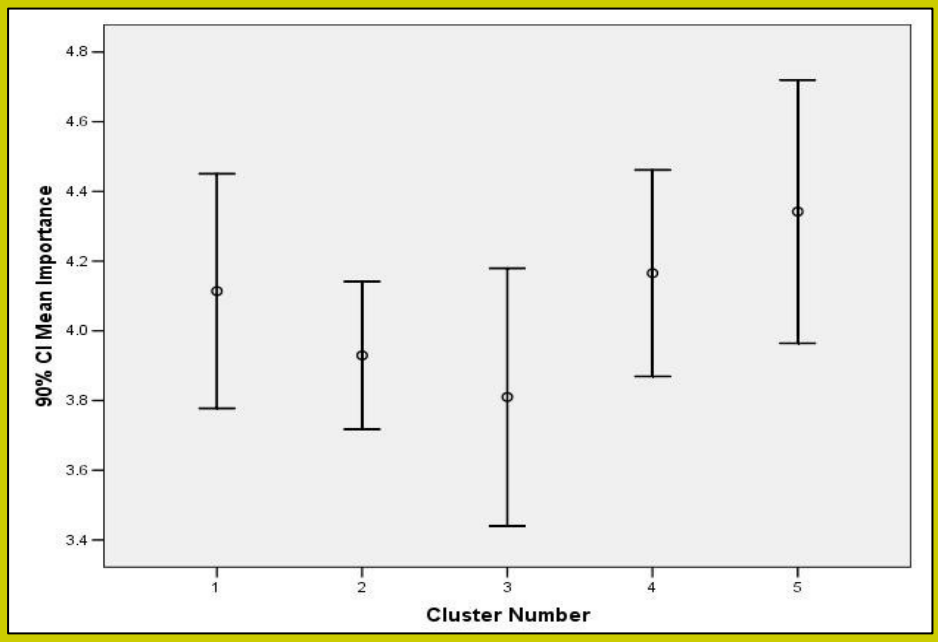



**Chart 3**

For three-dimensional (charts 3 & 4) solutions the researchers used SPSS to create error bars for each cluster by importance and difficulty. Due to the low number of statements in each cluster, the confidence interval was lowered to 90% (rather than the customary 95%). The two charts give the researchers a further idea about how much the concepts that emerged during the workshop differ. For example, chart 3 shows those who took part in this workshop believed cluster three, that cluster which refers to fire safety measures for homes in high risk areas/situations is of less importance in providing an understanding of making households and communities safer from bushfires, than is cluster 5, communication between all stakeholders. Chart 4 shows that participants believed that cluster 4, that cluster which refers to the complexity of multiple agency responsibilities than is more difficult to achieve than cluster two (Education to provide understanding of bushfire) when making households and communities safer from bushfire. Chart 4 shows that this difference is statistically significant, as the error bars of clusters 2 and 4 do not overlap.

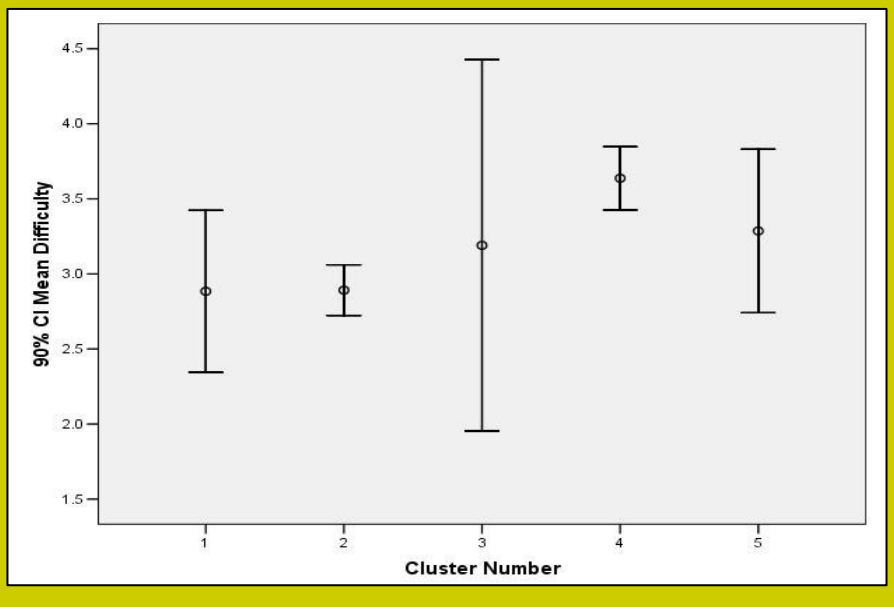



**Chart 4**