# Concept Mapping Workshop: Blue Mountains Community

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

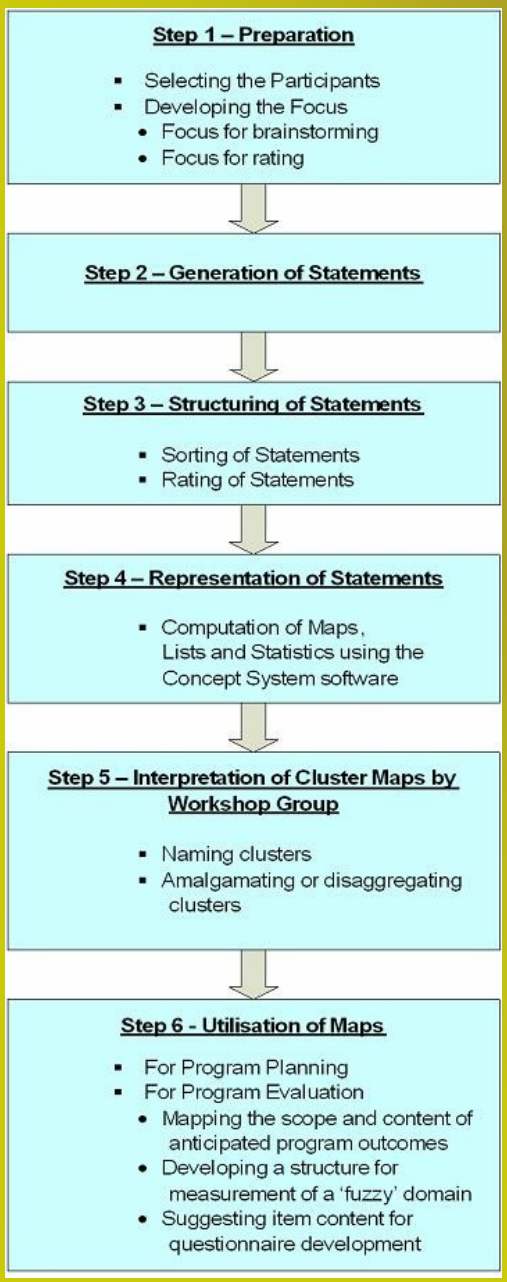



**Chart 1**

## 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 Blue Mountains community is outlined below.
- Step 1: Five community members from the area around Katoomba in the Blue Mountains were invited to attend a concept mapping workshop. The workshop took place at the local headquarters.
- 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 importance and difficulty of implementing it.
- 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:**

1. Effective communication at times of a fire or a high fire risk (eg radio)
2. Local groups that can check individual household preparation and encourage proper preparation (eg at a street level)
3. Local resource people who can provide advice to others on practical things they can do to be better prepared
4. Community are educated to understand the BENEFITS of being fire safe
5. People understand the impact that not being fire-safe can have on them and the community
6. People at local (eg street) level receive advice and support from fire services about how to make their properties as safe as possible
7. People need to be clear about whether they will stay or go based on a realistic understanding of their own circumstances and capacity
8. People are provided with clear information about things they need to consider in deciding to stay or go
9. Households have appropriate fire and evacuation plans
10. Households that have decided to stay need a readily available list of things they need to do in case of a fire
11. People need to know safe places to go to in case they need to evacuate
12. People need to see how quickly things they do wrong can lead to devastating results (eg through graphic TV ads)
13. People need to understand the circumstances under which they can be directed to leave their property and by whom
14. People have an independent water supply and means of pumping water if there is a power failure
15. People clear rubbish, leaves etc from their property
16. Where guidelines are issued to household they need to be appropriately specific about exactly what they need to do (eg pumps)
17. People should be able to get an assessment of their property and situation, and get recommendations specific to them
18. Councils provide information about importance of cleaning up when they inform residents of their collection services
19. Local brigades and planning bodies can help residents access the tradespeople and services they need in order to be properly prepared ('a one-stop-shop')
20. Needs to be a register of people who have special needs in case of a fire (eg elderly, disabled)
21. Residents know about people with special needs in their street/locality (eg elderly, disabled)
22. Adequate fuel reduction in ALL properties in a street
23. People know about the rural fire service website and are able to use it (and the website is kept active and up to date)
24. Communication during a crisis needs to be less haphazard and more locally precise (eg using local radio)
25. Need to have efficient ways for communities to provide information about fire behaviour to the fire services
26. Better two-way communication during a fire
27. In the case of a fire residents need to feel that lines of communication within the fire services are effective (and not blocked by internal squabbles)
28. Need means of contacting owners of holiday properties to notify them of needs regarding clean-up and preparation
29. People are provided with education in their own setting (eg street meetings)
30. Better understanding of what neighbours have for fighting fires
31. People need to understand that they are likely to be on their own in case of a fire and may not have power, mains water etc
32. People maintain all the equipment that they need for fire protection
33. Agencies provide positive education (benefits of being fire safe) rather than negative education (don't do this)
34. Information/education needs to focus on practical issues that people may not know

# 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. In order to represent the concept map in a way that makes sense the Concept Systems program creates a two dimensional graphic (Map 1). This is necessary, because, to show exactly how the statements relate to each other would require the number of dimensions equal to the number of statements minus one. For example 34 statements means 33 dimensions would be required to present the data precisely. While presenting data in two dimensions makes it easier to understand and interpret, distortions can occur.

Following the multi-dimensional scaling an additional analysis is conducted to form clusters (Map 2). The Concept Systems program groups statements that are close together (have a similar meaning). For example, cluster 2 consists of statements 7, 9, 10 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 2 were concerned with households planning what they would do in the event of a fire. Thus, it was decided that an appropriate name for the cluster would be 'Household plan/strategies (whether they stay or go)'.

In addition to naming individual clusters, participants identified two groupings of clusters that were related. Clusters 3 and 4 identified differing aspects of householdpreparation. Clusters 5, 6 and 7 were all related to the provision of education and advice. 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.

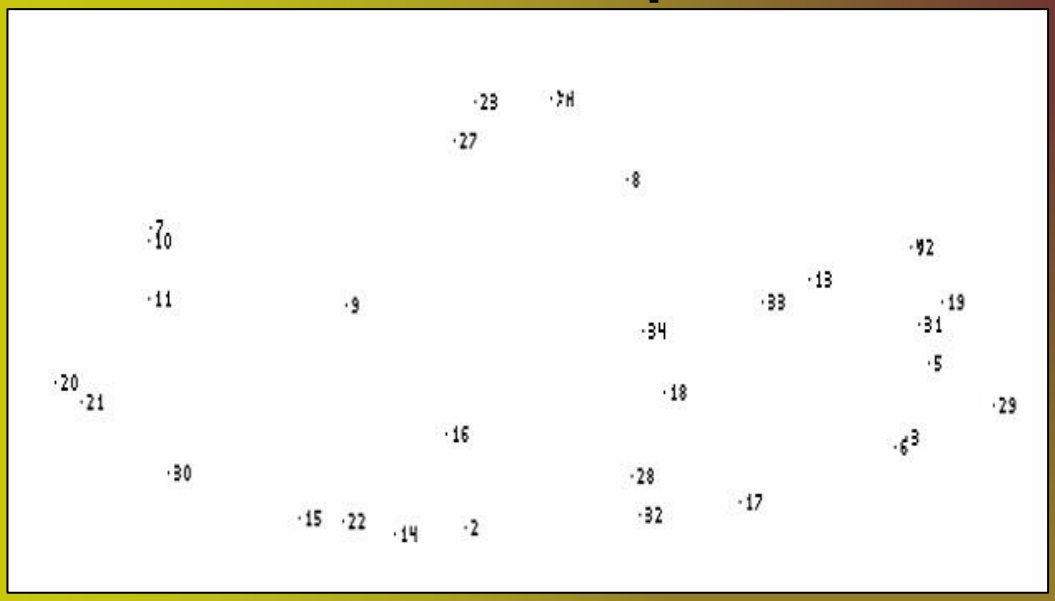
It is important to recognise that cluster analysis is not as robust a process as multi-dimensional scaling. As there is no, one, 'correct' method used to determine the number of clusters, or which points belong in which cluster (the Concept Systems program starts with approximately the number of clusters 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 following is a summary of the changes participants in the Blue Mountains Community Group workshop believed should be made:

- Statement 3: from cluster 5 to cluster 6;
- Statement 8: from cluster 1 to cluster 2;
- Statement 19: from cluster 7 to cluster 6;
- Statement 28: from cluster 6 to cluster 3;
- Statement 32: from cluster 6 to cluster 4.

In addition to these changes, participants felt specific implementation strategies used by fire agencies (eg street meetings) to assist residents in properly preparing themselves and their properties from bushfire were not represented on the concept map.

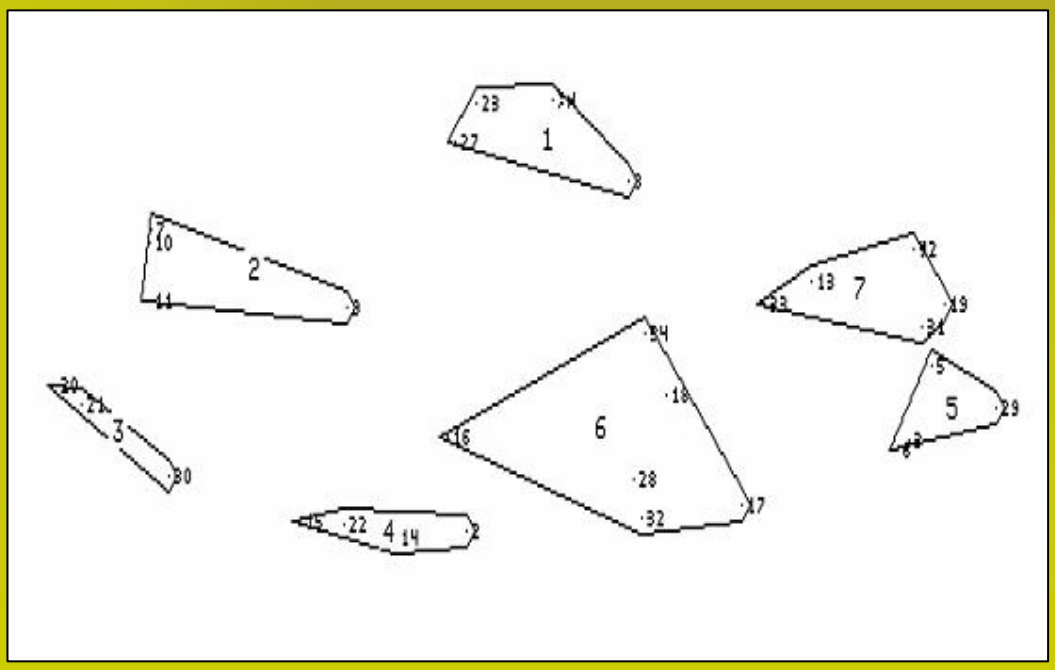
# The Concept Maps Generated During the Workshop




**Map 1**

## Cluster Names

- Cluster 1: Communication in a fire crisis
- Cluster 2: Household plan/strategies (whether they stay or go)
- Cluster 3: Knowing your neighbourhood (register, know neighbours circumstances)
- Cluster 4: Household preparation (for a group of households)
- Cluster 5: Education/advice in your setting (specific to your very local circumstances
- Cluster 6: Specific information and advice – practical
- Cluster 7: Broader education including media




**Map 2**

# 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.

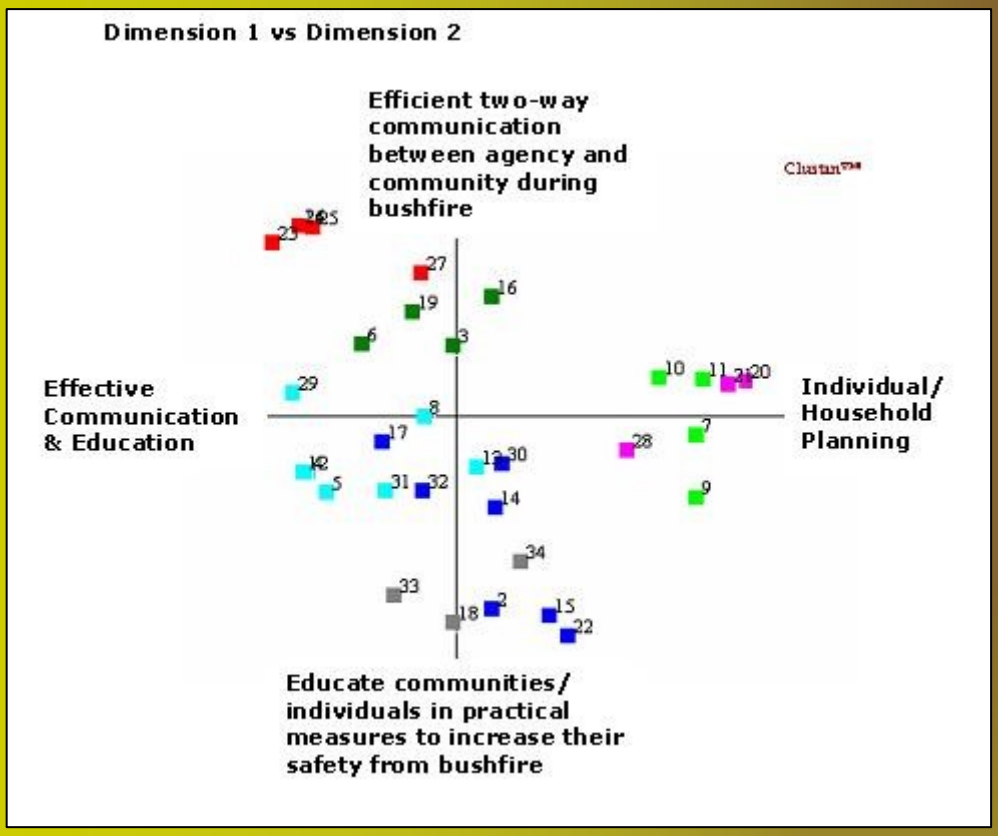
After three-dimensional concept maps had been constructed for each workshop (eleven in total) a broad range of themes related to community safety outcomes were identified. To identify and clarify these themes the researchers, as a group, sorted the pool of cluster names from individual workshops according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

As with the 2-dimensional concept map, broad themes were identified in the 3-dimensional maps. They were:

- Dimension 1 (right: Maps 3 & 4): Individual/ household Planning
- Dimension 1 (left: Maps 3 & 4): Effective Communication & Education
- Dimension 2 (top: Map 3): Efficient two-way communication between agency and community during bushfire
- Dimension 2 (bottom: Map 3): Educate communities/individuals in practical measures to increase their safety from bushfire
- Dimension 3 (top: Map 4): Specific neighbourhood/household preparedness activities
- Dimension 3 (bottom: Map 4): Effective agency-resident & intra-agency communication

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.



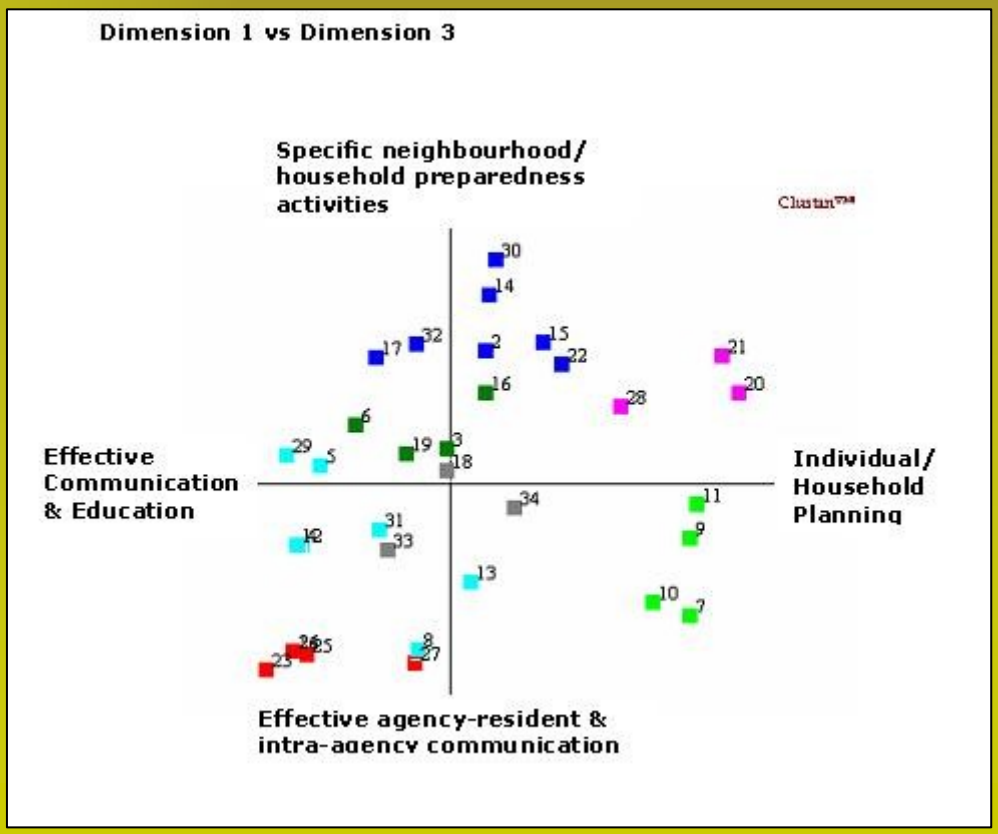

Map 3

## Cluster Names

- Cluster 1 (Statements 1, 23, 24, 25, 26 & 27): Efficient two-way communication between agency and community during bushfire
- Cluster 2 (Statements 2, 14, 15, 17, 22, 30 & 32): Preparedness activities of individual households and neighbourhoods
- Cluster 3 (Statements: 3, 6, 16 19: Agencies provide advice specific to individual situations

# 3-Dimensional Concept Maps

- Cluster 4 (Statements 20, 21 & 28): Procedures for householders with special needs
- Cluster 5 (Statements 7, 9, 10 & 11): Planning for 'Stay or Go'/an action plan
- Cluster 6 (Statements 4, 5, 8, 12, 13, 29 & 31): Community education to improve individuals understanding and knowledge
- Cluster 7 (Statements 18, 33 & 34): Information/ Education for practical actions




Map 4

# 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 both the two (Chart 2) and three (Chart 3) dimensional solutions.

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?

When using the 'importance by difficulty' scatterplots, whether it be for planning or as an aid to facilitate discussion, it is important to keep in mind that the cluster analysis gives different results for the two and three dimensional solutions. This means that while clusters may have similar names, it is likely that the statements that make up the clusters will differ. For this reason, the two should not be directly compared.

Finally, it should be emphasised that academic arguments about the merits of one solution over the other should not limit any discussion. If it is felt one scatterplot provides better or more interesting results for a particular purpose, then that one should be used.

# Importance by Difficulty Based on the 2-Dimensional Concept Map

### Cluster Names Derived from the Two-Dimensional Concept Map

- Cluster 1: Communication in a fire crisis
- Cluster 2: Household plan/strategies (whether they stay or go)
- Cluster 3: Knowing your neighbourhood (register, know neighbours circumstances)
- Cluster 4: Household preparation (for a group of households)
- Cluster 5: Education/advice in your setting (specific to your very local circumstances
- Cluster 6: Specific information and advice – practical
- Cluster 7: Broader education including media

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

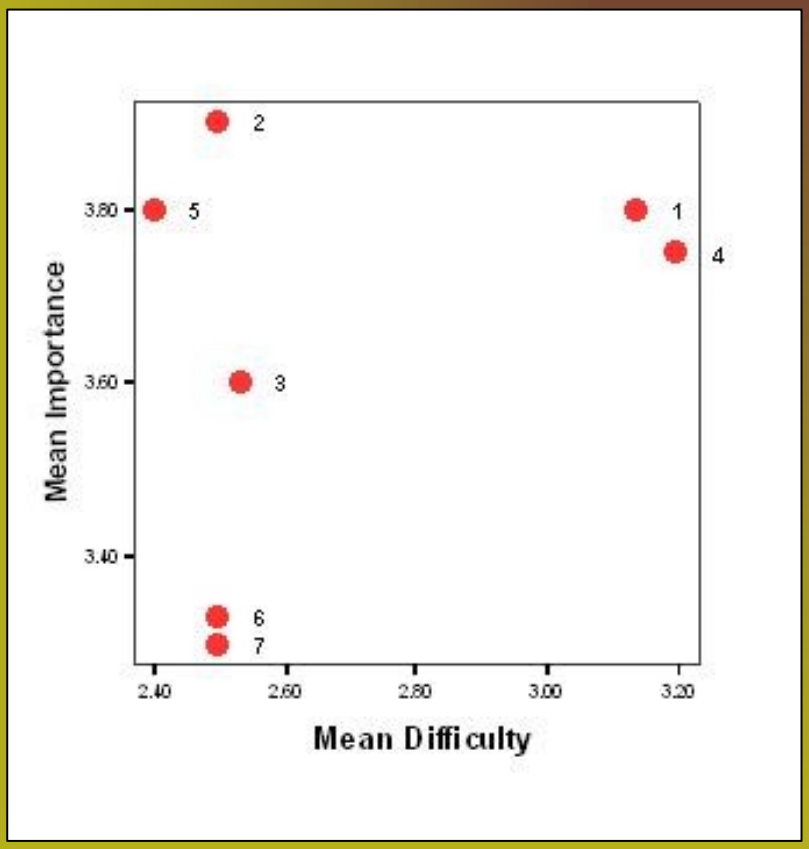



**Chart 2**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 3.8 | 3.1 |
| 2 | 3.9 | 2.5 |
| 3 | 3.6 | 2.5 |
| 4 | 3.8 | 3.2 |
| 5 | 3.8 | 2.4 |
| 6 | 3.3 | 2.5 |
| 7 | 3.3 | 2.5 |

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

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

- Cluster 1: Efficient two-way communication between agency and community during bushfire
- Cluster 2: Preparedness activities of individual households and neighbourhoods
- Cluster 3: Agencies provide advice specific to individual situations
- Cluster 4: Procedures for householders with special needs
- Cluster 5: Planning for 'Stay or Go'/an action plan
- Cluster 6: Community education to improve individuals understanding and knowledge
- Cluster 7: Information/ Education for practical actions

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

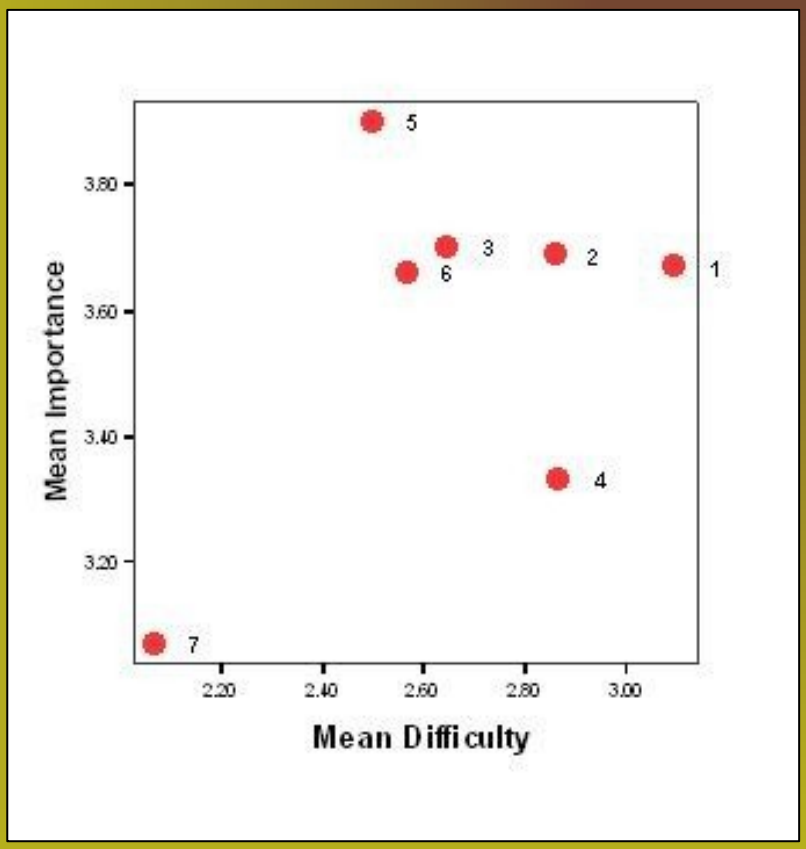



**Chart 3**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 3.7 | 3.1 |
| 2 | 3.7 | 2.9 |
| 3 | 3.7 | 2.9 |
| 4 | 3.3 | 2.9 |
| 5 | 3.9 | 2.5 |
| 6 | 3.7 | 2.6 |
| 7 | 3.1 | 2.1 |

# Statistically Significant Differences Between Clusters: 2 & 3-Dimensional Concept Maps

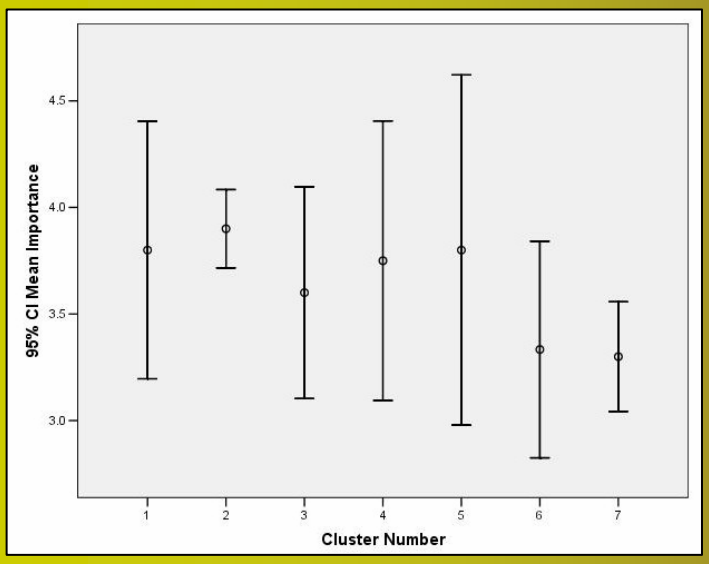



**Chart 4**

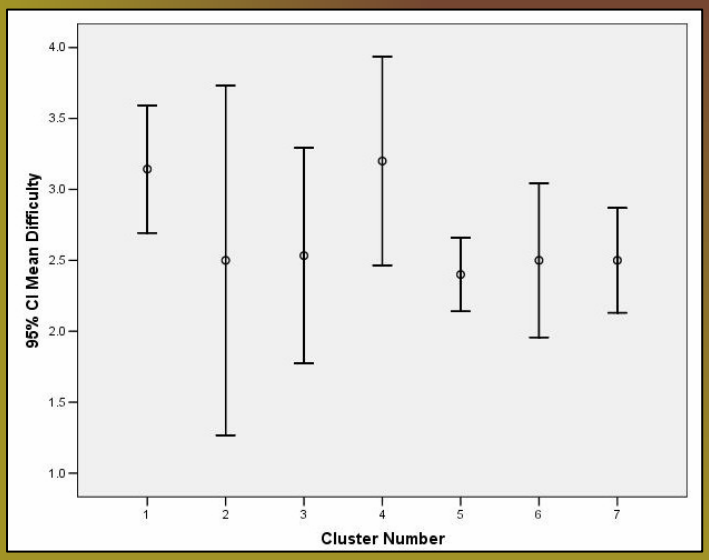



**Chart 5**

For both the two-dimensional (charts 4 & 5) and three-dimensional (charts 6 & 7) 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 four 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 five (Planning for 'Stay or Go'/an action plan) is more important than cluster seven (Information/education for practical actions) when making households and communities safer from bushfire. Chart 6 shows that this difference is statistically significant (if the error bars do not overlap the difference is statistically significant).

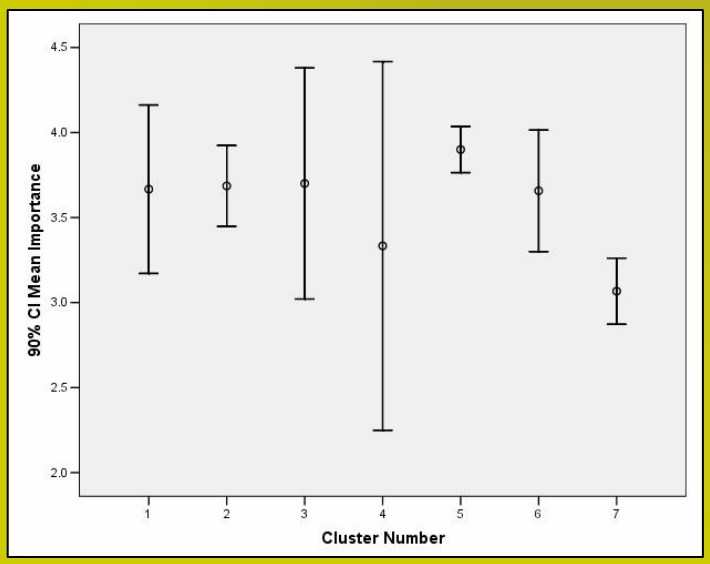



**Chart 6**

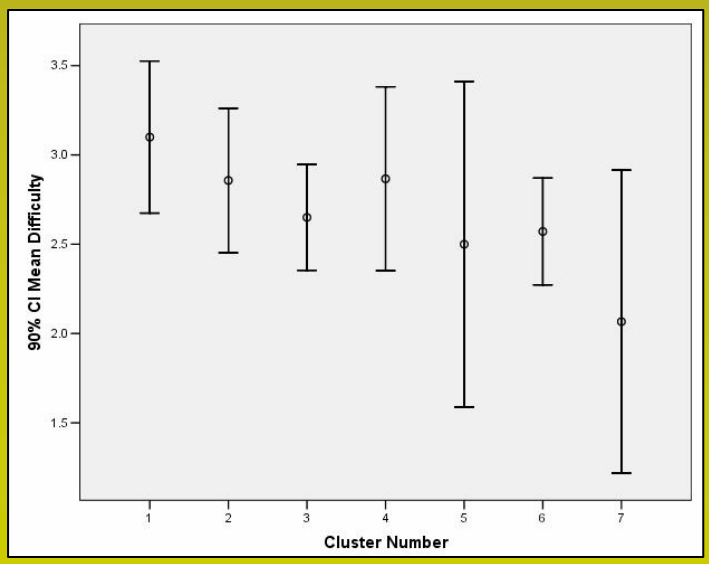



**Chart 7**