# Concept Mapping Workshop: Adelaide Hills

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

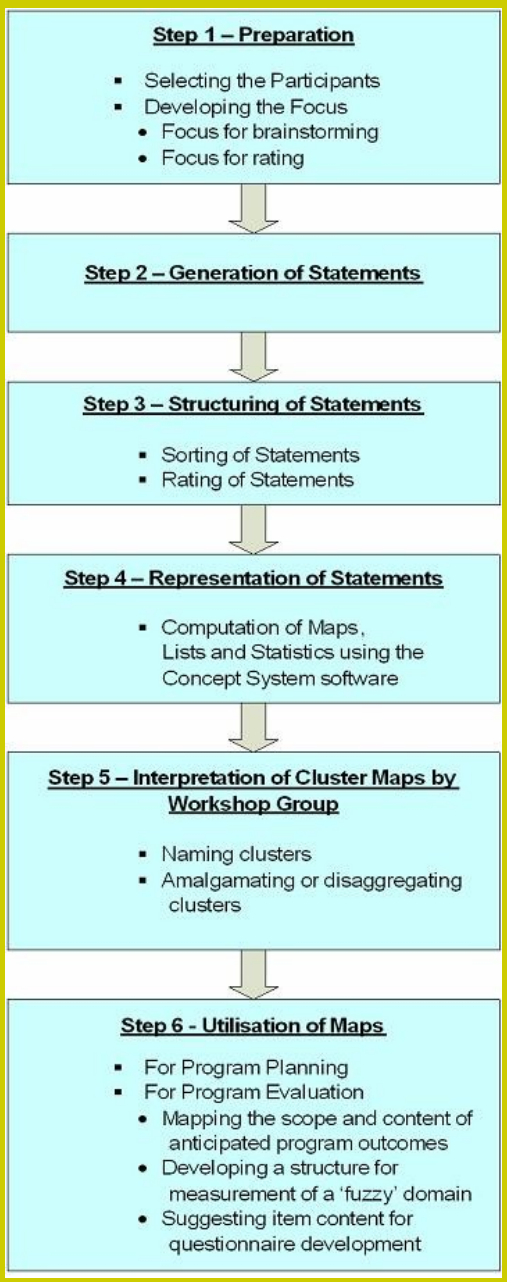



**Chart 1**

## 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: Ten community members from the Adelaide Hills were invited to attend a concept mapping workshop. The workshop took place at a conference centre situated in the Adelaide Hills.

- 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:

1. Community has an action list or count down to lead people into preparation for the fire season (a series of little achievable actions) - bite sized chunks
2. Messages reinforced through lots of media (eg rates notices, bus stops)
3. Young people are educated about fire prevention as they grow up (through schools and other opportunities)
4. As many people as possible have site inspections by CFS and co-ordinated with fire safe groups
5. Increase the awareness of the REALITY of bushfires and the REALITY of the risk
6. Need to deliver messages in an appropriate and targeted way to people in different age groups and circumstances
7. Community mechanisms to assist people with limited capacity to do their own preparation
8. A sense of community and MUTUAL preparation (if most households are prepared makes it easier to protect all)
9. Have a network and community links and arrangements that you can depend on in the heat of a crisis
10. Communities/households have a 'year-clock' of preparation activities
11. People are prepared for the emotional cost of staying and defending the property
12. People are aware of what a bushfire is like and that they can do practical things that help
13. People have a sense of responsibility for their own preparation
14. Communities and service organisations could help people who find it difficult to prepare
15. Messages regularly and consistently delivered over the media
16. Address issue of excess roadside fuel loads (especially for absentee landholders)
17. Councils and government utilities more engaged in an integrated approach to fire safety
18. Intelligence-based, information and messaging system to provide information to at risk communities before and during the progress of fires
19. People need to accept ownership of the fire-safety issue (not all outsourced to councils, CFS etc)
20. People aware of the services and activities offered or undertaken by agencies like local governments and CFS
21. Incentives and recognition for neighbourhoods that are well prepared (like 'tidy-towns)
22. People who move into the area receive contact from community fire safe
23. People are educated to understand flammable and non-flammable vegetation (eg, nurseries, plant labels)
24. People need ACCURATE information/education about fire behaviour and risks
25. Relevant agencies understand the linkages between ALL aspects of fire prevention and protection
26. People understand the links between fire prevention and protection measures including the agencies with different responsibilities, legislation and community, household and individual responsibilities
27. People have correct signage on shedding about chemicals contained within
28. People need to have ready access to information about appropriate plants and landscaping
29. Absentee landholders implement appropriate prevention measures
30. People need to understand that they need to be self-sufficient in a fire and can't assume that the CFS and others will be there to help
31. People need to be prepared for utilities such as power and water not to be available in a fire
32. Money. Agencies need to be funded for the responsibilities they have
33. Insurance incentives for people/households that are well prepared
34. Build sense of community so that people know and are willing to support each other
35. People need to have contingency plans for a variety of circumstances in which they may find themselves during a fire (have to stay, kids at home). Need to have a realistic understanding of the unpredictability of fires
36. More promotion of dependable alternatives to petrol pump (eg solar, batteries)
37. People know where there is a destination, an evacuation centre
38. Funding all year for community fire safe program
39. People have a better awareness of the design of their home, especially exits
40. Much stricter assessment of building designs by councils
41. Properties are designed and maintained in ways that allow access for emergency vehicles
42. Other community groups like neighbourhood watch and Red Cross involved in the plan
43. People in a local group (eg a street) know what is going to happen and who (individuals and agencies) will do what
44. People need to have ALL the information about what they and others are required to do
45. There are appropriate environmental plans for whole areas (eg development areas, green areas)

46. Agencies and programs encourage and support EARLY preparation rather than last minute preparation (eg garden waste pick-up timing)
47. Consistency and identifiability of fire alarms
48. People have greater first aid training relevant to fire situations
49. Road signs kept up to date and of high quality
50. Overcome conflicts between policies of organisations where these impede fire protection
51. Emergency services respond appropriately to rapid number calls and are able to find locations

# An Explanation of the Workshop

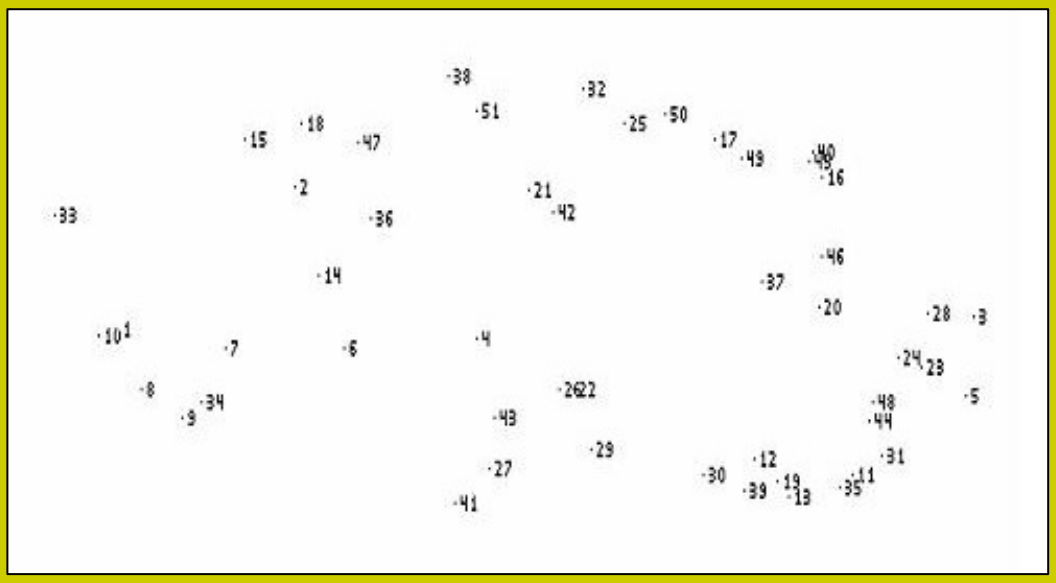
The initial stage of the computer assisted analysis uses a technique known as multi-dimensional scaling. The concept map is constructed by amalgamating the sorted statements of each participant. Each point (statement) is positioned on the map in relation to all the others, with statements sorted together 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 System 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 51 statements means 50 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 System program groups statements that are close together (have a similar meaning). For example, cluster 3 consists of statements 8, 9 and 34. 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 3 were concerned with individuals feeling they were part of the community. Thus, it was decided that an appropriate name for the cluster would be 'Sense of community, networking, co-operation'.

In addition to naming individual clusters, participants identified four groupings of clusters that were related. Clusters 2, 3 and 12 were concerned with differing aspects of community (how to achieve a sense of community, responsibilities of the community, etc). Clusters 4 and 5 were related to the provision of information. Clusters 7 and 8 related to what the role of fire agencies and government bodies should be. Clusters 9 and 10 identify the importance of educating the community on the risks posed by bushfire. 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. However, participants in the Adelaide Hills workshop felt that the concept map presented to them did not require alteration.

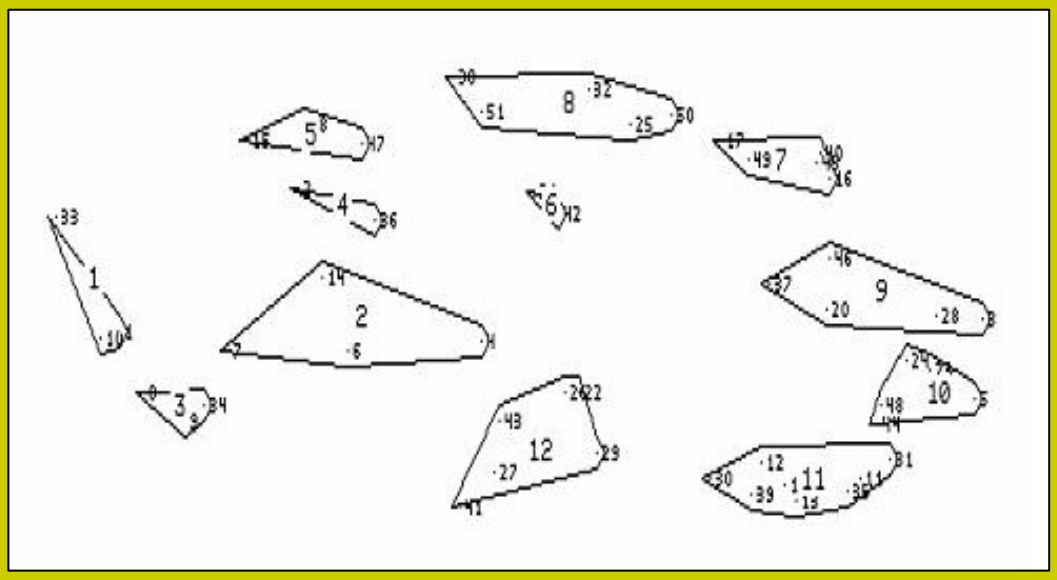
# The Concept Maps Generated During the Workshop



**Map 1**

## Cluster Names

- Cluster 1: Specific recommended actions (annually)
- Cluster 2: Household/customised support
- Cluster 3: Sense of community, networking, cooperation
- Cluster 4: Consistent messages
- Cluster 5: Acute episode info
- Cluster 6: Recognition of good performance
- Cluster 7: Council/planning authorities
- Cluster 8: Other agencies get act together
- Cluster 9: Education & info – prevention/preparation
- Cluster 10: Education & info – fire awareness, reality and facts
- Cluster 11: Attitudinal and emotional preparedness – responsibility
- Cluster 12: Individual responsibility to the community – beyond own household



**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.

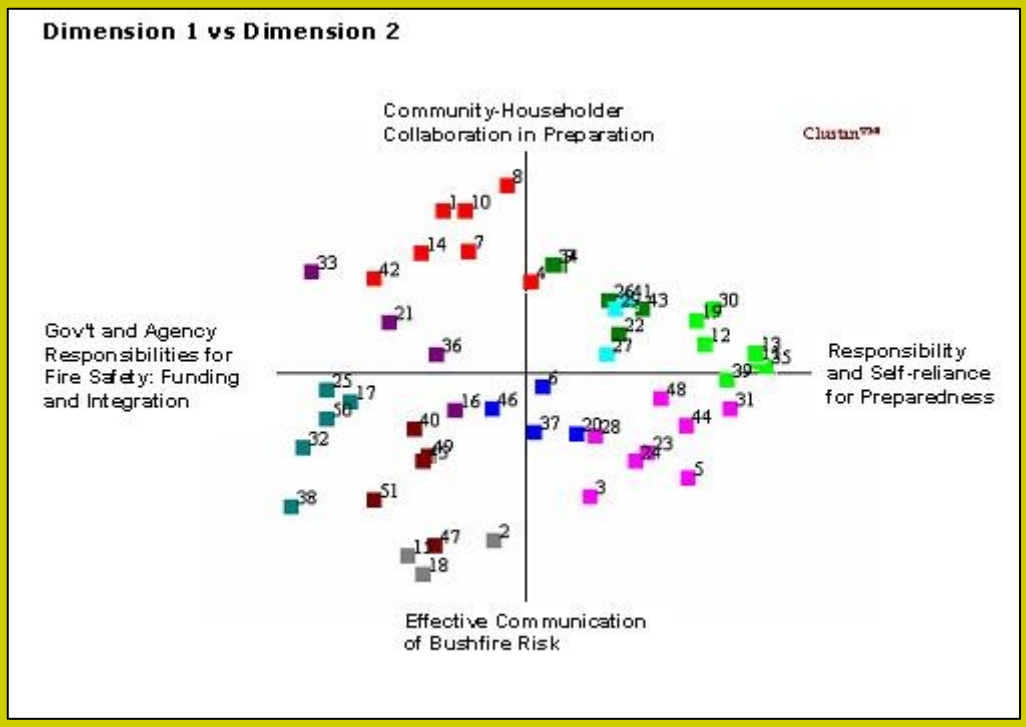
As with the 2-dimensional concept map, broad themes were identified in the 3-dimensional maps. They were:

- Dimension 1 (right: Maps 3 & 4): Responsibility and self-reliance for preparedness
- Dimension 1 (left: Maps 3 & 4): Government and agency responsibilities for fire safety: funding and integration
- Dimension 2 (top: Map 3): Community/ householder collaboration in preparation
- Dimension 2 (bottom: Map 3): effective communication of bushfire risk
- Dimension 3 (top: Map 4): Effective communication within the community
- Dimension 3 (bottom: Map 4): Proper preparation of rural properties

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 of bushfire risk' is one process whereby the outcome of 'Responsibility and self-reliance for preparedness' 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.

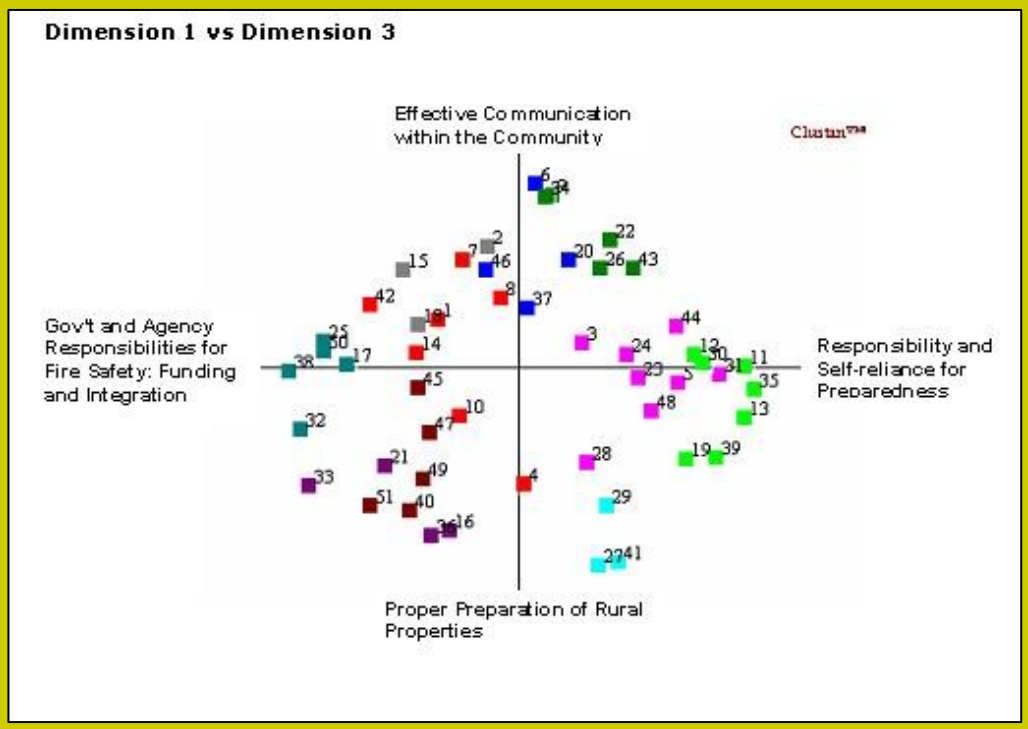
# 3-Dimensional Concept Maps




Map 3

## Cluster Names

- Cluster 1 (Statements 1, 7, 8, 10, 14 & 42): Community Preparedness for bushfire safety
- Cluster 2 (Statements 6, 20, 37 & 46): Resident/agency interactions leading to appropriate knowledge/awareness
- Cluster 3 (Statements: 9, 22, 26, 34 & 43): Building/strengthening community networks and knowledge of responsibilities at all levels
- Cluster 4 (Statements: 3, 5, 23, 24, 28, 31, 44 & 48): Access to comprehensive information/appropriate education
- Cluster 5 (Statements: 11, 12, 13, 19, 30, 35 & 39): Cluster 5: Individual ownership/awareness of responsibility for fire safety
- Cluster 6 (Statements 27, 29 & 41): Hands-on preparation
- Cluster 7 (Statements 2, 15 & 18): Systematic distribution of information through media
- Cluster 8 (Statements 16, 21, 33 & 36): Incentives to encourage preparation
- Cluster 9 (Statements 17, 25, 32, 38 & 50): Integration of agencies and government to create an overarching framework, including sustainable funding
- Cluster 10 (Statements 40, 45, 47, 49 & 51): Practical agency/government responsibilities




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: Specific recommended actions (annually)
- Cluster 2: Household/ customised support
- Cluster 3: Sense of community, networking, co-operation
- Cluster 4: Consistent messages
- Cluster 5: Acute episode info
- Cluster 6: Recognition of good performance
- Cluster 7: Council/planning authorities
- Cluster 8: Other agencies get act together
- Cluster 9: Education & info – prevention/preparation
- Cluster 10: Education & info – awareness, reality & facts
- Cluster 11: Attitudinal & emotional preparedness – responsibility
- Cluster 12: Individual responsibility to the community – beyond own household

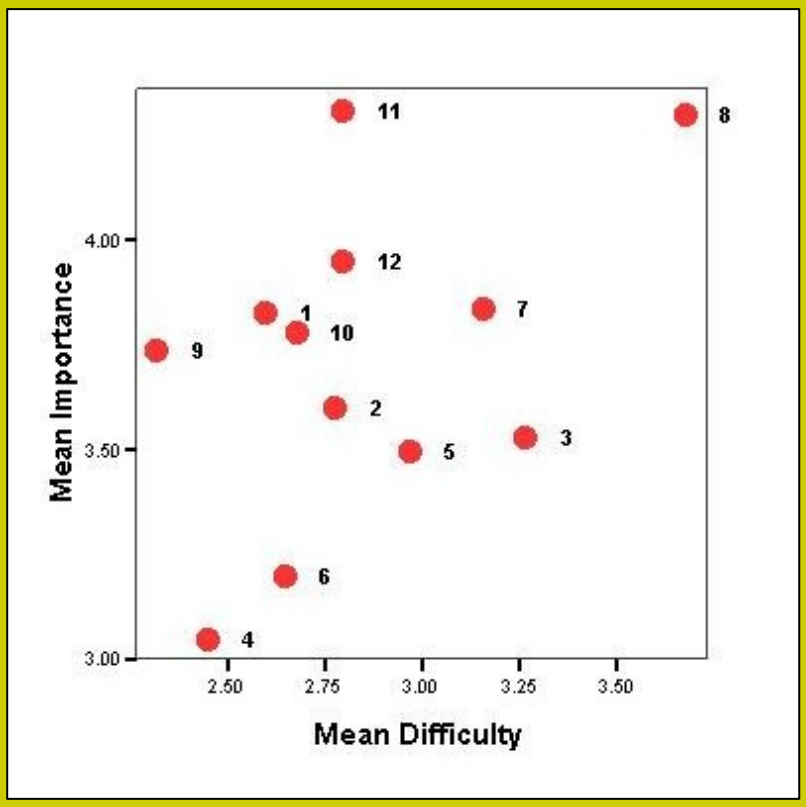



**Chart 2**

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

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 3.8 | 2.6 |
| 2 | 3.6 | 2.8 |
| 3 | 3.5 | 3.3 |
| 4 | 3.1 | 2.5 |
| 5 | 3.5 | 3.0 |
| 6 | 3.2 | 2.7 |
| 7 | 3.8 | 3.2 |
| 8 | 4.3 | 3.7 |
| 9 | 3.7 | 2.3 |
| 10 | 3.8 | 2.7 |
| 11 | 4.3 | 2.8 |
| 12 | 4.0 | 2.8 |

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

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

- Cluster 1: Community preparedness for bushfire safety
- Cluster 2: Resident/agency interactions leading to appropriate knowledge/ awareness
- Cluster 3: Building/strengthening community networks and knowledge of responsibilities at all levels
- Cluster 4: Access to comprehensive information/ appropriate education
- Cluster 5: Individual ownership/ awareness of responsibility for fire safety
- Cluster 6: Hands-on preparation
- Cluster 7: Systematic distribution of information through media
- Cluster 8: Incentives to encourage preparation
- Cluster 9: Integration of agencies and government to create an overarching framework, including sustainable funding
- Cluster 10: Practical agency/ government responsibilities

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

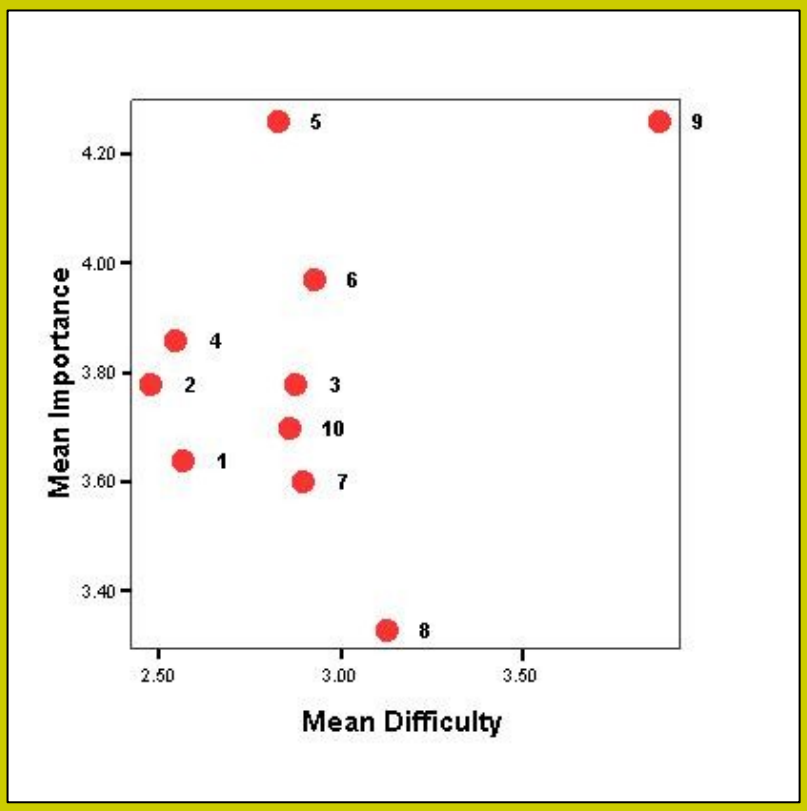



**Chart 3**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 3.6 | 2.6 |
| 2 | 3.8 | 2.5 |
| 3 | 3.8 | 2.9 |
| 4 | 3.9 | 2.6 |
| 5 | 4.3 | 2.8 |
| 6 | 4.0 | 2.9 |
| 7 | 3.6 | 2.9 |
| 8 | 3.3 | 3.1 |
| 9 | 4.3 | 3.9 |
| 10 | 3.7 | 2.9 |

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

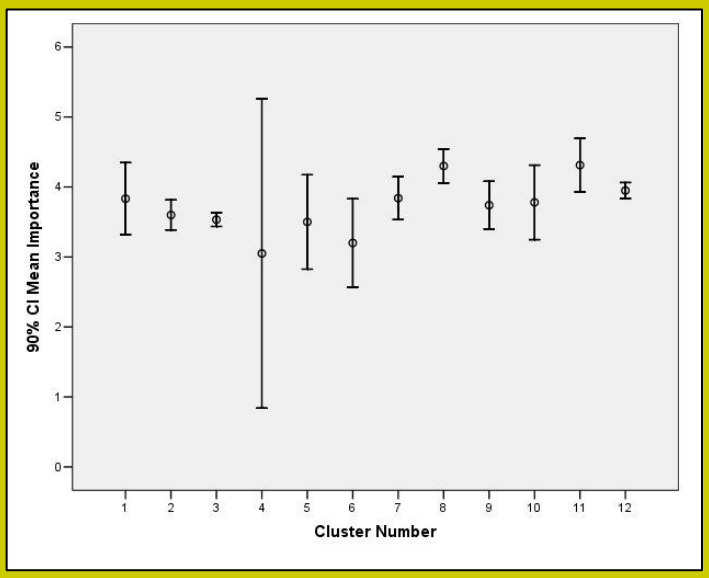



**Chart 4**

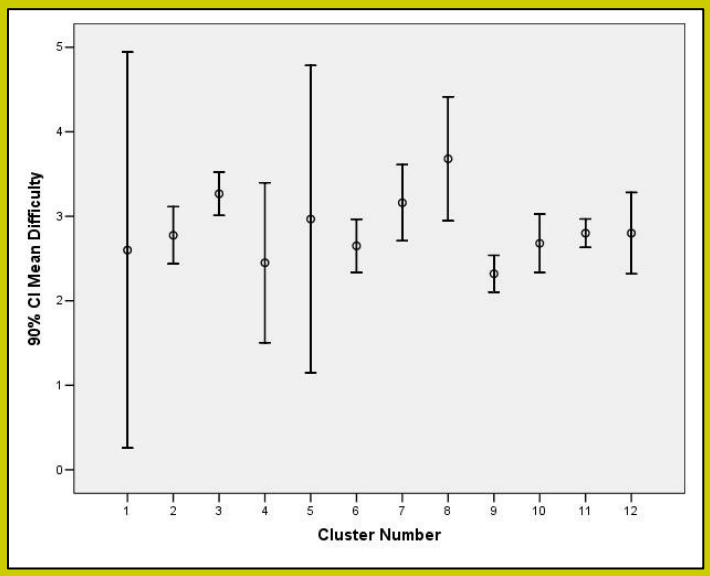



**Chart 5**

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 nine (Integrating of agencies and government to create an overarching framework, including sustainable funding) is more important than cluster eight (Incentives to encourage preparation) 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).

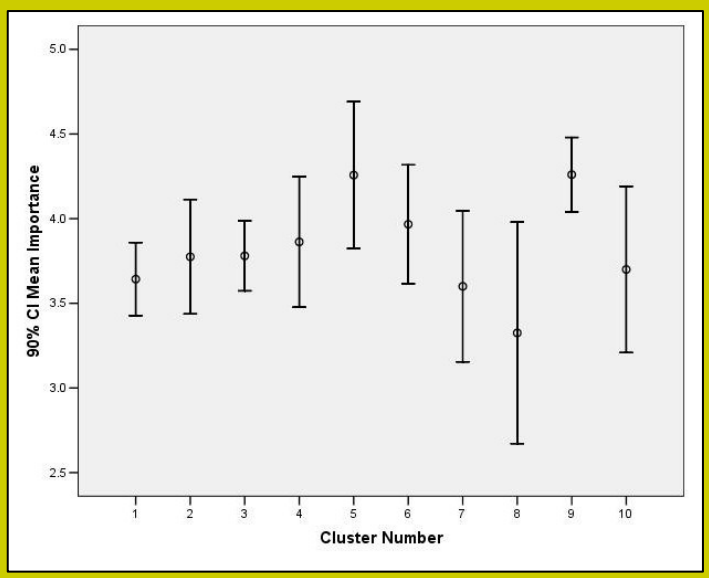



**Chart 6**

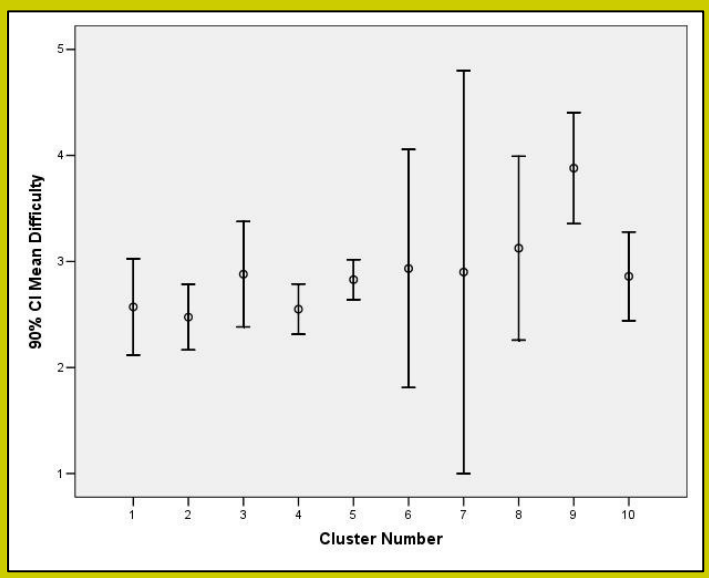



**Chart 7**