# Concept Mapping Workshop: Country Fire Authority

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 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

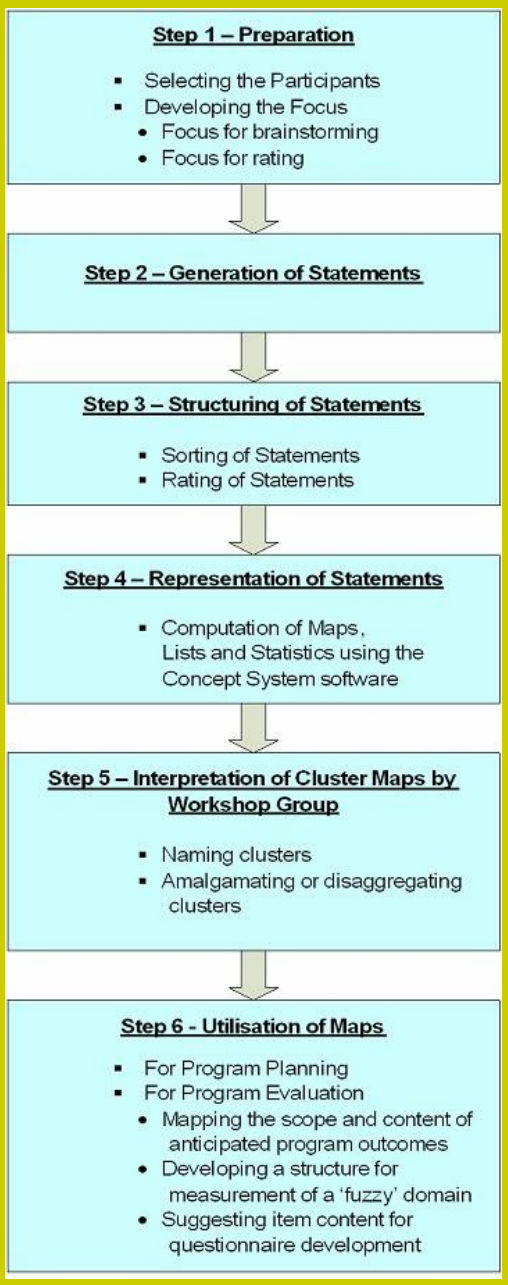


**Chart 1**

## 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 CFA consultation, is outlined below.

- Step 1: Ten CFA staff, who comprised managers of Community Safety, CFA Headquarters and Areas, and staff from Community Education and Infrastructure/Planning, were invited to attend a concept mapping workshop. The workshop took place at CFA 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. Education evolves and changes to reflect lifestyle patterns of individuals and communities in order to engage them
2. Households understand their rights to returning to their land
3. People in control of a fire scene understand land owner rights
4. Householders confident that they can successfully manage their risk
5. Declaration of areas where development should be avoided because of risk (e.g. restrictions on management of vegetation risk – conservation value)
6. Knowledge and awareness – land and home owners
7. Strong community networks and social connection
8. Increase peoples motivation to become prepared
9. Households work together within the household to prepare a bushfire plan
10. Deliver all messages with clarity respecting individual differences and needs
11. Greater understanding and accountability of public and private decision-makers in supporting appropriate development decisions
12. People who are renovating are aware of suitable materials (and thinking of using them)
13. Integrated mitigation (fire prevention works) regardless of land context – (How agencies do things together)
14. Acceptance of fire as a natural and inevitable part of the environment in which we live
15. Acknowledging the risks that go with the environment in which people chose to live
16. Understanding the natural environment and being connected to it - (a balanced view of the environment and risk so that you live with it and not against it)
17. Able to read natural indicators (e.g. high fire risk days)
18. Increased adoption of preparedness measures of householders
19. Increased accessibility to resources that support preparedness (to all people)
20. People understand how houses burn down
21. Appropriate incentives for reducing personal and household risk
22. Need to find ways to infiltrate the organizations and aspects of society that influence people's values, ideas and expectations
23. Promote resilience through unity and connections
24. Fewer people evacuate late
25. Access to appropriate information and education
26. Find synergies with other activities and programs (things that achieve a number of desirable outcomes)
27. Ensure the messenger is engaging and that the message and its delivery is relevant
28. Decrease resident dependence on the CFA as a fire suppression service
29. Houses are built appropriately for the area
30. Householders are involved in the development of strategies to motivate and assist their preparedness
31. Consistency of information shared and provided
32. Provide real-time fire information to aid residents decision-making
33. Residents know how to access fire information during a fire
34. Municipalities (as service providers in contact with individuals) build in provisions for assisting at risk residents
35. Fuel is managed to reduce bushfire attack on people and assets
36. Influence media to reduce spin and report accurately during bushfire events
37. People can access practical examples of a well prepared property, house etc.
38. Provision of environment that supports people through stages of learning and implementation (help them to explore what it means to them personally)
39. People have the opportunity to share their experiences, learning etc with each other and support each other – to bounce ideas
40. People have opportunity to ask questions and clarify issues for them individually
41. People emotionally and psychologically prepared for the experience (and the emotional cost of dealing with fire incident)
42. Explore ways in which those with experiences of fires can share that experience
43. Households and townships have adequate water supplies
44. Encouraging static water supplies for people in high risk areas
45. People have appropriate equipment (e.g. to use their water)

46. Mutual understanding and acknowledgement about asset priorities (e.g. stock versus house)
47. People understand what can and can't be achieved in terms of asset protection
48. Encourage informed choices among landholders and respect their values
49. Encourage fire-fighter friendly neighbourhoods (access, water supply, defendable space)
50. Residents plan and implement a suite of complementary measures (rather than ad hoc or fortuitous preparation)
51. People have a fully adequate concept of what "being prepared" means
52. People fully understand what having a "plan" means
53. People are prepared for active defence and understand the requirements (people power and equipment)
54. People who plan to leave early understand what "early" means and what this requires (e.g. when to come back)
55. Dispel myths about fires and what is safe and what is not safe
56. Organisations don't perpetuate myths about what is safe and not safe
57. As many agencies as possible give accurate rather than misleading information
58. Community and agencies (including CFA) understand accurately how houses are lost

# 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 Concept Systems program groups statements that are close together (have a similar meaning). 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. In cluster 3, for example, the items were concerned with creating community independence from the CFA. Thus, it was decided that an appropriate name for the cluster would be 'Community independence and resilience'.

In addition to naming individual clusters, participants discussed whether all items were appropriately positioned in the clusters. Generally it was agreed that they were, however within the group a decision was taken to reassign items from cluster 2 (accurate timely information) to cluster 3 (community independence and resilience). Additionally, the group suggested the original cluster 9 should be split into two clusters, named 'common understanding', and 'agreed values/priorities'.

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 System 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.

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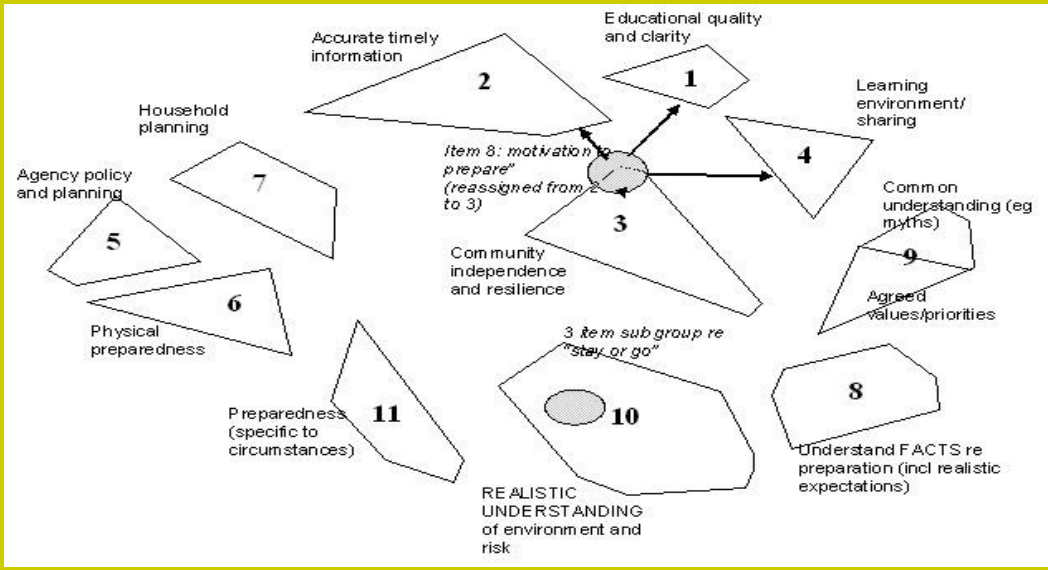
# The Concept Map Generated During the Workshop




**Map 1**

## Cluster Names

- Cluster 1:Educational quality and clarity
- Cluster 2: Accurate and timely information
- Cluster 3:Community independence and resilience
- Cluster 4:Learning environment/sharing
- Cluster 5:Agency policy and planning
- Cluster 6:Physical preparedness
- Cluster 7:Household planning
- Cluster 8:Understand facts re preparation (including realistic expectations)
- Cluster 9:
- Cluster 10:Realistic understanding of environment and risk
- Cluster 11:Preparedness (specific to circumstances)

# 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.

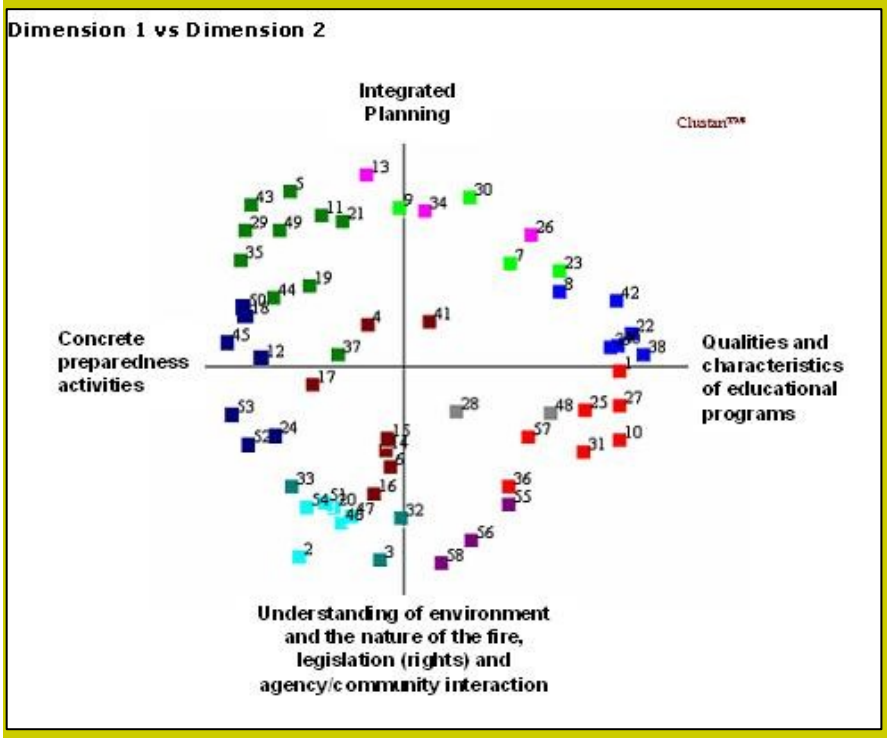
The broad themes identified in the 3-dimensional maps were:

- Dimension 1 (right: Maps 2 & 3):Qualities and characteristics of educational programs
- Dimension 1 (left: Maps 2 & 3):Concrete preparedness activities
- Dimension 2 (top: Map 2):Integrated planning
- Dimension 2 (bottom: Map 2): Understanding of environment and the nature of the fire, legislation (rights) and agency/community interaction
- Dimension 3 (top: Map 3): Distribution of quality (appropriate and consistent across different sources) information
- Dimension 3 (bottom: Map 3): Unnamed

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 that outcome. The dimensions can be seen in terms of processes and outcomes. For example 'Educating individuals and communities so they have an understanding/awareness and acceptance of the risk posed by bushfire and appropriate strategies for coping with it' is one process whereby the outcome of 'houses and surrounding infrastructure are appropriately designed' 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.

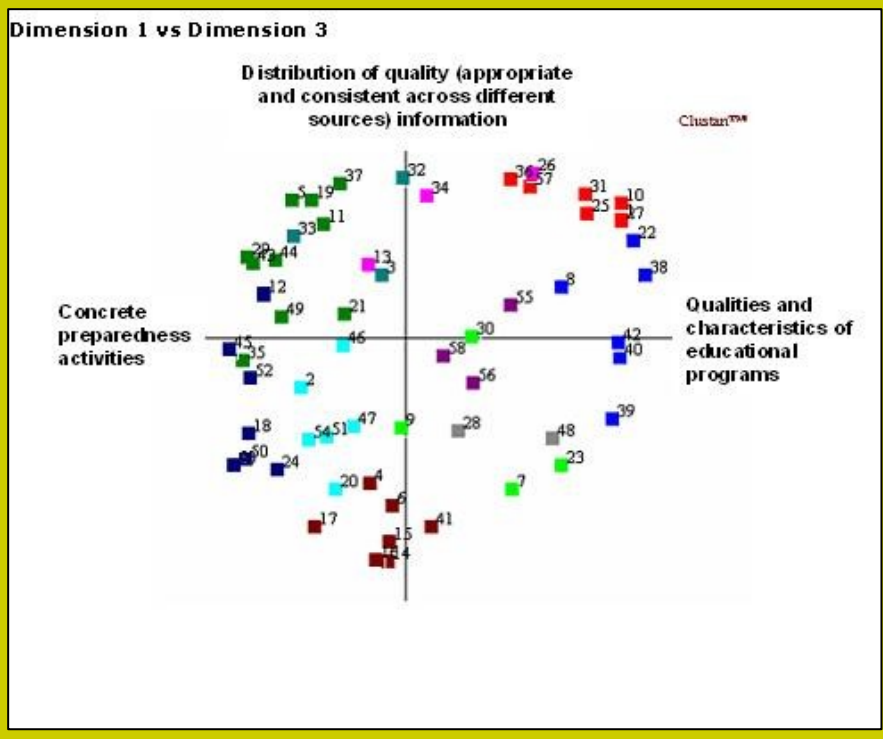
# 3-Dimensional Concept Maps




Map 2

## Cluster Names

- Cluster 1(Statements 1, 10, 25, 27, 31, 36, 57); Accuracy, clarity and consistency of educational message
- Cluster 2 (Statements 8,22,38,39,40,42) Supportive experiential learning environment
- Cluster 3 (Statements 5,11,19,21,29,35,37,43, 44,49) Appropriate municipal planning
- Cluster 4 (Statements 13,26,34) Agency/Community cooperation
- Cluster 5 (Statements 7,9,23,30) Householder engagement and cooperation
- Cluster 6 (Statements 2,20,46,47,51,54) Householder understanding of preparedness and asset protection
- Cluster 7 (Statements 28, 48) Reduced agengy dependence – enhanced landholder choice
- Cluster 8 (Statements 55,56,58) Accurate understanding of bushfire behaviour and impact
- Cluster 9 (Statements 3,32,33) Timely information for decision making
- Cluster 10 (Statements 4,6,14,15,16,17,41) Understanding and awareness of risk
- Cluster 11(Statements 12,18,24,45,50,52,53) Planning and physical preparedness




Map 3

# 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 3) 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:Accuracy, clarity and consistency of educational messages
- Cluster 2: Supportive experiential learning environment
- Cluster 3:Appropriate municipal planning
- Cluster 4:Agency/Community cooperation
- Cluster 5:Householder engagement and cooperation
- Cluster 6:Householder understanding of preparedness and asset protection
- Cluster 7:Reduced agency dependence – Enhanced landholder choice
- Cluster 8:Accurate understanding of bushfire behaviour and impact
- Cluster 9:Timely information for decision making
- Cluster 10: Understanding and awareness of risk
- Cluster 11: Planning and physical preparedness

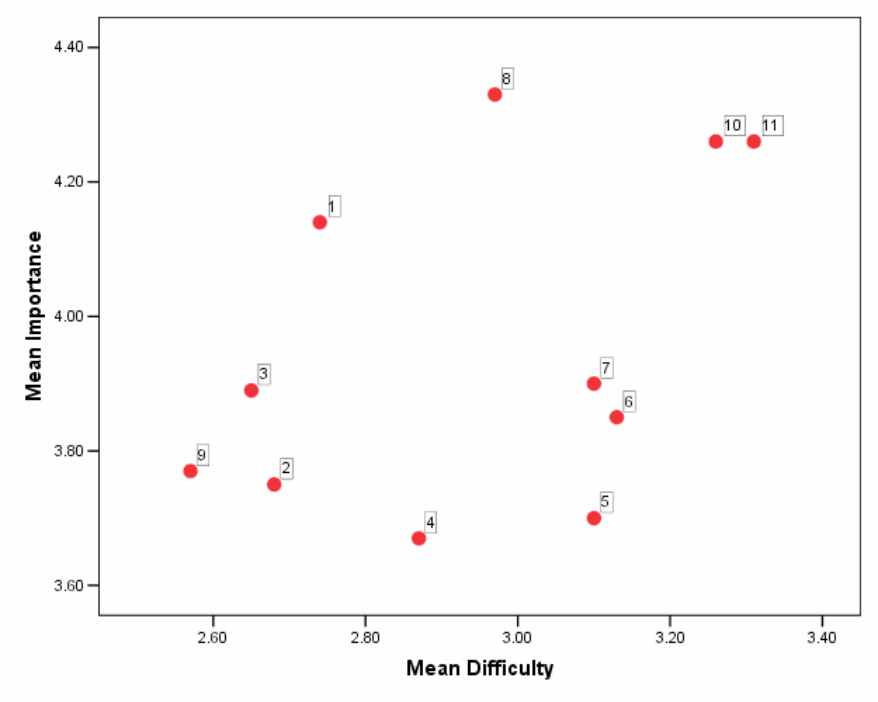



**Chart 1**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 4.1 | 3.7 |
| 2 | 3.8 | 2.7 |
| 3 | 3.6 | 2.7 |
| 4 | 3.7 | 2.9 |
| 5 | 3.7 | 3.1 |
| 6 | 3.9 | 3.1 |
| 7 | 3.9 | 3.1 |
| 8 | 4.3 | 3.0 |
| 9 | 3.8 | 2.6 |
| 10 | 4.3 | 3.3 |
| 11 | 4.3 | 3.3 |

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

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

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

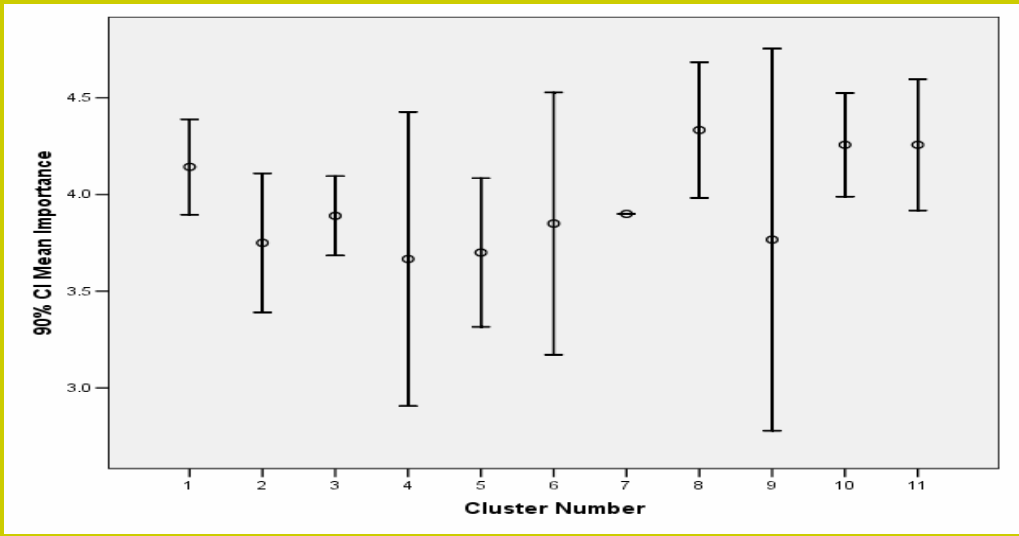



**Chart 2**

For the three-dimensional solution, the researchers used SPSS to create error bars for each cluster by importance and difficulty. Due to the low numbers 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 from the workshop differ. For example, Chart 2 (the scatter-plot for the three-dimensional solution) seems to show that those who took part in the workshop believed that Cluster 8 (Accurate understanding of bushfire behaviour and impact) was considerably more important to achieve than Clusters 4 (Agency/Community cooperation) and 5 (Householder engagement and cooperation). In Chart 3 it can be seen that the error bars around the means for Cluster 8, compared with Clusters 4 and 5 overlap so we cannot claim that the apparent differences in the means were greater than might be observed by chance. On the other hand, Chart 3 suggests that Clusters 10 (Understanding and awareness of risk) and 11 (Planning and physical preparedness) were perceived by those who attended the workshop to be rather more difficult to achieve than Cluster 9 (Timely information for decision making). Here the error bars around the means of Clusters 10 and 11 do not overlap with the error bars around Cluster 9. This shows that the differences are statistically significant, and we can say that they were unlikely to have occurred by chance.

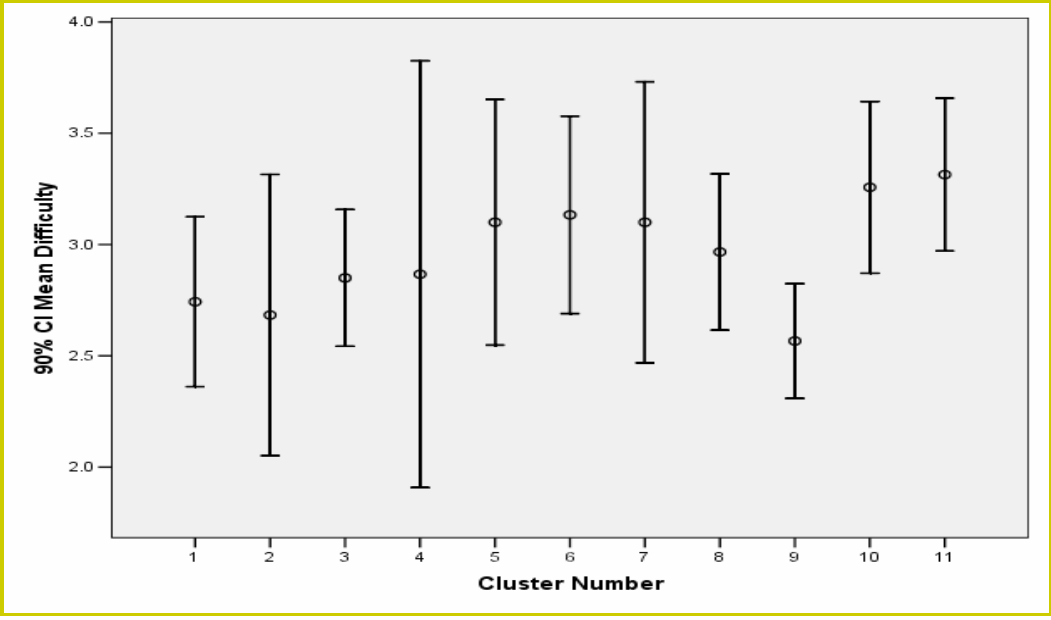



**Chart 3**