# Concept Mapping Workshop: Fire and Emergency Services 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

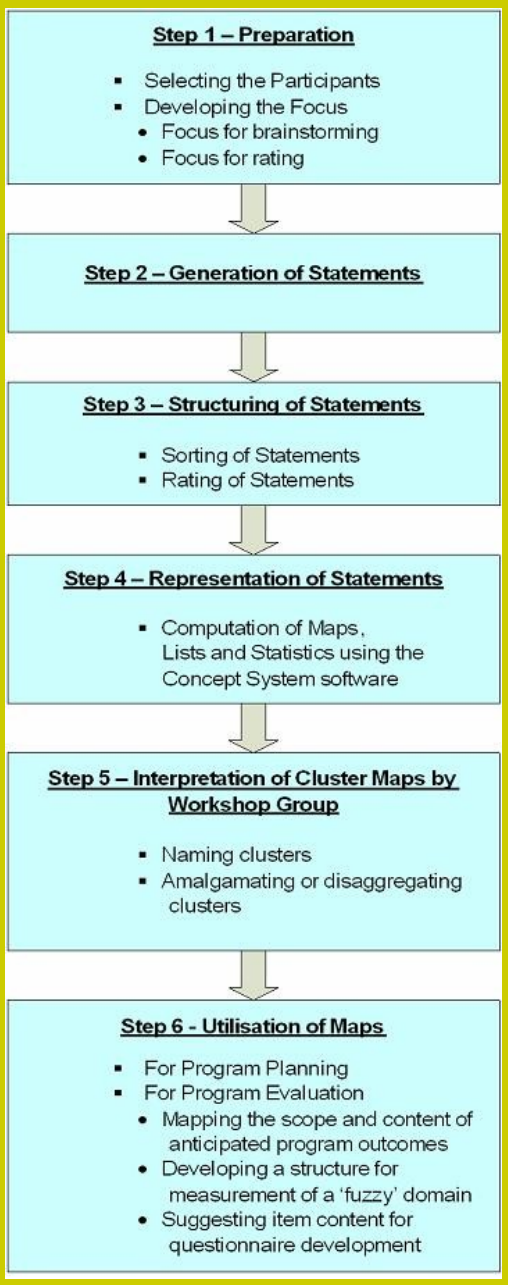



**Chart 1**

## 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 Blue Mountains community, is outlined below.

- Step 1: Six agency personnel from the FESA headquarters were invited to attend a concept mapping workshop. The workshop took place at FESA 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. Householders and neighbourhoods perceive that they are at risk of bushfire (in order to make themselves safer)
2. All subdivision development complies with requirements of "planning for Bushfire Protection Policy".
3. Simplify actions and/or behaviours required of households (user friendly messages - complexity not a disincentive).
4. Get people interested.
5. Touch meaningful emotional triggers for individuals (to want to change).
6. Community safety processes driven at a community level (supported by FESA).
7. Householders and neighbourhoods need to have evacuation plans.
8. Working together to create ownership and increase likelihood of action.
9. Residents understand and act on the nature of risk and implement PPR appropriate to level of risk.
10. Evidence of right behaviour at community level or above.
11. Create an environment where it is seen as a positive thing to be safe (community itself positively reinforces safety preparedness).
12. Work "with" and "within" the community rather than "on" the community.
13. Individuals and communities accept responsibility and ownership for safety preparedness.
14. Don't see all responsibility and power as lying with FESA and other agencies.
15. Changes in 'behaviour' in making houses safe, not solely on increase in knowledge.
16. Face to face interactions between community members and emergency personnel.
17. Evidence of ownership of safety by the community (key indicators, eg: membership of groups (brag, community fireguard, preparedness actions).
18. Know about what householders need (so that interventions target these needs, eg: knowledge, resources, confidence).
19. Safety messages appropriately marketed in accordance with people's needs, capacity to absorb information and capacity to implement change.
20. Organisation taps into where people are at and what motivates them for its marketing (social marketing perspective).
21. Effectively engage and respond to other cultures (can't just use a blanket approach).
22. Integrate ALL planning process from state through to community, including emergency management, land use planning right down to community safety business plans.
23. Householders undertake appropriate preparedness actions (eg 20m circle of safety, clean gutters, etc).
24. Emergency plans drawn up for high risk establishments (eg, schools, aged care facilities etc) (Response, preparedness, evacuation).
25. FESA takes community safety seriously as an integral part of all its activities.
26. Operational personnel active in promoting safety (not just responders).
27. Fire and emergency services work effectively with other local agencies to reinforce and support messages.
28. Householders have a realistic appraisal of the risk for their own particular property and preparedness requirements.
29. Householders take preparedness action appropriate to their own individual risk
30. People UNDERSTAND risk and safety (not just follow checklists).
31. Don't create excessive dependency on FESA.
32. 'Realistic' expectations about what emergency services can and cannot do.
33. FESA understands motivation to change at the individual or household level (understand motivation more deeply).
34. Communities at risk of a particular event are able to be identified and contacted.
35. Proportionate funding between prevention/preparedness and response.
36. Fire safety gets the same community profile as other safety issues.
37. Give people information that will maximise safety for the actions they choose (even if it is not the organisations preferred actions).
38. Plan for contingencies of people's desires and actions rather than stock messages.
39. Effective communication processes implemented during an event (planned communication strategy).
40. Holistic rather than hazard-specific approach to safety and safety messages.
41. Teach people how to be safe and think about safety rather than "what to do".
42. People skilled in thinking about their safety preparedness.
43. FESA gets "stay or go" policy sorted.
44. People and communities have 'stay or go' plans in place.
45. Local governments are on side with message and support community safety (in their policies and actions).

# An Explanation of the Workshop

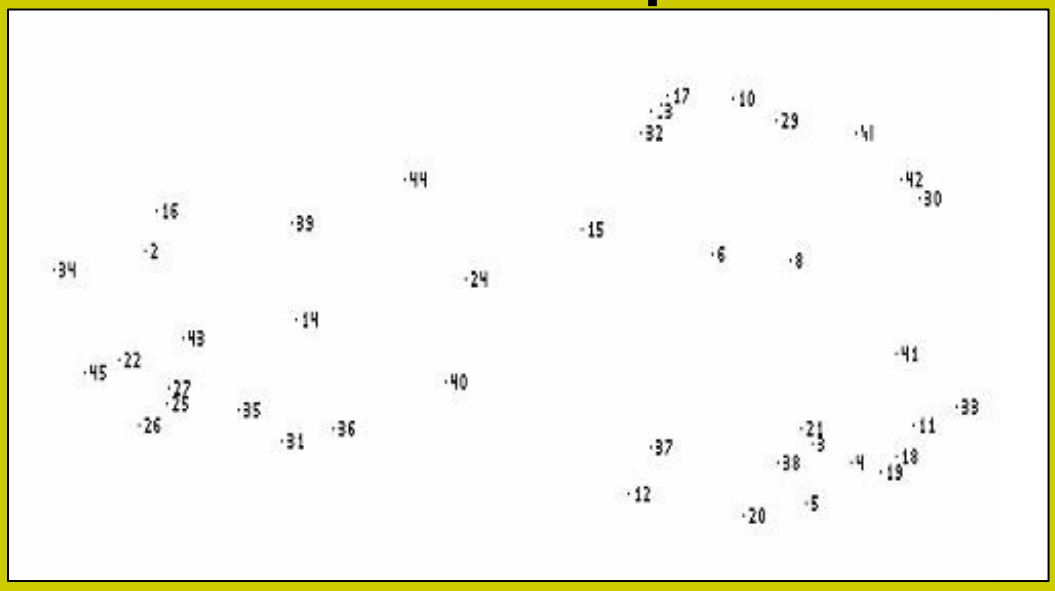
The initial stage of the computer assisted analysis uses a technique known as multi-dimensional scaling. The concept map is constructed by amalgamating the sorted statements of each participant. Each point (statement) is positioned on the map in relation to all the others, with statements sorted together 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 45 statements means 44 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 1 consists of statements 1, 9, 13, 28, 30 and 42. 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 individuals' understanding of the risk posed by bushfire and appropriate mitigation strategies. Thus, it was decided that an appropriate name for the cluster would be 'Mental understanding aspects of preparation'.

In addition to naming individual clusters, participants identified three groupings of clusters that were related. Clusters 3, 8 and 9 were concerned with the relationship between FESA and the community. Clusters 6 and 7 were both related to FESA as an emergency management organisation. While clusters 2, 4 and 5 highlighted aspects of preparation at differing levels within society (individual, household and community). 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.

In addition to noting these broad themes, participants felt the importance of corporate will within FESA in continuing to drive community safety initiatives for bushfire was not represented on the concept map.

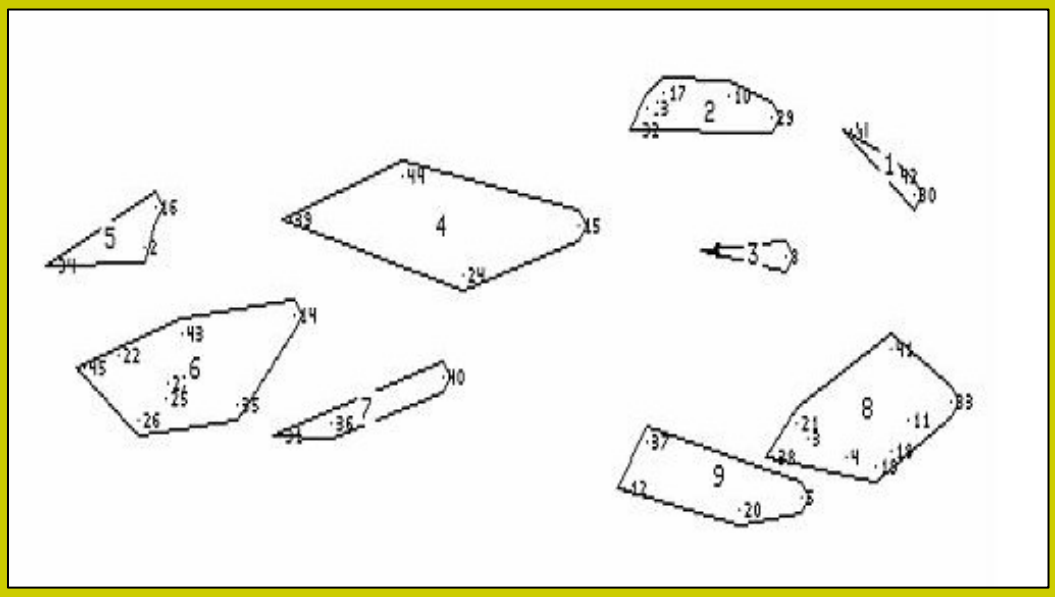
# The Concept Maps Generated During the Workshop



**Map 1**

## Cluster Names

- Cluster 1: Mental understanding aspects of preparation
- Cluster 2: Household preparation activities
- Cluster 3: Community control drives
- Cluster 4: Individuals and communities
- Cluster 5: Community preparation
- Cluster 6: FESA (ongoing focus on community safety)
- Cluster 7: External face of FESA
- Cluster 8: Knowing your market
- Cluster 9: Know how to market



**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.

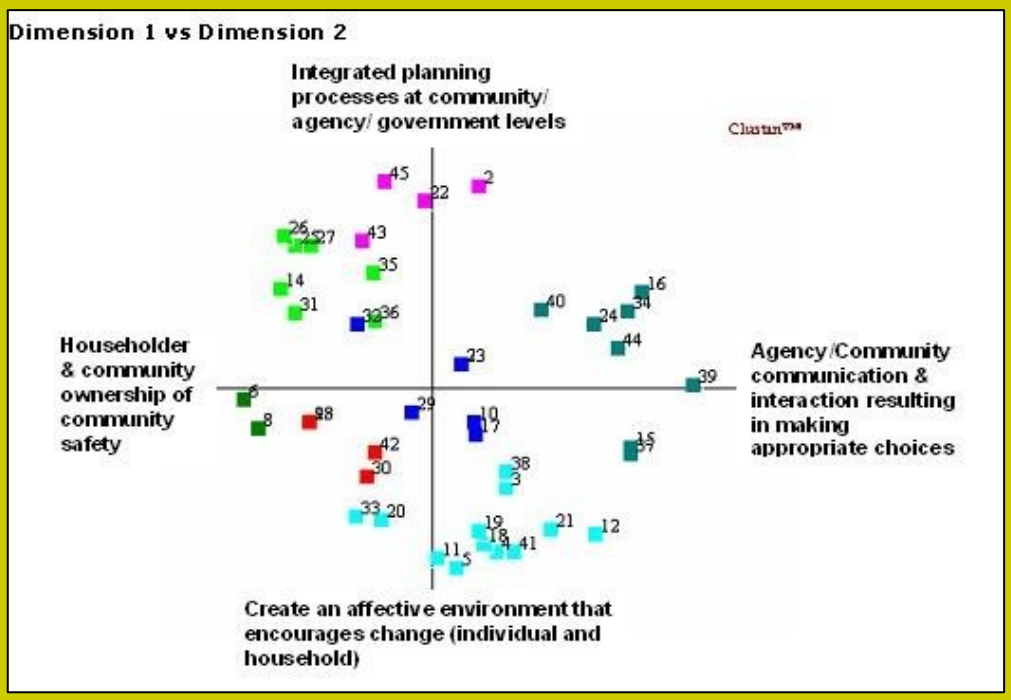
After three-dimensional concept maps had been constructed for each workshop (eleven in total) a broad range of themes related to community safety outcomes were identified. To identify and clarify these themes the researchers, as a group, sorted the pool of cluster names from individual workshops according 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):Agency/Community communication & interaction resulting in making appropriate choices
- Dimension 1 (left: Maps 3 & 4): Householder & community ownership of community safety
- Dimension 2 (top: Map 3): Integrated planning processes at community/ agency/ government levels
- Dimension 2 (bottom: Map 3): Create an affective environment that encourages change (individual and household**)**
- Dimension 3 (top: Map 4): Preparedness actions appropriately matched to risk
- Dimension 3 (bottom: Map 4): Agency activities appropriately matched to risk

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 'Agency/ Community communication & interaction resulting in making appropriate choices ' is one process whereby the outcome of 'Householder & community ownership of community safety ' 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.



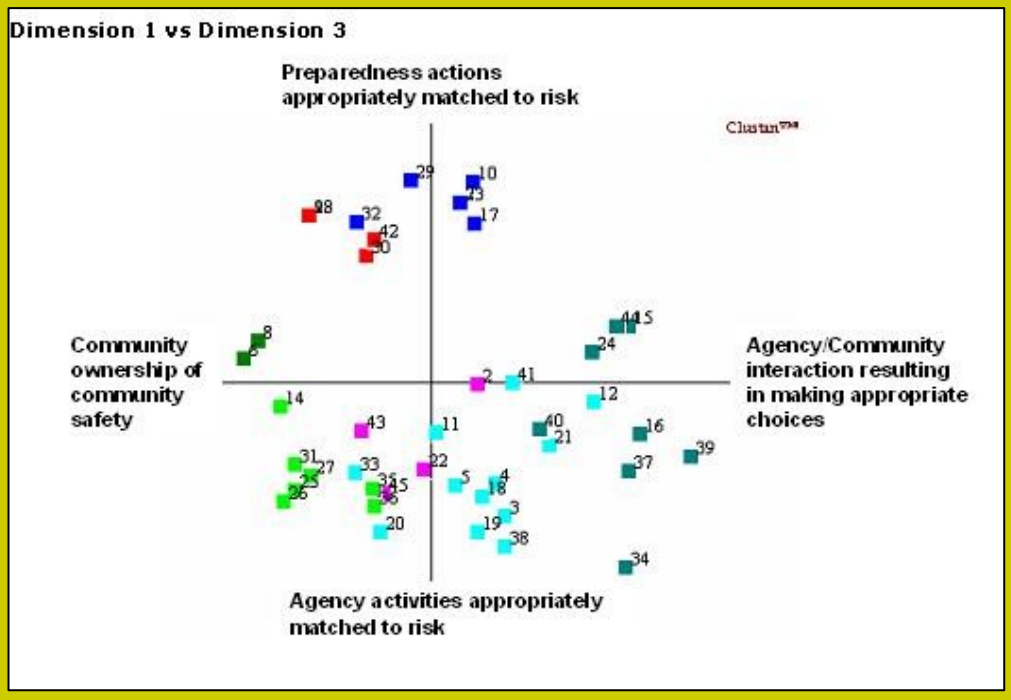

Map 3

## Cluster Names

- Cluster 1 (Statements 1, 9, 13, 28, 30 & 42): Individuals have a realistic understanding of risk and its implications
- Cluster 2 (Statements 7, 10, 17, 23, 29 & 32): Preparedness activities at household and community level
- Cluster 3 (Statements: 6 & 8): Community ownership of community safety
- Cluster 4 (Statements 2, 22, 43 & 45): Co-ordinated fire safety planning and policy

# 3-Dimensional Concept Maps

- Cluster 5 (Statements 14, 25, 26, 27, 31, 35 & 36): Shared responsibility between fire and other agencies
- Cluster 6 (Statements 3, 4, 5, 11, 12, 18, 19, 20, 21, 33, 38 & 41): Assessing/ knowledge of individuals' mindset and capacity to create appropriate interventions
- Cluster 7 (Statements 15, 16, 24, 34, 37, 39, 40 & 44): Effective agency/community interaction/communication leading to preparedness activities




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. Following the workshop the mean importance and difficulty for each statement was calculated. This data was 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 and three dimensional solutions (Chart 2 and 3 respectively).

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: Mental understanding aspects of preparation
- Cluster 2: Household preparation activities
- Cluster 3: Community control drives
- Cluster 4: Individuals and communities
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- Cluster 6: FESA (Ongoing focus on community safety)
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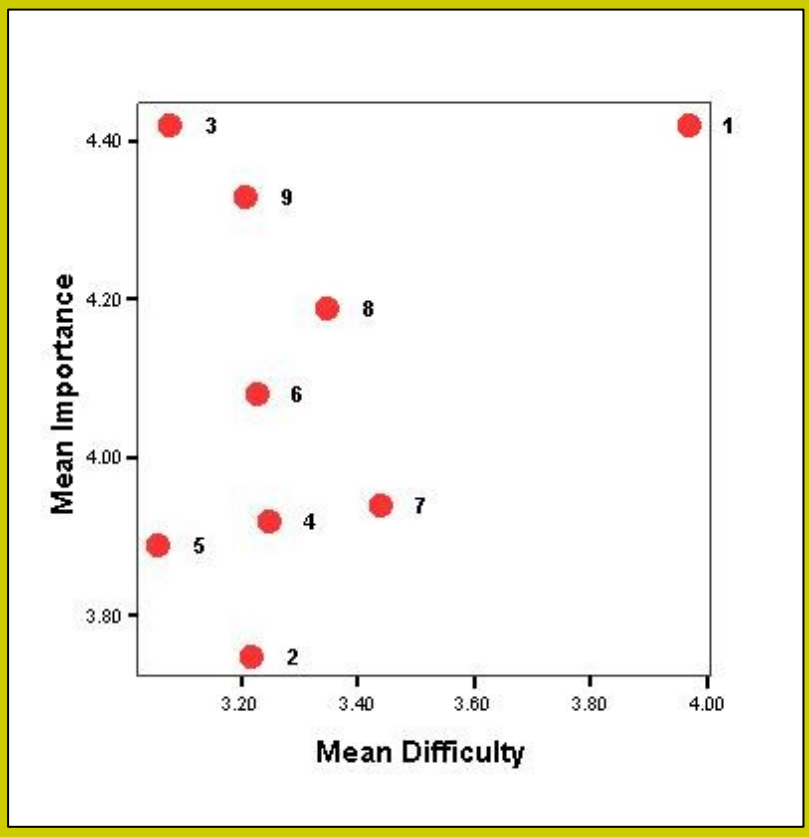


**Chart 2**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 4.4 | 4.0 |
| 2 | 3.8 | 3.2 |
| 3 | 4.4 | 3.1 |
| 4 | 3.9 | 3.3 |
| 5 | 3.9 | 3.1 |
| 6 | 4.1 | 3.2 |
| 7 | 3.9 | 3.4 |
| 8 | 4.2 | 3.4 |
| 9 | 4.3 | 3.2 |

| 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 |

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

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

- Cluster 1: Individuals have a realistic understanding of risk and its implications
- Cluster 2: Preparedness activities at household and community level
- Cluster 3: Community ownership of community safety
- Cluster 4: Co-ordinated fire safety planning and policy
- Cluster 5: Shared responsibility between fire and other agencies
- Cluster 6: Assessing/ knowledge of individuals' mindset and capacity to create appropriate interventions
- Cluster 7: Effective agency/ community interaction/communication leading to preparedness activities

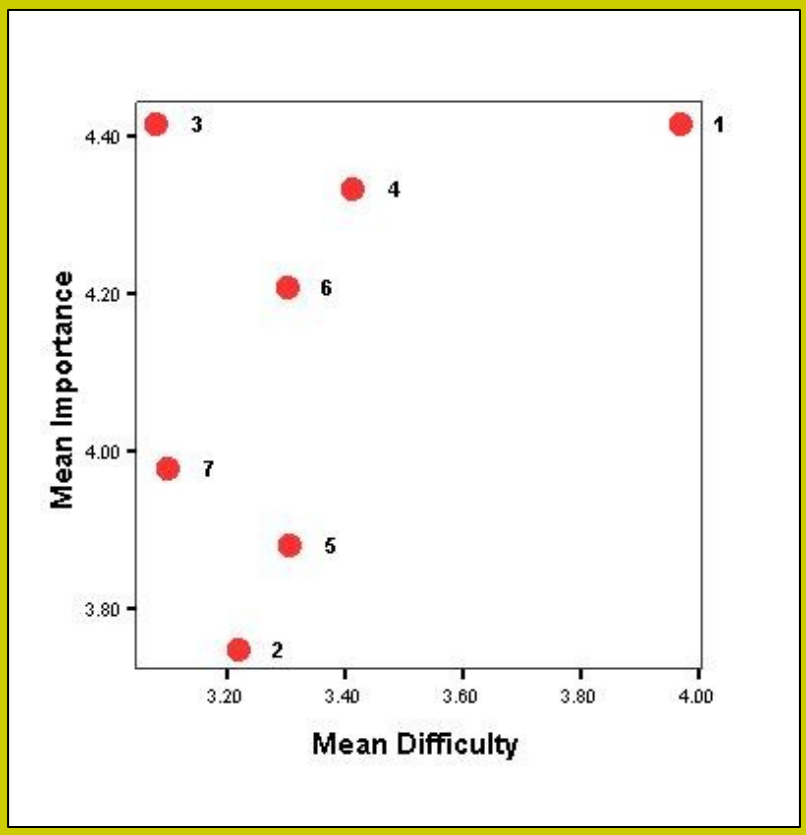


**Chart 3**

| Cluster No. | Mean Imp. | Mean Diff. |
|---|---|---|
| 1 | 4.4 | 4.0 |
| 2 | 3.8 | 3.2 |
| 3 | 4.4 | 3.1 |
| 4 | 4.3 | 3.4 |
| 5 | 3.9 | 3.3 |
| 6 | 4.2 | 3.3 |
| 7 | 4.0 | 3.1 |

| 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: 2 & 3-Dimensional Concept Maps

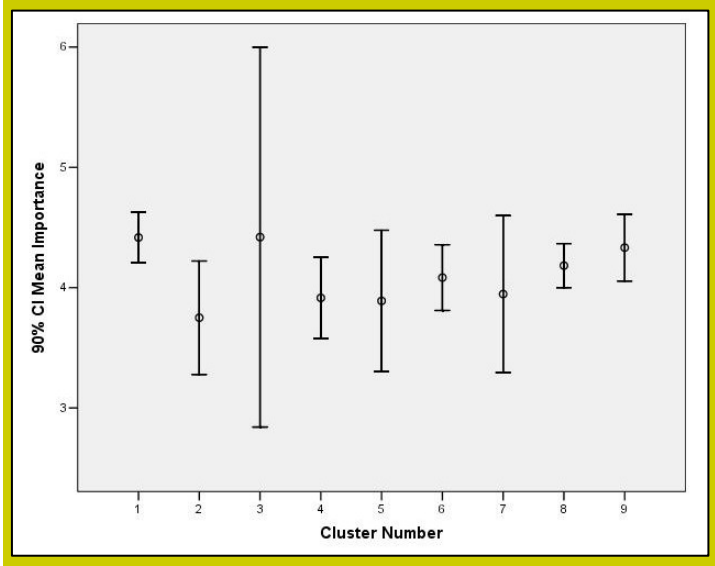


**Chart 4**

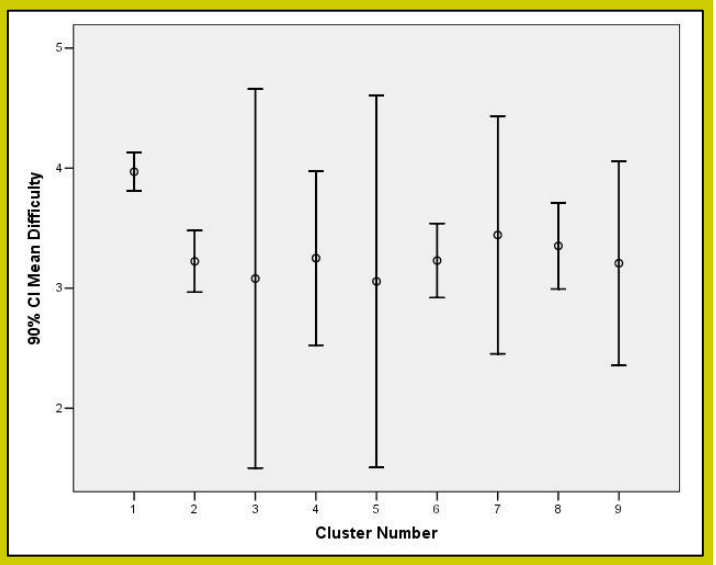


**Chart 5**

For both the two-dimensional (Chart 4 & 5) and three-dimensional (Chart 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 one (Individuals have a realistic understanding of risk and its implications) is more difficult to achieve than cluster two (Preparedness activities at household and community level) 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).

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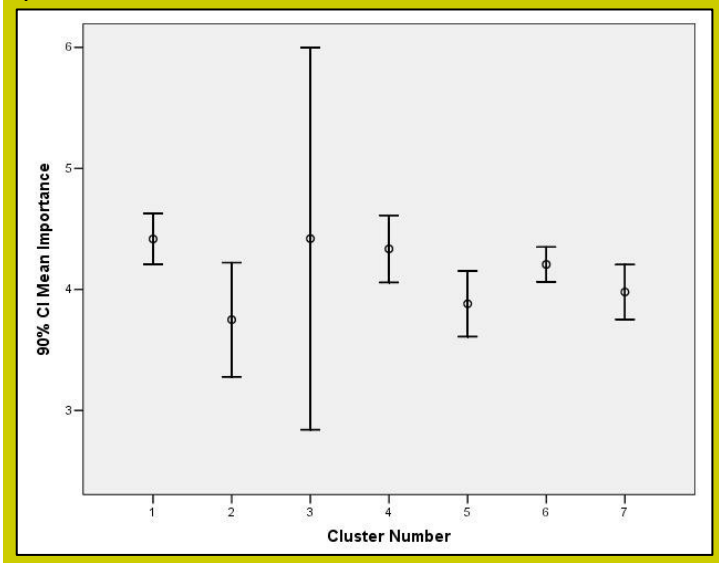


**Chart 6**

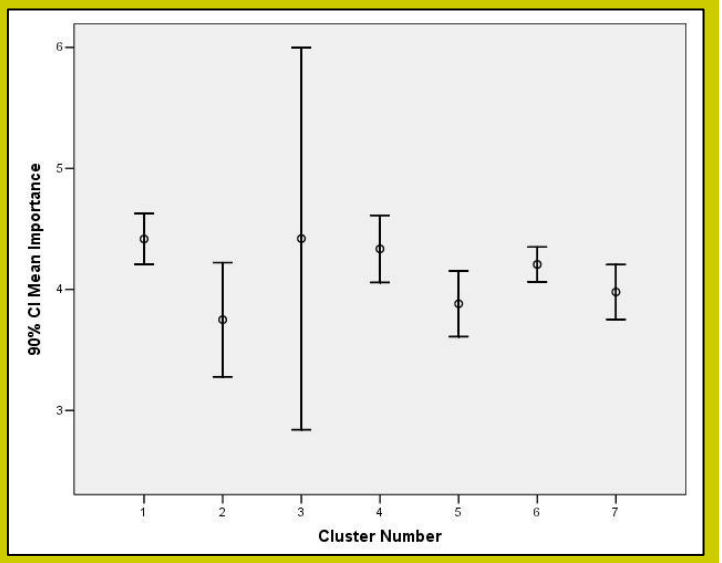


**Chart 7**