

Key Steps in the Analysis of Causal Maps

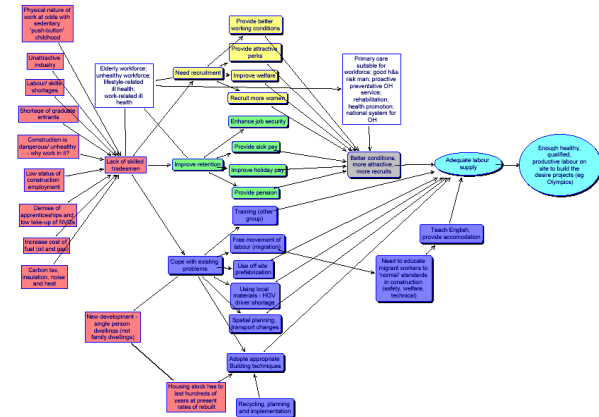
This note outlines key steps in the analysis of causal maps, resulting from industry workshops undertaken as part of the Big Ideas research project. It is important to note that, although these steps suggest a fairly structured and linear approach in the analysis, the actual process may be more of iterative and trial and error in nature. The overall process can be divided in two parts, namely constructing 'global' (combined) map and analysis. The analysis as explained here focuses on identifying central issues and their connections with other peripheral issues within the 'global' map, although another possible analysis is also suggested. A detailed description is presented in 'skills' paper.

Constructing 'global' map

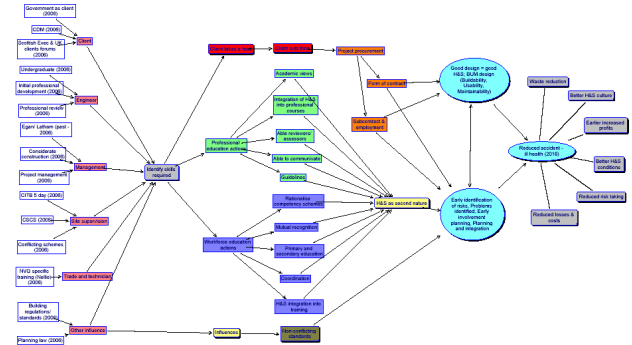
Step 1: Determine theme of the paper; and assess and select relevant causal maps

The assessment investigates issues depicted within potential causal maps, look for similarity, resonance between issues for possible merging. Ensure that issues within the maps cover a range of related topics. There is no guidance on the optimum number of maps, but say between 4 to 7 maps for further analysis. For example, six causal maps have been included in the skills themes:

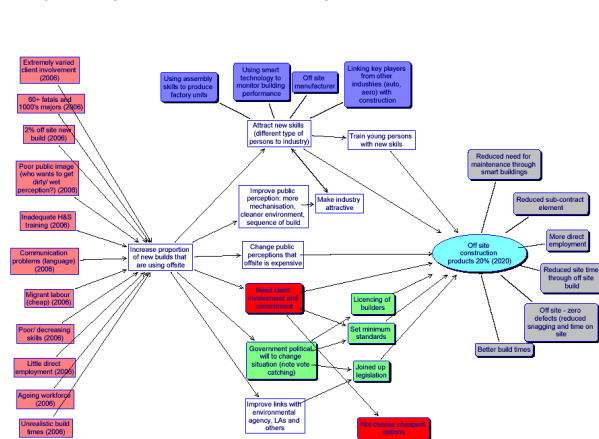
"Matching supply and demand for construction labour"



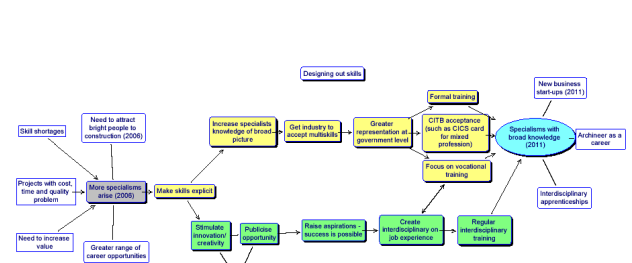
"Training and competence in construction H&S"



"Improving site condition using offsite"



"Greater emphasis on multi-skilled/ inter-disciplinary workforce"



which are connected to the central issues both directly and indirectly. The score of central analysis is derived by adding domain score with diminishing weight of each successive layer. For example, each issue directly linked to a particular issue is given a weight of 1; issues in the second layer are given 1/2; issues in the third layer are given 1/3, and so on (Eden, 2004).

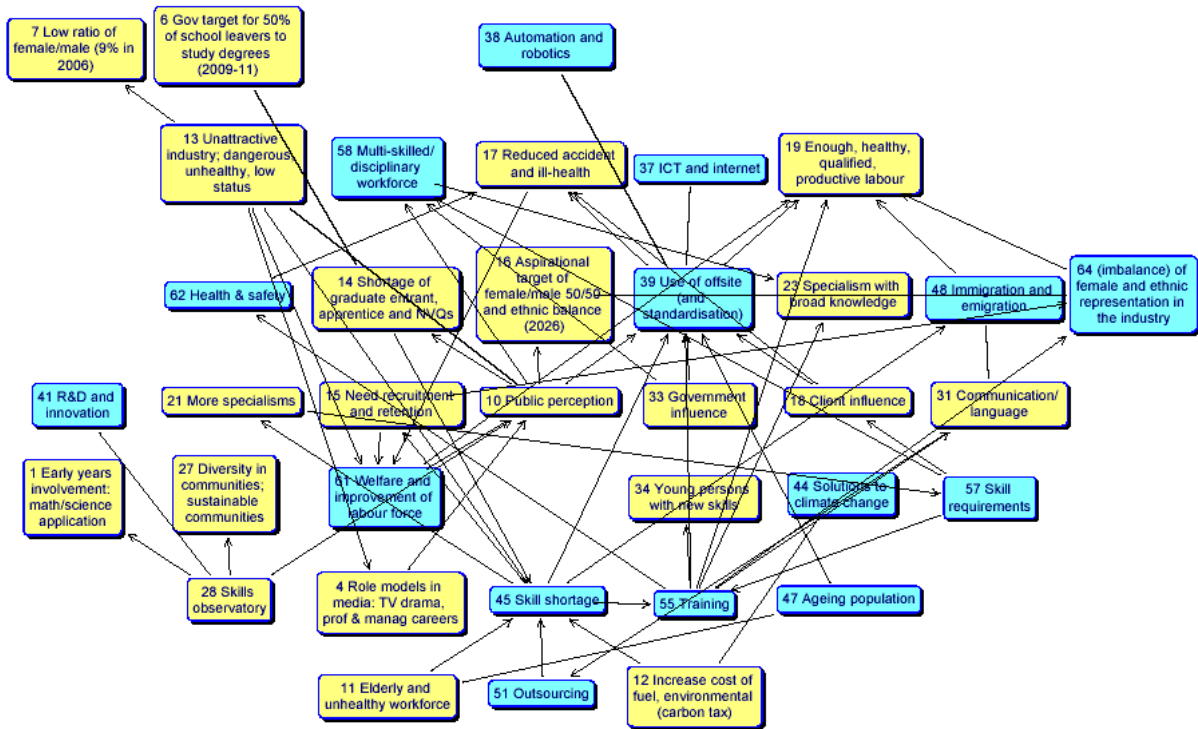
Guidance on how to execute this function can be seen in di Gregorio (2006) page 23 or DE user's guide version 3.2 pages 66-68, DE online reference version 3.3 pages 180-181 and 190. Then, compare the results between two analyses to identify few most important issues (see example below).

Domain Analysis		Central Analysis	
Issue	Score	Issue	Score
Skill shortage	10	Use of offsite (and standardisation)	24
Training	9	Public perception	24
Aspirational target of female/male 50/50 and ethnic balance (2026)	8	Training	23
Use of offsite (and standardisation)	8	Skill shortage	23
Public perception	7	Aspirational target of female/male 50/50 and ethnic balance (2026)	22
Enough, healthy, qualified, productive labour	5	(Imbalance of) female and ethnic representation in the industry	20
Welfare and improvement of labour force	5	Enough, healthy, qualified, productive labour	20
Unattractive industry; dangerous, unhealthy, low status	4	Unattractive industry; dangerous, unhealthy, low status	20
Reduced accident and ill-health	4	Welfare and improvement of labour force	19
Government legislations	4	Shortage of graduate entrant, apprentice and NVQs	19
Common qualification requirements	4		
Immigration and emigration	4		
Skill requirements	4		
Multi-skilled/disciplinary workforce	4		

Step 5: Map most important issues identified by domain and central analyses and compare results

The most important issues as identified by domain and central issues could be used to generate maps which show all the (peripheral) interconnected issues. Map function is available in DE software (see di Gregorio (2006) page 19). Guidance for mapping to specific levels and including only out/in elements can be seen in di Gregorio (2006) page 50.

A map generated based on 'use of offsite (and standardisation)' is shown as follows.



Step 6: Compare issues associated with central issues

Develop a table that compare issues identified from mapping the central issues (e.g. those issues identified in the map above) and investigate possible overlap between maps. This should identify fewer maps with most central issues in them. The ‘angle’ and discussion of the paper should be guided by these maps.

ID	Issue Description	Cluster with Central Issue (ID)							
		61	13	19	16	45	55	10	39
1	Early years involvement: maths/ science application								
2	School educated programme/ link to course content								
3	All teachers to have worked in com env prior to teaching				■				
...								
...						■		
								■	
									■
60	Flexible working								
61	Welfare and improvement of labour force	■	■	■				■	■
62	Health & Safety						■		
63	Work-life balance				■				
64	(Imbalance) of female and ethnic rep'tation in the industry			■	■		■		
	Proportion of issues covered in cluster 39 (%)	100	95	94	65	94	100	100	

Note:

■ : indicates central issue

▨ : indicates issues within immediate vicinity of central issue

■ : indicates related issues

Other potential analysis technique

Steps 4-6 are considered as one route in analysing data of this kind. Other possible approach is using 'cluster' analysis, which function is also provided in the DE software. Cluster analysis was not suitable for the skill theme as it arrives at two large clusters, also bypasses the identification process of the most important issues (i.e. domain and central analyses). The use of particular analysis is very much contingent upon data pattern, which could be explored (and detected) by trial and error using analysis as demonstrated here. Edkins et al. (2007) provides a brief overview of interesting cluster analysis for cognitive maps. This might be considered for future 'bespoke' analysis of the other emerging themes.

References

di Gregorio, S. (2006) *Introduction to Decision Explorer*. A short course note.

Banxia Software Limited (2002) *Decision Explorer User's Guide version 3.2*. Banxia Software Limited, Kendal, UK.

Banxia Software Limited (2005) *Decision Explorer Online Reference version 3.3*. Banxia Software Limited, Kendal, UK.

Edkins, A.J., Kurul, E., Maytorena-Sanchez, E. and Rintala, K. (2007) The application of cognitive mapping methodologies in project management research. *International Journal of Project Management* (article in press).