

7 Conclusions

7.01 The Hypothesis

The hypothesis of the research was “*conceptual graphs are a suitable knowledge-based decision support tool for use by management accountants in strategic planning*”. The events depicted by this thesis report eventually lead to the conclusion, and thus the original contribution of this research, that the above hypothesis turned out to be false. Those events are summarised as follows.

7.02 Retracing the Events

It was identified in Chapter 1 that computer knowledge-based approaches could help accountants apply their skills in the management of the *strategic planning* problems. The inexactness of this domain causes it to exist beyond other calculable means, namely numeric or data-based techniques. We saw that such problem domains could not be modelled effectively by computer alone, hence the only advanced knowledge-based methodologies of interest were those that could be adequately reviewed by the above management accountant in the light of this domain expert’s own continually changing tacit and implicit knowledge. This situation was supported by examining a commercially available ‘reinsurance’ expert system, and the ‘system dynamics’ technique. From the foregoing discussion, this chapter indicated that the thereby *knowledge-based decision support tool* needed both to be technically advanced yet directly usable by the domain expert.

In Chapter 2, we saw that structured diagram techniques, such as flowcharting, were well known by accountants and were a clearly understandable yet important aid in problem review. Apart from being founded on a logically complete reasoning system, the knowledge-based methodology of *conceptual graphs* was formulated to be an enhancement of these other methods. The chapter had highlighted the limitations of those methods. From all these bases, the potential appropriateness of conceptual graphs was first revealed as a directly usable tool by the strategic management accountant. A general description of the conceptual graphs theory was given,

followed by a knowledge-based example specifically in an appropriate problem domain. That example was based on the imprecise management accounting area of 'relevant values for decision making'. Chapter 2 thus supported the view that conceptual graphs might be usable by the strategic problem solving management accountant, who was by now referred to more succinctly as the *strategic management accountant*.

To determine further the extent of conceptual graphs' technical capability in the strategic problem domain, Chapter 3 and Chapter 4 each discussed a comparative study between conceptual graphs and a similarly appropriate methodology in current use. These other two methodologies, 'cognitive mapping' and 'economic accounting', underlined the technical advantages of conceptual graphs. Again these chapters supported the basis for the above hypothesis.

Given all the above support, Chapter 5 set out the most appropriate means of presenting conceptual graphs to the strategic management accountant. From the experiences with knowledge elicitation, we saw that a highly interactive human-computer environment would be necessary. The thesis' findings recommended that this integration would be best augmented by conceptual graphs. Furthermore it was identified that conceptual graphs enjoyed another similarity with a technique familiar to the accountant. This similarity was with the 'negating' brackets in the accountant's traditional bookkeeping model. Leading on from all the above, the Conceptual Analysis and Review Environment, or *CARE* for short, was devised. *CARE* was implemented in computer software.

In Chapter 6, *CARE* was employed to test the accepted graphical form of conceptual graphs through a series of user evaluation sessions. The evaluations started out with subjects from the conceptual graphs community itself, then key business school staff, and culminated in a session with senior practising accountants. In addition, *CARE* was enhanced iteratively in accordance with the results of each evaluation session. However, despite their strong prima facie attractiveness and positive response from the conceptual graphs community session, as the user evaluations progressed it became increasingly evident that the inherent complexity of conceptual graphs fundamentally undermined them as a viable tool, other than for very trivial problems well below the level needed to be viable for strategic management

accountancy. Therefore, as stated above, the original contribution of this research is sadly that its hypothesis turns out to be false.

7.03 Suggested Implications

Given my interest in seeking to extend the accountant's soundly developed techniques into the top-level area of strategic business knowledge, this was a disappointing result. It is thereby important to discern the implications of this result, so that others do not follow the same path. In recognition of this regard, the following considerations are suggested.

To start with, let us look at the role of conceptual graphs theory and ask "Are conceptual graphs an inappropriate tool in strategic management accountancy?". After all, the title of this thesis is "*The Suitability of Conceptual Graphs in Strategic Management Accountancy*". This thesis has shown that they are not for strategic management accountants, but the above question is somewhat more general. Conceivably, conceptual graphs could be used in this problem domain except now they would not be seen by the domain expert. On this success, the more general statement would be confirmed whilst its specific instance denied. In itself, this state of affairs would not be inconsistent.

We have seen, however, that the advanced knowledge-based tool must be directly usable by the domain expert, especially in the strategic problem domain. It is therefore insufficient to demonstrate that the strategic domain can be represented in conceptual graphs. This technical capability must be augmented by exhibiting a surface form the domain expert can understand. This may in the shape of some significantly enhanced conceptual graphs theory, or some other suitable representation.

It may be argued that perhaps the only clearly domain expert usable representation is natural language. We know, though, that natural language can be ambiguous and obfuscatory. In addition, natural language ignores the visuality of pictures. Despite the usability reservations revealed in this thesis about structured diagrams, and specifically flowcharts, the overall findings from the studies referred to in this thesis reveal that *good* visuality does aid human understanding. Discovering that visuality is the real challenge that lies ahead. The visual aid must not merely be usable, for this is likely to lead

towards that tool being too elementary. We are aware that it must be technically capable as well.

In the strategic problem domain, it may be that technical capability and usability is too fundamental a conflict. The technical dimension necessitates complexity whilst usability requires simplicity. This thesis demonstrates the difficulty, as employing conceptual graphs was an unsuccessful attempt to bridge this gap. Given that conceptual graphs theory is the most technically yet visually advanced knowledge-based formalism, perhaps strategic knowledge may never be computer manipulated as a result. There appears to be no other currently available representation that can resolve the conflict. The design and investigation of such representations, should they arise, would be valuable future work.