Selected Tacit Knowledge Observations Within Two Organisations

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Abstract

Given that tacit knowledge is necessary to firstly understand the codified knowledge, and secondly that the tacit element often comprises the majority of our knowledge assets, it is time to turn attention toward this phenomenon. Our approach makes use of expert versus novice comparisons as a means of interpreting the likelihood of an individual possessing tacit knowledge. In addition to descriptive statistics as a means of interpreting results, we choose to incorporate formal concept analysis to provide an alternative visualisation of questionnaire responses. Our incorporation of social network analysis maps the flows or likely non-flows between individuals within the IS domain. We present here the initial results from two small organizations, which we refer to as organization Y and Z.

1 Introduction

Given that a large proportion of the information we make use of is in the form of non – verbal communication, with words in themselves comprising only some 20% of our communication (Raghuram 1996), we begin to understand the issue of tacit knowledge, and in turn the importance of tacit knowledge management. From an organisational point of view, we need also to realise that some 50 to 90 percent of organisational knowledge is actually tacit, and that such knowledge is one of the ten factors affecting the successful implementation of knowledge management (Horak 2001). We present here an approach to gauging the likely tacit knowledge flows within two small IT organizations.

2 A working definition of tacit knowledge

Although a certain proportion of tacit knowledge cannot be codified, a considerable amount can be codified over time (Persaud, Kumar and Kumar 2001; Nonaka Ray and Umemoto 1998). Tacit knowledge can vary from the sensory skills such as 'learning to ride a bicycle', through to 'tricks of the trade' which can be articulated and passed on from the senior to the apprentice. Our use of tacit knowledge in this paper refers to the 'street smart' knowledge that employees make use of, but which is not necessarily written anywhere, yet to a large degree can be articulated if necessary. Not surprisingly, few means actually exist to measure this type of knowledge, among which Sternberg's (1999) approach could be said to be the most practical because of its more applied nature, and it is to some extent his approach that we use to test for 'tacit knowledge'.

3 Empirical tacit knowledge research

We have conducted a study on several organizations, two of which we present partial results for here, which we shall refer to as organisations Y and Z. We have applied social network analysis to the results to determine the likelihood of knowledge being passed from one individual to another. A questionnaire was completed by 7 subjects from organisation Y, almost all of whom were considered to be experts based on their experience, and 12 subjects in organisation Z, some of whom were considered experts. Experts were typically chosen on the basis of peer review. The questionnaire was modified extensively through various pilot tests and ultimately made available to the participant groups in electronic web-based form. The questionnaire was composed of three sections: biographical, social network analysis and the tacit knowledge inventory itself. There were 13 biographical questions, of which gender and age were not compulsory, however preferred. Age was included because it was felt to affect results (Gudlaugsdottir 2001; Colonia-Willner 1999), whilst gender was also included, as it has been noted to influence tacit knowledge utilisation (Somech and Bogler 1999; Horgan and Simeon 1990). The social network analysis section had the names of the employees hard coded into the program and respondents were to answer questions in relation to:

a. with whom they interacted;

b. how often;

c. the level of importance of the individual in relation to themselves; and

d. the type of occasion, which ranged from formal meeting through to drinks after work or lunch time get-together.

The third and final component of the questionnaire was the tacit knowledge inventory itself which was composed of 4 compulsory scenarios, each with their own combination of Likert scale answer options for which the respondents had to choose a value from extremely good through to extremely bad.

Gender	
Female	1
Male	6
Age	
30 – 34 years	1
35 – 39 years	1
50 – 54 years	4
55 – 59 years	1
Current job title	
Analyst: Business	1
Business Systems Analyst	2
Information Management Consultant	4
Highest Qualification	
Bachelor Degree	2
Graduate Diploma	1
Honours Bachelors Degree	2
Masters	2
Years of IT Experience	
0 – 4 years	1
5 - 9 years	1
10 – 14 years	3
30 – 34 years	2
Position	
Permanent	6
Contract	1
Years with the organization	
1 – 2 years	2
3 – 4 years	1
5 – 6 years	2
11+	2
No. of Subordinates	
None	5
5 – 9	2
ACS levels	
ACS-2	1
ACS-3	3
ACS-4	2
ACS-5	1

Table 1: Organisation Y

ACS Level 1: Little practical experience in IT work, may be supervising ancillary staff

ACS Level 2:Experienced and capable of performing wide range of general IT work

ACS Level 3:Experienced in specialised IT areas, well developed liaison skills

ACS Level 4: Managing a number of teams and the allocation of resources

ACS Level 5: Typically report to CEO, manage major function, extensive IT coordination

Gender	
Female	1
Male	10
Undef	1
Age	
20 – 24 years	3
25 – 29 years	2
30 – 34 years	3
35 – 39 years	2
50 – 54 years	2
55 – 59 years	1
Current job title	
Business Development Manager	1
Business Systems Analyst	1
Contractor	1
Help Desk Support	3
Network Manager	1
Programmer	1
Project Director	1
Project Manager	1
Software Engineer	9
System Administrator	1
Highest Qualification	
High School Certificate	2
Bachelor Degree	6
Graduate Certificate	1
Graduate Diploma	1
Graduate Bachelor	7
Masters	2
Years of IT Experience	
0 – 4 years	5
5 - 9 years	3
10 – 14 years	2
20 – 24 years	2
Position	
Permanent	9
Contract	3
Years with the organization	
7 – 12 months	1
1 – 2 years	3
3 – 4 years	1
5 – 6 years	3
7 – 8 years	2
9 – 10 years	1
No. of Subordinates	
None	6
1 – 4	3
5 – 9	2
15 – 19	1
ACS levels	
ACS-2	4
ACS-3	5
ACS-4	1
ACS-5	2

Table 2: Organisation Z

Quantitative background of staff at organizations Y and Z

In all a total of roughly 60 questions were involved (the actual number depended on the scenario which had been randomly presented to the respondent). However roughly 40 of these questions (the tacit knowledge inventory component), required two answers for each question, namely an ethical (some might say 'politically correct') answer was required as well as a 'realistic' one (i.e. what the respondent would really think or do about a certain issue). In total there were therefore more than 100 answers expected of respondents. The electronic nature of the questionnaire was such that it took respondents approximately 20 minutes on average to complete it. The numerical breakdown for the two organizations may be seen in Tables 1 and 2 below.

4 Social Network Analysis as a means of mapping the organisational knowledge flows

Although tacit knowledge is able to be introspectively gleaned through years of experience (Antonakis 2001), tacit knowledge is nevertheless passed in a social environment (Sveiby in Roberts 1998; Raghuram 1996), which has led to us incorporating Social Network Analysis into our research methodology, as this approach is felt to be more practical than participant observation as a means of observing interaction in the IT domain because of the normally sedentary computing related work of IT professionals. An examination of figure 1a, reveals no electronic communication flows in organization Y, instead all communication takes place in person. Given that organization Y is small and the personnel tend to be senior from an IT perspective (Table 1), we should not be surprised to find high tacit knowledge transfer rates amongst these personnel, for "larger communities of knowledge can share certain practices, routines, and languages, but for new tacit knowledge to emerge through socialization the group must be small" (von Krogh, Ichijo and Nonaka 2000 in Allred 2001 :162). Note also the frequency with which people have contact in organisation Y, that is to say daily, if not hourly (figure 1b).

If we examine our networks from a different point of view, this time in organisation Z (figures 2a and 2b), namely the importance of certain individuals within the organization, we can build up a picture of who the more important people are.

For example we may note in figure 2a, that individuals 3333, 3334, 3340 and 3336 have to be approached for workplace related tasks. At the same time when it comes to the question of trying not to see certain individuals (figure 2b), we may note that the relationship leads the opposite way, insofar as the people previously identified, have no real need to see the staff who have to see them. This would tend to indicate a one way power relationship.

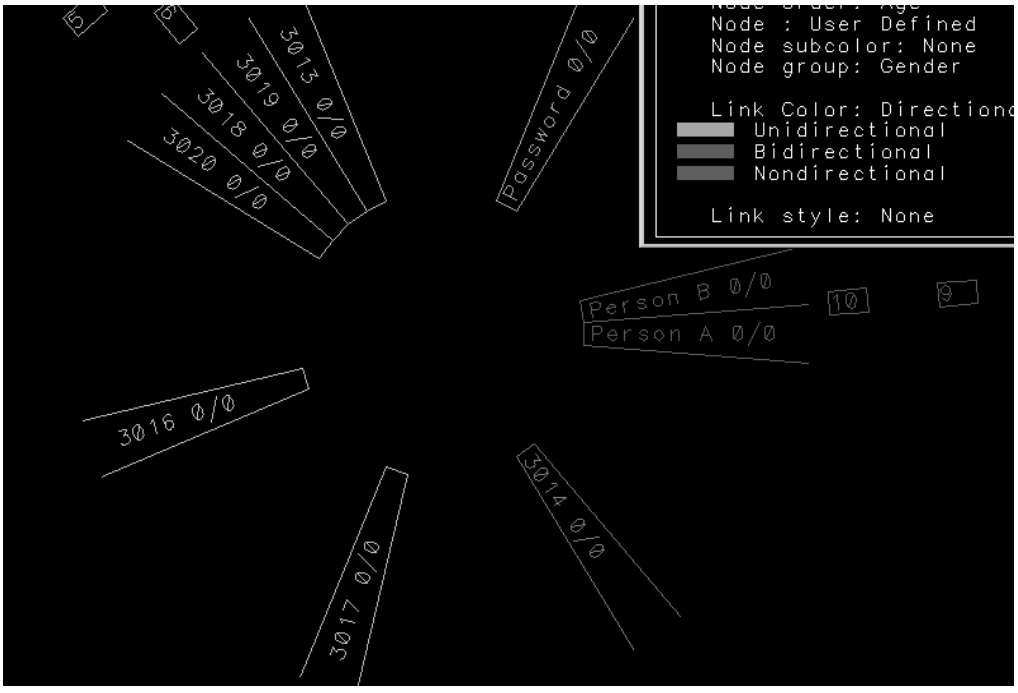

Figure 1a: illustrating fax/email flows in organization Y (in other words no such flows were identified).

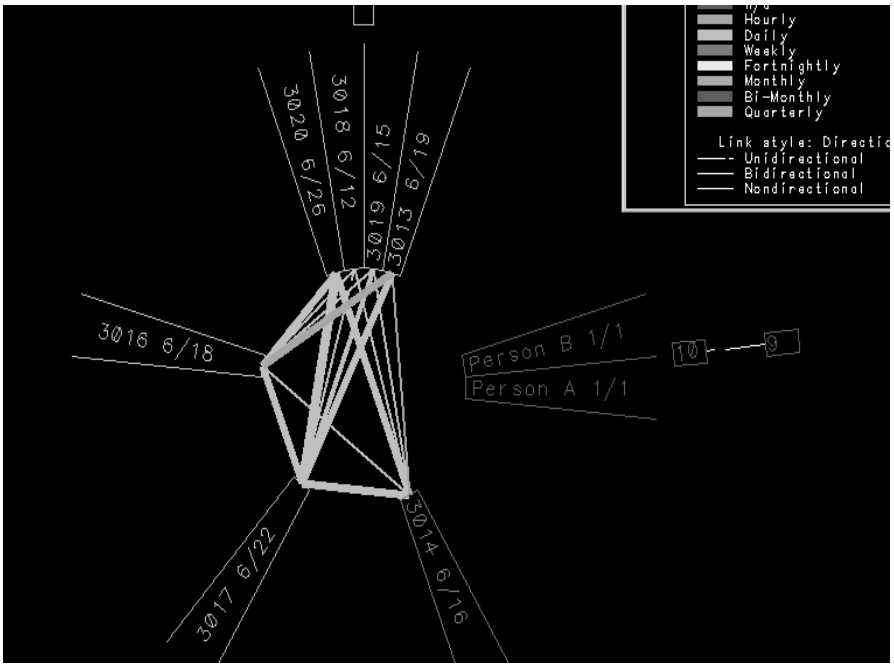

Figure 1b illustrating frequency of communication flows between individuals in organization Y (green indicates hourly, whilst blue indicates daily).

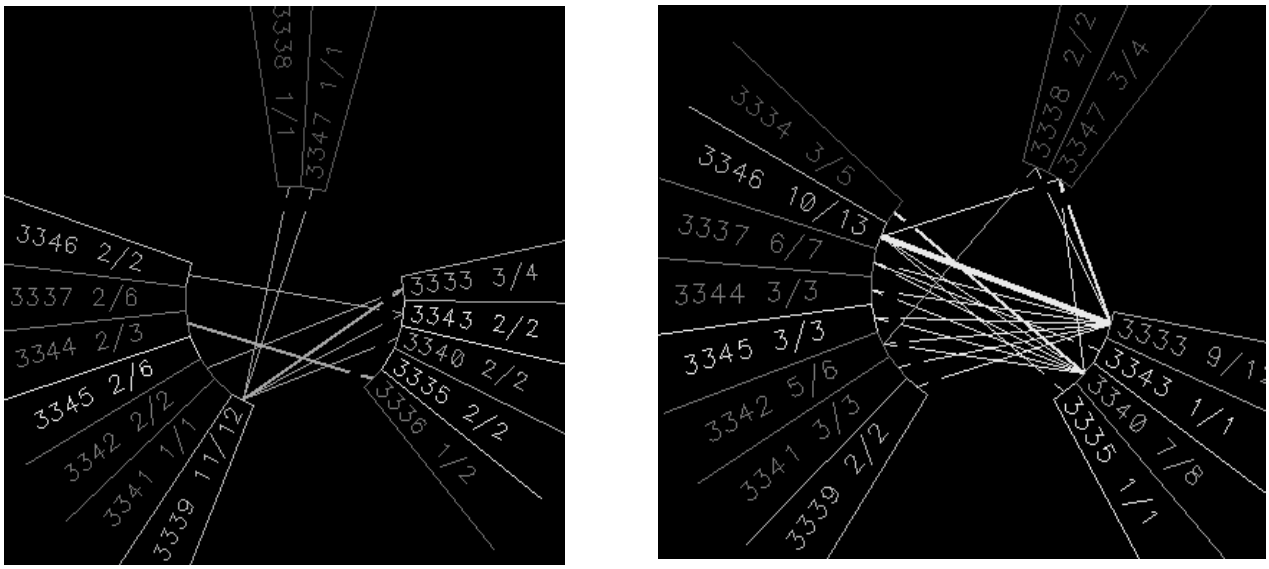

Figure 2a: Have to see the individual, and figure 2b, try not to see the individual (the directions of the arrows are given by the gap in the line, which represents the head of the arrow), for organisation Z. Note the importance of individuals 3333 and 3340.

5 Formal Concept Analysis

The biographical section and tacit knowledge inventory was also processed using Formal Concept Analysis (FCA). FCA is a set theoretic approach based upon lattice theory (Ganter and Wille 1999), whereby concepts are formally comprised of a set of objects, *(G)egenstande*; and a set of attributes, *(M)erkmale*; and the relationship between them *(I)*. The concepts are ordered and shown as lattices using term subsumption. The attributes belonging to a concept are found by following all ascending paths, whilst the set of objects are arrived at following all descending path. Attributes in our case are represented as questionnaire answers, and respondents are objects. We present a section of the questionnaire (along Sternberg lines) (figure 3), which relates to our set of results illustrated by way of FCA (figures 4 and 5). Examining the first concept lattice (figure 4) reveals a significant discrepancy between an ethical answer for scenario 12, answer option 5 (ethical and realistic). The outer concepts (ovals) represent *ethical* values, while the inner structures, *realistic* answers.

We use this to illustrate how tacit knowledge measurements may be attained through a Sternberg questionnaire approach. Our aim is to determine the 'distance' between questionnaire answers of experts and our control group (i.e. non–expert people).

We can see that Person 3017 (figure 4) considers the ethical answer to be *Very Bad*, but the realistic answer to be *Good*, whilst Expert 3013E (a senior manager), considers the ethical answer to be *Good*, but the realistic answer is actually *Very Good*. The ramifications of this are that we can (a) determine the likelihood that someone has high levels of tacit knowledge, based upon the closeness of their answer responses compared to that of experts, and (b) see by way of social network analysis whether experts are fostering a mentoring relationship. Note for example that 3013E is contacted hourly by at least some staff (figure 1b).

Turning our attention to a result from organisation Z (figure 5), we may see that the experts in this case are divided in their opinions on replying to the same scenario and answer. Experts 3343E and 3333E feel that the ethical and realistic answers are *Very Bad*, while expert 3336E feels that the ethical answer is *Extremely Bad*, but the realistic answer is in actual fact only *Very Bad*.

In this instance most of the experts (granted the sample size is very small), felt negatively inclined on the Likert scale towards answer option 2 for scenario 12. Although person 3345 is not an expert, their answer was similar to that of expert 3335E, which could tend to indicate they are effective users of tacit knowledge too.

Scenario 12

You have under you a Technical Services Manager who is very competent at his tasks. However the speed at which tasks are performed could be quicker as far as you are concerned.

Because of what the manager's job entails and the fact that he is required to occasionally liaise with external clientele you feel it would be nice at least if job turnaround time could be shortened.

The person has been with your organisation for 5 years, you have only been here for 2 years, nevertheless you are more 'formally' educated and in a senior position.

Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.

5. Pacify yourself by considering that how fast a person actually performs a task is not particularly important in any case, all that really matters is whether the job is done so properly

ETHICAL

Choose one:	○	○	○	○	○	○	○
	Extremely Bad			Neither Good nor Bad			Extremely Good

REALISTIC

Choose one:	○	○	○	○	○	○	○
	Extremely Bad			Neither Good nor Bad			Extremely Good

Figure 3 illustrating sample questionnaire scenario 12, answer option 5

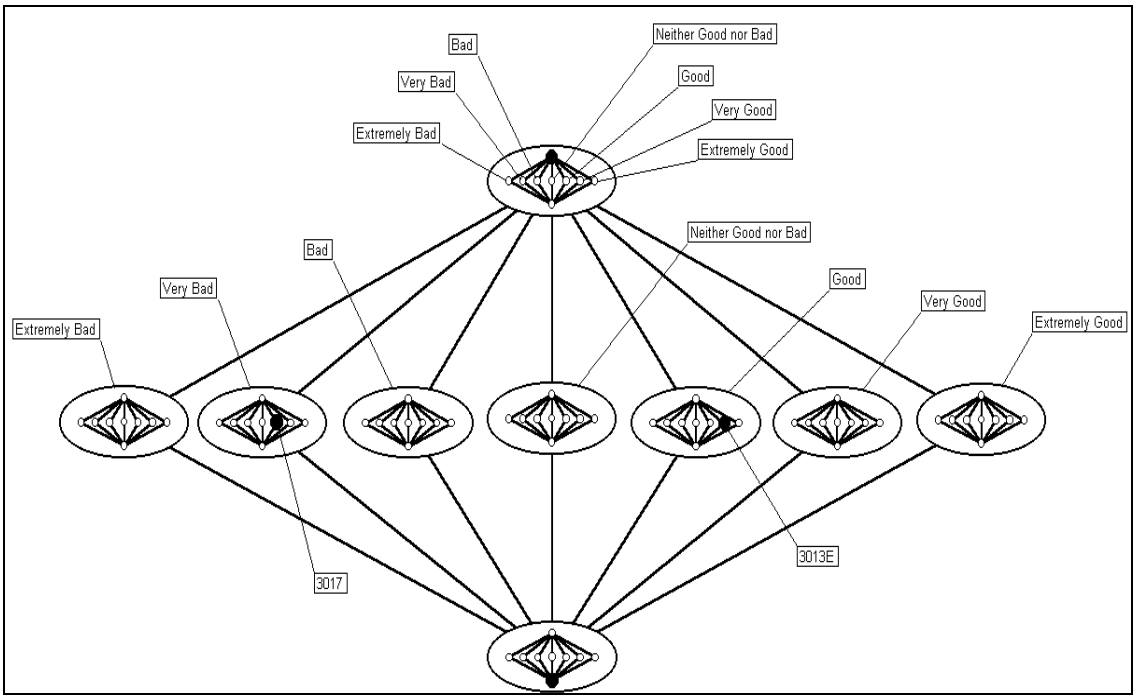

Figure 4 illustrating a formal concept lattice for Organisation Y, Scenario 12, answer 5 (ethical and realistic).

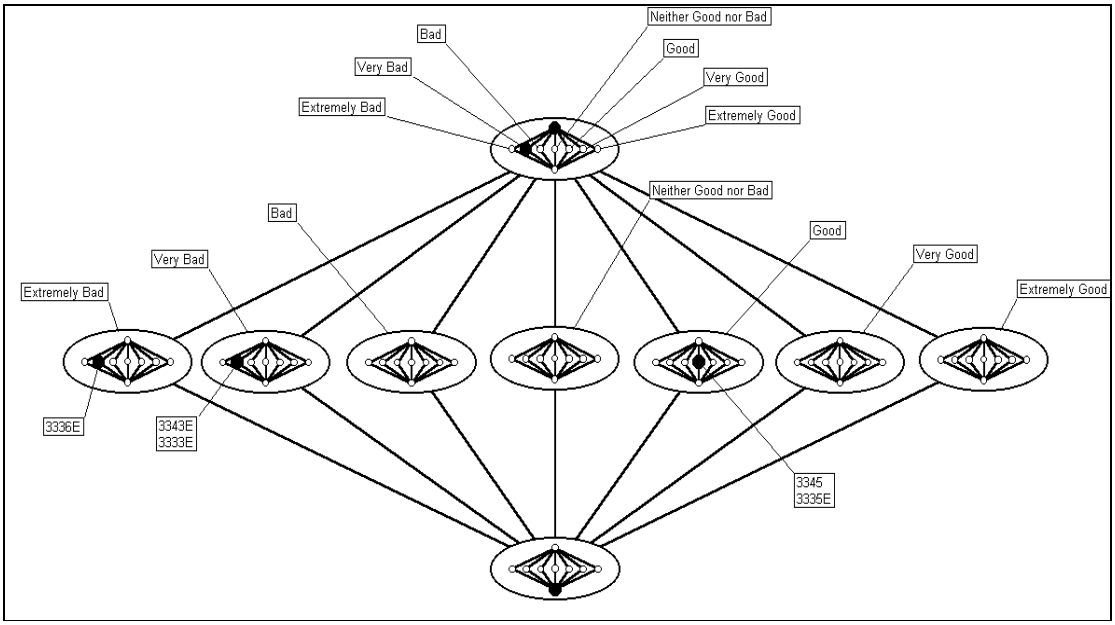

Figure 5 illustrating answers for Scenario12, answer 5 (ethical and realistic) for organisation Z.

6 Conclusion

As research in progress, we provide a means to visualize likely soft knowledge flows at an intra-organisational level. This is based upon a questionnaire along Sternberg's (1999) lines, but incorporating formal concept analysis as a means of more readily visualising questionnaire results, in addition to standard descriptive statistics. The inclusion of social network analysis permits analysis of relationships among workplace colleagues, which in turn enables us to detect whether there is a likelihood tacit knowledge will be transferred from one individual to the next. With larger sample sizes we feel our methodology will help to identify potential tacit knowledge bottlenecks, and ultimately aid an organisation in providing more effective mentoring for staff who may have the opportunity to acquire tacit knowledge alongside experts.

7 Acknowledgements

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