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TEACHING KNOWLEDGE MANAGEMENT AND INTELLECTUAL CAPITAL LESSONS:
An Empirical Examination of the Tango Simulation

by

Nick Bontis and John Girardi

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ABSTRACT

An explosion of interest in the areas of knowledge management (KM) and intellectual capital (IC) has recently arisen (Stewart, 1997, Bontis, 1998; 1999). Coinciding with this developing interest, both academics and practitioners are now searching for ways to increase their appreciation and understanding of these concepts.

The Knowledge Management Receptivity Survey (KMRS) has been developed as a means for determining the level of understanding and commitment to knowledge management and intellectual capital initiatives. Thirty-three senior executives completed the KRMS *before* and *after* they participated in the Tango simulation in May and June of 1998. The Tango simulation provides an environment where participants learn to manage and value the intangible assets of their business in a controlled environment (Sveiby and Mellander, 1994).

Statistical examination contrasting pre-test and post-test responses to the KMRS validated this proposition that Tango participants would be more favourably disposed to IC after the simulation as compared to before. This was based on three clusters of items that tap into: i) the importance of human capital; ii) a recognition of the knowledge perspective, and iii) the importance of a CKO.

The results of this research yield two important discoveries. First, the KMRS is a validated survey instrument for both academic and practitioner usage in examining the learning effectiveness of IC-related phenomena. Second, the Tango simulation provides participants with an effective means in heightening their receptivity to IC initiatives.

Key Words: **Tango simulation, intellectual capital, knowledge management**

Abstract: 230 words
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TEACHING KNOWLEDGE MANAGEMENT AND INTELLECTUAL CAPITAL LESSONS:
AN EMPIRICAL EXAMINATION OF THE TANGO SIMULATION

The realisation that management today is increasingly about managing intangible resources is beginning to dawn on business managers and academics alike (Itami, 1987). Intellectual capital (IC) has been identified as the key intangible resource in firms. Consequently, ensuring that managers understand this, and that organizational structures and cultures reflect this, is fast becoming a matter of organizational survival. Therefore organizations will need practical methods that can be used to quickly increase understanding and commitment to managing intangible resources.

This study explores one method for achieving this commitment and understanding: the Tango[1] business simulation. At the same time this study provides a method for measuring this commitment and understanding. As such there are two purposes to this study: i) to develop a survey instrument that can be used to measure the extent to which an organization's members understand and are committed to IC concepts, and ii) to study the value of the Tango business simulation. Specifically, the study investigates how Tango fosters an attitude that is receptive to IC concepts.

LITERATURE REVIEW

There has been an explosion of interest in IC concepts ever since FORTUNE magazine published a cover story on June, 3, 1991 (Stewart, 1991). More recently, interest in IC research

has reached an astounding level, signalling what appears to be the beginning of a paradigmatic shift in the way organizations are understood and managed. This is accompanied by extraordinary growth in managerial publications (Bontis, 1996; Stewart, 1997; Roos, Roos, Dragonetti and Edvinsson, 1998; Bontis et. al, 1999) academic studies (Covin and Stivers, 1997; Bontis, 1998; Bontis, 1999), dedicated conferences (Chatzkel, 1998), corporate initiatives and internet sites[2].

Despite the feverish interest and exponential growth in this field, the majority of literature has an *introductory* flavour, lacking substance and tends to quickly become repetitive. Readers, convinced of the importance of managing knowledge, intellectual capital, or intangible assets, are often left none-the-wiser as to what practical measures they can take to affect real changes in organizations.

However, a small number of authors stand out from the repetitive introductory body of literature, and provide practical advice and strategies for implementing IC initiatives. For example, Edvinsson & Malone (1997) provide a number of methods for measuring IC that fall out of Skandia's IC addendum (Skandia, 1994, 1997 etc.). Bontis (1998) uses Likert-type scales to tap into the interrelationships of IC sub-phenomena. Covin and Stivers (1998) use a survey methodology to examine the state of the field in Canada and the US. Bontis, Dragonetti, Jacobsen and Roos (1999) evaluate and contrast the IC framework with EVA (economic value added), BSC (balanced score-card) and HRA (human resource accounting). Finally, Sveiby,

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[1] See description of Tango at www.celemi.com

having explored these concepts since at least as early as 1986, provides an abundance of practical measures and strategies for managing intangible assets (1986, 1997).

The Tango business simulation, invented by Dr. Karl-Erik Sveiby, provides participants with an introduction to the concepts of valuing and managing intangible assets. Five or six teams compete, as simulated organizations, for up to a seven year period (which actually takes one to two full days). Organizations compete to attract clients and knowledge workers, as well as other staff, to service those clients. Conventional financial statements provide an indication of the relative success of organizations. However, Tango demonstrates, as is increasingly obvious in real life, that conventional financial statements provide only *one perspective* of the health of knowledge-based organizations such as software, accounting and consulting firms. Conventional financial perspectives are far from adequate for determining the health of many organizations that now generate wealth from assets that are primarily intangible. Thus, after completing financial statements, Tango teams must assess the value of the intangible portion of their organization. The intangible value of each team's organization can be boosted through the delicate and challenging process of balancing investment among a variety of choices such as: i) acquiring the correct staff mix for implementing strategy; ii) ensuring that staff/client chemistry is aligned; iii) completing challenging projects successfully; iv) undertaking research and development; and v) adequately training staff.

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[2] See the Official Intellectual Capital Home Page at www.mcmaster.business.ca/mktg/nbontis/ic/

There are no winners or losers as such in Tango. Tango is not a game, but a simulation of organizational life, in which the significance of intangible assets can be explored. However, as the simulation is about managing intangible assets, the teams that can build up the highest level of intangible value, as well as generating conventional profits, are the organizations deemed to be the most successful in this environment.

The Tango simulation can be used to achieve a mind-shift (Sveiby, 1997). Ideally, all managers and if possible all employees should achieve this shift in perspective, to affect real change. Pervasive, shared changes in the perspectives of managers and employees of an organization can be a powerful means for achieving organizational transformations. Or as stated by Harman, in relation to societal changes, and equally applicable to organizational change, "…throughout history, the really fundamental changes have come….from vast numbers of people changing their minds – sometimes only a little bit. Some of these changes have amounted to profound transformations, (1988: ix)".

Simulations provide an alternative to the all-too-common pedagogical, classroom style training programs used by organizations. The shortcomings of these conventional approaches to training are well documented (Gherardi, Nicolini & Odella, 1998; Tobin 1998; Brown & Duguid, 1991; Knowles, 1987). For example, Tobin laments the billions of misplaced training dollars by organizations, stating that "the great majority of this expenditure is wasted, resulting in no measurable gains for the companies that invested in this training" (1998: 5). Tobin, referring to this phenomenon as 'the great training robbery', highlights with urgency, the need to promote and experiment with alternative modes of learning. Simulations provide one alternative.

Mellander argues that simulations create conditions in which the learners can learn more than they are taught and therefore "the learning content is greater than the teaching content" (1993: 110).

The extent to which managers in particular can learn practical skills from traditional pedagogical modes of learning is questionable. Classroom environments have little in common with the actual environments where management occurs. Keys, Fullmer and Stumf state that "management may be one of the few professions in which members attempt to achieve competence without formalised practice" (1996: 36). Nowhere is the need to adopt innovative approaches to learning more urgent than for management who are faced with precarious organizational challenges that are far more complex than ever before. Amidst all of this turbulence, an organization's capacity to learn may be its only sustainable competitive advantage (De Geus, 1988; Stata, 1989). Wick and León put it more bluntly by warning managers that organizations must either "learn or die" (1993: 19).

Business simulations like Tango provide participants with a low risk learning experience, where they can *rehearse* novel approaches to management. "Observations about the parallels between their simulated and real worlds prepare participants to transfer learning into practice" (Keys, Fullmer and Stumf, 1996: 44). McAteer (1991) identifies four characteristics that mark simulations as a superior form of learning: i) they accelerate the learning process while reducing costs; ii) they serve as a framework for testing innovation; iii) they act as mechanisms for reducing risk, and iv) they create powerful linkages between decision making processes and critical business results (1991:20)".

DEVELOPMENT OF HYPOTHESES

The objective of the Tango business simulation is to transform the mindset of each participant towards a more favourable disposition concerning IC initiatives. Assuming that the simulation works effectively, a change towards a more positive acceptance of these initiatives should be realized. In other words, post-simulation participants should be more favourably disposed to IC than they were prior to the simulation. Based on the previous discussion, the following proposition is put forth:

P1 Tango participants will be more favourably disposed to IC after the simulation as compared to before.

The next step in testing the aforementioned proposition is to subdivide the proposition into measurable constructs. The survey items in the KMRS were clustered around three primary perspectives that measured the respondents' receptivity towards: i) human capital; ii) knowledge perspective, and iii) the CKO (Chief Knowledge Officer).

Human capital represents the individual knowledge of all employees in an organization. Most of the critical knowledge is contained in the skills and expertise of so-called *expert employees*. Expert employees are identified as those individuals that provide most of the intellectual horsepower of an organization. They are typically the ones that provide much of the higher added-value service to the organization. The human capital embedded in these employees is important because it is a source of innovation and strategic renewal, whether it is from individuals' brainstorming in a research lab, daydreaming at the office, throwing out old files, re-engineering new processes, improving personal skills or developing new leads in a sales rep's little black book. The essence of human capital is the sheer intelligence of each organizational

member (Bontis, 1999). This intelligence must constantly be challenged and replenished in order to realize organizational success.

It is hypothesized that the Tango simulation will raise respondents' awareness of the importance of human capital. The KMRS should tap into this change in human capital perspective. Based on the previous discussion, the following hypothesis is put forth:

H1a There is a positive and significant difference between respondents' receptivity towards human capital after the simulation as compared to before.

The knowledge perspective highlights the importance of knowledge assets. Although knowledge assets may represent competitive advantage, organizations do not understand their nature and value. Managers do not know the value of their own intellectual capital. They do not know if they have the people, resources or business processes in place to make a success of a new strategy. They do not understand what know-how, management potential or creativity they have access to with their employees. Because they are devoid of such information, they rightsize, downsize and reengineer in a vacuum.

That organizations are operating in a vacuum is not surprising, as they do not have any methods or tools to enable them to analyze their intellectual capital stocks. To that end, a methodology and valuation system is required which will enable managers to identify, document and value their knowledge in pursuit of becoming learning organizations. This will enable them to make information-rich decisions when they are planning to invest in the protection of their various intellectual properties.

It is hypothesized that the Tango simulation will raise respondents' awareness of the importance of organizational knowledge. The KMRS should tap into this change in knowledge perspective. Based on the previous discussion, the following hypothesis is put forth:

H1b There is a positive and significant difference between respondents' receptivity towards the knowledge perspective after the simulation as compared to before.

Recently, the job title of Chief Knowledge Officer (CKO) has been showing up on annual reports and in job advertisements with ever-increasing frequency (Economist, 1997). These pathfinding individuals have been given the unenviable task of channelling their organization's knowledge into corporate initiatives that become the essential source of competitive advantage (Gallagher, 1997). Knowledge managers are responsible for justifying the value of knowledge that is constantly being developed in their organizations (Nonaka and Takeuchi, 1995). From the capture, codification, and dissemination of information, through to the acquisition of new competencies via training and development, and on to the re-engineering of business processes; present and future success in competition will be based less on the strategic allocation of physical and financial resources and more on the strategic management of knowledge and the use of collaborative technologies that foster knowledge management.

What does this mean for senior managers? It means that the capacity to manage knowledge-based intellect is the critical skill of this era (Quinn, 1992). The role of a CKO (Chief Knowledge Officer) is distinct from the rest of senior management. It is hypothesized that the Tango simulation will raise respondents' awareness of the importance of a CKO and his/her role

in managing knowledge and reallocating budgets accordingly. The KMRS should tap into this change in CKO perspective. Based on the previous discussion, the following hypothesis is put forth:

H1c There is a positive and significant difference between respondents' receptivity towards the role of a CKO after the simulation as compared to before.

METHODOLOGY

Items in the KMRS were developed to measure understanding and commitment to IC concepts given the aforementioned hypotheses. The Likert-type items used reflect the most relevant IC concepts, identified in the literature (Sveiby, 1997; Stewart, 1997; Bontis, 1996, 1998). The items were developed by a method of sifting through the literature to identify the constructs that seemed to reflect the essential components of IC as described previously. The responses to the items range from 1 (strongly disagree) to 7 (strongly agree).

The survey was piloted on six members of the organization, and feedback was obtained to ensure that items were understood in the way they were intended. The survey has two versions: a pre-test and a post-test. The post-test is virtually identical to the pre-test, but includes a number of additional items.

The survey was mailed to all participants of the three separate groups of senior executives from a Queensland Public Sector Agency who participated in the Tango simulation as part of a senior executive leadership program (56 subjects in total). The Tango simulation was conducted

on the first two days of the leadership program. The pre-test version of the KMRS was mailed to participants prior to their participation in the Tango simulation. All pre-test versions of the survey were completed by participants prior to their participation in Tango. Follow up phone calls were made to participants to increase response rates. Surveys were then mailed out to participants about two weeks after they had completed the simulation. Only surveys from participants with matching pre and post test versions were used in the study. The final response rate was 59 % (i.e., 33 out of 56 possible respondents completed both the pre and post version of the survey).

RESULTS

The survey items (see Appendix A) and their descriptive statistics are highlighted in Exhibits A and B. For the purposes of testing the stated proposition above, the items were conceptually clustered in three perspectives: i) the human capital perspective; ii) the knowledge perspective, and iii) the CKO perspective.

The human capital perspective consisted of five items that tap into to the respondents' receptivity towards the importance of knowledge workers and expert employees. The mean of these five items was calculated for both pre- and post-survey data. The difference of means was then compared in a paired sample t-test. The mean for the human capital perspective (HUMAN) was 5.812 in the pre-test and 6.046 in the post-test. This represents a significant difference of 0.234 for HUMAN ($t = 2.374$, $p < 0.05$).

The knowledge perspective consisted of four items that tap into to the respondents' receptivity towards the importance of knowledge management in organizations. The mean of these four items was calculated for both pre- and post-survey data. The difference of means was then compared in a paired sample t-test. The mean for the knowledge perspective (KNOW) was 4.662 in the pre-test and 5.124 in the post-test. This represents a significant difference of 0.462 for KNOW ($t = 2.720, p < 0.01$).

The CKO perspective consists of two items that tap into to the respondents' receptivity towards the importance of a CKO (Chief Knowledge Officer) leading knowledge management initiatives. The mean of these two items was calculated for both pre- and post-survey data. The difference of means was then compared in a paired sample t-test. The mean for the CKO perspective was 4.017 in the pre-test and 4.800 in the post-test. This represents a significant difference of 0.783 for CKO ($t = 2.680, p < 0.05$).

DISCUSSION

The results of statistical testing validate the three hypotheses which together provide support for the proposition that Tango participants will be more favourably disposed to IC after the simulation as compared to before. These results provide evidence that the Tango simulation is an effective method for introducing IC concepts to senior management groups.

However, there are a few limitations in this study. First, sample size was confined to 33 respondents which is relatively small. Although statistical differences were realized for all perspectives, the substantiveness of the changes may change given a larger sample size. Further

testing with larger samples will help mitigate this issue. Second, all of these employees belonged to one organization which raises issues of generalizability. Although there is no reason to assume that the Tango simulation has systemic biases from one industry to the next, further testing should consider a cross-sectional group of participants from a wide variety of industries.

Cultural differences may also play a role in the receptivity of IC concepts. For example, Chinese organizations force a reconsideration of generalizability. These organizations are largely antithetical to most concepts of IC (Taylor, 1998). They are tightly controlled at the top, usually by the owner and several family members (Fukuyama, 1995). Furthermore, communication between and across levels is not encouraged and information is jealously guarded. Such low intra-organizational trust is a detriment to knowledge management and the development of IC. Ryder (1994) argues that French companies have stronger hierarchies than their Anglo-Saxon counterparts which also has implications regarding the openness of communication channels.

Given that this study took place in Australia, there seems to be no evidence of cultural pressure against IC initiatives. However, two items in particular – that were not part of hypothesis testing – provide evidence that respondents' views changed. Item 1 in the other items section of Appendix A addresses the issue of whether respondents agree that "our organization has the leadership capability in its senior management ranks to succeed in knowledge management". The mean of this item decreased significantly with a change in mean of 0.522 (see Exhibit B) from a pre-test mean of 5.044 to a post-test mean of 4.522 ($t = 2.152$, $p < 0.05$). This attests to the fact that after the Tango simulation, respondents' views on leadership

capability changed for the worse. An explanation for this would be that the Tango simulation highlights the difficulty in managing organizational knowledge and that this skill requires new leadership skills than traditional senior management may not possess.

Item 2 in the other items section of Appendix B addresses the issue of whether respondents agree that "intangibles are hardly worth measuring". The mean of this item decreased slightly with a change in mean of 0.424 (see Exhibit B) from a pre-test mean of 2.091 to a post-test mean of 1.667 ($t = 1.911$, $p < 0.10$). This result explains how respondents' views on the importance of measuring intangibles actually increased after the Tango simulation. The accounting activities in the Tango simulation require participants to pay special attention to measuring intangible resources. This yields a change in perception as to their importance.

Finally, two items were presented in the KMRS post-version only and therefore could not be used for hypothesis testing. However, they represent important descriptive feedback as to the effectiveness of the simulation on an absolute scale. Item 3 in the other items section of Appendix A addresses the issue of whether respondents agree that they "enjoyed the Tango simulation". The mean of this item was 6.031 which is favourable given that the Likert-type scale range is from 1 (strongly disagree) to 7 (strongly agree). Furthermore, item 4 taps into the essence of this study and whether or not respondents "have a new appreciation for knowledge management as a result of the Tango simulation". The mean of this item was 5.909 which is also favourable given the scale.

In conclusion, the results of this research yield two important discoveries. First, the KMRS is a validated survey instrument for both academic and practitioner usage in examining the receptivity of IC-related phenomena. Second, the Tango simulation provides participants with an effective means in heightening their receptivity to IC initiatives.

APPENDIX A

KMRS ITEMS

HUMAN CAPITAL PERSPECTIVE

- To retain knowledge in organizations, managers need to be aware of the importance of providing their expert employees with challenging work.
- For organizations, expert employees are the most valuable resource.
- Organizations need to have very clear strategies for retaining their expert employees.
- Higher level professional work, which contributes to the satisfaction of customer needs, would correctly be termed "knowledge work".
- Knowledge workers (i.e. experts and professionals) are the primary contributors to success in organizations.

KNOWLEDGE PERSPECTIVE

- I am familiar with "knowledge organizations" as a term and concept.
- Our organization is ready to transform itself into a learning organization.
- To be truly successful in business today, one needs to see the world from a knowledge perspective.
- To be truly successful in business in the future, one needs to see the world from a knowledge perspective.

CKO PERSPECTIVE

- A distinct "Knowledge Manager" position should be a part of this organization's structure.
- Our organization should commit additional resources to managing knowledge (e.g. by appointing a Knowledge Manager **and/or** by reallocating budgets towards the effective use of collaborative technologies).

OTHER ITEMS

1. Our organization has the leadership capability in its senior management ranks to succeed in knowledge management.
2. What is intangible in organizations, is hardly worth measuring.
3. I enjoyed the Tango simulation.
4. I have a new appreciation for knowledge management as a results of the Tango simulation.

EXHIBIT A

STATISTICAL RESULTS

		Mean	N	Std. Deviation	Std. Error Mean
H1a	HUMAN Post-	6.0464646	33	.5475285	9.531E-02
	HUMAN Pre-	5.8121212	33	.6097055	.1061361

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
H1a	HUMAN Post-Pre	.2343434	.5670180	9.871E-02	2.374	32	.024

		Mean	N	Std. Deviation	Std. Error Mean
H1b	KNOW Post-	5.1237374	33	.7108171	.1237374
	KNOW Pre-	4.6616162	33	.9787099	.1703715

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
H1b	KNOW Post-Pre	.4621212	.9760791	.1699136	2.720	32	.010

		Mean	N	Std. Deviation	Std. Error Mean
H1c	CKO Post-	4.8000000	30	1.6113819	.2941967
	CKO Pre-	4.0166667	30	1.7043723	.3111744

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
H1c	CKO Post-Pre	.7833333	1.6010952	.2923186	2.680	29	.012

EXHIBIT B

OTHER ITEMS TESTED

		Mean	N	Std. Deviation	Std. Error Mean
1	Pre-	5.0435	23	1.0651	.2221
	Post-	4.5217	23	1.3097	.2731
2	Pre-	2.0909	33	1.3314	.2318
	Post-	1.6667	33	.7360	.1281

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
1	Leadership capability	.5217	1.1627	.2424	2.152	22	.043
2	Measuring intangibles	.4242	1.2755	.2220	1.911	32	.065

POST-TEST SURVEY ITEMS ONLY

		Minimum	Maximum	Mean	Std. Deviation
3	Enjoyed Tango	4.00	7.00	6.0313	.9327
4	New appreciation for KM	1.00	7.00	5.9091	1.3776

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