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Go*Team: A new approach to developing a knowledge sharing culture

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Abstract

*In the ideal organisational environment, the voluntary transfer of information and knowledge would be the norm, and this understanding would underpin ongoing collective sense-making, leading to appropriate and creative actions for organizational outcomes. Workplaces are full of learning opportunities and in work life, socially based learning is occurring all the time. This paper describes Go*Team, a micro world simulation, for helping enculture the importance of collaborative processes that are at the heart of a knowledge sharing culture. The design of Go*Team and ways of playing the game are discussed, as are ways that Go*Team can be applied in order to gain a better understanding of the collective processes and behaviour of people in organizations.*

Keywords

Knowledge Sharing, Knowledge Management, Simulation, Collaboration Technologies

INTRODUCTION

The management and information systems literature of the 1990s and the early 2000s reflects profound and continuous changes in the business climate due to globalisation, exponential leaps in technological capabilities, and other market forces. In this world of rapid change and uncertainty, organizations need to continually renew, reinvent and reinvigorate themselves in order to respond creatively. This process of reinvigorating requires shifts in organizational structures and processes. As a consequence, many organizations are adopting a network-centric configuration in which workers leverage information through the collaborative efforts of small and agile self-directed teams (Warne et al 2005). The capability to do this emanates from rapid developments of information and communications technologies (ICT) which are driving and supporting the change from the industrial to the information age. The network-centric environment implies new ways of working, with consequences for the organization's infrastructure, processes, people and culture. One of the most challenging aspects of the network-centric approach is the need for a change the organizational culture from one determined by a command and control, rule-based hierarchy to one which supports loosely-coupled, self-managed teams to make cooperative decisions through the sharing of knowledge.

Organizational knowledge, knowledge management and the optimization of corporate, group and individual knowledge is a critical issue for organizations and for business activity. Many organizations invest heavily in implementing information and communication technology (ICT) to provide a solution to the management of information resources and organizational knowledge. Unfortunately, these initiatives are often implemented without much regard to how people in organizations go about acquiring, sharing and making use of information and the knowledge that is derived from it (Davenport et al 1992, Hart et al 2006, Hasan & Crawford 2006) and the result is that many such initiatives have been unsuccessful. In the ideal network centric environment, voluntary transfer of information and knowledge would be the norm and this would underpin an ongoing collective sense-making, leading to appropriate and creative action.

In this paper, we propose the use of Go*Team, a micro world simulation, for helping enculture the importance of collaborative processes that are at the heart of a knowledge sharing culture. Go*Team was originally designed to simulate situations in which people and groups coordinate, cooperate and share information, to achieve organizational goals in the anticipated future military network-centric environment. Although Go*Team was

created for the military, such situations also exist in other government, business and community settings. This paper describes Go*Team and discusses ways the playing of Go*Team can be applied in order to gain a better understanding of the collective processes and behaviour of people in organizations. Of particular interest are human or group related factors that may impede or even prevent the successful achievement of team coordination, cooperation, information sharing and consequently knowledge sharing (Hasan & Crawford 2006).

ELEMENTS OF A KNOWLEDGE SHARING CULTURE

As mentioned above, the development of a network-centric organizational configuration requires a significant cultural change where the human dimension of the organization takes centre stage. When employees go home at night, they leave behind an empty building and they take the organizational culture with them. It is also true that once issues involving people are concerned, carefully constructed plans often do not turn out as anticipated. Organizational culture is not built overnight; it is a complex and ongoing process.

Culture is a pattern of shared basic assumptions: learned by group members; taught to or assimilated by new members, as the correct way to perceive, think about, feel and act in all aspects of their daily working life. Once shared assumptions exist, they function to provide meaning to daily events (Schein 1993). Therefore, organizational or professional culture is something that individuals absorb over time and it acts at an almost sub-liminal framework for behaviour and expectations. The development of culture over time implies that culture is, by its very nature, oriented toward the past, and that cultural change would naturally lag behind technological or other changes within an organization.

A culture that would promote the sharing of knowledge needed to sustain a network-centric configuration is almost certainly a far cry from that which currently exists in most organizations. To begin the process of change requires a learning organization where individuals are encouraged to generate new knowledge, see ordinary things in an extraordinary way, share meaning and have a commitment to common goals. The work presented here on Go*Team adheres to the proposition that "the emergence of a learning organization is based on:

- task (activity) as a unit of work;
- the organization of work around communities of practice;
- work being structured around task performance;
- learning processes being overt components of tasks;
- integration of task planning, execution and reflection; and
- sophisticated ICT support for task performance" (Warne et al 2003).

Informal, activity-based learning is inherent to all human activities. Workplaces are full of learning opportunities and in work life, socially based learning is occurring all the time. As interactions occur between peers, genders, functional groups and ages, and across hierarchies, learning takes place and it happens in ways not normally recognised as learning. It is through these interactions and interrelationships that we build social and intellectual capital in organizations. As social capital grows stronger, it helps to create intellectual capital. It can be argued then, that through nurturing social capital in organizations, the web of interrelationships between people expands and contributes to the building of trust between individuals, to knowledge sharing, personal growth, and a vibrant organizational culture.

Social learning refers to learning done in or by a group, an organization, or any cultural cluster and includes: the procedures by which knowledge and practice are transmitted across different work situations and across time; and the procedures that facilitate generative learning – learning that enhances the enterprise's ability to adjust to dynamic and unexpected situations and to react creatively to them (Warne et al 2003).

Making a clear distinction between information and knowledge is not critical to our argument but we do emphasise that while information consists of messages that can flow, it is shared knowledge that leads to collective action (Nonaka & Takeuchi 1995). The challenge for organizations is to understand, train and measure the knowledge sharing capacity and effectiveness of its people. Go*Team is a vehicle for doing just that.

WHAT IS GO*TEAM?

Go*Team is a computerised client-server team version of the ancient Chinese strategy game of Go. The project to develop Go*Team has taken over a year from its original inception to its current state where the software application is operational and several trial games have been played to explore its possibilities.

Go*Team was developed by researchers from DSTO and academic collaborators from two universities, including the authors of this paper. The game is based on a concept developed by Dennis Hart and that concept has been designed and implemented by Jerzy Jagiello, of DSTO, in collaboration with other researchers, Go*Team was initially developed to assist in further validating observations from an interview program by

simulating aspects of the collaborative processes that are at the heart of an information sharing culture. Originally intended as a research tool, a myriad of other possible applications emerged as the tool was developed and tested. Some of these are discussed in this paper.

Why Go?

Go has been popular as a strategy game for centuries and so has stood the test of time as to its popularity and enduring challenge to players. Its suitability for our purpose lies in this appeal, while at the same time, the basic rules are quite simple to learn. In its standard form, Go is played on a square board of 19 parallel, evenly spaced lines per side. The two players each have a collection of 'stones' (181 for black and 180 for white), each of which may be placed on an intersection of two of the lines on the board. Once placed, a stone cannot be moved or removed, unless later captured. The fundamental aim of the game is to encompass as much territory on the board as possible which essentially involves not only capturing 'virgin' territory but also trying to surround opposition stones in order to capture them and thereby gain the territory previously held under their sway.

While the rules of Go are simple, to play the game well requires a remarkable degree of sophistication and subtlety. The basic rules are:

- each player takes it in turns to place a stone on the board;
- a stone may only be placed on an unoccupied intersection;
- a stone, once placed, cannot be moved or withdrawn from the board, unless captured;
- a stone may not be placed in such a way as to 'commit suicide' – that is, so that it and any of its companions become surrounded and therefore captured;
- the winner of the game is decided by which player at the end has the larger total of surrounded unoccupied intersections on the board plus captured opposition stones; and
- the end of the game is decided by mutual agreement of the players or, less commonly, when all the stones have been placed.

There are various 'standard' situations (e.g. particular strong points to hold on the board and certain patterns of stones) and related strategies that beginning players need to learn to recognize and implement if they are to improve their play but, for reasons discussed below, at least some of these become less relevant, or even irrelevant and possibly counter-productive, in the Go*Team version of the game. Consequently, in the team version it would not necessarily be an advantage and might even be disadvantageous, to be a good player of the standard game (Hart et al 2006).

The Objectives of Go*Team

Reflecting the aspects of knowledge sharing noted above, this team version of the game is designed to embed its players in an environment that involves:

- cooperation and coordination, but also competition (with and between the players in one's own team. i.e. 'co-opetition', as defined by Angehrn & Loebbecke (2004));
- information sharing (through the need to continually share information in order to synthesize and integrate, in a dynamic situation, multiple fragmentary and local perspectives into an overall situational picture); and
- timely and appropriate decision making (through the need to balance the time taken for adequate situational analysis and the pressure to avoid being overtaken by events).

This reflects the situation in the network centric environment where the transfer of information and knowledge is used for shared situational awareness and sensemaking. This leads to the most appropriate decisions and creative actions.

THE DESIGN OF GO*TEAM

While Go*Team is based on the original game, there are a range of differences between it and standard Go. The most important of these, with the reasons for each of them, are described below.

Firstly, the opposing sides now consist of two (or, possibly, more than two) teams of players rather than individuals. The reason for this is, of course, to introduce into the game the need for the relevant groups of individuals to cooperate and coordinate their actions. Moreover, each individual player in a team is allocated their own collection of stones, over which they have complete control regarding whether, when and where they are placed on the board. The reason for this is to give individuals autonomy over what happens to their stones so that it is possible, for example, that the team, or at least the other members of it, may decide they want a

particular player to put a stone at a certain position, but the ultimate choice of whether and how much to cooperate with the other team members in the use of 'their' resource is up to the player who owns the stone.

Individual players in a team have only a local view of the overall Go*Team 'world' in which they are embedded. This view consists of a board showing the positions of their own stones plus any stones of the opposing team that are closer to their own stones than those of any other player on their team. See Figures 1, 2 and 3 below, which illustrate this using a smaller version of the Go board than the usual 19x19 one.

This modification is to introduce the problem of information sharing and integration into the game. Since each player has only a local and partial picture of what is going on, it is necessary that they share what they can see with the other members in order to develop an integrated overall picture of the state of the board – and even if they can accurately achieve this in the time available, then they have to decide not only what is the best next move, but who should make it. And further, the situation they are trying to grapple with is dynamic since, unlike many other games and as is discussed in more detail below, Go*Team is not turn-based.

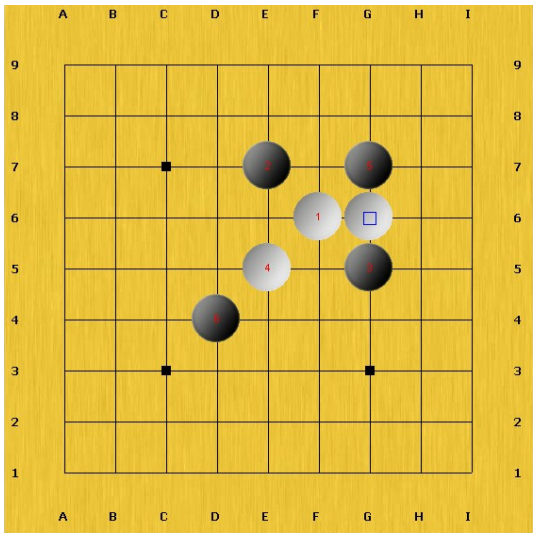

Figure 1**:** The global Go*Team situation (viewed via the server) on a reduced size board.

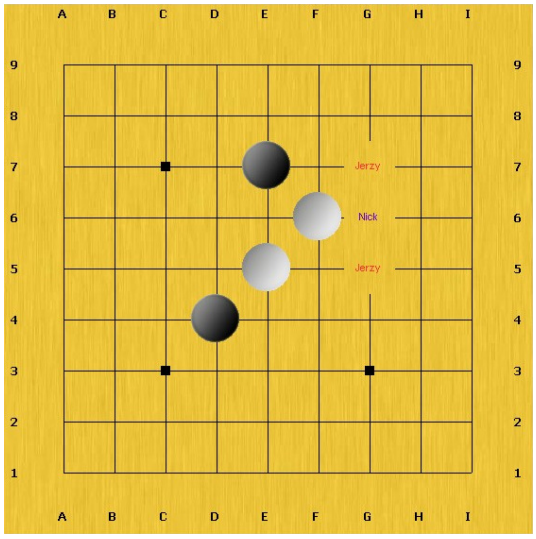

Figure 2: The local view of one of the two black players, who can see only their own stones plus those stones of white that are closer to their own stones than those of any other player on the black team.

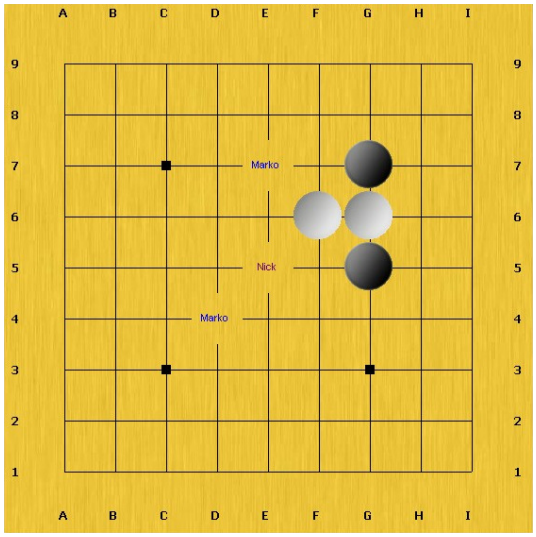

Figure 3: The local view of the other black player (note, however, that the equidistant white stone appears on both boards).

Each player has the ability to place various types of 'markers' on their local view of the Go*Team board. They can use these markers to record where they know, or think they know, stones belonging to the other members of their own team as well as those of the opposition are (see Figures 2 and 3). However, at the same time as this gives the individual players a tool for helping them build an integrated picture of the overall state of their Go*Team 'world', it also introduces the possibility that errors will be made, and therefore for there to be disinformation, incomplete and conflicting information circulating between the players in a team. This will only add to the uncertainty they face as well as the complexity of the decision-making processes in which they are engaged when deciding their next move.

Unlike standard Go, in which the players take turns to place their stones, teams playing Go*Team no longer have to take turns; a team's next turn can be taken after a 'relaxation time' (specified via the server, and most likely something of the order of a few minutes) regardless of whether or not the opposing team has done anything in the interim. This is to introduce the problems of tempo, uncertainty and potential decision paralysis into the game. While a team may take as long as they like, over and above the specified relaxation time to analyse their situation before making a move, they thereby increase the risk that the other team will gain an advantage by making further moves while they are still working out what to do next – the decision paralysis syndrome. Conversely, if they take insufficient time to do their situational analysis then they risk making inappropriate, worthless or even disadvantageous moves as a result. Moreover, this ability to make moves independently of whether or not the other team has done so removes, or at least significantly alters, the relevance of the 'classic' situations and their related moves that players of standard Go learn and use. This introduces the requirement for flexibility, imagination and innovation into working out how best to deal with the situations with which the team finds itself confronted on the board.

Go*Team sessions can be simply run as a team game where there is cooperation within the team and competition between teams. To introduce more complexity the Go*Team games can be played so that the overall winner is the individual player whose team wins, *and* who has a greater proportion of their original collection of stones remaining on the board than any other player in their team. This is to introduce an element of competition as well as cooperation between the players in a team in that, while a player cannot win unless their team also wins (so they have to share information, coordinate and cooperate with the other team members in order to achieve this at least), they also have the motivation to work to their own advantage as far as is possible within the bounds of that overall cooperation necessary to ensure that their own team wins. And, in order to do this, they, as individuals, will need to try to keep tabs on how the other team members are doing relative to themselves so they, as individual players, face not only the potential problem of information processing overload in trying to work this out but also how to influence team decisions (Hart et al 2006).

Go*Team can be used to study how teams behave and perform when composed of different types of individuals and set up with different structures. There is no preset leadership structure built into the Go*Team game. That is, as far as the game software is concerned all team members are peers; there is no 'team leader', or similar, with more power or capabilities than other team members. The only possible difference between team members lies in how many stones they have initially allocated to them (Hart et al 2006).

The information sharing that occurs when playing Go*Team can be affected by the richness of the communication medium used between players in the one team. The game is designed to be played in a network-centric environment in which players can be required, or choose, to make use of modern communication tools such as email, voice over IP, group support systems, chat rooms and the like (although they may also have available the more traditional means such as telephone and face-to-face meetings) to effect the cooperation and coordination they need to successfully play the game (Hart et al 2006). While the chat room currently used is pulled in as a separate application, there are plans to incorporate a Go*Team chat and other communication medium into the game software. Similarly, much of the data on individual moves is currently captured separately, but the next version of Go*Team will save this automatically, internally. The server view of the game is currently captured by the game's software, at all points of the game.

Go*Team was originally developed as a research tool, but its potential for practical training in different organizational environments soon became evident. In this paper, the results of research to date are presented but with the potential practical application of Go*Team in mind. For the research applications, developers and researchers are working to identify and prioritise objectives for Go*Team sessions. This has required identification of those elements that can be represented when playing Go*Team and then how they can be represented, then measured or otherwise evaluated.

Go*Team Parameters

The elements listed below have been adopted as the specific variables to be investigated with Go*Team:

Possible issues to study as dependent variables:

- emergent leadership;
- communication quality;
- cooperative behaviour;
- competitive behaviour;
- situation awareness;
- information sharing;
- effects of ICT used;
- group dynamics;
- the development of trust; and
- effective decision-making.

Possible independent variables are:

- stress – created by timing, incentives and rewards;
- uncertainty of information;
- training – in playing go, using the Go*Team software, as well as in team skills;
- tempo;
- team, size, structure and organization;
- diversity – homogeneous or heterogeneous teams; and
- communication mode (Hasan & Crawford 2006).

These are all variables that have been associated with knowledge sharing and collaborative behaviours. It is highly likely, therefore, that a well guided session of Go*Team, with suitable debriefings, may embed positive perceptions of information and knowledge sharing. The system is designed to provide experiences in which people confront the notion that each member of the team has a different awareness of any situation and explore the strategic benefits of collaborating to use all the insight and information available and also the risks of non-collaboration and 'going it alone'. The game environment makes a shift to this fundamental orientation clearly beneficial and provides an opportunity for players, while embedded in a fun environment, to explore new strategic strategies associated with working in teams. The game can also be used to identify people with, and train them to further develop, those attributes that will enable them to perform effectively in this collaborative environment.

Also of interest is the effect of pre-existing informal or social links between, or knowledge of, other team members on their level of trust, cooperation and information sharing as compared to others without such pre-existing links. This could be done by monitoring the communication between team members over the course of a game. Moreover, it could also be possible to test methods such as providing access to background information on other team members that may help to increase the level of trust, information sharing and cooperation (Hasan & Crawford 2006).

LESSONS FROM EXPLORATORY GO*TEAM SESSIONS

Once the potential of Go*Team was recognised for research and practice in areas associated with knowledge sharing, the multitude of possible factors, attributes and relationships became apparent. Go*Team sessions could be set up with many combinations of board sizes and timing; teams could be structured and instructed in various ways and participants could come from all kinds of backgrounds both individually and collectively. As indicated above, there are large sets of potential independent and dependent variables, some of which have obvious quantitative measures, but for many constructs, particularly those concerned with behaviour and learning, it would be difficult to determine practical methods of evaluation.

Managing the complexity of the multiple factors involved in Go*Team

The consistent pattern for running Go*Team sessions was to begin with a preliminary brief outlining the rules and the purpose of the game, after which each team met for ten minutes to discuss plans and strategies. Games were then played for a minimum of one hour following which de-briefing sessions were conducted where all participants were encouraged to reflect on the experience.

The initial exploratory Go*Team sessions helped us to determine a way forward from the multitude of possible configurations and subsequent opportunities that the game environment affords. There was immediate feedback that confirmed common findings on effect of media richness on communication. There was such a significant difference between the performances of teams that communicated verbally, as opposed to those that used online chat, that it masked other variables being tested. It was then decided to run further sessions using chat only. Also, there was a dominant effect of team size between teams of two compared with teams of three, particularly with less rich communication media, so all subsequent sessions used teams of three. To standardise games and minimise extraneous variables, Go*Teams sessions used the same timing and board size settings. Figure 4 below shows a screen capture of the server screen, during a game, and the chat of the black team.

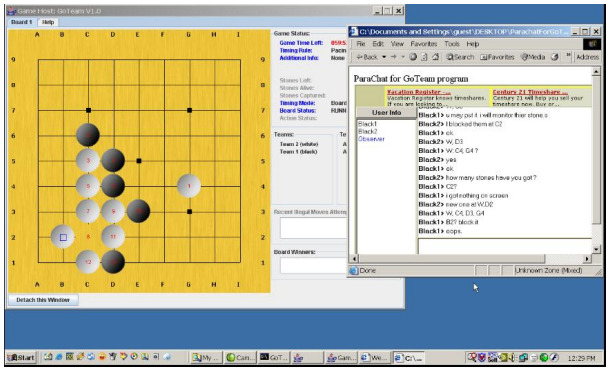

Figure 4: The server screen showing the whole board and the chat of the Black team during a game with students. The audio communication of the white team is also on the video recording.

Keeping these variables constant enables the focus during the game to remain on those factors that seemed to be most relevant to the way information sharing led to situation awareness and sensemaking, and then decision-making and action. These factors are: individual traits; team structure and composition; communication styles, as well as other elements concerned with the state of the game. Each game played exhibited a distinctive tempo where these same factors interplayed to form a unique rhythm.

The main outcomes regarding knowledge sharing from these exploratory sessions has been the learning that has occurred from the experience of playing the game and from the knowledge exchange at the post game debriefings. Some findings derived from these sessions are as follows:

- Teams of inherently cooperative individuals, namely those who rated highly on this trait in personality tests and all-female teams, performed better than others.
- Teams of young students were more at home with the use of chat technology and so were less distracted by the communication medium.
- Two distinct styles of communication were observed, both of which appeared to be effective. Some teams conveyed only basic information (e.g., “Black at C12”), while others interacted more and discussed tactics.

- As the game progressed, levels of situation awareness varied, usually from confused to comprehensible (when stones are usually captured) and then back to confusion as the number of stones on the board increases.

The game is currently being tested in a university environment and more tests are planned within military education facilities, and, possibly, in business and community organisations. Feedback and analysis from testing sessions is used to further refine and enhance the game software.

CONCLUSION

Many research studies have shown that effective knowledge sharing arises from effective leadership, a positive communication climate, appropriate reward and recognition, socialising, and commitment to a common goal. However, trust appears to be an over-riding requirement, one that provides the glue that binds these processes and strategies for effective social learning and knowledge management. Knowledge sharing cannot be mandated, it must occur willingly but it is essential first for a supportive knowledge sharing culture to exist. Trust underpins the team building behaviours and attitudes that result in the confidence and cohesion needed to openly share knowledge, construct new knowledge and build stronger organizations.

Go*Team mirrors the requirements for a knowledge sharing culture in a network centric environment where collective sense-making is necessary for appropriate and creative action. It provides an opportunity for a team to share information and knowledge while engaged in a dynamic, purposive task with a real-world goal. Team members can see the value of sharing information and making sense of the information in the context of making decisions to play and win the game.

Shared knowledge empowers not only the individual, but also the work group, and the organization as a whole. One way of enculturing this understanding is to actively work on demonstrating the value of knowledge sharing, building trust and team cohesion, through an intense learning activity that can be fun as well. The Go*Team simulation, or others like it, can play an important role in making the value of information sharing, and consequently knowledge sharing, more visible. Skryme (2002) suggests the fundamentals of knowledge sharing are culture, co-opetition and commitment (Angehrn & Loebbecke 2004). Go*Team attempts to address all three of these issues.

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