Building an enterprise process view using cognitive mapping

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Abstract

Purpose – This article offers an approach to building a high-level business process view of the enterprise, based on cognitive mapping techniques and the principles of modularity.

Design/methodology/approach – A case study illustrates how these maps can be used in action learning and executive leadership development programs as a means of aligning enterprise leadership by implementing a cross-functional process view from the top down.

Findings – This enterprise map shows both the customers' and the business's processes and their interrelationships, which helps align business strategy to process strategy, design and ownership.

Research limitations/implications – The authors suggest that future case analysis research be conducted in other private sector industries using the same model.

Practical implications – Building the business process view is a critical first step in business process orientation, an organizational philosophy closely linked to "systems thinking". It can link business strategy and customer needs to all the aspects of process design and management in a very powerful and visual way. This is the foundation for the success of corporations tomorrow by providing a clear view of the interrelationships inside and outside the company and by establishing a common language for change management.

Originality/value – This paper offers a unique approach for using cognitive mapping techniques and the principles of modularity to help align business strategy to process strategy, design and ownership.

Keywords Business process re-engineering, Cognitive mapping

Paper type Research paper

Introduction

The old ways of organizing and conducting business are out. A new paradigm is emerging with the integration and networking of business partners and the focus on the core processes. Many of the best companies – e.g. 3M, Cisco, Texas Instruments, and Dell – have embraced this new approach to business by becoming faster, more flexible, and more integrative, focusing on customers, competition, teams, time and process management. Their organizations and those following their lead have been variously described as "horizontal", "process centered" or "process oriented" (Brooks, 1995; Buxbaum, 1995; Byrne, 1993; Davenport and Short, 1990; Davenport, 1993; Drucker, 1988; Hammer and Champy, 1993; Hammer and Stanton, 1995; Hammer, 1996, 1999; Melan, 1985).

Processes, like never before, are now considered strategic intellectual assets. Consider how a dot-com firm like Amazon.com is protecting their business processes through patents, such as their one-click ordering and their internet customer-based referral system, better known by Amazon as "affiliates" (Krause, 2000). Dell has over 40 process patents listed on their web site (www.dell.conm) and considers process their

competitive weapon. Michael Dell recently commented on the almost 1,000 patents that Dell engineers have filed, the majority being for process improvements; not product innovations (Jones, 2003). We maintain that companies competing in the networked business environment will need to reassess the strategic importance of their processes, viewing their organizations as not just a collection of functions but highly integrated processes. In short, they will need to take a business process orientation.

A business process orientation (BPO) is not simply a new operations management strategy. Rather, it emphasizes process as opposed to hierarchies with special emphasis on outcomes, particularly customer satisfaction (McCormack, 1999; McCormack and Johnson, 2000).

This article offers an approach for developing and building a high-level business process orientation within companies in an effort to help them achieve a competitive advantage. Using cognitive mapping techniques and the principles of modularity, both the customers' and the business' processes and their interrelationships are mapped to help align business strategy to process strategy, design and ownership. A case study also illustrates how these maps can be used in action learning and executive leadership development programs as a means of aligning enterprise leadership by implementing a cross-functional process view from the top down.

Building the process view using the principle of modularity

Our studies have suggested that business processes are invisible within most organizations. Something becomes known or "visible" within an organization by the development and acceptance of mental models, or deeply ingrained assumptions, generalizations or pictures that provide an understanding of the way things are done (Senge, 1990). The problem with mental models is that they are often individualized based upon each person's understanding. In order to build shared mental models, individuals must come together, communicate and discuss their views and come to a common understanding of the model. This can be accomplished using cognitive mapping techniques, a form of representation, which allows one to picture, analyze and compare mental models (Spicer, 1998). The process of developing and agreeing on common cognitive maps is a critical process for organizational learning and alignment (Klimecki and Lassleben, 1998). The organization chart is a typical cognitive map of an organization's mental models of power and authority. The development of common cognitive maps is also an effective approach to gaining consensus and alignment on strategies and execution priorities (Stepanovich and Mueller, 2002).

The first step in building a business process orientation is to begin to look at the organization in a new way – through a process lens. This is what we call a "process view" or a mental model of the work that takes place within the organization. Building a common process view must be inclusive, not exclusive, involving at one time or another, all of an organization's personnel. Those not involved in preparing the actual documentation (or cognitive maps) should nevertheless review and validate the work being performed. Failing to take these measures will short-circuit the development of a common process mental model and the process orientation journey.

Many different methods could be used to build a common process view within an organization. A principle called modularity, used to understand and manage complex systems, offers some very important concepts that should drive the construction of this

view. Decomposability or logically grouping elements into or within a smaller number of subsystems, or levels, is one of the important concepts in the principle of modularity. Drawing boundaries that simplify the interdependencies of the parts of the system, a concept called interdependency, is also important (Langlois, 2000).

For example, in a non-decomposable system, one with the boundaries and levels in conflict with the principle of modularity, the successful operation of any given subsystem would strongly depend upon the successful operation of other subsystems. There would be numerous interactions required between the subsystems before a specific subsystem could produce its output. In a decomposable system, on the other hand, the successful operation of a sub system would have a lower dependency and interaction requirement outside of itself. Figure 1 provides a visual example of this.

From our research and based upon these key concepts of modularity, our approach begins with a high-level customer focused process map and works from there to build increasing levels of decomposed detail. Figure 2 provides a generic example of this type of map.

This key cognitive process map is critical in beginning the shift to a process view as well as a customer focus, both key components of BPO. It is also a very useful tool when organizing the construction of more detailed process views. A process map at the enterprise level, built using cognitive mapping techniques and conforming to the principles of modularity facilitates critical agreement on process boundaries, dependencies, enterprise performance measures and customer interactions. Once this common process view of the business is agreed to, process organization structures can be developed and process ownership assigned, both critical strategy implementation mechanisms. The construction of high level measures and the assignment of responsibilities for improving process performances can also be accomplished using this map. This is a critical leadership alignment mechanism in the operationalization of strategy.
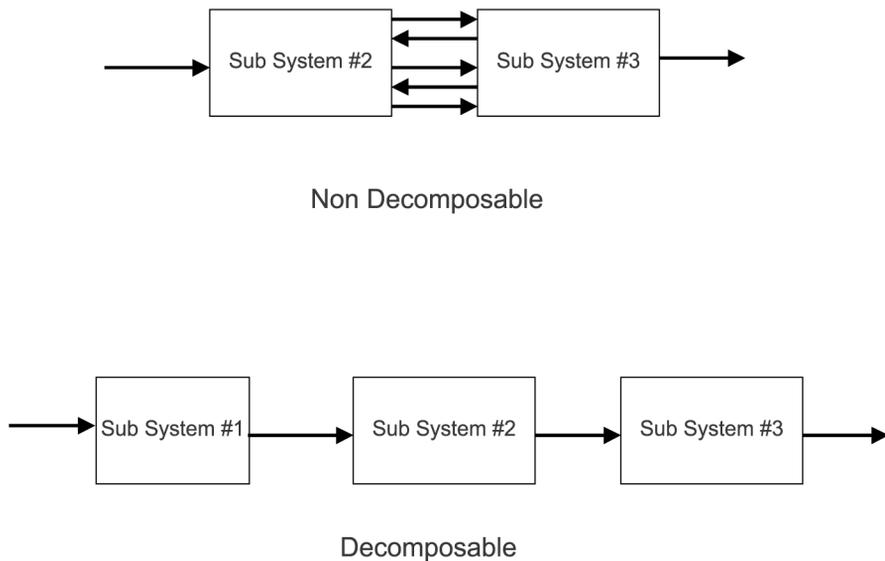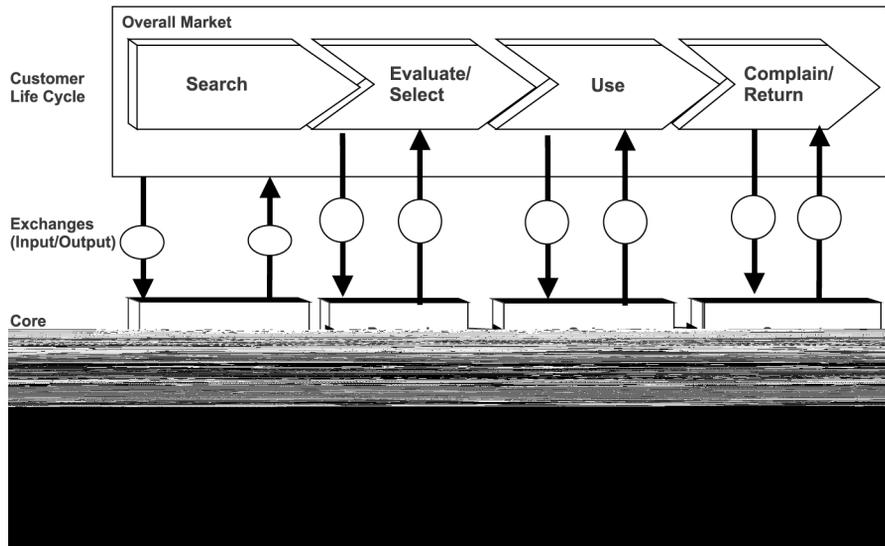

Non Decomposable

Decomposable

Figure 2.
A generic high level
process map

Components of the high level map

Organizing, classifying and setting boundaries are very important steps in the BPO journey and building this map is a critical first step. It defines decomposable systems that conform to the principle of modularity and sets the stage for successful development of the more detailed process view. It also groups the high level processes into process types, each possessing different characteristics and being managed differently. This section describes the components of the map, the different process types, and the methods for using the map.

Organizing and classifying the processes by customer lifecycle, the series of activities a customer performs when interacting with a business, helps focus on the outcomes that are critical to the customer and the businesses processes that produce these outcomes. Core processes, the value-added activities that support and facilitate the customer life cycle, represent the foundation of most businesses and the value that customers pay for and the essence of most businesses. The customer exchanges or interactions are the inputs that begin the process and the outputs that end the cycle. Measures built around these interactions are, from the customer's perspective, the essence of the business process performance. "What gets measured gets done" is a well-worn saying in process circles. Measures focusing on customer interactions taken from the customer's point of view will more likely lead to real change – and superior customer value.

Sustaining processes may not result in direct customer interactions, yet are critical to the operation of the business, such as product research and development. For a chemical company, a sustaining process might be process design; for a consulting company it may be knowledge management.

Supporting processes are not as insignificant, as their position on the map might imply. They are shown at the bottom of the map because they are the furthest from the customer. Human resource management would be an example of a supporting process in a consulting company. Information systems frequently serve as a supporting

process for many companies today. For example, for a pure internet play such as Amazon.com, the total customer experience is to a great extent shaped by its website and its daily function. In this case, design and support of that website could be viewed as sustaining processes or even as part of a core process.

Using the map in Figure 2, process measures can begin to be developed as well as identifying process owners accountable for these measures. At this level, each high level process listed on the map should have an owner that is responsible for building the next step in process view. This owner should also take operational responsibility and be given authority for the assigned process. These owners should be on the executive leadership team and involved in key leadership activities, just as the functional executives are. Often, the functional executives become the owners, especially of the sustaining and supporting processes. This owner must then begin to build the process-oriented jobs and cross-functional process teams and lead the transition to them, a tough but not impossible assignment.

Finally, this map also serves as a personality profile of the company, the markets it serves and the interactions with its customers. It is a critical starting point for building a process view. The next step in building the process view is to build process maps of increasing detail with cross functional teams continually involving more and more of the organization until everyone understands and accepts the processes, boundaries and interdependencies. It is important to remember that the documentation is not the outcome of this effort. It is the understanding and acceptance of the cognitive process maps by the entire organization. The process owners lead this with the deep involvement of all members of the process team. The result of this effort is then shared with the entire company for validation, understanding and acceptance.

Building the process view of an organization is very time consuming and expensive but there are no short cuts in this process. Like building a house without a good foundation, an organization without a fundamental process view, a shared cognitive map, has nothing upon which to build and will eventually revert back to a predominantly functional, vertical organization. A strong process view requires leadership and commitment from the management levels of an organization. The following case study at a construction company illustrates how cognitive maps can be used to develop management's understanding of the process view and their role as process advocates in the integration of these maps throughout the entire organization.

Applying BPO maps at Centex Rooney
Centex Rooney Construction Company is headquartered in Plantation, Florida and has an additional seven offices across the state of Florida. For two consecutive years, Centex Corporation has been ranked the nation's number one most admired engineering and construction company *Fortune Magazine*. *Fortune's* list of "America's Most Admired Companies"™ is the definitive report card on corporate reputations. Winners are chosen from the 1,000 largest US companies, ranked by revenue. Additionally, *Engineering News-Record* (ENR) has also rated Centex Corporation as the number one, top general building contractor.

Action learning concepts
One of the key attributes of Centex Rooney's reputation is employee talent. The company is dedicated to continuously developing its managers into strong leaders

through the use of action learning. Over the past ten years, action learning has emerged as a powerful and effective tool for life-long learning among executives in many progressive organizations such as Boeing, Motorola, Alcoa, and Nokia (Kalliath, 2002). Action learning projects are associated with cross-functional initiatives and are seen as a powerful tool in breaking down organizational silos.

Dotlich and Noel (1998) describe the usefulness of action learning as an educational methodology for equipping managers and organizational leaders with lifelong learning skills for managing change. The reasoning for the increased adoption of the action learning approach is based in part on the fact that in a rapidly changing environment, the rate at which individuals and organizations learn may become the only sustainable competitive advantage (Kalliath, 2002). Action learning is based on the principle that managers learn best when reflecting on how well they are addressing real problems, especially when they are able to question the assumptions on which their actions are based (Revans, 1980).

The basis for this methodology originates from the concept of the learning organization or "systems thinking", which is the ability to see interrelationships rather than things that are related (Senge, 1990). These interrelationships are associated with previously mentioned components of business process orientation. Other important theoretical underpinnings of action learning include change management and reflective learning. In research conducted by Kalliath (2002), it was found that the reflective learning process produces higher organizational learning by way of meta-cognitive learning or learning to learn. Action learning is basically "learning by doing" which requires a process of using real problems with real business consequences and reflective learning.

Cognitive learning methods at Centex Rooney

Using an action learning oriented approach, a selected group of Centex Rooney project managers is currently undergoing a two-year leadership development program. The purpose of the program is to prepare these managers for business unit leader (BUL) positions. The leadership program consists of 12 modules founded on the strategic vision and objectives of the company as well as its core operating values and philosophies. Each module is uniquely designed to address the business objectives and issues associated with each module topic. Participants attend a fully customized eight-hour workshop co-facilitated by outside academic instructors and internal subject matter experts consisting of senior executives. In addition, participants complete on-the-job pre-workshop and post-workshop assignments.

One of the modules is business process orientation. The module was designed from scratch over a two-month period. The process for designing the module consisted of three phases: planning, development and delivery. The facilitator team consisted of the authors of this article and three senior Centex executives.

Planning phase. During the planning phase, the team defined the company's business and learning objectives and issues associated with BPO. The primary business objective of this module was to create a strategic competitive advantage in the construction industry and achieve superior business performance by effectively managing efficient, effective, and agile cross-functional business processes. At the end of the module, participants were expected to learn to:

- view business processes as a dynamic, strategic weapon for competitiveness in the construction industry;
- understand the specific roles and responsibilities within the cross-functional business processes associated with leading a business unit at Centex Rooney;
- obtain an understanding of what it takes to be a change agent towards building a cross-functional process culture at Centex Rooney;
- understand and discuss the specific relationships between resources, business processes, corporate performance, and customer value and the associated challenges with managing these relationships;
- apply methods to evaluate, improve, manage and measure Centex Rooney business processes; and
- evaluate the proposed effectiveness of a business process orientation at Centex Rooney.

The function of a BUL is similar to that of an orchestra conductor. The BUL is responsible for identifying and managing the skills of resources in the company that have expertise in the various disciplines necessary to achieve target business results, while not having direct authority of these resources. Typically, the resources reside in different functional departments; therefore developing the competencies to manage cross-functional processes are of critical importance in this module.

Another consideration while designing the BPO module was the nature of the construction industry, which is primarily founded on relationship management. Centex Rooney's ability to perform its business objectives relies heavily on the interdependencies between its business customers, suppliers, contractors, architects, and community representatives. As noted in Figure 3, all stakeholders are at the center of marketing activities while business processes are the intellectual assets linking the stakeholders in the supply chain. According to Gordon (1998), relationship marketing organizes around customers. Processes advance the customer relationship by delivering the goods or services. Processes need to be established to structure and govern the relationships, with the expectations clearly laid out.

One of the primary challenges facing the facilitator team was to establish a common framework as the foundation of Centex Rooney's business process view. Discussions of various business processes made it clear that each team member defined processes differently. Initially, there was little consensus on the business process terms and the scope of each business process. Over a period of a month, the team developed a customer interaction map, the high level process view for Centex Rooney, as shown in Figure 4. It is important to note that relationship management extends across all exchanges.

Development phase. With the enterprise cognitive map defined, the team now had a common language to work from. The purpose of the development phase was to define the next level of processes within each core business process as well as design action learning activities that would reinforce the use of the customer interaction map as the company's process profile. The team defined the "macro blocks" or next level processes within each core business process, as illustrated in Figure 5 for the first core business process, demand creation.
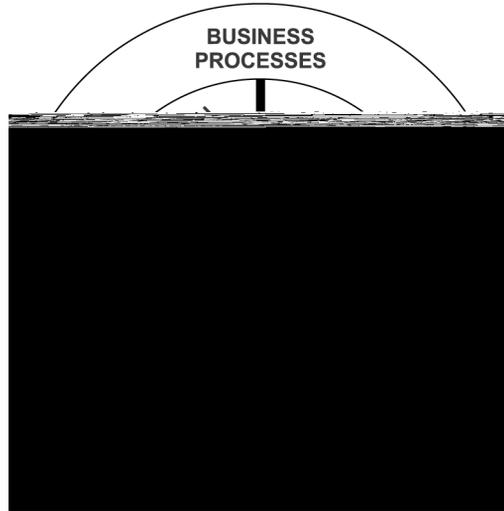
Figure 3.
Relationship marketing at
Centex Rooney

The primary action learning activity for the module consisted of an in-class team exercise. The key deliverable of this team exercise was to develop a plan for improving the performance of an assigned process in terms of efficiency, effectiveness, and strategic direction. The facilitation team identified a critical business issue within each core business process and associated with each macro block. These business issues were current real problems at Centex Rooney. The team then developed the content that would provide participants with the tools and techniques needed to achieve the deliverables of the in-class exercise.
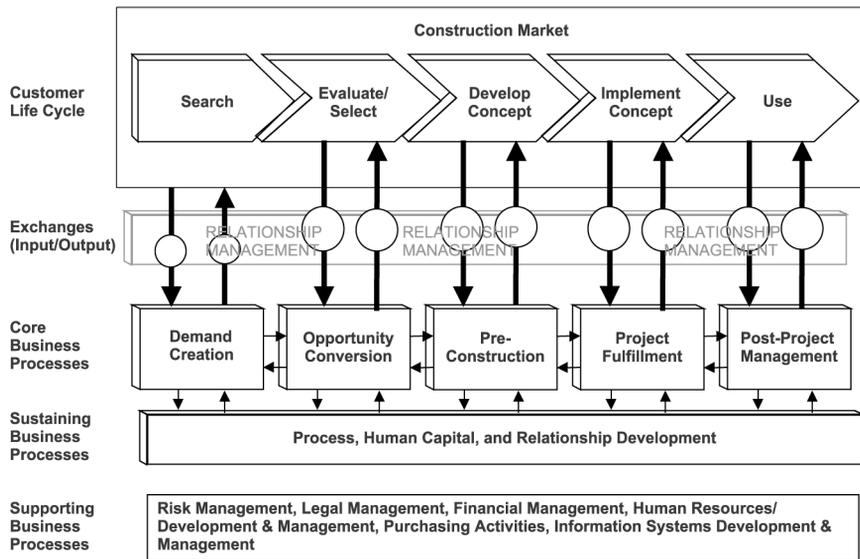

Figure 4.
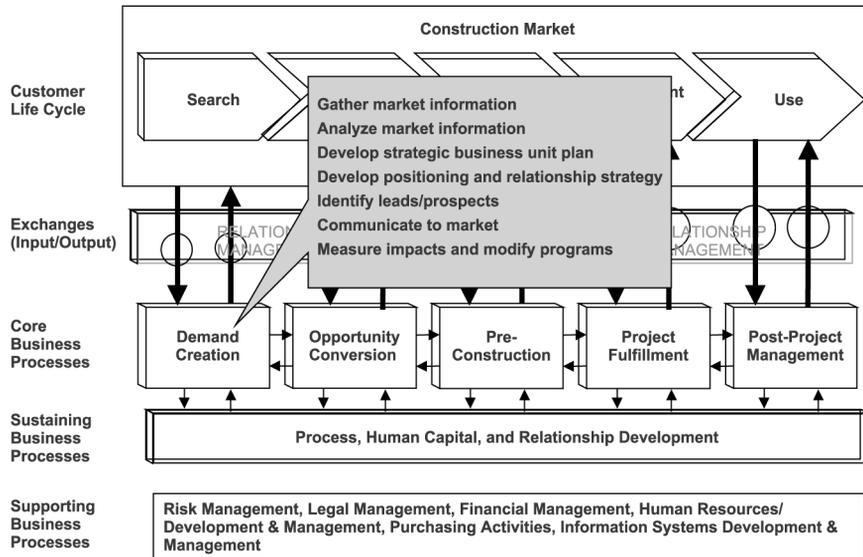Centex Rooney customer
interaction map

Figure 5.
Macro blocks for demand
creation

Delivery phase. The workshop participants were divided into five teams and each was assigned a critical business issue. Each team analyzed the boundaries (inputs and outputs of the macro block), the primary activities, the stakeholders, performance indicators and the interdependencies using detailed process mapping techniques reviewed by facilitators. At the end of the workshop, each team presented its improvement plan.

During the team presentations, participants used the cognitive map as a frame of reference for outlining the key actions of their proposed plan. It was observed that using these maps as a framework allowed for increased efficiency and effectiveness when discussing each plan as a group. Little time was wasted attempting to figure out the scope of the team's recommendations. By the end of the workshop, participants continuously referred back to the cognitive maps as a means of keeping the discussions on target.

Workshop evaluation. The participant evaluation of the effectiveness of the methods used during the workshop reflected a very high level of understanding with regard to BPO content, significance of the BPO subject and practicality of BPO ideas, skills and techniques. Using a five-point scale, with 5 being the highest rating, workshops results were all above 4.6.

The comments expressed by participants indicated that it was easy to comprehend and relate the BPO terminology to the processes used at Centex Rooney. As stated by one participant, the methodology used is a "way to make the invisible visible." Another participant suggested that BPO is a very interesting approach on what the company does day to day and that it would be inspiring if the BPO map was shared as a common approach in the whole company. The map put a description and methodology on BPO which was previously unknown to participants.

One of the critical success factors of action learning is executive sponsorship and participation. During the BPO workshop, the following "words of wisdom" were provided by the senior management attending and co-facilitating the workshop:

- "Make it common practice to distribute matrices on how cross-functional processes are performing."
- "It doesn't matter what department solves the problem; the important thing is that the problem gets solved objectively through the use of processes."
- "Empower your employees and let them do their work."
- "Connect at the top with your partners/subcontractors."
- "Explain the value of your processes to your customers. Ask them what works for them and what doesn't and listen to what they have to say. Value is in the eye of the beholder."
- "Create value for our customers by helping them establishing and improve their processes."
- "Let your employees know how their daily tasks and jobs relate to the BPO map."

Post-workshop action learning
As part of the action learning objective for the workshop, participants were asked to apply the BPO concepts to their real day-to-day jobs. Participants completed a post-workshop which described three specific ways in which they would implement the BPO principles and techniques on the job in order to increase the company's or the business unit's "process view". Participants were also asked to select a macro block from one of the five core business processes on the Centex Rooney customer interaction map that they would like to be a "process owner" for and identify improvements to that macro block.

The cognitive maps developed for Centex Rooney served as a basis for this post-workshop assignment. Participants indicated that they would use these maps to help communicate business process initiatives and goals to others in the company, particularly to employees from other functions or departments.

Conclusions and future research
Building the business process view is a critical first step in business process orientation, an organizational philosophy closely linked to "systems thinking". It can link business strategy and customer needs to all the aspects of process design and management in a very powerful and visual way. This is the foundation for the success of corporations tomorrow by providing a clear view of the interrelationships inside and outside the company and by establishing a common language for change management.

One of the challenges faced by companies today is the actual implementation of new philosophies or "views". Effective change management requires the involvement and commitment of key management positions. It is unlikely that a complete "process view" can be achieved if management does not buy-in and sell the new "view" to the rest of the organization. The case study presented in this article used cognitive maps to involve executives in the design of a company process view and to communicate the

executives' process view to other leadership positions as part of a leadership development program.

Effective organizational learning is considered a key intellectual organizational asset. This article demonstrates that the use of a "process view" in conjunction with action learning methods can contribute to effective leadership development and successful problem-solving through the shared mental models and reflective learning on real business issues. In this paper, the cognitive mapping techniques and the principles of modularity have proven to be useful in a more expedient learning process as well as a tool for reflective learning. Although the combined use of the cognitive maps and action learning addressed the construction industry in the private sector, initial results indicate their usefulness in the change management process. A future area of research would be to follow-up in 12 months to determine the more permanent effects of this approach on the company.

The authors suggest that future case analysis research be conducted in other private sector industries using the same model. It would be meaningful to incorporate the use of cognitive mapping techniques as part of customized leadership and management development programs in service industries such as health care and hospital management, where customer focus is clearly at the center of operations. Typically, process management research in these service industries has been interested in examining the use of techniques within the day-to-day lower-level operations of an organization; however, there is a clear need to involve executive management in the development and delivery of the process view message at the enterprise level.

A relevant extension and possibility for further research would be to examine the public sector using the same approach. Evidence suggests that public sector strategies are beginning to incorporate the use of private sector management philosophies and techniques. Given the perception that the public sector's structure is hierarchical, it would be appropriate to align the use of cognitive mapping with the sector's leadership and management development programs.

References

Brooks, S.S. (1995), "Managing the horizontal revolution", *HR Magazine*, Vol. 40, pp. 52-8.

Buxbaum, P.A. (1995), "The horizontal company", *Transportation and Distribution*, June, pp. 36, 82.

Byrne, J.A. (1993), "The horizontal corporation", *Business Week*, pp. 76-81, December 13.

Davenport, T.H. (1993), *Process Innovation: Reengineering Work through Information Technology*, Harvard Business School Press, Boston, MA.

Davenport, T.H. and Short, J.E. (1990), "The new industrial engineering: information technology and business process redesign", *Sloan Management Review*, Vol. 31, pp. 11-27.

Dotlich, D. and Noel, J. (1998), *Action Learning: How the World's Top Companies Are Recreating Their Leaders and Themselves*, Jossey-Bass, San Francisco, CA.

Drucker, P.F. (1988), "The coming of the new organization", *Harvard Business Review*, Vol. 66 No. 1, pp. 45-53.

Gordon, I. (1998), *Relationship Marketing*, John Wiley & Sons, Etobicoke.

Hammer, M. (1996), *Beyond Reengineering: How the Process-Centered Organization Is Changing Our Lives*, HarperBusiness, New York, NY.

Hammer, M. (1999), "How process enterprises really work", *Harvard Business Review*, Vol. 77 No. 6, pp. 108-18.

Hammer, M. and Champy, J. (1993), *Reengineering the Corporation: A Manifesto for Business Revolution*, 1st ed., HarperBusiness, New York, NY.

Hammer, M. and Stanton, S.A. (1995), *The Reengineering Revolution: A Handbook*, 1st ed., HarperBusiness, New York, NY.

Jones, K. (2003), "The Dell way", *Business 2.0*, Vol. 4, pp. 60-6.

Kalliath, T. (2002), "Implementing action learning in the OD classroom", *Organization Development Journal*, Vol. 20 No. 3, pp. 62-73.

Klimecki, R. and Lassleben, H. (1998), "Modes of organizational learning: indications from an empirical study", *Management Learning*, Vol. 29 No. 4, pp. 405-30.

Krause, J. (2000), "Turning patents into profits", *The Industry Standard*, July 3.

Langlois, R.N. (2000), "Modularity in technology and organizations", *Research Paper No. 1/00*, The University of Connecticut, Storrs, Ct, Version 2.0, February.

McCormack, K.P. (1999), "The development of a measure of business process orientation", paper presented at the European Institute for Advanced Studies in Management: Workshop on Organizational Design, Brussels.

McCormack, K.P. and Johnson, W. (2000), *Business Process Orientation: Gaining the E-business Competitive Advantage*, CRC Press, Boca Raton, FL.

Melan, E.H. (1985), "Process management in service and administrative operations", *Quality Progress*, Vol. 18 No. 6, pp. 52-9.

Revans, R. (1980), *Action Learning: New Techniques for Action Learning*, Blond & Briggs, London.

Senge, P.M. (1990), *The Fifth Discipline: The Art and Practice of the Learning Organization*, Doubleday, London, p. 8.

Spicer, D.P. (1998), "Linking mental models and cognitive maps as an aid to organizational learning", *Career Development International*, Vol. 3 No. 3, pp. 125-32.

Stepanovich, P.L. and Mueller, J.D. (2002), "Mapping strategic consensus", *Journal of Business and Management*, Vol. 8 No. 2, pp. 147-63.

Further reading

Brache, A.P. and Rummler, G.A. (1990), *Improving Performance: How to Manage the White Space on the Organization Chart*, Jossey-Bass, San Francisco, CA.

Imai, M. (1986), Kaizen*: The Key to Japan's Competitive Success*, McGraw-Hill, New York, NY.

Jaworski, B.J. and Kohli, A.K. (1993), "Market orientation: antecedents and consequences", *Journal of Marketing*, Vol. 57 No. 3, pp. 53-70.

Melan, E.H. (1989), "Process management: a unifying framework for improvement", *National Productivity Review*, Vol. 8 No. 4, pp. 395-406.

Porter, M.E. (1985), *Competitive Advantage: Creating & Sustaining Superior Performance*, The Free Press, New York, NY.

Walton, M. (1986), *The Deming Management Method*, Perigee Books, New York, NY.