

"The Glass Bead Game: Linking Interdependence and Organizational Learning"

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Executive Overview

Herman Hesse's Nobel Prize winning novel, *The Glass Bead Game*, may very well contain the secret to competitive success in the 21st century. Cast in a future period, one in which intelligence and knowledge reigned supreme, this fictional novel centers around an abacus-like device which masters from various disciplines used to synthesize new insights. For our times, the glass bead game can teach us much about how individuals from different functions and specialties can uniquely combine their respective knowledge to produce fresh new ideas and learning that will benefit their organization.

Historically, our organizations have not tended to operate in the above manner. Rather, narrow functional specialization and insularity have tended to produce sub-optimum corporate performance. Ultimately, we trace this "reductionism" to the thinking of two people---Sir Isaac Newton and Descartes. Modern day science is producing new insights, however, that tell us that holism and interdependence are the organizing principles of matter, not reductionism.

This paper argues that our emphasis on organizational learning is misguided, and instead, our emphasis should be on eliminating the barriers to organizational learning. Just as players of the glass bead game could not learn from one another until they developed a common language and grammar, individuals in our modern day organizations cannot learn from one another until they too transcend the "language" of their discipline and become united in the broader "language" of the corporation.

This paper will argue that our real focus should be on creating organizations that are interdependently linked in the pursuit of purposes (the pursuit of knowledge being one) which transcend functional boundaries. Our real challenge then resides in how we create this interdependence between people and groups. This paper will outline six practical strategies organizations can use to create bonds which transcend functional boundaries, and therefore, allow these functions to learn from one another and to work together more effectively for the good of the whole organization.

Herman Hesse's Nobel Prize winning novel, *The Glass Bead Game*, may very well contain the secret to competitive success in the 21st century.¹ Cast in a future period, one

in which intelligent activity reached its fullest expression, the glass bead game provided a way for intellectual masters from various disciplines to synthesize their thinking into new planes of knowledge.

In appearance, the glass bead game resembled an abacus, with several dozen wires strung vertically and horizontally. Upon these wires were hung beads of various colors, sizes and shapes. Originally, as Hesse relates, the glass bead game was used by musicians as a way to build upon and improvise on musical themes. Moving these beads into new configurations symbolically represented the development of new, musical themes.

Later, the glass bead game was adopted by mathematicians. In this context, the beads corresponded to mathematical formulae, which were combined with the mathematical notations of other players, to form new insights. Over time, the glass bead game was adopted by all major disciplines with the beads corresponding to the symbols, formulae and notations of that respective discipline.

As the glass bead game developed over some 50 years, it became increasingly desirable to develop a common grammar and language which would transcend all disciplines and allow experts from these disciplines to interact, and hence, to learn from one another. In Herman Hesse's development of the narrative, this actually does occur, and now, we find the game being played with perhaps the introduction of a theme from astronomy, followed by a musical theme from Mozart, leading to the emergence of a whole new level of thought. The game continues in this latter form through the duration of the novel.

This same capability to build upon each other's ideas is described in the book by Mitchell Waldrop, entitled *Complexity*.² In this book, Mitchell describes the interdisciplinary work at the Santa Fe Institute of esteemed researchers in the fields of economics, psychology, biology, information sciences and physics, and describes how new insights, for example in economics, emerge from thinking in the field of molecular biology. This is another example of the glass bead game in action.

Picture the following hypothetical scenario.

Assembled in one room, are executives from finance, human resources, legal, manufacturing, engineering, information systems and marketing. Each of them represents a highly specialized discipline with its own vocabulary, formulae and notations. As they play the "game," they find that each person has a distinct vantage point and unique ideas to contribute from their own discipline.

The game progresses as each player moves his or her bead in response to the movements of the other players. Suddenly, one player interjects that the ideas played thus far can be synthesized into a new strategy which embodies

each of the ideas, yet transcends them. The players move on to a higher plateau of knowledge, delighted with the emergence of a new, competitive strategy which they all contributed to and which will make them successful in the years ahead.

Sadly, this is not the scene in most organizations today. Either the disciplines do not speak a "common language," and/or they are not able to achieve an effective synthesis of ideas. My focus in this paper will be on addressing these two issues.

While a fictional construct, the glass bead game represents a powerful metaphor for one of the major leadership challenges of the 21st century -- namely, how do we enable and accelerate the flow of ideas, information and knowledge across our narrowly-defined, "stovepiped" organizations? Perhaps, although poorly defined to-date, this is what organizational learning is all about -- the ability to learn from one another and the ability to synthesize apparently disparate themes into new, insightful ideas which will benefit the whole organization.

Many authors have discussed the concept of "organizational learning" and described its importance to organizations. *Maybe, our focus on organizational learning is misguided. Perhaps instead, we should be focusing on how we can get people in organizations to work together more effectively.* This latter argument makes the assumption that if people work together more effectively, organizational learning will be a byproduct.

The focus of this paper is on one major, underlying enabler of organizational effectiveness ---namely, interdependence. The assumption is made that if we can foster interdependence between people and groups, then ideas, information and knowledge will flow more freely across our present day functional barriers. Just as players of the glass bead game could not learn from one another until they developed a common language and grammar, individuals in our modern day organizations cannot learn from one another until they too transcend the "language" of their discipline and become united in the broader "language" of the corporation.

This paper will focus on ways that organizations can use to foster interdependence between the people and groups in their organization. But before I do this, I will define interdependence further, state why it is important for competitive survival and describe the major societal force that is already pushing us in this direction.

What is Interdependence?

Webster defines interdependence as the "dependence of two or more things on each other." Dependence is further defined as follows: "A depending on another for material or emotional support (trust, reliance); a state of being contingent." One could interpret interdependence, therefore, as an inferior state; one in which individuals or groups are contingent upon one another. For our purposes, however, I would rather view it more positively. As with Hegel's philosophy, or for that matter, as with the glass bead game, I

view interdependence as the synthesis of independence and dependence. *I view it as the act of independent individuals or groups coming together in strength to pursue a common good which transcends their own narrow, self-interests.* They are mutually dependent on one another for the achievement of this common good.

In the metaphor of the glass bead game, we might see the concept of interdependence emerge in the following way. One player would lead with a bead symbolizing independence, and arguments would ensue as to the merits of independence. A second player would then follow with a bead symbolizing dependence and proceed to argue for its merits. As the debate continues, the players involved realize that there is a synthesis of these two concepts-- namely, interdependence. This latter construct allows them to transcend their original ideas and to develop a whole new unifying theme.

Is interdependence really a new organizational concept, or just an old one repackaged? Certainly, for decades, authors have discussed the need for integration in increasingly differentiated organizations. *But integration is not the same as interdependence.* For example, the vertical enterprise is *integrated*; the systems of the body are *interdependent*. We could say that all interdependent organisms are integrated, but not all integrated organisms are interdependent. There is a major difference here between functions which merely work together and whose activity is coordinated, and functions who are vitally bound together in a common pursuit. It's the difference between functions being involved with one another in some form of coordinated activity, and functions being committed to one another's mutual success. *We know a lot about integrating functions, but very little about making them truly interdependent.*

Interdependence allows us to retain the best aspects of independence, while mediating the latter's self-centeredness and potential excess individualism, through an emphasis on mutual dependence. It allows us, therefore, to be both independent and dependent at the same time. This latter concept corresponds well with Arthur Koestler's use of the term "holon," describing subsystems which are both whole and parts.³ As parts, there is an integrative tendency to function as part of the whole, and as wholes, an opposing tendency toward self-assertiveness.

Why is interdependence so important?

One could look at athletic teams as examples of the power of interdependence. Individuals on football teams, for example, seek to excel in their particular area -- offense, defense, specialty teams -- however, as members of the school, university or professional team, they also compete for overall results. In this latter context, they are mutually dependent on one another for the overall success of the team. One could say, therefore, that interdependence contributes to competitive success.

The football example gives us another opportunity to examine the difference between integration and interdependence. You could say that the activity of *all* football teams is integrated and coordinated; they all work together in some fashion. But there is a distinct difference between winning teams and losing teams. All things being equal, members of

winning teams are *passionately* united in a pursuit which transcends their own narrow self interest and the interest of their specialty group. It is this level of passionate commitment that we equate with truly interdependent organizations.

Another way to view the power of interdependence is by examining its presence in nature. For thousands of years, philosophers, cosmologists, astronomers, physicists, biologists and other scientists have pointed to the interdependence and unity in nature. Earlier, we mentioned the interdependence of the human body as one notable example. For a discussion on the interdependence of the members of the body, we might, for example, go back two thousand years ago to I Corinthians and the writings of St. Paul.

"... now the body is not one member, it is many. If the foot should say, 'because I am not a hand, I do not belong to the body,' would it then no longer belong to the body? If the ear should say, 'because I am not an eye, I do not belong to the body,' would it then no longer belong to the body? If the body were all eye, what would happen to our hearing? If it were all ear, what would happen to our smelling? As it is, God has set each member of the body in the place he wanted it to be. If all the members were alike, where would the body be? There are, indeed, many different members, but one body. The eye cannot say to the hand, 'I do not need you,' any more than the head can say to the feet, 'I do not need you.' Even those members of the body which seem less important are in fact indispensable.

... God has so constructed the body as to give greater honor to the lowly members, that there may be no dissension in the body, but that all the members may be concerned for one another. If one member suffers, all the members suffer with it; if one member is honored, all the members share its joy."⁴

(I Corinthians 11:26)

If we were to summarize the above thoughts, we see that interdependence is important because it points all members of the organization to a higher, common good. Indeed, our narrow, functional organizations have been criticized by Ackoff and others because they tend to be suboptimal in terms of their contributions to the overall organization. Each function or group, tends to look to its own group as the supreme good. In Ackoff's new book, *The Democratic Corporation*, he underscores this point.

"The performance of a system obviously depends on the performance of its parts, but an important, if not the most important, aspect of a part's performance is how it interacts with other parts to affect the performance of the whole. How part of a system performs when considered

independently of the system of which it is a part is irrelevant to its performance in the system of which it is a part. A part that works well when considered separately may not work well when interacting with other parts of a system; the parts may not fit together well....For these reasons, effective corporate management must focus on the interactions of its parts rather than on their actions taken separately. However, current organizational designs and modes of management focus on the actions of corporate parts rather than their interactions. It is assumed that if each part works well when considered separately, the corporation as a whole will, but this is not true. Supervision and command are the management of actions; coordination and integration are the management of interactions, and this requires leadership."⁵

Interdependence, therefore, would tend to have us look at our activities in terms of what they contribute to the overall success of the corporation. According to Webster Robinson, in an April 1925 issue of the Harvard Business Review, the natural tendency, however, is not toward this greater good.

"There seems to be a natural tendency in every organism to jar apart and become a loose-jointed aggregation of unrelated units, unless there is some binding, supervising, and coordinating force that continually keeps them in place and makes each unit realize that it is not complete in itself, but merely a part whose greatest service is rendered when it fits perfectly into the whole."⁶

In the next section, we will discuss a major shift that is occurring, one which may very well provide us the "coordinating force" that Webster Robinson references in the above statement.

Interdependence and Its Roots

At the same time that corporations struggle to break down the functional barriers that exist in their organizations, it appears that a supportive push in this direction is occurring *outside* of organizations. In an earlier paper, I described how the value shift from "authority-centeredness" to "person-centeredness" during the past three to four decades, has influenced everything from the way we raise our kids, to the way we work in our contemporary organizations.⁷

I believe another major value shift is occurring in our society; one which is influencing everything from national defense to the way we do computing. This major value shift is from the rugged American individualism of the past century to a greater recognition that we are all interdependent parts of something bigger. We see evidence of this in many ways, for example, in our global economy. Stock market results in the Tokyo Stock Exchange, can have dramatic impacts on the New York Stock Exchange. Interest rates,

exchange rates, trade imbalances and recessions in one part of the world can have significant impact on the rest of the world.

We see other examples in national defense and in the environment. The Persian Gulf War was a good example of different nations uniting in a common cause. And in the environment, disasters such as Chernobyl, can have devastating effects not only on the former U.S.S.R., but also, on the rest of the world.

At the organizational level, authors such as Margaret Wheatley, have argued persuasively that our narrow, specialized, functional organizations are derivatives of Newtonian physics and the philosophy of Descartes.⁸ The former viewed the world as a machine made up of many discrete elements -- an atomistic view of the world. As a result, over time we have tended to break complex things into smaller and smaller objects of investigation. Descartes' thinking further reinforces the reductionism prevalent in modern organizations. Complexity is dealt with through increased specialization. As we have increasingly specialized, we have increasingly lost the ability to effectively integrate both our ideas and our work for the sake of the greater good of the organization. It is interesting that in 1925, Webster Robinson already saw this pernicious threat in society.

If Newtonian physics has tended to break things down into smaller and smaller pieces, then what accounts for the recent interest in viewing the pieces as part of a much greater whole -- in other words, to adopt a more systemic or holistic view of the world? Once again, authors tell us that the discoveries in physics---in this case, Quantum Physics--- have led us to this current state. As Fritjof Capra relates:

"In contrast to the mechanistic cartesian view of the world, the view emerging from modern physics can be characterized by words like organic, holistic and ecological. It might also be called a systems view, in the sense of general systems theory. The universe is no longer seen as a machine, made up of a multitude of objects, but has to be pictured as one indivisible dynamic whole, whose parts are essentially interrelated and can be understood only as patterns of a cosmic process."⁹

We see, therefore, that the drive toward interdependence is a natural phenomenon, and one which we could speculate will have untold effects for hundreds of years. From the time of Newton in the 17th century to our present date, Newtonian physics and the philosophy of Descartes have influenced, to name a few, economics, medicine, psychology, ecology and organizations. Will quantum physics have the same impact on the institutions of the future, and can we somehow take advantage of this shift to effect greater interdependence in our modern day organizations?

How Does One Build Interdependence?

In the sections that follow, I will outline six ways to foster interdependence within organizations. I will attempt in the process to give as many real world examples from my own consulting experience as possible. Unfortunately, much of what I will relate is still "work in progress," and therefore, the long-term results will not be apparent for some time. For the short-term, however, I am encouraged by the preliminary results and continue to believe that the question is not whether organizations should become more interdependent, but rather, how do they do so?

In figure 1, I show a model which one can use to develop interdependence in organizations. This model originally came from the "Management in the '90s" research at the MIT Sloan School. During the past 5-6 years, I have used the model in my consulting work and have updated it to reflect my own client experiences.

[Insert figure 1 here.]

The model is in reality one for understanding how organizational change occurs. Ultimately, it traces its roots to Harold Leavitt and the Leavitt diamond.¹⁰ Harold originally said that change is the result of the interaction between people, tasks, structure and technology, which he depicted as four points of a diamond figure. For our purposes, the MIT model ties together much of our discussion on interdependence. For one, it is a systemic, and therefore, an interdependent model. A change in any of the seven elements will produce a change in the whole system. In this respect, it is unlike previous models which tended to be linear and sequential. You might say that previous models were Newtonian, whereas the MIT model very much reflects our findings from quantum theory.

The model, as we will later discuss, could also be viewed as an operational model of the firm. Viewed in this manner, it shows how the various functions must come together in order to successfully execute a chosen strategic direction. For our purposes, it captures the problem with our modern day firms and highlights one of the major paradoxes of the 90s---namely, that as we find out more and more how interdependent our organizational activities must be, we have no effective way to bring together the functions which "own" these respective activities. The model shows that whereas the work of the organization needs to be highly interdependent, the functions that represent this work are not. Let us take a closer look at this.

If we take information technology (IT), for example, the model points out that information technologies impact literally every other element of the model. We know that IT can have an impact on strategy, and we have learned that it has human, social, and cultural impacts as well. But if we look at the respective functions responsible for these elements, we see that they have difficulty communicating effectively with one another. The IT person does not typically understand the human, social and cultural impacts of information technology---something the human resources person is vitally concerned with. And the IT person does not typically understand the *language* of strategy---something the senior management and strategic planning people are vitally concerned with.

We could also look at this problem in the opposite direction. Typically, human resources people do not understand how IT can provide human, social and cultural benefits. And likewise, senior management understands very poorly how to use technology in a strategic way. We could go on with this example to illustrate the problem that functions have interacting with one another, but the real purpose of this paper is to figure out what to do about it. So, let us move on to that discussion.

We will use the model to describe how each of the elements, if properly designed, can contribute to greater organizational interdependence. In the process, we will also discuss some current practices that inhibit interdependence.

1. Business Strategy

Creating a *shared* business strategy is one way to foster interdependence in the organization. What is a shared business strategy? It is one that is clear, consistent, and easily understood by everyone in the organization. But more than this, it is one which people are able to internalize, and as a result, feel an identification with. Back to our glass bead metaphor, it's the common "language" of the organization that tells us what we as a corporation are trying to achieve and how we plan to achieve it. Its purpose is to galvanize us as a group in pursuit of this strategy.

The problems with business strategy currently are many. These problems include having no corporate strategy at all, developing one at the top of the organization and passing it down, having one which is not clear, having one which is not consistently supported, and communicating it poorly. As well, there appears to be a school of thought that believes that strategic planning provides no useful purpose. These people would rather see strategy emerge, rather than be thoughtfully planned.

During the past ten years, I have helped many different clients create a strategy for their organization. While in most of these cases the primary focus was on the strategy content, and not on interdependence per se, I have observed an unmistakable coming together of the parties involved in the process. The process itself of developing a business strategy can therefore be used to unite people in a greater cause, and thereby, make them more interdependent.

The most recent example of this was a major university that I assisted with the development of their five year strategy. Universities are not well known for their ability to bring highly educated, independent disciplines together into anything resembling a common direction. They are often described humorously as a "herd of cats." With this particular university, however, the different colleges and disciplines came together over a period of many months, temporarily put aside the loyalty to their particular school and truly built an exciting future direction for the university. In the process, they invested themselves in a purpose greater than that of their individual school.

I have been involved in two interorganizational situations whose *specific* purpose was to use the strategic planning process as a vehicle to achieve greater interdependence. One of these was with a large, domestic state. In this particular case, our plan was to use the strategic planning process to foster greater interdependence between the state government, the educational establishment and the business community. We theorized that if we could successfully create interdependence between these three separate entities, we would not only have established a successful model for this particular state, but indeed, have established a successful role model for the entire United States. Unfortunately, as the readers might guess, we were never able to get this effort off the ground. The very things we were trying to address---namely, bureaucracy and politics---got in the way.

The second situation involved a foreign alliance of ten independent companies. In the past, a loosely-coupled alliance had met the needs of all parties. Now, global competition made it imperative for these previously independent companies to band more closely together and explore areas of synergy. In this case, we used the strategic planning process to unite the parties in a broader purpose, and thereby, to foster greater interdependence at the alliance level. It should be noted that, at the same time, the individual companies continued to operate independently. *In other words, our design intent was to create strategic interdependence, while preserving operating independence.*

Recently, I have been involved in a major strategy development activity which highlighted for me the division that occurs when an organization does **not** have a shared business strategy. With this particular client, we used the Treacy/Wiersema model as the starting point for our strategy development efforts.¹¹ In this model, the authors argue that market leaders excel in one, *and only one*, value discipline---product leadership, operational excellence or customer intimacy. They further go on to say that the corporation must support this value discipline with a consistent operational model.

A major shortcoming of Treacy's and Wiersema's book is that they discuss elements of an operational model, but never actually show one or describe how to use it. For our purposes, we used the operational model which I described previously and which was shown in figure #1.

In the absence of a clear corporate strategy, I first had the information systems (IS) function develop alternative scenarios for the three Treacy/Wiersema value disciplines. I did not know at the time what this would show us, if anything. I was amazed to see the incredible range of IS applications that would have to be developed if one did not have a clear sense of what the corporate focus was---a situation not unlike that in most corporations that I have worked with.

To further test the theory, I conducted an identical workshop for the manufacturing group at this corporation. In this case, I asked them to develop three alternative manufacturing responses, depending on which value discipline the corporation might choose as its primary focus. Once again, I was struck with the wide divergence amongst the three manufacturing alternatives.

To develop the model further, we also developed three alternative operational model scenarios. These models, together with the previous work, showed quite graphically how lack of a clear, shared strategy at the top of the organization results in functions interpreting differently what their response should be. And more critically, lack of a clear, shared strategy results in an inconsistent operational model. People get measured and rewarded for the wrong things, the wrong business processes are focused on, inadequate structures are in place, the systems support the wrong things, the culture doesn't match the strategy, etc.

The next step for this particular client is to agree on a primary value discipline, develop a consistent operational model to support it, and communicate this clearly to everyone in

the organization. We hope in this manner that the employees will be able to internalize the company strategy, and therefore, understand better how their work can contribute to the success of this strategy. And as people and functions line up behind a common corporate strategy, their emphasis on the things that will help the corporation be successful will hopefully bring them together into more of an interdependent fabric.

2. Organizational Culture and Leadership

A second way to create interdependence is through a shared culture. Why does a shared culture contribute to the development of interdependence? When people share values and core beliefs, it unites them in a greater purpose. We speak, as it were, a "common language" with those people and become interdependently linked to preserve those beliefs. One way to create interdependence, therefore, is to create a strong organizational culture that people can identify with. But in spite of this, there are certain cultures that do **not** foster interdependence. Perhaps, several stories will illustrate.

Several years ago, I consulted with a large U.S. manufacturing company who wished to implement teaming as a major component of their strategy. After working with them for several months, and after sitting through a three day seminar with 45 of their senior executives, I was able to conclude why the corporation was having difficulty with the formation of teams.

The first distinction that should be made is that there are different kinds of teams, as I was to point out to this organization. There are formal teams created by management (and these can either be permanent or semi-permanent). There are also informal teams, which are empowered by the assumptions of a family-like culture, and arise spontaneously within the organization. This particular corporation had had considerable success with semi-permanent, formal teams, i.e., project teams, but wished to go to the next step and develop both permanent, formal teams (as in high performance teams) and informal teams. As I was to point out to the CEO of this organization, their chances of creating either permanent, formal teams or informal teams were not very good, given the highly individualistic nature of their culture.

This particular corporation had a long and rich cultural history, tracing its roots to its legendary founder -- a rugged, individualistic type person. Individual contributions were highly valued and rewarded and individual heroics were still the dominant mode of behavior. Creating a team culture in this context, would have taken a major shift. It can be said, therefore, that a highly individualistic culture serves as an inhibitor to the interdependence of individuals, groups and organizations.

It might also be obvious that interdependence cannot exist unless the parties trust one another. While working with a strategic business unit (SBU) of another client company, a cultural workshop that I facilitated had some rather startling surprises. One was the lack of trust that existed in this particular organization. Bureaucratic checks and balances had arisen as a result of one part of the organization not trusting the other, and therefore, having to sign off on everything that the other party did. More surprising, was the lack of

individual heroes in this culture. Heroes are revealing in that they reflect the desired attributes of a culture, or in some cases, heroes can be countercultural. In the latter case, heroes are sometimes individuals who have survived and been successful in an otherwise repressive culture, and therefore, are looked up to by the individuals in the organization who must still endure the repressive aspects of this culture.

In the subject company there were *no* current or historical heroes. As my subsequent characterization of new hires was to reveal, this was a culture in which individuals who raised their heads above the crowd were knocked down. I was subsequently to characterize this type of culture as a "whack a mole" culture---similar to the arcade game in which children smash down with hammers the little individual moles as they surface their heads in random, circular openings.

As can be seen from the above examples, culture can be a serious enabler or an inhibitor to interdependence. A family-like culture with a high level of trust clearly contributes to interdependence, while low trust and a repressive culture that knocks individuals down, would exacerbate even further the walls that divide organizations. We can also see from these examples how very difficult it would be for organizational learning to occur without an enabling culture.

Let us turn now to a brief discussion of the type of leadership that is necessary in an interdependent organization. We could ask, for example, if the leaders of interdependent organizations are different, and if so, how?

I would argue that the ability to combine themes and ideas from different disciplines and functions in new insightful ways, will require the future manager to become much more of a "general manager." She will continue to have an in-depth specialty; however, she will need to understand much better the inter-relationships of her function and discipline with the others in the organization.

Symbolically, I like Iansiti's "T" concept.¹² The vertical portion of the "T" corresponds to the in-depth specialty, while the horizontal line corresponds to the linkages and interdependencies between the subject specialty and the other specialties in the organization. We have all worked on the vertical portion of this T; we now need to figure out how to work better on the horizontal portion.

3. Business Processes

There is an incredible amount of interest these days in business process reengineering (BPR). One way to use processes to build interdependence between functions is to create processes in which the members of the organization are interdependent elements of a much larger process (such as customer engagement), instead of ends unto themselves. Indeed, this is the current thrust in BPR---to build processes which cross functional barriers. My own experience and the experience of others suggest, however, that these cross-functional processes are not always successful. There is too much power vested in

our traditional functions, and redefining one's work, can be a serious threat to this power base.

For our purposes, I would like to use business processes to take a more detailed look at the relationship between interdependence and organizational learning---returning in essence, to our main theme. To conduct this examination, I would like to take a historical perspective.

If we start with a historical examination of process, we find that at the beginning of the industrial economy (1750 in Europe; 1850 in the U.S.) businesses were primarily limited proprietorships. Businesses engaged in manufacturing or design or service or selling, but not all of these. As a result, the business you were in was equated to the work or processes you performed. An interesting footnote is that organizations had to be interdependent during this period in order to survive.

In the early 1900s, the cost of transacting business in this manner became prohibitive, leading eventually to the development of the vertically integrated enterprise. It was during the early 1900s that the Alfred Sloan multidivisional model and the hierarchy were developed. Now, businesses performed many tasks and processes and were no longer identified with the work they did, but rather, with the product they produced (automobiles) or the business that they operated (rail transportation), for example.

The next major phase was the beginning of the information economy, somewhere around 1950, according to Stan Davis and others. With the advent of the computer, we saw the processes of the industrial economy automated and performed faster and more accurately, but not appreciably different.

With the recent emergence of the interest in business process reengineering, we are now taking pains to redesign the business processes from the industrial economy. A logical question to ask is, "*Why are we spending so much time and energy redesigning the processes from the industrial economy, when we are now in the information economy?*" Shouldn't we be devoting equal, if not more time, to the processes of the information economy? Let us briefly examine the implications of these questions.

Are the processes of the information economy different, and if so, what are they? Writers such as Peter Drucker, Tom Peters and Peter Senge, maintain that the organization of the future must concern itself with knowledge. If that is indeed the case, then we will have seen a historical progression from data in the '60s and '70s, to information in the '80s, to knowledge in the '90s and the 21st century. Charles Handy maintains that the source of wealth has changed historically from land during the agricultural economy, to the means of production in the industrial economy, to knowledge in the information economy.¹³ If this is true, what are the associated knowledge processes?

We could say, as some writers have already said, that the new work of the information economy is *learning*.¹⁴ The associated business processes would then deal with the creation, dissemination and maintenance of knowledge. *If learning is the new work of the*

enterprise, then how do we bring people together to conduct this "new work?" With this question, we are brought back to the original theme of this paper and see once again the importance of interdependence as a way to make sure that people are truly united in this new work of the enterprise. But our question suggests that we need to go beyond this and learn *how* to do the new work---in other words, learn how to create, disseminate and maintain knowledge. In the next section, I will discuss an organizational structure, the systemic organization, which incorporates these processes as one of its main activities.

4. Organizational Structure

Another way to foster interdependence is through the organizational structure. In its simplest form, and as already practiced by many organizations, this means putting individuals together on teams, projects, task forces or committees. What is needed, however, is a much more enduring mechanism. The "systemic organization" which I first described in the Fall 1990 issue of the Sloan Management Review, might be an example of such a structural form.

In the systemic organization, individuals are grouped by *system* instead of function. Essentially, the theory is that since systems are by definition interdependent, creating systems of individuals will by definition create interdependence amongst those individuals. Systems have other advantages as well. We can measure the efficiency of systems and detect deviations from norm, before they affect the whole organism.

(Put figure 2 here.)

In figure 2, we see the aforementioned organizational structure. In this example of a manufacturing company, we see that there is a manufacturing *system*, instead of a manufacturing function. Everyone who is a part of the manufacturing system is concerned with the *same* goal of delighting customers. In this example, marketing would interface with customers and through that interface provide customer-centered input into the product development process. Engineering would design the products and manufacturing produce them. Purchasing would make sure that the materials are available to produce the products and distribution would be concerned with the flow of products to the customer. Service is of course concerned with the after market results and providing superior service to the same customers. You might say that this is a system tuned to provide high customer satisfaction with all the members united in this common pursuit.

In a similar way, the other subsystems shown, revolve around critical shared metrics. For example, the people system might be concerned with the ultimate morale, well-being and productivity of the people in the organization. The financial system in this biological metaphor, corresponds to the nutrient producing aspects of the human organism. While it may not be intuitively obvious to make the sales organization part of the financial system, it makes sense when we consider that sales is the main revenue producer in many organizations.

At the upper right hand corner of the figure, we see the knowledge system that I referenced earlier. Corresponding to the respiratory system in the body, we have a function that "breathes in" new ideas, information and knowledge. The "breathing in" might come from inside the organization or outside. For example, the Internet and World Wide Web are becoming rich outside sources of ideas, information and knowledge. The challenge is to capture those elements that will truly benefit the organization, rather than merely entertain the individual users.

Continuing the body metaphor, as with the circulatory system in the body, the ideas, information and knowledge are then circulated to members of the organizational body. In the process, some ideas and information are built upon and eventually become knowledge, while pre-existing knowledge is disseminated as is.

Making possible the circulation of ideas, information and knowledge, enabling the conversion of some of these into other forms, and connecting people to people and to other organizations, is of course the electronic network. Figure three highlights this new value-added role of the information systems function and does away with the outdated *input-process-output* paradigm which still dominates many IS organizations.

[Insert figure 3 here.]

The remaining portion of our "systems" organization is the command and control system, corresponding to the central nervous system in the body. For our purposes, it reinforces the point that even as we build interdependence between functions, some overarching control mechanism is needed at the top of the organization. We will discuss this more as we discuss "management systems."

Underlying the command and control system are values and organizational culture, which influence the organization much as personal values and societal culture influence the individual. As discussed previously, the shared organizational values serve as the "glue" which holds the whole organization together and may very well be our best source of control---in this case, inner control---in today's empowered organization.

5. Information Technology

The computer is not ordinarily seen as an instrument to build stronger bonds between people and groups. For our purposes, I would like to investigate further the role of the electronic network in fostering greater interdependence.

In a 1986 MIT Sloan School Working Paper, Harry Chandler Stevens introduced the idea that a many-to-many electronic network contributes to community development.¹⁵ We could argue that members of a community are indeed mutually dependent on one another for their social, religious or intellectual satisfaction. This argument would allow us to link the concepts of interdependence and "community."

In a research work that I conducted several years ago, mentored by Ed Schein from the MIT Sloan School, one of the conclusions was that the electronic network could be used to either control or empower people. "Authority-centered networks" (ones in which all which is not expressly permitted is prohibited), tend to be controlling and hence limit the peer-to-peer interaction which is so necessary for creating interdependence. On the other hand, "person-centered networks" (ones in which everything which is not expressly prohibited is permitted), tend to empower people, and therefore, serve as enablers to organizational learning and knowledge creation.

Kiesler and Sproull, in their book *Connections*, discuss how electronic networks, in this case electronic data interchange (EDI), can be used to increase organizational interdependence.¹⁶ They mention the examples of American Hospital Supply and Foremost McKesson, who in essence have offloaded their order entry function onto their respective customer organizations. In effect, the order entry clerks from the customer organizations, have become virtual members of American Hospital Supply and Foremost McKesson, thus increasing the interdependence between them and their customer organizations.

It should also be noted that electronic networks can serve to isolate people from one another, rather than bring them closer together. A case in point is a seminar that I conducted several years ago. The purpose of this seminar was to simulate the organization of the future. Accordingly, information technologies were used extensively throughout the program. For example, rather than face-to-face communication, members of this future corporation communicated electronically.

The seminar was very successful in showing the senior managers in attendance a new way of working, but we did have one very unexpected result. In previous seminars that we had conducted, significant camaraderie developed between the participants. This had been a major design element of these seminars, as it was of this one. When I asked one of the participants why the strong feelings of camaraderie had not developed, his response was, "Of course we never got to know one another very well; except for our initial introductory meeting, we never again met face-to-face."

The results of the subject seminar highlight for us one of the major challenges of our times. Even as we increasingly isolate workers from one another and increasingly use electronic media to replace our traditional face-to-face contact, we may be undermining our efforts to create strong bonds between people. And without these strong bonds, our chances of creating interdependence between these same people are hopeless.

6. Management Systems

Management systems are the measurements, rewards, incentives and controls that reinforce the desired organizational behaviors. They also include the planning and budgeting systems. In the case of the latter systems, we see some of the factors that have contributed to our "stovepiped" organizations. If we first take budgeting systems, we see that budgets have typically been established by function or group, and then, rolled up to

create the corporate budget. We see in this process once again identification with the function, rather than the corporation. What if budgets were allocated based upon a "return on value," i.e., the more your activities contribute to the corporate good, the bigger your budget?

Our traditional planning systems further divide the functions, as each group typically establishes a plan based upon its own priorities, rather than those of the corporation. Having each function participate actively in the creation of the corporate plan is one way to make sure that the corporate priorities also become the functional priorities.

Earlier, we discussed the role of measurements and their power. In discussing the systemic organization, we used the example of all members of the manufacturing subsystem being measured on a common metric---namely, customer satisfaction or delight. In general, we can say that wherever possible, shared metrics would contribute to greater interdependence. This leads us to a fundamental principle in creating interdependence within organizations: *Whether it be work definition, or how individuals are measured, every effort should be made to define their activities holistically.* Members of the organization should constantly be reminded that they are there to serve the greater good of the whole organization, not just the function or group that they represent.

As with cultural change, what management pays attention to is also very critical in fostering interdependence. If it is clear to all that management really cares about people in the organization working together, this will go a long way toward successful implementation.

For the past two years, I have consulted with a client who provides us yet another lesson on the relationship between management systems and interdependence. In this case, a highly-empowered, entrepreneurial culture was held together by a strong family-like belief. As this organization grew large, senior management feared loss of control, and hence, became obsessed with the notion of "accountability." The combination of accountability and the continued belief in empowerment, led this client to establish an internal market economy with accountability at the individual contributor level.

The results of these actions were instructive, to say the least. A preoccupation with individual metrics now prevailed, as individuals fought over who should get credit for certain revenues and who should get charged for certain costs, etc. In this particular case, accountability was certainly achieved, but at great expense to the previous family fabric and its associated, interdependent workings. This corporation, once one of the industrial stars of the 20th century, is still struggling to recapture what it lost.

Another important element of the reinforcement mechanism is the control system. What does control mean in an interdependent organization? Historically, control has been identified with the autocratic policies of the authority-centered company. It is my strong belief, however, that organizations **cannot** function effectively without control, discipline and authority.

It is certainly fair to say that much of the needed control will come from within the individuals themselves. This is the hallmark of an empowered organization. In this regard, the assumptions and values of the organizational culture will help the individuals internalize "what is right." And to the extent that the culture is a strong, shared one, this will be especially so.

It may be that control in the interdependent organization means that one controls systems, instead of people. As I discussed earlier with the systemic organization, by establishing metrics at the subsystem level, such as customer satisfaction, one can measure the efficiency of the subsystem itself and detect any deviation from this norm in advance of it affecting the entire organization. Perhaps, that is where we should put our energies -- to establish metrics that are holistic and can be shared, and then, to "control" to make sure that these metrics are achieved.

More work needs to be done in this area of management systems. For now, it appears that shared goals, what management pays attention to, appropriate control systems and overall consistency in behavior appear to be important elements in the interdependent organization.

6. Human Resources

We have not said much about the human resources and their role in creating interdependence. Perhaps, it is obvious that they are central to any discussion and are the *subjects* of interdependence. Ultimately, it is they we measure and reward on interdependence, for example.

We could talk about the training and skills development that is necessary for interdependence to occur. Do our people have the necessary skills and attitude that it takes to be successfully interdependent? Some work has been done in this area as a result of the movement toward high performance teams. Much more work needs to be done on extending what we have learned on high performance teams to the organization at large.

As an example of a skill that might contribute to interdependence, one might mention collaboration. Michael Schrage has written an excellent book on this subject.¹⁷ In it, he describes many techniques one can use to foster successful collaborations.

We could also recruit "interdependent-type" individuals into the corporation. These are individuals who have an affinity to work with others and who have a natural talent to "see the bigger picture."

Summary

To return to our earlier metaphor, we can say that the glass bead game symbolizes each of us as individuals coming together to exchange and build upon the knowledge that each of has. But our ability to do this for the overall good of the organization depends vitally on our having developed some ability to transcend our functional barriers. In the glass bead game, a common language and grammar performed this role. In the organization of the future, interdependence will play the same role, as it truly unites people in a common cause. As we enter an era in which the value of information and knowledge will exceed that from our traditional products, can we ask for anything less?

Endnotes

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