PROSPECTIVE ON THE NEXT TWENTY FIVE YEARS. . .

Into the Next Millennium: Some Thoughts on IS Practice and Research

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In this, the 25th anniversary issue of DATA BASE, other authors have looked back from whence we came. As in most retrospectives, we find we have come much farther than we originally thought in some things, yet nowhere near as far in others. It has been said that we never move as far in five years as we forecast. However, we move far beyond the wildest forecasts over the span of a generation. This is particularly so in the rapidly changing information systems (IS) field. In this article, we will gaze into the crystal ball and consider where IS might be heading in the next 25 years. The intent is to engage the reader through postulating future possibilities. To do this, we are going to consider where the consumers of information technology are going and the role IT will play in getting them there. We will consider the technology itself, and where that might be going. We will discuss some impacts on the information technology industry, or what might be a better future name, the information industry. Finally, we will consider the future role of academe and its journals, as they are impacted and impact the field of IS.

Introduction

The information industry has changed faster than any other industry. The capability, sophistication, and price/performance of the industry's products have shown almost exponential growth since the original ENIAC of the 1940's. In terms of hardware, this growth seems to show no signs of slowing. In the past, some forecasters have asserted we are approaching impassable physical boundaries; however, research at a number of vendor laboratories show that the size limit that would have forced a move from silicon to more expensive materials, such as gallium arsenide, has been lifted through ever smaller line widths in etched circuits. RISC chips may well be operating at the 500 mhz level by the turn of the millennium. While software has not advanced as fast as hardware, it has shown amazing advances. The only reason that they seem lesser is that they pale by comparison to the hardware advances (Brooks,1987).

Information technology (IT) is not an end, but a means to an end. It has no intrinsic value. Its value accrues in the uses to which it is put. IT does not solve the kinds of problems organizations face, but it is an enabler in solving these problems. Today, and for the foreseeable future, IT represents a necessary, but not sufficient, condition for problem solution. We can think of IS as the deployment of IT, i.e., the uses to which it is put. To gain insight into the directions of IS, we must put IS into a context. This context

is the spectrum of problems that will use IT as a solution enabler.

The environment in which organizations live today is very different from that of twenty, or even ten years, ago. Temporal-spatial boundaries have imploded. In the spatial dimension, for example, the geographic boundaries that used to denote marketplaces are collapsing into the global marketplace. As a result, we have now, and will increasingly in the future have, more competitors in every subregion of the global marketplace. Those that were intra-regional competitors now face outsiders. Furthermore, in the temporal dimension, transmission of information and knowledge can be instantaneous. This is currently at its most refined in the financial markets. In financial trading, decision and execution are simultaneous, any time, anywhere. It is to the point where the trillions of dollars traded daily in the world currency markets make it extremely difficult for governments to control their exchange rates. Witness the trading pressures that forced Britain out of the European Monetary System (EMS) in September 1992, for instance.

This ability to trade, anytime, anywhere, is, of course, IT enabled. It represents a prototypical example of information systems generating the temporal-spatial implosion referred to earlier. What is more, the temporal-spatial implosion is impacting all aspects of our economies. Time compression, in terms of new product time to market and time in market, is affecting companies in all industry sectors from finance to manufacturing to service. The collapse of the spatial boundaries of marketplaces has increased the number of suppliers for any potential customer in any given location. This competition has changed the relationship between the customer and supplier. The adage of "what we make is what they'll buy" is no longer true, and exhortations to sell harder will not make it true again. We are moving from an environment of "make and sell" to an environment of "sense and respond" (Nolan and Croson, in press).

The Consumer

Consumers of information technology can be thought of as belonging to two distinct groups: consumer markets and industrial markets. The consumer market is similar to the personal market for appliances or movies, whereas the industrial market is a corporation-to-corporation market. IT is having a profound effect on both these markets.

Let us look at the industrial market first. We noted above that companies are being forced from their traditional make and sell attitudes to sense and respond. Companies evince this by calling themselves customer-driven or market-driven. While most have adopted the jargon of change, few have successfully transformed themselves to the kind of organization that can actually support change. The magnitude of the transformation requires radical change. Hammer and Champy (1993) call it "Reengineering the Corporation." Other consultants have other names for this process of radical change, but all seem to be agreed that it cannot be done without extensive use of IT.

We are not going to explore new organizational forms in this article. Suffice it to say that the "information organization" of the 21st century will be a very different animal from the "industrial organization" of the past. It will be fluid, flexible, and dispersed. It will likely take the form of ad-hoc agglomerations of individuals across inter-corporate alliances.

Drucker posits new organizations built of self-managed teams of knowledge workers (Drucker, 1988). Others talk of these new organizations being glued together into the "virtual corporation." Basic to such organizations is the ability for people to communicate. They need to develop and exchange shared knowledge. Clearly this cannot be achieved without IT. There will be multiple layers of IT, and there will be multiple layers of knowledge available, as a universal commodity to any organizational unit that has the need and the resources to acquire it. The basic IT infrastructure will be a utility, like the telephone. Users will plug into it, as they would plug a telephone into a socket on the wall. However, as with the telephone system, the technology behind the wall socket will be very sophisticated, with high functionality and complexity. The level of this complexity, though, will be much greater

than our current telephone system. At its base will be networks of networks, intelligent networks, with very high bandwidths. The nature of the traffic will be multimedia. Yet in all likelihood, multimedia as we know it today will be totally inadequate.

Let us explore what the work environment of one of these organizations of the future might be like. Project members will be dispersed across functions within an organization, across organizations, and across continents. The members of these teams will need to collaborate across time and space. Most of the ways in which projects now take shape are through ad-hoc, fluid, single topic meetings. These typically take place in corridors, offices, even at the water cooler. In the future organization, such an environment will be created without the physical presence of the players.

Advanced versions of current technology, such as Lotus' Notes, have the capability for providing video of participants on PC screens plus audio and text. However, screen size presently limits the capabilities. Furthermore, many of the ad-hoc discussions that go on in a project, particularly in design applications, involve multiple people using a white board. To create the effect of physical presence, we need to simulate the discussion environment of today. To do so, we need a cyberspace meeting room complete with a cyberspace white board. Holography will be the way to achieve the simulated presence without size limitations from screen capacity. The holographic meeting will be displayed in the office of each participant, size adjusted by that participant. Each participant can draw on the white board, modifying, or adding to, the work of others. This environment will have the capability to function asynchronously so that someone in Japan can review a meeting that took place in the US the previous day, insert themselves into the meeting to add their input, and the US participants subsequently continue the meeting with the Japanese input. Such a cyber-discussion will also have instantaneous translation so that any participant hears the discussion in the language of his or her choice.

The advantage of holography, and other post-millenium virtual realities, is that three-dimensional displays, to any scale, can be provided of things that are not really there. Designers can show a new car that only exists in its computer form. Industrial machinery can be shown by a salesperson as a hologram. A dress designer can design a dress on a holographic client, interactively with that client. A car purchaser can go into the showroom and call up the model she is interested in as a hologram. She changes colors and features until she has the configuration she wants, inserts her debit card into the reader, and the car is delivered two days later. Dealer inventory is minimized, the buyer does not need to compromise on features, and the manufacturer builds to order. This requires manufacturers be far more flexible and swifter than they are today.

The problem with holography today is that one cannot touch a hologram. In the future we will see touch sensitive holography, so we can open the door of our holographic car. A doctor will be able to view the internal organs of a patient holographically. She will also be able to feel them. This will eliminate much of the need for exploratory surgery.

Returning to our internationally dispersed, self-managed team of knowledge workers, let us now consider the application infrastructure required to support them. As the team develops a base of shared knowledge, they will need applications that support the creation, acquisition, storage, manipulation, and distribution of that knowledge. They will need applications that enable the planning, engineering, execution, and measurement of the project. Each project is unique -- in its task, its membership, its dynamic. As such, each project will have applications tailored to its unique needs and *modus operandi.* Some "projects" will be ongoing, such as customer service. However, the way customer service is provided will be undergoing continuous improvement interspersed with periods of radical change so application tailoring will also be continuous. The implications this portends for IS will be addressed later.

In the consumer market, much of the media hype today is on interactive multi-media. It is rare to find magazines without some reference to it and to the "information superhighway." The *Wall Street Journal*, for example, produced a special supplement on multimedia in a March 1994 issue. To date the focus has been on multimedia for the household, particularly in terms of entertainment. Here again, holography will come into its own.

We could see Swan Lake performed by the Moscow Ballet in miniature, in three dimensions, on the coffee table in the den. Alternatively, we could see, holographically, a full-sized performance at the local theater. Extensions of this concept would enable us to explore worlds in virtually reality by actually being within them.

As media bandwidths explode to incorporate holography, the limitation to our state of being forces us to maximize our capacities at the point of reality. Bandwidths that can provide consumers with controlled access to the five senses -- the ability to see, touch, feel, hear, and smell across spatial and temporal boundaries -- can distort the sense of existence. This distortion may well lead to large bodies of people becoming disconnected from reality, creating the possibility for equally distorted societies.

Consumers will be the controllers of their own bytes. Service charges for bandwidth will be based on byte consumption, and not on time and distance as they are today, since these dimensions lose much of their relevance with a technological infrastructure operating at the speed of light. The consumer will be able to match the expenditure of bytes across a variety of needs, such as access to video expertise, participation in asynchronous holographic designs, and mass customer solicitations, where the size of the potential order can be matched to the richness of the media used.

So what is the source of competitive advantage for organizations in such an environment? Successful corporations will base their success not on the omnipresent technological utility, but on what flows on the utility. The ability to match task and information will enable competitiveness. Quality of information flow to the customer along the familiar dimensions of relevancy, accuracy, and format will be the source of value added as will the quality of case workers, i.e., those who "sense and respond." Quality and speed of mass customization -- satisfying the niche market of one -- will be critical. And of course, while information will never be free, it may be shared to mutual advantage. It will be protected, valued, acquired, and sold, based on its niche and will lose value, as all commodities, with increasing availability and demand.

The Technology

We can look at the future directions of information technology in any number of ways. In this article we will briefly touch on hardware, software, and deployment methodologies. The capabilities of processors and storage are growing exponentially. On the other hand, the number of leads from a chip, a surrogate for interchip communication capability, is only growing linearly. To compensate for this imbalance, processing power is moving into the network. Clearly, the capability of hardware is continually outrunning our ability to use it effectively. There is no evidence to suppose that we cannot continue to grow hardware power at the ever accelerating rate that we have done in the past. Our limitations for the near term, at least, are software and deployment methodologies.

The "software crisis" has been with us for twenty years and is just as much a crisis now as it was then, if not more so. We can describe this crisis as software that is late, over budget, functionally deficient, and does not work as expected or as stated. Functional deficiency and failure to work as expected are illustrated in the following example. We all have spreadsheets on our PC's. They have so much function it is almost an embarrassment of riches. However, out of the range of functions available, some will be used rarely, if ever; some will remain undiscovered. On the other hand, there is often something that an individual user wants to do or some way in which to do it, but the desired function is not there, or its use is so arcane the user gives up.

Furthermore, most products seem to fail to meet their original announced ship date, have reduced function from that originally announced, or both.

As the world is fast changing, so must the information systems that support that world be equally fast changing. The nature of the teams described above will be fluid and transient. The applications that support them will need to be equally fluid and transient. This leads us to the concept of team-specific, throwaway applications. Teams will have their own members who bring IT expertise to providing the team with their IS support. Applications will be tailored to the needs of the team and the task. While "throwaway" may be an overstatement, applications will not be generic, nor will they be static in the way of today's applications. They will have a generic base, but will be tailored to the processes the team decides to use.

In today's world, applications develop a life of their own. Typically, they represent the automation of some localized procedure and have cyclical releases of new or updated function, to reflect a continuing, stable set of procedures. Transient teams of the future will have transient processes and procedures. Just as the nature of work will be changed to drive a dynamic "sense and respond" environment, so will the nature of IS be equally changed. Teams, and their processes, will be ad hoc and dynamic; their information systems, correspondingly ad hoc and dynamic.

For IT/IS to be an enabler to the information age, rather than an inhibitor, a number of things must happen. Corporations must abandon legacy systems. Legacy systems represent the paving of the cow path; they institutionalize what was. The IT infrastructure must be comprehensive, and at a much higher level of capability than today, e.g., intelligent networks. For example, the communication environment described above for teams of the future must be built into the corporate IT infrastructure. Moreover, the IT infrastructure must be tailored to the corporate strategy; it must be an integral part of that strategy. The corporation must create its own, corporate strategy-driven information architecture. This architecture goes far beyond data warehouses; it addresses information, not data. It must incorporate all information the corporation requires, internal and external, in whatever form it is stored. Access must be supported by "intelligent agents," sometimes called "knowbots," that find and deliver relevant information to the task at hand. These agents will find information by relevance, not some predefined keyword context.

Finally, there will have to be a completely different way of growing information systems ("grow" as opposed to "build," in the spirit of Brooks [1987]). Applying to both the IT infrastructure and the information systems that sit atop the infrastructure, the dynamic team environment cannot afford the concept of permanence that "build" evokes. The infrastructure must grow and change as the corporate strategy evolves. It must also capitalize on new technology to provide increased strategic leverage. As for applications, they will have a half life in the region of 90 days; few will live beyond six to nine months. They will be gone with the team that used them. The development cycle for the team applications will not be longer than 30 days. It will be part of the team start up period. Applications will be grown by the team and grow with the team.

What will be the source of these applications? There will be two approaches. The first approach will be the purchase of self customizable, generic applications. Customization capability will be built into the applications. The applications will be generic variants of generic business processes.

The second approach will use building blocks, much the same as a child's Lego[tm] set. These blocks will be purchased from "merchant block manufacturers" much the same way as merchant chips are purchased today. The team will assemble its particular application set from both sources.

New methods of information systems development will exist to grow these systems. Our current methodologies cannot produce working systems in 30 days, nor can they produce them at a cost that supports the throwaway system concept. Considerable research is being done

on modeling and representational formalisms. Unfortunately, it is beyond the scope, capability, and interest of the average system analyst to use these mathematical approaches. On the other hand, such approaches offer rigor and parsimony in representing systems.

Workable methods and formalisms must be hidden behind an intelligent, usable, facade that enables our project teams to grow their systems without the need to understand the underlying methods. Problem definition and information systems solutions will grow hand in hand through using intelligent development environments operating in the problem domain.

What about object-oriented design and development, which is currently seen as the solution to the software crisis? Let us consider the philosophical soundness of this belief. The concept of objects is immediately appealing. Physical objects appear in all aspects of our daily lives. We can classify objects as automobiles, and subclassify them as sedans. We can say they consist of other objects, such as wheels and engines. In the IS world, we can take a concept, such as a customer order, and simulate tangibility through its representation on a piece of paper. A customer is a true object. Physical items the customer orders, such as appliances, are tangible objects. We have predefined methods for processing the order and so we can represent a customer order as object in the IS sense. We can create our IS objects with data and methods. It is likely that libraries of objects will not be built internally but rather they will be available on the open market as "merchant objects" in much the same way as ASICs and merchant chips are today.

But the knowledge workers of the future are, by definition, dealing with knowledge and not with more primitive conceptual structures such as objects. Knowledge, as an interrelationship of concepts, has no tangible being. Information is often used as a synonym for knowledge. The adage ". . . and there is data; data meaningfully displayed is information; information absorbed is knowledge; knowledge understood is wisdom," can be used to explicate this. In Webster, one definition of information is "facts" whereas a definition of knowledge is "the fact or condition of apprehending truth or fact." Thus, knowledge is dependent on the level of individual apprehension. Knowledge can be described at two levels. The first is discursive knowledge and the second, practical knowledge. The discursive knowledge is that of which we are consciously aware and can discuss. Practical knowledge is the base of things we just know, and is the accumulation of experiential knowledge acquired, ordered, and related throughout the course of our lives. In the process of the apprehension of new information to add to the individual's knowledge base, a level of interpretation takes place to fit the new knowledge with the existing set. The individual meaning of this new knowledge then, is predicated on the base of knowledge to which it is being added. Davenport (1994) suggests that information is complex, ever expanding and impossible to control completely. He refers to a human-centered approach to information in which specific information, such as customer, does not have a common definition. In other words, there are no absolutes. The meaning of information is dependent on its use and its users.

Relationships with customers, for example, are complex. They are based on intersecting value sets and concomitant needs and wants satisfaction. These relationships are not based on tangible elements, but on concepts, knowledge, and apprehension of the participants; yet it is just these relationships that become important in the world of "sense and respond." For an IS object to reflect such a relationship, it would need to capture and represent both the discursive and practical knowledge of the participants. Objects, as we currently think of them, assume a common definition of a given piece of information. This commonality problem is exacerbated in the merchant object environment. Objects will need to be easily customizable to reflect the particular meaning, or apprehension model of each user. Under these circumstances, it will be extraordinarily difficult to build meaningful IS objects which capture the meaning of conceptual knowledge, except insofar as the object reflects the apprehension model of the author.

Where we wish to "build" systems that automate, even "informate" (Zuboff, 1988) preset procedures, object-oriented methodologies can accel-

erate the building of such systems. We question their efficacy for "growing" systems in the world of fluid relationship management .

Where does all this leave the IS professionals? Extrapolation of the trends of downsizing, client-server architectures, graphical user interfaces, and user control, leads to the dissipation of the IS group as we know it. Of course, global infrastructure wizards will exist to keep the highway utility and the traffic signals running. But, bread and butter development will move to the point of system use and will be seamlessly integrated across these points of use to form the global application base. The need to bridge the gap between the problem and the tool will remain a necessity. Friendly, rapid customization to fulfill a need will be a valued skill. Information analysts will be valued members of teams or such skills will be subsumed by other team members. Decisions between grades of information and access modes, as they pertain to the issue at hand, will be a critical skill. But there will always be a place for the visionary to lead the strategic deployment of super ordinate information and technology.

The Research

As academics immersed in the study of information systems and technology, how do we fit into this rapidly changing environment? A fresh assistant professor, with a doctorate from a prestigious school, is now grounded in our 15-year literature base with a strong repertoire of methodological tools. If he or she is fortunate enough to get a job at a research-oriented institution, certain restraints are immediately imposed at the beginning of his research agenda. It is made clear that respectability is gained by pursuing science and scientific approaches. Furthermore, our field demands relevance. He is told that theory is good, and needs to be built, expanded, and enhanced. Yet he also knows that we have limited, sometimes conflicting theory on which to build. Moreover, there is a world of reality that needs to be operationalized and examined based on fixed apriori relationships. It is also made clear that to understand the richness of processes, he cannot study phenomena without a context. The importance of statistics and good instrumentation is emphasized. And yet when he examines an adrenaline pumping phenomenon, he finds very little instrumentation to draw on. We tell him to be wary of fads and to examine sustainable concepts. But the technology catalyst propelling our field moves so fast that he cannot find anything sustainable. And we say to him that he has the luxury of theorizing and treading new ground. And then we put a loud clock in his office as a reminder of tenure and doom. This is further exacerbated by the dichotomy, teaching versus research. He must decide where to apply his time, that scarce resource of which there is never enough.

What would he do? As a rational individual he would attempt to publish in a set of journals based on his *a priori* beliefs and upbringing. He would identify a phenomenon of contemporary interest to be investigated. He would look for theory and possibly instrumentation, mostly outside the field, build hypotheses, gather, and analyze data and write the results. He would carefully articulate the rigor of his arguments and the relevance of his results. He would enhance the impact of the results through careful generalization of the sample to the population. He would then submit it to a journal and pray. The result of a multiplicity of such efforts in North America, in particular, is a positivist tradition in IS research. This is our way of pursuing scientific inquiry or the imposition of quantitative science on a problem. In so doing, we buy objectivity. It may be said that qualitative work is gaining ground; however, there are reasonable doubts that this will evolve as a promotable strategy for the tenure seeker.

But the future described earlier has multiple concurrent phenomena. And to get to these futures, we will experience multiple intermediate phenomena. The technological catalyst of our field is moving too fast for us to hold it long enough in our grasp to study its impacts. And so we capture transient concepts, fads, and describe organizational case experiences. As the law of requisite variety implies (Ashby, 1956), if two players are playing a game and one has a set pattern of moves, then the other has complete control over the course of the game. The researcher plays this game with the topics, con-

structs, and paradigms. Yet the IS researcher is faced with unlimited topics through burgeoning IT. To control this variety, he tries to obtain precise results, limited in validity, often investigating contemporary pervasive phenomena. This may well be limiting the scope of our research, particularly at the junior faculty level. If we are an integrating discipline that draws from many other disciplines to create a whole greater than the sum of the parts, then breadth of vision and concomitant breadth of research is mandatory. Thus, playing the game leads to a less than desirable outcome in that the research will be conducted with rigor, but may not add significantly to usable knowledge.

Our Reaction

We have spent numerous journal pages looking at ourselves. Such introspection partially comes from our own insecurity about our legitimacy as a field of inquiry and partially from our youth. We draw on reference disciplines in the computer, management, and organizational sciences and hope for reciprocity. We define and redefine our boundaries and use labels like MIS, DSS, ES, MoIS, IS, and IT to reflect our evolving boundaries. We recognize and justify our multi-aradigm existence and our single-time, cross sectional research designs. More importantly, we recognize our need for both relevance and rigor and make tradeoffs based on the idiosyncrasies of the journals involved.

And what about our research infrastructure? We are seeing rapid proliferation of journals, particularly reflecting the growing interest of the field in Europe and Asia. Many of these journals purport to bridge the gap between theory and practice. On one hand, the growing journals add to our ability to publish in a field, the majority of whose constituents are junior faculty. On the other hand, they add to the confusion among our peers in other more mature disciplines who are puzzled by the lack of a core competency. The problem is compounded as we are often housed within such departments as management science, decision science, management, or accounting. And while we take pride in our pragmatic tradition, a survey of our journal circulation indicates that we publish for academics, an inbred community lacking means of communication to the practitioner world. If we do publish in trade-oriented journals, we do not gain respectability among our academic peers and our vitas are disdainfully discounted at annual reviews. Of course, our field changes so fast that by the time we suffer journal lead times and publish our descriptive science, new methodologies, technologies, and approaches are being practiced by IS professionals, consultants, and vendors.

How to solve these dilemmas is food for lateral thinking.

Our Future

So how does the IS academy make itself more useful and meaningfully sustain our existence into the next millennium? The technological futures discussed in the first half of this essay are frighteningly viable. Fortunately, our field involves humans, their strategies, and their structures, at both the micro and macro levels. These social mechanisms and human systems cannot evolve as rapidly as the technological catalyst. Therefore, achieving a technological utopia is enacted via intermediate stages involving organizational structures, development techniques, political infighting, bounded rationalities, government regulation, departmental parochialism, organizational contingencies, and strategic orientation. Each and every one of these factors is an inhibitor to the effective utilization of information technologies. And each and every one of these factors is a reason for our existence.

If we accept our role on the front of pragmatism, then we as IS researchers should be the facilitators of the effective use of information and information technology. Our dependent variables are our forte. Our pragmatic implications are derived from our understanding of the dependent variables within their contextual frameworks. Whether it be encouraging system use, enhancing satisfaction, individual or group productivity, or organizational and inter-organizational profitability, our understanding of technological and contextual interactions can hold valuable prescriptions. Our units of analyses can be as grandiose and range from the individual to the

globe. Ironically, we are researching on the path that might ultimately lead to our demise -- where human vagaries can be programmed and the effective use of information and IT is a given. However, we can take solace in the fact that this is well beyond the millennium. Even today, while the omnipresent telephone utility is no longer a source of competitive advantage, its effective usage, as compared to alternative media, still poses legitimate research questions.

Let's delineate how we can facilitate effective deployment of information and IT at all these levels. First, we can continue our positivist quantitative research (Orlikowski and Baroudi, 1989). There are enough practicing analysts in the field that can rigorously address relevant issues following the guidelines suggested by a carefully developed theoretical base. With organizational contingencies growing, the research issues should retain as much contextual richness as practical. However, in doing so, we must recognize the need to market aggressively useful results back to the practitioner community and reward those who do so accordingly. This might require redressing of academic articles in their pragmatic essence and creating a delivery mechanism that transcends the ivory tower.

Second, we can address current practical problems without always resorting to deductive theorizing. We can follow practice, investigate important practitioner issues, and draw data from the field. Then, with the liberties provided us by our research infrastructure, we can analyze, tabulate, and structure the data in order to make it meaningful to practice. This might mean facilitating the dissemination of information, e.g., act as a clearing house for interpreting and disseminating best practices from one context to another.

Third, senior researchers in the field need to explicate theories and frameworks and critique widely held assumptions. Nolan's Stages of Growth Model is a classic example. Regardless of its ability to withstand scientific scrutiny, it generated a framework for debate and controversy (Farhoomand, 1987). Such debate can focus attention on problems and potential solutions, consistent with our objective of facilitating effective deployment of information resources.

Fourth, we can involve ourselves in phenomena, participate in practice, and observe processes within their context, without being biased by theoretical notions. Ascription of meaning to, and understanding phenomena based on, interpretation of the context is done in a non-deterministic sense. While the uniqueness of context inhibits generalizability, the interpretation of context facilitates it.

A quick survey of IS research studies will indicate that all four of these traditions currently exist in the field. However, questions remain regarding the variance in the distribution of such studies across the four categories, the quality of investigation, channels of dissemination to practice, and the time-effort-reward ratios within our current research infrastructure. On a more positive note, we are on the right track, despite the rate of change of technology. We cannot question the legitimacy of scientific inquiry. Nor can we question the need for contextual richness. If we accept the pragmatic nature of the field, and if we ascribe roles and have expectations from the gatekeepers of our field, e.g., journal editors, then there is a place for competent researchers within the framework of our common objective. While we will always have analysts that are biased by their upbringing toward a methodology or toward inductive/deductive philosophies and we might be questioned about our legitimacy as a field, honest work toward our common goals will remain the glue that binds us together. With the changing environment, we will see greater demand for business schools, to move research more toward the pragmatic front, which bodes well for our future.

To study our field effectively in light of our objective, to enhance IS and the effective deployment of IT, we need to transcend functional boundaries and examine technology related issues through a cross functional lens. To establish core boundaries for our field would be as artificial as drawing boundaries around the technology that we examine. Diversity of perspective and approach are good words. However, the issues that have sustaining power through the technological explosion projected by our crystal ball are not those that directly pertain to the technology itself. They are those that pertain to:

(1) the matching of context and technology for effectiveness; (2) a theory or framework for information; and, (3) the investigation of processes.

The first question tells under what conditions, and when, we can make the right technological choices. These technologies should not be defined by the names given to their boxes, which have a negligible half life, but by the sustainable concepts of technological functionality. The second question addresses the issues related to the effective usage of information and the management of growing information capacities. And, the third question deals with how we can actually do things in order to be effective. All three areas meet the test of utility in our futuristic world. Thus we might approach IS as an integrative discipline, bringing together the elements of technology, organization, sociology, and economics, as theory and research bases for understanding the impacts of IT, and how to deploy it most effectively.

On this note of optimism, we have expectations of a grandiose new technological millennium and the knowledge that if we, as a field, work together toward our common goals, revamp some of our academic systems, and elect effective gatekeepers, there might be enough room for all of us. And the very infrastructures and bandwidths that are changing social structures and strategies can go far in facilitating our existence as a community of scholars.

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