

one COMMUNICATION-indicated information perspective to optimize that goal.

Table 10-2 helps in defining the following conclusions that:

1. The most popular aim of information is control (CTR).
2. Aims of information images as communication (COM) and cognition (COG) goals are only half as popular than CRT.

It would perhaps be wise to advise that, to avoid unnecessary conflicts at all levels of humanity, goals of improving cognition and communication should be supported strongly and more widely than nowadays. Even saying that, the more we know, the less we need to be controlled or to be engaged in controlling. Of course, communication should also be improved, since it is a tool to share cognition.

THE INFORMED ARCHITECTURE OF AN ORGANIZATION

The Information Wave impacts the architecture of an organization, which becomes more information-systems-intensive, as is shown in Figure 10-16. Every facet of an organization is nowadays supported by computerized information systems (CIS) which interact through computer networks. The architecture shown is an ideal one, which identifies popular CIS, applicable in business and institutional organizations. Of course, it is still too soon to identify any organization which applies all those systems in a very orderly manner.

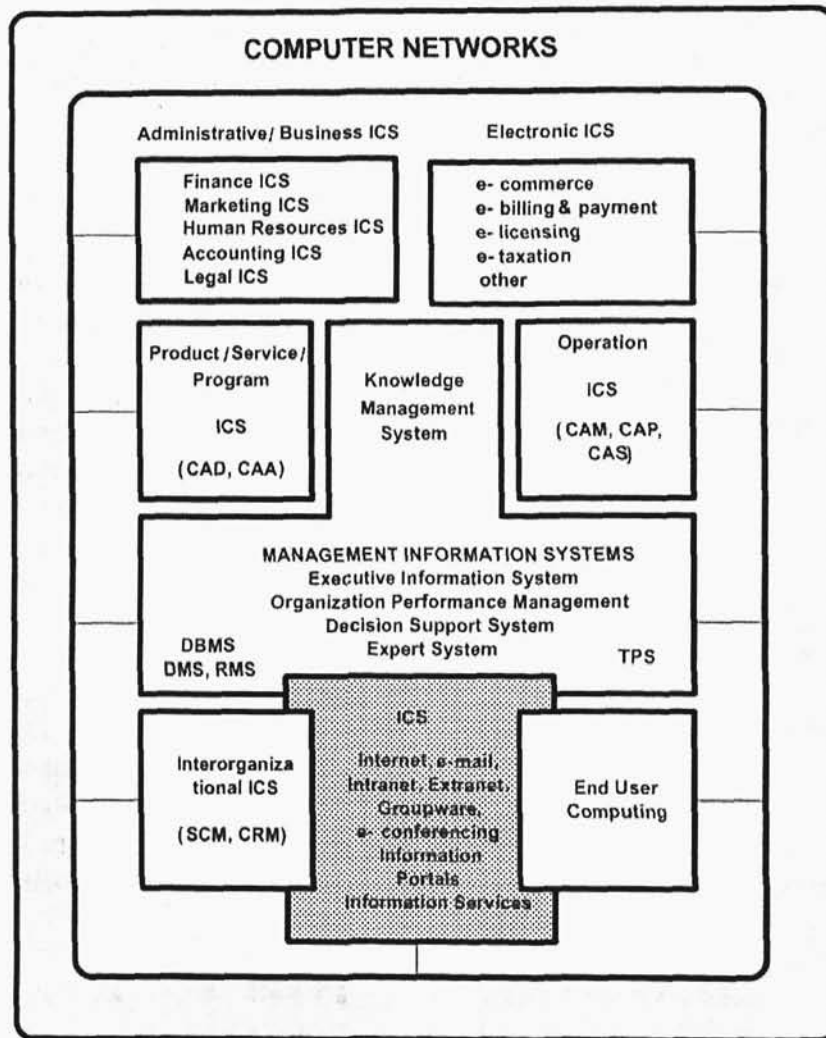
A process of reaching a level of “perfect” systematization of an entity passes through the following organization configurations, classified by the technology criterion (Targowski, 2003):

1. *Off-line organization* – is a typical solution for the kind of industrial enterprise which operated in the 1950s and 1960s. Several

applications, such as payroll, stock control, production control, and customer orders, are processed independently, and their data is provided in batches.

2. *Networked organization* – is based on computer networks such as Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN), Global Area Network (GAN), and the Internet. Applications are interconnected electronically, which leads toward a so-called extended organization, or in business, an *extended enterprise*, in which suppliers are connected with producers via a supply chain management (SCM) system to support just-in-time manufacturing.
3. *Integrated organization* – once an organization is connected into computer networks, the next step in its evolution is the integration of applications around a common database. In business, this integration is done presently by enterprise resource planning (ERP) software.
4. *Informed organization* – when an organization is networked and integrated, organizations look for the added value that CIS can bring to management. So far, the CIS(s) have been organized around a formula of *planned versus actual* performance, and systems are of the OLTP (online transaction processing) kind. In the *informed* configuration, systems are driven by OLAP (online analytical processing), which leads toward the application of a knowledge management system (KMS). This system’s main component is data mining, which generates new patterns and rules of a given organization’s stakeholders’ behavior. This is de facto knowledge processing, increasing awareness of decision-makers about issues, which up till then were beyond their grasp.
5. *Communicated organization* – when the content of information is at the optimal level (connected and integrated), it is necessary

Figure 10-16. The info-communication system architecture of an organization (ICS-Info-Communication System, CAD-Computer-aided Design, CAA-Computer-aided Advertising, CAM-Computer-aided Manufacturing, CAP-Computer-aided Publishing, CAS-Computer-aided Service, DBMS-Database Management System, DMS-Document Management System, RMS-Records Management System, TPS-Transaction Procession System)



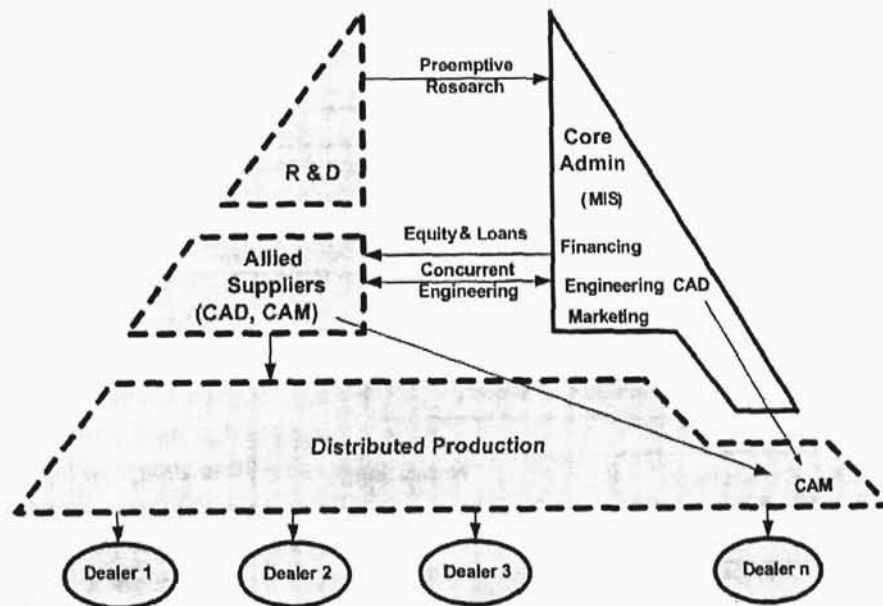
to communicate it to all stakeholders of an organization through: groupware (such collaborative software as Lotus Notes), intranet, extranet (the Internet, which, together with e-mail, can be installed at any level of organization configuration), e-conferencing, information portals, and information services (news and published content of journals, books, music, etc.).

6. *Agile organization* – is a business solution for mass customization of products and services through computer integrated manufacturing (CIM), which integrates computer-aided design (CAD), computer-aided manufacturing (CAM), and management information systems (MIS). This programmable technology may deliver 100 to 1,000 different products from the same production facility, because

it reduces setup and changeover times and lowers run size and the cost of customization.

7. *Mobile organization* – electronically and usually wirelessly connects field workers with central applications and office workers via handheld personal computers (HPC) and personal digital assistants (PDA) to increase the velocity of operations, very often via workflow systems (WFS) to access SCM, CRM, and ERP systems via Web technology.
8. *Electronic organization* – is the electronic implementation of previously mentioned systems, particularly through Web technology, e-document management systems (e-DMS), WFS, information portals, and so forth. Its goal is to implement a paperless organization.

Figure 10-17. Virtual enterprise at the beginning of the 21st century (dotted lines -- Outsourced functions)



9. *Virtual organization* – is formed dynamically in response to customer demand and dissolved as soon as it becomes economically unviable. Its processes are partially outsourced and sub-contractors are treated as partners who are involved in a common process of accomplishing a task, for example, a designer's spring fashion collection. This organization partially or entirely operates without a real building, mostly via the cyberspace of the virtual organization. The architecture of a virtual enterprise is shown in Figure 10-17.

The organization ecosystem of the 21st century will be characterized by a blurring of once distinct boundaries: between public and private, foreign and domestic, insider and outsider, friend and foe. The effect will be invigorating in many ways. Corporations will be freer to pursue an opportunity wherever in the world they find it, and exploit it according to the changing requirements of circumstances. Outsourcing will become ever more ubiquitous, transforming many corporations into super-efficient organizations. The growing flexibility of vital relationships will require constant attention and inventiveness by all engaged.

Figure 10-18. The stages of IT impact on organization performance

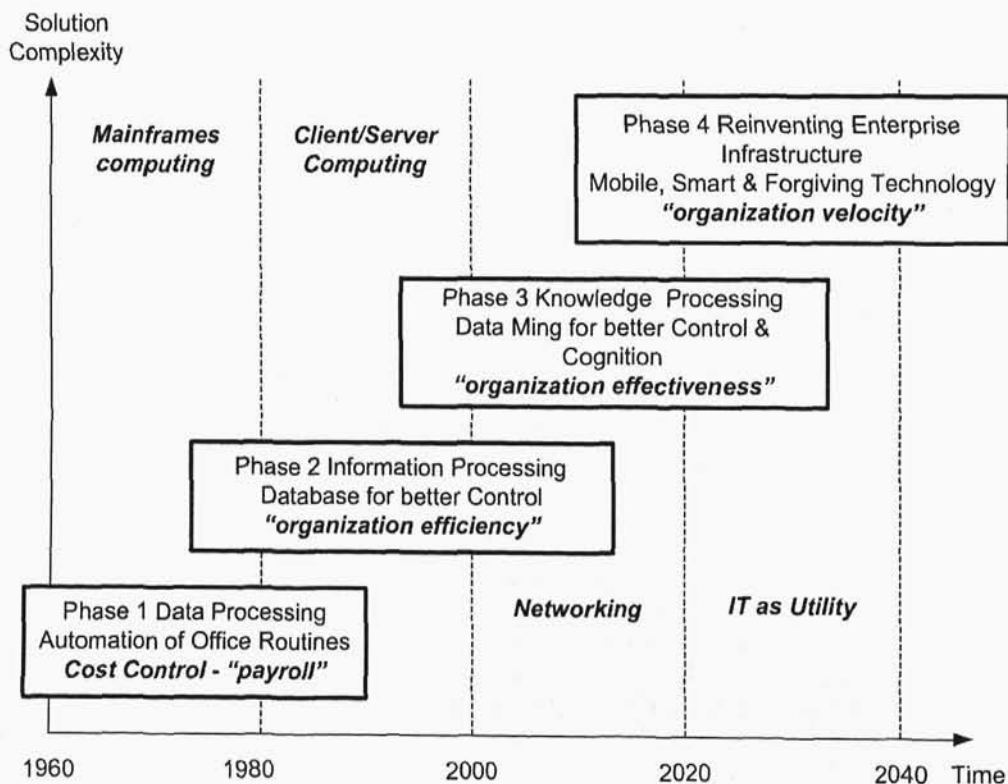


Figure 10-18 illustrates the impact of IT on organization performance in selected technology solutions. This model indicates that modern computing is still very young. At the beginning it is involved in automation of simple office routines; later it shows an ambition to impact an organization's efficiency, effectiveness, and velocity. Will it be enough to slow down civilization's drainage of resources or, instead, will it lead to faster depletion of strategic resources and put the whole civilization in limbo?

THE INFORMED ARCHITECTURE OF MANAGEMENT

Anthony's (1965) model of planning and control consists of three categories: strategic planning, management control, and operational control⁴. This model has dominated the theory and practice of business for the last 40 years. Anthony's model reflects a closed-system concept of isolated enterprises in a formatted (machines and materials) national economy. This economy was based on the division of a specialized and massive labor force similar to the military in World War I and II with a rigid command structure. The 1980s were the last decade when this model could be successfully applied in business without major modification.

The 1990s were the decade of an emerging global and informed (computers & communication) economy in a post-industrial era, where "borderless-stateless" multinational companies and national companies compete with foreign products and services through innovation, price movements, and time controls. The competition, cooperation, and partnership among company peers, research centers, and suppliers through enterprise-wide computer information systems have shifted the management structure. It has been transformed from a tall to a flattened hierarchy of four or fewer layers with network communications subordinated to result-oriented performers

within and among ad hoc project teams. This new structure reminds one of university governance. In essence, this new multi-domestic enterprise has two rules: "Each person is his/her own boss," and "think globally, act locally."

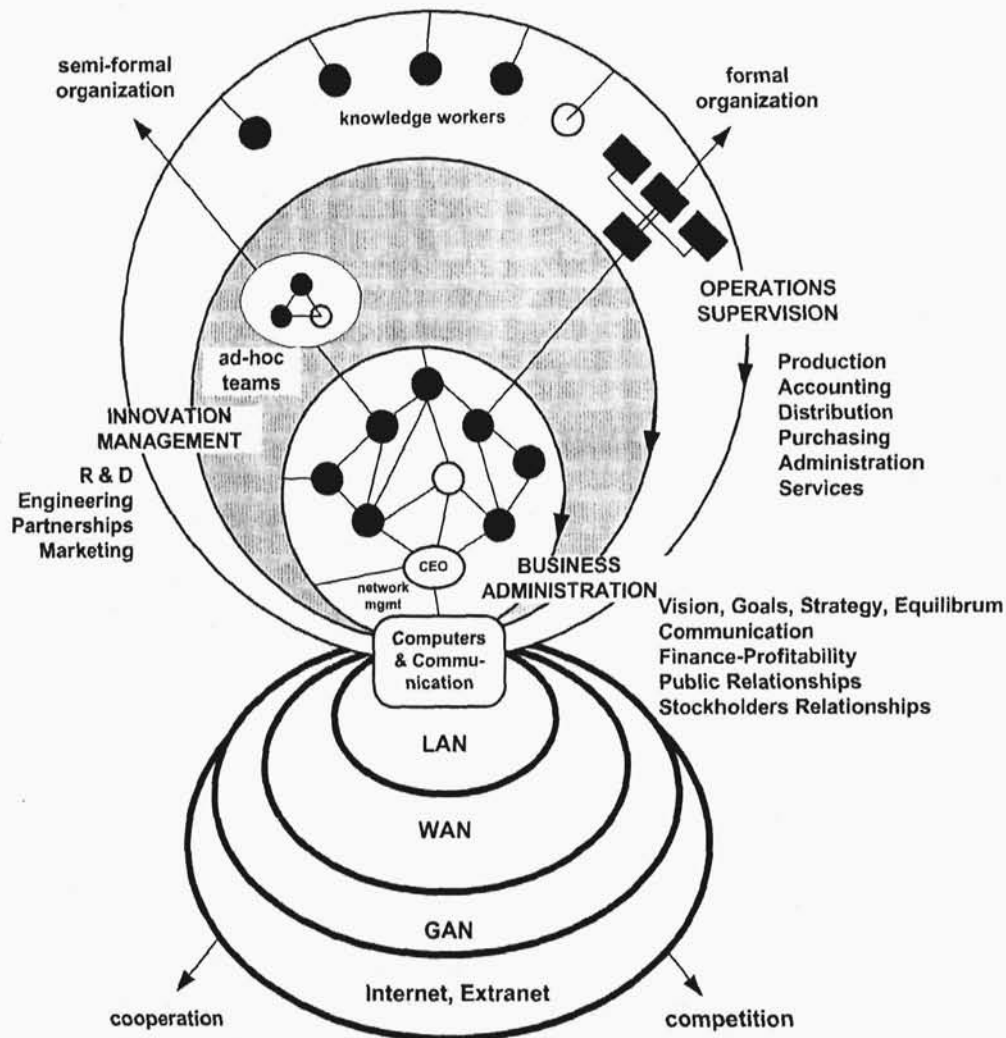
The steep hierarchy in the Information Wave area is no longer an adequate base of power. Today's managers get work done by building a lateral network of information sharing relationships, and by developing commitment rather than compliance to a shared vision. They also find new sources of ideas and opportunities, and broker deals across internal and external corporate boundaries. Effective managers are integrators, conductors, facilitators, and "fertilizers," not watchdogs or supervisors (Nye & Owens, 1996).

A network is a recognized group of managers (seldom fewer than 25 or more than 100) assembled by senior management. Network membership solution criteria are simple, yet subtle: which selected group managers, by virtue of their business skills, personal motivation, drive, and control of resources, are uniquely positioned to shape and deliver a winning strategy? Networks, the new social architecture, are important for the change of organizational behavior; the frequency, intensity, and honesty of the dialogue among managers determines the outcomes of priority tasks. The network operates at its best when it guarantees the visibility and free exchange of information to all participating members (Harris, 1985; Kanter, 1989; Halal, 1996).

In companies such as Conrail, Dun & Bradstreet Europe, MasterCard International, General Electric, Dupont, and Royal Bank of Canada, networking plays to the participants' best interest, by achieving commitment for specific tasks. Over time, the network induces emotional energy, builds commitment, and enjoys the work (Charan, 1994).

Figure 10-19 depicts a synthesis of existing practices and postulates solutions for a new campus structure of management in a network-

Figure 10-19. Campus management apparatus-driven by the information wave



cooperative enterprise. Since knowledge becomes a strategic resource, knowledge-based firms will evolve into university-like organization structures (Davis & Botkin, 1994). As such, they will turn to this structure, which will have dual processes: a formal organization for strict procedures of production, accounting, and so forth, and a semi-formal organization for such innovation-oriented procedures as R&D, engineering, marketing and so forth. A president (CEO) is in such structure a

facilitator, not a "boss," while knowledge workers ("faculty") are result-driven workers who are facing customers (students).

In the campus apparatus of management for business settings, the old steep hierarchical structure is inverted and flattened. The new apparatus is divided along three time dimensions: long-, medium-, and short-range. It is also electronically integrated by an enterprise-wide communications and computer information system. Outside of

the halls of academia, this model has been fully embraced by Intel and Microsoft.

In the campus model, business administration must provide the vision, motivation, corporate culture, agenda, goals and strategy, communication, profitability, discipline and equilibrium. Business administration is a long-term management function, carried out by a CEO and executives (CFOs, COOs, CIOs, etc.) who ensure a spirit of competition and cooperation. They must also provide new opportunities and customers. The skills required are intellectual, with a global strategic conceptualization of business.

One can suggest the new rules of business in the times of the Information Wave:

1. From one stakeholder and system to many
2. Act locally, think and profit globally
3. Customers, not executives, drive a business
4. Knowledge is as important a strategic resource as capital
5. Cooperation precedes and is integrated into the competitive process
6. Lead time, innovation, quality, and utility satisfy a customer
7. Do not separate thinking from doing and ethics

8. The integration of islands of automation into an enterprise information infrastructure is a gateway to the Electronic Global Village.

These rules (and other ones offered by Kelly [1998] and Herzenberg, Alic, & Wial [1998]) may lead to more efficient, effective, and fast-moving organizations, but we cannot forget that if this can be an impressive achievement from the organization theory point of view, it can be also criticized for profound degradation of the ecosystem, which cannot last forever with such an effective "civilization machine."

THE TRANSFORMATION FROM AN INDUSTRIAL TO AN INFORMED ENTERPRISE

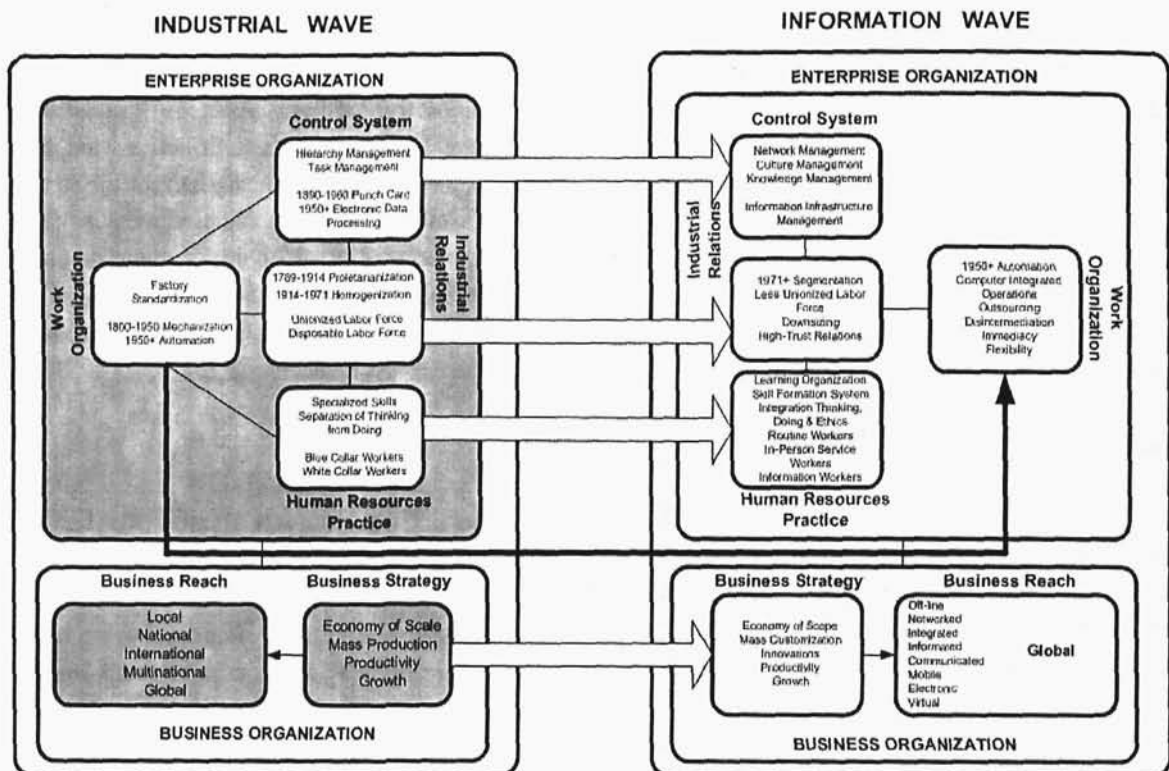
The transformation of an industrial to an informed enterprise is a very complex and lengthy process. It involves shifts at all levels of an enterprise structure, for example:

- from a business strategy of economy of scale to one of economy of scope, and therefore from mass production to mass customization

Table 10-3. The comparison of industrial and informed models of an enterprise

Criterion	Industrial Model	Informed Model	Shift Challenge
Work System	Rigid	Flexible	Computer Skills
Control System	Hierarchical	Networked	Knowledge Mgmt
Industrial Relations	"Disposable" workers	High-Trust Relations	Cooperation
Human Resources Practice	Separation of Thinking from Doing	Integration of Thinking, Doing & Ethics	Learning Organization
Business Strategy	Maximization	Optimization	Knowledge Mgmt
Business Reach	Concentrated	Dispersed	Computer Networks

Figure 10-20. The transformation from an industrial to informed enterprise at the beginning of the 21st century



- from enterprise reach of many levels to the global level, supported by different organization configurations driven by IT
- from a hierarchical to a network control system of enterprise organization
- from homogenized and disposable workers to high-trust industrial relations
- from separated to integrated thinking and doing and ethics in human resources practice
- from rigid to flexible production, therefore from mechanization to informed automation

The comparison of the industrial and informed model of an enterprise is provided in Table 10-3.

As Table 10-3 and Figure 10-20 indicate, challenges triggered by the Information Wave that an organization must meet are profound and not easy to implement, particularly by unreconstructed managers whose ways of thinking were established before the Information Wave.

CONCLUSION

The Information Wave impacts strongly the way humans perceive cognition and its role in an organization's transformation from the industrial to the informed model. Information itself has no single universal definition. It can be perceived in terms of perspectives or images or both, depending on circumstances. Once civilization learned how

to process materials; now it learns how to process information. This leads to the transformation of hard to soft civilization, with more emphasis on informed, knowledgeable and even wiser control of events, with the desire to investigate process more and more. The latter is a good sign of human awareness that the future of civilization depends on human wisdom, which comes along with more knowledge-based and positive experiences of its applications.

On the other hand, the more informed and knowledgeable that decisions are for business, the more problems they may bring for the society, which is growing at a time when employment goes down and strategic resources are more intensively used or even used up. What does it mean for civilization? As we know more, shall we want more and be in more trouble? Can we overcome knowledge that we created?

A. Further Research Directions

- Investigate the relationships among different approaches to the definition of information and their impact on different spheres of human activities. Find out some similarities and differences in information definitions and their impact on understanding how information leads to better performance of organizations and humans.
- Investigate different enterprise configurations driven by information-communication systems and their ability to apply in business and public organizations. Find out some similarities and differences in approaches to the way enterprise configurations are planned and executed. Also examine how information leads to better performances from organizations and people.
- Investigate successful methods and techniques which should be applied in the transformation from industrial to informed organizations.

B. Research Opportunities

- The research opportunity is in investigating the relationships among civilization waves at the levels of economy, organizations, individuals, and society.

C. Additional Ideas

- The Information Wave intellectualizes the human experience, minimizes muscular effort and should lead to a wiser civilization. Investigate the reasons why this premise is not fully successful in human activities.

D. Rationale

- Information is a “substance,” which is handled and processed by people and computers. However, information is just a colloquial term, which has several variations (data, concept, knowledge, wisdom), each of which plays a different role in improving humans’ systemic control and cognition. This concept is information “arithmetic,” which allows for developing information “calculus,” needed for more complex information solutions. So far, the development and implementation of information systems unguided by lack of information “arithmetic” have led to automation islands. However, along with better knowledge about *information* these concepts are gradually transforming into information infrastructures. Many new business models enabled by IT are arising for the internal organization and functioning of business and public organizations and for their external interactions with customers/citizens/users, suppliers, and competitors. Those models have to be generalized in order to secure their standardization and cross-organizations communication. To make human and organization activities more efficient and effective, one must *informate* old (agricultural

and industrial) organizations. Therefore, methods and techniques supporting this transformation should be investigated and in terms of their technological might and also their social and ethical solutions.

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ENDNOTES

¹ This will work only if semantic meaning is rejected not only as a subjective factor but as an objective one as well. That is, the format of a message must consciously and successfully exclude all assumed subtexts. Otherwise, subtexts can be the key to a message. Just ask any teenager how much of their communication is based on shared values that never have to be spoken. To reject semantics is to say that a message cannot be anything more than a list. This may work in business so long as it is rigorously enforced, but such enforcement programs tend to be extremely uncomfortable to the people they are enforced on. Even when it works, it creates a world as rigorously formal as a video game, and the surgery required on data may end up carving away some very inevitable side effects.

² O'Reilly, Chatman, and Andersen (1978) indicate that decision makers are noticeably biased in their procurement of information. Instead of relying in the most accurate sources of information, they rely on more accessible sources (Naylor, 1964). O'Reilly

(1982) found that although decision makers recognized information sources of high quality, they use sources that provide lower-quality information that are more accessible. He explains those results in terms of the cost involved in acquiring information from less accessible sources. The bias toward accessible information is also reflected in managers' strong preferences for oral as opposed to written information (Dewhirst, 1971), as well as information from credible sources (Beach et al., 1978).

³ On this topic, there are some interesting ideas provided by Draft and Lengel (1986) who argue that rich media are needed to process information on complex organizational topics, therefore managers will turn to face-to-face or telephone communications. Ackoff (1967) and Leavitt (1975) argue that computerized information systems for management provide data about stable, recurring, predictable events but do not provide insight into the intangible, social dimensions of an organization. Weick (1979) and Galbraith (1973) argue for the support of management hierarchy, because it reduces uncertainty of information and reduces ambiguity of communication.

⁴ This looks like a direct borrowing of 1930s Soviet military theory, with its division of war into strategic, operational, and tactical levels, as against everyone else's two-level (strategic and tactical) division at that time. The idea has become canonical everywhere since that time. Did R. N. Anthony know about it?