# Everything's Coming Up Virtual

by *Susan E. Yager*

## Introduction


We all function in organizations -- privately held companies, publicly traded firms, public agencies, or academia -- that are changing drastically around us. Growing complexity in the business environment makes "business as usual" ineffective [33]. Globalization extends the need for communication and coordination across different time zones and locations. Time stresses require reduction in reaction time, driving businesses to just-in-time inventory, orders, scheduling, payments, manufacturing, distribution, etc. Change has become the norm, an unpredictable basic reality. Flexibility in **information technology (IT)** enables the fast adaptation necessary to accommodate this constant and rapid change [33].

The new economic frontier is the knowledge economy, and right now about 97% of all employment growth is coming from knowledge work. Wealth today is generated primarily by the value people add through new ideas [40]. What members of these workgroups do is called **collaborative work** and they must often overcome barriers of time zones and geography to document what has been accomplished [45]. To remain competitive in today's business environment requires new levels of cooperation and coordination, both within and between organizations. Communications networks and IT are the tools that make possible this "working together apart," and **telecommuting** (or homeworking) is making workgroups more productive [45]. With technological support, a working group can collaborate as effectively as a single entity, even though they are geographically separated [13].

IT plays a fundamental role in supporting critical activities, enabling organizations to make efficient and effective changes in the manner in which work is performed [47] and offering real potential for changing the way in which people work [21]. For example, the Internet provides a way for small businesses to create a virtual organization to complete projects [12]. Companies are forming international collaborative arrangements as the basis for developing a competitive advantage from technology [5]. Coordination of IT management presents a real challenge to these firms which have to deal with dispersed, decentralized IT practices [24 ]. While decentralization may bring flexibility and fast response to changing needs, it also makes systems integration difficult, presents barriers to standardization, and

acts as a deterrent for achieving economies of scale [24].

In conjunction with rapid changes in the business environment, the way in which business is conducted is also changing at a rapid pace. Groups, not individuals, have become the fundamental unit of work in modern organizations, with non-routine and new work most often being accomplished through teams, committees, or *ad hoc* workgroups [27]. Groups and group behavior are consequential for both organizational performance and individual group members. Computer-based technology may affect these groups and their behavior. At least some electronic groups behave like real social groups, even though they share no physical space, their members are invisible, and their interactions are asynchronous [27]. Computer-based technology can lead to new or different forms of group organization, with consequences beyond mere efficiency changes. IT can allow organizations to create more flexible structures, so that the experience and expertise of employees are available wherever they are needed. We have entered the age of the "virtual" organization, and IT is leading the parade!

## Organizational Change

Organization theory says that for firms to achieve sustainability, they must adapt. These changes can range from very specific responses to switches in general strategy [31]. We have seen major changes in corporate focus previously [35]:

- The late 1950s and the 1960s saw organizations increasingly viewed as "open systems" which drew resources, such as people and raw materials, from their environments and exported goods and services back.
- In the 1970s, senior management's attention was increasingly drawn to interdependencies between the organization and its environment.
- The 1980s saw even more attention paid to issues outside the organization, with a focus on how the organization interacted with its environment and how those external forces affected its behavior. New management theories emerged which considered sources of organizational dependence on the environment, whether those sources were people, resources, markets, or information, and whether and how they could be controlled and influenced.

Modern organizations confront a turbulent environment that requires rapid, flexible response to changing conditions. We must develop mechanisms to support response to those changes. Both intra- and inter-organizational coordination is needed. IT is often regarded as an integral component of these shifts in organization design [24]. **Electronic integration (EI)** has enabled new forms of organizations that transcend traditional and firm boundaries, and IT is seen as a critical force in the transformation of competition, firm structures, and firm boundaries [32]. These new, agile, market-driven companies shuffle resources to meet customer needs [38] by implementing strategic alliances and inter-organizational collaborations and partnerships [42].

Deciding how to reform traditional organizations or guide the development of new entrepreneurial units

is a complex challenge [19]. A new model is evolving which includes a network of corporate units, independent organizations, and entrepreneurs. The resulting new organization forms are lean, flexible, adaptive, and responsive to customer needs and market requirements. The key features are an understanding of customer needs and a product that offers value to those customers [19]. A new term emerged in the 1980s, the "dynamic network" [6], which consists of a controlled interlinkage of only those parties required for the production of a particular product at a particular point in time. This highly flexible arrangement can adapt rapidly to changing markets, technologies, and demand levels by coupling agents into or out of its web.

## Movement to Virtual

Corporations are evolving into virtual enterprises using integrated computer and communications technologies to link hundreds, thousands, even tens of thousands of people together. These collaborative networks are not defined by concrete walls or physical space, but make it possible to draw upon vital resources as needed, regardless of where they are physically located and regardless of who owns them [10]. This does not mean that these organizations have no physical space that they occupy, merely that the physical location need not be a fixed site [25]. Solid, traditionally defined, and sharply delineated companies are evolving into virtual organizations with structures and systems that are loose and fuzzy, so they can assume whatever form is needed to respond to a rapidly changing marketplace [26]. Often, **Information Systems (IS)** departments are required to become "virtual IS departments," as IS is being asked to implement the same application for multiple operating companies that have different architectures [39].

Advocates for Remote Employment and the Virtual Office (AREVO) [1] defines the **virtual office** as *the operational domain of any business or organization whose work force includes a significant proportion of remote workers*. Remote employment is any working arrangement in which a worker performs some significant portion of their work at a fixed location other than an employer's central office or plant -- typically at the worker's home. The virtual office is more than a fantasy for the future or a few scattered trials involving a handful of workers, and certainly more than a fancy term for taking work home at day's end [15]. Instead, the virtual office is a reality now at hundreds of companies, made possible by new IT and innovative ideas about the office and the way people work.

The virtual organization had its beginnings 15-20 years ago as people began to see the possibility of using technology for work at home [37]. What began as a vision of futurists has become a possibility for business theorists and an economic necessity for corporate executives [15]. All of this occurred in little more than a decade, underscoring an inevitability of this new business model as well as hinting at the sped-up sense of time that characterizes it. The virtual organization carries the concept of flexible specialization a step further than the dynamic network organization, because it is not limited by physical locations or by complex contractual arrangements [6].

Virtual enterprises are emerging largely because a new kind of product is being demanded: the virtual

product [10]. Overnight package delivery, one-hour prescription eyeglasses, high-quality photograph developing in less than an hour, instant movies from tiny camcorders, and custom-made tacos in 20 seconds are just a few examples of the array of virtual products leading the way [10]. Virtual organizations are the result of a competitive push to deliver these virtual products [22]. For an entity or object to be virtual used to mean that it possessed powers or capabilities of another entity or object. Now the term means that previously well-defined structures begin to lose their edges, seemingly permanent things start to change continuously, and products and services adapt to match our desires. Virtual products, whether goods or services, mostly exist even before they are produced. They can be made available at any time, in any place, and in any variety; but they can only be offered because of the latest innovations in information processing, organizational dynamics, and manufacturing systems. Virtual products deliver instant customer gratification in a cost-effective way, can be produced in diverse locations and offered in a great number of models or formats, and ideally are produced instantaneously, customized to the customer's request. A new kind of company is necessary to produce and distribute this new kind of product, one that can control ever more sophisticated types of information and master new organizational and production skills -- the "virtual organization" [22].

Virtual organizations are likely to be reliant on cyberspace (the medium in which electronic communications flow and software operates); be enabled by new computing and communications developments; and initially exist only across conventional organizational structures [6]. Four different versions of the virtual organization have been identified [6]:

1. **Telecommuting**. With telecommuting, or homeworking, employees use a remote terminal to access their office system.
2. **Hot-desk environment**. In a hot desk environment, individual desks are abandonded. Employees arriving at work are allocated a desk for the day from which they can access their electronic mail and computer network files.
3. **Hotelling**. Hotelling acknowledges the fact that many workers have no need of a permanent desk at their parent company. Instead, they spend much of their working lives with clients, using client facilities much like a hotel.
4. **Virtual teams**. By working in virtual teams, people collaborate closely but may be physically located in a variety of locations.

Along with these changes to organizational structure, IS must also make adjustments to bring crucial information instantly to the right decision maker and then transmit the decision back through the network just as quickly [22].

# Current Research

Cooperation is believed to be a predominant behavior of organizations in complex societies [29]. Cooperation and coordination have been used interchangeably in the inter-organizational research literature [3]. **Coordination** is the means by which organizations undertake difficult goals and manage

uncertainty [46], thereby increasing their ability to deal with environmental turbulence and solve problems that no single organization acting alone could solve [41]. In inter-organizational systems, coordination controls and integrates work activity across organizational boundaries [3].

Focus on groups has resulted in an increased interest in how electronic group communication could change existing patterns of coordination and performance in small, face-to-face work groups [34]. These research interests and observations may be the groundwork for understanding the effects of technology interaction and coordination in the virtual corporation of today.

IT has become a frequently studied organization design variable in the organizational research literature [37]. Basic assumptions of modern organization theory and practice are being invalidated as organizations are being redesigned through IT [33]. IT is being used to achieve organizational advantage by simplifying and streamlining communication and coordination, supporting new modes of teamwork and collaboration, eliminating unnecessary work, and reducing dependence on old organizational structures that place work in fixed locations [33].

The complexity of political, regulatory, and technological changes confronting most enterprises in the 1990s has made organizational change and adaptation a central research issue [30]. Computer-based technology is in widespread use, forming common telecommunications infrastructure, networks, and data exchange across divisions or business units [2, 43]. However, the use of computer-based systems for organizational coordination management has not been systematically studied. While virtual organizations may sound like the latest in a long litany of concepts peddled by consultants, they are real. Too many companies are already operating without significant investment in infrastructure, while producing successful products and profits, to pass off the virtual corporation as a simple fad [8].

Many of the organizational possibilities enabled by IT have either been overlooked or not well understood in the academic literature [37]. Both technological and structure factors are purported to affect levels of cooperation and conflict in systems [3]. There is a need to know more about how to evaluate systems and what constitutes success as well as to understand the design and use of systems in broader contexts [13]. IT is seen as an enabler of coordination when used with cross-functional teams [24], but the need for further development is great. For instance, we still have much to learn about how organizations choose among possible coordination mechanisms, the circumstances where these mechanisms are seen as being effective, and steps that have been taken to maximize benefits and minimize coordination costs [24].

## Managerial Perspective

While virtual organizations can unleash the power of information, they present new challenges to management in areas of role definition, clarification of boundaries, accountability and measurement of results, and impact on teams [44]. The virtual corporation is a temporary network of independent

companies (i.e., suppliers, customers, even competitors) linked by IT to share skills, costs, and access to each other's markets [14]. This evolving corporate model is fluid and flexible -- a group of collaborators quickly unites to exploit a specific opportunity and, once the opportunity is met, often disbands. IT's role is to help far-flung companies and entrepreneurs link up and work together from start to finish, allowing partnerships based on electronic contracts and an unprecedented level of trust based on a sense of "co-destiny," where the fate of each partner is dependent on the other [14].

The virtual organization will be more common in the future. A variety of forces, from child care to air pollution, demands fewer centralized workplaces, reducing or eliminating the necessary commute for such a physical workplace [37]. Coordinating mechanisms are needed to assure that IT management is synchronized, so that diverse business practices operate as an integrated whole and organizational goals are realized. Creating the "virtual products" of today and tomorrow is usually the result of interaction between multiple, and often unrelated, advances in IT [22]. Managers must select and build suitable mechanisms to coordinate and integrate activities of the firm with those of its customers, suppliers, and others in the environment [32]. In the world of virtual organizations, this task becomes even more complicated. However, companies are finding "bottom-line" results from the move toward a virtual work world. For example,

- AT&T reduced commuting and increased its use of home offices, which allowed its sales force to spend 15% - 20% more time with customers;
- Compaq Computer Corporation moved its sales force into home offices and recorded a drop in sales and administrative expenses (from 23% to 12% of revenue), partly due to this change; and
- scientific equipment manufacturer Perkin-Elmer based 300 sales and customer service representatives in their homes, which allowed the firm to close 35 branch offices [36].

It has been estimated that one in three U.S. workers uses a computer in some way, and that 30% - 50% of capital investment in the U.S. is for IT [36]. Computer-based systems have the potential to reduce coordination costs [17, 20], enable more rapid and responsive communication across time and space [28], and bring structure to otherwise unstructured dialog between coordinating parties [23]. Understanding the effects of Electronic Integration -based strategies is increasingly important [32]. What can and should IT do to support and exploit new organizational forms? What needs and opportunities exist for new kinds of computer-based systems devised specifically to facilitate management and coordination in organizations [16]? Reports, papers, and books about virtual companies, factories, offices, and corporations exhibit little agreement on term definitions, but all are concerned with how developments in technology will allow remote individuals to work together [6].

The sharp upswing in telecommuting presents new challenges to already overburdened IS departments, which must struggle with new technologies in a rapidly changing workplace [11]. Virtual organizations face the challenge of balancing advantages of centralized and decentralized management [24]. A critical issue facing managers of IT today involves how to respond to the emergence and growth of these new organizations [16]. We must link together IT activities of independent or loosely coupled units, each of

which may have its own IT function [24].

## Conclusion

The integration of IT with organizational strategy and structure is of paramount concern to managers [2]. Companies are rapidly moving toward a distributed work force that uses technology to link workers and functions at scattered sites. This change is rapidly altering the nature of work. The growth of the virtual organization is fueled by three factors:

1. Rapid evolution of electronic technologies, which facilitate digital, wireless transfer of video, audio, and text information;
2. Rapid spread of computer networks; and
3. Growth of telecommuting, which will enable companies to provide faster response to customers, reduce facility expenses, and assist workers to meet their child- and elder-care responsibilities [7].

IT was once a tool for organization expansion and became a tool for downsizing and restructuring [4]. Computer systems have assumed many of the communication, coordination, and control functions that middle managers previously performed. Previously, managers had to choose either a centralized or decentralized structure. Today there is another option -- technology-driven control systems that can support the flexibility and responsiveness of a decentralized organization, as well as the integration and control of a centralized organization. Managers no longer just react to technology -- they use it to shape the organization. Companies can have the benefits of both small scale and large scale operations simultaneously, and even large organizations will be able to adopt more flexible and dynamic structures.

## References


**1**

A.R.E.V.O. 1996. Advocates for Remote Employment and the Virtual Office. World Wide Web URL: http://www.globaldialog.com/~morse/arevo/

**2**

Allen, B. R., and Boynton, A. C. 1991. Information Architecture: In Search of Efficient Flexibility. *MIS Quarterly*, 15 (4), pp. 435-445.

**3**

Alter, C. 1990. An Exploratory Study of Conflict and Coordination in Interorganizational Service Delivery Systems. *Academy of Management Journal*, 34 (3), pp. 478-502

**4**

Applegate, L. M., Cash, J. I., Jr., and Mills, D. Q. 1988. Information Technology and Tomorrow's Manager. *Harvard Business Review*, 66 (6), pp. 128-136.

**5**

Bailetti, A. J., and Callahan, J. R. 1993. The Coordination Structure of International

Collaborative Technology Arrangements. *R & D Management*, 23 (2), pp. 129-146.

6

Barnatt, C. 1995. Office Space, Cyberspace and Virtual Organization. *Journal of General Management*, 20 (4), pp. 78-91.

7

Barner, R. 1996. The New Millennium Workplace: Seven Changes That Will Challenge Managers--and Workers. *Futurist*, 30 (2), pp. 14-18.

8

Beckham, J. D. 1995. The Death of Management. *Healthcare Forum*, 38 (4), pp. 14-23.

9

Biemans, W. G. 1996. Organizational Networks: Toward a Cross-Fertilization Between Practice and Theory. *Journal of Business Research*, 35(1), pp. 29-39.

10

Bleecker, S. E. 1994. The Virtual Organization. *Futurist*, 28 (2), pp. 9-14.

11

Blodgett, M. 1996. Who Can Telecommute? *Computerworld*, 30 (39), p. 66.

12

Blotzer, M. J. 1995. Three Steps to the Internet. *Occupational Hazards*, 57 (3), pp. 53-54.

13

Bly, S. A., Harrison, S. R., and Irwin, S. 1993. Media Spaces: Bringing People Together in a Video, Audio, and Computing Environment. *Communications of the ACM*, 36 (1), pp. 28-47.

14

Byrne, J. A., and Brandt, R. 1993. The Virtual Corporation -- The Company of the Future will be the Ultimate in Adaptability. *Business Week*, February, pp. 36-41.

15

Caldwell, B., and Gambon, J. The Virtual Office Gets Real. World Wide Web URL: http://techweb.cmp.com/iw/563/63mtoff.htm

16

Ching, C., Holsapple, C. W., and Whinston, A. B. 1996. Toward IT Support for Coordination in Network Organizations. *Information Management*, 30 (4), pp. 179-199.

17

Clemons, E. K., and Row, M. C. 1991. Sustaining IT Advantage: The Role of Structural Differences. *MIS Quarterly*, 15 (3), pp. 285-292.

18

Coulson-Thomas, C. J. 1994. Quality Training and Corporate Transformation. *Journal of European Industrial Training*, 18 (7), pp. 7-13.

19

Cravens, D. W., Shipp, S. H., and Cravens, K. S. 1994. Reforming the Traditional Organization: The Mandate for Developing Networks. *Business Horizons*, 37 (4), pp. 19-28.

20

Daft, R. L. 1992. *Organization Theory and Design*. St. Paul, MN: West Publishing.

21

Daniels, S. 1995. The Disorganized Organization. *Work Study*, 44 (2), pp. 20-21.

22

Davidow, W. H., and Malone, M. S. 1992. *The Virtual Corporation: Structuring and Revitalizing the Corporation for the 21st Century*. New York: Harper Business.

23

DeSanctis, G., and Gallupe, R. B. 1987. A Foundation for the Study of Group Decision Support Systems. *Management Science*, 34 (3), pp. 589-609.

24

DeSanctis, G., and Jackson, B. M. 1994. Coordination of Information Technology Management: Team-Based Structures and Computer-Based Communication Systems. *Journal of Management Information Systems*, 10 (4), pp. 85-110.

25

Dixon, T. L. 1995. Virtual Organizations: Success Stories. World Wide Web URL: http://mansci1.uwaterloo.ca/~msci604/summaries/virt_org.html

26

Durutta, N. 1995. Communicating for Real Results in the Virtual Organization. *Communication World*, 12 (9), pp. 15-19.

27

Finholt, T., and Sproull, L. S. 1990. Electronic Groups at Work. *Organization Science*, 1 (1), pp. 41-64.

28

Fulk, J., and Boyd, B. 1991. Emerging Theories of Communication in Organizations. *Journal of Management*, 17 (2), pp. 407-446.

29

Gray, B. 1985. Conditions Facilitating Interorganizational Collaboration. *Human Relations*, 38 (10), pp. 911-936.

30

Greenwood, R., and Hinings, C. R. 1996. Understanding Radical Organizational Change: Bringing Together the Old and the New Institutionalism. *Academy of Management Review*, 21 (4), pp. 1023-1054.

31

Jennings, P. D., and Zandbergen, P. A. 1995. Ecologically Sustainable Organizations: An Institutional Approach. *Academy of Management Review*, 20 (4), pp. 1015-1052.

32

Kambil, A., and Short, J.E. 1994. Electronic Integration and Business Network Redesign: A Roles-Linkage Perspective. *Journal of Management Information Systems*, 10 (4), pp. 59-83.

33

Keen, P. 1991. *Shaping the Future: Business Design Through Information Technology*. Boston: Harvard Business School Press.

34

Kraemer, K. L., and King, J. L. 1988. Computer-Based Systems for Cooperative Work and Group Decision Making. *ACM Computing Surveys*, 20, pp. 115-146.

35

Leavitt, H. J., and Bahrami, H. 1996. *Managerial Psychology: Managing Behavior in Organizations*, fifth edition. Chicago: University of Chicago Press.

**36**

Lucas, H. C., Jr. 1996. *The T-Form Organization: Using Technology to Design Organizations for the 21st Century*. San Francisco: Jossey-Bass Publishers.

**37**

Lucas, H. C., Jr., and Baroudi, J. 1994. The Role of Information Technology in Organization Design. *Journal of Management Information Systems*, 10 (4), pp. 9-23.

**38**

Miles, R. E., and Snow, C. C. 1992. Causes of Failure in Network Organizations. *California Management Review*, 234 (4), pp. 53-72.

**39**

Moad, J. 1994. Welcome to the Virtual IS Organization. *Datamation*, 40 (3), pp. 32-35.

**40**

Moyer, J., and Fierheller, G. 1994. Managing in an Information Highway Age. *Business Quarterly*, 58 (3), p. 73.

**41**

Mulford, C. L., and Rogers, D. L. 1982. Definitions and Models. Edited by D. L. Rogers and D. A. Whetten. *Interorganizational Coordination: Theory, Research and Implementation*. Ames, IA: Iowa State University Press.

**42**

Piercy, N. F., and Cravens, D. W. 1995. The Network Paradigm and the Marketing Organization: Developing a New Management Agenda. *European Journal of Marketing*, 29 (3), pp. 7-34.

**43**

Richardson, G. L., Jackson, B. M., and Dickson, G. W. 1990. A Principles-Based Enterprise Architecture: Lessons From Texaco and Star Enterprise. *MIS Quarterly*, 14 (4), pp. 385-403.

**44**

Richman, H. 1995. In discussion with authors D. Birchall and L. Lyons. *Creating Tomorrow's Organization: Unlocking the Benefits of Future Work.* London: Pitman Publishing.

**45**

Stuck, B. W. 1995. Collaboration: Working Together Apart. *Business Communications Review* (Networking Supplement), February, pp. 9-11+.

**46**

Thompson J. D. 1967. *Organizations in Action*. Chicago, IL: McGraw-Hill Book Co.

**47**

Turban, E., McLean, E., and Wetherbe, J. 1996. *Information Technology For Management*. New York: John Wiley & Sons, Inc.

Susan E. Yager (yager@cobaf.unt.edu) is A.B.D., currently developing her dissertation proposal at the University of North Texas, Business Computer Information Systems Department of the College of Business Administration.