PREPARING BUSINESS
FOR THE
TELECOMMUNICATIONS ERA

Peter G. W. Keen

December 1981

CISR No. 83
Sloan WP No. 1280-82

Center for Information Systems Research
Massachusetts Institute of Technology
Sloan School of Management
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Introduction

Before any of us sit at a keyboard to write about the communications revolution, we should look down at QWERTY. Our office-of-the-future component uses an arrangement designed in the 19th century to solve a major problem in bringing a new technology to the market — preventing the keys from jamming. The solution was to position the letters to slow the typist down. QWERTY survives, embedded in a technology whose aim is to speed everything up. We can talk all we want about productivity, teleconferencing, integration, etc, etc, but cultural forces and social interests strongly influence the pace at which a new technology is assimilated by individuals and organizations.

At the same time, anyone sitting down at a typewriter to write about the naive optimism of technological visionaries should think back over the forecasts in the 1940's and 50's that fewer than twenty computers would satisfy the world's needs and that there was no large market for photocopiers.

The word revolution is almost the same as evolution, and vice versa. It is clear that communications technology will change the way business is done, create new markets and alter the nature of work and organizational life. In some industries, especially banking, insurance and related financial and information services, this process is well advanced. There now is an Electronic Marketplace in which IBM, AT&T, American Express, Citibank, Xerox, RCA, Merrill Lynch, Chase, Exxon, Sears, Warner, Dun & Bradstreet and the like commit more and more of their attention and imagination to creating communications infrastructures — the information highways — and services and products that can be placed on them — the traffic. The pace of the revolution or evolution depends on both traffic
and highways, not on one or the other.

The responsibility of the Information Systems profession (IS) within business organizations is to create and manage the infrastructure. It has to help build a field of Telecommunications and Business Strategy (TBS). The "and" is key. Telecommunications is certainly a technical revolution. Business strategies evolve constantly. Telecommunications and Business Strategy will accelerate the impact of the infrastructure on the traffic and the traffic on the infrastructure.

Preparing business to adapt to and exploit communications involves six main areas of activity where IS must, for at least awhile, take the lead:

1. **Explain what the end point is:**
   We often do a poor job of articulating to managers the nature and value of the Ideal capability (figure 1). Which we are moving towards, even though it underlies almost every feature of the IS plan.

2. **Take a fresh look at the "user" and bridge the culture gap:**
   The terminal pushes computers into new cultures that are largely unprepared. (Figure 2) Users do not see the communications infrastructure; they see the terminal. For them this is the Terminal revolution (the pun is deliberate).

3. **Create new roles for the new IS business:**
   DP was largely a manufacturing department. The move to end-user development and distributed processing has added a marketing focus, in which analysts became analogous to industrial salesmen. For Telecommunications and Business Strategy, planning and liaison roles are of central importance.

4. **Educate the organization, including ourselves:**
   DP has been primarily tactical in its focus and management methods. We had to learn painfully how to make the single development project work. Communications technology strains the management process: it is an infrastructure that involves long-term base building, is organizational in focus, not departmental, and requires complex strategic planning. Management needs to learn more about technology and the technology delivery process. (Figure 3) IS needs to learn more about business and the management process, at the strategic level.

5. **Stimulate creative thinking about the traffic:**
   For Business Strategy, the issue is not what is the network but where can you put a terminal and what services and products does
it access? The revolution will come from bright ideas. Their most likely source is the people closest to the marketplace, who are often furthest from the technology -- and from IS.

6. **Update our design skills:**

   The terminal is the communications system: it is analogous to a phone receiver. The quality of the user-system dialog, the display and the physical device determine the quality of the overall product just as much as (but no less than) the lines and nodes the user does not see. We currently have many improvements to make. It is not enough to develop "user-friendly" systems: that tends to be a synonym for "cutesy". DP personnel have tended to view the user as an abstraction. We now have to design flexible, responsive systems for a vast range of jobs, people, levels of knowledge and personal styles.

All these six needs can be met. They require leadership and a heavy emphasis on education and communication. (How long can we continue to have office information personnel knowing little about offices, management information systems staff ignorant about the way managers do their jobs and spend their time, or communications specialists not communicating?)

   The main barriers may not be the user. We need to recognize that DP is as tradition-bound as any other profession. In the communications field, we are car mechanics in 1910; to own and operate a car requires our essential expertise. Can we move from an era of mechanics to one of driving? If you feel the transition is an easy one, review the heated correspondence in Computerworld over the past few years about structured programming or the resistance of many DP-ers to APL and micros. The higher the competence, espirit de corps and sense of identity a group has, the more likely it is to resist change. Communications technology may in some ways be harder for DP to assimilate than for users. If the terminal does something useful, simply and clearly, users will adjust. In the end, telecommunications is just another device.

**Explaining the End Point**

The ideal capability of Figure 1 represents a tremendous
organizational resource. The hardware base is its bedrock, but it is the communications system that adds value. Data that are available but not accessible are not an asset. Communications create the asset. A company's internal transaction processing systems become a marketable service if customers can dial directly into them. Coordination, control, reporting and inquiry are transformed once the binding constraints of physical location and time are loosened.

The access vehicle will inevitably be a workstation. Vendors talk about the convergence of data processing and word processing. Once we get adequate standardization within the organization, everything in the Ideal Capability converges. The workstation is used to get information, make transactions, talk to others, handle all aspects of records, provide customer service, and coordinate and control business activities.

Obviously, it will be a long time before we get to the Ideal, but every development in technology is contributing to it. The senior IS managers' concern for integration and compatibility reflects an understanding that short-term local opportunities should not threaten the long-term creation of the integrated resource (at its worst, this reveals itself as Applephobia).

Unfortunately, while we are making solid progress towards this Ideal, we rarely have bothered to tell top management. A lot of our technical explanations and political squabbles make more sense if we focus on the resource we are building and then discuss operating systems, standards, vendor strategies, office technology, etc. If we do so, we shift our own and management's attention away from hardware, which is increasingly the tactical component to the strategic one of communications. Perhaps the most useful step IS can make in preparing business for the communications
era is to discuss the computing resource and identify to management the investment opportunities (figure 4) it represents. We, the car mechanics, now have to focus on transportation and switch our vocabulary to the financial planner's: resources, capability, assets, investment, risk, portfolio (versus single projects). The vocabulary we use signals our objectives and determines management's response.

Taking a Fresh Look at the "Uses"

What does a user look like? Is it big or small? Clearly, it is not as smart as we are or we would not be as patronizing as many of our discussions indicate. The user is a colleague, customer, manager, supplier, secretary, liberal arts major, supervisor, engineer ... . The word user is about as precise a description as "employee" or "manager".

If DP people up to now could view the user as a homogenous abstraction because it (we had no reason to distinguish he's and she's) played a passive role, mainly filling in forms or keypunching input data. It could be trained or ordered to adjust to conventions like 1/2 for male/female, complex error messages, clumsy formats, and inflexible procedures. Figure 2 shows this class of user in an inner circle, centered around the computer, physically and psychologically close to the programming staff.

Communications throws the terminal into new cultures. The users in the second circle are heterogeneous. Fairly soon, with no advances needed in technology, we can expect most of the organizations work to be computer-mediated (Zuboff)

It is very easy for DP-ers to assume that "resistance to technological change" reflects incompetence, irrationality or laziness. There seems in fact to be more resistance to computer people than to computers. The accelerating adoption of desktops, financial modeling languages, and end-
user inquiry and reporting systems shows that people will make direct use of a terminal, if the dialogue is natural and there is something worth getting at the other end. Not unreasonably, they are wary about the intrusion into their world of overassertive technicians who have not taken the trouble to learn their business, vocabulary, and priorities, whose track record in the mid-1970's was very poor, and who often seem more concerned with preserving a data-processing monopoly than meeting their needs. Resistance may be very rational. We need to ask:

- Who is the user?
- How does this real person think and operate?
- How much do we need to know about the user's organization and business functions?
- How much do users know about us and vice versa?
- How do we build credibility and understanding?

Our concept and understanding of the user will obviously determine our strategy for applying communications. Currently it is too narrow.
New Roles for the New IS Business

The DP management structure was not designed for a world of communications technology. It reflects a manufacturing focus, a deliberate isolation of computing from the mainstream business, and a reactive role for top management. In many instances DP set the application priorities.

Obviously, this is changing. In the organizations making most effective use of the new technologies:

- the DP - or IS - function reports at a very senior level
- steering committees provide the organizational mechanism and authority to set priorities
- the systems analyst's job increasingly emphasizes communication, consulting skills and service
- more and more resources are committed to end-user tools.

Any comprehensive communications-based strategy relies on accelerating this shift from DP as a manufacturing department, in which jobs are based on building systems or on operations, to an Information Company. The head of IS has to have the authority, visibility and breadth of focus to coordinate an organizational resource relevant to all business functions and units. User liaison roles become key:

- business-oriented analysts
- office technology specialists
- functional support staff for end-users (e.g. support for a financial modeling capability)
- technical support staff (e.g. for a hot line to a DBMS specialist)
- planners: network standards and capacity, analysis of user needs and technical options, etc.
- educators and trainers

There is ample reason to expect the current shortage of skilled analysts, technical specialists and, above all, technology managers, to grow even worse in the next few years. Backlogs of development projects, already large, will grow as supply creates demand - one effective new on-line system stimulates new ideas and requests for two to six others. In most companies, one need only lure away five key people, especially in the
communications planning area, to bring strategic development plans to a lurching halt.

It would be an illuminating exercise actually to create, on paper, the Information Company, by pooling all computer-related costs and assets, including modems, communication lines and terminals. The company's investment in software - if known! - should be capitalized and depreciated as the long-term asset it is. (Botched development efforts should be written off).

The resulting balance sheet may well be among the largest business segments in the organization. Its management structure should reflect this. One may ask how many senior managers it has, how much it spends on R&D, marketing and human resource planning, what the career path is to senior management, etc. It obviously should have adequate strategic planning mechanisms, and sophisticated costing and pricing analyses.

In practice, the Information Company is usually run by a few overworked, outstanding "hybrids" - people who are fluent about technology and literate about business and applications or vice versa. There is a virtual absence of middle management talent and no succession planning. Analysts are having to learn the new demands of a user-driven environment: communication, awareness of business priorities, service, and consultancy skills.

Worse than all this, there is a vast shortage of telecommunications staff to handle technology assessment, network planning, long-term capacity analysis, purchasing, costing of components and services, installation, and the traffic to the highways, and vice versa.

It will be a waste of time for organizations to get ready for exploiting the opportunities communications technology opens up, if it
fails to create the roles and develop the people critical for this new context.

Educating the Organization

Creating these roles and broadening the management focus is obviously not something IS can do unilaterally. Communications technology implies a change in authority for planning and setting development priorities, reorganization and major changes in staffing, hiring and promotion. Top management, at the corporate level and in user departments, needs to be brought in to the process.

This means strategic education. In too many companies, DP is gearing up to meet the challenges of the new computing environment but lacks the needed authority and mandates. Management has generally gotten along adequately with limited knowledge of computers. Relatively suddenly, they need to be proactive, not reactive, and to make strategic policy decisions, especially in two areas:

- regulating the free market: deciding which aspects of the Ideal Capability require central direction and hence stay within the DP monopoly and which are local option and can be purchased in the free market. It is hard to see how the crucial communication strategy can be made a local choice. (Nor the overall data management strategy.)

- setting the criteria for selective application and establishing priorities; given even existing backlogs there is simply no way increased demand for applications can be met. We can expect that the better the communications infrastructure, the greater the demand. What are the criteria for allocating scarce development resources?

Unfortunately, management is generally puzzled by computers. The education available to them focuses either on concepts or details and rarely relates them. The concepts underlying information technology are on the whole simple and correspond to management common sense. The details are appallingly complex, especially in the area of communications. It is
undesirable either to overwhelm managers with inert details (try explaining X.25 versus SNA) or to ignore them and rely on simple, general concepts (such as: "a distributing processing system should correspond to the organization's style and structure: it makes no sense to run a fully decentralized system in an organization with a strong central planning and central focus").

Figure 5 outlines the focus and contents of a course for top management run for Citibank's international corporate banking organization over the past two years. There are obviously many possible approaches; the key features of this one are the focus on investment choices, authority and responsibility in the technology delivery process, and key issues in planning and implementation.

Educating top managers is an essential step toward creating the Information Company and meshing the business and technology plan. It needs to be supported by a sustained commitment to education at all levels of the organization. For example (Figure 6), implementation skills are key for systems personnel; they can no longer just handle technical issues and leave the rest to the user. They have to learn how to design for implementation. Office technology, for instance, involves little systems development but major organizational changes.

At the same time, users can no longer delegate decisions that effect every aspect of their business to technicians. They have to get "involved", but lack the vocabulary and methods to do so. How do they help develop functional specifications or a testing plan? They need to learn what happens in systems development and what their role is.

Telecommunications and data management constitute a new computing environment. There is as urgent a need to get DP people oriented towards
it as to bring users up to date. In many companies, attention and money is increasingly given to user education, but the busy DP staff get little of either. They are provided with seminars to update the technical skills they need for their current job but not to prepare them for a world of communications and end-user tools in which consulting skills and knowledge of business functions are essential.

Strategic computer re-education is expensive - and vital. If we think of communications technology - and the terminal that is its concrete embodiment - as a culture shock, then education needs to lead rather than follow change.

Erich Willner of Citibank speaks of education as "technology mobilization." The type of education plan implied by Figure 6 provides this mobilization. It adds yet another level of complexity and scope to IS's responsibilities. On the whole, DP has not played an active role in strategic education. In fact, training efforts by DP have often made the culture gap even wider. They explain the software, not its uses, focus on file updating and inputs not outputs, and are couched in the technician's not the user's terms. Such training programs reinforce users' expectations that computers are boring, complicated and not very useful and, worse, that computer people do not care about helping them. There is a difference between education and training.

**Stimulate Creative Thinking**

The distinction between highways and traffic is an important one. With traditional batch-oriented technology, there was relatively little scope for innovative thinking about applications. The infrastructure was the traffic. Communications (and, to a lesser extent, microcomputers) rely on creativity. For example, real estate companies in, say, Boston, can now
show customers houses in California; mortgage applications can be sent by fax to a bank specializing in home loans; an oil company allows distributors to access a database on inventory levels in order to smooth out orders; an insurance salesman carries a briefcase with a modem which allows him or her to create custom-tailored plans in the customer's home.

These innovations provide a competitive edge. They are simple, clever ideas that come from an expert in traffic linking up with an expert on highways. We simply have no idea of the limits of even existing communications technology on such innovations, which tend to be fairly inexpensive since the bulk of the investment has already been made, in the network.

The British Post Office's videotext experiment, Prestel, provides a useful lesson about creative thinking. Prestel was a major technical innovation, watched carefully in the U.S. It has not become an application innovation. That it would not do so has seemed obvious for several years. Most of the data accessible via Prestel was simply either not worth paying a premium for or better obtained manually: restaurant guides, timetables, price lists or, to the U.K. government's dismay, guides to Soho pornography stores.

A terminal is just a terminal. A network is just something which you take for granted unless it is malfunctioning. Perhaps a key rule for communications technology is: if in a demonstration your selling point is the terminal and you need to focus on the network, you are in trouble: the user is excited by functional capability, which for communications means data and/or a business edge. Prestel remains a brilliant infrastructure - with dull traffic.

The people in the organization most likely to come up with creative
applications are the ones closest to the business environment: in marketing, customer service, corporate planning, and...? The isolation of many DP units from the wider organization means they cannot add to the "and". Nor do they have contacts or credibility with marketing. The four steps already outlined help change this: explaining the Ideal Capability, taking a fresh look at the "user", creating new roles, and educating users and technicians. The overall responsibility of IS is to create an infrastructure worth using. Once that is done, creating uses is key. An infrastructure is just an infrastructure.

Improve Design Skills

In a world of communications, the user is a consumer. We all know a lot about consumers - they are ourselves. We buy calculators and cars on the basis of more than just functionality. Ease of use, aesthetic design, service, and packaging differentiate the product.

Some DP units are so used to having a monopoly on computer-use that they may not realize that we have moved from supply to demand economics. If a manager in our organization or a customer dislikes our decision support system or teleconferencing capability, he or she will not use it. Their adoption depends more and more on the quality of the user-system dialog. The interface is the system.

The quality of many user-system interfaces is quite simply, horrible. DP professionals' skills have mainly been in the area of data structures and procedures. Lacking a clear concept of the user, and of the context of use, they too often impose inflexible, uncommunicative systems. This is simply unacceptable to discretionary consumers.

Visicalc, the end-user capability that took the micro from a neat idea to a ubiquitous challenge to DP to build something as useful and usable,
illustrates the latent demand for well-designed software. Why did DP, with its experience base, expertise and sophisticated tools, never produce a Visicalc? Surely, because it viewed "good" design in technical terms, not from the user's view. Any analysis of what makes end-user software sell - packages, languages, inquiry systems etc. - will highlight the importance of ease of use, ease of learning, robustness and flexibility. Providing these require good technical skills, which are hard to learn, and a solid understanding of users and uses. This is easy to learn, once the technician recognizes its importance. It mainly requires spending time with users, observing and listening.

The interface is the system.

Getting Started on a Communications Plan

The challenge with communications is to evolve a revolution. Building the infrastructure takes time and involves unceasing attention to details. It is very likely that details will become an end in themselves, instead of a means to the end of more effective business operations.

It is hard to break away from a technocentric worldview. The DP field has not commanded respect for its breadth of focus and its concern for relating its technology to organizational life and business activities. The payoff for Telecommunications and Business Strategy is potentially huge. It involves a joint venture between colleagues - "users" and "systems".

The starting point (Figure 7) is the business plan: what are the critical success factors\(^3\) for the organization? What are the opportunities for new products and services? Where can improvements in information access and distribution and in communication improve effectiveness?

If the senior IS planners do not know where to get answers to these
## Figure 6

**STRATEGIC COMPUTER EDUCATION**

<table>
<thead>
<tr>
<th>MODULES</th>
<th>TOP MANAGERS</th>
<th>MIDDLE MANAGERS</th>
<th>TECHNOLOGY MANAGERS</th>
<th>TECHNICAL SPECIALISTS</th>
<th>USER LIAISON</th>
<th>USERS</th>
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</thead>
<tbody>
<tr>
<td>MANAGING TECHNOLOGY</td>
<td>X</td>
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<td>INTRODUCING TECHNOLOGY</td>
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<td>BUILDING SYSTEMS</td>
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<td>X</td>
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<tr>
<td>IMPLEMENTING SYSTEMS</td>
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<tr>
<td>NEW COMPUTING ENVIRONMENT</td>
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<td>X</td>
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<td>X</td>
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<tr>
<td>MANAGEMENT TECHNOLOGY UPDATE</td>
<td>X</td>
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<tr>
<td>X FOR NON X-ers (e.g., Marketing for non-Marketers)</td>
<td>X</td>
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</table>

**MANAGING TECHNOLOGY**: Policy issues, key strategic choices, resource needs, opportunities

**INTRODUCING TECHNOLOGY**: Basics, demonstrations, presentations by senior managers/technology managers

**BUILDING SYSTEMS**: Vocabulary, methods for participation, user/technical staff-management roles and responsibilities

**IMPLEMENTING SYSTEMS**: Managing organizational change, technology mobilization, forum for open expression

**NEW COMPUTING ENVIRONMENT**: Consciousness-raising, refocussing development staff, maintaining broad exposure

**MANAGEMENT TECHNOLOGY UPDATE**: Joint action in key strategic and technical areas

**X FOR NON-Xers**: Knowledge of business, exposure to what users do and care about, building consulting skills

---

Need **HUMAN RESOURCE POLICY + STRATEGIC DEVELOPMENT TIMETABLE + EVALUATION METHODOLOGY**

Who to educate?

When?

Why?
BUILDING A COMMUNICATIONS STRATEGY

1. Links to the Business Plan:
   - What are the organization's critical success factors?
   - Opportunities communications strategy can provide for new products and services
   - Desirable improvements in information access and distribution and in organizational communication flows

2. Computing Strategy
   - The top management priorities for applications: improving revenues, improving costs, base-building
   - Key data resources, access needs and capabilities
   - Priorities and timetables for evolving the Ideal Capability

3. The Strategic Options for Communications:
   - Likely capacity needs over the next five years (high - low estimates)
   - Risks and costs of being over/under capacity
   - Private versus public network: Costs, capabilities, tradeoffs
   - Compatibility issues and vendor constraints

4. Network Architecture
   - Long-term architecture
   - Short-term options and phasing
   - Authority and responsibility

5. Network Design and Implementation:
   - Network analysis and optimization
   - Network plan
   - Allocation of roles, authority, responsibility
   - Strategic education: users and technicians
   - Implementation

6. Application Development
Figure 4 (cont.)
INVESTING IN INFORMATION TECHNOLOGY
A Framework for Top Management Planning

Investment Opportunities

<table>
<thead>
<tr>
<th></th>
<th>Improving Revenues</th>
<th>Improving Costs</th>
<th>Base Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Interdependencies? (affects or depends on other components of Ideal capability)</td>
<td></td>
<td></td>
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<tr>
<td>11. Expertise available?</td>
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<tr>
<td>12. Top management's desired priority?</td>
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<td>13. Responsibility?</td>
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<tr>
<td>14. Authority?</td>
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</table>
STRATEGIC COMPUTER EDUCATION: A TOP MANAGEMENT COURSE

1. Components of the Computer Resource:
   - the Ideal Capability (figure 1)
   - Characteristics of each component, performance measures, tradeoffs, risks: hardware base, software, data, communications
   - interdependencies
   - management issues

2. Investing in Hardware: How much do you need to know about the technology to make informed choices?

3. Investing in Software

4. Investing in Data

5. Investing in Communications

6. Benefits from Investing in Information Technology (figure 4)

7. What Has to be Managed: The Technology Delivery Process (see figure 3)


9. Delivery: Managing Implementation

10. Delivery: Software Productivity Tools

11. Coordination and Planning: Technology Scanning

12. Coordination and Planning: Selecting and Integrating Projects

13. Coordination and Planning: Coordination Users and Technicians
Figure 3
INFORMATION TECHNOLOGY DELIVERY SYSTEM

POLICY
Authority: Top Management
   Set criteria for
   Selecting projects
   Regulate free market;
   determine central authority
   versus local autonomy;
   Budgeting and resource allocation.

COORDINATION
AND PLANNING
Authority: Senior
   IS Staff
   Technology
   Scanning: R&D, Pilots
   Selecting and Integrating Projects
   Capital Investment Standards
   Coordinating users and
   Technicians; user liaison and service roles

DELIVERY
   Managing Systems Development
   Managing Organizational Change
   Technical Productivity Tools

- Delivery: implement simple projects
- Coordination and Planning: manage applications portfolio, create effective organizational mechanisms
- Policy: Provide mandates and directives

Key Issue: What policy choices must managers make to put in place planning and coordination mechanisms to drive delivery process?
Figure 4
INVESTING IN INFORMATION TECHNOLOGY
A Framework for Top Management Planning

<table>
<thead>
<tr>
<th>Investment Opportunities</th>
<th>Improving Revenues</th>
<th>Improving Costs</th>
<th>Base Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Likely yield from moving along current path? (i.e. no change in competitive strategy)</td>
<td>Improving existing services: quality access</td>
<td>leveraging production &amp; skills of key personnel</td>
<td>cost displacement</td>
</tr>
<tr>
<td>2. Degree of direction needed from top? (commitment, planning, authority)</td>
<td>creating new services &amp; products</td>
<td>cost displacement</td>
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<tr>
<td>3. Lead time for delivery</td>
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<td>4. Size of payback?</td>
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<td>5. Immediate of payback?</td>
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<td>6. Resource needs? (financial, technical, organizational, educational)</td>
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<tr>
<td>7. Learning curve? (pilots time to build experience needed)</td>
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<tr>
<td>8. Technical risk?</td>
<td></td>
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<tr>
<td>9. Organizational risk?</td>
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</table>
Figure 1

THE IDEAL CAPABILITY

**Immediate Transaction Processor**

**Data Store**

**Tools for Enquiries and New Reports**

**Hardware Base**

**Tools for Building New Systems**

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**Immediate Transaction Processor:** Equivalent to a perfect clerk; software for, e.g., on-line entry or cash management.

**Data Store:** Logically, a centralized, accessible library of data, regardless of physical structure and location.

**Tools for Enquiry & Reports:** Packages and nonprocedural "end-user" languages that eliminate dependence on programmers.

**Tools for Building New Systems:** Systems development languages and productivity aids.

**Hardware Base:** Configuration of mainframes and/or minis; may be centralized, decentralized or distributed.

**Communications Network:** Voice and data network linking users to the transaction processor, data store and enquiry software via the hardware base.

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questions, all they can do is build the communications infrastructure and hope. The questions define the criteria for a computing strategy. That strategy cannot in itself answer them.

Given the strategy, management needs to know the strategic choices and tradeoffs. The details involve private versus value added networks, SNA, X.25, intelligent terminals, capacity and buying bandwidth. The concepts relate to uses—to traffic. Only when management and IS jointly evaluate what the communications capability should provide, in terms of information creation, access and distribution, can a network architecture be defined. The architecture should not determine the capability and use.

Given the architecture, the final and key issue is delivery. Who leads the planning and implementation process? With what authority? What roles must be filled for effective coordination? What education is needed? What are the design criteria? The planning horizon for a communications strategy is 1985 rather than 1982. The technology is still in flux and demand characteristics unclear. We are still a long way from true integration of the technological building blocks underlying the Ideal Capability. It may well be that the best short-term plan is to try and avoid decisions that commit the organization over the long-term. IS needs to get ready for 1985. The means getting the organization ready. Perhaps the two key components of the 1982 strategy are strategic education and the creation of the new roles communications imply. Communications technology represents an immense organizational opportunity. It requires an organizational focus.
REFERENCES


2 Many of the ideas expressed here came from developing that course, including the recognition that communications is, from a top management perspective, the strategic issue and hardware a tactical one. Richard Mills and Mathew Devlin of Citibank have been major contributors to the course and the ideas.

3 The concept of critical success factors (CSF's) is described by Rockart, J.F., in *Chief Executives Define Their Own Data Needs*, Harvard Business Review, Vol. 57, No. 2, 1979