Networking Strategies for Information Technology

Bruce Elbert

Artech House
Boston • London

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by Bruce R. Elbert

Chapter 5. "MAKE OR BUY" DECISIONS

Once the requirements for a major IT network project are established, a strategic unit must further decide how to go about the process of implementation. The two alternatives of Make or Buy represent the opposite poles of this management decision. To Make a network means that a private infrastructure is to be created out of public and privately-owned elements. The strategic unit must also operate and maintain the majority of systems, which effectively makes it a provider of IT services to internal users. If, on the other hand, the Buy option is taken, the requirements are met through services that are provided by telecommunication carriers or specialized service providers who own and operate all facilities. Your primarily responsibilities in this case are to manage the relationship and to pay on time (lest you be disconnected).

In Chapter 4, we reviewed two sets of network solutions: those that can be purchased in the form of equipment, and those that are offered by major service organizations. One can imagine an IT network which is created by exclusively using one of the two forms. In reality, networks are an appropriate combination of both. The situation with regard to DP is different, as most organizations purchase and operate their own computers. However, there are circumstances when the DP function is also taken as a service.

A graphic representation of Make or Buy is presented in Figure 5-1. Within the Buy region, the organization acquires all of its IT capabilities as services; these include telecommunications and data processing. The Make region is one in which the strategic unit implements a private network to support computer systems and software that are self-managed as well. There is an overlapping region to indicated when a strategic unit establishes a private IT network resource by contracting with a facilities management firm to provide and operate that resource. Outsourcing is a popular term for an approach where the strategic unit maintains full control of the network but transfers some aspect of ownership and operation to another firm.

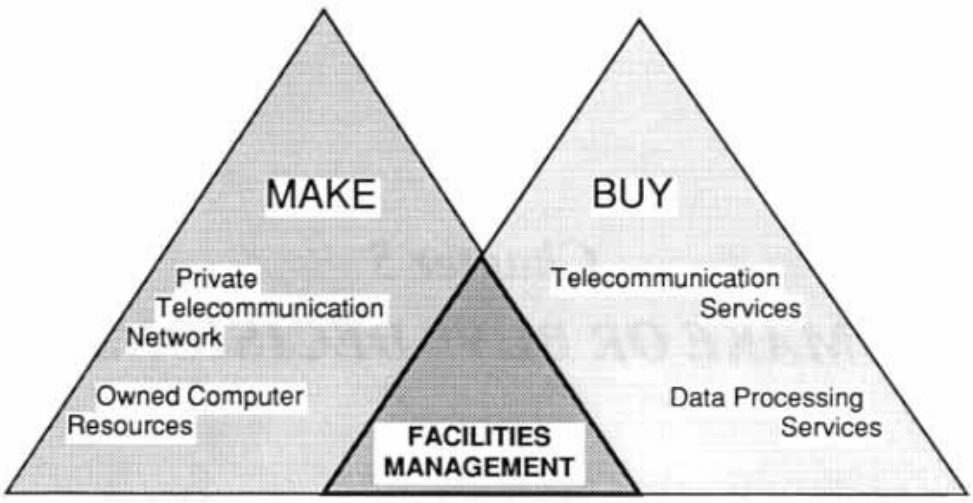


Figure 5.1 Make or Buy alternatives in IT network implementation and operations.

As a secondary tradeoff for the Make alternative, the strategic unit may choose either to purchase the system or to lease it on a long term basis (also called lease versus buy). This is actually a financing decision since the IT capability is still controlled and maintained by the organization. A lease is a useful tool for acquiring an IT capability even during times when capital money is tight. It also allows an organization to convert an investment cost (which is an up front payment) into an annual cost. The other side of the coin is that a lease commitment will usually run the useful life of the facility so that when all the payments are considered, the actual costs are the same (or greater) than the Buy.

Clearly, the topic of Make or Buy is an exceedingly complex one. The options are numerous, defined by vendors according to their capabilities and by strategic units according the particular arrangement that they are using. In the remainder of this chapter, we provide guidelines and methodology. Some of the considerations are strategic while others are strictly financial. At the conclusion of the chapter are case studies which represent each alternative. Eastman Kodak Company chose a very well-structured Buy strategy, while McKesson Company remains a staunch believer in controlling its own destiny through a well-integrated Make strategy.

5.1 STRATEGIC ISSUES CONCERNING MAKE OR BUY

The Make or Buy decision tends to have implications beyond the technical and financial domains. This is because the selection of one approach over the other (as well as the variants) will impact the existing IT network organization and the manner in which users' needs are met. It is felt that an appropriate Make or Buy decision will aid the strategic unit in its pursuit of business goals.

Weighing the Financial Perspective

Business people often look at decisions in financial terms: return on investment (ROI), requirements for investment capital, reduction of operating expenses, and proper allocation of corporate overhead. Because an IT investment competes with other investment opportunities, a

major business issue is the allocation of scarce capital. It may be difficult to show a direct return from an IT investment as compared to construction of a new manufacturing plant or purchase of an on-going business. For example, should the business unit develop a customer service application system using a new computer and supporting network, or should it add new distribution facilities for existing products? Investments in research and development (R&D), which do not show an immediate payoff, are somewhat similar to IT network investments.

It is relatively easy to determine the cost of a new computer or network service, while the cost of operating an international electronic data interchange (EDI) network might be less tractable. Engineers can specify the detailed requirements for transmission and switching equipment so that accurate purchase prices can be obtained from vendors. On the other hand, it is more difficult to identify all of the operating costs before the network is actually put into service. Nevertheless, we must make estimates and educated guesses.

Investment decisions are influenced by the cost of capital. Utility companies and governments typically have a low capital cost and hence can consider the Make and Buy alternatives with impunity. If you have an unmistakable need for the network and can predict that the need will last several years, then the Make strategy could represent a very low risk investment. From a strategic standpoint, the network investment could be better than a high risk investment in new product R&D or an unproven manufacturing system.

However, if capital is very limited or very expensive for the strategic unit, it may be better to obtain the IT network as a service. The vendor makes the bulk of the investment and operates the system. The customer pays for services according to a contractual commitment or, in the case of a common carrier, a tariff filed with the appropriate government agency. In the worst case, a business which goes bankrupt is not saddled with an ill-liquid investment in the IT network, while the service provider can remove the facilities and provide them to other (paying) customers.

In many situations, several non-financial considerations are used to make the selection. These may be intangible benefits, such as:

- Which is more compatible with the business operation?
- Which has a lower risk of failure?
- What can be done within the capabilities of the present network organization?
- Which provides the greatest flexibility for future expansion and enhancements?

Evaluating these factors is far from a science and must instead rely on judgment and experience.

Moving to a New Infrastructure

Creating or modifying an IT infrastructure can challenge an organization and tax its resources. After the decision to make such as change is made but before selecting a Make or a Buy, we must carefully consider the transition from the existing infrastructure to the new one. The term

"roll-out" is often used to describe the process for making this transition. Properly planned and executed, the roll-out of new services should follow a low-risk implementation, one where users gain smooth access and where services are delivered as promised. A poorly conceived and conducted roll-out can be disastrous and may actually lead to total failure of the project. Some of the most basic roll out methodologies are graphed in Figure 5-2 and discussed below.

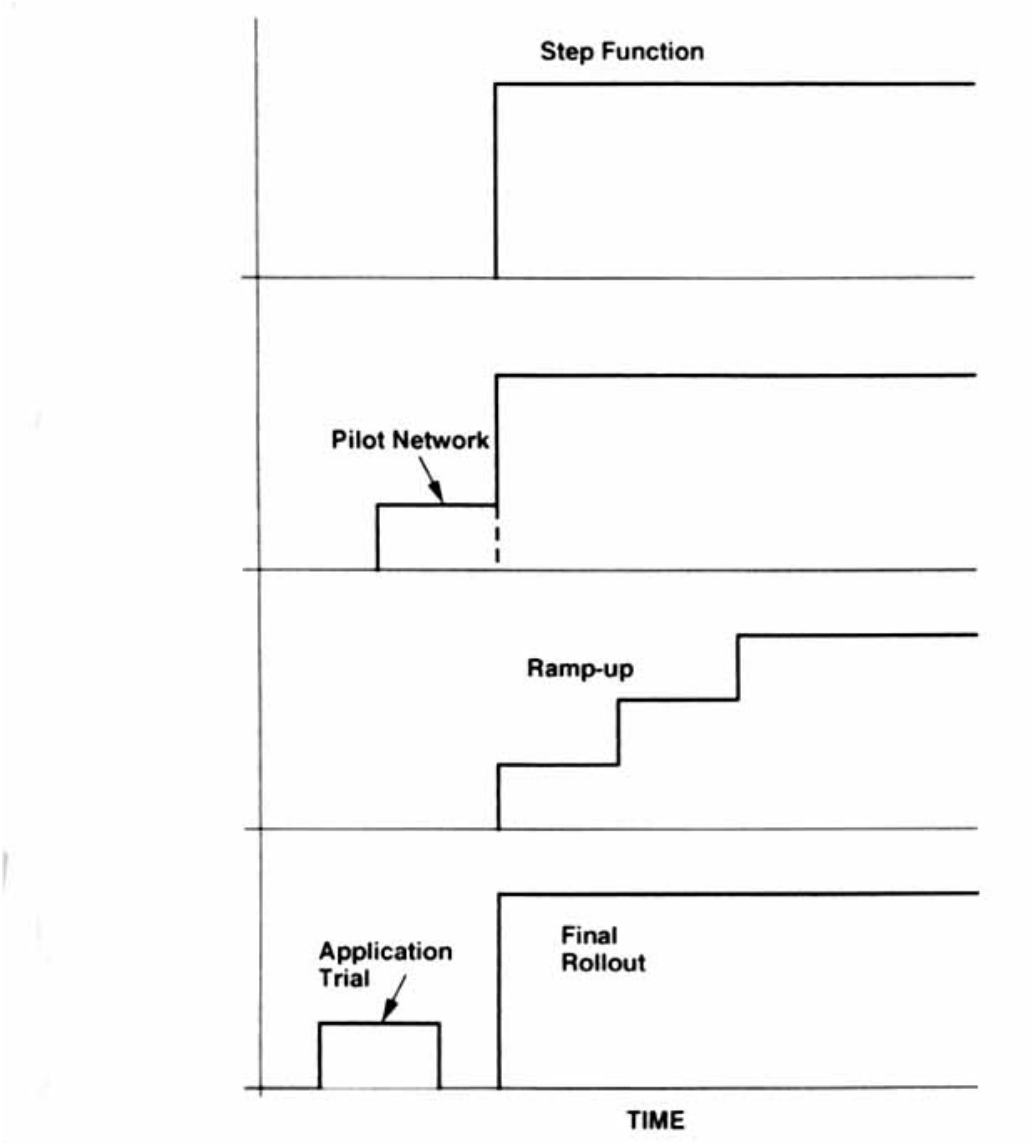


Figure 5.2 Network roll-out strategies.

The Step Function is the most drastic of roll-out strategies, making the full network capability available at one point in time. This approach is used by system integration contractors and major network providers, often resulting in the lowest total implementation cost. Buy making all purchases at the same time, maximum leverage is exerted on suppliers. Also, the cost of money is minimized since payments are made earlier in the procurement cycle. The supplier can perform all of the tasks in a compressed time, sell-off the project to the buyer, and then move on to the next contract.

The principle downside factors of the Step Function are that the IT network must work correctly at the start and you must need all of that capability at the beginning. Step Function implementations are generally not tolerant to changes unless additional requirements are included which foresee the future. If the supplier is a major corporation or carrier, technical risk can be offset by corrective actions taken by the supplier over the duration of the network's service life. One of the biggest dangers is that the entrenched supplier could extract more money than is justified by the work simply because they have the strength of being in a sole-source position.

An approach which has become very popular during the 1980s is the Pilot Network that uses the same technology and suppliers as the ultimate implementation. The vendor and buyer are able to solve interface problems before the full roll-out begins. Users also get the opportunity to "test drive" the hardware and software before becoming completely reliant on it. While Figure 5-2 indicates a Step Function for subsequent roll-out, it is certainly possible to use the Ramp-up as described in the next paragraph.

Ramp-up implementation is a better match to needs which are growing over time The roll-out can track the construction of new branch offices or additions of new on-line applications as they are introduced to the users. Ramp-up timing either can be predefined in the contract or directed by the buyer according to need. The issues here are the pricing of the additions, which could be subject to inflation for long delays, and availability of supplier staff to do the actual installation work. Obviously, if you can specify the Ramp-up ahead of time, the supplier will better be able to plan for the availability of equipment and installation personnel.

The Application Trial is perhaps the least risky strategy because the final decision on technology or architecture can be delayed until more is known about the viability of the operational concept. In this experimental scheme, the main capabilities of the network are simulated with whatever technology and service that can be pieced together. Users are given the opportunity to play with the Application Trial to see how the particular application would work in the real world. They may even process live transactions on a limited basis. Due to its experimental nature, the Application Trial probably will not use the ultimate architecture or vendors. After the Application Trial proves that users can apply the concept, the actual network can be designed and rolled out using one of the other approaches.

An IT network which represents a radical change from the status quo of the strategic unit should probably employ the Application Trail or at least the Pilot Network. McKesson Corporation used the Application Trial method to assess the value of allowing their customers direct access to a computerized order entry system. At the time in the 1970s, McKesson was unsure if the concept would provide desirable results or even work. The Application Trial was literally thrown together by internal DP staff after consideration of the results of the trial, the decision was eventually taken to proceed with the actual network. Today, the network is known as Economost, and is recognized as the model for a successful business network application [Clemons, 1991].

A roll-out strategy of one type or another is required whether the implementation decision is to be Make or Buy. The organization that conducts the roll-out would be one of the following: your own IT network department; a vendor such as a systems integration firm; or a total service provider acting under the Buy strategy. Even if you already own the network, you may still convert to a Buy by transferring the primarily assets to the vendor. If you continue with the

Make, you must have an organization to manage and maintain the facilities. If you Buy the network as a service, your organizational requirements are less, but not eliminated. You still need to direct changes to configuration, monitor performance, administer contracts. These aspects are reviewed in the Kodak case study.

5.2. CHARACTERISTICS OF "MAKE"

During the 1970s and 1980s, many leading U.S. industrial firms adopted the Make approach for their data processing centers and telecommunication network needs. This caused them to invest heavily in network facilities and to build rather large organizations. There was the belief that the sheer volume of usage could justify the investment, even if services were delivered somewhat inefficiently. Typically, the DP function was in the hands of a strong group of people, centralized at corporate headquarters. The network could be handed over to AT&T to be provided on a service basis. With the onslaught of Divestiture, telecommunication professionals were hired away from Ma Bell to oversee network operations; typically, these people understood the practical necessities of data communication but did not relate directly to the actual DP applications.

Today, organizations need to consider all of the aspects of the Make strategy before embarking on this costly and complex approach. Yet, as discussed below, there are circumstances where a Make is justified.

The Making of Network Capabilities

Prior to Divestiture in the U.S. and privatization in other western democracies, strategic units were forced to employ the public network for the majority of service requirements. One could lease standard voice grade private lines to build a data network, but bandwidth was limited and reliability was always less than adequate. Companies took advantage of the first wave of deregulation in the U.S. by experimenting with satellite communication. Government agencies and companies that successfully employed satellites found that the ability to reach any remote location and to provide wide bandwidth services such as video and high speed data were valuable to their missions. Many actually delivered profitable information services through a direct connection to their customers.

The Make strategy not only improves control but also provides a great deal of certainty as to the specific make up of the network. At any time, you know precisely what your network configuration is and hopefully how it is performing. Traditional public networks, on the other hand, are so extensive that it is almost impossible to know the routing and handling of your information once handed over.

This situation seems to be resolving itself as public network operators update their technology for the digital era. Today's intelligent networks offer many of the advantages found on the earlier private satellite networks. The sophisticated nodal devices and protocols can provide a strategic unit with control over delivery of information. An ideal situation is one where the private network exists within the public network, yet is not dependent on an external organization for routine support. Network management capabilities such as MCI View and AT&T's Bandwidth Management Service, both or which are discussed in Chapter 4, offer such capability.

A private telecommunication infrastructure can produce cost savings particularly if capacity can be shared among a number of users. Companies like Sears, HBO and American Airlines have invested so heavily in their private networks that they have been able to enter the communications business. In reality, what they are doing is sharing the cost of the network with other users. To be able to compete with public telecommunication companies, the private network operator must either sell at a lower price or focus on particular markets by offering services which are more finely tuned to the needs of a specific user community. The only strategy which is viable on a long term basis is that of focus. In the case of American Airlines, the services offered include reservation transactions and messaging to other airlines and travel companies around the world.

The Making of Data Processing and Software

Strategic units may be able to accept handing their long haul network requirements over to a major telecommunication service provider. However, their willingness to do the same with the data processing side is much less. Ownership of the "iron and silicon" of the computing machinery itself is perhaps less of a strategic decision than ownership and use of the underlying application software. The majority of applications are tailored to the specifics of the value chain and hence are not as generic as long distance telephone service or perhaps E-mail. These applications usually reside in the central computers of the organization and are maintained by a core DP staff.

Business unit managers will accept having an internal DP organization provided that the staff is responsive to business needs. Changes will be needed to adjust applications to the demands of customers and to respond to competition. The development of applications may have to be kept confidential so that the element of surprise can be maintained when entering a new market. Protection of an existing business line could also require that the structure of existing applications not be divulged. In cases where such confidentiality really is important, the Make strategy would appear to be highly justified.

Application development by outside firms can be problematic in chases where that firm fails to deliver the needed application. Many software development firms are small companies with somewhat limited financing. They may simply run out of money. This can be avoided by only dealing with a major firm such as Arthur Andersen or EDS. Such companies have formidable capabilities, yet the also tend to spend heavily during application development. Smaller firms are usually less costly to employ and may have a particular style, technology or experience which the buyer needs.

In pursuing the Make approach, an organization can employ some of the most advanced application development systems currently on the market. These include fourth generation data bases, computer aided software engineering (CASE) languages, and expert systems. The training involved in learning how to develop applications through these systems is considerably less than what was required in the past. For example, the standard business language, COBOL, and the standard engineering language, C, are both difficult to learn. It takes highly experience software programmers to use these languages effectively. In contrast, modern languages are so easy to use that programmers as such are no longer required. The systems engineer or analyst who organizes the project can actually code the programs as well.

Having developed your own applications, you are in the best position to deal with future uncertainty. There is no external software development firm to go out of business. As time goes on, your own staff can maintain and modernize the applications to fine tune the process and to adapt the system to a changing business environment. Many of these products have convenient networking features, so that many users and locations can easily share the same data.

5.3. CHARACTERISTICS OF "BUY"

Some of the largest firms in U.S. and European industry have completely turned their IT network infrastructures over to outside firms. The success of EDS in building a multi-billion dollar business out of this trend is legendary. But as we have discussed previously, many classes of service providers exist in this complex marketplace. The reasons when organizations wish to buy IT capabilities are often as varied as the particular circumstances.

Perhaps the biggest reason of all is that even the largest corporation or government agency may not wish to expend or tie up capital in an IT network which performs primarily administrative functions. The service provider may have already invested in appropriate facilities and hence the incremental cost of adding one customer could be relatively small. This allows the provider to achieve an economy of scale. On the other hand, the transfer of an existing private IT network infrastructure to the service provider may not improve the economics in a global sense, but will help the customer organization reduce its total capital burden. Operating costs also may decrease in a case where the previous IT network organization was particularly inefficient. The result is that you will be relieved of many of the mundane aspects of running the network.

When an organization Buys service from a provider who has an extensive IT network infrastructure, there are a number of advantages that are gained besides simple economy of scale. You have access to a greater network resource from which you can draw additional value. Service providers like AT&T, MCI and EDS have very extensive networks which stretch globally. It becomes a relatively simple matter to connect your individual user locations to this infrastructure. In the case of telecommunication service providers who are engaged in this business, you may even use their facilities to directly reach your customers, suppliers, and other affiliates. A more extensive network will also tend to be reliable since there are alternative routes to achieve an end-to-end connection.

In using the facilities of other service providers, the strategic unit may still wish to preserve those aspects of a private network that have strategic value. A single vendor approach could work against these aims, particularly if that vendor is a telecommunication service provider with a strict set of service offerings. The way around this problem is to segregate the network into what might be called an "open" element provided by the general service provider and one or more "closed" elements which are developed for the strategic unit under a proprietary arrangement of some kind. An important aspect of this mixed approach is that the open and closed elements must interface properly with each other.

Speaking further of the closed element(s), the strategic unit can maximize proprietary control by developing these areas with internal staff who work under direction of network management. Application development would be included in this area. Many organizations are choosing to delegate application development to the business units, an approach which can be more responsive to specific needs. However, there are potential interface problems between closed elements developed in this manner and the rest of the network. This is where the central IT staff

should specify some standard application development environments which the business units employ without loss of network integrity.

With either no direct responsibility for the network or perhaps only limited responsibility for specific closed elements, the strategic unit can focus on its business mission and desired strategic outcomes. You will be able to avoid the bulk of the operational demands of running the network. Also, any problems can be assigned to the appropriate vendor for resolution. When crisis hits and users are demanding action, the advantage of being able to point your finger at someone else should not be underestimated!

Some of the largest companies in the world are aggressively pursuing the IT network service market. Each contract is hard won and prized. Maintaining a good working relationship with customers is also coming into vogue as a way of building a business in this field. The result is that you tend to get the support of a highly motivated provider who wants your continued business. Incidentally, you can foster this attitude through good organizational communication and by keeping the vendor(s) a little bit hungry. Strategies for structuring and negotiating the contract can be found in [Muller, 1989].

The Buy strategy offers the possibility of obtaining special services and support which you could not afford to implement on your own. These include engineering expertise, programming resources, and network bandwidth services on demand. A properly established and managed vendor relationship provides benefits at a cost which is a fraction of their true value. Another important feature is that by not investing your own capital, you may be able to avoid a long term commitment to the particular architecture and facilities. A significant part of business risk can thereby be reduced or eliminated. This flexibility is important to a startup business, even if undertaken by a major corporation. If this is an important consideration, then it is essential that any services agreement not lock the customer in for a longer period than can be tolerated by the business case.

5.4 OUTSOURCING OF IT NETWORKS

Outsourcing is a popular buzz word which, regrettably, lacks a precise definition. What was once a government contracting vehicle has become a popular approach for reducing a strategic unit's involvement in the more mundane aspects of IT network operations. The Yankee Group breaks down this segment of the services business into facilities management, systems integration and contract programming, shown graphically in Figure 5-3. While there is overlap, the three primary areas are discernable due to the actual tasks that the vendors take on.

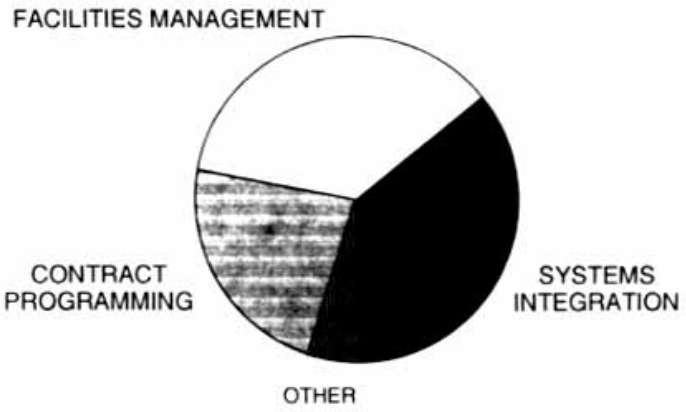


Figure 5.3 Relative level of revenue for out-sourcing and systems integration business in the US.

Facilities Management

Facilities management is a Buy strategy where the contractor provides a total service which is customized to the needs of a major user organization. Rather than the buyer implementing the network, the contractor acquires all of the equipment and hires the staff to carry out the actual operation for the life of the contract. In cases where the buyer already has existing network facilities, it is a matter of transferring these facilities and staff to the contractor. The contractor adds other capabilities or may convert the IT network over to its own systems, wholesale. The basic selling point is that through efficiencies and economy of scale (which may or may not exist in practice), the facilities management contractor promises to reduce annual IT network expenses by 20% or more. Careful consideration should be giver ahead of time to how changes and upgrades might be incorporated at a later date. Because this is a long-term commitment lasting typically five years, there may be little flexibility for the buyer once the contract is entered into.

Systems Integration

Systems integration is a contracting approach for implementing a network infrastructure and can be applied to either the Make or the Buy strategy. Historically, ownership and operating responsibility of network facilities reside with the buyer. The term "turn-key procurement" was used for systems integration during the hey day of U.S. government contracting of the 1960s and 1970s. In some instances, the contractor continues to operate the system under an operations and maintenance (O&M) agreement which lasts for several years. In effect, the buyer can outsource the operation phase, avoiding having to hire and train its own support staff.

More recently, systems integration projects have been the leading edge of a facilities management arrangement. Ideally, the same contractor that implements the network will operate the network for an extended term. They are in the best position to keep the network working at its optimum because they have substantial engineering resources. Hardware and software will typically require modification as a result of lessons learned as well as "bugs" which remained latent in the system.

Leading players in systems integration are typically major equipment manufacturers like IBM and DEC. Computer Sciences Corporation is also strong in systems integration, claiming that by not being a manufacturer they do not suffer a conflict of interest. Aerospace companies like Hughes Aircraft Company and Martin Marietta built substantial systems integration businesses in some of the most high tech areas of IT networking as well as the old standby of government electronic systems.

A good example of a commercial systems integration contract is the Interactive Satellite Education Network, which Hughes implemented for IBM in the early 1980s. The initial installation was completed within 18 months of contract execution, upon which ownership of four instructor broadcast studios and 20 remote video education classroom sites were transferred to IBM. The operations phase has been conducted jointly, with Hughes responsible for the maintenance of technical network facilities, including classroom electronics, the satellite transmission network and trouble reporting. IBM has not had to hire a staff of maintainers, but instead concentrates on classroom scheduling and the training itself. Any changes to the network are jointly decided upon and executed by Hughes through incremental projects at relatively minor cost. The joint working relationship has maintained the network in tip top shape while IBM's operating costs have not risen appreciably due to the long term nature of the contract.

Contract Programming

A somewhat smaller segment exists for contract programming, an area firmly established by Andersen Consulting. A major new IT network development project may require a large quantity of software to be written. Using some of the more traditional "procedural" languages such as COBOL and FORTRAN, the overall project has to be broken down into separate modules called routines. These are coded by literally an army of programmers who convert the design of the application into an actual computer programming system. While the total labor is very large, amounting to man-years of effort, the buying organization does not require an ongoing staff of this level. Therefore, the actual program development effort is subcontracted to a hardware, software or consulting firm. All that is involved is human brain power and access to the right computing resources.

In the 1990s, the value of contract programming has diminished due to the power of fourth and fifth generation languages and expert systems. With these powerful tools, most of the effort is involved with understanding the requirements of the business application, along with the capabilities of IT architectures. This expertise can be developed in-house, or can become part of the agreement with a systems integrator or facilities management firm.

Other Approaches to Outsourcing

The collection of smaller services under the "Other" category in Figure 5-3 includes a potpourri of activities which can allow a strategic unit to achieve reasonably good control of its owned network resources. There is growing interest in the area of Network Management Services, wherein an outside firm takes over the responsibility for managing all telecommunication resources. The facilities themselves are a combination of privately-own equipment and services from common carriers. The network management firm replaces the telecommunication management function of the buyer. Actual contracts for equipment and services are directly between the vendors and the buyer. The network management provider installs and operates a

technical operations center to monitor network performance and direct various changes and service restoral procedures.

Call accounting and other business functions can be included with the more technical aspects of network management. This relieves the buyer of having to worry about tracking assignments of equipment and charges for services. The service provider insures that users are billed directly and accounting transfers are properly made.

Leading Outsourcing Vendors

The leading companies in these markets are indicated in Figure 5-4. EDS, founded by H. Ross Perot, grew up with the proliferation of IBM mainframes for large administrative applications such as insurance claim processing and inventory management. Their business has expanded to include application development and operations. The sales strategy of EDS is to promise the CEO or CFO that by replacing their DP system and organization, there will be a cost savings of at least 20% over the period of the contract. Because of this business base, EDS operates some of the largest data processing centers in the U.S. and the world. They have become IBM's single largest customer for mainframes and data networking systems. EDS's business expanded even further when they merged into GM and acquired all of GM's DP and telecom facilities and staff.

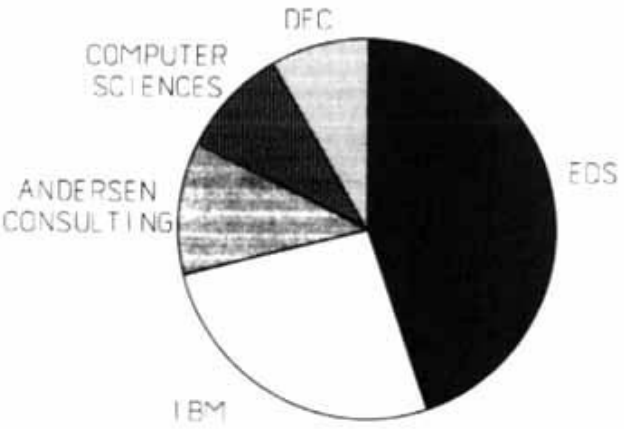


Figure 5.4 Relative market share of the five top IT out-sourcing vendors.

IBM has vertically integrated its mainframe computer business by going into all of the areas of outsourcing. Their experience with contract programming and systems integration provided the basis to compete with EDS for facilities management contracts. Recently, Kodak selected IBM over EDS to build and operate their new "mega data center" in Rochester. A similar recognition has been make by DEC, who is emphasizing their skills in computer and telecommunication networking.

As a pioneer in computer timesharing and a leading contract programmer for the U.S. government, CSC has also been expanding its involvement in the systems integration and facilities management marketplace. As a step toward commercialization, they acquired the Index Group, an IT strategy consulting firm. Several activities have been combined into a commercial systems integration group so that large outsourcing contracts could be pursued.

While the overall numbers for oursourcing appear to be relatively high, the market is still quite undisciplined. As we indicated before, precise definition of these services is lacking. There is no industry standard for outsourcing agreements. Of course, a particular company will generally do business in a self-consistent way. Potential buyers of outsourcing services, including systems integration and facilities management, will need to structure the agreement very carefully. Good contracting and legal advice will pay dividends over time. Also, as discussed in the Kodak case study, considerable effort will be required to manage the relations with outsourcing vendors, who become like a member of the extended family.

5.5 FINANCIAL COMPARISONS OF MAKE OR BUY

The Make and Buy alternatives are significantly different from each other in the manner in which facilities are provided and paid for. Generally, a Make implementation includes a large component of up-front investment and subsequent annual expenses for operations and maintenance (O&M) staff and other support services. The Buy approach is usually paid for on a monthly or annual basis, with a more nominal up-front component for the initial connection. In the ideal situation, the Make and Buy alternatives meet the same IT network requirements for the expected period of operation. Real world performance of Make and Buy is not as predictable, so managers need to diligently assess the prospects for how each approach will impact services and future expenses.

The methodology of engineering economics provides techniques to compare network implementation approaches which have widely different financial time lines [Smidt, 1970]. According to this approach, you convert all costs into equivalent annual operating expenses to give a year by year comparison. A total cost can be computed by converting the annual cash flows into a present value using an assumed discount rate. Whether viewed on an annual basis or as a total up front cost, the analysis should give the same answer.

A financial analysis assumes that the network is an expense of doing business and should relate to profit. According to Anthony Diromualdo, of the Diebold Research Program, many organizations still do not evaluate IT purchase decisions as if they were investments related in some way to the corporations future profitability [Diromualdo, 1990]

The most common reasons for pursuing a new IT network project is to reduce cost or increase operating efficiencies. Typically, there is an existing system of some type which satisfies at least the basic needs of the strategic unit. An appropriate financial analysis requires looking at a savings, which are negative costs, as if they were revenues. The effective rate of return for the investment can be measured in this way because any negative cost is effectively a positive contribution to the corporate bottom line.

Spending decisions are routinely carried out as part of the normal capital budgeting process [Weston, 1981]. The finance department of most organizations would have a reasonably formal process for making investment decisions. You may be able to enlist their help in making financial comparisons. Any new investment should give a rate of return that exceeds some threshold set at the organization's cost of capital, which could be as low as 9 to 12%. Very often, however, a higher rate such as 20 to 25% is required as a means to isolate an investment which may not be attractive.

Another requirement could be that the investment provide sufficient savings to pay back its cost within a certain period of time. There are a number of factors which encourage us to use a payback period of five years or less (even though the system could provide reliable service for at least 10 years of continuous operation). Some of these factors are:

- The architecture or technology could become obsolete and needing of replacement for performance reasons.
- The needs of the business change so significantly that the existing systems cannot support the requirement.
- The cost of service after a few years of operation, which were fixed at startup, might be considerably higher than would can be obtained on the open market.

Because of these factors (and others), it is important to carefully consider the payback period so that your analysis will hold up into the future. On the other hand, if the investment will return 24% and provide a payback in 2 years, you should have little trouble having it approved!

The Buy case is typically the simplest to consider because the charges are fixed in advanced. All you have to do is develop a simple spread sheet showing how the expenses grow over time. Up front expenses for investment and connect charges are typically small compared to the cost of the service.

The Make case is more complex because you need to look at the investment and the operation. The government refers to this as the life cycle cost. Investment expenses can be converted to annual expenses using annualizing factors which take account of depreciation, cost of money and other miscellaneous items such as taxes. Labor, rents, third-party maintenance expenses, and utilities are some of the largest operations expenses which must be estimated.

An Example of a Financial Model

Financial analysis in telecommunications is best approached by building an economic model from the network design. Each element has a cost associated with it. The job of the analyst is to identify those items with significant costs, whether for investment or on an annual basis, particularly for carrier services. The model should be faithful to the actual structure, but abstracted sufficiently so that the economic picture is not overly complex.

We employ a rather simplified network topology consisting of three nodes and eight branch offices, shown in Figure 5-5, to illustrate the modeling and analysis process. Transmission between the nodes is provided with dedicated T1 links, allowing considerable aggregation of traffic in different forms. Intelligent T1 multiplexers are located at each node to integrate the traffic and provide such additional features as channel reconfiguration, timing, and network management. Spur links to branch offices are with dedicated 56 kb/s leased lines that connect to remote multiplexers on each end to break service down to lower port speeds such as 9.6 kb/s. The actual user devices could consist of dumb terminals, personal computers or fax machines. Mini or mainframe computers could also be connected to a node through a dedicated 56 kb/s port, although this was not considered in this simplified model.

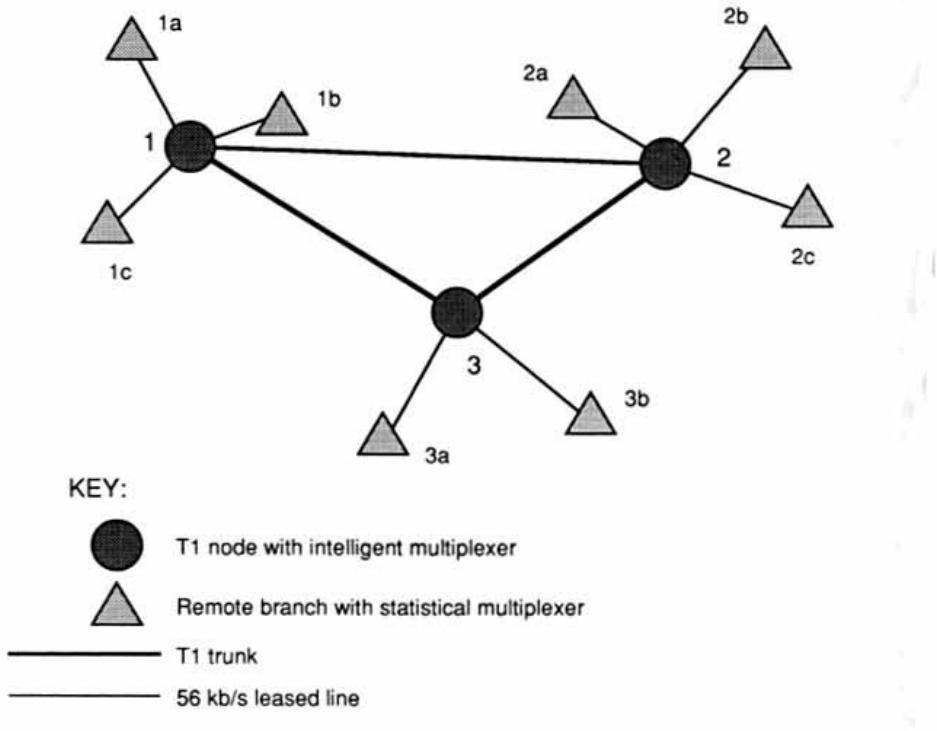


Figure 5.5 Wide-area network model for use in an example of a Make or Buy financial comparison.

The same basic architecture and computing resources are assumed in examples of Make and Buy implementations. There will be operations differences, some of which are subtle and others that are not so subtle. These aspects are discussed at the end of this section. Relying on dedicated T1 trunks tends to run up costs; reduction in the cost of bandwidth between nodes could come if "bandwidth on demand" services were available. However, for the time being, strategic units must commit to a specific amount of capacity measured in multiples of 64 kb/s between nodes, assuming either full T1 or fractional T1 trunking services. Further assume that the computing resources of the network are the same in both cases and are therefore out of the equation.

Analyzing the Make Case

Investment costs for the Make case of the network are presented in Table 5-1, which is a spread sheet put together with the Microsoft® Excel program. The costs have been estimated for typical equipment available in 1991. Any Make alternative will involve a considerable capital investment, which in engineering economics is called the first cost. The strategic unit would contract with one or more vendors to acquire facilities, which may also be installed as part of the same deal. The total cost of the installed system represents the original investment. Expenses incurred by the buyer for internal labor and associated construction of building space should be included as part of this investment. The key is to make sure that all up front expenses are included in the analysis.

The first cost of each node is determined from data gathered by engineering staff, along with the cost of the associated building facilities. The actual links are obtained as a service from a common carrier, hence their cost will be considered on an annual basis rather than as an investment element. Devices such as DSUs and statistical multiplexers which interface with the terrestrial links are part of the initial acquisition, however. Other items of initial expense include uninterruptable power supplies (UPS), installation costs, and miscellaneous items such as cabling and equipment racks. The grand total investment cost of the network facility, estimated here at $428K, becomes an input to the annual cost model.

A spread sheet containing the annual costs is presented in Table 5-2; a summary of the major elements for the six year period is plotted in Figure 5-6. The investment cost of the network is converted to an annual expense by employing depreciation deductions and interest expense. These are shown on line 4 of Table 5-2 for each of the six years assumed for the life of the system. The depreciation balance at the beginning of each year is shown in line 5. We assume that this amount has been borrowed and amortized through the depreciation charges each year. Interest expense at a rate of 12% on the remaining balance is included on line 7. Operation past six years comes at reduced expense since the equipment is depreciated to a zero "book" value. This is analogous to the situation where you have paid off the loan on your automobile yet continue to drive it for several more years.

Expenses for carrier services (summed on line 22) were determined by referencing the appropriate tariffs. This data can be obtained directly from the service provider's sales representatives, who typically have it available on a computerized data base. An alternative source is a network analysis software package containing the same tariff data, typically for all of the major carriers in the U.S. market. Tariff data is available for the European market from Logica Consultancy, London. The particular values are determined by the amount of bandwidth and the distance traversed. In the U.S., there are separate components for access from the LEC and for the long haul portion from the IXC.

Lines 24 and 25 identify services from outside vendors that repair specialized equipment. It is fairly routine for manufacturers telecommunication hardware and computers to repair the printed circuit boards and disk drives under an extended warranty. This is done by sending the failed components back for exchange or repair. In our particular case, we have chosen to contract with the vendor for preventive and corrective maintenance on site, effectively outsourcing this function. This may be more expensive on an hourly basis than using our own staff, but the higher cost is probably still not particularly excessive and provides another form of insurance.

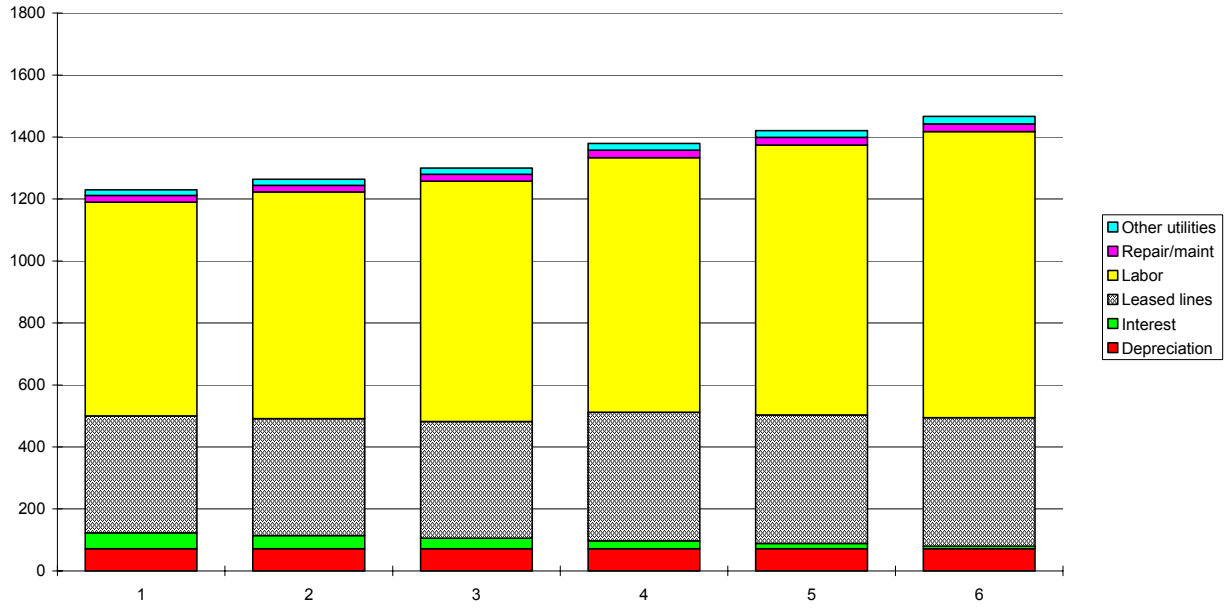
Table 5.1. Investment Cost for the Make Case ($000)

ITEM	Unit cost	Node 1		Node 2		Node 3		Total
T1 Node		1	$0.0	1	$0.0	1	$0.0	$0.0
CSU		2	$0.0	2	$0.0	2	$0.0	$0.0
Multiplexer		3	$0.0	3	$0.0	2	$0.0	$0.0
DSU		3	$0.0	3	$0.0	2	$0.0	$0.0
Misc			$0.0		$0.0		$0.0	$0.0
UPS		1	$0.0	1	$0.0	1	$0.0	$0.0
Installation		1	$0.0	1	$0.0	1	$0.0	$0.0
SUBTOTAL			$0.0		$0.0		$0.0	$0.0
	Unit cost	Branch 1a		Branch 1b		Branch 1c		Total
Multiplexer	$8.0	1	$8.0	1	$8.0	1	$8.0	$24.0
DSU	$1.0	1	$1.0	1	$1.0	1	$1.0	$3.0
Misc	$5.0	1	$5.0	1	$5.0	1	$5.0	$15.0
Installation	$4.0	1	$4.0	1	$4.0	1	$4.0	$12.0
SUBTOTAL			$18.0		$18.0		$18.0	$54.0
	Unit cost	Branch 2a		Branch 2b		Branch 2c		Total
Multiplexer	$8.0	1	$8.0	1	$8.0	1	$8.0	$24.0
DSU	$1.0	1	$1.0	1	$1.0	1	$1.0	$3.0
Misc	$5.0	1	$5.0	1	$5.0	1	$5.0	$15.0
Installation	$4.0	1	$4.0	1	$4.0	1	$4.0	$12.0
SUBTOTAL			$18.0		$18.0		$18.0	$54.0
	Unit cost	Branch 3a		Branch 3b				Total
Multiplexer	$8.0	1	$8.0	1	$8.0	0	$0.0	$16.0
DSU	$1.0	1	$1.0	1	$1.0	0	$0.0	$2.0
Misc	$5.0	1	$5.0	1	$5.0	0	$0.0	$10.0
Installation	$4.0	1	$4.0	1	$4.0	0	$0.0	$8.0
SUBTOTAL			$18.0		$18.0		$0.0	$36.0
GRAND TOTAL								$74.0

Table 5.2. Annual Cost for the Make Case (%000)

Year	1	2	3	4	5	6
Depreciation	87	87	87	87	87	87
Balance	521	434	347	261	174	87
Interest (12%)	63	52	42	31	21	10
T1 services						
N1-N3	144	144	144	158	158	158
N1-N2	360	360	360	396	396	396
N2-N3	96	96	96	106	106	106
56 kb/s						
R1a	6	6	6	7	7	7
R1b	5	5	5	6	6	6
R1c	12	12	12	13	13	13
R2a	6	6	6	7	7	7
R2b	4	4	4	4	4	4
R2c	5	5	5	6	6	6
R3a	7	7	7	8	8	8
R3b	8	8	8	9	9	9
Leased lines	653	653	653	718	718	718
T1 multiplexers	12	12	12	13	13	13
Stat mux	6	6	6	7	7	7
Facilities	4	4	4	4	4	4
Repair/maint	22	22	22	24	24	24
Other utilities	18	19	20	21	23	24
Personnel						
Management	160	170	180	191	202	214
Engineering	100	106	112	119	126	134
Operations	250	265	281	298	316	335
Maintenance	180	191	202	214	227	241
Labor	690	731	775	822	871	923
GRAND TOTAL	1383	1425	1471	1586	1636	1690
Present value @12%	5591					

Figure 5.6. Projection of Make case annual cost for the wide-area network model.



A very significant portion of annual expense is that for internal labor, i.e., the cost of your network staff. We have assumed a modest organization with capability to do top level engineering and procurement management. Other members oversee the day to day operation of the network, seeing to it that users always have a point of contact for problem resolution. There is an internal capability to maintain certain major pieces of equipment and facilities. As shown on line 35, labor is the largest single contributor to the annual cost. This is why there is considerable interest in outsourcing of network operation, where the vendor provides most of the people.

We have included the effect of inflation by increasing the annual expenses by 6%, where appropriate. The combined cost of the network is $5.6 M, which was computed by adding the initial investment of $428 K, to the present value of annual costs (less depreciation) at a 12% discount rate. Notice how equipment is less than 10% of the present value of the network when examined over a 6 year operating life.

Analyzing the Buy Case

The Buy case that we have modeled is one in which the T1 backbone and nodes are provided by a single telecommunications service organization. All three major U.S. IXCs offer this type of service. In addition to providing long haul facilities and nodal equipment, they arrange with the LECs for all local area transmission and access. This is the closest thing to one stop shopping that you will find in the U.S. for the foreseeable future. The portion that remains in the strategic unit's hands is the customer premise, where terminating equipment and computing devices would be located.

The investment spread sheet for the Buy case is shown in Table 5-3. We see that all investment in T1 nodes is zeroed out, since this equipment is part of the IXC's long haul network. The functionality of the nodes is provided through the facilities of network control and customer reconfiguration. The Digital Reconfiguration Service (DRS) of MCI, discussed in Chapter 4, has been assumed as the means of providing flexibility in network operation. A careful analysis will be needed to assure that the capability of DRS is sufficient to accommodate the needs of users. For example, DRS can be used to select an alternate route for a T1 in the even that the primary T1 fails or is congested with traffic. Further flexibility exists to assign individual DS0s within a given T1. The full capability of an intelligent T1 multiplexer, such as the IDNX manufactured by Network Equipment Technologies, can be obtained at additional cost. AT&T has introduced this capability under BMS, utilizing Paradyne multiplexers and work stations, as discussed in Chapter 4. Telecommunication managers will need to review these capabilities to see if they are worth the added expense, which can be considerable.

The only capital expense indicated in Table 5-3 is for remote multiplexers and other devices to be installed at the branch offices themselves. At a total expense of $74 K (line 36), it is clear that this owned equipment is not a significant contributor to annual cost. Reliability of these remote devices can be critical, however, since these are the means of directly serving users. Careful consideration must be given to how maintenance is provided and that quick action can be taken when there are problems on the customer premise.

Annualized expenses for the Buy case are presented in Table 5-4. Use charges for the backbone network are identical to the Make case because we have provided the same capacity and connectivity. As we stated previously, this analysis is based on tariffed offerings in 1991, which currently do not include "bandwidth on demand" services. During the coming years, we anticipate that the LECs and IXCs will introduce versions of SMDS and B-ISDN which have as their purpose to allow assignment of digital channel capacity in response to the dynamic traffic flow. Substantial savings in service charges will hopefully be the result of such innovation. It is likely, however, that any such service will be available to the Make case since equipment vendors will of necessity make their devices compatible.

Projected charges for network management features which are provided by the IXC and summarized on line 26. We discussed the use of DRS, for which there is a monthly fee. If DRS is actually used, there will also be charges per activation. Any time that alternate T1 channels are employed, there will be charges for this backup capacity. This has been ignored in the analysis. In any case, the cost of DRS is small in relation to the equipment investment that it eliminates.

Table 5.3
Investment Cost for the Buy Case ($000)

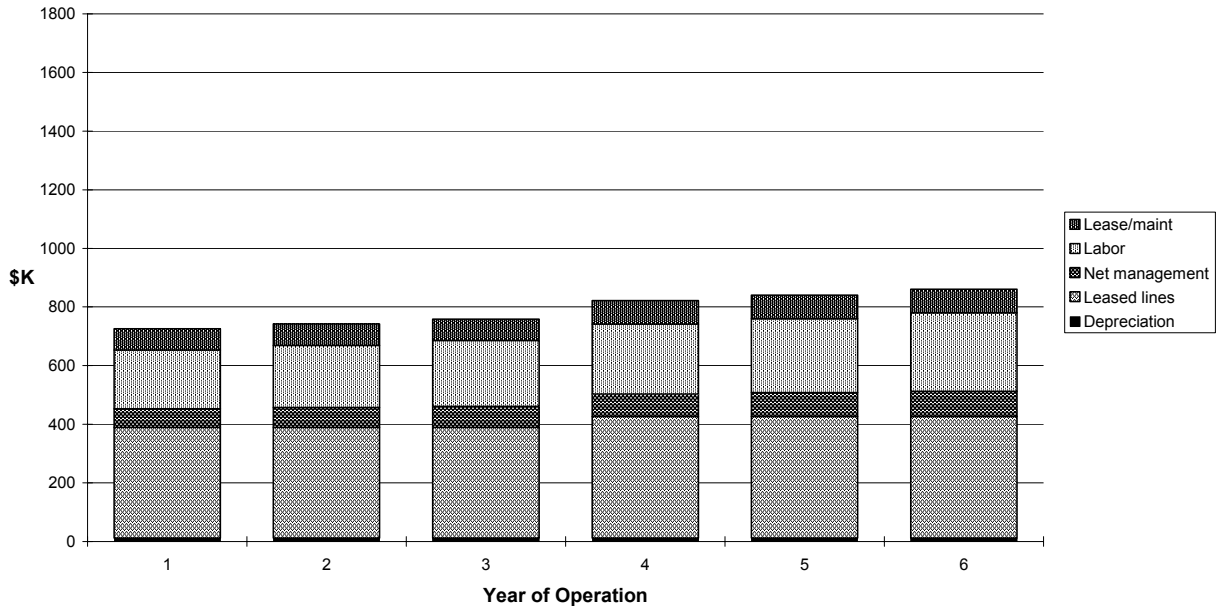
	A	B	C	D	E	F	G	H	I
1									
2									
3									
4	INVESTMENT								
5	ITEM	Unit cost	Node 1		Node 2		Node 3		Total
6	T1 Node		1	$0.0	1	$0.0	1	$0.0	$0.0
7	CSU		2	$0.0	2	$0.0	2	$0.0	$0.0
8	Multiplexer		3	$0.0	3	$0.0	2	$0.0	$0.0
9	DSU		3	$0.0	3	$0.0	2	$0.0	$0.0
10	Misc			$0.0		$0.0		$0.0	$0.0
11	UPS		1	$0.0	1	$0.0	1	$0.0	$0.0
12	Installation		1	$0.0	1	$0.0	1	$0.0	$0.0
13	SUBTOTAL			$0.0		$0.0		$0.0	$0.0
14									
15		Unit cost	Branch 1a		Branch 1b		Branch 1c		Total
16	Multiplexer	$8.0	1	$8.0	1	$8.0	1	$8.0	$24.0
17	DSU	$1.0	1	$1.0	1	$1.0	1	$1.0	$3.0
18	Misc	$5.0	1	$5.0	1	$5.0	1	$5.0	$15.0
19	Installation	$4.0	1	$4.0	1	$4.0	1	$4.0	$12.0
20	SUBTOTAL			$18.0		$18.0		$18.0	$54.0
21									
22									
23		Unit cost	Branch 2a		Branch 2b		Branch 2c		Total
24	Multiplexer	$8.0	1	$8.0	1	$8.0	1	$8.0	$24.0
25	DSU	$1.0	1	$1.0	1	$1.0	1	$1.0	$3.0
26	Misc	$5.0	1	$5.0	1	$5.0	1	$5.0	$15.0
27	Installation	$4.0	1	$4.0	1	$4.0	1	$4.0	$12.0
28	SUBTOTAL			$18.0		$18.0		$18.0	$54.0
29									
30		Unit cost	Branch 3a		Branch 3b				Total
31	Multiplexer	$8.0	1	$8.0	1	$8.0	0	$0.0	$16.0
32	DSU	$1.0	1	$1.0	1	$1.0	0	$0.0	$2.0
33	Misc	$5.0	1	$5.0	1	$5.0	0	$0.0	$10.0
34	Installation	$4.0	1	$4.0	1	$4.0	0	$0.0	$8.0
35	SUBTOTAL			$18.0		$18.0		$0.0	$36.0
36	GRAND TOTAL								$74.0

Table 5.4. Annual Cost for the Buy Case ($000)

Years	1	2	3	4	5	6
Depreciation	12	12	12	12	12	12
Balance	74	62	49	37	25	12
Interest @12%	9	7	6	4	3	1
T1 services						
N1-N3	108	108	108	119	119	119
N1-N2	120	120	120	132	132	132
N2-N3	96	96	96	106	106	106
56 kb/s						
R1a	6	6	6	7	7	7
R1b	5	5	5	6	6	6
R1c	12	12	12	13	13	13
R2a	6	6	6	7	7	7
R2b	4	4	4	4	4	4
R2c	5	5	5	6	6	6
R3a	7	7	7	8	8	8
R3b	8	8	8	9	9	9
Leased lines	377	377	377	415	415	415
DRS	24	25	27	29	30	32
MCI-view	40	42	45	48	50	54
Net management	64	68	72	76	81	86
T1 multiplexers	0	0	0	0	0	0
Stat mux	72	72	72	79	79	79
Facilities	1	1	1	1	1	1
Lease/maint	73	73	73	80	80	80
Personnel						
Management	80	85	90	95	101	107
Engineering	0	0	0	0	0	0
Operations	120	127	135	143	151	161
Maintenance	0	0	0	0	0	0
Labor	200	212	225	238	252	268
GRAND TOTAL	714	730	747	809	828	848
Present value @12%	3239					

One of the biggest levers in IT network outsourcing is in the area of reducing the requirements for internal staff. In this model, we have eliminated the engineering function entirely because all project development functions are handled by the IXC. Maintenance staff is unnecessary because the IXC operates and maintains the backbone and branch connections. We still require a small operations staff to act as the help desk and to administer adds, moves and changes. The management function can now focus on higher-level issues relating to effective use of the network as opposed to day- to-day operations problems. The annual and present values show that the cost of the Buy case is approximately 60% of that of the Make case. This impressive difference stands out when you examine Figures 5-6 and 5-7.

Figure 5.7. Projection of Buy-case annual cost for the wide-area network.



This compact study shows a financial preference for buying the network as a service from a qualified IXC. We have not included any significant discounts from equipment providers or IXCs, all of which are willing to negotiate deals with large customers. Also ignored were the anticipated savings over continuing to operate an existing network which probably uses leased analog private lines. An internal rate of return might have been computed for the Make and the Buy, although our main attention is focused on selecting which of the two alternatives is best in terms of the cost of implementation and operation.

Readers must not view these results as conclusive since we only offer this as an example of the methodology. The approach is very straightforward and will provide useful data in making a decision. However, there are many other factors to consider, many of which are not financial. These were suggested at the beginning of this chapter.

5.6 "BUY" CASE STUDY - EASTMAN KODAK COMPANY

This case study of a major industrial corporation has been put together to demonstrate the processes used to evaluate the Make or Buy comparison and to implement the result in the most effective way. I chose the Eastman Kodak Company, the leading supplier of photographic film,

because they represent the leading edge of companies who are realizing that the old ways of providing IT network capabilities may no longer be appropriate for them. Other companies have taken note of Kodak's direction. In March of 1991, Texas Instruments announced that they were pursuing a similar strategy.

Kodak is a major US corporation with an well-established international business. Their new IT strategy is primarily organizational in nature, as opposed to technical. Kodak chose to Buy literally all IT network capabilities, ranging from data processing to telecommunications, from personal computers to telephones. The basic philosophy was to a select principal vendor for each main area. Referred to as strategic partners, the vendors are managed so that maximum benefit is derived from the capabilities and technologies that each can muster to satisfy the IT network needs of Kodak.

Changes in Kodak's Business Situation

In 1985, Kodak was restructured into four business units: photographic and motion picture products; chemicals (including plastics and fibers); health (drugs, medical films, clinical instruments); and information systems (copiers, publishing systems, computer printers, optical disk drives). As of 1989, the company had a total revenue of $18 billion and approximately 145,000 employees worldwide.

Kodak senior management concluded that they needed to totally re-organize their provision of IT services throughout the various businesses. Their objectives were to improve responsiveness and to convert fixed costs to variable costs (transfer investment to the service provider). Corporate Information Services (CIS) was created, reporting directly to the office of the CEO, with responsibility to put in the infrastructure to go across the entire corporation.

CIS started re-engineering Kodak's IT networks in 1987. The existing CIS organization consisted of 1200 people organized into 15 different units. Voice communications, data communications, and data processing where separate functional activities. With this size and diversity, Kodak lacked a comprehensive plan for developing and exploiting IT resources. The first surveys found that Kodak also had an outdated portfolio of systems and technologies, organized functionally rather than toward the business units' needs.

According to Katherine Hudson, VP of CIS, their desire was to end up with interactive systems, relational databases, and the ability to service users in real-time. "We're trying to work on the IT infrastructure so that it can serve as the platform for doing business on a global basis. In the 90s, this will mean a customer can call you from anywhere in the world, order anything in your product line, get [the product] shipped anywhere they want it, and get all that taken care of with a single phone call. That's the kind of globalization no one has yet, and everyone wants." [Krass, 1990]. This would require an entirely new infrastructure, based on centralization of primary data processing and decentralization of applications and personal computers.

The new IT network infrastructure and partnering relationships provide the platform to carry out the vision created by a study called Project NOVA (novel approach to applications development). This project identified three phases, lasting to the year 2000:

1. Freeze current applications software. Many applications date back to the 1970s.

2. Start to use common integrated software. (standardized application development environment).

3. Focus on high value-added systems. This means concentrating on software for manufacturing processes and operations that directly affect customers.

From the original strategy, Kodak proceeded to put flesh on the bones by employing some of the most respected consulting organizations in the world. This produced detailed long range plans for telecommunications and central DP. Such an approach required the re-establishment of a much larger DP center in Rochester, employing massive amounts of on-line data storage, near super-computing capabilities, and sophisticated wide area networking facilities that are global in nature.

The Strategic Partnership Approach

A principle conclusion of NOVA was that Kodak would best meet its goals through outsourcing of the bulk of DP and telecommunications services. This would achieve the types of economic efficiencies shown in the financial comparison in the previous section. Kodak has decreased its internal IT staff from a high of over two thousand in 1987 to as few as 250 in 1991.

This core team is primarily responsible for strategic and management focus over the new direction. A knowledge-based organization, the new CIS manages the evolving IT architecture, interface standards, and relationship with strategic partners. There is now greater need for people with strong leadership skills who can act as systems integrators and relationship managers. Part of their challenge is to invent the architecture of the future while the outsourcing firms operate the current infrastructure.

The new IT infrastructure takes the form of a worldwide network "backbone" tied to large-scale computing facilities, two overseas and one in Rochester. This electronic centralization will produce significant savings, sufficient to fund the applications development side of NOVA. There is a distributed computing environment, based on powerful workstations and personal computers to perform office functions in a LAN environment. The mainframes are focused on data bases for improved customer service, and advanced application development systems to accelerate the creating of new capabilities along standardized lines. Kodak also anticipates greater use of image-intensive and computing intensive tasks, and responsive network management. All together, the IT capability will be <u>much greater</u> than what one business group could afford to put together by itself.

Kodak has selected three strategic partners to implement and manage the new infrastructure:

IBM, July 1989. Contract valued at $100 M over 10 years. Five DP centers are being consolidated into one in Rochester, designed, built and managed by IBM. 350 employees were transferred to IBM on Oct 2, 1989,.along with many of the existing mainframe computing assets.

DEC, Jan 1990. 5 years, no contract value available. 250 people transferred to DEC, who will manage and operate worldwide network for telecom, voice, data and installation of telephones.

Businessland,. About 50 employees and 50,000 PCs. All PC support in the US is now handled by Businessland.

Approximately 95% of the application development responsibility is being transferred to the business units, with an emphasis on Buy versus Make. The central CIS organization will continue to develop some strategic applications which have enterprise-wide significance.

One of the largest gains comes in financial savings through reduction in employees and capital investment. Any loss of technical edge by internal staff is felt to be overcome by the advantage of having major technology companies managing Kodak's future IT network systems. Their strategic partners are world class providers who are strategically committed to these services and their customers' satisfaction. For Kodak's corporate benefit, negative costs will improve the bottom line and therefore increase shareholder value.

Clearly, there is now a shift in Kodak's attention, away from how services are delivered to what services are appropriate. Management need no longer concern itself with day to day running of data centers, global networks and telephone services. There might have been a concern about the DP and telecommunication professionals who would no longer have positions with Rochester's largest employer. However, these former employees now work with companies who's business is DP and telecom. This improves career possibilities because these companies can offer more training and opportunity for advancement. Strategic partnership or alliance management is a complex process which requires the implementation of new systems of management and communication. Listed in Table 5-5 are five partnership management elements developed at Kodak to achieve this aim.

Table 5-5. Partnership management elements continuously in use at the Eastman Kodak Company.

(1) For each alliance, they have a relationship director with a small staff.

(2) A management board for each alliance, composed of Kodak and vendor executives. They meet quarterly to insure that objectives are met.

(3) A user's counsel, to give directions with regard to architecture, technology direction and service needs.

(4) A control center for each area to monitor performance.

(5) The cross alliance board. If one business unit orders PCs configured into a LAN, then the cross alliance board would make sure that the telecom is put in place.

Lessons Learned During Project NOVA's Development

Any IT organization which selects an entirely new philosophy and structure will experience major changes. As the IT network manager, you will be managing change in your own organization. You have to re-engineer the whole administrative services sector; the established bureaucracy must change. Those who remain in the downsized organization will find themselves focused on managing relationships instead of subordinates

Careful consideration must be given to which commodity-type value chain activities are to be transferred. This must be done with considerable finesse, or else the strategic unit could lose control of vital functions. For example, DEC handles the interface with AT&T and MCI, the two primary carriers. However, Kodak maintains contact with these vendors so that CIS staff have a clear view of the future.

According to Henry Pfendt, Director of CIS, you must ask yourself, "Can the partner do the job, and can we live together at all management levels?" Get the highest level attention of the vendor that you can. In his words, "go for the "biggies." This is most necessary during the transition period, when there must be a team spirit at all levels. This does not mean a retreat from leadership and control, but a flexible attitude in the way we proceed.

Kodak verified once again that a well structured implementation program is needed, even if most of the work is delegated to outside suppliers. The five phases are as follows:

Preparation: Porter's value chain was used as a tool. Have a strategic plan for IT so that you know where you are going. Evaluate your existing products against the value chain model It is possible to have help using this model buy working with a consulting company such as the Monitor Group of Cambridge, MA. An outcome of this analysis is that you identify the activities for strategic partnership.

The retained staff will need new skills, which emphasize business and management rather that operations and engineering (but don't think that you can neglect technical and operation issues after you outsource). Develop a training program for you people so that they can be part of the project.

Selection: Set up the procurement process by first using a request for information (RFI). Be selective in the vendors that you will consider. For example, if you have an international business like Kodak's, then your vendors also must have global reach. After you have made your selections, assemble a cross functional team - business, technical, personnel, financial.

A technique which proved helpful in selecting widely differing approaches: measure the value of an approach and then assess the cost of the best alternative to the partnership relationship. This should follow a financial methodology similar to that presented in the last section.

Negotiation: Bring in senior executives on both sides during the process. There will be many roadblocks that come up, so senior management can help clear them. As part of this up front activity, develop business plans with your strategic vendors.

Implementation: Create a transition management team for smooth transfer of assets and people. Involve your human resources department, particularly since you may eventually close down

some of the old administrative support functions. Other aspects of downsizing are discussed in Chapter 3.

Ongoing relationship management: Establish as many of the five partnership management elements (Table 5-5) as are appropriate for your situation. Since you need continuity and performance monitoring, some of the engineering and operations functions might be retained within your organization. This cannot be totally handed over to the other contractors

The following are some of the critical needs that you must address when pursuing the outsourcing strategy:

- Know your objectives
- Get your management and users involved in the negotiation process.
- Should the key negotiator have a career interest in the outcome? Avoid conflict of interest with vendor.
- Know how to measure schedules and performance
- Communicate with employees. Hold regular meetings, keep them up to date about the negotiations. Employees are fearful of the jobs. Help them understand that their quality of work life will improve.
- Partner selection. Choose them carefully; you must live together for a long time.

Kodak IT management took the bull by the horns and created their own strategy to downsize, consolidate and enhance responsiveness. This may have only been possible because the CIO, Kathlene Hudson, had been a business unit manager herself. As a general rule, we in IT network management need to come up with solutions, even tough ones, rather than waiting for users to impose them on us. A well designed and implemented outsourcing strategy will benefit both the organization and you as the innovative thinker.

5.7 "MAKE" CASE STUDY - MCKESSON COMPANY

McKesson Company is the largest distributor in the U.S. of pharmaceutical and related products to drug stores, having approximately 20,000 customer locations to serve. In 1991, they added Wal Mart to their base and now are responsible to supply all of the pharmacies located within Wal Mart stores. As a testimonial to the resourcefulness and technical capabilities of McKesson's Information Services group, the entire Wal Mart account composed of approximately 1300 locations was transferred over in one weekend. The acquisition of this new business would not have been possible without the facilities of one of the most advanced automated order processing and customer service systems in the world.

McKesson's Vision of the Optimum Architecture

McKesson designed, installed, operates and maintains its principal data processing and communications facilities. The architecture is largely the result of the vision of their VP of Information Systems, John Fitzgerald. He states that McKesson designed the system, but essentially every element has been bought off the shelf from vendors. An exception is the voice response system used to acknowledge customer orders that are entered by remote terminals. This particular internal development effort was needed because suitable voice response

technology did not exist in 1983 when the requirement was created. In 1991, McKesson is updating the voice response system to an off the shelf product which has superior voice quality and is easier to use by their customers.

John Fitzgerald is in every way the prototype of the modern IT network director. He is as comfortable technology as he is with business and management issues. Having been hired away from Texas Instruments by the chief operating officer of McKesson, John has easy access to the corporate board room. On the floor of the computer facility, he is well recognized and knows the purpose and even operation of every major piece of equipment and every individual as well. Importantly, John Fitzgerald is a people person and places a very high value on the technical and communication skills of his staff. Importantly, McKesson's entire IT operation is run by a small staff amounting to under 100 people.

John's experience at Texas Instruments was as the worldwide manager of the IT network. This entailed integrating IBM mainframes with TI minicomputers and PCs. Accustomed to being a decade ahead of his time, John introduced to TI a centralized computing approach based on a host in Dallas with 56 kb/s data lines strung around the U.S. and by satellite to foreign locations in Europe, Latin America and Asia. According to him, you could sit at a terminal at any TI location in the world and be able to design and price a new component as if you were physically located at the main plant in Dallas. This is the type of integration that is considered to be advanced by today's standards. Because of his unique experience, talent and personality, John was brought into McKesson to rationalize the its DP activities and prepare the company for the expected growth in customers.

McKesson's IT network, illustrated in Figure 5-8, is compact yet extensive. Much of the computing is done on IBM platforms, but transaction processing functions employ Tamdem Non-stop systems for near-perfect availability. Primary data processing and service functions are performed at the Drohan data center in Rancho Cordova, CA. Of great importance is telecommunications access to this facility. By working closely with Pacific Bell and AT&T, McKesson was successful in being the first subscriber in the area to have a direct digital fiber hookup to Pac Bell's local exchange. This gives a pure connection from their digital PBX, a System 75 from AT&T, through AT&T's closest point of presence. This is particularly vital because all customer service calls are routed through 800 service even though the actual order placing is done with computer terminals. Leased data lines are also necessary to connect the central computer resource to remote distribution centers, numbering over 40.

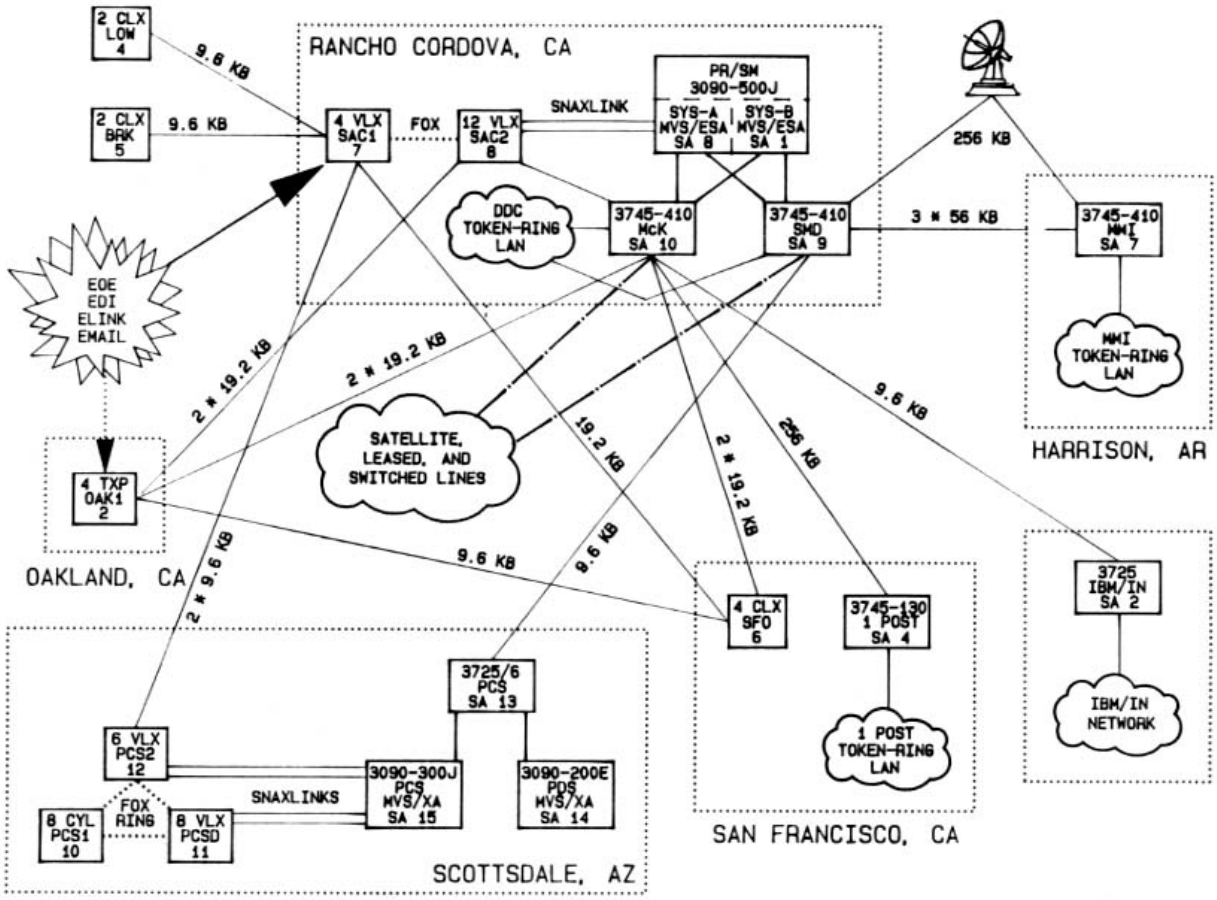


Figure 5.8 McKesson network topology.

Being comfortable with satellite communication, Fitzgerald had no problem adopting VSAT technology even before it was a buzzword. They have a dedicated hub in the parking lot of the data center, with small dishes located at the distribution centers. This means that there is complete diversity for critical data flow. Because the distribution centers must deliver ordered goods within 24 hours, the actual order information must arrive as quickly as possibly, to allow for set up of deliveries the night before.

McKesson Commitment to the Make Approach

McKesson's the IT network defines 80% of the business. The company first experimented with the concept of direct customer ordering by computer back in the 1970s. According to Mike Halbert, manager of planning, the first application was for ordering of miscellaneous "seasonal items" such as beach toys, by drug stores. After this technique proved effective, a major commitment was made to the process. This led to implementation of an IBM 370 central computer supported by System 1 "shop floor" minis at the distribution centers. Order entry remained a manual process, using operators who spoke to customers over the telephone.

As the business developed and grew rapidly, the size of the staff ballooned. A new approach was needed to contain costs and allow a much higher level of business than the manual system

could support. Along with this came the issue of whether to develop the systems internally or to outsource all DP and telecommunication functions. As leader in its industry along with being a profitable company, McKesson chose to continue to run its own IT shop. With anticipated growth in the business, a new set of network strategies were needed to meet demands of cost containment and efficiency improvement.

Top management knew that technology was moving rapidly and that they would need some very powerful help in creating the new vision. While they were not engineers themselves, they knew that to achieve this vision it would take a great effort. They were fortunate enough to find John Fitzgerald, a man who had already build one of the most advanced and IT service architectures in the world. Doing this for McKesson would appear to be a relatively easy task in comparison. However, John approached this new challenge in such a way that his past accomplishments were little more than high school training. To keep McKesson ahead of the industry and to improve the level of service to customers, radical changes would be required. This is where an engineering perspective is of great benefit.

McKesson's updated architecture goes right back to the basics under which the information industry was built. Customers no longer speak to operators; instead, they enter their own orders through hand held terminals that automatically dial through the telephone network to McKesson's data center. DP is centralized in a very well protected facility called the Drohan Data Center. Drohan is located in a suburb of Sacramento, California, in an area of low seismic activity. All facility support systems are redundant, following the best of the models discussed in Chapter 6.

The critical management philosophy which Fitzgerald installed within the Information Services group was to have strong, opinionated project managers. They can deal very effectively with the vendors who will do the bulk of the work. McKesson maintains strategic relationships with IBM, Pacific Bell and AT&T. In essence, the Information Services group employs the partnering approach adopted by Kodak, but chooses to retain design responsibility. A small technical staff has been retained for the purposes of identifying new technologies and proof testing new products to be connected to the network. The bulk of the technical talent, however, is taken from outside sources so that the nominal staff level can be held down. This is also important because routine tasks would not challenge the kinds of people who would be needed during the early phases of network development.

Quality Costs Less

McKesson is most proud of their record for up time of the order processing system. As of the writing of this book there had not been a single failure of the Drohan facility. Even through they have surpassed the industry expectancy for mean-time-to-failure, an on-line backup facility is maintained in Oakland, California. Clearly, McKesson has placed its money where its mouth is when it comes to availability.

John Fitzgerald has difficulty accepting a notion popularized a decade ago that quality is free. Rather, quality costs less. The investment in quality facilities which produce greater reliability will cost less in the final analysis. The most important quality measure is up time, which McKesson achieves through a relentless search for potential single point failure modes which could break the connection between customer and order delivery. Facilities are maintained in top notch condition. The expense of this type of quality could undermine the economics of

delivering the order processing services for which McKesson is renown. However, this is were centralization has achieved the countering economy of scale. Taken together, the system is economical to operate, yet is highly resistant to degradation and failure.

The first line of defense for all potentially threatening situations is their trouble desk. Available 24 hours per day and seven days per week, this highly professional facility can handle most situations posed by customers, users and other operations personnel. The people who man the help desk are trained in every aspect of user applications on the system, particularly the order entry system and terminal devices. They can access the network management system, which relies heavily IBM's NetView. Currently, they resolve 99.7% of the problems posed to them. The remaining .3% is handed off to the network control center where skilled technicians can process the trouble to its conclusion.

Middle Management and Application Development

The Information Services group is organized in a horizontal fashion, with essentially all line supervisors reporting to a division head. McKesson has effectively eliminated the middle management function, utilizing office automation systems such as E-mail instead of human intermediaries. Other organizational efficiencies result from offloading short term tasks to subcontractors and vendors, as discussed previously.

A critical area which remains part of McKesson's structure is applications programming. Currently, this function is performed at the San Francisco headquarters rather than at the Drohan data center. This group is responsible for developing and maintaining the administrative systems and business applications that are the foundation of McKesson's business.

John Fitzgerald observes that there are new programming environments, such as fourth generation data bases and expert systems that can reduce dependency on full time programmers. He has been successful at utilizing the functional groups to do their own application development. A key example is the information support system used by the help desk. According to Fitzgerald, this PC-LAN based network application was designed and programmed by the operators who use it.

The next great task before McKesson is to integrate all of the various network management and computer control systems onto a single platform. To date, no company or vendor has reached this ideal state, where any network resource can be monitored and controlled from a single console. The current situation at most organizations is illustrated in Figure 5-9, which Fitzgerald describes as the IT Tower of Bable. As readers are well aware, vendors of computer and network systems usually taken a proprietary route to network management. Some systems, notably AT&T Accumaster Integrator and IBM NetView, go a long way toward facilitating the management of extensive WAN facilities. However, every single one of these devices has gaps. Strategic units with large IT network investments must include a variety of control consoles in the network operations center. This complicates the management of the network, making it very difficult to tie situations together so that problems can be resolved quickly.

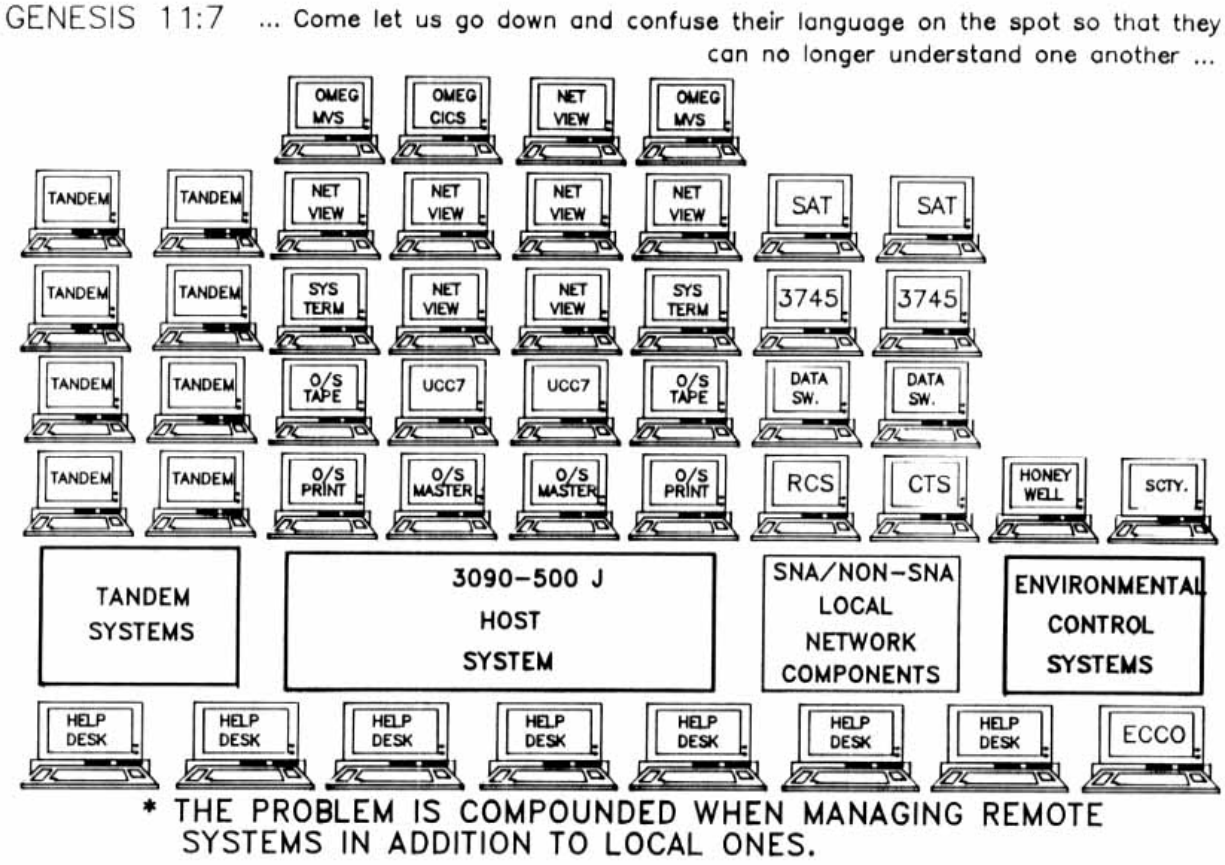


Figure 5.9 The IT Tower of Babel—THE PROBLEM.*

A state-of-the-art system called McKview, being developed by McKesson, uses powerful IBM P/S-2s running O/S-2 in a LAN environment. Through the windowing and multi-tasking capability of this architecture, network controllers can obtain and act upon information almost in real time. The only remaining system to be integrated into the new McKView platform is the network operating system of the VSAT network. This will likely come as a result of an upgrade of the satellite network.

Philosophy of Management

The operating management philosophy is really that of John Fitzgerald, developed over many years of working with people and IT. The most important point is that the people who make up the IT service team must have the knowledge they need to perform their current jobs as well as their future jobs. This is because no function can be expected to remain static. There should be no difference between working and learning, and learning and working. Training is not viewed as time away from the job, but rather an integral part of it. Very few people can learn their jobs in school - what you do on the job is basically different from what is covered in class. There are some courses that can be taken in the classroom, such as vendor schools on specific pieces of equipment or software. But what is lacking is education on how to put things together. (As an author, my goal is to improve this situation.)

Fitzgerald maintains as close a working relationship as possible with McKesson's top executive management. The common thread among the team is operations - everyone is geared to keeping the systems running smoothly so that customers are served very efficiently. The most important IT success factors to upper management at McKesson are unit costs for transactions and up time. The IT group has a relatively easy time justifying expenditures which pursue these objectives; however, such investments will only be approved after current operations have essentially shown to require change.

In terms of justifying the "Make" approach, McKesson looks at how well they are doing with respect to other companies in the same or similar industries. Financial management questions are used to evaluate their IT capabilities and strategies against their peers. It is important to continue to argue effectively to maintain a strong internal capability for IT. This involves a lot of selling to other senior people, particularly those in the business units.

Senior people saw a direct benefit to the business when the Hinsdale, IL, central office fire did not disrupt operations at a nearby McKesson distribution center. A competitor in the Chicago area was knocked out for weeks, while McKesson's Chicago distribution center was able to return to processing orders within one or two days. The marketing department went into action and was able to acquire new customers who otherwise would not have seen a need to change. Such effectiveness tends to prove that controlling your own destiny has strategic value that is hard to measure in financial terms.