

Systems Planning: The Key to Using Computer Technology

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Do any of these stories sound familiar?

- You invested a small fortune in a construction accounting system with powerful features for handling change orders, purchase orders and project management. The accounting department and all the project managers endorsed the purchase. Two years later all you have is an accounting system that produces job cost reports a month too late to use.
- Over the last four years, your estimating department has had four different pilot projects to computerize the estimating process. Numerous man-years and thousands of dollars have been spent, but you still haven't found a system that fits your operation.
- You bought PCs for everyone in the office and installed a Local Area Network so they could all share information. Half the PCs aren't used and most of the information can't be shared because it's stored in different systems that can't talk to each other. The network crashes every few days and your network vendor says you need to purchase lots of new hardware and software to fix the problem.

Situations like these are symptoms of a problem so common that the computer industry has invented a term for it, *The Productivity Paradox*. This is the puzzle in which, with all the hardware, software and resources you've poured into information technology, you still haven't significantly improved your organization's productivity.

Many factors can contribute to the productivity paradox, but planning is the one powerful tool for avoiding it.

The Need for Systems Planning

When I started working with construction information systems nearly twenty years ago, the main use of computers in construction was accounting. The systems we installed were relatively simple implementations of the construction accounting process. There were only a few users within each company, and they could be quickly trained to perform

the simple tasks supported by the systems. Hardware and software were so expensive that training costs were a small part of the overall system cost. As a system vendor, we provided a plan for installing and operating the system and we were willing to spend whatever time was necessary to get the job done.

Today it's a very different story. Those simple accounting systems have grown into powerful systems that reach into every department in the company. They provide many times the functionality of early systems and are used by numerous individuals within your organization. Planning for the installation and operation of these systems is no longer a simple service included with the software purchase. It's up to you, the buyer, to make sure you have a comprehensive plan for the system before you buy it.

To complicate things further, the accounting system is probably a small part of your company's overall computer usage. Estimating and scheduling are usually computer driven. Most white collar workers use word processors or electronic spreadsheets regularly. Ideally all these uses are wholly or partially integrated. Project managers need access to job cost information using the same PC used for estimating and spreadsheet work. Estimates need to be automatically converted into job budgets. Final job costs need to be transferred back to the estimating department for historical reference. The connections go on and on. In reality, the whole company is connected into one big complex system. Some of the connections may depend on sneaker-net or paper shuffling, but the dependencies are there. Systems like this can't be implemented, maintained or operated effectively without planning.

Systems planning is also needed for purchase decisions. These decisions require good information about current and future operating costs. The purchase price of the hardware and software is a small part of the overall cost. This overall cost is impossible to estimate without a plan for implementation and operation. Costs are only half the decision information. Purchase decisions should be based on tangible business goals that justify the cost.

The implementation process for a major system may require anywhere from several months to several years. A plan is needed to keep the process on track and guarantee that the needed resources and manpower will be there when needed. The implementation plan shouldn't end with the system installation. It needs to follow all the way through to achieving the business goals that justified the system.

Once the system is implemented, planning is required for continuing operations. Complex systems are like complex equipment, they need continuous maintenance and well trained operators for best results. Unlike complex equipment, complex systems don't usually come with recommended training and maintenance instructions.

What's Included in a Systems Plan

A Systems Plan is the document used to define and communicate how computer technology will be used within your company. It should start with general philosophical and strategic issues, then work down to detailed budgets and operating plans for all systems.

The Corporate Philosophy on Information Technology

The plan should start with a statement of your company's philosophy on the use of computer technology. The company should clearly define its attitude, whether it is cautious or aggressive. This might be stated as "ABC wishes to take advantage of information technology when it has a clearly demonstrated benefit", or as "XYZ wishes to seek out and implement innovative applications for information technology".

This philosophy should reflect the strengths and limitations of your organization as well as your market. If innovation is your strength, you may be able to successfully implement leading edge technology. If your strength lies in the maturity and experience of your staff, don't expect them to accept rapid change. Your market will also affect your philosophy. If your customers are technologically aggressive, they may demand the same of you.

The Components of a Systems Plan

1. The corporate philosophy on information technology.
2. Potential strategies for the use of new systems.
3. Potential strategies for the enhanced use of existing systems
4. A prioritized list of strategies to be implemented
5. Operating plans for new and existing systems
6. Implementation plans for new systems

Guidelines for frequently purchased hardware and software

Potential Strategies for Use of New Systems

Corporate strategic plans focus the attention of the company on key areas or operations. These plans should be examined for enhanced information flow opportunities. Internal systems may be used to reduce overhead or allow revenue growth without increasing overhead. Better internal information may also reduce operating costs by improving scheduling or allowing quicker response to potential problems. External systems will involve communications with customers, suppliers and subcontractors. Enhanced communications with customers may enhance marketing efforts or improve relations.

When developing potential strategies, it's important to focus on the business goals for the strategy, not on the technology used to reach those goals. See the sidebar, *Business Goals, not Technology Goals*.

Potential Strategies for Enhanced Use of Existing Systems

This area is often overlooked, but enhanced use of existing systems frequently provides more benefit at lower cost than implementing new systems. As corporate strategies evolve, existing systems will need to adapt. Opportunities for enhanced use will also arise as users become more familiar with the system.

Prioritized List of Strategies to be Implemented

Major system enhancements and implementations are very disruptive and require a significant investment of resources. Top management needs to examine the potential system strategies, set priorities and select those to be implemented in the near term.

Strategies which are not selected for implementation should be kept for future consideration. As technology and corporate strategies change, priorities may also change.

Operating Plans for New and Existing Systems

Every existing system should have an annual operating plan. New systems should have a projected operating plan for the first year of operation. Those plans should include the following components:

- A description of the system and the technology used to implement it.
- A list of tangible business goals to be met by the system. As mentioned above, don't substitute technical goals for business goals. Progress toward the goals should be measurable and the goals should include targets for those measurements. Avoid using adjectives such as "faster", "better" or "more accurate". Instead set specific targets and measure your progress toward them.
- A System enhancement plan. Most systems include advanced features that aren't used during the initial implementation. It's important to periodically review all systems and look for ways to enhance their operation.
- A staffing plan (for enhancement and ongoing operation). Under-staffing a system is a sure way to keep it from reaching efficient operation. Be sure your staffing plan allows for maintenance, training, support and enhancement. Whenever possible, include schedules or milestones in the staffing plan.
- A maintenance plan including upgrades and replacement. Poorly maintained systems become unreliable, and your staff will avoid using them. The maintenance plan should include a schedule for preventative maintenance. For software, preventative maintenance includes installing patches and upgrading versions. For hardware, the maintenance plan should include procedures for handling emergency repairs. The plan should also cover replacement of obsolete equipment. Frequently, software and hardware upgrades will need to be coordinated.
- A training plan. We tend to think of training as limited to the installation process. This is a big mistake. New employees must be trained on the use of existing systems. If this is ignored, the average operator skills will gradually decline and a system that used to work well will be considered inadequate or difficult to use. For ongoing employees, advanced training may dramatically improve productivity. Training requires time for the trainer and the trainee. Be sure to allow for both in your staffing plan.
- A support plan. An effective support plan is a critical element in any system. If the training plan is effective, support will be required less often, but even well trained staff will need support occasionally. Especially if they are trying to enhance their use of the system. The support plan may use multiple levels, starting with internal expertise. If internal expertise is used, be sure to allow the time to provide that support in your staffing plan.

- A budget for staffing, maintenance, training and support. If the plans above are complete, this should be a simple extension.
- Major changes expected over the next five years. This is a brief look into the future. When decisions are made regarding the enhancement or replacement of a system, an annual plan may be insufficient. This section should include any items that would make future annual plans differ significantly from the current annual plan.

Implementation Plans for New Systems

New systems should have a projected operating plan, just like existing systems. In addition, new systems should have a complete implementation plan, even if the implementation will take several years. Ideally the plan should be developed before the implementation decision is finalized. That plan should include the following

- A list of hardware, software and services to be purchased. Most of this will be provided by the system vendor, but don't forget the resources required by the system. Office space, phone lines, wiring, etc. are frequently overlooked.
- An implementation schedule. This is absolutely the most critical piece of the implementation plan. Taking the time to create a schedule will prevent nasty surprises during the implementation process. The schedule should include extensive detail with staffing estimates for all tasks. Hardware and software installation are a small part of the schedule. Training and data conversion are usually the most time consuming tasks. If the system has numerous occasional users, multiple training schedules may be needed. Make sure that the schedule matches staff availability.
- Business goal milestones. This is closely tied to the implementation schedule. The implementation decision is based on achieving specific business goals. It's important that implementation plan include milestones for those goals.
- Projected life of the system. It's easy to say that you are implementing a system for perpetual use, but that's rarely the case. In the past, technology has made computer architectures obsolete every ten to fifteen years. Punch cards were replaced by terminals, terminals were replaced by PCs, character displays were replaced by graphical displays, etc. You may be able to migrate an application from one technology to another, but that migration should be considered the end of a life cycle. When making a purchase decision, it's important to consider the projected life of the system. If it's short, current features are very important. If the system will have a long life, waiting a year for one product to leapfrog its competitors may be justifiable. Long term, the stability and innovation rate of the vendor is more important than their current feature list.

Guidelines for Frequently Purchased Hardware and Software

In some companies, items such as PCs, printers or modems may be purchased frequently. The systems plan should include guidelines for those purchases. These guidelines will encourage consistency and direct the purchases toward long-term system goals. The guidelines should allow for the known trends in computer technology. Computer prices

decline steadily. Computer power and storage capacity grows steadily. Applications continually require more computer power and storage.

The guidelines might also recommend specific products. Standardizing on a particular word processing or spreadsheet product simplifies training and support. When the hardware or software purchased must be integrated with other hardware or software, the guidelines may be strictly enforced. In other cases they should be flexible enough to meet the needs of a specific application. It would be foolish to force a CAD user to use the same size screen as a data entry operator.

Developing a Systems Plan

The first step in developing a systems plan is to set the corporate philosophy. If a de facto philosophy and a consensus exists, this can be a very quick process. Once a philosophy is proposed, several hypothetical scenarios should be examined to see how the philosophy would affect decision making. It may also be useful to examine past decisions. Is the proposed philosophy consistent with the past or are you setting a new course? The corporate philosophy is closely tied to the corporate culture and seldom changes.

Technical and financial guidelines are needed for the planning process. The cost and technical advancement of computer technology can be projected fairly accurately up to five years out. These projections will be needed during the remainder of the planning process. For example, computer storage cost tends to decline fifty percent every two years. CPU power tends to double every two years. These are pretty reliable trends. Projecting the **use** of the technology is more difficult. Be wary of projections made by those who are promoting technology. The technology guidelines should also include the guidelines for frequently purchased hardware and software.

Financial guidelines should include

Business Goals, not Technology Goals

When discussing the use of computer technology to achieve business goals, it's easy to lose track of the business goals. This may be due to a fascination with technology, or a mistaken belief that the technology is the critical component.

I know a contractor who set out to install an office wide network to share and transfer information. As the planning progressed, the discussion focused entirely on servers, storage capacity, software, cabling and cards. Contracts were signed with a computer vendor to provide and install the network, but nothing in the contract or the installation plan discussed what information would be shared, or how the company would benefit from the system. In the end, a fully functional network was installed and the project was considered a success, but no one used it to share information.

Another place that business goals get lost in is major system purchase decisions. I receive calls from contractors on a regular basis asking something like this:

"I'm about to install a new job cost system and I need help deciding on my Network design."

It's theoretically possible that these contractors are trying to decide between systems that are functionally identical, but use different technology. It's more likely that one of the vendors thinks they have a technical advantage and they'd rather focus on that than the contractor's business goals.

If you focus on technical goals, you'll achieve technical goals. If you focus on business goals, you'll achieve success.

hourly staff costs plus any other costs used in developing budgets. Costs for frequently purchased hardware and software should be included. The use of these guidelines will provide consistency when comparing system implementation and enhancement suggestions.

Complete annual operating costs for all existing systems should be collected. This may be a good time to review the state of those systems. If training or maintenance has been ignored in the past, this should be noted and the operating costs should be increased to reflect the cost of proper operation.

Once the corporate philosophy and the guidelines are in place, we begin an iterative process of suggesting and evaluating different strategies. This step should be performed on an annual basis, probably coinciding with other annual planning.

There are two major ways that computer systems are used to improve operations. The first is simply to automate operations. The savings from automation are limited to the cost of the operation. In construction, this is usually just a few percent of revenues. The second use of computer systems is to provide improved information or feedback for decision-making. The potential savings is the difference between the cost of a good decision versus the cost of an uninformed decision. Savings from better decision-making are difficult to evaluate, but the potential may be much greater than the savings from automation.

For automation strategies, examine how information is (or should be) transferred in your organization. Include any major exchange of information with customers, suppliers and other outside contacts. Look for large expenditures, then imagine how those operations might be automated. For decision making strategies, look for areas where managers are asked to make decisions with missing or unreliable information. Don't limit your thinking to major decisions, the best candidates may be situations where many minor decisions are made. Encourage everyone in your organization to make suggestions. Don't forget to consider enhancements to your existing systems.

For each suggested strategy, perform a quick analysis. Make sure you have tangible business goals and set a projected savings for those goals. Determine the projected cost to implement and operate the system. Don't forget maintenance and training costs. Estimate the time required to implement the system and its projected life. During the first iteration, these numbers may be nothing more than guesses. The idea is to generate lots of suggestions, then quickly focus on the most promising ones.

After analyzing all suggested strategies, prioritize them. Focus on the most promising and analyze them again in more detail. The goal is to spend most of your time analyzing strategies that you implement. For those, you should eventually develop all the implementation and operating plan elements mentioned above.

The last step in the planning is to develop operating plans for all existing systems. You may wish to do this before analyzing strategies. The only disadvantage with developing operating plans first is that they may change if you decide to enhance the system. Hopefully most systems will offer good opportunities for enhancement.

The completed plans should be merged with other corporate budgets and operating plans. This may generate some surprises. If you've been ignoring training in previous plans, your budget and staffing requirements will grow. If this happens, don't ignore it. If you over commit, the required work will get done but the optional work won't. Unfortunately, training, enhancing operations and implementing new systems all fall in the optional category. You risk making all the purchases, but never fully implementing the system.

Conclusion

You now have the *potential* to make your systems pay off. A sure way to lose that potential is to put your plan on the shelf and never look at it again. A sure way to reach the potential is to use the plan and track your progress against it. No plan is perfect and you'll have to make changes. As you make those changes, do two things. First, revise the plan. Operating outside the plan is just like discarding it. Second, try to determine why the plan had to be changed. See if there's a way to improve your planning process to avoid similar changes in the future.

Systems planning takes time, but it's minor compared to the overall effort required to implement and operate computer systems. The contractor who creates and uses a systems plan will have a clear focus on the potential benefits of those systems and a clear path to achieving those benefits.