DATAMART

Effective Phone System
Upgrade & Migration Strategies
Best Practices

TABLE OF CONTENTS

INTRODUCTION

There are numerous reasons that companies transition to newer phone systems ranging from business growth or contraction, relocation or expansion, new technology or obsolete technology. Whatever the reason, many companies find that the process of moving to a new system is seldom as simple as everyone would like. Challenges ranging from increasing business demands to ever-changing technological improvements make it ever more critical that "change teams" be thorough and pragmatic throughout the process.

The intent of this paper is to present key questions and best practices to help manage the process more effectively. The pages that follow will include effective strategies, best practices and key decision criteria, all intended to guide you through a successful transition. The key elements presented will include:

- **Needs Assessment**
- **Infrastructure Evaluation**
- **System Selection**
- **Project Planning**
- **Project Deployment**
- **Test & Troubleshoot**

Each of these points will be covered in as much detail as is practical and applicable to most medium to large sized organizations. With every stage of evolution in the telecommunications industry, these strategies continue to be employed on a daily basis by top performing companies. We hope that you will find them beneficial.

Sincerely,

Scott St. Clair
Keefe Bailey
Jim Boudreau
DATAMART, Inc.

NEEDS ASSESSMENT

Often times the situations that lead companies to update their communications systems create a sense of urgency that prevents them from doing complete due diligence. At best, it results in a series of "challenges" that arise throughout the transition. At worst it results in a poor choice of system and or a failed implementation that results in down time. All of this can be mitigated, however when a proper Needs Assessment is conducted by the transition team. The following will outline the key aspects of that process and the items that should be considered to ensure a successful transition.

WHY CHANGE TO A NEW SYSTEM?

Impetus for Change – A number of different events typically precipitate the move to a new system:

- New facilities (move/expansion)
- Consolidating operations
- End-of-Life of current system
- End of lease on current system
- Changes in organizational size/structure

Understanding the impetus for change and the resultant/expected changes in organization and/or facilities are critical to making a successful transition. Some key questions to answer:

- Will the organization's head count be increasing or decreasing?
- Will new facilities come in to play? Local or remote?
- What aspects of current system capability are crucial to ongoing operations?
- Is the transition to happen sequentially or in parallel with existing systems?
- How is the business expected to grow and/or contract over the next 5-10 years?

Evolving Business Objectives – Another critical component to the Needs Assessment process is analysis of the business's current and future business objectives, which are often very different from those that existed when the current systems were chosen:

- Is revenue stable, increasing or being managed down?
- Are customers being added?
- How extensive are customer relationships to manage?
- How well is capacity being utilized for customer contact activities?

Current System Capabilities – Evolving business objectives will often tax systems designed to support different staff levels and business methodologies than were in place when the system was selected. Features that were not important previously may now be of critical nature while others may have diminished:

- Voicemail (capacity, options)
- Call forwarding/re-direction
- Administration/management interface
- Auto-attendant(s), call answering

DEFINING CRITICAL DECISION FACTORS

Numerous factors often drive technology decisions. The challenge is deciding which of these factors are most critical to the company's long-term business objectives and prioritizing new system features accordingly,

Organizational Capabilities – Every organization places different demands on staff and, consequently, on their technology. These demands might often include:

- Improved productivity
- Ability to work remotely
- Improved collaboration

Call Processing Requirements – Companies with more intensive call center activities may place other demands on their systems:

- Call monitoring
- Call prompting/predictive dialing

System Features – Most technology solutions have feature lists so extensive that they are impossible to fully leverage. Most of these solutions, however, have certain feature sets where a given system excels versus others in the market. It is therefore crucial to decide which factors are most important to your organization BEFORE being influenced by vendor presentations.

Ease of Use – This is an aspect of most systems that is often overlooked, in favor of the "cool factor" that is highlighted in most system presentations. Before any system is selected due diligence needs to be conducted on the usability of the systems under consideration, including:

- Examination of administrative and user interfaces
- Test trials and demonstrations
- Review of documentation and other support resources

Specialized Applications – Many companies utilize specialized software applications ranging from Customer Relationship Management to Operations Tracking and Management. It is often desirable to have telecommunications systems integrate with these applications to improve call flow, event tracking and more. Key factors that should be examined:

- Integration with existing desktop applications, e.g. Outlook, etc.
- Integration with CRM/Customer Service applications
- Database integration capabilities
- Other programming interfaces to enable other integration, e.g. MAPI, TAPI, etc.

Technology – Technology is often thought of as "bells and whistles" but should be more closely equated with the implications of particular technological approaches:

- Network-based phone systems can utilize PC networks simultaneously to simplify infrastructure requirements and reduce cost.
- PBX – the ability to maintain anonymity of local extensions and maximize utilization of incoming and outgoing phone line capacity
- VoIP – technology to leverage the Internet as a telecommunications network to reduce long-distance calling expenses

- Modularity – the ability for a given system to "morph" through the addition of other components to place greater emphasis on specific functionality.

Scalability/Upgradeability – Current priorities often lead companies to overlook longer terms needs, potentially resulting in long-term limitations in capacity and/or capability. Key factors to examine:

- Ability/cost to add incoming and/or outgoing lines
- Ability/cost to add internal extensions
- Ability/cost to increase voicemail capacity
- Ability to update/patch internal firmware and/or software

System Performance – Directly related to scalability and upgradeability is performance. Most systems will function well under most circumstances. Most systems also, however, typically have limitations, limitations that arise only under particular circumstances. Unfortunately, most performance limitations are only revealed after a system has been in place for a period of time, making past customer references a critical element of due diligence when selecting a new system.

Manageability – Traditionally, phone systems have been designed to be managed utilizing specialized hardware and/or software, available only to certain, specially trained individuals. The cryptic nature of these "tools" often prevents companies from employing their own internal resources to manage systems, unless they invest thousands of dollars and many hours in training. In either case, the end result is ongoing maintenance expenses, even for tasks as simple as maintaining users, adding extensions, etc. In the course of due diligence, a number of points should be examined:

- System management interface – how does the administrator connect, what is the interface like and what do any necessary tools cost?
- Training – what training is available for internal resources for system management and administration?
- Support Resources – what documentation and/or human support resources are available to aid in the deployment and management of the system?
- Troubleshooting Tools – what software and/or hardware tools and documentation are available to address both user and administrative issues as they arise?

Ease of Installation – Installation is another critical up-front cost component. The most cost effective systems to implement easily integrate into existing rack management and cabling setups.

Cost Effectiveness – The cost effectiveness of a given system should be weighed in total, taking into consideration a number of factors:

- System deployment costs, including system cost, installation costs and infrastructure upgrades.
- Ongoing maintenance and support costs, both hourly/as-needed and contractually obligated.
- Ongoing productivity gains for management and staff.
- Ongoing phone service cost improvements gained through more effective utilization of available resources.

VAR Qualifications – The vast majority of small-to-mid-sized telecommunications solutions are deployed by local Value Added Resellers (VAR's) that can range in size from one-person consultancies to multi-million dollar companies with dozens to hundreds of staff members. Key questions:

- How long have they been in business?
- How large is the organization?

- What are the organization's skill sets/core strengths?
- How is day-to-day support handled? Remote management? Truck rolls?
- What hours are staff/support resources available?
- Customer referrals/recommendations?

DETERMINING SYSTEM SCOPE

In addition to the system capabilities mentioned above, the system scope must be examined to determine the size and capacity of system needed, including but not limited to the following:

Staff Levels – How many present and future staff members will require telecommunications capabilities? What levels are envisioned in 1, 3 & 5 years?

Location(s) & Proximity – Present and future facilities must also be examined:

- Physical buildings/plants, number, size and proximity?
- Number of staff members per location?
- Number of offices/cubicles/workstations located within each location?

INFRASTRUCTURE EVALUATION

One of the most often overlooked aspects of the transition to a new telecommunications solution is the cost and time involved in preparing the company's infrastructure for a new system with capabilities that may or may not have been envisioned when existing systems were deployed.

LAN TOPOLOGY

An examination of a company's LAN topology will determine a given facility's capacity for a new/upgraded system.

Centralized Switches – Telecommunications and/or network cabling, both incoming and outgoing should be centralized into a fixed location housing all network hubs/switches and connecting points.

Distributed – In the case of multiple locations, the methods of connection between them should be examined. Often times, upgrades to new connectivity technologies, e.g., MPLS, T1, T3, Radio, Free Space Optics, ATM, Fiber, etc. can lead to not only improved performance but also ongoing cost reductions.

POE Readiness – Many, newer telecommunications systems are capable of using computer networks to distribute calling capability, making a company's network infrastructure more versatile and cost effective. This will often require an upgrade to POE (Power Over Ethernet) hubs/switches to distribute power to extension phones and other resources.

Fiber – The increasing availability of fiber-optic services is creating opportunities for companies to dramatically improve the speed and capacity of their network and telecommunications connectivity. Taking advantage of his opportunity typically necessitates new wiring from "pole" to facility and requires careful planning and scheduling with service providers to ensure that all necessary infrastructure upgrades and system components are in place at the proper times.

Network Documentation – each aspect of the network also needs to be documented, including:

- Servers – quantity, ID's, etc.
- Operating systems, including revisions, level of updates, etc.
- Hosted software applications
- IP addresses
- Switches, routers, etc.

WAN TOPOLOGY

In the case of organizations with multiple locations, WAN topology becomes particularly important as it defines the interconnectivity between facilities. Particular factors that need to be examined include:

Bandwidth & Performance Requirements – An examination of the utilization of the current network, based upon number of users, voice & data traffic, etc., compared with forecast growth to determine the efficacy of the new system over the existing network.

QOS Capability – "Quality of Service" is a new requirement that accompanies most new telecommunications systems, particularly those that utilize data networks to carry voice traffic. QOS consists of a set of policies and parameters that prioritize voice traffic to ensure that high quality is maintained. With QOS configured properly the addition of voice traffic over a network does not impact data traffic.

Circuit Design, Configuration & Availability – To ensure that the new system is procured in the proper configuration, and that it will function optimally, it is crucial that the existing infrastructure be documented. This documentation should include:

- Network/system flowcharts
- Equipment lists specifying hardware and software model numbers, revisions, etc.
- Phone number catalog, including type (e.g. T1, POTS lines, etc.)
- Network IP numbering schemes, including all assigned addresses and subnets.
- Circuit types, numbers, capacities, configurations, etc. (e.g. T1, Frame Relay, MPLS, ATM, Fiber, etc.)
- Are adequate services available to support expansion and/or new facilities?

Documentation of Locations – Each location in an organization should be identified and documented. This documentation should include:

- Location addresses, building numbers, etc.
- Building blueprints and/or wiring diagrams.
- Existing system lists, including specific hardware and software, by location.
- User lists, including system access and privileges.

IP LOGICAL LAYOUT

As organizations grow and evolve they often outgrow the configurations of their networks. An IP addressing scheme that would easily support a network of 100 PC's may not be sufficient to support a network of 150 PC's plus network devices, a network-based communications system, etc. Key factors that need to be evaluated:

- Availability of IP addresses
- Level of subnet (e.g. 255.255.0.0 versus 255.255.255.0)
- Expandability across locations

PHYSICAL PLANT

Technology is often an afterthought when allocating space and location within a given facility, with equipment relegated to the last available "closet". This can, however, lead to substantial increased cost in system implementation and particularly in ongoing improvements/upgrades.

Physical Space – The physical space allocated to a telecommunications system should be:

- Sufficient to house all necessary telecommunications and network equipment (which should be housed together).
- Enough to manage all internal and external cabling.
- Enough to support airflow to ensure proper operating temperatures for all equipment.
- Enough to provide a workspace for system administrators and support staff.

Racks – Modern servers, network components and telecommunications systems should be properly mounted in system racks for a variety of reasons:

- Effective use of space
- Cable management
- Dust/static reduction
- Power management

Power Circuitry – Ample, reliable power resources should be available within network and telecommunications facilities.

- **Primary Power –** Primary power should be clean and filtered, certified by a licensed electrician as able to handle the loads of existing and future equipment. These circuits should also be isolated and separately grounded to prevent spikes and other destructive surges from passing from other circuits in the building.
- **Backup –** Backup power supplies should be installed based upon a company's tolerance for "down-time". This "tolerance" should factor in:
    - Availability and turn-up timing for backup generators.
    - Time to log users off of network resources before powering down servers.
    - Time and resources available to properly power down servers.

HVAC – Another often overlooked aspect of a company's infrastructure is the heating and cooling of network and telecommunications facilities. The high-performance nature of much of today's hardware generates heat that can increase the temperature in a "phone closet" by as much as 20-30 degrees. At best, systems will "de-clock" and slow themselves down to avoid hardware failures, but seriously impacting network performance. At worst, catastrophic hardware failures can occur. HVAC contractors can calculate extra heating and cooling requirements using the combined power supply capacities of the equipment housed in a given facility.

Existing Wiring – As companies grow and evolve, so typically does their wiring. A cable added here and moved there often adds up to a knotted mass of "spaghetti". This will add to increased installation and maintenance costs, and potentially to network reliability problems.

- **Punch Boards –** Are all punch boards organized, numbered, catalogued and mapped to assist installers and support personnel in system setup and ongoing upgrade, maintenance and support.
- **Cable Marking –** All network and telecommunications cables should be properly numbered, marked, catalogued and mapped to assist installers and support personnel in system setup and ongoing upgrade, maintenance and support.
- **Condition/Bandwidth –** Different grades of cable are capable of delivering different levels of network and/or telecommunications service. Existing and future cable installations should be evaluated against the goals and capabilities of both existing and incoming equipment and services.
- **Cable Length –** Different grades of cable lose their ability to transmit voice and data signals effectively over certain distances. This should be evaluated prior to deploying new technology to existing wiring.
- **Cabling Environment –** Cabling should be kept in an environment isolated from any and all sources of interference, including:
    - **Power Cables** – all network/telecommunication cabling should be run at least 24" from any electrical circuits and especially not run parallel.
    - **Lighting Fixtures –** light fixtures, particularly fluorescent lights, can create reliability issues with both phone and network cabling.
    - **Phone vs. Network Cabling –** major incoming phone circuits, particularly analog phone lines, should not be run in parallel or in close proximity to network cabling to prevent "cross-talk", a condition that can disrupt data transmission.

Access/Security – Most companies go to great lengths to protect and preserve critical resources, ranging from accounting records to checks, cash etc. The same consideration needs to be given to data resources as they often contain information that is no less valuable to a company's ongoing operations. Precautions should include:

- **Key/Card Access –** Access to telecommunications and/or network resources should be allocated on a strict "need-to-know" basis to management and staff. This access should, at the very least, be provided via locked door(s), however card access systems can closely monitor which individuals have accessed technology resources and on what occasions.
- **Video Surveillance –** Many companies choose to augment access controls with video surveillance to aid in both intrusion detection and enforcement.

SYSTEM SELECTION

Telecommunications systems are often chosen based upon "hot buttons" which can range from excitement over a new technology to a wish list based upon inadequate features in legacy systems. Care must be taken to balance "old issues" with "new wishes" objectively and pragmatically. Increasingly, the choice of a telecommunications system and its inherent capabilities is becoming a strategic organizational decision.

KEY FEATURES

If is often advantageous to create a "feature-set requirements document" prior to beginning the system selection process. This can be as simple as a spreadsheet listing and prioritizing key requirements for the new system.

System Features – System features should be weighed carefully against a pre-determined requirements document to preserve objectivity. While most of today's systems will provide a broad range of similar features, many place greater emphasis on specific features designed to benefit specific types of users. Feature-sets typically include:

- **Voice Mail –** voicemail systems can be evaluated on several criteria:
    - Number of voicemail boxes
    - Message capacity (number of messages & duration)
    - Remote access
    - Message options (in-office, away, etc.)
- **Call Routing –** many newer systems provide a great deal of flexibility in routing calls, including:
    - Call forwarding
    - Conference calling
    - Conditional routing (e.g. if out of office forward calls to cell phone)
    - Workgroup & call distribution across multiple locations
- **Call Monitoring –** useful for monitoring calls for security, training or customer service management

Ease of Use – The excitement that often follows a presentation of new features and technology will often overshadow downstream issues that a presentation may not cover, particularly ease of use. Any evaluation of a new system should include actual use of the system and its key functionality by the people that will use it day-to-day. This will ensure that a given system is intuitive and will also help determine the level of training that will be necessary after deployment.

Specialized Applications – Many of today's newer telecommunications systems are designed to integrate with other systems to improve not only communications but also organizational productivity.

- **PC Application Integration –** increasingly, systems are being designed to integrate with existing desktop applications, e.g. Microsoft **Outlook**, to take advantage of existing address books and other information to simplify calling and contact management.
- **CRM/Customer Service Applications Integration –** integration with CRM applications can help to track customer contact histories more simply and more accurately.
- **Database Integration –** the use of MAPI and TAPI interfaces are enabling more and more systems to use existing company databases to initiate and track calls and other related information.

Technology – Traditional telecommunications technology has remained fundamentally unchanged for two decades. Recently, however, new technological approaches have begun to be employed to improve manageability and integration with information systems and infrastructure.

- **Traditional/Legacy PBX Systems –** traditional PBX technology still forms the basic design of most systems, with a main "switchboard" managing traffic between outside telephone lines and internal extensions.
- **Network-Based PBX Systems –** a number of new systems have been introduced that utilize network cabling wiring and infrastructure to connect components. This dramatically reduces build out/expansion cost and complexity by utilizing a single wiring network for both computer and telecommunications technology.
- **VoIP –** new "Voice over Internet Protocol" technology is being used increasingly to use the Internet versus traditional "rented" lines to reduce long-distance calling costs.
- **Modularity –** as organizations become larger and more mobile, newer systems have been introduced that allow increased connectivity and expandability by the addition of new components. Traditionally, entire systems have had to be replaced to facilitate expansion.

Scalability/Upgradeability – While many companies expend a great deal of energy planning their future and the future needs of their organization, it is impossible to anticipate the "growth spurts" that often impact companies and tax their infrastructure. Most phone systems are designed to expand, but typically only within a set order of magnitude. Key factors to examine include:

- **Growth –** systems typically have specific capacity limits that, once reached, require an entirely different system, making the existing system insufficient if not obsolete. The key questions to ask are – "what happens when we exceed this system's capacity for…?":
    - Incoming lines
    - Local extensions
    - Auto-attendant
    - Voice mail boxes
- **Portability –** beyond capacity, portability is often a major consideration. If a company outgrows its facilities and is forced to move, it infrastructure must also be moved. How easily or expensively this is accomplished should be considered when choosing any new system.
- **Upgrades –** other questions to be asked relate to upgrades:
    - Is the system modular - can capacity and/or functionality be added?
    - What are the capacity limitations of a system, with or without expansion?
    - Do components and/or software support dissection, e.g. splitting an organization across multiple locations?
    - Is hardware and/or software upgradeable?

System Performance – Unfortunately it is very difficult to determine how a given system will perform in a given environment. Each of the system's capacities should be evaluated, however, to determine what the typical daily "use-versus-capacity" ratios will be. For example, if a system has 2,000 hours of voicemail capacity, how much will be used on a daily basis.

Manageability – One of the most common complaints companies have with their telecommunications systems is the manageability, or lack thereof. Most systems are designed to require specialized software or personnel to handle even the simplest maintenance. Key points to evaluate:

- **User/Management Interface –** does the system require specialized software for management and configuration? Does the system use a GUI (Graphic User Interface) or a CLI (Command Line Interface)?
- **Software/Equipment –** is specialized software or hardware required to connect to and/or interface with the system?
- **Level of Expertise –** what level of technical skill is required to do day-to-day maintenance?

Ease of Installation – Installation can bring other challenges that create cost, not only related to the telecommunications system, but also for upgrades to infrastructure:

- **Mounting Requirements –** Some systems require mounting to a wall, while others may mount in standard network/server racks.
- **Wire Management/Connections –** Does the system require specialized cables and/or connectors? Are connections made via jacks/adapters or individually wired and/or punched down?

Troubleshooting Tools – Most telecommunications equipment companies offer the hardware and software solutions necessary to maintain and troubleshoot their systems. These tools, however, are often only available to the VAR's and dealers that market their systems, preserving service income for their channel. Companies that desire to do at least a portion of their own system management need to ensure that these tools will be available before a system is committed.

COST COMPONENTS

When examining the financial impact of a new phone system the up-front cash outlay is often the major consideration when evaluating one system versus another. As with most technology, the TCO (Total Cost of Ownership) can be much higher once downstream costs are added in. Often times, systems that are more expensive to purchase initially are substantially less expensive in the long run. The key cost components that have to be weighed are typically:

Initial Hardware/Software – The initial cost of deployment, including:

- System Hardware
- System Software
- Installation/Configuration Labor
- Training Labor & Materials

Infrastructure Upgrades – It is not unusual for infrastructure upgrades to cost as much as the new system coming in. These costs can include:

- Structural/Facilities Upgrades
- Heating & Cooling Upgrades
- Wiring Upgrades
- Security Upgrades

Hardware/Software Updates – Many, newer systems can be upgraded to add new features or to patch system flaws. These upgrades are often provided only to clients paying an annual service fee, while some companies do make them available to any system owner.

Annual Service Agreements – Annual service agreements typically accompany the installation of any new phone system. These costs may or may not include:

- On-site Repairs & Updates
- Software Updates
- Hardware & Firmware Patches

Ongoing Service & Support – In addition to Annual Service Agreements, many systems, which are not easily managed by their owners, require day-to-day changes, maintenance and updates to be conducted by "trained service personnel". These "service calls" are often very expensive for even the simplest tasks (e.g. adding an extension) and are billed from the time the technician leaves his office until he returns, often with at least a 2 or 4 hour minimum.

COMPATIBILITY WITH EXISTING INFRASTRUCTURE

New systems also need to be evaluated based upon their ability to integrate with existing physical infrastructure, including, but not limited to:

Mounting/Location – A few key questions related to the structural/facilities requirements:

- **Mounting –** Does the system require racks or wall mounting?
- **Size –** How large and heavy is the system?

Heating & Cooling – Many newer systems run much hotter than their predecessors, requiring an examination of the ability of the system's location to handle its temperature requirements.

Wiring – Most older systems did not demand a great deal from their wiring. Newer systems, however, are charged with managing a great deal more traffic, often times requiring an update of the wiring in a given facility. It is too late, after a system is installed, to find out that the building's wiring was not sufficient for a particular system. Key criteria:

- **Bandwidth –** how much traffic can the cable handle?
- **Cable Configuration –** how many conductors/what grade of cable (CAT3, CAT5…)
- **Connections –** are the existing cable terminations/connectors compatible with the new system?

VENDOR SELECTION

Given the dependence most companies have on their telecommunications systems, it is crucial to select the correct vendor(s). This choice is often complicated by the fact that a number of different vendors, none accountable to the other, must come together successfully to ensure a reliable system:

- **Telecommunications Equipment Manufacturer**
- **Telecommunications Equipment Dealer/VAR**
- **Telecommunications Service Providers/Carriers**

Due Diligence – It is almost impossible to gauge in advance just how much better (or worse) the incoming system is going to be. The best approach to ensuring a solid decision is to conduct due diligence for all of the participants in the process:

- **Manufacturer –** Given that most phone systems are in place for up to 10 years or more, an equipment manufacturer must be chosen carefully. Key questions:

    - How large a company are they? (Sales, Employees)
    - How long have they been in business?
    - What are their service/support hours?
    - What other clients with similar requirements are they working with?
- **Dealer/VAR (Value-Added Reseller) –** Since most manufacturers work exclusively through dealers and VAR's, it is as important to select one that is going to be available and reliable for years to come:
    - How large a company are they? (Sales, Employees)
    - How long have they been in business?
    - How well do they seem to understand the particular needs of your business?
    - How well are they interacting with management & staff?
    - What are their service/support hours?
    - What other clients with similar requirements are they working with?
    - What is an example of a system deployment that did NOT go well? What went wrong and what was learned from the experience?
- **Client References –** For both manufactures and dealers/VAR's it is important not only to get references, but also to call them and gauge their experiences against your expectations.
- **Site Visits –** When and where possible it is extremely beneficial to conduct site visits of at the very least the dealer/VAR, and where possible the manufacturer and/or other client sites.

Certifications/Awards – Both manufacturers and dealers/VAR's should be evaluated against their peers on a number of other levels and criteria:

- **Certifications –** What certifications and/or endorsements have been achieved by the dealer/VAR and/or system manufacturer?
- **Awards –** What awards, if any, have the dealer/VAR and/or system manufacturer achieved?

INTANGIBLE BENEFITS

Another often overlooked aspect of a telecommunications system is the impact it has on the outside of the organization:

Customer Goodwill – No company can place a value on the goodwill it has with its customers. Something as simple as a good (or poor) phone system can impact a company's relationships with its customers on many levels.

Corporate Image – A company's overall corporate image is often affected in many ways by the technology that it selects, often best illustrated by the often unspoken questions asked by the company's primary stakeholders (customers, suppliers, employees & owners)

- How easy is it to reach people?
- Is the company forward-thinking?
- Does the company care about its customers?
- Does the company provide tools to its employees that make it easier to be more productive and to support the company's customers?

PROJECT PLANNING

The implementation of a new communications system requires thoughtful coordination and planning. There are numerous resources and purchases to coordinate, many of which are interdependent and involve moderate to long lead times. The more thoughtful the planning process, the more successful the implementation is likely to be.

THE PROJECT PLANNING PROCESS

Critical Path Items – The first step in any major project plan is laying out the "critical path items", that is the project tasks and deliverables that must come in on time for the project to stay on schedule.

- **Outline –** Any project plan begins with the development of an outline of all of the tasks that must be completed in the course of the project.
- **Responsibilities –** Each project task then needs to be assigned to the applicable resource.
- **Time/Timelines –** Each resource should provide an estimate of the time required to complete each tasks, including timing/timelines based upon resource availability. Lead times for product and/or service deliveries also
- **Key Dates –** Absolute dates need to be identified to provide an overall timeline for the project, such as move dates, service cutoffs, etc. Often times a project plan must work backwards from these key dates to determine when all other tasks must be started and completed.
- **Dependencies –** As important to the specific dates are the dependencies of each item on the plan, for example, services must be delivered before the system can be configured, power and cabling requirements met, etc.

Planning Tools – Many project plans can be presented via tools as simple as Microsoft Excel or Word. With increasing complexity of systems and infrastructure and interdependency of vendors and service providers it is often advantageous to take advantage of more comprehensive planning software like Microsoft Project and other project planning software. This software provides a number of key tools to simplify the management of a project and to highlight critical issues:

- **Project Outline –** Projects are entered into the system as hierarchical outlines of tasks and sub-tasks.
- **Timeline –** Each task has either a start date or end date assigned, along with a timeline for completion.
- **Resource Allocation –** Each task is assigned to a resource. Most project planning software will correlate task assignments for each resource against available time to identify conflicts.
- **Dependencies –** Task dependencies are also assigned to assess impact on the overall timeline of the project.
- **Reporting –** Most project-planning software will provide a series of reports, including Gantt charts, resource allocations and more to illustrate to resources their specific responsibilities. These reports are often used to identify milestones and responsibilities in service agreements to ensure all parties are accountable for their tasks within a project.

INFORMATION GATHERING

For a project plan to be accurate and for a project deployment to be successful, it is critical that it be based upon accurate information. Planning information related to task timelines and timing should not be taken on face value – it should be included as a comprehensive due-diligence item when suppliers and service provider reference checks are done.

Service/Circuits – Orders for communications phone service, often require substantial lead times of 2-4 months, particularly if they involve high-speed data communications lines, e.g. T1, T3, fiber, etc. Many service providers will assure their clients that these timelines can be relied upon, however this is a critical path item and those assurances should not be trusted.

Equipment Orders – Equipment lead times are typically not as cumbersome as other project plan components but again cannot be assumed.

Infrastructure Upgrades – Infrastructure upgrades can also add dramatically to the scope and scale of the project with many items beyond the control of the client, VAR and/or service provider. These items include, but are not limited to:

- **Availability –** Of sub-contractors, as well as the bidding process to identify the best of those available.
- **Permits –** Many jurisdictions will require permits for any wiring and/or HVAC upgrades.

System/User Topology – Many aspects of a new communications system can be pre-configured prior to installation and deployment. This requires documentation of the incoming systems topology, including:

- Users
- Phone Numbers
- Extension Number

PROJECT MANAGEMENT & COMMUNICATION

Even the best, most thoughtfully completed project plans can fail to be executed. A plan is only a road-map for project team managers and staff to follow. Successful project completion depends upon several key factors:

Contact List/Project Roles – All members of the project team must be able to communicate with the others. A formal contact list should be produced identifying not only contact information, but also formal project responsibility, alternative contacts, etc.

Vendor/Client Conferences – Communication is critical for the success of any project. Regular meetings and/or conference calls should be conducted to review the status of each item on the project plan, with adjustments made as applicable to timelines and responsibilities. This will highlight new critical path items and identify any resultant risks to the timeline of the overall plan.

Continuity/Contingency Planning – Key questions need to be answered and articulated within the project plan to address contingencies should key aspects of the plan not be completed successfully and/or on time:

- What if the T1's are not delivered on time?
- What if the equipment does not arrive on time?
- How long will it take people to become accustomed to the new system? Will there be a productivity drop that needs to be accommodated in resource scheduling post-deployment?

PROJECT DEPLOYMENT

The conversion to a new communications system often requires systems and/or services to be shutdown for a period of time as the migration is completed. Much of this will depend upon the level of diligence and detail that was dedicated to the development of the project plan.

PRIORITIZATION

Once developed and signed off by all involved personnel, contractors and vendors, the project plan should form the basis of all management and communication for the remainder of the project. It should be considered a "living document" that changes and is re-communicated to the project team as each milestone is achieved and/or schedule item is revised. Project tasks should be prioritized and executed based upon:

- Forecast timeline for acquisition/completion
- Level of risk to the overall project timeline
- Availability of resources
- Potential resource scheduling conflicts
- Access to facilities and/or service infrastructure

ORDER PLACEMENT

All product and/or service orders should be placed formally and documented. Documentation to and from all vendors and service providers should include:

- Product and/or service descriptions, separately identified and included as a line item
- Detailed specifications and/or reference to specific specification documents
- Terms and pricing
- Delivery dates
- Incentives and/or penalties for failing to meet schedule
- Warranties including policy documents and/or remediation

Carrier/Service Orders – This is a critical component that is central to the entire project. This cannot be emphasized enough if the deployment is across an enterprise and involves remote locations. Lead times and install dates of circuits can set the pace of the entire plan and likewise cause expensive delays. It is essential to have accurate and up to date information from the carriers. Know their lead times very early in the planning process and order circuits with allowances for carriers to run into the inevitable delays they encounter. Verify in writing to verify correct information, as they are hard to correct on the day of install. They key to successful delivery of carrier/service order is to **order early and to expect delivery dates to change, invariably longer than promised**.

Infrastructure Upgrades – A properly configured infrastructure forms the foundation of any communications system. It is essential that any upgrades/expansion is in place and complete before the deployment of the new system begins. Key risk items to consider when placing orders:

- Availability of contractors/resources
- Overlap/dependence upon other contractors
- Permits, regulatory compliance processes

- Availability/lead time of supplies and/or specialized components
- Availability of customer technology staff

Hardware/Software –- Key considerations when placing equipment and software orders:

- Lead times from the manufacturers
- Safety and storage capacity of the destination
- Allow time to upgrade and configure before shipping to destination site
- Direct shipment of non-configurable components to deployment site.
- Shipping costs

INFRASTRUCTURE UPGRADES

Proper attention must be given to the upgrade and preparation of all aspects of the communications system's infrastructure. Poor execution on this element of the project can dramatically increase both short-term and long-term project cost as extra trouble-shooting and remediation becomes necessary.

Wiring Upgrades – Communications systems only function well as the wiring in a given facility. Many legacy systems are wired over traditional 4-wire or CAT3 cable, which was sufficient for traditional analog/PBX systems. Many newer systems, however combine voice and data services and will function more effectively over updated CAT5/6 cabling. These requirements should be reviewed with vendors in advance to identify any special requirements (e.g. CAT3, CAT 5/6, shielding, plenum rating, etc.). It is also critical that all cables are thoroughly tested not only for pure functionality, but also for performance and/or interference. Any problems should be dealt with well in advance of the system installation.

HVAC – Modern communications systems, like all computer equipment, require the proper operating environment to ensure proper operation and system longevity. It is particularly important when a communications system is involved due to high uptime expectations. Cleanliness and neatness do matter. Clean power, good access front and back, proper grooming of power and data cabling, temperature and humidity are important factors.

Power Upgrades – Clean power equates to reliability. Backup power equates to up-time. Both are necessary for a successful deployment of a new system. Proper consideration must be given to all components of the new system, not just the system itself. Clean, redundant power also needs to be provided for routers, modems, circuit blocks and any network switches integral to the system's functionality.

Rack space – New systems typically are more compact than what they are replacing however don't overlook the likelihood that the new equipment might be better off in a different location (e.g. a communications rack vs. a wall mount). It is necessary to assure that adequate space is made for the new equipment. Also note that both the new and old systems may be operating for a period of time and redundant space may be necessary during the transition.

CARRIER READINESS

TELCO Lines – Verification at all stages of the Carrier Circuit order installation process is extremely important. Remember, to a carrier "installation" date does not mean the circuit is ready to use. Track the order, order acknowledgement, install date and turn up date. Identify any problems along the way. You may have to adjust implementation plans if the carrier has a delay.

Parallel Services – Business continuity may mean that certain carrier services are duplicated for a period of time. Take care to coordinate the transition and overlap of services to minimize cost but most importantly allow for slippage of dates on new circuits so you are not left with a service gap.

NETWORK READINESS

Many newer systems integrate with company networks and/or wiring to provide increased functionality and to simplify deployment and management. When deploying any new system, these factors must be weighed and understood, particularly as it applies to network utilization and/or upgrades. Depending upon the level of network integration/utilization consideration may need to be given to the following factors.

IP Structure/Routing – Newer, network-based communication systems typically require some LAN reconfiguration, e.g. QOS implementation, VLAN, etc. The reassignment of IP addresses many also be necessary to allow for growth and to build a true routed environment. These upgrades are beneficial on several levels as data performance improvements usually result.

Quality of Service (QOS) – QOS is a process that is typically different for each network. The common thread is that it involves all routers (including those in the carrier's network) and Ethernet switches, as well as the components of the new phone system. In a coordinated effort all of these devices should be configured to recognize voice packets as the highest priority and transport them throughout the network in that manner. This will assure consistently good voice quality with little or no impact on data traffic.

WAN/LAN Performance Assessment – Once QOS is configured on a network it must be tested to prove that it is working optimally. QOS becomes critical if two or more sites are being deployed, particularly in an enterprise-level environment. Software tools can be used to simulate voice traffic – ideally over the production network prior to the installation of the new phone system. These tests will ascertain whether or not the WAN circuits are properly configured for QOS and have the carrying capacity for the desired amount of voice traffic. Further, it will identify problems and provide the opportunity to correct them and establish the level of performance prior to live deployment. Good test results equate to good voice quality.

SOFTWARE CONFIGURATION

Communications systems vary greatly in the level of complexity and/or tools necessary for configuration and testing. User interfaces range from simple web-based interfaces to complex CLI's (Command Line Interfaces) that require special programming languages and/or software tools. Not only does this play a role in the configuration and testing of a new system, it impacts downstream maintenance and management cost.

In the case of new system deployment, some systems can be pre-configured off-site while others can only be configured and tested in their permanent deployment location. In either case, it is critical that the end customer be involved in the configuration process, particularly for the following key components of the system:

- **Extensions –** a complete list of users and their corresponding extensions must be provided and configured.
- **Work Groups –** any work groups and/or departmental segregation must be identified and configured.
- **Call Flow –** must be documented and factored in to call routing and auto-attendant configuration.
- **Policies & Privileges –** higher level users, e.g. administrators, operators, etc., must be configured and privileges determined and configured.
- **Auto Attendants –** auto attendants must be recorded and configured to ensure proper call routing.
- **Messages/Greetings –** must be configured and recorded for all users, mailboxes, etc.

SYSTEM INSTALLATION

The actual installation of the system requires coordination and diligence, particularly if any old equipment is being replaced, and/or is being run in parallel with the new system.

Project Staging – it is typically advisable to set up a staging area to ensure the efficient assembly and deployment of equipment, phones, etc. This space should be secure, clean, free of traffic and have access to power and network communications.

Cabling – Assuming that all infrastructure wiring has been properly upgraded and/or tested, cabling is often simple, involving one or more of the following components:

- Punch-down connections and/or Amphenol connections between POTS phone lines and phone systems.
- Separation and punch-down of fax machines and other dedicated lines.
- CAT5/6 patch cords between network components and/or between T1 circuits and routers.

Equipment Installation – Different phone systems use different mounting/assembly methodologies, ranging from wall-mount to free-standing to rack-mount. This must be identified prior to deployment to ensure that the proper infrastructure is in place, whether it be a plywood mounting wall, work table, 2-post rack, 4-post rack, etc. Regardless of the particular installation methodology employed, a number of factors must be considered:

- Proximity to power connections
- Cable management/cable lengths
- Strength of mounting hardware/necessary screws, brackets, etc.

SYSTEM CUTOVER

The "cutover" to a new system involves the transfer of carrier services and any applicable wiring to the new system. The complexity of this process and the resultant down-time will depend largely upon how well the project has been planned, and upon a number of factors:

- Are multiple carriers available in-bound and out-bound? If so, can each carrier handle all traffic so that one carrier can be maintained on the old system while another is deployed on the new system?
- Can the company withstand down-time? If so, when and for how long?

Careful coordination must take place between all project team resources to ensure that the cutover is smooth and that downtime is minimized.

Carriers – service carriers (telephone companies) need to have personnel available and scheduled at the cutover time to manage the process and troubleshoot any issues that arise. This is especially critical if T1/data lines are being re-routed from one circuit to another, or if traditional phone lines (POTS lines) are being re-routed from one locale to another. This can be more challenging if a company cannot afford to make the cutover during normal business hours.

Project Team – it must be assured that all necessary team members are present during the cutover to ensure that all components are functioning properly and that all necessary tasks, from cable connections to system installation are handled expeditiously.

DOCUMENTATION & TRAINING

Once a system is installed, it must be documented and the organization trained. This will ensure the least possible disruption to the company's operations during the period of transition.

Documentation – documentation for a new system happens on several levels:

- User documentation, including user manuals, system manuals, etc.
- Network/system documentation, including network diagrams, equipment lists, user lists, station/jack assignments, serial numbers, etc.
- Training manuals, CD-ROM's, etc.

Training – every member of an organization should receive some level of training on the new system. This training should be conducted separately based upon application, e.g. administrators separately from operators separately from user. Training should be conducted in group sessions of 6-8 people and take from 4-8 hours depending upon the complexity of the system and the features utilized. Training sessions should also have sufficient equipment present to ensure that it is substantially "hands-on".

TEST & TROUBLESHOOT

Before taking any new communications system into production it is crucial that all elements of the system are thoroughly tested and issues prioritized and addressed.

TELEPHONE SERVICE PROVIDERS

Every outside calling/phone service should be tested and documented individually, tied back to the project plan and network diagrams. Key test components:

- Can carrier services calls be generated to each circuit? Priority should be given to thorough testing of the main inbound number and the related call flow programming, greetings etc.
- Verify that all published outside numbers (main switchboard, “800” numbers, DID, fax numbers, departmental numbers such as Service, Sales, etc.) are working properly and being routed properly through the phone system. Make sure that lines hunt properly across a telco hunt group.
- Calls can be placed to local and long distance destinations?
- Is Caller ID being sent outbound properly and received properly?
- Can interoffice calls be placed between all locations and is quality consistent and high?

INSIDE ROUTING/FUNCTIONALITY

Phone system functionality testing begins with testing basic phone system features i.e. transfer, conference, caller ID, etc. A representative sample of desktop features should be tested from a group of phones to determine that features are working properly.

A thorough exercise of any customized call routing and programming should be performed. i.e. Auto attendants, workgroups, departments, dial by name directories, greetings queues, etc. to determine that not only do features work but work under normal load.

Voice mail should be tested at the desktop and via remote access.

It is important to note that much of this call flow testing can only be performed after cutover so it is important to have a checklist which reflects all the call flow programming that was done. Once the system is connected to the outside world or other company sites, go down the checklist sequentially.