Stimulating Your Fiber Deployment: Planning the Life Cycle Management of Your FTTH Rollout

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Setting The Stage

Finance, equipment and buildout overshadow operational needs of a FTTH deployment in the early stages of a project. On first consideration, this makes perfect sense because as a percentage of capital expenditure, the OSS is insignificant when compared to the cost of fiber, equipment and labor. With the benefit of experience, another perspective emerges which we will explore. The importance of the operational system surfaces with the need for critical information to drive sales, market services, turn up new services and restore lost services. Keeping existing customers is as important as winning new customers. Planning for the life cycle management is explored in this discussion with a focus on seeing the benefits of an operational system that is integrated across applications used by all departments. Special consideration is given to the value of visuals and how they aid in decision-making and use of the data from the OSS.

Project Life Cycles

There are various representations of projects throughout their life cycle. Many are circles emphasizing the iterative nature of some projects. Others look like Gaussian distributions as they chart the resources, effort or volume of sales. Since our goal here is not to become project management experts but to improve the planning we do for the life cycle, we will keep it simple. Many of you may ascribe to the principle of KISS (Keep It Super Simple) which is a guiding principle for this effort. We will look at four simple stages as the framework for our project discussion. Figure 1 illustrates the stages we will use: Plan, Design, Build and Operate.

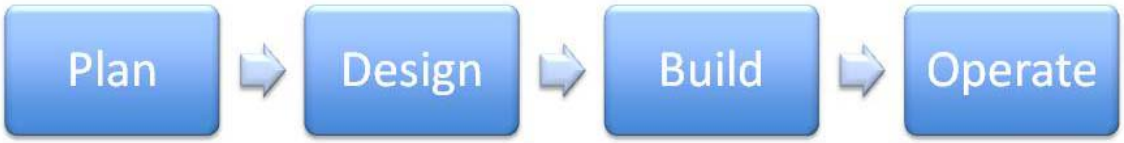

Figure 1

First Things First

Management of the entire life cycle is our focus and there are at least three aspects of management that work together for success.

Vision – what do I want to accomplish?
Planning – how can I best accomplish it?
Action – doing it

Vision is a picture in the mind of the finished accomplishment. For many of you who are starting a fiber project, that accomplishment is a plan that raises the investment required to launch your project. For others it is a design that lays out the details for how every subscriber links to your network operations. For some others it is the satisfaction of running cable through every pole or conduit on the drawing. The perspective I want to share from today is that of a completed operation which is generating sales and delivering services that pay back the capital investment of the project.

Let's begin with the end in mind. To put first things first, we have to put last things first, which is to say we start with the operational systems as illustrated in Figure 2.

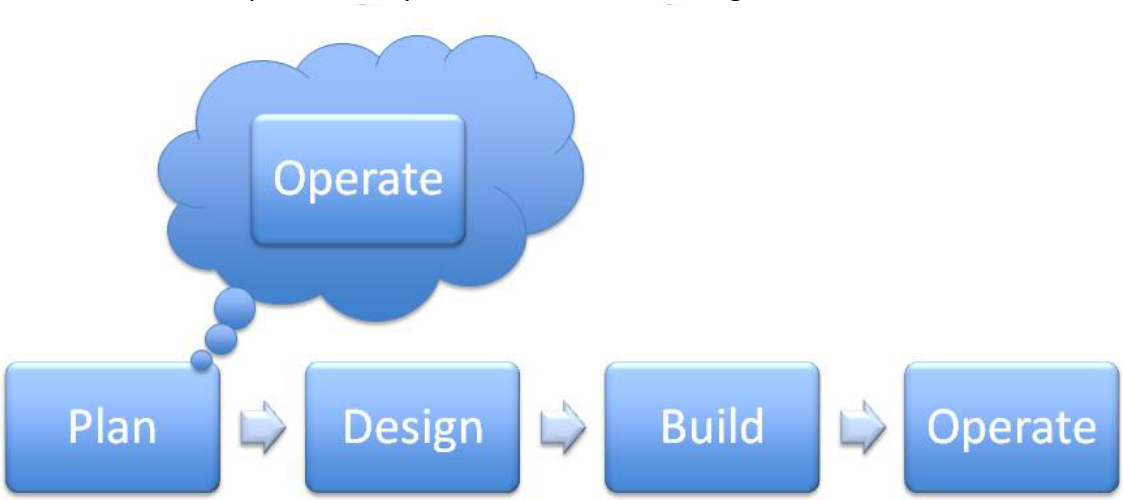

Figure 2

As Figure 2 suggests, I have a firm belief in communicating visually. As we discuss planning over the entire life cycle, I hope to bring you to agreement that the power of communication is greatly enhanced by visuals. The application of this idea to our discussion today is that the systems you rely on to run your operations are better and more intuitive if they are visual. With the demands for information processing by employees today, faster decision-making is a crucial part of efficient delivery of services. Whether raising funding for a project, defining details for engineering review, tearing up roads and ground or provisioning new services, sharing information visually results in quicker understanding and reduces the chance of miscommunication.

Operational Readiness

Let's begin our planning improvement by visualizing how we want the operation of our fiber project to take place. The "operational readiness" quiz gives you the opportunity to look at

some of the real life situations that will occur throughout the life cycle of your project and consider how those should best be handled.

Operational Readiness Quiz

- Does it take more than one step for a change in fiber usage to be reflected in your fiber records and maps?
- Does it take more than one person to determine whether capacity on a particular fiber exists?
- Do your network monitoring/management personnel have to call an OSP tech to identify the physical location of a fiber or to identify what fiber a circuit is on?
- Could you have fibers or circuits providing service to customers who are not being billed properly?
- In the event of a cut, do your CSRs know which customers are affected before they start calling in trouble reports?
- Do you maintain a separate set of fiber maps and/or records, independent of your copper or coax records?
- Are your splicing diagrams or records maintained in a different format than your OSP maps and/or records?
- In the event of a cut, do your technicians call back to the office to learn which fibers to splice first?
- When your technicians do an OTDR reading, do they manually add up back spans from maps in order to locate the end point?
- If your company leases dedicated fiber or dedicated capacity on fiber, do your technicians know what accounts are served by each fiber, or the level of QoS guarantees?

  If you answered "Yes" to any of these questions, you have an opportunity to improve the operational plan for your fiber project and accelerate the return on investment through greater efficiency.

Operational Considerations

There are new operational realities in the highly competitive world of FTTH based communication services. This competition has implications for customer service and network expectations. Customers have little loyalty to services so customer interactions become high risk/reward opportunities for building loyalty. The ability to give a live answer with the correct information during a single call is a competitive advantage that builds customer loyalty. Of course, no amount of loyalty will keep customers from leaving a network with poor performance or availability. That is why an operations system that minimizes downtime and maximizes the amount of information available to a customer service agent is crucial.

Another consideration for operations is the ability to support revenue generation. Fiber projects are capital intensive and require aggressive sales and marketing efforts. Operations has the critical plant information that determines when new infrastructure is truly ready and

available to come online. Knowing the current status of a build allows the marketing efforts to match demand to capacity. Set too high an expectation for availability and you disappoint the market. Wait too long to begin marketing efforts and you not only miss revenue but give competitors more time to react.

While superior customer service, network availability and aggressive sales are all good reasons to prioritize operational considerations in your planning, they are not the most basic. Bringing new services online is the most basic reason to prioritize operational considerations in your planning. One of my clients said, "The information system is the driver for all engineering, construction and fiber assignments. Without this, you will be dead in the water at the time you rollout services." While another said, "The struggle is not in the equipment design or getting it in the field but in the operating and plant systems." Which is not to say that design or construction are easy or trivial, but that these tend to be better resourced with more attention due to their costs.

The bottom line for one client is the aspect of the operating system he calls facilities management. He says, "Incorporate Facilities Management at the very beginning. THIS IS THE MOST IMPORTANT PART OF THE BUILD." (His emphasis, not mine) He suggests the following questions as you consider your operating environment.

- How will you provision and manage the new equipment?
- Will you need a new server?
- Can your plant records system track it?
- Can your mapping system map it?
- How will you monitor and manage it remotely?

Silos of Information

These questions point out that the operating system is not a singular system. Multiple systems are in use by different departments that have important impacts on the efficiency and effectiveness of the operation. Billing, accounting, network management, service desk, trouble ticket, dispatch, vehicle tracking, CAD, mapping, and circuit management are some examples of the many systems, that as a composite, form the organization's operating system. Each department has a system that is optimized to meet their needs but typically does not communicate outside that group. People bridge the gaps. Phone calls, emails, text messages, meetings and paper work are all means of bridging the gap between the systems and expertise housed in each department. Siloed information is the typical description of this type of a structure which is illustrated in Figure 3. Each process between departments becomes a series of handoffs that may or may not be traceable in any of the systems.

Silos of Information Separate Data By Department

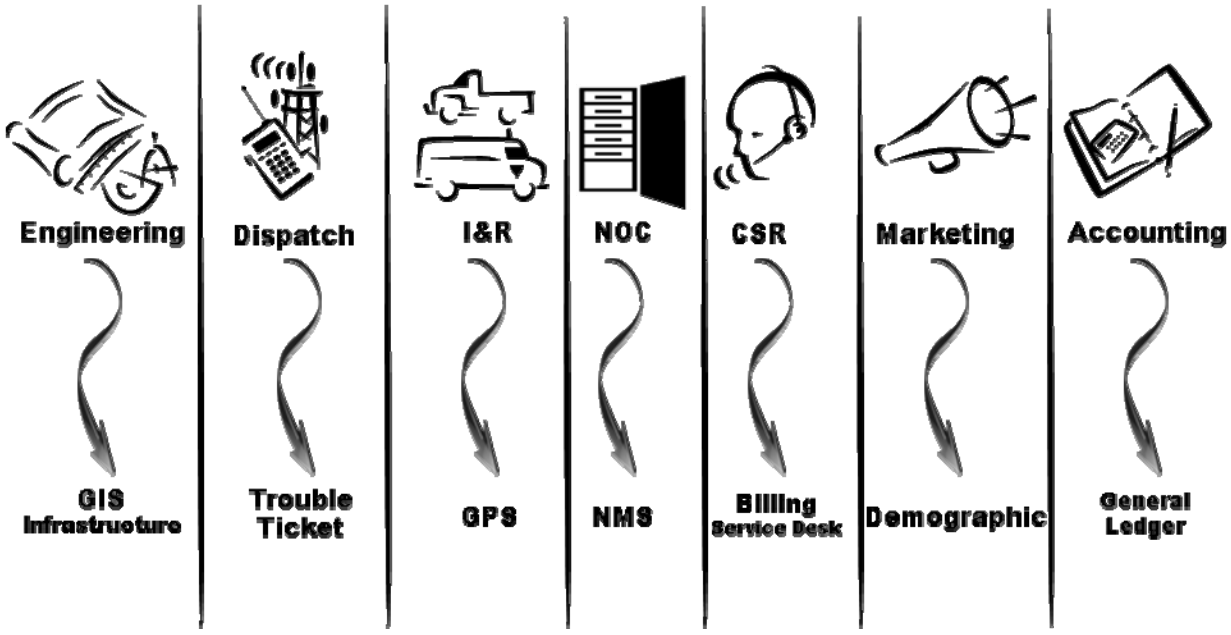

Figure 3

These types of systems lead to a complex and confusing exchange of information. As an example, consider the number of interactions required to plan a circuit proposal in a siloed organization. Figure 4 illustrates 10 steps between a customer request for a circuit and the customer response to the proposal. The time elapsed between the request and quotation is a significant factor in the customer's perception of the organization's competence and professionalism. The provisioning process is a common bottleneck in this process due to the amount of information that is required to confidently tell a customer the cost of a service and date available. The number of quote requests is far greater than the number of sales or service orders that actually complete. So there is a substantial amount of time drawn from NOC, CO and OSP engineering that can be reduced or eliminated if the provisioner has access to the plant resources that are available.

Confusing & Complex Information Exchange - Operational Scenario: Circuit Proposal

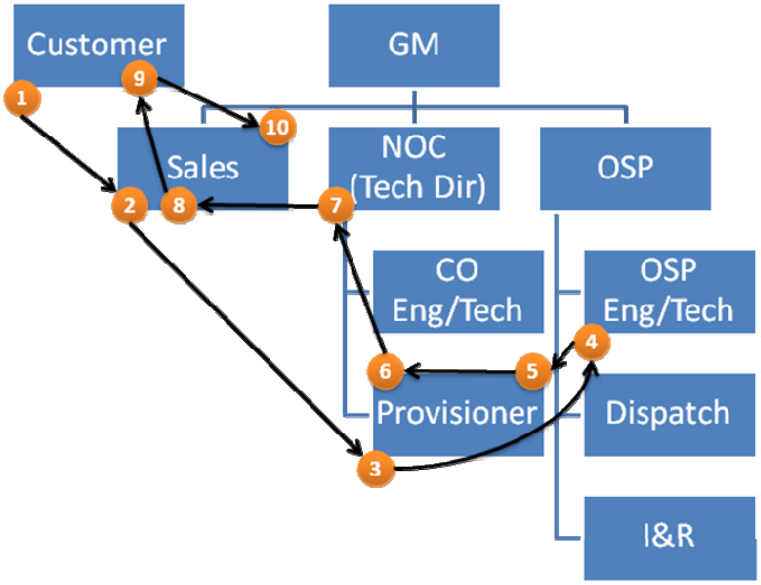

Figure 4

1. Potential customer requests a service quote for a circuit
2. Sales creates a proposed service order (SO)
3. NOC Provisioner reviews SO to start a "CO Plant Order" for data from other groups
4. Provisioner requests OSP Eng for OSP resources (existing & proposed) to customer location
5. Provisioner requests CO Eng for DLR (Design Layout Report, i.e. ISP resources) to connect circuit type to OSP
6. Provisioner creates "CO Plant Order" identifying service, customer, DLR and OSP resources
7. NOC Tech Director approves "CO Plant Order"
8. Sales develops proposal and presents quote for services to customer
9. Customer decides on service
10. Sales approves or cancels the service order

Integrating the OSS and plant management systems may eliminate up to three steps in developing a circuit proposal. Instead of relying on manual interactions with other departments, the provisioner is able to determine a possible route for the new service. Figure 5 illustrates the streamlined workflow which is possible through the integration of the OSS systems. Steps 3-5 are eliminated when the provisioner can access the availability information directly without risk of damaging the data integrity. Of course, where existing infrastructure is not present, a provisioner may still have to call on an engineer for a construction order but they will be able to provide detailed information that makes specification of the construction quicker.

Integrated Systems Reduce Complexity and Eliminate Steps in Workflow

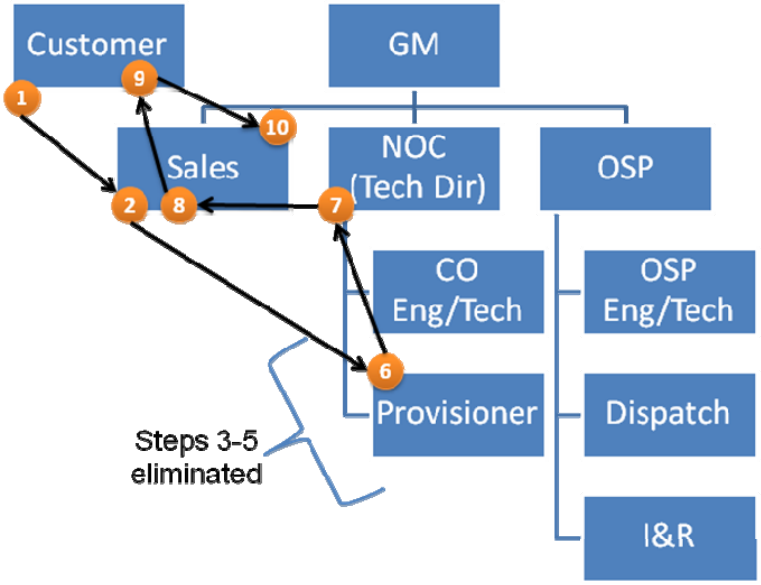

Figure 5

This is only one of many operational scenarios that benefit from eliminating communication silos. Integration between your OSS and Plant systems improves the customer service image to your customers by giving them access to the fullest information available. Figure 6 illustrates how a centralized repository ties together multiple OSS systems through integration. Such integrations enable people to access the information they need to do their job without communication delays being introduced by other departments. Across the top of Figure 6 are the groups which access the centralized repository. Across the bottom of Figure 6 are the various systems used by the departments in their day-to-day work. The centralized repository consolidates and correlates information from all the applications through integrations, then presents that information to the departments in a format tailored to their function.

Almost all areas benefit: for instance, Dispatch has the ability to identify the best, closest resource for a trouble call and other areas can see who was assigned. Customer service benefits from the ability to see who's affected and handle calls more quickly as a result. Engineering benefits from the ability to quickly locate OTDR traces, check fill rates or easily provide accounting with detailed inventory reports for CPR records.

Integration of Information Into a Central Repository

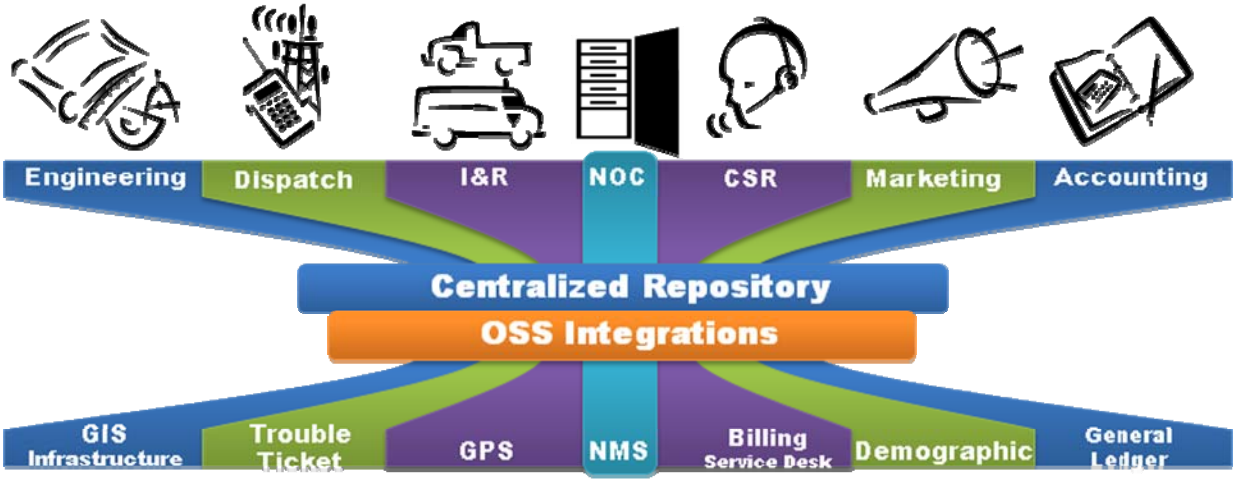

Figure 6

These capabilities and others like them create operational benefits across the entire company that improve efficiency in many scenarios. The overarching need for departments to share critical, real-time data company-wide can be met through the integration of the B/OSS and plant systems. Employees can gain unparalleled visibility into the network to see immediately who is affected by an outage, which allows companies to minimize service disruptions in a competitive field. The end result is to boost subscriber confidence and loyalty, reducing customer churn and improving satisfaction.

Let's consider a specific example in a siloed organization where marketing needs to target prospects with the correct service offerings available in their service area. Figure 7 illustrates a series of seven steps that are required for marketing to have a list of qualified targets. Marketing must request the customer list from the billing system, a CSR must retrieve the information and then send the information back. Then Marketing must contact Engineering to learn what services are available at each of the locations which are not already customers. Engineering reviews their GIS, plant and infrastructure records to determine what services are at the locations, then returns the information to Marketing. Marketing is now in a position to assemble a list of the qualified prospects for particular services and initiate a campaign to increase take rates.

Qualifying Prospects in a Siloed Organization

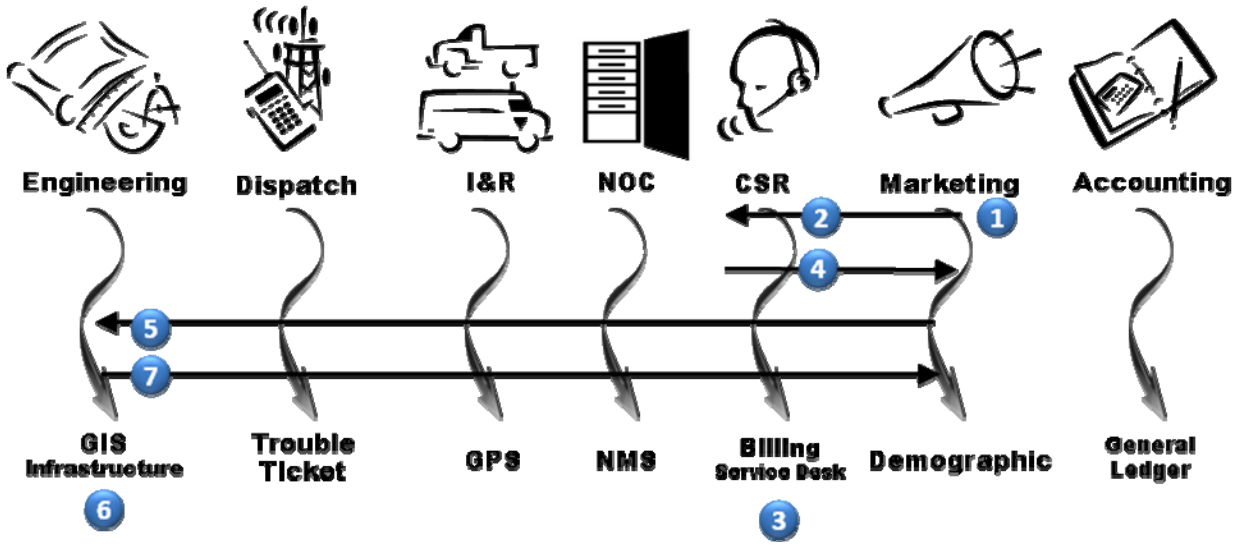

Figure 7

In an integrated organization, Marketing has no obstacles to access the information on either the prospects or the plant. Figure 8 illustrates how Marketing can draw the customer list from a centralized repository and service qualification by location without depending on other departments to work in their request. All of this information can be presented in geographically accurate representation to allow analysis of take rates by serving area.

Qualifying Prospects in an Integrated Organization

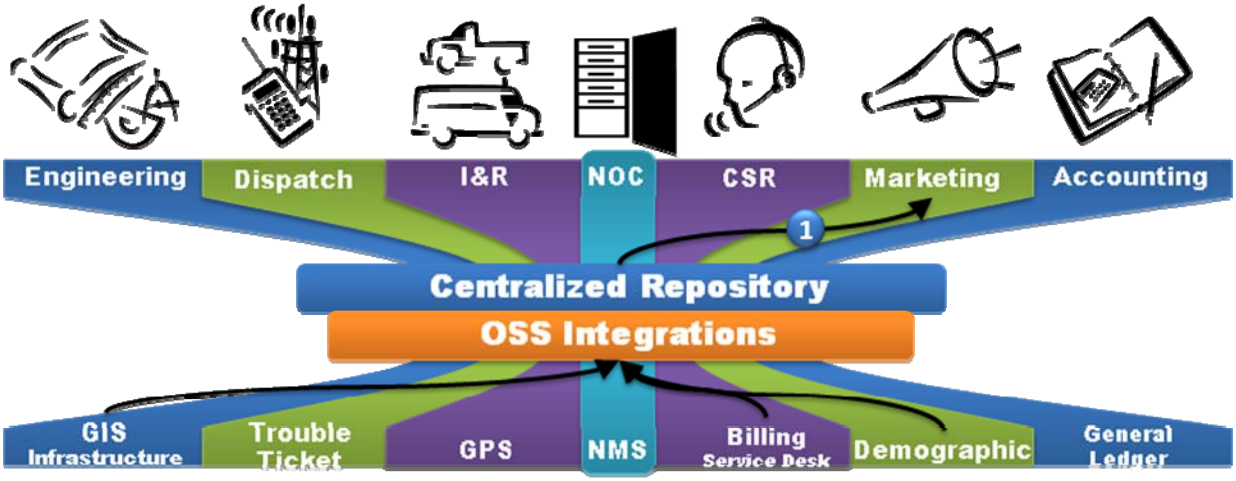

Figure 8

To create operations that can deliver the financial results demanded by capital-intensive projects in a competitive landscape, planners of fiber projects must balance the resources spent on design and construction with the necessary, up-front effort to define the many systems in their OSS and bring them together in a unified, central repository of information that is

accessible company wide. In the pressure filled planning stage when attention is demanded by the financial taskmasters of a large, expensive project, ignoring the details of the operational systems invites poor execution at the revenue generating stage when the quality of project planning comes to light. Answering the questions raised by our clients and implementing a centralized repository of information from the project start lowers the risk of a failure when customers are ready to come online.

Planning Considerations

Hopefully you are now convinced that an operations system which gives access across departments, visualizes data in graphic formats, and creates a central repository of information is the way to manage the operations. Let's look at how such a system is useful for the other phases to understand that the payoff of an operations investment takes place through all phases of the life cycle. But just a minute now you may be thinking, the operations system won't be running when I am planning. For a new CLEC that is just starting, there may be no operations systems at all, but all other companies have some existing OSS and plant systems. Changes at most companies are like trying to fix race cars without taking them off the track. Even if you are a new company, should you take the advice of my clients, you will start small and work in incremental phases, which means you would be working in a phased project management life cycle as illustrated in Figure 9.

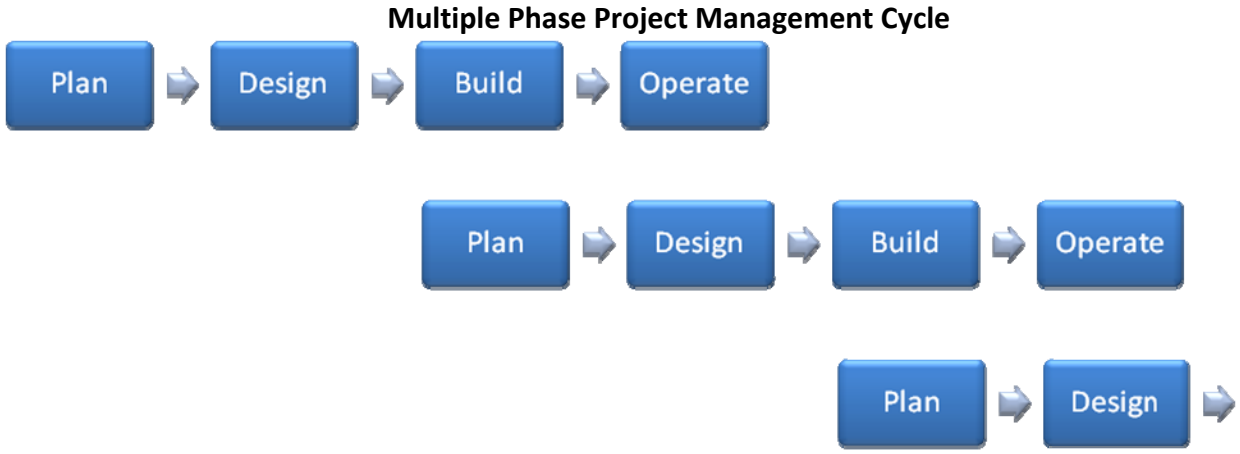

Figure 9

When a project is broken up into multiple phases, the planning and design in latter phases runs in parallel with live operations. Once you are working in incremental stages or "starting small to allow learning" as my client put it, you accrue knowledge and experience from prior stages. For example, in the initial stage of a project, you must rely on the take rate estimates based on other companies. In the latter stages of your project you have actual take from your own area.

In your plan, include time for learning. Set up a warehouse area where employees can practice new critical skills like splicing and ONT installation. One client actually set aside an entire week where every employee was trained in splicing and ONT technology in order to generate better teamwork through the excitement over the new technology.

The fiber cable is the most important decision because everything else can change on the end points to increase the amount of information passed and it is superior for bi-directional communication. Of course with a FTTH audience, that doesn't need much explanation. The need for a large capital budget is well understood and to a lesser degree, the need to overplanning capacity. One client completely sold out their 10-year plan in two years whereas another has already filled 8 of 9 channels on capacity they expected to last forever. So, they are already designing a DWDM solution to increase their capacity. One of the most difficult aspects seems to be to anticipate the bandwidth explosion – will it be a firecracker or something more "nuclear"? So be sure to include a "best case scenario" in your plan that is bigger than you think is reasonable.

Talking with similar companies may be the best input for properly sizing your capacity. Location based data is another input you may want to include. Demographic and customer information are two examples of data best viewed by location that can help your capacity evaluation. Looking at the business locations and population densities on a geographically accurate map can help in planning areas served in each phase of a multiphase project. Household income data and take rates are additional location-based data that will influence the planning. Using a system that includes aerial photography insures that major obstacles such as roadways and bridges are considered. A good operations system can bring all this information together in a single repository to support your planning. A variety of departments can benefit from this information. For instance, engineering can use the information for design; accounting for continuing property records; and marketing for developing target lists for campaigns.

Some additional considerations suggested by clients are to know and follow all applicable regulations, know your competitors and don't forget that for video systems, content acquisition and management is a significant effort unto itself. Perhaps the most critical of all is to synchronize your build stages and sales launch. An aggressive sales program is demanded by the size of the financial investment so timing demand creation (i.e. generating buzz) is critical. Build demand too early and the audience doubts your ability to deliver and competitors will have a field day. Build demand too late and you delay revenue and risk lower take rates.

These considerations which were recommended by clients will help you to keep the entire project in view as you plan your fiber project. Let's turn our attention to the design stage to review some additional considerations and recommendations.

Design Considerations

The best advice on design is to hire a good engineer or engineering company. We have clients who do both. Deciding on your approach to design is a good subject for discussion with friends at similar companies and the FTTH conference is a great place to make those connections. One of our clients recommends that you in-source the core design and build of your network. Of course, that is because he was able to hire a great engineer. He estimates that he saved

approximately 30%. The next client I spoke with said he always uses an engineering firm. I see the decision is most likely driven by the access you have to people with the domain knowledge.

The first design decision is the technology. Get the "Right capacity the first time!" says one client. With a FTTH audience, this is the easy part. The right capacity will be delivered over fiber cable and all the way to the home or premise. "All the way" is the right distance from a capacity viewpoint. Nothing else insures future-proofing like fiber cable. As one client says, "Broadband is just the beginning. FTTH is the end game."

Another design decision is whether to standardize. Standardization of design criteria incorporates the specifications in such a way as to constrain what engineering will implement. There are many tradeoffs to consider in topology, active/passive, distributed or centralized splitters, buried or aerial. Standardization lays out detailed guidelines for engineering, i.e. specifics on things such as loop lengths, loop locations, pedestals, drops & terminals. Drops are a significant unknown in rural communities and can be a surprise cost addition, so be careful with converting entire service areas. "Do I have to convert all?" is a good question to ask. You may end up with significant drop costs that do not have new revenue associated with them.

The biggest decision in many respects is the equipment. The clients I talked with suggest visiting companies that have the equipment you are considering. Is the equipment vendor proprietary or standards based? Look at your vendor's road map. Do they deliver on time? Look at the lead times on products. Do they use distributors? Is there value you get from the distributor? Is the equipment at the beginning of its life cycle or at the end? Is the vendor financially stable? Are they likely to be bought? These are the types of questions my clients ask when selecting their FTTH equipment and vendor.

As an operations-focused guy, I'm going to take an aside here to ask what the engineers need to ask from their OSS software. One of my clients said that "the investment is too big to be managing it with excel spreadsheets." What I understood him to be getting at is that the relationships throughout the network of fiber connections are too complex to manage in software that is not specifically designed for it. So what should your OSS and plant system be able to do and to handle? It should improve your design workflow, generating quick cost estimates by reducing planning steps. If the software can reduce drawing time and construction order time, it will help to maximize your efficiency in engineering. Clearly the design software needs to allow you to layout your fiber routes and place racks and equipment. Moreover, if you can specify your splices, patch panels, splitter connections, conduit and ducts, you are on your way to completely documenting your FTTH project in a way that will be easier to build and maintain. Splitters are an important element to track and trace that are not easily handled. Skipping details like these means more questions from construction and operations once the project is built. And a final word of encouragement on engineering is to "Stay disciplined, plan the work and work the plan!" One client calls it "blocking and tackling."

Before moving onto Build Considerations, let's look at how an integrated OSS can support design, as well as improve the build, operate and plan stages. If you are planning a CLEC build, you can start with the demographic information overlaid on a land base for the target areas. Then you can do "what if" designs to show which homes and businesses are reached by various equipment types and placements. For the design alternatives, you can estimate the return on investment for a variety of take rates and ARPU levels. With this range of variables, you will better illustrate the impact of design alternatives and the importance of the variables on payback. Then the real benefit of this approach is that you have the design work done and your chosen alternative becomes your prepost design which provides your staking sheets for construction. Ultimately, after construction notes are added, the posted design becomes your as-built, with no redrawing. Then marketing and sales have access to the same structures and demographic data to create target marketing lists, track take rates, and track ARPU.

Build Considerations

If the construction work order is as thorough and complete as described in Design Considerations, the build will be smooth, right? Not necessarily. There are many rules to follow, particularly in the area when you are working with other utilities. Be humble is the recommendation because other utilities can slow you down. By following the rules, you will minimize those delays. Keeping complete documentation of your communication about specific assets is one way to speed those interactions. Having a central repository of information is key to preserving important files such as right-of-way documents and easements. With such repository in place, it opens the door to many things like reducing risk by capturing pre & post trenching images. Such documentation may be vital in the case of damage claims or lawsuits.

Another way to reduce risk is to spend the time up front to get your team comfortable with new requirements. Splicing and ONT installation are two key areas to plan for training.
As you start your build, expect your construction order to be available both in print and electronic forms. This allows you to not only see more information but to be able to drill down into information not typically on a print and to make field notes electronically, saving you time back at the office.
A key contribution during the build is to set the proper expectation for as-builts. Too many details are lost during the build primarily due to schedule pressure. The ongoing cost of operations is very dependent on the quality of information, and short of an audit, that information must come from the build stage.

Summary

Al Uhryniak, a former Telco GM, is fond of saying, "If you always do what you've always done, you'll always get what you've always got." Take a word of advice from our clients and try some of the suggestions they've made to see if you can improve your results. The quality of your project plans will show up in the daily operation. Project plans that include the complete life cycle perspective will provide more useful guidance to engineering, capture better as-built

information from the build, launch sales efforts at the correct time and operate more efficiently. Integrated OSS and plant systems provide better visibility which can lead to higher productivity, response times and customer satisfaction. Finally, integrated systems which share data in geographically accurate context communicate the richest information content to speed decision making and enable improved productivity. Good luck on your next project.