Texoma Medical Center
Denison, Texas

Temecula Valley Hospital
Temecula, California

UHS®

Lean Project

DELIVERY GUIDE

Cumberland Hall Hospital
Hopkinsville, Kentucky

Springwoods Behavioral Health
Fayetteville, Arkansas

UHS

Lean Project

DELIVERY GUIDE

Dear Healthcare Development Team Member,

On behalf of the entire UHS Project Delivery Team, welcome! You have been invited to this project for your unique talents, and you will be challenged to use them fully, as well as to develop them as we work together. *This project is very, very different from any other project you have worked on.* We expect that you will assist us in "breaking down the silos" and in reducing waste of traditional project delivery.

Trust: Talk straight. Demonstrate respect. Create Transparency. Right wrongs. Show loyalty. Deliver results. Get better. Confront reality. Clarify expectations. Practice accountability. Listen first. Keep commitments. Extend trust.

Learning: Ask a lot of questions before starting any task. What are the conditions of satisfaction? What are the expectations of my work? What is the target cost of the system I am working on and can I reduce that? What performance indicator is affected by this task? How might I add value to this project? What innovative concept could help improve the delivery of healthcare, or eliminate injuries during construction and operation? How can I reduce task duration? What can I do to ultimately improve the quality of care or the total cost of ownership? Listen to others for understanding and admit when you need help. If you know everything already, it will be hard to succeed as a part of this team.

Collaboration: Collaborate with people from other companies and disciplines. There are many intelligent people that you will have access to everyday. If you are a designer, then work hand-in-hand with a specialty builder. Communicate openly and frequently about how to best solve a problem or develop a system before we draw.

Innovation: Be as innovative and creative as possible. You are hereby given permission to think "outside of the box". Question the norm and challenge everyone on the team, regardless of position, company affiliation, or tenure.

Lean project delivery is about focusing on delivering value while reducing waste throughout the system. Working together to identify and reduce waste enhances everyone's value proposition. This goes beyond lower cost for the owner to include enhanced profits for partners, more timely delivery, better quality, and more satisfaction for all. We at UHS believe that all partners in the project should make a fair profit and that the team should develop on-going relationships that they enjoy.

As you will read further on, UHS's mission statement states, "to provide superior quality healthcare services…" We look to our healthcare facility development teams to incorporate this important thought throughout their work as they focus on delivering value to UHS and our extended customers.

We expect our development team to care about the operations of the facility long term; taking into consideration energy consumption, maintenance, the number of employees needed to service patients, the number of nurse steps and other such factors. Operationally, we look to our teams to Value Stream map and implement other lean approaches to improve the efficiency of our facilities while enhancing the quality of experience for the customer.

Taking this into consideration will make for rewarding relationships and positive outcomes for this project and for the people who will deliver and receive care in the future. Thank you for working with us to improve care delivery by enhancing the way a project is designed and built.

Sincerely,
UHS Project Development Team

2
Understanding Your Client (UHS)

UHS Mission Statement

To provide superior healthcare services that: Patients recommend to families and friends, physicians prefer for their patients, purchasers select for their clients, employees are proud of, and investors seek for long-term results. We will realize this vision through our commitment to the following principles:

Service Excellence
We will provide timely, professional, effective and efficient service to all of our customer groups.

Continuous Improvement in Measurable Ways
We will identify the key needs of our customers; assess how well we meet those needs, continuously improve our services, and measure our progress.

Employee Development
We understand that the professionalism and drive of our people are the most important factors in the quality of the service UHS provides. We will hire talented people, increase their skills through training and experience, and provide opportunities for personal and professional growth within the company.

Ethical and Fair Treatment of All
We are committed to forming relationships of fairness and trust with our patients, the physicians, purchasers of our services, and our employees. We will conduct our business according to the highest ethical standards.

Teamwork
We will work together to provide ever-improving customer service. This team approach to our work will supersede traditional departmental organization and create a true customer focus. People at all levels of the organization will participate in decision-making and process improvement.

Compassion
We will never lose sight of the fact that we provide care and comfort to people in need. The patients and families who rely upon us are fellow human beings, and they will receive respectful and dignified treatment from all of our people at all times.

Innovation in Service Delivery
We will invest in the development of new and better ways of delivering our services.

UHS Staff Expectations

UHS staff is committed to creating a "WOW" experience!

Treat Everyone as a Guest
I make a positive first impression and continue that positive impression through ongoing efforts.
I anticipate the needs and expectations of all customer groups.
I will display service recovery skills.
I am responsible for resolving customer dissatisfaction without assigning blame.

Associated Behaviors
Always say "Please" and "Thank You"
Greet guests with eye contact and a smile

Demonstrate Professionalism and Excellence in the Things I Do
I deliver excellence that goes beyond departmental and individual job responsibility.
I am proud to sign my name to what I do.
I demonstrate professionalism in how I look, what I do, and what I say.
I hold myself accountable – I am a positive role model.

Associated Behaviors
Always wear your name badge
Use language appropriate to the situation and the guest

Practice Teamwork
I participate in decision-making and process improvement, regardless of my level within the organization.
I communicate effectively within and beyond my assigned team.
I focus on the problem or issue, not the person.

Associated Behaviors
Always end an interaction with the guest by asking, "Is there anything else I can do for you?"
I hold myself accountable for getting the information I need to know to do my job

3
Why Lean?

The American healthcare construction industry is in crisis. The industry is struggling with skyrocketing costs, poor quality, skilled labor shortages and employee dissatisfaction— all symptoms of deeper problems inherent in the system itself.

More and more construction industry professionals are realizing the imperative of improving quality and safety and eliminating waste as strategies for responding to the challenges. Enter Lean Construction, the "how to" of managing change, and creating continuous improvement.

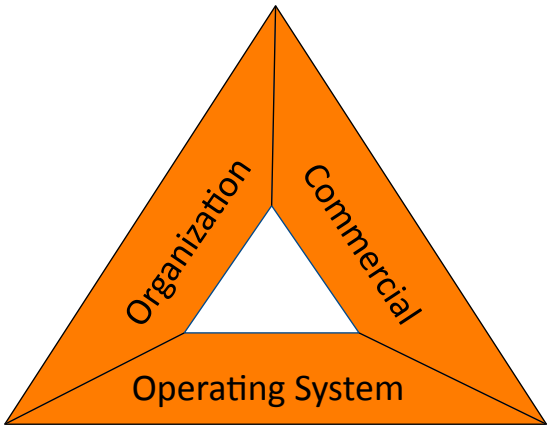
Lean Construction (adapted from the Toyota Production System) is not just another project delivery model: it's a way to transform your entire organization into a safe and high-quality, high-performing project delivery system.

Lean project delivery entails deep collaboration. It means collaborating with different parties and in different ways than used on more traditional projects.

"Collaboration dramatically improves team performance. Most teams collaborate with varying degrees of success, but by incorporating Collaborative Project Delivery teams can greatly enhance their effectiveness. Collaborative Project Delivery brings principles, structure and tools to enable collaboration to become an integrated system in which all team members are working together. It is a system that keeps teams mindful and purposeful about collaboration resulting in greater successes and more personal reward. Individuals can gain the skills necessary to work effectively in teams." **– InsideOut Consulting, Inc.**

Fundamentals of Lean:

- To understand ***value*** from the customer's perspective and to only take ***actions*** which deliver that value (thus eliminating waste).
- Waste is disrespectful
    - to humanity – squanders scarce resources
    - to individuals – adds work
    - to clients – adds cost/time/aggravation
- Become a leaning organization through relentless reflection and continuous improvement as a team. It entails continuously analyzing the work and the team's processes to improve them. Status quo is never acceptable.
- Lean is about inspiration and empowerment. People are empowered to affect decisions and the work itself which not only delivers better projects, but leads to heightened satisfaction for all.
- Lean is about developing ***principles*** that are right for your organization & diligently practicing them to achieve high performance. It is not about ***imitating the tools*** used by Toyota in a particular manufacturing process.



The Lean Construction Institute ***www.leanconstruction.org*** refers to 3 domains of a project as equal sides to a triangle:

Commercial
The commercial terms supporting the project

Organization
How the delivery team organizes

Operating System
The system by which the team delivers

The **commercial** terms used by UHS teams are per Consensus Docs 300 for Integrated Project Delivery. This addressed in more detail in Section 5.1

Lean project teams **organize** in a flat, collaborative, cross-discipline, responsibility-based manner. This is addressed in more detail in Section 6.3.

Lean **operating system** consists of lean principles, behaviors and tools. This guide addresses all of these throughout but focuses on lean as a system in all of Section 6.

Important Note to Reader:

You are about to embark on a challenging yet fun journey. Shifting to lean delivery is referred to as a journey because it is exactly that! It entails learning step by step how to do things differently. It truly is a shift to new behaviors and thinking to form new habits. It entails change and change is never easy. But it can be fun and the outcome can be rewarding in many ways. The best advice is to relax into the new ways, open up to new ideas and processes, enter into it with an adventurous spirit and have fun. It is important not to become overwhelmed by the changes, especially with being presented with this guide. Back to the concept of the journey – one must learn one step at a time!

Learning Resources:

"Toyota Way", Jeffery Liker

Appendix 1 Why Lean? Presentation by Universal Health Services William Seed

4
Collaborative Communication

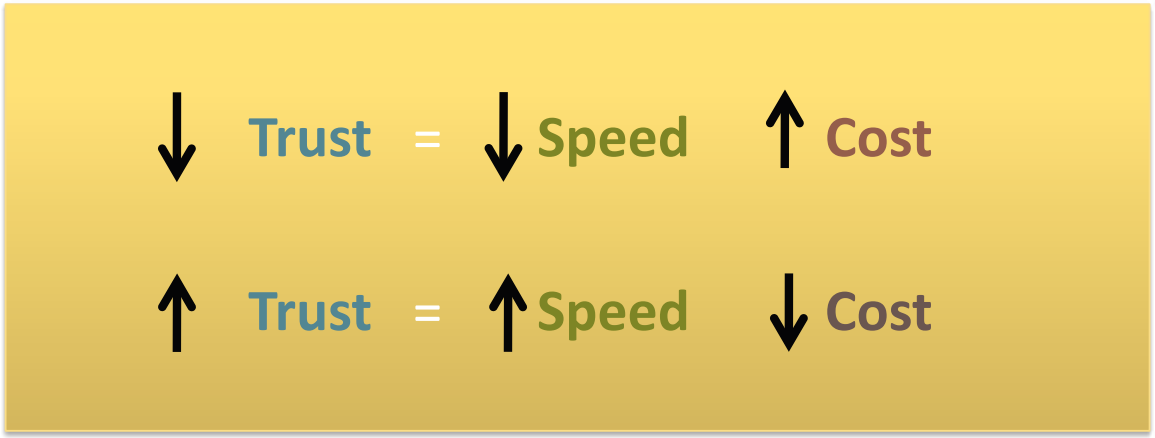
4.1 Trust, Trust, Trust!

Lean/Collaborative project delivery is dependent on building deep trust throughout the team. Trust does not just happen but must be consciously built and begins by understanding how it is connected with 3 assessments that others are making:

1. Sincerity – ethical
2. Competence – operational
3. Reliability – need history

If teams start with an assumption that everyone on the team is sincere in their efforts for the greater project, and that they are part of the team because they are competent in their specialty, or they would not have been chosen to join the team, then the opportunity is to build trust through being reliable. Being reliable means making clear, complete commitments and managing those commitments well.

The following diagram from Steven M. R. Covey's "The Speed of Trust" indicates the importance of trust:



YouTube – Stephen Covey – Leading at the Speed of Trust
http://www.youtube.com/watch?v=igyxxYShXYo

4.2 Conditions of Satisfaction

All projects are a network of promises, commitments, or agreements. The promise to deliver the project is a big commitment that is delivered by people in network of commitments. A promise is not a complete promise unless it has clear, agreed-to "Conditions of Satisfaction" (CoS). Project teams must develop written CoS for their project in collaboration with the Owner and Key Stakeholders of the project. CoS are measurable statements that tell the project delivery team what tests a project must pass to be accepted as a success. They should be posted in the Big Room for all to share in understanding.

Conditions of Satisfaction are critical in the way projects are planned. See Section 6.2.1 Collaborative/Pull-planning.

Hand-in-hand with trust is a view that **contingency** represents a lack of trust. Every person and company that is involved in projects builds in contingency. Why? Because they are uncertain about what is going to happen during the project. Uncertainty is a form of lack of trust. Contingency is waste on a project, yet it is a major part of traditional delivery. It shows up in time, costs and space. Driving out uncertainty is critical to lean delivery. Identifying risks as a team and developing strategies to reduce or eliminate risk is the job of a lean team. But it takes being open with information – ALL information.

Learning Resources:

Appendix 2 Conditions of Satisfaction Examples for other UHS projects
GW Evolution of Conditions of Satisfaction

Appendix 3 Action Workflow Diagram

"The Speed of Trust", Steven M. R. Covey

"Crucial Conversations", Kerry Patterson

5
IPD Agreement (Commerical Terms)

5.1 Consensus Docs 300

UHS implements Consensus Docs 300 as the base document to form the Agreement for Integrated Project Delivery. The agreement is signed jointly by a minimum of the Owner, Architect and Constructor. Other Trade Partners or Key Contributors may be invited to be partner signers of the Agreement. The Agreement requires the team to deliver the project using lean methodologies.

It is quite different than traditional contract agreements in that it is a *relational vs. a transactional* contract. It is based on building trust, being transparent and open and on the signing parties making decision regarding how they are going to act. It requires collaboration per the agreement:

> 3.2 COLLABORATIVE PROJECT DELIVERY The Parties agree that the Project objectives can be best achieved through a relational contract that promotes and facilitates strategic planning, design, construction and commissioning of the project, through the principles of collaboration and lean project delivery. This approach recognizes that each Party's success is tied directly to the success of all other members of the Collaborative Project *ConsensusDocs 300 (Standard Form) Page 5 of 47*
>
> Team and encourages and requires the Parties to organize and integrate their respective roles, responsibilities and expertise, to identify and align their respective expectations and objectives, to commit to open communications, transparent decision-making, proactive and non-adversarial interaction, problem-solving, the sharing of ideas, to continuously seek to improve the Project planning, design, and construction processes, and to share both the risks and rewards associated with achieving the Project objectives.

The traditional idea of "control" on a project by certain individuals is no longer appropriate. Management and decision-making is by a Management Group:

> 4.1 MANAGEMENT GROUP The delivery of the Project shall be managed by the Management Group, which shall serve as the decision-making body for the delivery of the Project and shall employ collaborative methods for achieving the highest quality and most efficient and economical delivery of the Project. The Management Group shall be comprised of an authorized representative of the Owner, the Designer and the Constructor. The original Management Group may invite other critical project participants to become members of the Management Group, for purposes of advancing the overall collaborative approach and the best interests of the Project. Any party added as an additional Management Group member shall be entitled to participate in all Management Group functions and shall have a right to vote on Management Group decisions that directly concern that party's work and area of expertise. The Management Group may also vote to remove non-original Management Group members from the Management Group.

It is recommended that new teams perform a Study Action Team™ to lean about the agreement with a shared understanding. See Appendix 20, Another Approach to Project Delivery: Creating a Shared Mind.

5.2 Choosing Your Partners /Management Group

As stated above, the Integrated Project Delivery (IPD) Agreement is a relational contract. It describes HOW the team members will act, make decisions and manage the project as a collective entity. Therefore choosing partners who will operate in this way is imperative to the success of the team and project. From Consensus Docs 300:

> 3.4 COLLABORATIVE RELATIONSHIP The Parties each accept the relationship of mutual trust, good faith and fair dealing established by this Agreement and covenants with each other to cooperate and exercise their skill and judgment in furthering the interests of the Project. The Designer and Constructor each represents that it possesses the requisite skill, expertise, and, as applicable, licensing to perform the required services. The Owner, Constructor, Designer and all members of the CPD Team agree to adhere to principles of collaboration based on mutual trust, confidence, good faith and fair dealing. Within the scope of their respective expertise, the Parties shall together actively and continually pursue collaboration in the best interests of the Project. The Parties shall endeavor to promote harmony and collaboration among all Project participants.

Notice the reference to the parties acceptance of a relationship of mutual trust, good faith and fair dealing. This is the basis for choosing partners for the project. The team must be comprised of members who trust each other, are willing and interested in operating by lean approaches, who will contribute to the team through innovating and problem-solving as a whole, and who will focus on optimizing for the good of the project as a whole. This is very different than choosing partners based on a fee structure.

UHS has developed a preliminary questionnaire that can be used during the interview process. It is attached in Appendix 5. It is expected that teams will add to the list for themselves and other teams in order to continually improve the interview process.

IPD projects are managed by the signors of the agreement who form a **Management Group.** It is important that teams learn to make decisions by consensus, hence the name Consensus Docs. Per the Agreement, a Management Group is the management body or the delivery of the project. It is often also referred to as the Core Group.

> 4.1 MANAGEMENT GROUP The delivery of the Project shall be managed by the Management Group, which shall serve as the decision-making body for the delivery of the Project and shall employ collaborative methods for achieving the highest quality and most efficient and economical delivery of the Project. The Management Group shall be comprised of an authorized representative of the Owner, the Designer and the Constructor. The original Management Group may invite other critical project participants to become members of the Management Group, for purposes of advancing the overall collaborative approach and the best interests of the Project. Any party added as an additional Management Group member shall be entitled to participate in all Management Group functions and shall have a right to vote on Management Group decisions that directly concern that party's work and area of expertise. The Management Group may also vote to remove non-original Management Group members from the Management Group.

5
IPD Agreement (Commerical Terms)

Frequently Asked Questions about a "Management/Core Group"

These answers are based on and supported by the Integrated Agreement for Project Delivery between Owner, Architect, CM/GC and MEP/FP Engineer (IAPD) prepared for a project team working on a hospital project.

What is a Core Group?
The Core Group includes representatives from the Owner, Architect, CM/GC and MEP/FP Engineer. They provide "governance" for the project – in other words – resolution of cost and schedule questions, resolving personnel conflicts, making sure the goal of collaboration is met and generally setting the strategic direction of the project. The representatives must be close enough to the project to understand the needs of the various parties and senior enough in their own organization to be able to commit resources as required. The Core Groupfunctions in a very open, frank, collaborative way – this requires a certain "chemistry" within the group for it to function effectively. It also implies that there is no "hierarchy" within the group – all are equal in stature and value and all opinions are considered.

Why do we need a Core Group?
The IAPD establishes a fundamentally different way of operating. **The parties agree to establish a relationship to jointly deliver the project.** The Owner does not buy a design from the Architect and a constructed plant from the CM/GC with all the details, specifications and conflicts inherent in that transaction. The goals of this relationship are: collaborating throughout design and construction with all members of the Integrated Project Delivery (IPD) Team: planning and managing the Project as a network of commitments; optimizing the Project as a whole, rather than any particular piece; and tightly coupling learning with action (promoting continuous improvement throughout the life of the Project). The Core Group provides the leadership and "governance" to see that these goals are met.

What does the Core Group "do"?
The Core Group provides "governance" of the project. This being said, there are some specific responsibilities that they must fulfill:

- They must insure that the IPD Team implements and uses a Production Control System (such as Last Planner System®.) The Core Group will encourage all IPD Team members to make "reliable promises," realistic requests, understand constraints and work to improve the planning system.
- They will closely monitor the team's schedule and cost performance. Both of these are critical to all team members, especially when incentive programs have been put in place. The Core Group's responsibility includes review of a preliminary cost model, the SD Cost model, the project estimate and approval of overruns. • The Core Group shall oversee development of design documents, including milestone schedules and the use of CADD techniques. • The Core Group selects the remainder of the project team. They do this in conjunction with the CM/GC and use various methods ranging from "team, qualifications and fee" proposals to lump sum bids. The Core Group may choose to eliminate or add additional contractors as the project proceeds.

How often does a Core Group meet?
The Core Group typically meets bi-weekly. Some Core Groups have found that at certain times during a project weekly meetings are more appropriate. It is suggested that on a quarterly basis, senior staff or management from the parties attend the Core Group meeting to better understand the progress of the project.

How does a Core Group make decisions?
The Core Group will try to make all decisions by consensus.

Can a Core Group change over time?
Yes, new members can be added or removed by the original Core Group. This would typically happen as the project progresses and an organization's role was begun or completed.

If there is an impasse in the Core Group, how is the issue solved?
In the event of an impasse, the Owner may give directions that it believes are in the best interest of the project.

Can an Owner overrule the Core Group?
There is a detailed "Dispute Resolution" procedure described in Section 41 of the IAPD that provides a means to resolve contentious issues that is similar to that included in more standard contracts. Section 41 also stipulates that subcontractors who are not a party to the IAPD must agree with the resolution procedure.

What is the relationship between the Core Group and Lean Contractors?
Lean Contractors are those brought on to the project as Trade Contractors and later awarded a subcontract for design and/or construction services. These contractors will participate in incentive programs and agree to fully support the goals of an integrated project delivery program. The Lean Contractor staff participates in weekly IPD Team meetings, utilizes the production control system and are considered an integral part of the integrated project delivery model. The Core Group will, on a regular basis, invite the senior leadership of these contractors to participate with them in reviews of the project progress. These reviews will include assessments of the contractor staff performance, the current schedule status and most importantly the financial status of the project as it reflects on the availability of incentive funds to be awarded at project completion.

5.3 Executing the Agreement

Executing the IPD Agreement takes time. It is a VERY different form of agreement and companies should take appropriate time to understand the agreement. It is highly recommended that the signors all read the agreement in sections and come together (phone is fine) to discuss in segments to gain an mutual, shared understanding of what is being signed. It is ideal to have these conversations coached by a facilitator that understands the agreement.

Teams usually work together through a Validation Period (See Section 6.2.3 Target Cost) to determine a Target Cost in which they have confidence that they can deliver. Alignment to a Target Cost is imperative to signing the IPD Agreement. UHS project teams are funded to deliver work through Validation under letters of agreement. Fees for service are determined and tracked openly during this phase. Teams must sign the IPD Agreement prior to submitting for Permitting of the project, unless otherwise agreed to with UHS Management. Initially a pull-plan should be developed to take the team through Validation.

Learning Resources:

Appendix 3 Copy of Consensus Docs 300

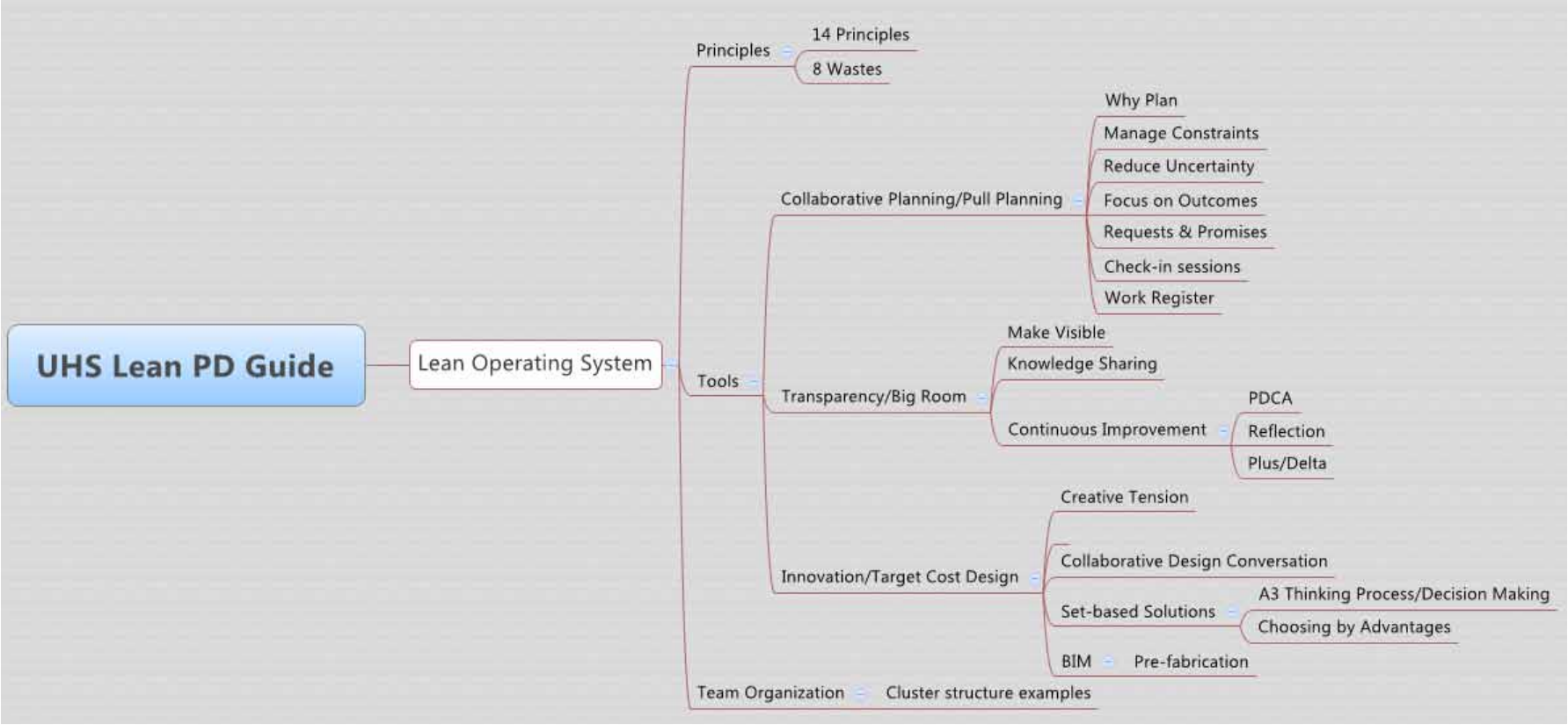
Appendix 4 Integrated Project Delivery; An Example of Relational Contracting, Owen Matthews & Gregory A. Howell

Appendix 5 Interview Questions – Wellington
Sample RFP for Contractors

6
Lean Operating System

Operating System

The following mind map diagram is a way to think about lean as an operating system. The principles and tools of lean delivery intertwine to create a system. No one principle or tool can stand on its own. For purposes of this guide, they are given a structure to help the beginning learner ground their thinking and gain a mental picture of the system. In addition, the diagram and this guide focus on the tools and principles that a beginner should start to learn and continue to relentlessly develop. As one shifts in their understanding of lean delivery and their thinking and behaviors will also shift. Then they are ready to start to take lean delivery to higher level.

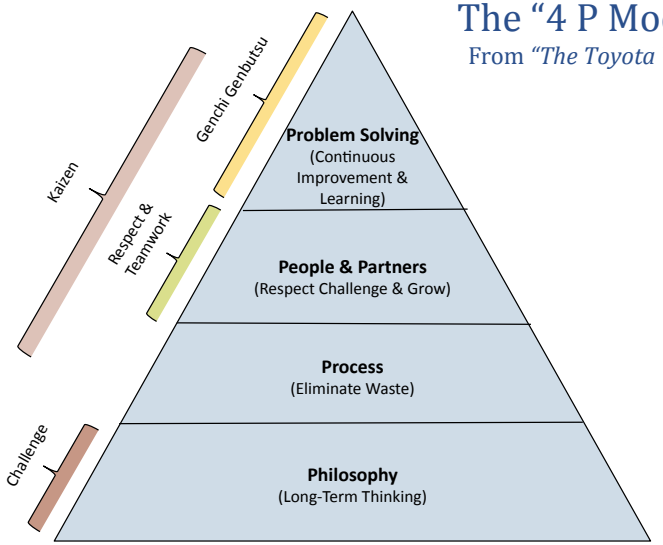


6.1 Principles

6.1.1 FOURTEEN PRINCIPLES

The following diagram indicates how the principles build upon each other and are needed to complete the full pyramid. Most companies stay focused at the process or tool level on the pyramid below during transformation, thus not realizing long-term success with lean initiatives.

The "4 P Model"
From *"The Toyota Way"*



14 Principles as identified in "The Toyota Way" by Jeffery Liker

Philosophy: Long Term Thinking

Principle1: Base management decisions on a long-term philosophy, even at the expense of short-term financial goals

Process: Eliminate Waste

Principle 2: Create continuous process flow to bring problems to the surface
Principle 3: Use 'pull' systems to avoid over production
Principle 4: Level out the workload (Work like tortoise, not the hare)
Principle 5: Build culture of stopping to fix problems, get right quality first time
Principle 6: Standardize tasks as foundation for continuous improvement & empowerment
Principle 7: Use visual control so problems are not hidden
Principle 8: Use reliable, tested technology that serves your people & processes

People & Partners: Respect, Grow, Challenge

Principle 9: Grow leaders who understand work, live philosophy & teach others
Principle 10: Develop exceptional people & teams who follow your philosophy
Principle 11: Respect your extended network of partners by challenging them & helping improve

Problem Solving: Continuous Improvement & Learning

Principle 12: Go & see to thoroughly understand the situation
Principle 13: Make decisions slowly by consensus, considering all options, implement rapidly
Principle 14: Become a learning organization through relentless reflection & continuous improvement

6
Lean Operating System

6.1 Principles (cont.)

6.1.2 EIGHT WASTES

There are 8 categories of waste identified in "The Toyota Way", by Jeffery Liker. Most waste in the design and construction industry fall into the same categories. See if you can think of examples of waste in each!

- Overproduction
- Waiting
- Unnecessary transport or conveyance
- Over or incorrect processing
- Excess inventory
- Unnecessary movement
- Defects
- Unused employee creativity

Learning Resources: "The Toyota Way", Jeffery Liker

6.2 Tools

Many tools exist for teams to deliver on a lean basis. The tools presented herein are just a few and are included in an introductory manner. Much more depth of understanding is needed in order to successfully implement the tools. As you learn about the tools, keep in mind that they are based on the principles, without that understanding the tools become meaningless. Also keep in mind that the tools and principles work together as a system. They are intertwined liked gears, all turning and affecting each other.

6.2.1 COLLABORATIVE/PULL PLANNING

"Collaborative Planning is the foundation by which the team collectively organizes the actions required to meet their goals. It is an approach which profoundly improves the team's ability to plan, and then deliver, effectively. The focus is on expected outcomes and doing the right work at the right time. Planning and execution are connected through conversations resulting in well-coordinated action and an understanding of the interdependency of the work." **– InsideOut Consulting, Inc.**

Collaborative Planning results in: (InsideOut Consulting, Inc.)

- team-wide understanding of value for client
- realistic and achievable plan
- alignment by all performers
- increase in reliability
- diminish or eliminate re-work/unnecessary work
- rapid response to unpredictable circumstances
- capacity being managed
- more simultaneous work
- less problems during execution
- less stress, frustration and overwhelm
- people enjoy their work

6.2.1 COLLABORATIVE/PULL PLANNING (CONT.)

Pull-planning is method of planning that is based in conversation about requests and promises. Work is planned at the "request" of a downstream "customer". The "performer" of the work makes a promise with agreed to "Conditions of Satisfaction". In essence, the work in planned from the "expected outcome or defined milestone" backwards, and becomes more detailed as it is closer to the date of the planning conversation.

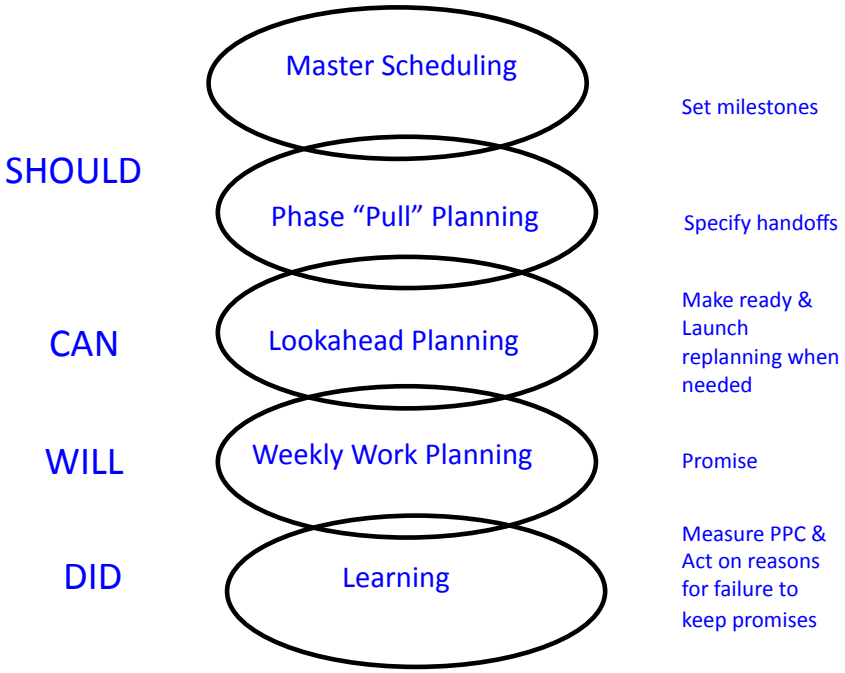
"Plans are nothing; Planning is everything." – Dwight D. Eisenhower

"Planning is the act of conversation that leads to well-coordinated action." – InsideOut Consulting, Inc.

Planning is linked through conversations; what we SHOULD be able to do, what we CAN do, what we WILL do and what we DID.

The Last Planner System of Production Control

Courtesy of Lean Construction Institute



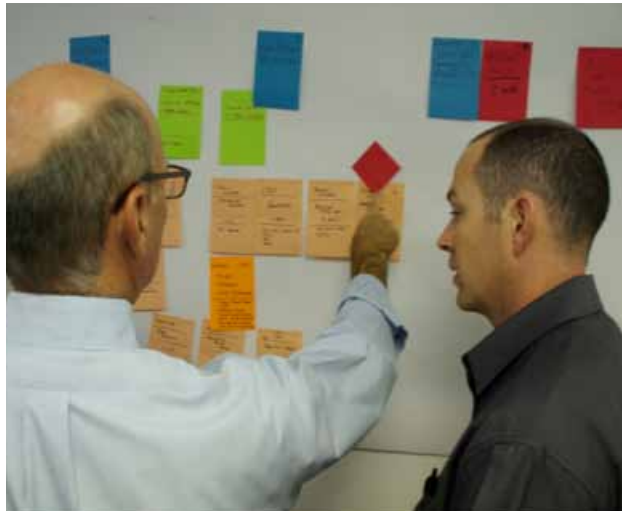
6.2.1 COLLABORATIVE/PULL PLANNING (CONT.)

Key aspects of pull-planning are:

- Manage **constraints** and **variances** of the project as a team
- Reduce the **uncertainty** so that the team is better prepared to respond to the unexpected
- Focus on clearly **defined outcomes.**
  Note: 50% Design Development is not a clearly defined outcome.
- Planning is done in a **pull manner.**
- Planning and execution are **connected through conversation** using requests and promises with clear Conditions of Satisfaction for each agreement.
- Work is made to **flow** by breaking the work down into smaller increments
- The people **performing** the work are the ones who **plan** the work
- Holding regular, short, energetic **Check-in Sessions** is an important part to keep the team coordinated and to manage the constraints.
- During the design phase at Check-in Session each person answers **4 questions:**

1. What commitments did you complete since the last session?
2. What commitments will you complete before the next session?
3. What concerns or constraints do you have regarding your work?
4. Are you on track to meet the overall work plan?

- During the construction phase the process shifts to using a 6-week look ahead plan for tracking the commitments and constraints
- We track the productivity of the team using **Percent Plan Complete** or PPC. In the industry on average 55% of what is said will be accomplished by a given time actually is. This is a low percentage and indicative of the problems in the industry. Lean teams strive to reach at least 85% on a regular basis.
- Work is planned using sticky (GM Post-it) notes on a wall (see photos below). The work is then captured in a **work register** or other format. Often this is an excel spreadsheet that all can easily use.
- There is a **continuous learning** cycle built-in (Plan-Do-Check Act/Adjust)



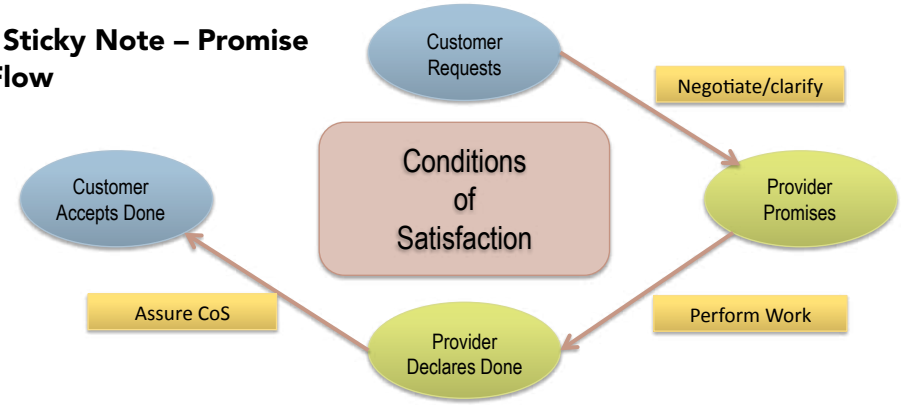
6.2.1 COLLABORATIVE/PULL PLANNING (CONT.)

Your Name Company	Delivery Date
Your Promise **What you will deliver** **Make a reliable promise**	
Your Request **What you need from others** **Make a reliable request**	

- Promise must have clear CoS
- Next step after making a promise is to manage and keep it

- A request must have clear CoS
- Be sure to negotiate to a promise you can keep

Elements of a Sticky Note – Promise Action Work Flow



Learning Resources:

Appendix 6 Last Planner System of Production Control

Appendix 7 Intro to Pull Planning GWUH On-boarding Manual Presentation

"Product Development for the Lean Enterprise", Michael Kennedy

"Joe's Garage", William Miller

6.2.2 TRANSPARENCY / BIG ROOM

"Making work 'transparent' or accessible and visible to all team members at all times is key to collaboration. The open sharing of work that is still in progress enables others to contribute knowledge that may shape the outcome of the work (refer to Innovation above). Transparency improves predictability by allowing the whole project team, especially the team leaders, to know that quality work is being delivered with a better understanding of its status. Collaborative Delivery tools and methods bring transparency to the work." – **InsideOut Consulting, Inc**

Transparency results in: (InsideOut Consulting, Inc.)

- understanding of status of work
- rapid identification of misalignments
- responsiveness to others' difficulties
- clarity of work product across disciplines
- anticipating and delivering on the needs of other team members
- more coordinated work
- team confidence

An important aspect of lean project delivery is the concept of the **"Big Room."** The Big Room is a term to describe a space where all stakeholders in the IPD team can come together and work. As opposed to individuals working in silos in their own offices, this allows for open communication and dialogue, resulting in more efficient and real-time work product, as well as less rework and revision. Teams should plan consistent Big Room days for working together. If teams cannot be physically together, they must look to technological means to implement the concept of working in this manner.

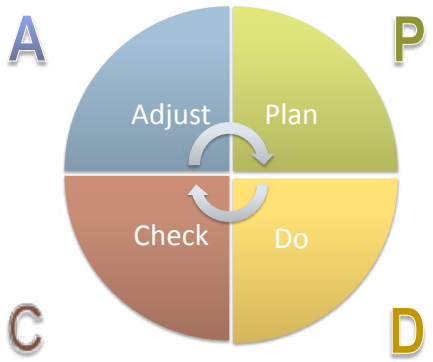
Examples of activities in the Big Room include:

- Collaborative design conversations – set an agenda for the subject of the conversations to ensure the right people are included
- Pull-planning
- Presentations
- Learning opportunities
- Structured Reflections – the team collectively reflects on how they are operating for the purpose of continuously improving their process of working together
- Plus/Delta for rapid improvement
- Collective team sessions and smaller break-out sessions
- Mutually developing working agendas for big room days

Teams should strive to have the space set up in a manner to support their work and be flexible. This may include:

- Smart Boards
- Wireless internet connectivity
- Lots of wall space for posting work, financials, Conditions of Satisfaction
- Dedicated space for the Pull-plan with space around for gathering to plan
    - Supplies for Pull-planning
- Break out rooms for smaller meetings
- Conference calling set up
    - Post the call numbers and pass codes on agendas and in the rooms
- GoToMeeting or other video conferencing set up
    - Post the call numbers and pass codes on agendas and in the rooms
- Provide flip chart pads and/or marker boards
- Restrooms and kitchenette area for coffee/water/snacks

6.2.2 TRANSPARENCY / BIG ROOM (CONT.)



Teams should post information on the walls to serve as reminders and guides to the team. This should include things like:

- Conditions of Satisfaction for the project (Appendix 2)
- Rules for Engagement in the Big Room (Appendix 8)
- Pull-plan with Plan Percent Complete (PPC)
- Project data/plans, etc.
- Financial tracking data – keep up to date
- A3's

Lean principle 14; Become a learning organization through relentless reflection and continuous improvement.

Lean thinking and behaving integrates a continuous improvement cycle. This cycle is one of Plan-Do-Check-Act/Adjust known as PDCA.

The following is an adaptation of PDCA to a project called the Four P's and is critical to the successful development of a project. An Owner's challenge is to predict the cost, make a business case, and decide to proceed, then deliver and operate. Most projects predict a cost, decide to proceed then pay whatever it takes to build and operate. UHS looks to **predict** the cost, **plan** to the prediction, **perform** to the plan while perfecting along the way and **perfecting** from one project to the next. This approach applies to each participant of the project from design parties through the trades. It is applicable to every scope within the project, each day of work and every meeting.

The fundamentals of the projects are based on the Four P's:

Predict: UHS is an investor-owned system. Therefore, our client must accurately predict the cost of a project prior to its start and maintain or reduce that cost as the project moves to completion.

Plan: Planning is extensive and constant. The effort should involve a significant amount of innovation.

Perform: Everyone is expected to deliver on promises.

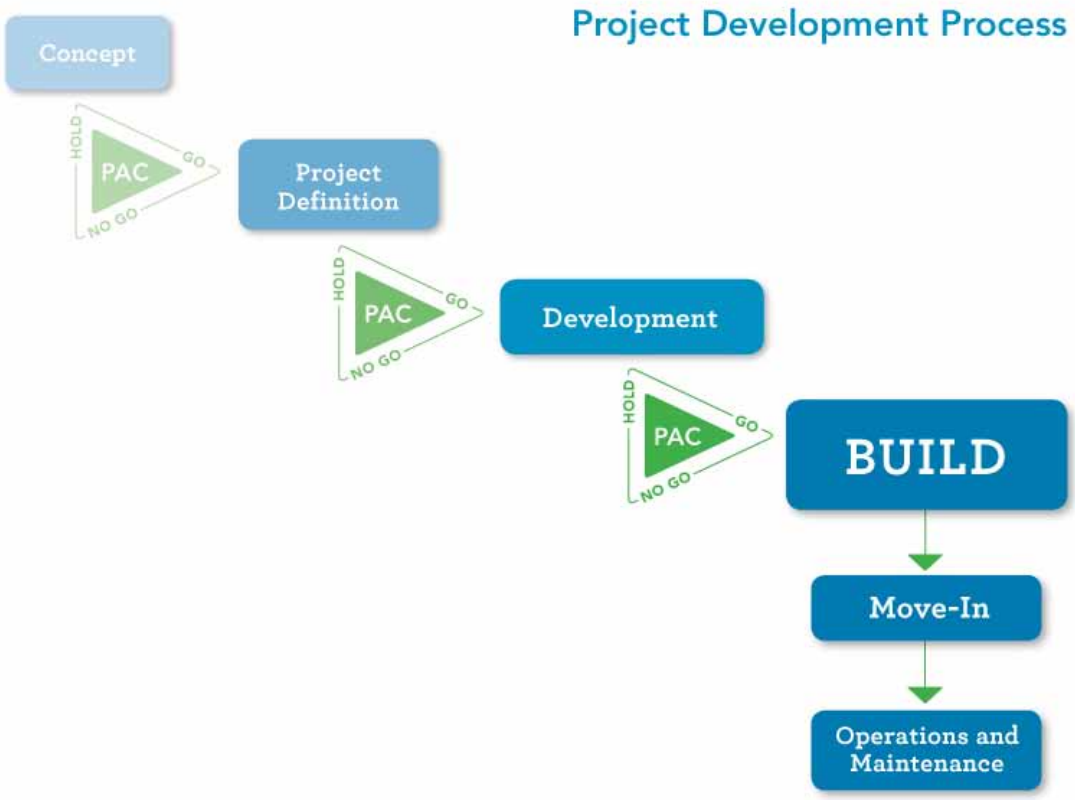
Perfect: Lean is a method of continuous improvement.

Learning Resources:

Appendix 8 Big Room Rules of Engagement
Appendix 9 Email Etiquette
Appendix 10 Examples of Project Big Room Agendas
"Toyota Culture", Jeffery Liker

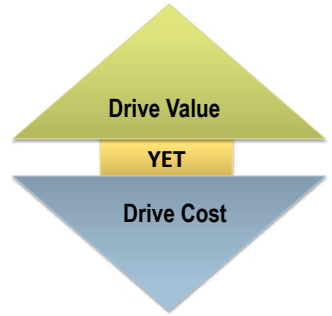
6.2.3 INNOVATION / TARGET COST DELIVERY

Target Cost Delivery is a cornerstone of lean project delivery. It is comprised of Target Value Design (TVD) and Target Value Production (TVP). The Agreement requires that the team align around a Target Cost for delivering the project early in the project, during the business case development and then validate the Target Cost through a validation period. The graphic below indicates how Target Cost Delivery is addressed throughout the phases of a project.



Target Delivery is upside down and backwards to traditional project delivery costing. Therefore it is also a hard concept for teams to grasp. It is a very different model from design, estimate in review, cost and value engineer – a traditional process full of waste. Keeping in mind that lean is about identifying value and taking only actions to deliver value, clients do not value the process of rework and loss of quality that comes from "value engineering."

Target Cost Delivery is a project approach that drives design and production (construction) to deliver to defined **Conditions of Satisfaction** (value) within **project constraints** including cost and time. It generates a "creative tension" between driving up quality YET driving cost down.



Teams develop the Target Cost through consensus with each other and the owner. Often teams start with benchmarking similar projects in a similar market on a square foot basis, then deciding on a lower target. Delivering to Target Cost results in savings not only for the client but the entire team.

6.2.3 INNOVATION / TARGET COST DELIVERY (CONT.)

An approach for designing to the Target Cost is outlined in Appendix 11. It involves keeping a "creative tension" throughout decision making. This is often referred to as "no-compromise goals." For a better understanding of this, refer to Chapter 5 of the "Toyota Way" by Jeffery Liker. Traditionally we describe a 3-legged stool, the legs being quality, price and time. It is said that a project can deliver on 2 but not all 3. Target Cost Delivery proves this to be wrong. Clients can have all 3 and project teams must strive to deliver on all three aspects. Driving out waste in the system and continuously improving on their delivery process are critical ways in which teams reach target cost.

Innovation is equally important for delivering to target cost. Without changing the way they design and produce projects, teams will struggle to meet target cost and likely fall back on traditional actions and behaviors that don't work. Innovation in this context means doing things that are not traditionally or usually done on projects.

Eliminating Contingency is a prime goal of a lean project team. Contingency is waste. When viewed this way, it becomes imperative that project teams actively reduce uncertainty and raise the level of reliability for the project. **Open book management** is required to drive to a target cost. Teams must identify true project direct costs, which means no contingency included. Risk must be managed by identifying possible risks with associated probable costs. Then actively working to address the risk to reduce or manage it as a team. Contingency as related to trust is addressed in Section 4.2.

Project costs are comprised of direct costs, profit/overhead and contingency. When contingency is hidden throughout it represents a huge portion of project costs. Identifying contingency and pooling it together to manage risks becomes the additional shared profit pool for IPD teams to share. Understanding that eliminating the need for hidden contingency results in $$$ for the company via the shared profit pool metrics.

Following are some means or achieving Target Cost Delivery.

Collaborative Conversation before drawing is a form of innovation during the design process. In the lean context this means including ALL relative stakeholders and perhaps others as provocateurs in designing an aspect of the project IN CONVERSATION prior to drawing. Stakeholders must include constructors and cost estimators to influence the decisions early on. All stakeholders arrive at mutual consensus during the conversations and know what their work consists of upon conclusion. This means that engineers do not have to wait (waste) for the architects to draw everything before they can do some work. Here are pictures of teams in collaborative conversation.

Collaborative Conversation: Architect PM, Mechanical Trade Partner, Electrical Trade Partner, Space Planner, Drywall/Stud Trade Partner, Contractor PM, Interior Designer, Medical Planner

6.2.3 INNOVATION / TARGET COST DELIVERY (CONT.)

Set-based Solutions is a critical aspect of lean design. Traditionally teams make decisions from narrow perspectives of their specialty or discipline – "knowing" what is best. Those decisions become integrated into the design early on and often need to be revisited due to other project constraints resulting in rework, OR the right thing is not actually built. Set-based solutions involve looking at multiple options early on from a broader, collaborative perspective. Options are thoroughly considered from all stakeholders and from the perspective of the whole project. The team narrows the options, choosing the best one for the project at a time that is right. This "right time" is referred to as the "last responsible moment". When decisions are made too soon, they may not be the best decision and a may be influenced by information that emerges at a later time. Last Responsible Moment decisions should be identified on the pull-plan.

A3 Thinking/Decision Making Process is used to analyze, document and lead to alignment on decisions for the sets. A3 refers to an 11x17 piece of paper used for documenting the process. However, the A3 Process is way more. It is a process that tells a clear story and is about the underlying thinking. It is a documented representation of the thinking process behind a decision. It must include all stakeholders at a minimum in order for the process to render a collaborative, decision made by consensus. Appendix 12 is a presentation that describes the A3Thinking Process.

Choosing by Advantages (CBA) is a powerful tool for sound decision making that supports the A3 decision making process. The A3 process includes an analysis step; conducting a CBA is a way to arrive at a sound decision.
From *www.decisioninnovations.com*

> *Decisions must be based on the* ***Importance of Advantages!***
>
> Compared with the methods in common use today — including such methods as Choosing By Advantages and Disadvantages, the pros and cons methods, the so-called Rational Methods, and others — the CBA methods are simpler and faster, and they produce better decisions. Those who learn and apply the CBA definitions, principles, models, and methods are able to significantly improve the quality of their lives and the lives of others by improving the quality of their decisions. Because CBA helps good decision makers become excellent and excellent decision makers even better, more and more individuals, families, and organizations are learning and using the CBA methods. For example, CBA is being used in several government agencies, including the U.S. Forest Service, the National Park Service, and others. As another example, it was successfully used by an interdisciplinary decision-making team — with representatives from the Sierra Club, the Audubon Society, land developers, government agencies, and others — to select a highway location for the 2002 Winter Olympics.
>
> What is very exciting is that CBA strengthens interpersonal relationships in families, as well as in business organizations and government agencies. CBA is a major breakthrough in the art of decision-making.

See Appendix 13 for examples of CBA decisions.

6.2.3 INNOVATION / TARGET COST DELIVERY (CONT.)

Building Information Modeling (BIM) is a tool that supports lean delivery. It allows teams to fully understand the implications of the design early on by detecting clashes and to sequence work. It provides the opportunity for "drawing once" to become a reality. Re-drawing work in the form of shop or fabrication/detailing drawings is considered waste. When trade partners are included in the design process, they can be the producers of the models/drawings that are not only used for Construction Documents and Permitting, but for the final fabrication and production. Furthermore, the use of BIM allows for pre-fabrication or pre-assembly of portions of work. Producing sections of work off-site enhances the team's ability to deliver better quality and in reducing the schedule. A project teams using exterior panel systems assembled and hung from the inside of the building cut a production schedule from 11 months to 4 weeks for close in of the building. BIM affords the opportunity to dramatically change a production process from the traditional stick by stick sequence that extends of long periods of time.

Learning Resources

Appendix 11 Target Value Design, Lean Project Consulting

"Managing to Learn" – John Shook

Appendix 12 A3 Thinking Process, InsideOut Consulting

Appendix 13 Examples of CBA Decisions

Appendix 14 Target Cost Delivery Presentation, InsideOut Consulting

"The Toyota Way" – Chapter 5, Jeffery Liker

www.ewenger.com/theory, Community of Practice Informational Website

6
Lean Operating System

6.3 Team Organization

(Organization)
During design, lean projects teams organize in a manner conducive to cross-discipline collaboration. The organization is in "clusters" sometimes also referred to as "components". The clusters are developed to address or design a particular aspect of the facility. The clusters are comprised of team members who are appropriate to the system or aspect design and must include estimating and constructors as part of the group. The clusters are responsible for planning their work and for delivering it to the target cost associated with their portion of the work. This is why real-time-estimating is important in the clusters. The clusters will change with the project as it develops. See Appendix 14 for a PowerPoint presentation of a particular project's clusters.

Learning Resources:

Appendix 15 Cluster Group PowerPoint (Temecula)

7
Continuous Learning

Recall the 4P's Pyramid from section 6.1 and the top segment of the pyramid:

Problem Solving: Continuous Improvement & Learning

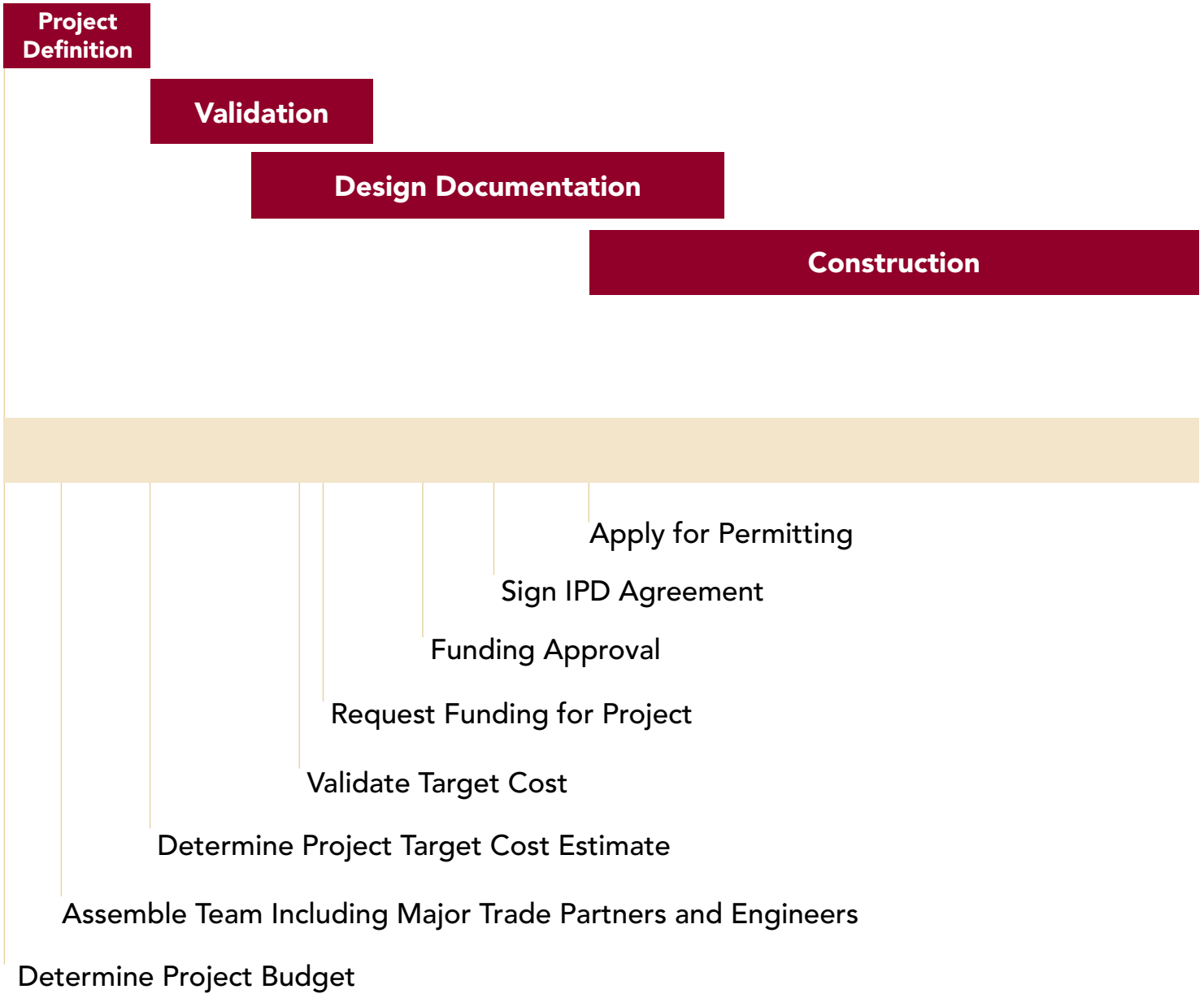
Continuous Learning IS what lean is about. It is a major differentiator for lean delivery. Teams must incorporate proactive, planned ways to advance lean and to continuously learn to better their delivery. Teams often feel too busy to take time out for learning and this is a mistake.

Developing a Community of Practice (CoP) is an approach for teams to ensure that they continuous advance their lean learning. See Appendix 16 for an A3 for Advancing the Skills of LeanTeams. This A3 describes how a CoP can be instrumental to a team's development.

Learning Resources:

Appendix 16 A3 Advancing Skills of Lean Facilitators
Appendix 17 COAA Project Leadership Awards Nomination for GW
Appendix 18 GWB Story
Appendix 19 Links to Informational Videos
Appendix 20 Another Approach to Project Delivery: Creating a Shared Mind
Appendix 21 Project Delivery is Broken: If's it Broke, Fix it
Appendix 22 Learning Guide for a High Performing Team

8
Timeline


Project Definition
Validation
Design Documentation
Construction
Apply for Permitting
Sign IPD Agreement
Funding Approval
Request Funding for Project
Validate Target Cost
Determine Project Target Cost Estimate
Assemble Team Including Major Trade Partners and Engineers
Determine Project Budget

9
Appendices

Learning Resources:

Appendix 1 Why Lean? Presentation by Universal Health Services William Seed

Appendix 2 Conditions of Satisfaction Examples
GW Evolution of Conditions of Satisfaction

Appendix 3 Consensus Docs 300
Insert Consensus Docs 300

Appendix 4 Integrated Project Delivery; An Example of Relational Contracting by Owen Matthews and Gregory A. Howell

Appendix 5 Interview Questions – Wellington
Sample RFP for Contractors

Appendix 6 Last Planner System of Production Control

Appendix 7 Intro to Pull Planning GWUH On-boarding Manual Presentation

Appendix 8 Big Room Rules of Engagement

Appendix 9 Email Etiquette

Appendix 10 Examples of Project Big Room Agendas

Appendix 11 Target Value Design by Lean Project Delivery

Appendix 12 A3 Thinking Process Presentation by InsideOut Consulting

Appendix 13 Examples of CBA decisions

Appendix 14 Target Cost Delivery Presentation, InsideOut Consulting

Appendix 15 Cluster Group PowerPoint (Temecula)

Appendix 16 A3 Advancing Skills of Lean Teams

Appendix 17 COAA Project Leadership Awards Nomination for GW by Bernita Beikmann, HKS Architects

Appendix 18 GWB Lean Story

Appendix 19 Links to Informational Videos

Appendix 20 Another Approach to Project Delivery: Creating a Shared Mind, Kristin Hill, Christine Slivon, John Draper

Appendix 21 Project Delivery is Broken: If's it Broke, Fix it, Kristin Hill

Appendix 22 Learning Guide for a High Performing Team

Universal Health Services, Inc.

1

Facilities

236 Hospitals and Ambulatory Care Treatment Facilities:

- 26 Acute Care Hospitals
- 201 Behavioral Health Facilities
- 9 Outpatient Facilities & Surgical Hospitals

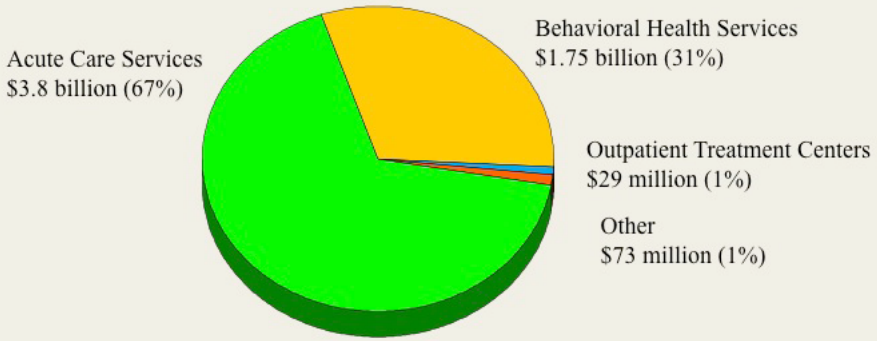
2

UHS operates facilities in 37 states, D.C. and Puerto Rico

3

Revenue

2010 Net Revenue $5.6 Billion



4

Appendix 1

Design & Construction

How Can We Help You Grow?

William R. Seed, Staff Vice President

5

What We Do

- Pre Acquisition Assessment
- Capital Facility Upgrades
- Concept Design/Feasability
- Equipment Planning
- Construction Implementation
- Engineering Support
- Utility Cost Management
- Master Planning

6

Capital Project Spend

- 2007 $439 million 124 projects
- 2008 $415 million 93 projects
- 2009 $380 million 65 new projects
- 2010 $319 million 35 new projects
- 2011 $400 million 100 new projects

7

Forget IPD

Let's Bid, the Market is Great!

UHS

8

Appendix 1

Bid Day

DESIGN*BID*BUILD

What did you just Buy?

$10MM Cost= $9MM + ~~$1MM Profit~~

$9MM Construction Cost

UHS 9

What did you just buy?

1. Contentious partners whose primary focus is to get that profit back.
2. Only what is indicated in the Bid Documents.
3. Arguments, Delays, Change Orders.
4. A Group of Trades who most likely have very little understanding of your needs, that have never worked together.

OPENING DAY…$10MM Cost…$11 MM Cost… ???



UHS 10

What is in Cost?

$9MM = $4.5MM Value + $4.5MM Waste

= $4.5MM Value + $2.25MM Unavoidable Waste + $2.25MM Avoidable Waste

Avoidable Waste

incomplete information
lack of design knowledge
misunderstanding design intent
inappropriate scheduling
poor logistics
Duplicated effort
Significant Paperwor
Rework
Poor Work
Hunting, Gathering
Insufficient/Incorrect Material
Mismatched Systems
Unused Creativity

UHS 11

How about we give the Trades the Profit and Incentivize them to Eliminate Avoidable Waste?

BID DAY

$10MM Cost= $1 MM Profit + $4.5MM Value + $2.25MM Unavoidable Waste +$1.125MM Avoidable Waste

*Coordinated Collaboration Efforts
*Eliminate Changes and Waste
* Do the work right one time
* Empower the work force to decide

OPENING DAY

$8.875MM

UHS 12

Appendix 1

TEXOMA MEDICAL CENTER

Conditions of Satisfaction	Results
•reduce cost by $4 million– overall goal is $94 million	•Final construction cost was $97.9million •$1.7 million in savings pool •$7 million in value adds
•deliver project in 17 months– november 2009.	•project delivered first week in december despite 87 rain days
•no punch list	•no punch list at owner turn over
•no injuries	•Only 4 minor recordable injuries
•no rfi's	•190 rfi's •40 related to early steel package •many were confirming
•no change orders	•$1.4 million in change orders •$1.1 million was owner driven
•no rework	•rework greatly minimized through collaborative efforts

13

Let's Back Up!

Ever wonder :

who decided to build Redundant Steam Systems?

Why so many Fancy Doors?

Why Custom Air Handlers?

Why is the Roof System so Expensive?

Who wrote the Duct Cleaning Specification?

Why 6 Band no Hub Connectors?

Why these Recessed Door Pockets?

Why are these Details not Buildable?

Why am I paying a Premium for Window Extrusions?

UHS 14

What if you could pick?

	Good	Better	Best
Chillers	300	325	350
Generators	200	250	310
Roof	50	60	70
Wall System	100	110	120
Flooring	5	7	9
Glass	10	12	15
Elevators	20	25	30

Real Trade Pricing

Total Impact of Cost

No Value Engineering

...And postpone the decision until the last responsible moment?

...Giving latitude to make the **Value Decision** while new issues pop up?

UHS 15

HOW?

Form Team from the Start

Establish **Target Value Design**

Design to a Detailed Budget

Set Based Design with a Conceptual Estimator

Take advantage of Trade Knowledge

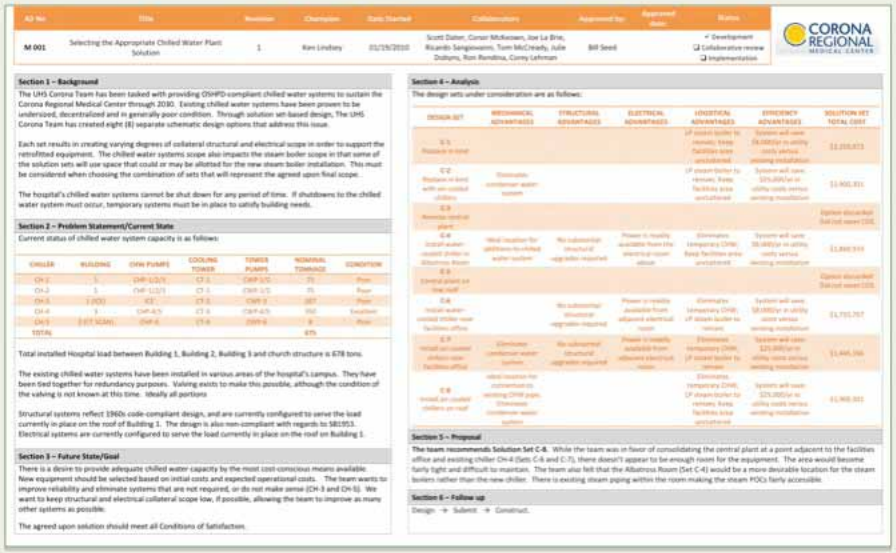
Create a learning Innovative Environment

Create **B.H.A.G.**

Get Involved!!

UHS 16

Appendix 1



A3 No.	Title	Revision	Champion	Date Started	Collaborators	Approved by:	Approved date:	Status
M 001	Selecting the Appropriate Chilled Water Plant Solution	1	Ken Lindsey	01/19/2010	Scott Dolor, Conor McKeown, Joe La Brie, Ricardo Sangiovanni, Tom McCready, Julie Dobyns, Ron Rondina, Corey Lehman	Bill Seed		✓ Development ☐ Collaborative review ☐ Implementation

CORONA REGIONAL MEDICAL CENTER

Section 1 – Background

The UHS Corona Team has been tasked with providing OSHPD-compliant chilled water systems to sustain the Corona Regional Medical Center through 2030. Existing chilled water systems have been proven to be undersized, decentralized and in generally poor condition. Through solution set-based design, The UHS Corona Team has created eight (8) separate schematic design options that address this issue.

Each set results in creating varying degrees of collateral structural and electrical scope in order to support the retrofitted equipment. The chilled water systems scope also impacts the steam boiler scope in that some of the solution sets will use space that could or may be allotted for the new steam boiler installation. This must be considered when choosing the combination of sets that will represent the agreed upon final scope.

The hospital's chilled water systems cannot be shut down for any period of time. If shutdowns to the chilled water system must occur, temporary systems must be in place to satisfy building needs.

Section 2 – Problem Statement/Current State

Current status of chilled water system capacity is as follows:

CHILLER	BUILDING	CHW PUMPS	COOLING TOWER	TOWER PUMPS	NOMINAL TONNAGE	CONDITION
CH-2	1	CHP-1/2/3	CT-1	CHP-1/2	75	Poor
CH-3	1	CHP-1/2/3	CT-1	CHP-1/2	75	Poor
CH-5	2 (ICU)	CHP-4	CT-2	CHP-3	187	Poor
CH-4	3	CHP-4/5	CT-3	CHP-4/5	152	Excellent
CH-1	3 (CT YEAR)	CHP-6	CT-4	CHP-6	9	Poor
TOTAL					675	

Total installed Hospital load between Building 1, Building 2, Building 3 and church structure is 678 tons.

The existing chilled water systems have been installed in various areas of the hospital's campus. They have been tied together for redundancy purposes. Valving exists to make this possible, although the condition of the valving is not known at this time. Ideally all portions

Structural systems reflect 1960s code-compliant design, and are currently configured to serve the load currently in place on the roof of Building 1. The design is also non-compliant with regards to SB1953. Electrical systems are currently configured to serve the load currently in place on the roof on Building 1.

Section 3 – Future State/Goal

There is a desire to provide adequate chilled water capacity by the most cost-conscious means available. New equipment should be selected based on initial costs and expected operational costs. The team wants to improve reliability and eliminate systems that are not required, or do not make sense (CH-3 and CH-5). We want to keep structural and electrical collateral scope low, if possible, allowing the team to improve as many other systems as possible.

The agreed upon solution should meet all Conditions of Satisfaction.

Section 4 – Analysis

The design sets under consideration are as follows:

DESIGN SET	MECHANICAL ADVANTAGES	STRUCTURAL ADVANTAGES	ELECTRICAL ADVANTAGES	LOGISTICAL ADVANTAGES	EFFICIENCY ADVANTAGES	SOLUTION SET TOTAL COST
C-1						
C-2						
C-3						
C-4						
C-5						
C-6						
C-7						
C-8						

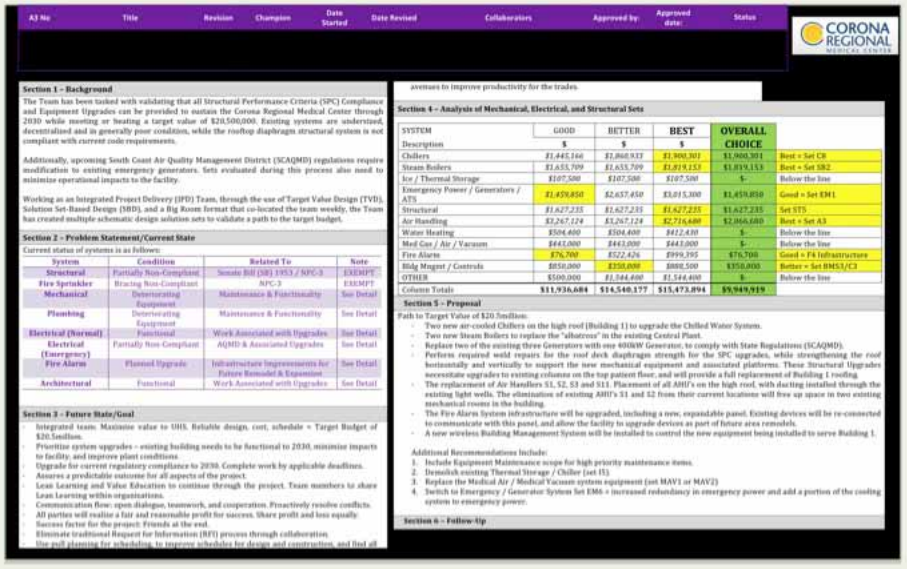
Section 5 – Proposal

The team recommends Solution Set C-8. While the team was in favor of consolidating the central plant at a point adjacent to the facilities office and existing chiller CH-4 (Sets C-6 and C-7), there doesn't appear to be enough room for the equipment. The area would become fairly tight and difficult to maintain. The team also felt that the Albatross Room (Set C-4) would be a more desirable location for the steam boilers rather than the new chiller. There is existing steam piping within the room making the steam PDCs fairly accessible.

Section 6 – Follow up

Design → Submit → Construct.

17



A3 No	Title	Revision	Champion	Date Started	Date Revised	Collaborators	Approved by:	Approved date:	Status

CORONA REGIONAL MEDICAL CENTER

Section 1 – Background

The Team has been tasked with validating that all Structural Performance Criteria (SPC) Compliance and Equipment Upgrades can be provided to sustain the Corona Regional Medical Center through 2030 while meeting or beating a target value of $20,500,000. Existing systems are understood, decentralized and in generally poor condition, while the rooftop diaphragm structural system is not compliant with current code requirements.

Additionally, upcoming South Coast Air Quality Management District (SCAQMD) regulations require modification to existing emergency generators. Sets evaluated during this process also need to minimize operational impacts to the facility.

Working as an Integrated Project Delivery (IPD) Team, through the use of Target Value Design (TVD), Solution Set-Based Design (SBD), and a Big Room format that co-located the team weekly, the Team has created multiple schematic design solution sets to validate a path to the target budget.

Section 2 – Problem Statement/Current State

Current status of systems is as follows:

System	Condition	Related To	Note
Structural	Partially Non-Compliant	Senate Bill (SB) 1953 / NPC-3	EXEMPT
Fire Sprinkler	Bracing Non-Compliant	NPC-3	EXEMPT
Mechanical	Deteriorating Equipment	Maintenance & Functionality	See Detail
Plumbing	Deteriorating Equipment	Maintenance & Functionality	See Detail
Electrical (Normal)	Functional	Work Associated with Upgrades	See Detail
Electrical (Emergency)	Partially Non-Compliant	AQMD & Associated Upgrades	See Detail
Fire Alarm	Phased Upgrade	Infrastructure Improvements for Future Remodel & Expansion	See Detail
Architectural	Functional	Work Associated with Upgrades	See Detail

Section 3 – Future State/Goal

- Integrated team: Maximize value to UHS. Reliable design, cost, schedule + Target Budget of $20.5million.
- Prioritize system upgrades – existing building needs to be functional to 2030, minimize impacts to facility, and improve plant conditions.
- Upgrade for current regulatory compliance to 2030. Complete work by applicable deadlines.
- Assures a predictable outcome for all aspects of the project.
- Lean Learning and Value Education to continue through the project. Team members to share Lean Learning within organizations.
- Communication flow: open dialogue, teamwork, and cooperation. Proactively resolve conflicts.
- All parties will realize a fair and reasonable profit for success. Share profit and loss equally.
- Success factor for the project: Friends at the end.
- Eliminate traditional Request for Information (RFI) process through collaboration.
- Use pull planning for scheduling, to improve schedules for design and construction, and find all avenues to improve productivity for the trades.

Section 4 – Analysis of Mechanical, Electrical, and Structural Sets

SYSTEM	GOOD	BETTER	BEST	OVERALL CHOICE	
Description	$	$	$		
Chillers	$1,445,166	$1,860,933	$1,900,301	$1,900,301	Best = Set C8
Steam Boilers	$1,455,709	$1,455,709	$1,819,153	$1,819,153	Best = Set SB2
Ice / Thermal Storage	$107,500	$107,500	$107,500	$-	Below the line
Emergency Power / Generators / ATS	$1,459,850	$2,457,450	$3,015,300	$1,459,850	Good = Set EM1
Structural	$1,427,235	$1,427,235	$1,427,235	$1,427,235	Set ST5
Air Handling	$3,267,124	$3,267,124	$2,716,680	$2,066,680	Best = Set A3
Water Heating	$504,400	$504,400	$412,430	$-	Below the line
Med Gas / Air / Vacuum	$443,000	$443,000	$443,000	$-	Below the line
Fire Alarm	$76,700	$522,426	$999,395	$76,700	Good = F4 Infrastructure
Bldg Mngmt / Controls	$850,000	$350,000	$800,500	$350,000	Better = Set BMS3/C3
OTHER	$500,000	$1,344,460	$1,344,460	$-	Below the line
Column Totals	$11,936,684	$14,540,177	$15,473,894	$9,949,919	

Section 5 – Proposal

Path to Target Value of $20.5million:

- Two new air-cooled Chillers on the high roof (Building 1) to upgrade the Chilled Water System.
- Two new Steam Boilers to replace the "albatross" in the existing Central Plant.
- Replace two of the existing three Generators with one 400kW Generator, to comply with State Regulations (SCAQMD).
- Perform required weld repairs for the roof deck diaphragm strength for the SPC upgrades, while strengthening the roof horizontally and vertically to support the new mechanical equipment and associated platforms. These Structural Upgrades necessitate upgrades to existing columns on the top patient floor, and will provide a full replacement of Building 1 roofing.
- The replacement of Air Handlers S1, S2, S3 and S11. Placement of all AHU's on the high roof, with ducting installed through the existing light wells. The elimination of existing AHU's S1 and S2 from their current locations will free up space in two existing mechanical rooms in the building.
- The Fire Alarm System infrastructure will be upgraded, including a new, expandable panel. Existing devices will be re-connected to communicate with this panel, and allow the facility to upgrade devices as part of future area remodels.
- A new wireless Building Management System will be installed to control the new equipment being installed to serve Building 1.

Additional Recommendations Include:

1. Include Equipment Maintenance scope for high priority maintenance items.
2. Demolish existing Thermal Storage / Chiller (set 15).
3. Replace the Medical Air / Medical Vacuum system equipment (set MAV1 or MAV2)
4. Switch to Emergency / Generator System Set EM6 = increased redundancy in emergency power and add a portion of the cooling system to emergency power.

Section 6 – Follow Up

18

A3 No.	Title	Revision	Champion	Start Date	Collaborators	Approved By
2	Conditions of Satisfaction/Innovations/Differentiators	1	Bill Seed	1/10/2011	Team-ecula	

50 Foot Rule
Patient Transport Team
In-Room Workstations
Point of Care Service
Patient Control of Environment
100% Private Patient Beds
Attention to Lighting Levels
Noise Reducing Strategies
Room Service Food Delivery
Meditation Areas
Outdoor Dining/Plazas
Healing Gardens
Homelike Waiting Rooms
Family Sleep Zones

Standardized Environment
Organizational Culture Shift
Communication Stations
Facility-Wide Wireless Network
Owners Manual
OR/Central Sterile Integration
Consolidated Treatment Unit Operations Center
Pneumatic Tube System
Fusion (Cerner) Integration
Just-In-Time Materials
Nurture/Steelcase Collaboration

Incorporation of Local Art
Groundbreaking Ceremony
Collaboration with Pechanga Tribe
"Better Performance" Benchmarks
Use of Simulation and Modeling
Simplified Exterior Wayfinding
Drought/Drainage Landscaping
No Roof Window Washing System
Complete Elevator Infrastructure
Minimal Future Utility Rerouting
Lowest Building GSF

Lightest Structural Frame
Hybrid Moment Frame
Floor-to-Floor Framing
Prefabrication
Verticality of MEP Systems
No Overhead Cable Tray
Flexible Pipe Sprinkler Drops
One CAV/Two Patient Rooms
Common Boilers for Hot Water
Aluminum Feeders
Designing with Specific Equipment
Integrated Switch Gear
Best-Fit Scope Assignment
Shared Hoisting and Excavation
Moved Parking Lot

Double-Loaded Corridor
Three-Bed Bays
Active/Early Involvement of Of
OSHPD Pre-Approved Bra
OSHPD Pre-Approved Equip
Incremental OSHPD Submis
Inspection Collaboration
Fully Collaborative Design
Major Modification Approv
Coordination with City of Ter
No Conditional Use Perm
Change Without New El
Used Basins/Bioswells/Soi
Refined Foundation/Soils An

Innovations and Differentiators					Innovations and Differen		
Safe, patient-centered care environment	More operationally efficient	Satisfied doctors and staff	Positive community impact	Flexibility for future growth	Fastest to market	Lowest cost in California	OSHPD best customer

Operational and Patient-Centered | Planning/Design and Con

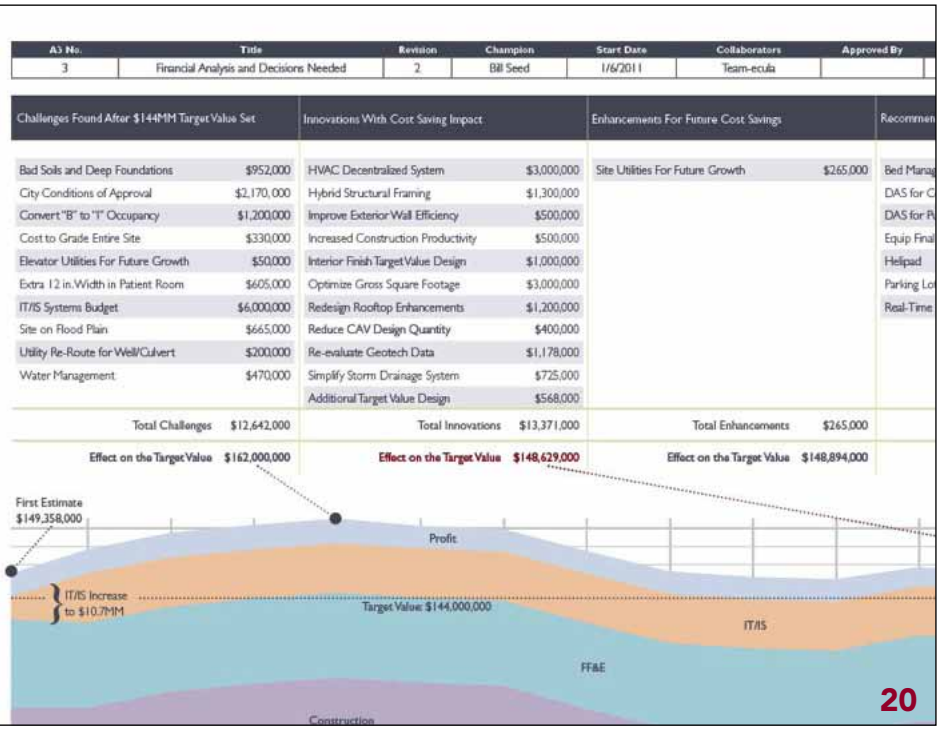
Conditions of Satisfaction

Team-ecula Project Team

driving value to the ow

driving valu

19



A3 No.	Title	Revision	Champion	Start Date	Collaborators	Approved By
3	Financial Analysis and Decisions Needed	2	Bill Seed	1/6/2011	Team-ecula	

Challenges Found After $144MM Target Value Set		Innovations With Cost Saving Impact		Enhancements For Future Cost Savings		Recommen
Bad Soils and Deep Foundations	$952,000	HVAC Decentralized System	$3,000,000	Site Utilities For Future Growth	$265,000	Bed Marag
City Conditions of Approval	$2,170,000	Hybrid Structural Framing	$1,300,000			DAS for C
Convert "B" to "I" Occupancy	$1,200,000	Improve Exterior Wall Efficiency	$500,000			DAS for P
Cost to Grade Entire Site	$330,000	Increased Construction Productivity	$500,000			Equip Final
Elevator Utilities For Future Growth	$50,000	Interior Finish Target Value Design	$1,000,000			Helipad
Extra 12 in. Width in Patient Room	$605,000	Optimize Gross Square Footage	$3,000,000			Parking Lo
IT/IS Systems Budget	$6,000,000	Redesign Rooftop Enhancements	$1,200,000			Real-Time
Site on Flood Plain	$665,000	Reduce CAV Design Quantity	$400,000			
Utility Re-Route for Well/Culvert	$200,000	Re-evaluate Geotech Data	$1,178,000			
Water Management	$470,000	Simplify Storm Drainage System	$725,000			
		Additional Target Value Design	$568,000			
Total Challenges	$12,642,000	Total Innovations	$13,371,000	Total Enhancements	$265,000	
Effect on the Target Value	$162,000,000	Effect on the Target Value	$148,629,000	Effect on the Target Value	$148,894,000	

First Estimate
$149,358,000

Profit

IT/IS Increase to $10.7MM

Target Value $144,000,000

IT/IS

FF&E

Construction

20

A3 No.	Title	Revision	Champion	Start Date	Collaborators	Approved By	Approved On	Status
1	Request to Proceed with Full Funding	6	Bill Seed	11/1/2010	Team-ecoda			Development

BACKGROUND

In March 2010, a team was assembled to take on the challenge of building a 140-bed patient-centered hospital for $144MM while maintaining existing City entitlements and previous UHS lessons learned. Through collaboration around innovative design and cooperative construction techniques, all participants were solicited for best practices and relentless pursuit of waste elimination and continuous improvement to deliver upon the stated Conditions of Satisfaction.

Bergelectric DPR / Turner HMC Architects

PROPOSAL

1. Approval for full funding of $148,629,000 to proceed
2. Confirmation that the innovations are acceptable (A3 No. 2)
   - If conflict, assign corporate champion for improvement
3. Confirmation of the schedule (below)
   - First Patient Day in the 3rd Quarter of 2013
4. Provide an Operational Leader
5. Value Enhancement/Recommendation Decisions (A3 No. 3)

Site Utilities For Future Growth	$265,000
Bed Management/Room Status System	ROI in process
DAS for Cell Phone Carriers	$240,000
DAS for Public Safety	$54,000
Equip Final 10 ICU Beds	$1,000,000
Helipad	$195,000
Parking Lot Security Call Boxes	$42,000
Real-Time Locating System	ROI in process

CURRENT STATE

At-Risk Team / This collaborative development team made of six firms (above) is unique, risking 100% of their profit, to report a high level of confidence in delivering this medical center for $148,629,000.

Trade Partners / 15 trade partners have been contracted at an estimated maximum price, which represents 78% of the total cost. This represents minimal cost risks as the remaining partners are secured.

People will ask, "How did you do this?"

FUTURE STATE

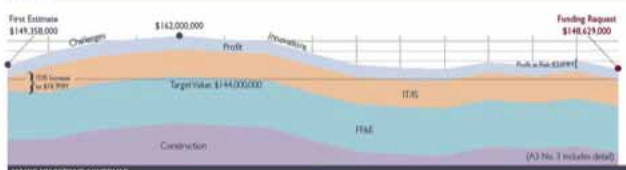
Delivery	3rd Quarter 2013		
Cost	$148,629,000	Per Bed	$838
Square Feet	177,286	Per Bed	1,266
Beds	120 Med/Surg+20 ICU, All Private		
Parking	434 Spaces		
Scope	Basic ED, Six OR, One Minor Procedure Room, MRI, CT, Nuclear Medicine, Mobile Technology Dock		

Conditions of Satisfaction

Operational and Patient-Centered
- Satisfied Doctors and Staff
- More Operationally Efficient
- Safe, Patient-Centered Care Environment
- Flexibility for Future Growth
- Positive Community Impact

Planning/Design and Construction
- Fastest to market
- Lowest Cost in California
- OSHPD Best Customer
- Injury Free construction
- Profit for all partners

ANALYSIS



Contingency

Risk is being accounted for through a contingency of $5.8MM to account for the major challenges remaining, including:
- OSHPD Review Time
- OSHPD Code Review
- Archeological Findings
- Community Relations
- Technology Advances
- Department of Health Services
- Realization of Anticipated $3.6MM Additional Savings
- Continuous Cost Improvement
- Continuous Schedule Improvement

MAJOR MILESTONE SCHEDULE

Appendix 1

GWUH Radiation Oncology Relocation
Conditions of Satisfaction

Comprehensive Finish Schedule that incorporates elegance and quality yet fits within the budget

Impeccable Coordination that results in no field conflicts or system compromises

No Disruptions to Other Building Tenants yet work is completed without delays or interruptions

Rapid Mitigation of Existing Condition Discoveries without cost or schedule impacts

Smooth Operational Transition from Warwick to 1250 without disruption to patient care activities

Integrate Field Staff into Innovation Process by establishing a Lean Introduction Program

Reward Field Staff for Innovation without negatively impacting the budget

No Submittals for Commodities and Repeat Items yet satisfy specification and contract requirements

Define or Develop a Standards Book that can be used for all GW projects yet customizable for specifics

All Partners Realize Their Anticipated Profit without overstating the actual cost of the work

Zero Defects in Permit Drawings by…… yet……?????

Establish a Lean Savings Pool to reward innovation and participation yet stay within budget

Zero Deficiencies During AHJ Inspections by…… yet……?????

Pull Plan Scheduling Throughout the Project so that at project completion all trades are proficient with this process

Publish One (1) Whitepaper Per Month serve as study action for the team

Conditions of Satisfaction

1) Project Delivery Success
- Maintain Conditional Use Permit by securing major modification approval in November 2010
- Maintain or reduce the Target Value Cost of $144M for 140 beds
- Deliver the Owner's Manual six months prior to opening (approx 3rd quarter 2012)
- Certificate of Occupancy by the 1st quarter of 2013
- Construction safety reflected by ?

2) Project Team Participation and Satisfaction
- Every team member firm finishes this project with a profit
- Secure one new project as a team by the issuance of the Certificate of Occupancy
- Two visitors (owners/industry colleagues/additional team firm employees) in the Corona Big Room per month
- Two or more educational presentations in the Corona Big Room per month
- Every team member an active participant in at least one lean organization
- Predictable outcomes as a result of labor efficiency
- Reliability and trust as shown by measuring promises made versus promises kept

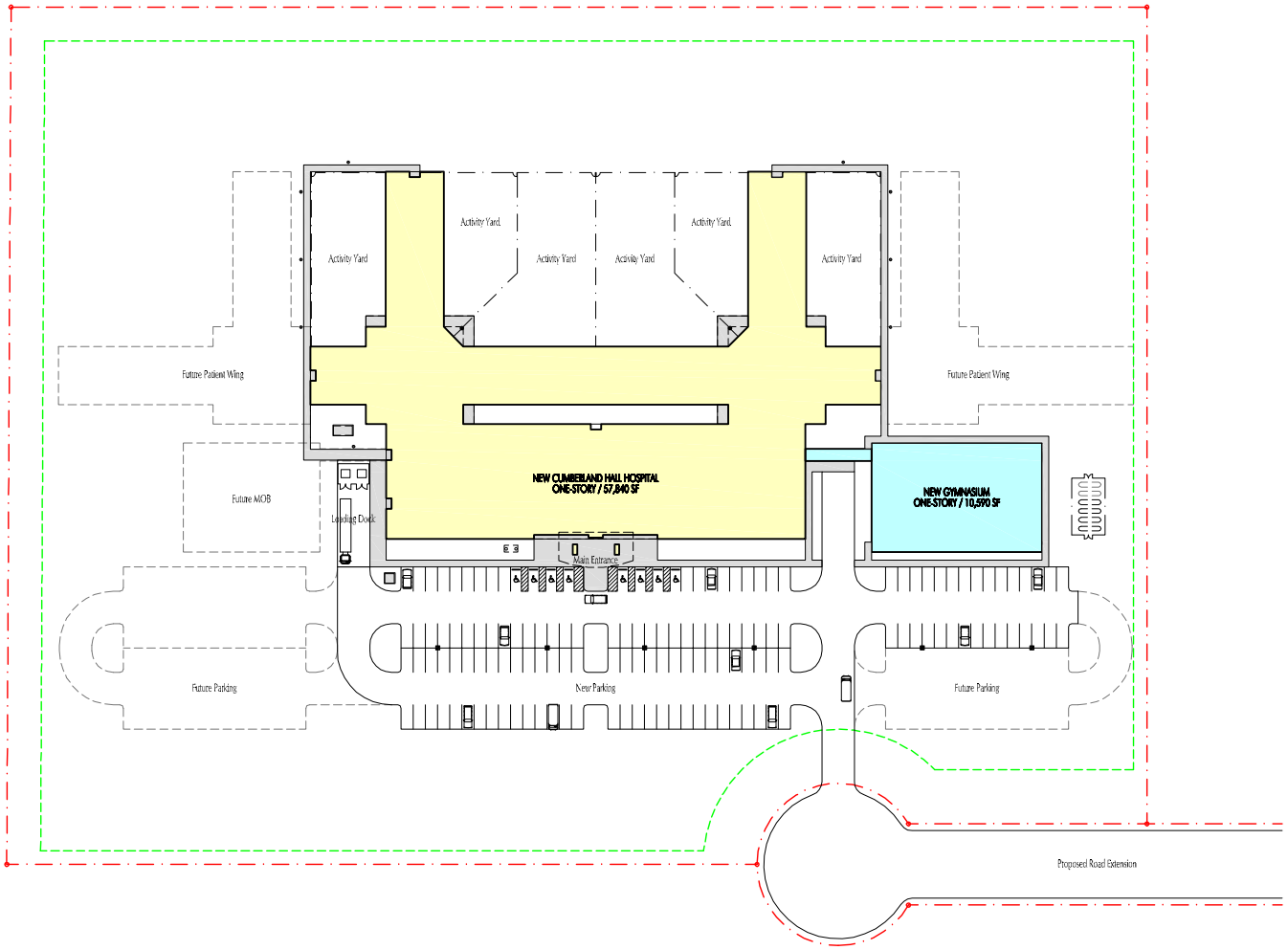
3) Community and Social Responsibility
- Positive press in the local and regional press
- Physician buy-in as reflected by hiring rates
- Neighborhood satisfaction score of 3.5 (out of 4) – survey to be conducted

4) Relationships with Regulatory Agencies
- Maintain promise of UHS being OSHPDs best customer
- Zero defects in all agency submittals
- Drawings in OSHPD possession for a time period 15% lower than the lowest established records
- "No excuses" surrounding OSHPD, City, etc. for not meeting COS, milestones, etc.
- Trade partners considered a business partner of OSHPD at the completion of the project

5) Facility Operational Success
- 30% more operationally efficient than the best performing UHS facility
- Patient Family Centered Care Delivery and Design reflected by HCAHPS scores of _____.
- Safe Patient Care Environment by improving/reducing _____.
- Community endorsement by the use of our facilities versus others in the area

DESIGN DEVELOPMENT

LEGEND	
New Hospital Area	57,840 sf
New Gymnasium Area	10,590sf
Total New Building Area	68,430 sf

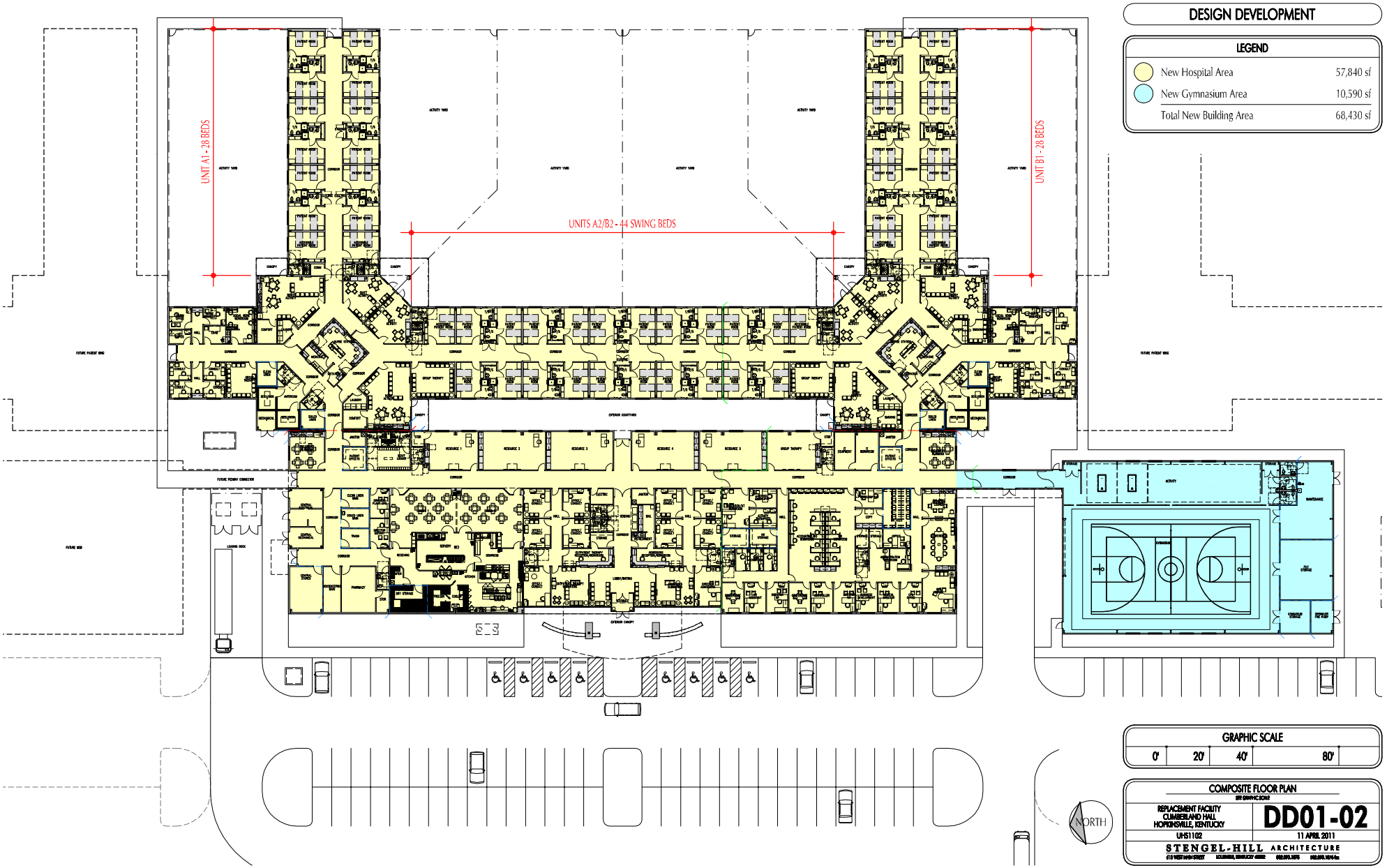


GRAPHIC SCALE			
0'	50'	100'	200'

NORTH

SITE PLAN (SEE GRAPHIC SCALE)	
REPLACEMENT FACILITY CUMBERLAND HALL HOPKINSVILLE, KENTUCKY	DD01-01
UHS1102	11 APRIL 2011
STENGEL-HILL ARCHITECTURE	
613 WEST MAIN STREET LOUISVILLE, KENTUCKY 40202 502.583.1575 502.583.1594 fax	

Appendix 2



DESIGN DEVELOPMENT

LEGEND

New Hospital Area	57,840 sf
New Gymnasium Area	10,590 sf
Total New Building Area	68,430 sf

GRAPHIC SCALE

0' 20' 40' 80'

COMPOSITE FLOOR PLAN

REPLACEMENT FACILITY
CUMBERLAND HALL
HOPKINSVILLE, KENTUCKY

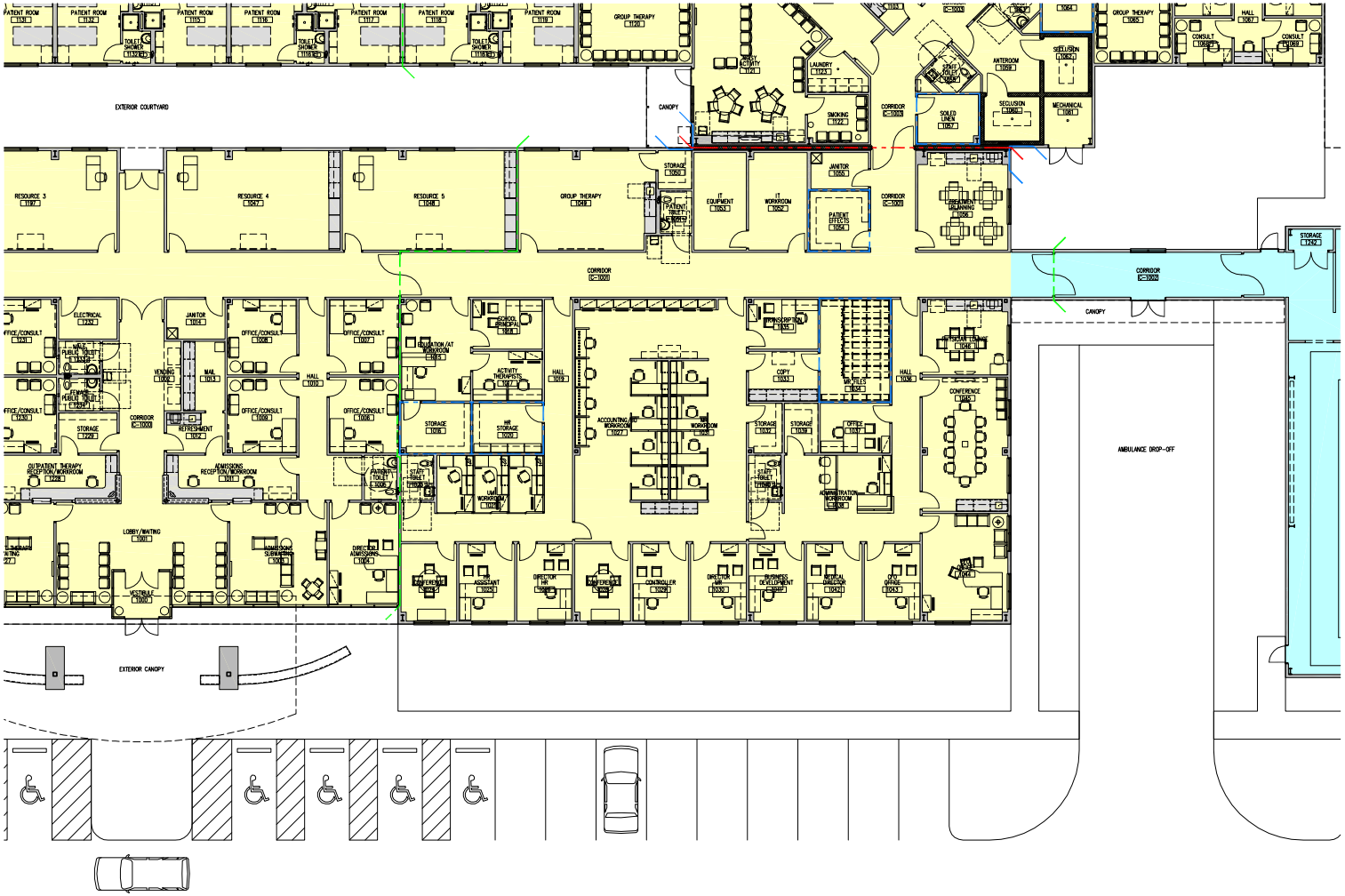
DD01-02

UHS1102

11 APRIL 2011

STENGEL-HILL ARCHITECTURE

Appendix 2



DESIGN DEVELOPMENT

LEGEND

New Hospital Area	57,840 sf
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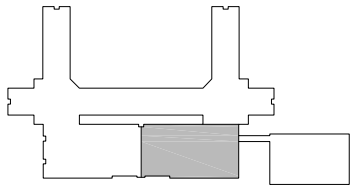
Total New Building Area	68,430 sf

KEYPLAN



GRAPHIC SCALE

0' 10' 20' 40'

PARTIAL FLOOR PLAN - AREA 'A'

REPLACEMENT FACILITY
CUMBERLAND HALL
HOPKINSVILLE, KENTUCKY

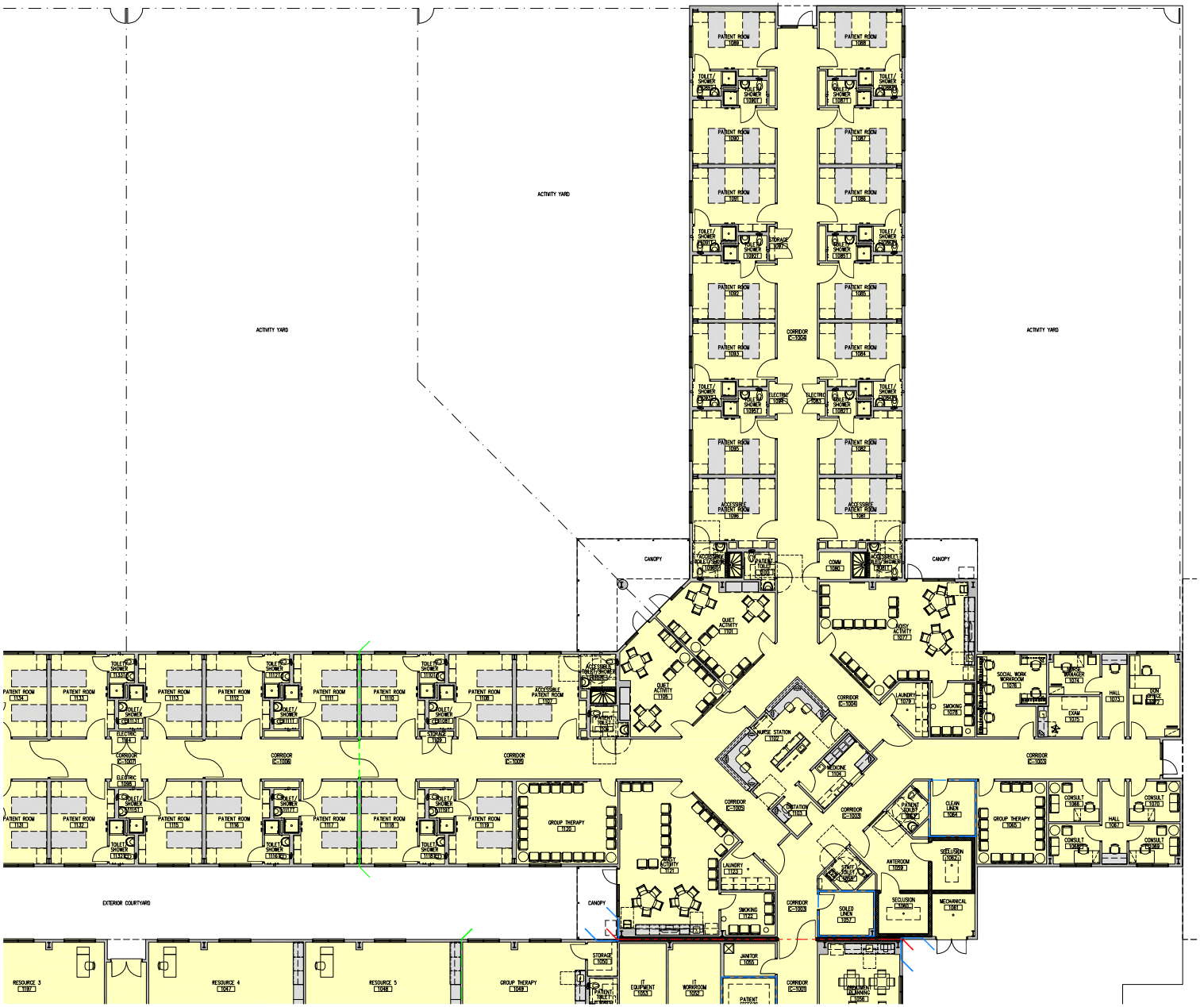
DD01-02A

UHS1102

11 APRIL 2011

STENGEL-HILL ARCHITECTURE

Appendix 2

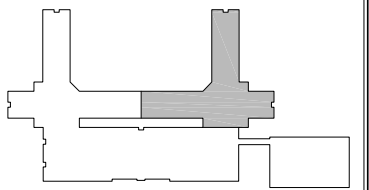


DESIGN DEVELOPMENT

LEGEND

New Hospital Area	57,840 sf
New Gymnasium Area	10,590 sf
Total New Building Area	68,430 sf

KEYPLAN



GRAPHIC SCALE

0' 10' 20' 40'

PARTIAL FLOOR PLAN - AREA 'B'

REPLACEMENT FACILITY
CUMBERLAND HALL
HOPKINSVILLE, KENTUCKY

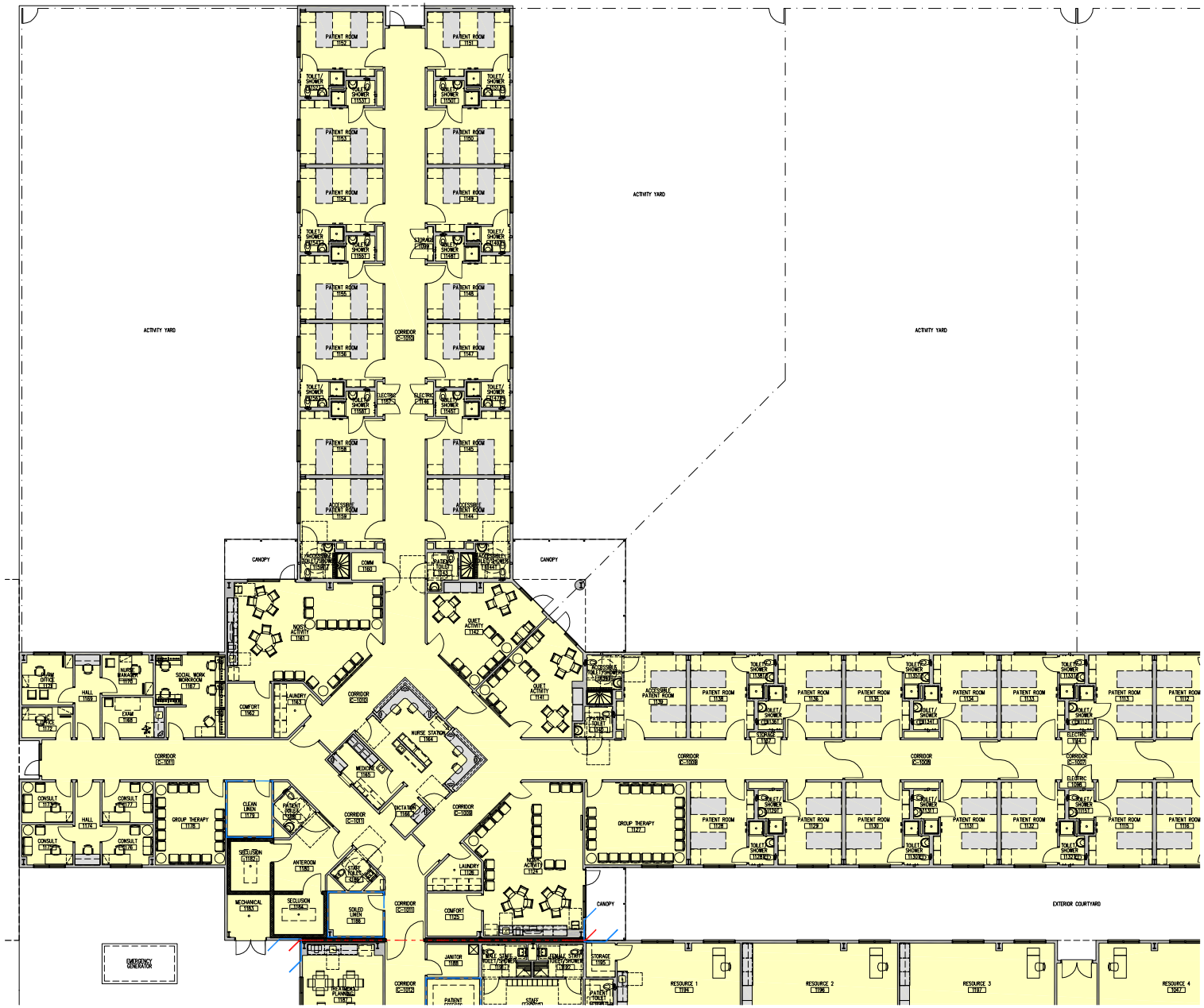
UHS1102

DD01-02B

11 APRIL 2011

STENGEL-HILL ARCHITECTURE

Appendix 2



DESIGN DEVELOPMENT

LEGEND

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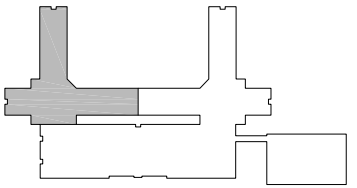
Total New Building Area	68,430 sf

KEYPLAN



GRAPHIC SCALE

0' 10' 20' 40'

PARTIAL FLOOR PLAN - AREA 'C'

SEE GRAPHIC SCALE

REPLACEMENT FACILITY
CUMBERLAND HALL
HOPKINSVILLE, KENTUCKY

UHS1102

DD01-02C

11 APRIL 2011

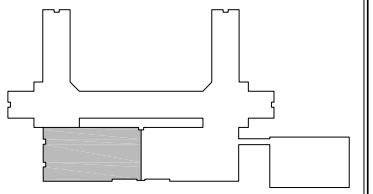
STENGEL-HILL ARCHITECTURE

Appendix 2

DESIGN DEVELOPMENT

LEGEND	
New Hospital Area	57,840 sf
New Gymnasium Area	10,590 sf
Total New Building Area	68,430 sf

KEYPLAN



GRAPHIC SCALE

0'	10'	20'	40'

NORTH

PARTIAL FLOOR PLAN - AREA 'D'

SEE GRAPHIC SCALE

REPLACEMENT FACILITY
CUMBERLAND HALL
HOPKINSVILLE, KENTUCKY

DD01-02D

UHS1102

11 APRIL 2011

STENGEL-HILL ARCHITECTURE

Appendix 2

DESIGN DEVELOPMENT

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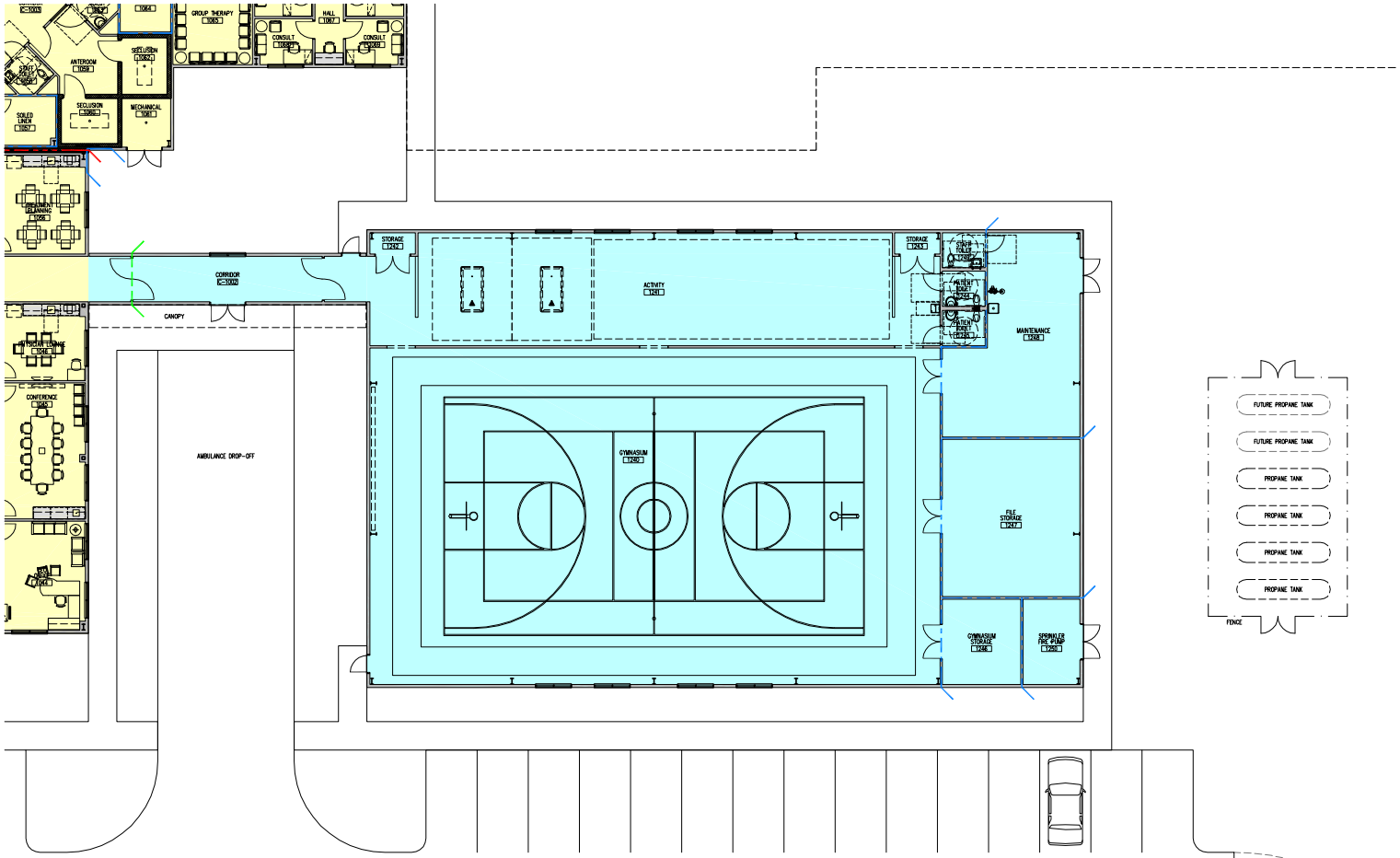
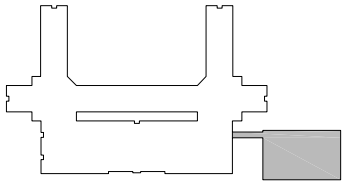


KEYPLAN



GRAPHIC SCALE

0' 10' 20' 40'

NORTH

PARTIAL FLOOR PLAN - AREA 'E'

REPLACEMENT FACILITY
CUMBERLAND HALL
HOPKINSVILLE, KENTUCKY

UHS1102

DD01-02E

11 APRIL 2011

STENGEL-HILL ARCHITECTURE

Appendix 2

Wellington Bed Tower
Conditions of Satisfaction

- Fully predictable time line by fully understand the time requirements necessary to permit and construct the Bed Tower and Kitchen then predict a completion date by September 1, 2011. We will meet this date by working together across traditional contract boundaries to help remove any hurdles and there will be no time slippage from commitment to completion.
- Fully predictable delivery cost by fully understanding the direct costs and identify cost risks necessary to establish a final project budget by September 1, 2011. We will work across traditional contract boundaries to understand the value and cost of innovated concepts and incorporate innovated ideas from the build partners to obtain the best value. There will be no change orders driven by the documents or scope misunderstandings, the final construction GMP will not exceed the identified value in the final budget and an incentive pool will be created, defined and shared among all team members.
- Fully predictable end product by communicating with the end users and occupants consistently and effectively such that there will be no surprises to the form, fit or function of the final product or the process. We will design the Kitchen one time and we will communicate any and all disruptions to the facility to safely and predictably understand all disruptions to the care and use of the campus. We will meet a 100% ratio of predicted disruptions to actual disruptions throughout the process.
- Exceed UHS's expectations in an effort to get the next project by innovation, continuous improvement, staying on budget, delivering quality, value and communications up to 24 months after completion.
- No warranty callbacks due to QA, staff training, OM manuals and completing last 10% of work…
- Up to 150% Profit yet still maintain scope, quality, without lowering wages, impacting facility operations, reimbursable expenses or hurting other trade partners and implement a "no OT policy".
- Improve production & efficiency by maintaining safety, close parking, carefully coordinated staging, economic transportation, JIT delivery, field coordination, flow of work, start times, innovation, risks, clean site, pull planning and schedule to drive design.
- Complete project with ZERO accidents and repeat near misses by employing full time safety inspector, take appropriate action on near misses, careful planning, educations, awards program, obtaining partners corporate support and hold everyone accountable.
- Deliver a lower cost project to increase ROI but still deliver customer expectations, maintain scope, quality, without lowering wages, impacting facility operations, reimbursable expenses or hurting other trade partners.
- No avoidable rework in the field caused by team breakdowns, failure to communicate or failed planning efforts, and conduct End User virtual & actual mockups, walk-thru's, detailed & accurate BIM, systematic QA, reduce mgmt turn-over, finished product mockups and project team conversations.
- Generate community excitement by ground breaking on 9/14, team up with Marketing, provide public tours, accident free worksite, use local vendors and artists, BIM for Marketing, solicit feedback and use of effective signage.

- UTILIZE LESSONS LEARNED FROM PHASE I.
- ~~PROVIDE THE MINIMAL AMOUNT OF DISRUPTION TO THE FACILITY.~~
- PLANNED, CONTROLLED AND PROPERLY COMMUNICATED DISRUPTIONS TO THE FACILITY.
- HAVE THE BEST UHS PULL PLAN.
- PERFORM PROPER COORDINATION AND PLANNING TO ELIMINATE DELAYS AND COST OVERRUNS.
- COMPLETE PROJECT WITHIN THE TARGET VALUE AND SCHEDULE.
- UTILIZE AN INTEGRATED PROJECT TEAM TO ~~PROVIDE~~ DRIVE A HIGHER LEVEL OF VALUE TO THE CLIENT AND TO REDUCE INDIVIDUAL RISK.
- ~~CREATE A SAFE ENVIRONMENT FOR ALL TEAM MEMBERS.~~
- ZERO INJURIES.
- BREAK OLD HABITS-BREAK DOWN BARRIERS.
- ASK WHY-SPEND THE MONEY AS IF IT WAS OUT OF YOUR OWN POCKET.
- HAVE AN OPEN AND TRUSTING RELATIONSHIP WITH OSHPD.
- EACH TEAM MEMBER WILL REALIZE A FAIR AND REASONABLE PROFIT.
- CONTINUED INNOVATION THROUGHOUT THE DESIGN AND CONSTRUCTION PROCESS.

Corona Regional Medical Center Upgrades
Conditions of Satisfaction (COS)

1. Utilize an integrated, lean approach to maximize the value to the client and improve reliability in the design, cost, and schedule, using a Target Value (Budget) of $23million.

2. Prioritize system upgrades and ensure upgrades are functional to 2030 with zero unplanned interruptions to the existing facility, and improving plant conditions and operations in that timeframe.

3. Upgrade existing facility to meet criteria for compliance to 2030 with current regulatory requirements, including the completion of construction by applicable deadlines.

4. The team assures there will be a predictable outcome for all aspects of the project.

5. Stay committed to Lean Learning and Value Education throughout the project and our respective organizations…taking it forward.

6. Keep communications flowing with open dialogue, teamwork, and cooperation allowing us to proactively resolve conflicts within the team.

7. All parties represented on the team will realize a fair and reasonable profit for the successful validation, design, and construction of the upgrades project. Share profit and loss equally as part of the team commitment.

8. Individuals' enjoyment of the lean process will continue until the project is complete, as a success factor for the project. End as friends.

9. Team collaboration will be utilized to transform – and essentially eliminate - the traditional RFI and submittal processes.

10. The core team and trade partners will commit to pull planning, and will identify resources and flows for the project schedule, in order to provide the most efficient schedule for the project, and to improve trade productivity.

Appendix 2

CONSENSUSDOCS 300
STANDARD FORM OF TRI-PARTY AGREEMENT FOR COLLABORATIVE PROJECT DELIVERY

This document was developed through a collaborative effort of entities representing a wide cross-section of the construction industry. The organizations endorsing this document believe it represents a fair and reasonable consensus among the collaborating parties of allocation of risk and responsibilities in an effort to appropriately balance the critical interests and concerns of all project participants.

These endorsing organizations recognize and understand that users of this document must review and adapt this document to meet their particular needs, the specific requirements of the project, and applicable laws. Users are encouraged to consult legal, insurance and surety advisors before modifying or completing this document. Further information on this document and the perspectives of endorsing organizations is available in the ConsensusDOCS Guidebook.

TABLE OF ARTICLES

This Agreement has important legal and insurance consequences. Consultation(s) with an attorney and with insurance and surety consultants are encouraged with respect to its completion or modification.

INTEGRATED PROJECT DELIVERY
AN EXAMPLE OF RELATIONAL CONTRACTING

Owen Matthews[1] and Gregory A. Howell[2]

ABSTRACT

Maximizing value and minimizing waste at the project level is difficult when the contractual structure inhibits coordination, stifles cooperation and innovation, and rewards individual contractors for both reserving good ideas, and optimizing their performance at the expense of others. This paper describes an innovative contractual structure that aligns the interests of all contractors with the objectives of the lean delivery system. The approach, requirements for implementation, and results obtained will be described and a brief reflection on theory offered.

Key Words
Contract, Lean Delivery, Project Organization, Primary Team Member, Pact, Relational Contracting, formula, Integrated Project Delivery™

Westbrook is a 55-year-old mechanical contractor located in Orlando Florida. Chilled water systems have been the heart of Westbrook's construction business over the years. Westbrook also offers air-conditioning, plumbing and electrical services to residential and commercial Clients.

Westbrook has participated in a number of design build projects, sometimes as a subcontractor and sometimes as a prime contractor. They could not help but notice that when they worked as a subcontractor, promises of cooperation and teamwork never seemed to reach their potential, and the results often fell short of the team member's expectations. This happened even when they worked with high-caliber and well-intentioned General Contractors (GCs) and for clients who had bought into, and expected to receive the benefits of a design/build cooperative effort. Even as the prime contractor they were unable to sustain a spirit of teamwork through the end of the project. The instinct among all parties for self interest was too keen especially in instances where individual profit potential might have eroded somewhat throughout the project.

Maximizing value and minimizing waste at the project level is difficult when the contractual structure inhibits coordination, stifles cooperation and innovation, and rewards individual contractors for both reserving good ideas, and optimizing their performance at the expense of others. What was wrong? What was standing in the way of their being able to work as a true team; one able to work together to maximize value while minimizing waste throughout the process?

In pursuit of answers to these questions, they have been working over the past five years with a consortium of design professionals and construction practioners to determine if there might not be a better way to organize themselves to deliver a project than the models that are common today. For four years now they have been meeting for breakfast twice a month to further this pursuit and in the process have built relationships that form the basis for Relational Contracting.

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FOUR MAJOR SYSTEMIC PROBLEMS WITH THE TRADITIONAL CONTRACTUAL APPROACH

Problem 1: Good ideas are held back
The Mechanical, Electrical and Plumbing (MEP) contractors and other major trades were generally brought into the process by the GC once the drawings were at the Design Development (DD) stage in order to establish a competitive price. Even though the trades were frequently consulted through the design process, there was no real commitment to or from them because a number of different companies representing the same trades were involved. As a result, each of the trade contractors saved their best ideas in hopes of gaining a competitive edge during the "bidding process." Many times these ideas were very good. Time and the opportunity for innovation among the trades were lost as the design team attempted to revamp their designs to accommodate the best of these late arriving ideas.

Problem 2: Contracting limits cooperation and innovation
A systemic, but less obvious problem was the system of subcontracts that link the trades and form the framework for the relationships on the project. The prime contractor held the contract for every consultant and subcontractor. Long and tedious subcontract agreements attempted to spell out in great detail exactly what each subcontractor was to provide (and by deduction exactly what he was not to provide), rules for compensation, and sometimes useful, if unrealistic, information about when work was to be performed.

The 20 to 30 page subcontracts mostly dealt with remedies and penalties for noncompliance. These contracts made it difficult to innovate across trade boundaries even though the work itself was frequently interdependent. (*It is hard to have a wholesome relationship with another when you have a charge of dynamite around your neck and the other holds the detonator.*) Of course, horse trading always takes place anyway, but for "equal" horses. Trading a small increase in effort by one contractor for a big reduction for another, a horse for a pony was almost impossible.

Problem 3: Inability to coordinate
While some projects held "partnering" sessions, there was no formal effort to link the planning systems of the various subcontractors, or to form any mutual commitments or expectations amongst them. Project organizations looked like 20 or more rubber balls, representing subcontractors, all tethered to a single point by long elastic bands. When the connection point jiggled, the balls jiggled in all random directions colliding with each other in unusual and unexpected ways.

Problem 4: The Pressure for local optimization
Each subcontractor fights to optimize his performance because no one else will take care of him. The subcontract agreement and the inability to coordinate drive subcontractors to defend their turf at the expense of both the client and other subcontractors. Remember that everyone on the project other than the prime contractor is a subcontractor. These subcontractors frequently, in their life outside of the subcontract, may be generous, caring and professional. However, since right or wrong is defined by the subcontract, they, more often than not, take on a very legalistic and litigious stance becoming an army where the rules of engagement are "Every man for himself."

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APPROACHING THE SOLUTION

Could they organize themselves to function as a single company with unified goals and objectives? Could independent design firms and construction companies actually find a way to integrate project delivery?" To use the earlier analogy, was there a way to take all of these rubber balls and connect each to the other so that they could all move in the same direction. A new set of questions suggested the new approach:

> *What if every member of the design build team shared completely the responsibility for the entire project and set about correcting deficiencies or problems wherever they popped up without regard to who caused the problem or who is going to pay for it? What if all of the construction members were friends looking out for the interest of the Client and each other, applauding the successes of each other and sharing the pain of each others failures? What if all of the design and construction entities on a project could be organized in such a way that they all functioned as if they truly were a single company with a single goal and with no competition amongst themselves for profit or recognition?*

They were not naïve. They knew that aligning interests, objectives and practices, even in a single business, is not easy or automatic; however, the advantages looked real, and they had powerful ties and long standing relationships with the companies that could make it happen. A new process which they called Integrated Project Delivery[3] (IPD) was taking shape. Primary Team Members would include the Architect, key technical consultants as well as a general contractor and key subcontractors.

There are two types of contracts, transactional and relational.

- *transactional where exchanges are made for goods and services,*
- *relational contracts where the relationship "takes on the properties of 'a mini-society with a vast array of norms beyond those centered on the exchange and its immediate processes.*

Without benefit of these definitions in the beginning, the Team was never the less creating a network of commitment built around relational contracts.

Two Principles Govern Their Team Relationship

With the IPD process, two principles define the relationships between the Team Member that holds the prime contract with the client and between that Team Member and the other Primary Team Members (PTM).

1. With IPD, all PTMs are responsible for all provisions of the prime contract with the Client.
2. Primary Team Members share the risk and profit for total project performance.

The Prime Contract

A single contract binds the IPD Team to the client. The prime contract may be any one of a number of standard forms that are available. It spells out the commercial terms and defines the scope, schedule and cost of the project. One entity signs the prime contract.

[3] Integrated Project Delivery (IPD) is a registered business mark with the US PTO

The Team Member Agreement

Each Primary Team Member (PTM), including the one who holds the prime contract, then enters into a single "pact" with the other PTMs. They each jointly and severally bind themselves to each other and to the fulfillment of all of the terms, conditions and requirements of the prime contract. Further, PTMs agree in this "pact" to share the cost on the project and to distribute profit based upon a formula that rewards the PTMs in accordance with their participation on the project. The entity that signed the Prime Contract is simply a PTM and receives profit based on the same formula and in the same manner as the other PTMs.

Key Pact provisions:

- The PTMs each agree to be bound together accepting full responsibility for all of the terms and conditions of the prime contract, sharing together in the cost and profit in accordance with a pre-established formula. Each member is reimbursed for all verifiable direct costs that he incurs. Profit is calculated at the project level at the end of the project and divided based on the formula.
- Each of the PTMs provides a certificate of insurance in the form and amounts as indicated in the prime contract.
- Each PTM agrees to open their books pertaining to this project to the other PTMs and to the Client.

Team members are united together under the prime contract. The Team has one price, and that is the price to the Client. The Team has one scope, and that is the project scope as defined in the prime contract. There is no accounting among PTMs for who is over or who is under budget. *Holding everyone solely accountable for their own scope and price would drive the project back down the road to local optimization and inhibit innovation. IPD was formed to avoid these problems.*

Through their association with the Lean Construction Institute, they have learned that their intuitive and practical approach rests on a principle of production system design; *local optimization leads to sub-optimal project performance*. Prior to forming IPD, they were working in a system that guaranteed that each participant would vigorously work to optimize his own part of the project without regard to the effect on the other parties or the over all project. Typical subcontracts confer upon the subcontractors an autonomy that always works to the detriment of the project. Instead of becoming a team working in harmony toward a common goal, they often became separate warring factions. The structure of IPD also supports innovation and improvement within each craft and between them. As a result, they may shift work and cost across traditional boundaries to reduce total expenditures and to improve total project performance.

To support this IPD process each PTM agrees to immediately disclose any condition (internal or external) that might threaten their ability to fully perform on the project. The pact automatically expires with the final fulfillment of the terms and conditions of the prime contract and the final distribution of profits to the pact members after fulfillment of all warranty obligations.

"One for all and all for the project"s ounds great but there is an unavoidable implication: If one PTM makes a mistake, each PTM will pay for it. Some find this hard to accept. Cost reductions anywhere are shared among those in the Pact and with the Client. An overrun on the project will reduce the gross profit available for distribution. Under this pact, they came to think of themselves as mountain climbers roped together. If one falters the others pick up the slack; they

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don't cut him loose. They are not involved in a search for the guilty. They are involved in applying all of their talents to getting the job done. They recognize that everyone makes mistakes and are willing to jointly absorb the cost for those honest mistakes. They are comfortable in this because they have chosen team members with integrity, character and competency; Team Members who are trustworthy.

THE IMPACT OF IPD ON PROJECT DELIVERY

On the design process
There is no incentive for team members to hold back ideas. This effect is very powerful in reducing project costs and enhancing the "value engineering"p rocess. Value engineering takes place at the beginning of the project and throughout the project. It is "built in" as it should be and not "tacked on" at the last minute as a cost saving or profit enhancement tactic. It is amazing how quickly effective solutions can be devised when there is no concern over which entity will pay for them. This creativity always benefits the client, however, when the GMP is set too late in the process the IPD Team Members are limited in their participation in the savings brought about through this creativity.

Cooperation, Innovation and Coordination
All of the primary team members wear the same hardhats on the job with the same logo. They all work under one general superintendent who has total authority from the Primary Team Members to direct the project to achieve the most efficient and lowest overall cost delivery. Field problems are quickly resolved based on the lowest perceived overall cost and least impact principle.

The Team decides what positions such as Project Executive, Director of Design Services, Director of Construction Services, Project Manager, Project Superintendent, Project Accountant, Manager of Information Technology, and Systems Manager need to be filled for the particular project at hand. These positions are filled with the best available person from any of the Primary Team Members. They become direct job cost and the company from which they came is reimbursed for the time they spend on the project.

Each person assigned a project leadership position works for the Team, is paid by the Team, and is responsible to the Team. In this way, their allegiance is to the Team and the project and not to their own sponsoring company. All have the traditional authority and responsibilities of the positions that they are filling.

The principals of the companies developing the IPD process meet two mornings a month for breakfast and fellowship. They discuss the IPD concept in order to refine and further develop it. Attendance at these meetings, and the involvement and "buy in" of the top stakeholders is crucial to success of the process. These meetings underpin the broader network of relationships that hold the projects together.

Each month the PTMs are reimbursed based upon their actual verifiable direct job cost. At the end of the project, gross profits are distributed to each PTM in accordance with their incurred direct cost on the project. A mutually agreed upon formula is used for determining the actual amount of gross to be distributed to each team member. The formula is weighted more highly toward direct labor than subcontracts and more highly toward material purchases than major equipment purchases. The intent is to recognize the varying overhead associated with each type of job cost.

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GOVERNING THE RELATIONSHIP

The best governance is self-governance. With IPD self-governance among PTMs is facilitated and encouraged by the structure of the IPD process. From the Client's viewpoint the IPD central accounting and monthly review of each of the PTMs billing packages is a form of governance. Since the collective interest of the PTMs is aligned with that of the Client, he can have confidence in this review process. The open book, and shared savings features are both means of governance. Governance of the project execution is vested in the people who perform the traditional roles of Project Executive, Project Manager, Superintendent, Director of Design Services, etc. These people have traditional responsibilities and authority on the project. Dispute resolution would be handled by discussion and agreement between the PTMs. They have found that most project disputes typically are rooted in the financial interests of the disputing parties. Since they have a common financial interest, disputes of the typical type do not seem to be a problem. In any case through the first four projects, there have been no disputes.

EXAMPLES OF SUCCESS

They have completed four successful IPD projects and have been awarded a five-year continuing services contract for design build work for Orlando Utilities Commission, an enthusiastic Client from a prior IPD project. Rather than describe the projects that have been completed, it may be more helpful to offer some examples of the IPD process in action. Some of these examples may seem trivial in size but they are offered as best illustrating the effects IPD. A "Case Study" is also included for the OUC North Chiller Plant which is the most current IPD project.

The Last Planner™: An extensive dormitory renovation had to be done over the summer. The Team knew that an exhaustive approach to planning and organizing the work would be required because the renovation of an old building can be very complex, a large number of trades would be involved, and the completion time was short. They committed to an aggressive use of the Last Planner™. Their integrated approach to the project enabled us to optimize implementation of the Last Planner™ system. Instead of a GC having to herd a group of independent contractors and design professionals, each with their own agendas, toward a project completion date, they were able to develop a coherent approach and work as a unit. No one wanted to let the Team or themselves down. They each shared the full responsibility for the total project and this meant keeping on schedule. Occasionally, despite their best efforts, work fell behind. In other situations it cost more than expected to hold to the schedule. These situations did not present an insurmountable obstacle as they were sharing all cost and the burden of overtime, etc. The cost of keeping up did not fall on the party working to catch up, but was shared by the total Team through their shared cost arrangement. The project finished two weeks ahead of schedule while other similar projects on campus ran over their schedules.

Shared Manpower: Their electrical team member made use of workers from other trades as needed to assist in pulling wire and other chores. This availability of ready casual labor enabled him to complete the job with fewer workers assigned to the project than otherwise would have been required. This type of impromptu sharing of manpower occurred throughout the project and between all trades.

Problem Resolution: In the course of construction, a large conduit bank masked a portion of a new roof hatch. The IPD superintendent agreed with the Client's representative to install a second hatch in another section of the plant. This solution gave the Client a full hatch and a second hatch with somewhat restricted access. There was no need to price anything or to get any

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kind of approval. All trades simply did what was necessary to quickly and efficiently make this change.

Handling Major Changes to the Work: The intention was to match new cooling towers to existing towers. After the towers were released the manufacturer notified them the model had been changed to one that was taller and had a different footprint. The Client opted to go with a different manufacturer. The IPD Team was able to stop the order for the original towers without penalty, select the new towers that were suitable, redesign the support steel and modify the piping and electrical to accommodate the new towers. Because of the flexibility of the IPD process and integrated design team, they were able to make this change without requiring an increase to the GMP or any extension of the project schedule. They believe that the magnitude and timing of this major change would have scuttled the schedule and budget of a traditionally run project.

Work Across Traditional Boundaries: Their electrical Team Member received a favorable quote for variable frequency drives as a part of the equipment package. These drives were originally intended to be provided in the mechanical package. They simply agreed on the spot for the electrical to buy the drives as a part of his package as that made the best sense for the project. The project cost was reduced and the increased profit shared by all including the Owner.

Recovering From Oversights: When they discovered a missing elevation for an exterior light, the superintendent called the architect and explained the problem. Within 30 minutes a sketch was faxed showing the mounting elevation. No RFI was required and there was no impact on the project because of this omission. It was their integrated approach that made it possible for the field superintendent to call the project architect direct and effect this fast resolution.

Avoiding Redundant Effort and Expense: Multiple trades required core drilling, fire protection, electrical and pipe chases, and clean up. The trade that had the most in each category, or for whom the work was most convenient, provided this service for all trades. There was no need to record or charge back any cost. This resulted in efficiency and lowered overall project cost.

Enhancements to Job Site Safety: The IPD Team determined to run accident free projects. The superintendent has the authority to direct the activities of all workers on the projects. This ensures uniform compliance with safety procedures. The cost of safety compliance falls to the entire team and not just to the involved subcontractor, so there has been no resistance to following these sometimes costly safety procedures. There has not been a single accident on any of the four IPD projects completed to date. All shared the costs and the benefits of this achievement.

Spending More to Save More: Normally, the Design Engineer prepares design drawings from which the contractor prepares shop drawings for fabrication. Major changes in the layout can arise during this translation. In the case of the OUC South project, the engineer sent his designer to the mechanical contractor's office. The designer worked there with an experienced mechanical piping expert to lay out the equipment room in detail using object based 3-D. This increased engineering cost at first, but saved money downstream. The mechanical contractor did not have to produce shop drawings because the engineering drawings were sufficient for the fabrication shop. The pipe was fabricated and installed exactly as designed.

Sharing Rental Equipment: Rental equipment and other resources were shared by the Team. This resulted in optimum usage of the equipment. There was no need to track who used the equipment or for how long. The Team Members shared all cost.

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OUC NORTH PLANT – A CASE STUDY

Westbrook and the IPD Team was awarded a contract for the design and construction of a central chilled water plant in downtown Orlando that would have the utility infrastructure to support the ability to deliver 12,000 tons of chilled water to the chilled water customers of Orlando Utilities Commission in the downtown area. Initially the plant would have an installed capacity of 3,000 tons that could be easily and quickly expanded as needed to the ultimate build out of 12,000 tons.

This contract was awarded to the Westbrook/IPD team pursuant to their having been selected as one of two design-build firms that would deliver chilled water plants such as this to OUC over a five year period.

The plant stands today as a testament to the benefits of Relational Contracting as employed by the Westbrook/IPD Team.

Schedule Performance

☐ Contract Date	12/30/03
☐ DD Complete	1/26/04
☐ Demolition Complete	1/7/04
☐ Permit Issued	4/14/04
☐ Work Begins on Site	5/4/04
☐ Plant Ready to Operate	7/28/04

This performance would not have been possible without the Team commitment and the heavy reliance on the relationships amongst the Team Members to ensure that commitments were kept. Once everyone got in the spirit of accelerating the project, it seemed that anything was possible.

Budget Performance

☐ GMP	$6,000,000
☐ Final Price	$5,400,000
☐ IPD savings against GMP	$600,000

The GMP was set after the DD documents were complete and reflected the Team's best value engineering which was applied from the first day. These savings of approximately 10% were realized in the construction phase of the project. No one ever dreamed such savings were possible in the actual construction phase. The IPD advantages mentioned above contributed to these savings. Beyond that, they have discussed below some of the job specific events that contributed to these extraordinary savings in both time and direct job cost.

Coordinate Design With Schedule: Many different column cross sections will satisfy a design requirement. By involving the steel erector, they were able to use the mill schedule to inform the selection of columns that would be available when needed. This type of coordination would have been next to impossible under traditional delivery systems.

Function Over Form in Design: The placement of the columns can be arbitrary to some degree. The mechanical contractor modeled the equipment room using the 3D objects for the actual equipment and suggested a column spacing that worked best even to the point of offsetting one of the columns 18" from its predicted location. From a structural viewpoint this worked as well as

any other layout and it was adopted. The structural engineer verified the adequacy of the design to accommodate this change. Rarely, if ever, would a mechanical contractor be involved in the determination of the column grid and certainly no other system would afford the opportunity to offset a main column to accommodate the mechanical work.

Early Fundamental Design Decisions Support Construction Details: When the Team began to seriously consider placing all utilities under the slab the design of the column footers was the subject of a rigorous Team meeting which considered how high the tops of the pads could be and still allow utilities that had to pass over them to turn up properly to the finished floor. Several vertical offsets were planned in the perimeter foundation wall to allow passage of utilities without sleeving or cutting that wall.

GC Goes the Extra Mile: The general contractor backfilled and compacted to an elevation 30" below grade and the site was turned over to the Team Member responsible for the electrical construction who laid 1 mile of conduit without the need for any excavation. Seeing the entire grid laid out "above ground", as it was, afforded the opportunity for accurate layout and verification. The GC then came back in and backfilled to grade using fire hoses to wash fine aggregate in and around the conduits. This innovation saved more than three weeks off of the schedule and many thousands of dollars. Consider that the conduit was originally intended to be run overhead in galvanized pipe. This implied extensive hangers and considerably increased lengths as the pipe would have had to run parallel to column lines and would have required 20' drops at each end of each run.

The top of the column footers was set 30" below top of grade to allow room for all utilities to turn up and penetrate the finished floor vertically. Setting the elevation for the top of the footers was a Team decision determined in a weekly Team design meeting.

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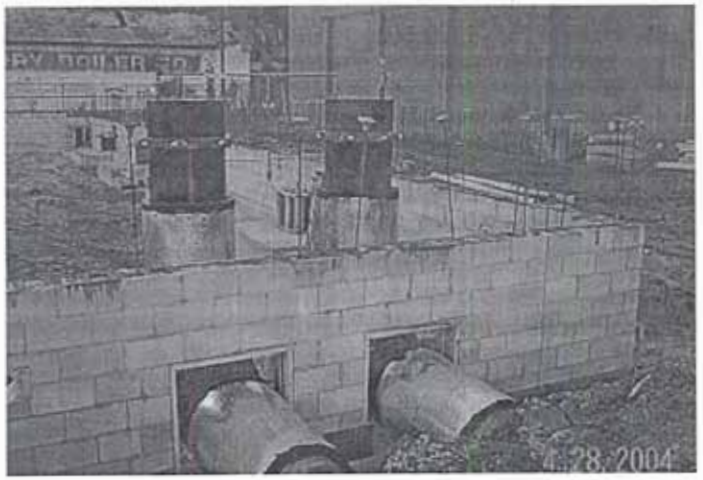

Step downs in the wall footer were determined at a Team design meeting to allow for all utilities to cross properly.

An initial perceived obstacle to laying out all of the utilities exposed was how backfill could be done without crushing and moving the conduits. The Team solution was to begin backfill at one point using fine sand, washing it in with fire hoses, compacting and testing as they fanned the backfill operation over the entire building. It worked flawlessly. Here you can see the backfill process beginning at the top of the picture. An added benefit was that each run was totally visible and could be easily checked for correctness.

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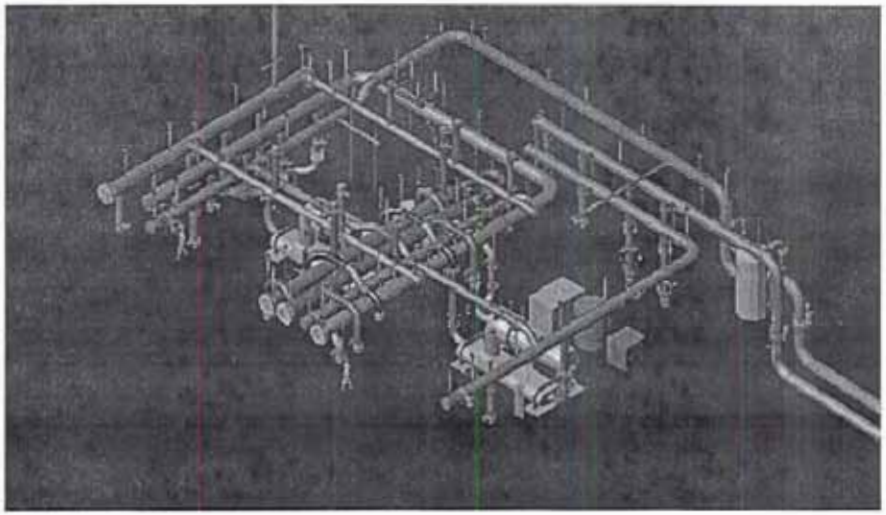
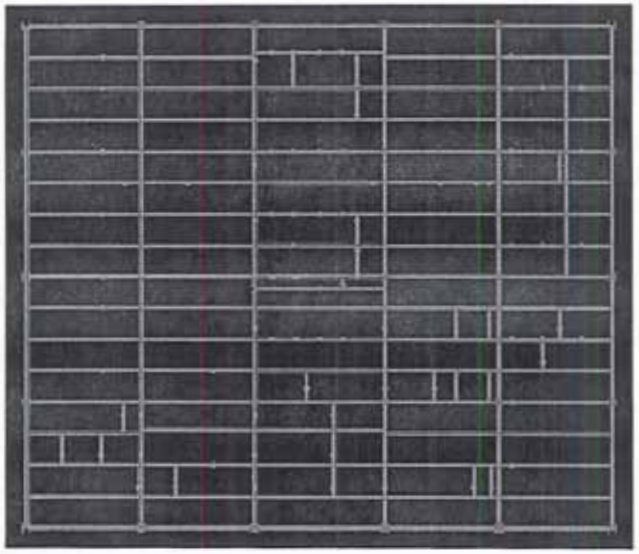


On this object based CADD drawing prepared by Westbrook we can see each hanger assembly. The main headers are 30" and 24" pipe. Everything shown was prefabricated off site and delivered "just in time".



The mechanical design determined the column grid and the structural engineer designed to suit. Here we see that one column near the center was offset to accommodate connections to one chiller. The points represent pipe hanger locations placed by mechanical contractor/design team. Where no steel existed, the structural engineer added beams to carry the pipe hangers.

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The steel has arrived and is being erected. Note the weldments to receive the pipe hanger assemblies. This steel with the weldments was prefabricated in another state. Note the date on the picture.

By the end of the next day, 5/19/04, every hanger assembly was installed and still no pipe had been delivered to the site. The hanger assemblies were prefabricated to exact lengths. No measuring or layout was required to install them. All that was required was putting assembly A on point A and installing a bolt.

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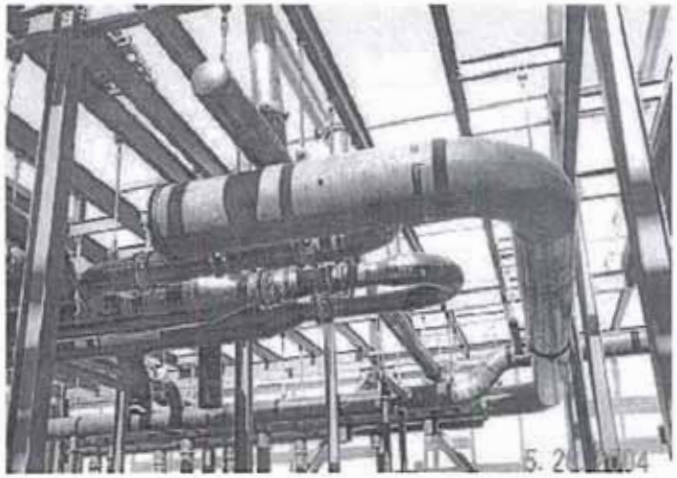

Here we see pipe being hoisted into place using a crane rigged through the steel. The steel erector held off the decking to facilitate this time saving and safe operation; another example of a contractor spending a nickel to save the project a dollar. This worked because we never had to consider who was spending the nickel or who was saving the dollar. All pipe was installed, two 1,500 ton chillers set and connected in 10 calendar days. Everything fit perfectly.

The plant is a showplace of quality and efficiency of design and execution.

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PROBLEMS ENCOUNTERED

IPD has encountered and resolved a number of challenges concerning such issues as insurance, bonding, job costing, job accounting, the formula for distributing gross, the form of the internal "pact", project leadership, consolidated budgeting, warranty, communications, etc. These have all been, for the most part, expected issues that simply needed to be addressed and solved. Even so, over the past four years there have been other problems worth noting.

The Uncommitted Member: IPD team members were carefully selected and had significant history working together on design-build projects and design-bid-build projects. Nonetheless, they still had a team member who wasn't suitable for the IPD process. The managing partner and majority shareholder of that member of the Team had very little personal involvement with IPD. As a result, the representative of that company experienced significant internal pressure to revert to the old self-preservation concepts. At the conclusion of the project, the member withdrew from the IPD Team through mutual consent.

Old Habits Die Hard: On an early IPD project the General Contractor assigned a skilled and respected project manager who had been working in the industry for more than 20 years. While the President and Executive Vice President of the GC partner were fully on board with IPD and attended the bi-monthly meetings, the assigned project manager just could not get his mind around the concept. He often seemed offended that he was not being asked or allowed to function in his typical role as PM. This was a man that the Team Members had enjoyed working with successfully on other more traditionally run projects, but he could not work effectively in the IPD environment.

These cases show that not everyone is suited to work in this environment. Those assigned to work on IPD projects must be carefully selected and prepared for the new rules.

CONTINUING CONCERNS - AREAS FOR DEVELOPMENT

Setting the price: With IPD, the value engineering process is so strong and effective that by the time they reach the design-development stage, everyone's best ideas are incorporated. The budget produced at that time, therefore, reflects all of the Team's creativity and experience. Value engineering, experienced as cost saving ideas submitted late in the design process, does not occur as the construction practitioners and design professionals work together from the start to ensure a cost efficient design. The Client receives the full benefit of this process and the likelihood of contractor initiated change orders is greatly reduced. It seems clear that this offers powerful benefits for the Client but the IPD Team is uncertain at this point how these benefits can be quantified and how they can be compensated for the true value that the IPD process adds to the project. As it stands today, IPD members benefit only from cost savings after the budget is developed. These result from the considerable field efficiencies inherent in the IPD process and the application of Lean Construction Principles.

Managing Risk: Depending on the size or complexity of the project, a joint risk assessment committee could review the project monthly focusing on such areas as the team's performance, any indications of a team member problem, change orders and claims initiatives, payment history of the Client and any trends that may need correcting.

Appendix 4

WORKING WITH NON IPD MEMBERS, EXPANDING THE TEAM

It is fairly easy to introduce a specialty contractor into a project as a member of the team either by bringing him in early and negotiating a price at the appropriate time or by actually inviting them to become a full member of the team for a particular project sharing cost with the rest of the Team. Circumstances would determine which method might be employed.

They pursued a major project where their usual engineering partner was unable to participate. They agreed to invite another engineering firm to participate with them as a full Team Member for that particular project. The substitute firm readily understood the IPD process and was an eager and capable participant in the preliminary design and pricing. IPD was not the successful bidder for this design-build project, but the experience with the "plug in" Team Member was successful.

REFLECTION ON THEORY (Greg Howell)

IPD developed as the participants applied common sense drawn from their experience; No particular theoretical consideration shaped the effort. Even so, reflection on organizational theory, particularly those rooted in transactional cost analysis, helps explain why the approach is so effective and may offer guidance for future development. This note proceeds by first considering two types of cost that arise in the course of doing work in an organization. This is followed by a discussion of the way managing these types of cost shape organizations and contracts. IPD is located in the resulting framework and suggestions offered.

Types of costs

The cost associated with doing work in organizations can be divided between the cost expended producing goods and services – the production cost, and transactional costs – the cost of "doing the deal", associated with the movement of those goods and services across organizational or market boundaries (Williamson 1979). In construction, transaction costs include among others, the cost of preparing and negotiating contracts, insuring performance and settling disputes. Efforts such as partnering are aimed at reducing the transaction costs associated with disputes. Constructability and value engineering efforts are mostly aimed at reducing production costs. Examples of efforts that reduce both costs can be found in this paper under the heading "Examples of Success." For example, IPD demonstrates how they reduced transaction costs in "Recovering from Oversights". An example of reduced production costs is found in "Sharing Rental Equipment". (Interested readers are advised to read closely the works of Williamson, Ouchi, Gunnarson & Levitt, and Macniel included in the references section of this paper.)

Types of contracts

Williamson and Macneil discuss two broad classes of contracts; transactional where exchanges are made for goods and services, and relational contracts where the relationship "takes on the properties of 'a mini-society with a vast array of norms beyond those centered on the exchange and its immediate processes.'" (Williamson 1979, pg 238) Relational contracts arise as transactions become less discrete, and the transaction costs increase due to the duration, uncertainty and complexity of the matter at hand.

Transactional contracts foresee a single outcome; the value of a single future outcome is made present and both parties agree to the exchange – money for the project (Williamson 1979). The dispute record of the construction industry proves that drafting transactional contracts for the

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delivery of complex and uncertain construction that foresee all contingencies, allocate all risks, limit opportunistic behavior and still motivate highest global efficiency is impossible.

Macneil, cited extensively by Williamson, proposes relational contracts to manage in this situation (Macneil 1974). Relational contracts foresee many possible outcomes – for richer, for poorer, in sickness and health, now and forever – and bind the parties to maintain their relationship even as they pursue other objectives[3].

IPD Contract and Organization

IPD employs both transactional and relational contracts. Externally, they enter a classic transactional contract with the client and some suppliers. Internally, members are bound by a relational contract described in the "pact" they all sign. The "pact" minimizes transactional cost by binding the parties together in a partnership for the duration of the project. Records are not kept to allocate costs or determine blame. They have yet to have a dispute internally or with a client.

Production costs have been reduced by sharing resources and finding innovative ways to reduce project cost; trading ponies for horses. All this is accomplished because the contractual incentives and operating rules reward cooperation and still stimulate innovative approaches to managing work. (It could be argued that sub contractor transaction costs may be increased if they could have made more money pursuing their own short term interest or by the requirement for a larger insurance policy, but we hear no complaints from IPD participants.)

IPD is a clever solution to the tough organizational and contracting problems faced in today's market. It relies on careful participant selection, transparency and continuing dialog. They have not set in place alternative dispute resolution methods or taken other steps to insure they can solve problems and retain their organizational structure. Perhaps they will never face such problems. In any case, it is hard to imagine a better internal contractual relationship for applying lean construction. Construction consumers might consider rethinking their contracting strategies to share more fully in the benefits.

CONCLUSION

IPD is a Relational Contracting approach that aligns project objectives with the interests of key participants. It creates an organization able to apply the principles and practices of the Lean Project Delivery System.

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[1] CEO, Westbrook Air Conditioning & Plumbing, Box

END

Appendix 4

Wellington BedTower

Project Management Questionairre

Innovation is a unique solution to a need or process that offers improvement over the traditional methods. With that in mind, how often do you innovate? How important is it to your role on a project? Have you either been rewarded or offered to others a reward for innovation?

Innovation is critical to continuous improvement. As such I always look to ways to innovate and encourage others to do so. As a PM or Superintendant it is not only my job to innovate but critical that I empower and require other to do so daily as well.

What do you think about "lean Construction"? Is it new and improved? Or is it just another fad? Is it something you have been doing but now it has a name? Do you have no idea?

Lean construction is the new application of concepts brought forward in other industries now being applied to our industry. The applications are different but the concepts are the same. 1) drive customer value, 2) eliminate waste, 3) continuous improvement. The essence of Lean construction is to involve the builders in the design process to garner all of the best ideas and solutions prior to drawing plans. This eliminates inconsistencies in the field while in the field collaboration between trades rather than silo mentality drive improvement to all parties. The concept of optimizing the entire value stream rather than pieces changes the perspective of how and where value is created.

Define the best way to solve a problem. Who was involved in problem solving on your most successful jobs? In a perfect world, who and how often would this problem solving group get together?

All stake holders should be present and all possible options should be given an opportunity to be discussed. Time should be spent researching any promising opportunity as the best decision can't be made if it is not considered. A multiple disciplinary approach should be taken, not a one person perspective. The designers should walk the site regularly and tradesmen should be given direct access to the designers.

It is critical that all parties be offered respect and all comments are given equal value regardless of who brought them to the table.

Please answer true or false to the below statements:

Trust is soft	False
Trust is slow	False
Trust is built solely on integrity	False
You either have trust or you don't	False
Once lost, trust cannot be restored	False
You can't teach trust	False
Trusting people is too risky	False
Trust is established one person at a time	False

How do you make (or enhance) profit on your projects?

Work smart. Plan, Plan, then plan some more. Do it right the first time. Eliminate waste as much as possible. Listen to the guys in the trenches. Ask questions when not sure. Admit your ignorance.

How do your partners (subcontractors) make their profit?

Ask them. Less labor? Work being ready when they deploy troops? Better ability to schedule materials. Have confidence that when asked to provide 6 tradesmen all 6 will be productive. Proper coordination with others. Understanding expectations by performing first work studies.

What do you think is a fair profit?

Fair is what is agreed upon. More is unfair if at the expense of others. Less is unfair provided all agreements are lived up to.

How does the architect make profit?

Draw less. Full code understanding. Collaborating with Authorities having jurisdiction. Understanding how you plan to build something and helping to make sure it fits.

How does the owner make profit (during the job not after)?

By receiving more value. Value can take many forms. Early delivery. Better quality. Better access to maintain. The ability to chose between systems with an actual cost to make fully informed decisions. Knowing when critical decisions need to be made. Having flexibility to make decision without impacting others.

If you had the opportunity, would you be willing or do you think it is your role to help others make or enhance their profit?

It is imperative we all have the same goals to win.

Sample RFP for Contractors

Date

Contractor Address

Re: Request for Proposal
UHS hospital at location

Dear Mr. Contractor,

On behalf of the UHS project team, we are pleased to invite your firm to submit a proposal for preconstruction and construction services for the referenced project. The current team performing design, preconstruction and construction services for previous "Pre-phase" packages and this referenced work is the Owner (name), Architect (name), GC (name), etc.

The project is a new tower ……. The interior fit-out includes surgery with ……. There is an amount of shell space that will remain for future development that is outside the scope of this project. Also included are some renovations to existing spaces that are primarily at connection points between the existing and new building. Refer to the design documents that have been completed to date for more specific information regarding the scope of the project. Documents are being forwarded to your attention from (drawing service) under separate cover.

A key element of the delivery of this project through the preconstruction and construction phases is the implementation of "Lean Construction" principles. The project team strongly feels that to successfully implement these principles the major stakeholders of the project should be involved during the preconstruction and planning of the project. We encourage you to research and learn about the concepts of "Lean Construction" and incorporate these within your proposal. There are many resources available to learn about "Lean Construction". We have found the following website (www.leanconstruction.org) to be very informative.

UHS has expressed a commitment to the partnering concepts of Lean Construction and intends to enter into mutually beneficial relationships with qualified, reputable firms for the project.

It is desired that the preconstruction and construction services be performed on an "open book" format with the establishment of a guaranteed maximum price at a mutually agreeable time frame.

It is our intent to select firms to work with in each trade category following our review of the proposals received and interviews/presentations with short-listed firms. The proposals shall be delivered on or before (date) to:

Whoever will read them

We are currently anticipating that these interviews/presentations will be scheduled sometime during the week of (date) with selection of the successful firms following very shortly. Upon selection the preconstruction and planning efforts will begin immediately with construction in late summer.

Sincerely,
UHS
Project Director

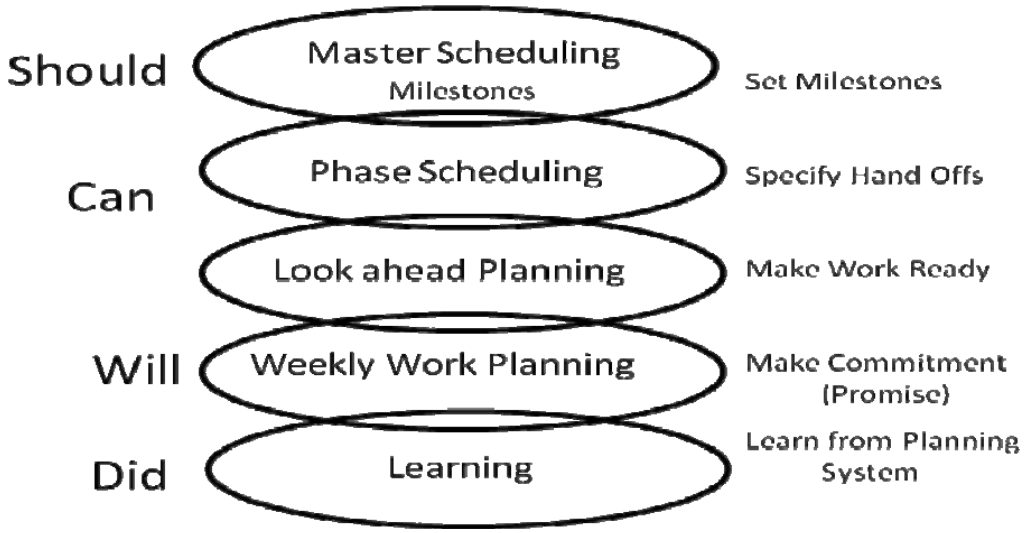
Cc:

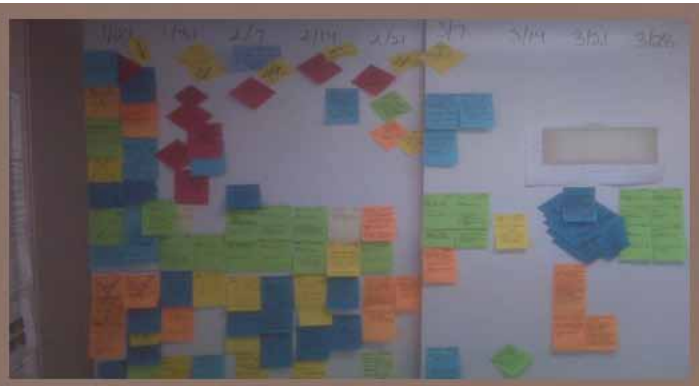
Last Planner™ System of Production Control

The use of an Integrated Project Delivery (IPD) system to plan, design, fabricate and erect this project is essential to meeting the Owner's "Conditions of Satisfaction", specifically those regarding cost and schedule. There are many components of IPD; however, one of the most important is the use of the Last Planner™ System (LPS) by the construction forces in the field. The LPS was developed to produce predictable workflow and rapid learning. This produces maximum value to the Owner by eliminating waste caused by unpredictable workflow. Its use has enabled contractors to reduce the delivery time of the project and at the same time allowed specialty contractors to improve utilization of their resources.

The LPS requires team members to make and keep commitments based on their confidence that prerequisite work, design information, materials, labor and equipment will be ready so they can start and complete installations to meet Master Schedule milestones. Specialty contractor supervisors are expected to plan together with other trades in building a "Phase Schedule" for each major phase of work on the project in which they will be participating. In the Phase Planning Meeting, specialty subcontractor supervisors structure the flow of work and design the network of commitments by identifying hand-offs between trades. Each onsite supervisor is considered a "Last Planner" in the LPS, and has the responsibility to plan their activities six weeks ahead in a "Lookahead Schedule" and to identify crew assignments for the current and next week in a "Weekly Work Plan". **Last Planners are asked to commit to performing work that they know can be made ready for their crews and to refuse to assign work they are not confident can be started and/or completed because it is not ready.** It is this cycle of planning and commitment coupled with learning from seeing the results which creates reliable workflow.

In schematic fashion, LPS can be represented as shown below:





INTRODUCTION TO PULL PLANNING

XXXXXXXXX

1

Current Scheduling Process

- Work expands to fill the time allowed
- Work flow (hand-off) is not reliable
- Work production is not steady
- Dates and durations are determines by few
- Traditional methods of how work, information and material are processed needs to change

2

What is Pull Planning?

Working from a target completion date (milestone) backward, tasks are defined and sequenced so that their completion releases work

3

How does Pull Planning Work?

- Work tasks, information flow, and material deliveries are planned based on the request (or "pull") of downstream customers
- Pull scheduling will often expose the need for smaller batches, just in time delivery, improved leveling of resources, and reduced lead times
- Workflow becomes more reliable and efficient as the waste of waiting, redundancy, and over-processing are eliminated

4

Appendix 7

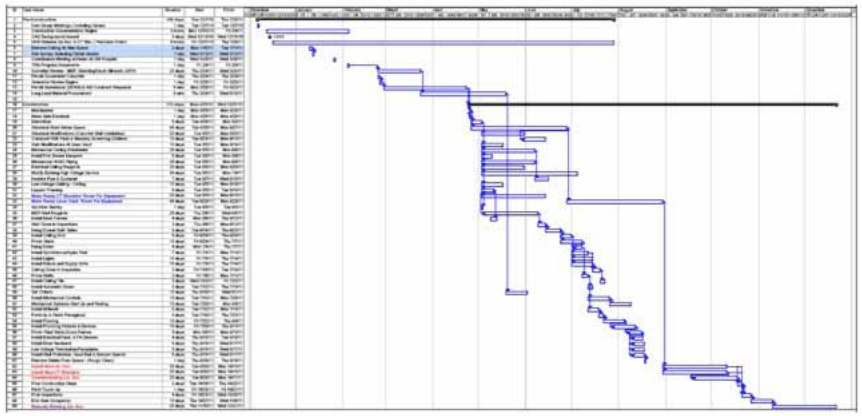
Pull Planning Step

1. Define the phasing of the work
2. Determine completion dates for the phases (or milestones)
3. Using team scheduling and sticky's on a wall, develop the network of activities required to complete the phase working backward from the completion date
4. Apply durations to each activity with no contingency or float in the estimates
5. Re-examine logic to try to shorten the duration
6. Determine the earliest practical start date

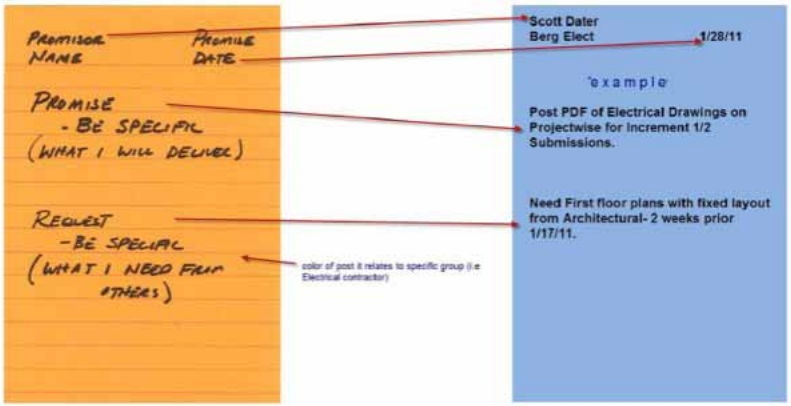
Pull Planning Step continued

7. Decide what activities to buffer or pad with time contingency
   - Which activity durations are most fragile?
   - What are the risks?
   - Rank order by degree of uncertainty
   - Allocate available time to the fragile activities in rank order
8. Is the team comfortable that the available buffers are sufficient to assure completion within the milestone? If not, either re-plan or shift milestone as needed and possible

Milestone or Phases



Sticky Format



Appendix 7

Sticky Wall

Pull Planning Rules

- All work shall be clear as to content, sequence, timing and outcome
- Every connection (hand off of work) in the work stream must be direct and there must be a clear way to request action and receive a response
- The pathway for production must be simple and direct
- Tasks and completion dates must be negotiated with "performer" and "receiver"
- No one can assign or move another persons sticky

Now What?

- Transfer sticky's and commitment dates to:
  - Work Register (design phase)
  - Last Planner System (construction phase)
  - Other specialized software available
- Monitor progress and task completion through Check-In sessions or Daily/Weekly meetings
- Adjust commitments or tasks as needed by Re-Pulling if needed

Work Register

Last Planner System

WEEKLY WORK PLAN — December 10, 2010

Area:	2nd Floor - Phase IV	CATEGORIES OF PLAN FAILURE				TOTAL ACTIVITIES:	11
Subcontractor:	Listed Below	1 Coordination	5 Prerequisite Work	9 Submittals	13 Space	ACTIVITIES COMPLETED	
GA-IN	Day	2 Eng/Design	6 Labor	10 Approvals	14 Site Conditions	PERCENT PLANNED COMPLETE	
Last Planner:	HITT	3 Owner Decision	7 Materials	11 Equipment	15 Inspections		
		4 Weather	8 Contracts/COs	12 RFIs	16 Work Stoppage		

Master Schedule Activity ID	ASSIGNMENT DESCRIPTION Safe - Defined - Sound - Proper Sequence - Right Size - Able to Learn	Responsible Individual	Start Date: 10-Dec-10						Done	LEARNING	Category
			Fri	Mon	Tue	Wed	Thur	Fri	Sat	Y/N	REASONS FOR PLAN FAILURE	
			10	13	14	15	16	17	18			
219	Hang Drywall OR 15	Drywall Contractor	X									
218	Install Ceiling Grid OR 15	Drywall Contractor			X							
219	Hang Drywall 2nd side through-out Phase 4	Drywall Contractor	X	X	X	X	X					
220	Tape and Block Drywall through-out Phase 4	Drywall Contractor	X	X	X	X	X	X				
199	Build Infectious Wall in existing sub sterile	Drywall Contractor		X								
201	Cut new opening in Sub Sterile	Drywall Contractor			X							
215	Install Frame and Door in Sub Sterile	Drywall Contractor			X							
214	Install Electric in Sub Sterile for Future Equipment	Electrical Contractor			X	X						
209	Rough-In Ceiling Electrical for Steris in OR 15	Electrical Contractor		X	X	X	X	X				
209	Rough-In Ceiling Electrical for Steris in OR 16	Electrical Contractor		X	X	X	X	X				
210	Insulation of Duct Work	Mechanical Contractor		X	X	X	X	X				
	Workable Backlog [What work can I do w/o affecting other trades if											
	(7) Core Drills											

Questions?

Big Room Rules of Engagement

This is a Safe Zone
Everyone is encouraged to speak their mind without concern for embarrassment or ridicule by others.

No Stripes
We all have equal status and say in all matters. No one person has more authority than others.

Speak Up
Get engaged in conversation and share ideas. Your opinion is important in helping guide the team.

Listen to Others
Focusing on what others have to say helps you understand their point of view.

No Side-Bar Conversations
Only have one meeting at a time. Conversations should be heard and shared by all.

Turn Cell Phones Off
Help keep the meeting and participants on track by eliminating phone disruptions.

No Multi-tasking
Stay focused on what is going on in the meeting. This includes laptop computers and PDA's.

Stay on Time
This includes start time, end time, break times and agenda.

Email Etiquette

- Is this email needed, or is this issue better addressed via phone call or meeting?
- Does this person really need another email?
- Share your appreciation in regular meetings and calls.
- Place “UHST” and the request/action needed in the subject line
- Use agreed-upon acronyms (EOM: end of message) in subject line
- Summarize background information below the action item(s)
- Set clear due date and time if applicable
- “To” recipient is the only person needed to take action
- “CC” recipients are stakeholders receiving information only
- Restrict the use of “Reply All”

UHS Temecula Medical Center - Big Room Agenda

Predict, Plan, Perform, Perfect *Intent, Capability, Results, Integrity*

Date: Tuesday, July 12 **Facilitator: Jeff H.** **UHS Onsite:** Tara **Visitors:**

All Hands | Budget Cluster | Site Cluster | Core/Shell Cluster | Interiors/Planning Cluster | Other/Misc

Big Room	Temecula	Corona
7:30 HOSPITALITY AND SET UP (GoTo)		
8:00 To 8:15 INTRODUCTIONS AH HA MOMENTS CHECK-IN CLUSTER LEADER REPORT OUT	**7:00 to 8:00** BREAKOUT: Budget Cluster Attendees: MegaYots, DA, DS, TM, TS, KL, ES, SD, SW, TL, BK	
8:15 to 9:00 - HOT TOPICS · ESA Extension Action Plan Sharing Reflection COP o Feedback & Sharing of knowledge Scott D (L) - ALL		**8:30 to 12:00** CORONA TEAM
9:00 To 11:00 Pull Planning: Itemize time slots before start 1. Construction Milestones – Steve Y 2. Inc 3 &4 QA/QC 3. Procurement – Details for next 2-3 mos a. Balance of trade partners b. Agree on target date/updates for all trades 4. Site Grading Status Updates/Pull Plan a. Permit status, bid status, award of trades. 5. Increment 5, 8 Pull Plan ATTENDEES: Saiful/YK, Steve, H., 6. BIM Update Pull Plan – Dustin/Jason K. a. Update schedule & plan 7. Structural Pull Plan – Schuff/YK REQUIRED	**10:30 to 11:30** Constructability Review Steve Y (L), Bob, Dean, Ken, Marius, Ward, Ed, Scott D, Steve H.,	
11:00 to 11:30 NEXT WEEK'S AGENDA		
11:30 to 11:45 FLEX TIME		
11:45 to 12:00 Plus/Delta (Save smart boards)		
12:00 to 12:30 LUNCH – ??? HEAD COUNT	**12:00 to 1:30** Core Team Attendees: Dave S (L), Steve W, GZ, Tara, Rebecca, Ken, Scott, Bob, Ed, Tom M., Steve Y., Kelley, Cynthia (GoTo)	
1:30 to 2:30 Inc. 5 Page Turn · Bring Drawing Sheet index & Half size set Attendees: Ward (L), Ken, Sun, Dan, Steve H., Imelda, Scott D., Carlos, David S., Corey, Rahim, Jason N., Marius, Natasha		
2:30 to 3:45 Hazardous Materials Inv · Develop a plan that leads to completion in 2 weeks Attendees: Marius (L), Ward (L), Steve W (L), Ken, Rebecca, Tara, Dave Smith, Electrical		**2:30 to 4:00** COMMUNITY OF PRACTICE · Debrief Conversation · Onboarding Review · Study Action Team · Next week's Agenda · Plus Delta Attendees: Steve Y, Dean, Dan, Corey, Chris.
3:45 to 4:00 FLEX TIME		
4:00 to 4:15 Plus/Deltas (Save smart boards)		

Big Room
https://www2.gotomeeting.com/join/168532106
Meeting Password: bigroom2010
Organizer Email: william.seed@uhsinc.com
Organizer Password: bigroom2010
Call-In #: 215-383-1005 Access Code: 168-532-106

Temecula Room
https://www2.gotomeeting.com/join/282780482
Meeting Password: temecula2010
Organizer Email: kathy.duffy@uhsinc.com
Organizer Password: temecula2010
Call-In #: 646-558-2102Access Code: 282-780-482

Corona Room
https://www2.gotomeeting.com/join/277828538
Meeting Password: corona2010
Organizer Email: nancy.squartino@uhsinc.com
Organizer Password: corona2010
Call-In #: 630-869-1012 Access Code: 277-828-538

Appendix 10

UHS Temecula Medical Center - Big Room Agenda

Predict, Plan, Perform, Perfect *Intent, Capability, Results, Integrity*

Date: *Wednesday,* July 13 ***Facilitator*** ***UHS Onsite:*** ***Visitors:***

All Hands | Budget Cluster | Site Cluster | Core/Shell Cluster | Interiors/Planning Cluster | Other/Misc

Big Room	Temecula	Corona
		6:30 to 8:00 **Construction Strategy Meeting** Attendees: Trade Foremen
7:30 **HOSPITALITY AND SET UP (GoTo)**		
8:00 **INTRODUCTIONS AND AGENDA**		
8:30 to 9:30 **Headwall Sound Proofing Discussion** · **Posttest debrief** Attendees: **Chris (L)** Dean, Marius, Ward, Ian (GoTo), James, Trade foremen	8:00 To 10:00 **ONSITE Underground Utilities Pull Plan** Attendees: **Tom M (L), Berg, Bali, Earth Tek, Landscape, Granite**	8:30 to 10:30 **INNOVATION OVERLORDS Kick-Off Meeting** Attendees: Ken (L), Rebecca, Steve W., Steve H., Mike G.,
11:30 to 11:45 Plus / Delta (Save smart boards)		
11:45 to 12:00 FLEX TIME		
12:00 to 12:30 LUNCH		
12:30 to 2:00 **Firestopping Kick-off Discussion** · **Define scope & expectations** · **Cross discipline coordination** Attendees: **Ken (L), Corey, Bob**, Dean, David, Marius, Dan (GoTo), Steve W, Steve H, James A	1:00 to 2:30 **DPR/TURNER ops / staff** · Site Submittals Log · Budget, contract, safety Attendees: Danny (L), George, Chris, Steve Y, Ed, Tom M, Doug, Richard, Kelley **Job Site Office**	
	2:30 to 4:00 **Document Management During Construction** · Determine Software · Procedures · Owner of Process Attendees: Dan (goto), (L), Danny (goto), Steve H., Margie(goto) Dean, Ken, Emily(goto), Frank (goto)	
4:00 to 4:15 Plus/Delta (Save smart boards)		

Big Room
https://www2.gotomeeting.com/join/168532106
Meeting Password: bigroom2010
Organizer Email: william.seed@uhsinc.com
Organizer Password: bigroom2010
Call-In #: 215-383-1005 Access Code: 168-532-106

Temecula Room
https://www2.gotomeeting.com/join/282780482
Meeting Password: temecula2010
Organizer Email: kathy.duffy@uhsinc.com
Organizer Password: temecula2010
Call-In #: 646-558-2102Access Code: 282-780-482

Corona Room
https://www2.gotomeeting.com/join/277828538
Meeting Password: corona2010
Organizer Email: nancy.squartino@uhsinc.com
Organizer Password: corona2010
Call-In #: 630-869-1012 Access Code: 277-828-538

Appendix 10

Target-Value Design: Nine Foundational Practices for Delivering Surprising Client Value

Hal Macomber[1] and John Barberio[2]

Throw-it-over-the-wall design performed by specialists and sub-specialists working in isolation from others interacting with the design results in projects that are unaffordable, unconstructable, off-target and late. Rework, repricing, change orders, and de-value engineering are all symptoms of a process that ignores the nature of design and the systems nature of the built environment.

Target-Value Design (TVD) turns the current design practice upside-down.

- Rather than estimate based on a detailed design, design based on a detailed estimate.
- Rather than evaluate the constructibility of a design, design for what is constructible.
- Rather than design alone and then come together for group reviews and decisions, work together to define the issues and produce decisions then design to those decisions.
- Rather than narrow choices to proceed with design, carry solution sets far into the design process.
- Rather than work alone in separate rooms, work in pairs or a larger group face-to-face.

TVD offers designers an opportunity to engage in the design conversation concurrently with those people who will procure services and execute the design.

A Little Background

What do we mean by design conversation? We hold design as principally a social activity. The notion that some one person sits alone and is inspired to design misses both the nature of design and the countless contributions from others. The point of design is to bring forth new value in line with the client's interests.

What is value? Value is an assessment made relative to a set of concerns that someone wants addressed. There is nothing *of value* independent of a person saying (assessing) it *is valued*. Client concerns – interests, not worries – must be

1 Hal is a Principal with Lean Project Consulting. Previously, he was the COO for the Neenan Company, an integrated design-build firm.

2 John is a business consultant to the design and construction industry, JB Consulting Services, LLC.

kept in the foreground of the design conversation. Doing so allows designers to engage in a conversation for exploring various ways to take care of the concerns of that client. Those concerns inevitably change over the life of the project. As design proceeds new concerns arise while others fade away. Locking down requirements early in the process cuts short the exploration and development of the clients' concerns. Consequently, design suffers as does the value delivered to the client.

What roles do clients play? Clients are key performers during design, not just customers. As performers they express their concerns, make value assessments, and eventually make choices. When clients fail to take those actions in a timely way it leads to immeasurable waste for the project team. The team cannot let their fear of the client get in their way of holding all performers, including the client, to act responsibly.

TVD Foundational Practices

Here we are introducing nine practices for creating the conditions for delivering the target-value from the design process.

1. **Engage deeply with the client to establish the target-value.** Both designers and clients share the responsibility for revealing and refining concerns, for making new assessments of what is value, and for selecting how that value is produced. Continue engaging with the client throughout the design process continue to uncover client concerns.
2. **Lead the design effort for learning and innovation.** Expect the team will learn and produce something surprising. Establish routines to reveal what is learned and innovated real-time. Also expect surprise will upset the current plan and require more re-planning.
3. **Design to a detailed estimate.** Use a mechanism for evaluating design against the budget and the target values of the client. Review how well you are achieving the targets in the midst of design. When budget matters, stick to the budget.
4. **Collaboratively plan and re-plan the project.** Use planning to refine practices of coordinating action. This will avoid delay, rework, and out-of-sequence design.
5. **Concurrently design the product and the process in design sets.** Develop details in small batches (lot size of one) in tandem with the *customers* (engineer, builders, owner, users, architect) of the design detail. Adopt a practice of accepting (approving) completed work as you design.

6. **Design and detail in the sequence of the customer who will use it.** This maintains attention to what is valued by the customer. Rather than doing what you can do at this time, do what others need you to do next. This leads to a reduction in negative iterations.
7. **Work in small and diverse groups.** Learning and innovation arises socially. The group dynamics of small groups – 8 people or less – is more conducive to learning and innovating: trust and care for one another establish faster; and communication and coordination are easier.
8. **Work in a Big Room.** Co-locating design team members is usually the best option. Design is messy. Impromptu sessions among design team members are a necessary part of the process. So are regular short co-design sessions among various specialists working in pairs.
9. **Conduct Retrospectives throughout the process.** Make a habit of finishing each design cycle with a conversation for reflection and learning. Err on the side of having more retrospectives not less. Use plus|deltas at the end of meetings. Use more formal retrospectives that include the client at the end of integration events. Instruct all team members to ask for a retrospective at any time even if they just have a hunch that it might uncover an opportunity for improvement.

How to Proceed

Be careful not to pick and choose from the above nine practices. We call them foundational practices indicating that taken together they establish a base for adopting other lean design practices. Both *Responsibility-based Project Delivery*™ and *Knowledge-based Design* build on TVD.

Also, be careful not to think "We already do this." While we have taken care to describe what we see as different, we recognize that it might sound like something very familiar. Consider how what we are describing here is different from what you are doing.

Take an experimental approach to adoption – PDCA (plan-do-confirm-adjust) – based on the scientific method. While the nine foundational practices work, exactly how they work for your organization and specific projects might vary. Use your team leaders to bring about TVD practices on a project-by-project basis by considering both what is being designed and who will be doing the work. Stay close to these early experiments standing ready to offer whatever help the project team needs to succeed both on their project and with these new practices.

Collaborative Thinking Process/A3

Kristin Hill, AIA
InsideOut Consulting, Inc.
June 19, 2010

1

Resource

"Managing to Learn"

Using the A3 management process to solve problems, gain agreement, mentor and lead

by John Shook

2

Collaborative Thinking Process A3

- Process for producing consensus & alignment
  - Status reports
  - Proposals/recommendations
  - Problem solving
- A3 format for documenting the process

3

What is an A3?

- "A3" refers paper size 11x17 (approx)
- Every organization issue - 1 page
- Follows a ***common logic***

4

Appendix 12

Effective A3 Process

- Effective Use of A3 Process
  - Can facilitate shift from ***debate*** about who ***owns what*** (authority-focused)
  - To ***dialogue*** around ***what is the right thing to do*** (responsibility-based)
- Creates a "pull-based" authority

5

- Radical impact on the way decisions made
  - Individuals ***earn*** authority to take action
  - Leaders do not take a laissez-faire disengagement
- Incorporate A3 into team activities:
  - Learn to stop avoiding problems
  - Recognize problems as powerful opportunities for learning and improvement
  - Places ***responsibility*** on the author-owner
    - Not necessarily having authority over all aspects
    - Accepts responsibility to ***get decisions made and implemented***

6

A3 – Storyboard

- The ***underlying thinking*** matters - not the ***format***
- Visual manifestation of problem-solving thought process involving ***continual dialogue*** between owner of issue & other stakeholders

7

Story

- Should tell a ***story*** from the upper left to lower right
- Traces a journey from context/definition, to resolution & sequel

8

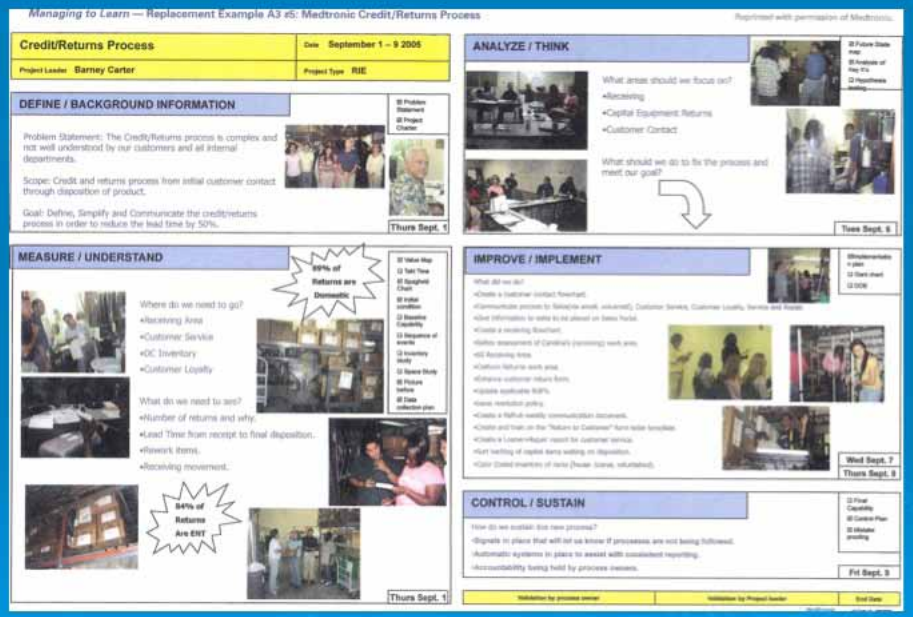
Appendix 12

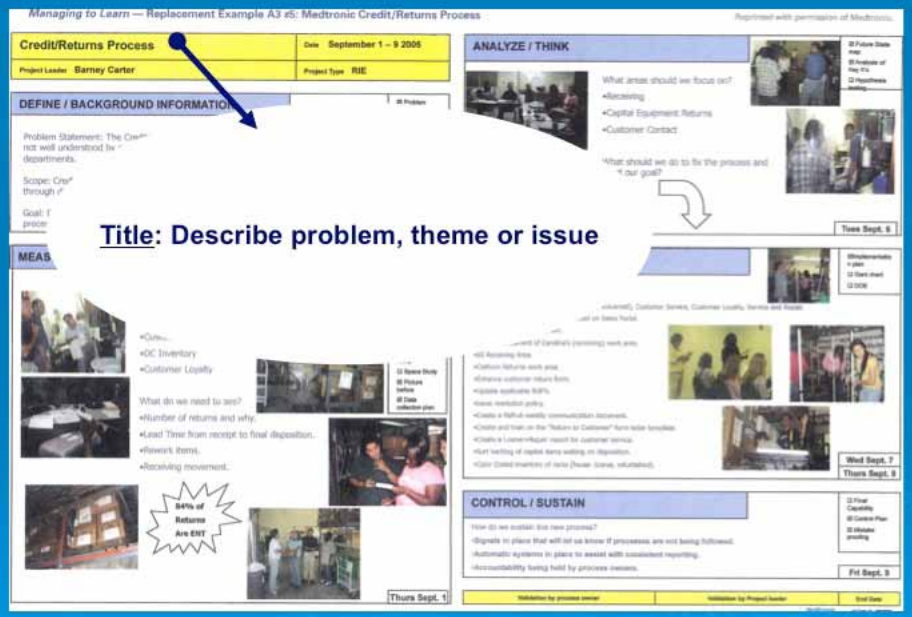
The Process

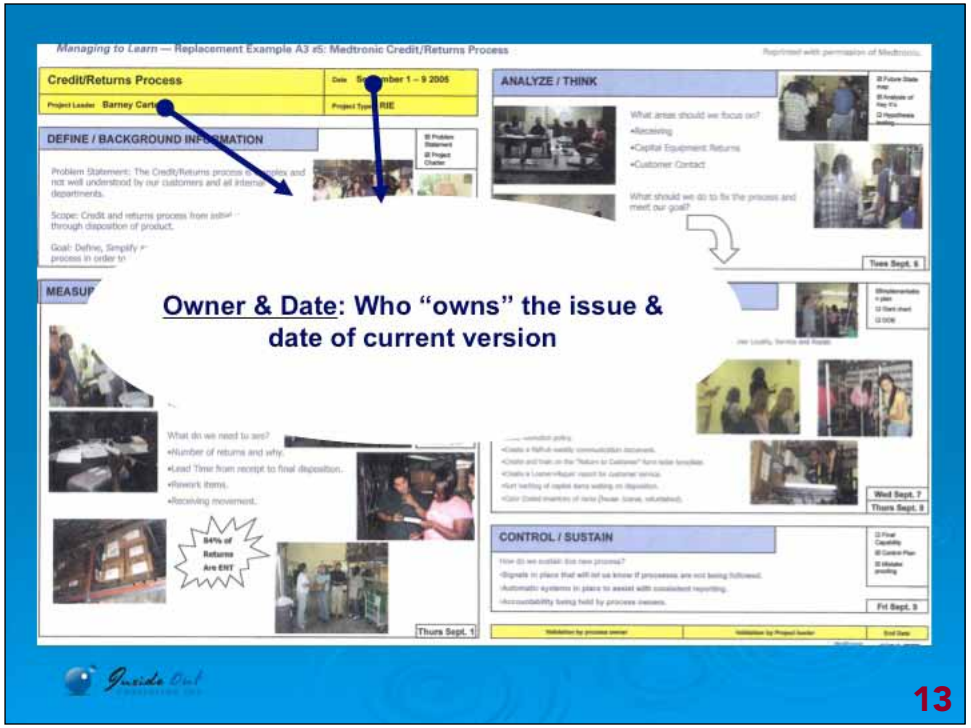
- A3 Process follows **PDCA**
- Plan – Do – Check – Act (Adjust)
- Fundamental approach to **ALL** work in collaborative/lean approaches

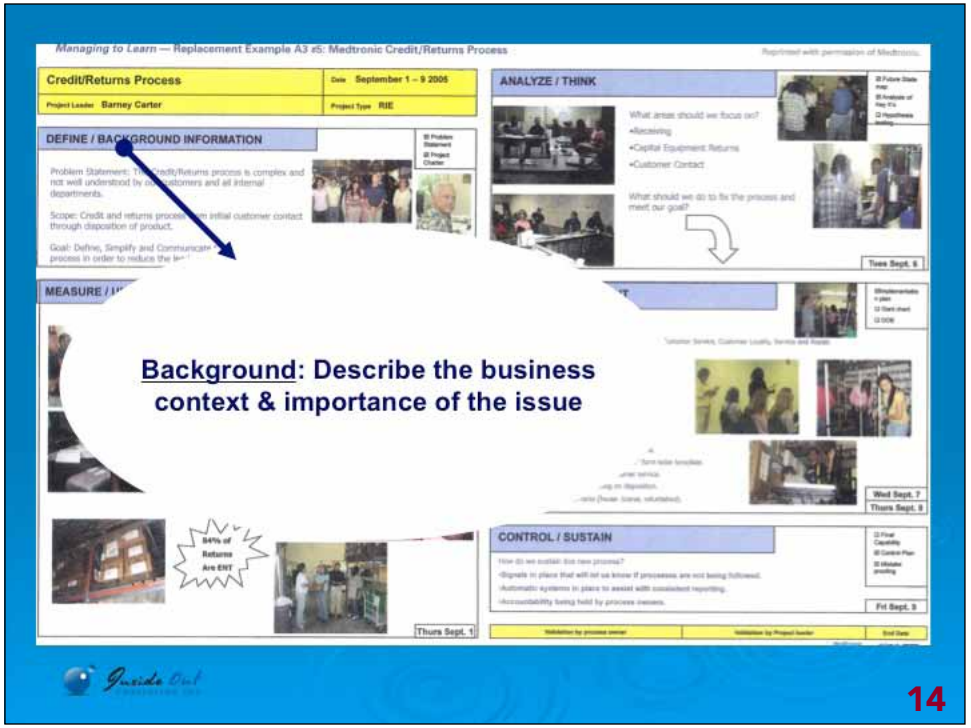
Elements

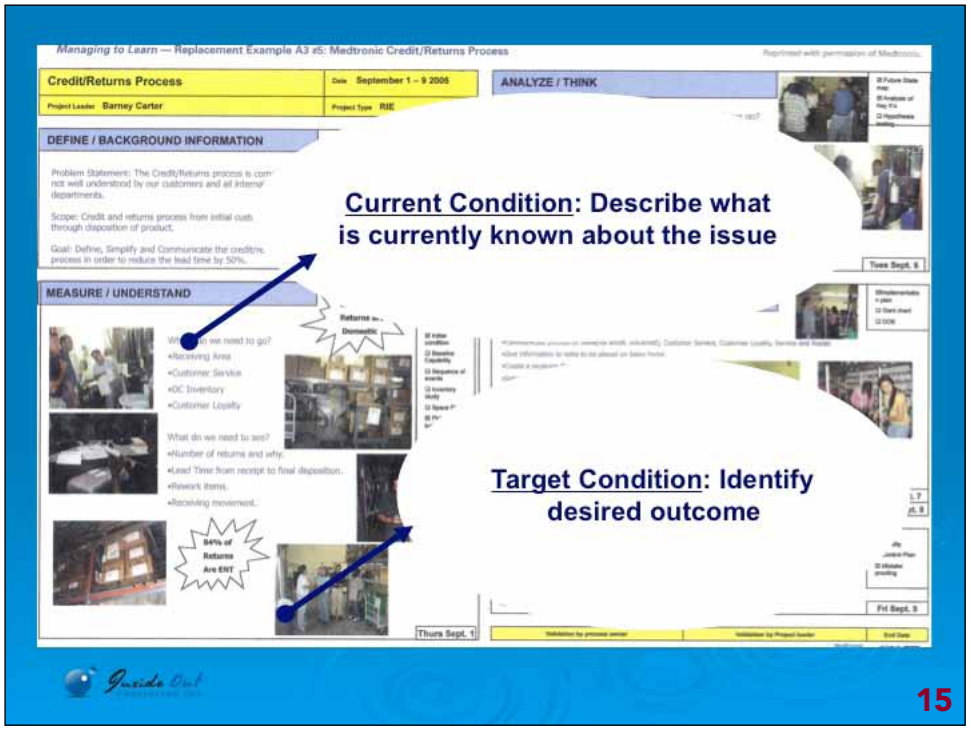
- Title
- Owner/Date
- Background
- Current Condition
- Target Condition
- Analysis
- Proposed Countermeasures
- Plan
- Follow-up

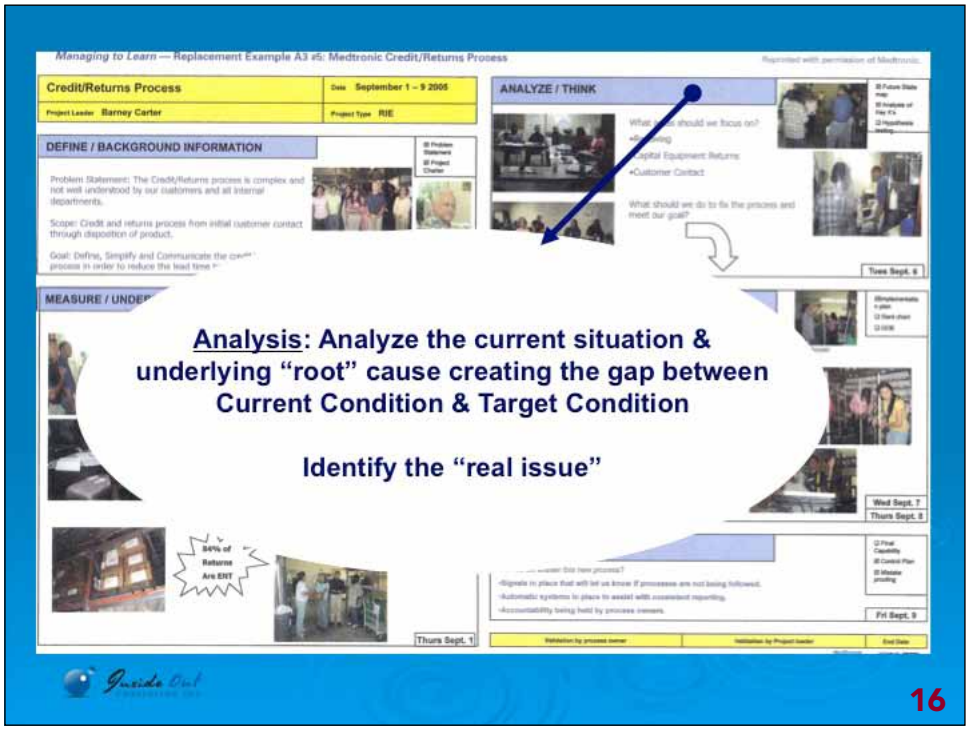





Managing to Learn — Replacement Example A3 #5: Medtronic Credit/Returns Process
Credit/Returns Process
Project Leader Barney Carter
Date September 1 – 9 2005
Project Type RIE
DEFINE / BACKGROUND INFORMATION
ANALYZE / THINK
MEASURE / UNDERSTAND
CONTROL / SUSTAIN
Owner & Date: Who "owns" the issue & date of current version

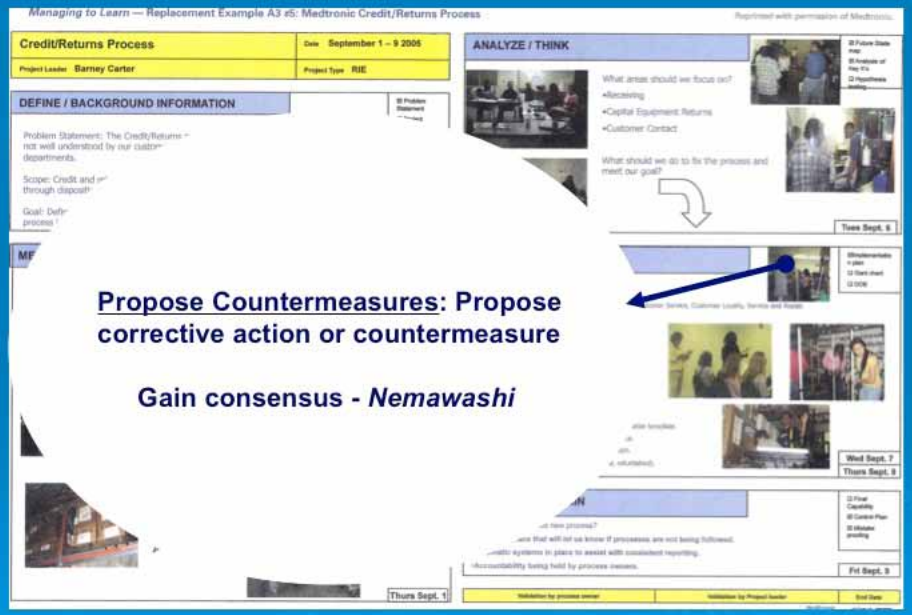

Managing to Learn — Replacement Example A3 #5: Medtronic Credit/Returns Process
Credit/Returns Process
Project Leader Barney Carter
Date September 1 – 9 2005
Project Type RIE
DEFINE / BACKGROUND INFORMATION
ANALYZE / THINK
CONTROL / SUSTAIN
Background: Describe the business context & importance of the issue


Managing to Learn — Replacement Example A3 #5: Medtronic Credit/Returns Process
Credit/Returns Process
Project Leader Barney Carter
Date September 1 – 9 2005
Project Type RIE
DEFINE / BACKGROUND INFORMATION
ANALYZE / THINK
MEASURE / UNDERSTAND
Current Condition: Describe what is currently known about the issue
Target Condition: Identify desired outcome


Managing to Learn — Replacement Example A3 #5: Medtronic Credit/Returns Process
Credit/Returns Process
Project Leader Barney Carter
Date September 1 – 9 2005
Project Type RIE
DEFINE / BACKGROUND INFORMATION
ANALYZE / THINK
Analysis: Analyze the current situation & underlying "root" cause creating the gap between Current Condition & Target Condition
Identify the "real issue"

Getting to the Real Issue

- Go to ***Gemba*** to fully understand the issue
  - The value-creating place the work actually happens to discover the "truth"
- ***"Root Cause"*** investigation
  - Perform ***"5 Whys"*** to get beyond the obvious symptoms



Nemawashi

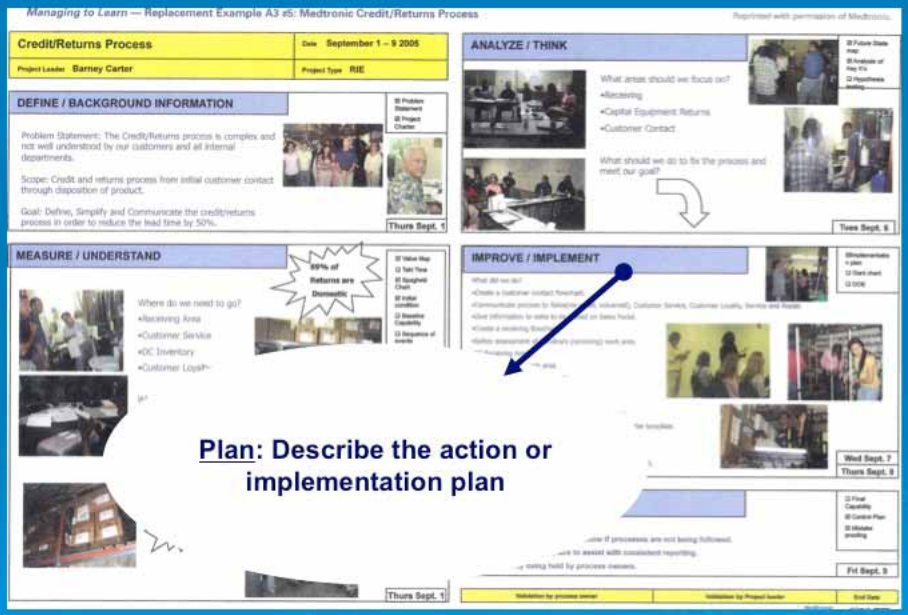
- Refers to the consensus process of aligning organization around the countermeasure
- Approval at end of the process – formality
- Heart of Pull-based authority

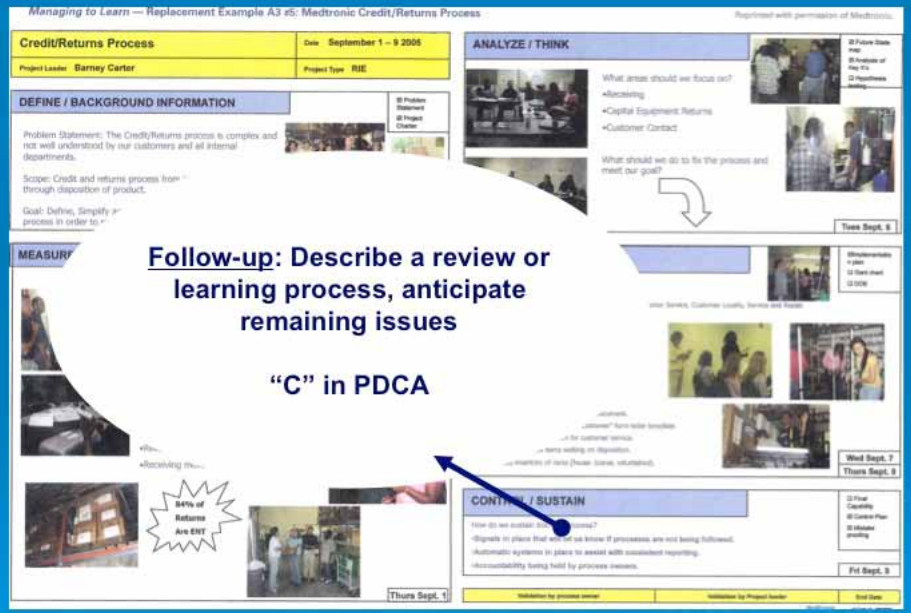
Consensus/Agreement

- Does NOT mean giving up on one's ideas or beliefs
- DOES mean that one will support the decision of the group
- Requires listening to other's point of view

Set-based Decision-Making

- One of most important aspects of lean decision-making
  - Assessment of a **"set"** of countermeasures
  - ***"Just-in-Time"*** *Decision-Making*





Caution!

- A3 Pitfalls
  - Making it about the "report"
  - Not working until reaching consensus with key stakeholders – not collaborating
  - Not identifying all/correct stakeholders
  - "Jumping" to a solution or attaching to one course of action
  - Arduous process – frustration
  - Operating in-between "authority & responsibility based" approach

Executive Summary

ISSUE

Optimize a scalable medical campus supporting the UHS mission in Temecula, CA

BACKGROUND

- Validate the delivered price of a net new [100] hospital (Future: 325 beds)
- Develop timeline of phased implementation schedule

CURRENT CONDITION

- Target total project cost is $125M
- Use the existing building pads
- Maximum of six (6) stories for the hospital and four (4) for the MOB
- Grading commences July 1, 2010 as promised to the City of Temecula
- Assume that one (1) MOB is developed separately

PROBLEM ANALYSIS

- Organizational silos/inefficiency

- Time to market/profitability/phase by phase
- Engage existing entitlements
- Utilize existing building pads
- Time and cost of long OSHPD reviews
- Best practices and lean leadership capabilities

TARGET CONDITION

- Integrated lean, including OSHPD, using lean processes to deliver the greatest value to UHS
- Deliver optimized design solutions (standardized efficient, patient-centered, adaptable, sustainable)
- Scalable market and service focused program
- ROI-focused phasing strategy and schedule
- Reduce areas of state agency review
- Building organization that minimizes OSHPD involvement and review

COUNTERMEASURES

- Four options for a net new hospital with a target total project cost of $125M (See reverse side for study sets)
- 1 to 8 occupancy = 30% decrease in 1-occupancy

- Phased Plan Review (PPR) - Incremental OSHPD submittal (see implementation plan)
  - OSHPD on team and city engagement
  - No deferred approvals
- Efficient Flow and Organization - 18% decrease in bgsf
  - 30% > operational efficiency
  - 30% increase revenue in ED/Urgent Care

- Phasing plan for incremental growth
- IPD team formation with continuous lean learning including Jack Uldrich and Choosing By Advantages
- Innovations and alternatives
  - Material Distribution Center - 15-20% reduction in supply costs
  - Rapid ROI from use of existing surplus
  - Scalable energy models with alternates reducing utility costs by 40%
  - 65% reduction of central plant building shell = savings of $300,000
  - East/west patient tower orientation allows 20-25% greater solar energy gain/generation potential

IMPLEMENTATION PLAN

Temecula Healthcare Facility Development

Mission:

HMC Architects
Turner

Date: February 1, 2010
Version: HMC/Turner Team
Sheet: 1 of 1

PROJECT DASHBOARD

BACKGROUND

- Phase 1 Tower Addition includes a 4-story building connecting to the existing at the Inpatient Entry with the following program: Ground Floor (Administration/Conference/Support Services/Future Accounting), 2nd/3rd Floor (Med-Surg), 4th Floor (Shelled for future Med-Surg).
- Project is being designed and constructed using Lean principles, including A3 Learning, Pull Planning, Responsibility-Based Design, and POCA (Plan-Do-Check-Adjust).

RECENT DISCOVERIES

- No need for new chiller.
- No need for new elevators.
- Generator to be half size originally planned.

CURRENT INVESTIGATIONS

- Pharmacy layout with Lionville.
- Nourishment area and nurse station configuration.
- Piping supports on the roof from existing Central Plant.

PLANNING SESSIONS

DD Planning Calendar: Weekly sessions
(Thursdays at 8:30 am PST)

Week 1:
Plug/Defa on Design Cycle
Detailed Planning Week 2
Update Pull Plan if necessary

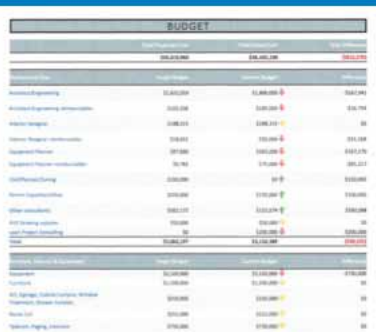
Week 2
Formal Retrospective on last two design cycles
Update Design Cycle Plan
Detailed Planning for next week
Update Pull Plan if necessary

SCHEDULE

Major Milestones

1 100% Schematic Design
2 100% Design Development
3 95% Contract Documents
4 Agency Submittal
5 Ground Breaking

BUDGET

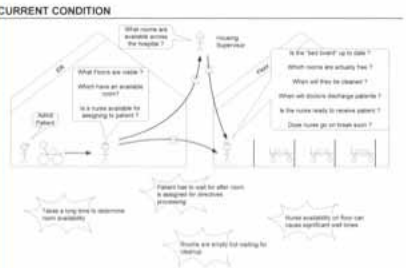


ISSUE : Long "Patient To Bed" (P2B) times causing patient distress

BACKGROUND

once an ED patient has been admitted as an inpatient it takes time before that patient arrives in his/her room. When this time (P2B) is long it is causing added distress to patients.

CURRENT CONDITION



PROBLEM ANALYSIS

Problem : Takes a long time to determine room availability
- Why : Bed boards are inaccurate
  - Why : Patient discharges / Room cleanup is sporadic
    - Why : Partly because "out of hospital" doctors with variable discharge times
    - Why : Unaware (for a time) that bed requires cleanup
- Problem : Patient has to wait even after room assignment
  - Why : "Advance Directives" does not start until after bed assignment
- Problem : Patient has to wait even if a room is available
  - Why : Nurse is not on duty or not ready to receive patient
    - Why : Nurse can be on or near a break or be busy with another patient
    - Why : Particular problem near shift changeover because it impacts a large number of nurses

(See P2B value stream map for details)

TARGET CONDITION

TO	Bill
BY	Jane
DATE	July 2006

COUNTERMEASURES

- Use admin or volunteer resources to check bed availability on a high-frequency basis and update "bed board"
- Start "Advance Directives" before patient bed is assigned

IMPLEMENTATION PLAN

What	Who	When	Outcome
Use additional admin resources with "my task" approach to keep bed boards accurate and initiate cleanup requests	Ann	Month of August	Collect wait time data and do before/after comparison on impact of accurate room availability information
Investigate automated bed availability and notification systems in use at hospitals. Visit a working hospital site	Amy	Month of August	Cost and implementation details for an automated system for room availability hospital wide
Implement better room availability process based on results of August activities	Amy	Sept-Nov	Reduced patient wait times and staff times in finding rooms

FOLLOW UP

- Monthly tracking of outcome values
- Monthly estimation of annual costs / savings
- Monthly update of VSM
- Report out in December

Costs / Savings	Value
Bed Availability System implementation cost (Projected over 12 months)	xxx
Staff time saved per year in tracking bed availability and converted to approx dollar savings	xxx

Outcome	July	Aug	Sep	Oct	Nov	Dec
Characteristic patient wait time (95% of patients have a wait time less than xx minutes)	xxx	xxx	xxx	xxx	xxx	xxx
Average patient wait time	xxx	xxx	xxx	xxx	xxx	xxx

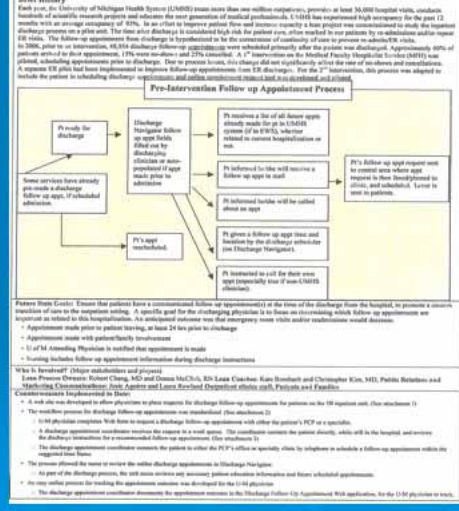
Improving Patient Flow by Reducing Hospital Readmissions through Patient Involvement

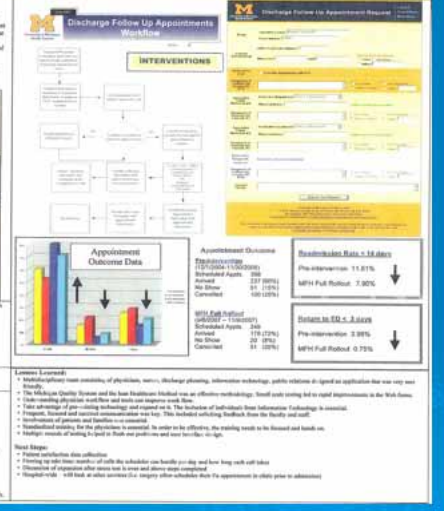
Name of Project or Theme: LEAN Discharge Follow up Appointment Process

Where Are We in the Project Cycle? Full rollout to MFH Service - October 2007

Brief History

Each year, the University of Michigan Health System (UMHS) treats more than one million outpatients, provides at least 36,000 hospital visits, conducts hundreds of scientific research projects and educates the next generation of medical professionals. C-1045 has experienced high occupancy for the past 12 months with an average occupancy of 93%. In an effort to improve patient flow and increase capacity a lean project was commissioned to study the inpatient discharge process on a pilot unit. The time after discharge is considered high risk for patient care, often marked in our patients by re-admission and/or repeat ER visits. The follow-up appointment from discharge is hypothesized to be the cornerstone of continuity of care to prevent re-admits/ER visits. In 2006, prior to an intervention, 68.6% discharge follow-up appointments were scheduled primarily after the patient was discharged. Approximately 40% of patients arrived for their appointment, 15% were no-shows and 25% cancelled. A 1st intervention on the Medical Faculty Hospitalist Service (MFH) was piloted, scheduling appointments prior to discharge. Due to process issues, this change did not significantly affect the rate of no-shows and cancellations. A separate ER pilot had been implemented to improve follow-up appointments from ER discharges. For the 2nd intervention, this process was adapted to include the patient in scheduling discharge appointments and online appointment request tool was developed and piloted.





Future State Goals: Ensure that patient have a communicated follow up appointment(s) at the time of the discharge from the hospital, to promote a smooth transition of care to the outpatient setting. A specific goal for the discharging physician is to focus on discharging which follow up appointments are important as related to this hospitalization. An anticipated outcome was that emergency room visits and/or readmissions would decrease.

- Appointment made prior to patient leaving, at least 24 hrs prior to discharge
- Appointment made with patient/family involvement
- U of M Attending Physician is notified that appointment is made
- Training includes follow up appointment information during discharge instructions

Who Is Involved? (Major stakeholders and players)
Lean Process Owners: Robert Cheng, MD and Deana McChris, RN Lean Coaches: Kate Bombardi and Christopher Kim, MD, Public Relations and Marketing Communications: Josie Aguirre and Laura Rowland Outpatient clinic staff, Patients and Families

Countermeasures Implemented to Date:

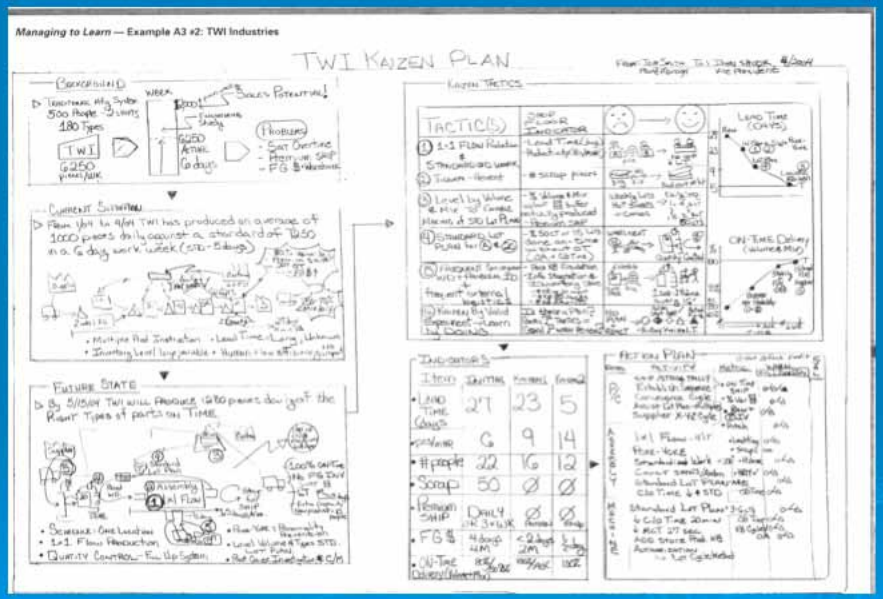
- A task site was developed to allow physicians to place requests for discharge follow-up appointments for patients on the 10 inpatient unit. (See attachment 1)
- The workflow process for discharge follow-up appointments was standardized. (See attachment 2)
  - 1) 64 physicians complete Web form to request a discharge follow-up appointment with either the patient's PCP or a specialist.
  - A discharge appointment coordinator receives the request in a work queue. The coordinator contacts the patient directly, while still in the hospital, and reviews the discharge's instructions for a recommended follow-up appointment. (See attachment 3)
  - The discharge appointment coordinator contacts the patient to either the PCP's office or specialty clinic by telephone to schedule a follow-up appointment within the suggested time frame.
- The process allowed the nurse to review the online discharge appointments in Discharge Navigator.
  - As part of the discharge process, the unit nurse reviews any necessary patient education information and future scheduled appointments.
- An easy online process for tracking the appointment outcome was developed for the 11-04 physician.
  - The discharge appointment coordinator documents the appointment outcome in the Discharge Follow-Up Appointment Web application, for the 11-04 physician to track.

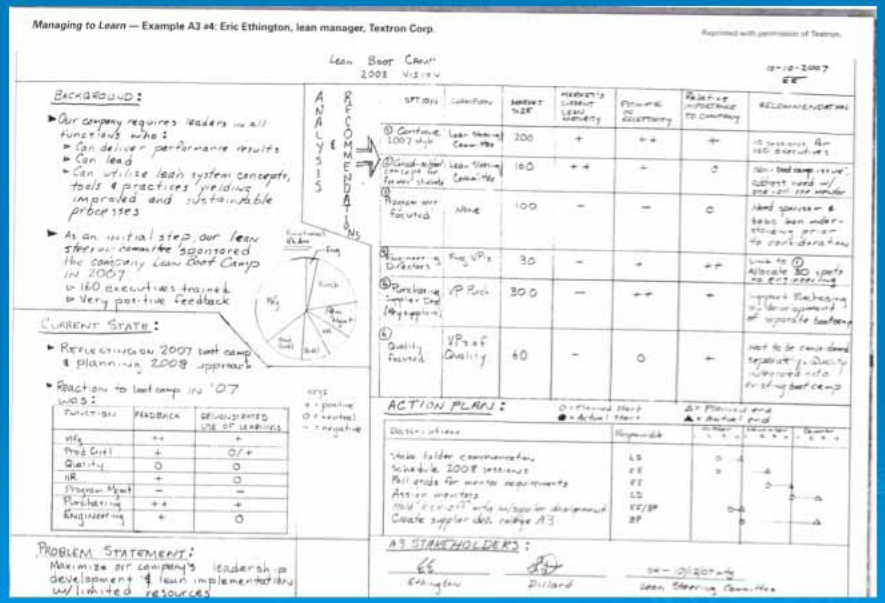
Lessons Learned:

- Multidisciplinary team consisting of physicians, nurses, discharge planning, information technology, public relations & signed an application that was very user friendly.
- The Michigan Quality System and the lean Healthcare Method was an effective methodology. Small scale testing led to rapid improvements in the Web form.
- Understanding physician workflow and tools can improve work flow.
- Take advantage of pre-existing technology and expand on it. The inclusion of individuals from Information Technology is essential.
- Frequent, focused and succinct communication was key. This included soliciting feedback from the faculty and staff.
- Involvement of patients and families was essential.
- Standardized training for the physicians is essential. In order to be effective, the training needs to be focused and hands on.
- Multiple rounds of testing is hard to flush out problems and user interface. Go light.

Next Steps:

- Patient satisfaction data collection
- Freezing up rule time: number of calls the scheduler can handle per day and how long each call takes
- Discussion of expansion after seven test is over and above steps completed
- Hospital-wide - will look at other services (i.e. surgery) after schedules that Pa appointment in clinic prior to admission)





Learning to Learn

- Develop perpetual PDCA Thinkers
- Use A3 Thinking to document the process
- Become a continuous learning & improving organization – ***be lean***

Let's Try

- Break into groups of 5-6 people each
- Pick an "owner"
- Owner to pick from the following (no discussion – it is the owner's choice)

A3 Topics

Propose: Going from sick/holiday/vacation structure to Paid Time Off (PTO)

Propose: Going to a 4 day work week in summer

Problem: People arrive late to meetings

Problem: People (mostly management) are not turning time sheets in on time

Propose: Free yoga classes at lunch

Start A3 Process

- Identify stakeholders – someone play the role
- Develop the title – remember it should state the real problem & not be offering the solution

Elements

- Title
- Owner/Date
- Background
- Current Condition
- Target Condition
- Analysis
- Proposed Countermeasures
- Plan
- Follow-up

Choosing by Advantages Study: George Washington University Hospital Rad Onc Space

	Alternative 1 1255 23rd Street		Alternative 2 1250 23rd Street Basement using courtyard for Lin Ac		Alternative 3 1250 23rd Street Basement using lease space above for shielding		Alternative 3 2101 L Street		
Factor: Location relative to GWUH Criteria: Distance from GWUH to Lease Space Advantage: Attribute:	3.5 Blocks		3.5 Blocks		3.5 Blocks		4 blocks		
Advantage:	less	70	less	70	less	70			70
Factor: Contiguous Space Criteria: Leasable Square Footage is attached will be less advantagous for staff and patients to be split. Attribute:	Space is split 4500sf and 1000 sf, space upstairs does not stack		Is contiguous		Is contiguous		Must be split if 2 LIN AC's are required		
Advantage:	Split and short	20	Contiguous	80	Contiguous	80	Lin Ac must be split	60	80
Factor: Requires special zoning provisions Criteria: Most variance/ special allowances required. Attribute:	No special zoning/ cannot block fire pump below		Must verify if building is allowed in courtyard		No special Provisions		Must verify retail rules if using Level 1 space		60
Advantage:	No zoning issues	60	Special Consideration		No zoning issues	60	Minor zoning issues	40	
Factor: Square footage meets original program square footage. Criteria: Square footage of original program is: 10,000sf Attribute:	4000 square feet short of program		240 sf extra		At program		At program with unusable square footage		100
Advantage:		0	More than program	100	Meets Program	90	Meets program	90	
Factor: Ceiling Height of space Criteria: Minimum 12'-0" ceiling height to accommodate Linear Accelerator Attribute:	Ceiling height is 15'-7" floor to bottom of structure		Ceiling height only adequate in courtyard		Ceiling height adequate if space is leased above for shielding		14'-0" in garage Lease has 9'-6"		50
Advantage:	Most generous ceiling	50			Complies	40	Partially complies	30	
Factor:Can accommodate 2 Linear Accelerators Criteria: Requires 9000 square footage with12'-0" ceiling heights Attribute:	Will accommodate 2 Lin Ac's		Will accommodate LIN AC's in Courtyard Not sure if allowed		Will accommodate LIN AC's if space is purchased above		1 can be in basement location, or and 1 on Level 1		90
Advantage:	Yes	90	Maybe		yes with conditions	80	yes but split	45	
Factor: Requires structural upgrade to foundation. Criteria: Attribute:	Floor strengthening and for Lin Ac will be required		2-3 levels of parking below courtyard upgrades required.		2-3 levels of parking below courtyard upgrades required.		No foundation upgrades for basement only.		40
Advantage:	more significant	20		0		0	minor	40	
Factor: Requires structural upgrades to space Criteria: Estimated extent of renovation Scale 1-10most Attribute:	Add'l beams required		Will have to upgrade structure for this location		Will have to upgrade structure for this location		Bad concrete floor structural upgrades required.		40
Advantage:	least amount	40		30		30		0	
Factor: Access to power Criteria: Ease of connecting to normal power Attribute:	Easy access and space for new breakers 480V service 2 400A switchboards		Limited space for new breakers/Long distance for switchgear/ E clost is not adequate for space		Limited space for new breakers/Long distance for switchgear/ E clost is not adequate for space		Available space for new breakers 480 V, 4000A switch board		30
Advantage:		30						30	
Factor:Access to emergency power Criteria: Existence and capacity of emergency power Attribute:	Only 100KW generator cannot accommodate equipment.		Only 350 KW generator cannot accommodate equipment		Only 350 KW generator cannot accommodate equipment		Will need generator upgrades		10
Advantage:	least requirements	10		0		0	least requirements	10	
Factor: Mechanical cooling Criteria: Attribute:	Capable of accessible space for mechanical cooling		Capable of accessible space for mechanical cooling		Capable of accessible space for mechanical cooling		Need to evaluate Vent air requirements		30
Advantage:		30		30		30		30	
Factor: Additional requirements Criteria: scale of 1-10 (major requirements) Attribute:	If 2nd floor space is required, may need to add stair/ elev. 6		Not sure if building in courtyard is allowed 6		Must transfer patient from Level 2 to Level 1. 5		Restrictions on Lease space on 1/ only 1000sf may be available 3		20
Advantage:						10	least add'l req	20	
		420		310		490		395	
COST									
RANKING									

Appendix 13

Choosing by Advantages Study: George Washington University Hospital Helipad Elevator Analysis

		Alternative 1 D1 Adj. to Existing Elevators		**Alternative 2** D2 Elevator located west of Stair #3		**Alternative 3** D4 Elevator located west of stair #3 closer to screen wl		**Alternative 4** D3-A Modernize Elev. Equip Above Elev Raise the Roof		**Alternative 5** D3-B Modernize Elev. Equip Relocated West		**Alternative 6** D3-C Modernize Elev. Equip relocated to exterior		**Alternate 7** D5 Replace Existing Elevator	Value	**Alternate 8** D6 Add New Elevator on Side Of Hospital	Value	
Factor: Amount of Structural Modifications Required		Hole in Roof, New Shear Wall, New Beams to tie Floor into new shear wall		Cut Roof create sump pit		Cut roof- cuts column strips		Extend penthouse roof Remove portion of Existing penthouse roof		Construct area for equipment, Remove portion of roof, raise roof		Construct area for equipment.		New sump pit,				70
Criteria:																		
Advantage:	Attribute:																	
	Advantage:																	
Factor: Amount of Days Elevators will be down		1 elev KONE-12-14 weeks		0		0		1 elev KONE-12-14 weeks HITT 4 weeks Total 18 weeks		1 elev KONE-12-14 weeks HITT 4 weeks Total 18 weeks		1 elev KONE-12-14 weeks HITT 4 weeks Total 18 weeks		1 elev KONE-18weeks HITT 18 weeks Total 36 weeks		0		100
Criteria: Days for prepping/ days for elevator Installation	Attribute:	Total 14 weeks																
	Advantage:	22 weeks less	70	36 weeks less	100	36 week less	100	18weeks less	50	18 weeks less	50	18 weeks less	50			36 weeks less	100	
Factor: Length of access path required to elevator		190' of Path to Elevator		190' of Path to Elevator		165' of Path to Elevator		210' of Path to Elevator		210' of Path to Elevator		210' of Path to Elevator		210' of Path to Elevator				30
Criteria: Length of travel from Helipad Stop to Elev.	Attribute:																	
	Advantage:	20' Less	15	20' Less	15	45' Less	30		0		0		0		0			
Factor: Amount of spaces affected on 5th floor		Depending on elevator chosen and detail, may fit above ceiling		Depending on elevator chosen and detail, may fit above ceiling		Depending on elevator chosen and detail, may fit above ceiling		0		0		0		0				90
Criteria: Square footage of space alterered	Attribute:																	
	Advantage:	Some above ceiling	60	Some above ceiling	60	Some above ceiling	60	No space affected	90	No space affected	90	No space affected	90	No space affected	90			
Factor: Amount of Space affected on the 6th floor		100 sf for elevator 80sf for lobby 80sf for machine room Total= 360sf		100 sf for elevator 80sf for lobby 80sf for machine room Total= 360sf		100 sf for elevator 80sf for lobby 80sf for machine room Total= 360sf		0		0		0		0				80
Criteria:	Attribute:																	
	Advantage:							No space affected	80	No space affected	80	No space affected	80	No space affected	80			
Factor: Amount of Revisions to existing roof		Relocate elevator exhaust		Relocate MAU-1 and Kitchen exhaust fans and ductwork		Relocate some mechanical equip and fans		Relocate elevator exhaust Relocate elev equip		Relocate elevator exhaust Relocate elev equip		Relocate elevator exhaust Relocate elev equip		Relocate elevator exhaust				20
Criteria: Amount of MEP revisions Scale:1-10most	Attribute:																	
	Advantage:	1	20	7	3	5	10	3	13	3	13	3	13	2	17			
Factor: Meets Zoning Criteria		Does not require variance		Does not require variance		Does not require variance		Requires Variance		Requries Variance		Does not require variance		Does not require variance				50
Criteria: Cannot be over 18'-6" above roof	Attribute:																	
	Advantage:	Variance Not Req.	50	Variance Not Req.	50	Variance Not Req.	50					Variance Not Req.	50	Variance Not Req.	50			
Factor: Amount of Space in Leased Space affected		0		2 exam rooms in classroom area 170 sf		Conference Room in Classroom area 300 sf		0		0		0		0				80
Criteria:	Attribute:																	
	Advantage:	None required	80	130sf less	40			None required	80	None required	80	None required	80	None required	80			
Factor: Requires Life Safety Modifications to Level 6		Yes, blocks exit corridor Will have to reasses exiting from Psych		Minor Life Safety Modifications if careful with placement		Minor Life Safety Modifications if careful with placement		0		0		0		0				70
Criteria: Degree of difficulty ofmodifications required- Scale 1-10(most)	Attribute:	Difficulty 5		Difficulty 3		Difficulty 3												
	Advantage:		30	Minor required	60		60	None required	70	None required		None required	70	None required	70			
Factor: Structural Analysis Required		40 hours		40 hours		40 hours		40 hours		40 hours		40 hours		80 hours				10
Criteria: Estimated amount of hours	Attribute:																	
	Advantage:	40 hours less	10	40 hours less	10	40 hours less	10	40 hours less	10	40 hours less	10	40 hours less	10		0			
Factor: Maintain 8'-0" Path to Elevators		40' of Path at 6'-6" wide		Can maintain 8'-0" for length of Path		Can maintain 8'-0" for length of Path		40' of Path at 6'-6" wide		40' of Path at 6'-6" wide		40' of Path at 6'-6" wide		40' of Path at 6'-6" wide				40
Criteria: Length of Path at 8'-0"	Attribute:																	
	Advantage:		25	Entire Path	40	Entire Path	40		25		25		25		25			
Factor: Amount of Above Ceiling Modifications on Level 5/6		Large amount of piping Fuel lines, and conduit above ceiling		Small amount of HVAC above ceiling to serve adjacent rooms		Small amount of HVAC above ceiling to serve adjacent rooms		None required		None required		None required.		None required.				60
Criteria: Amount of modifications- Scale 1-10 (most)	Attribute:	8		4		4												
	Advantage:	8 x as diff	10	4 x as diff	25	4 x as diff	25	None	60	None	60	None	60	None	60			
			370		403		385		478		408		528		472			
	COST																	
	RANKING	7		5		6		2		4		1		3		3		

Factor: Amount of Exterior Wall required		Approx 700sf of ext 220 sf of roof		Approx 1120sf of ext. 220sf roof		Approx 400 sf of exterior 220sf of roof		Approx 400 sf of exterior 220sf of roof		Approx 400 sf of exterior 100sf of roof		Approx 700sf of ext. 220sf roof		0		0
Criteria:																
	Attribute:															
	Advantage:	400sf less ext		720sf less ext		720sf less ext		720sf less ext		720sf less ext/ 120sf less roof		400sf less ext		None		

Choosing by Advantages Study: Helipad Elevator Analysis

		Alternative 1 D1 Adj. to Existing Elevators		Alternative 2 D2 Elevator located west of Stair #3		Alternative 3 D4 Elevator located west of stair #3 closer to screen wl		Alternative 4 D3-A Modernize Elev. Equip Above Elev Raise the Roof		Alternative 5 D3-B Modernize Elev. Equip Relocated West		Alternative 6 D3-C Modernize Elev. Equip relocated to exterior		Alternative 7 D5 Replace Existing Elevator		Alternative 8 D6 Add New Elevator on Side Of Hospital	
Factor: Amount of Structural Modifications Required		Hole in Roof, New Shear Wall, New Beams to tie Floor into new shear wall		Cut Roof create sump pit		Cut roof- cuts column strips		Extend penthouse roof Remove portion of Existing penthouse roof		Construct area for equipment, Remove portion of roof, raise roof		Construct area for equipment.		New sump pit,		New structure required to support elevator	
Criteria:																	
Advantage:	Attribute:																
	Advantage:																
Factor: Amount of Days Elevators will be down		1 elev KONE-12-14 weeks						1 elev KONE-12-14 weeks HITT 4 weeks Total 18 weeks		1 elev KONE-12-14 weeks HITT 4 weeks Total 18 weeks		1 elev KONE-12-14 weeks HITT 4 weeks Total 18 weeks		1 elev KONE-18weeks HITT 18 weeks Total 36 weeks			
Criteria: Days for prepping/ days for elevator Installation	Attribute:	Total 14 weeks															
	Advantage:	22 weeks less	70	36 weeks less	100	36 week less	100	18weeks less	50	18 weeks less	50	18 weeks less	50			36 weeks less	100
Factor: Length of access path required to elevator		190' of Path to Elevator		190' of Path to Elevator		165' of Path to Elevator		210' of Path to Elevator		210' of Path to Elevator		210' of Path to Elevator		210' of Path to Elevator		25' pf Path to Elevator	
Criteria: Length of travel from Helipad Stop to Elev.	Attribute:																
	Advantage:	20' Less	10	20' Less	10	45' Less	15									185' less	30
Factor: Amount of spaces affected on 5th floor		Depending on elevator chosen and detail, may fit above ceiling		Depending on elevator chosen and detail, may fit above ceiling		Depending on elevator chosen and detail, may fit above ceiling										Delete 1 Semi-Private Room, lose 2 licensed beds	
Criteria: Square footage of space alterered	Attribute:																
	Advantage:	Some above ceiling	60	Some above ceiling	60	Some above ceiling	60	No space affected	90	No space affected	90	No space affected	90	No space affected	90		
Factor: Amount of Space affected on the 6th floor		100 sf for elevator 80sf for lobby 80sf for machine room Total= 360sf		100 sf for elevator 80sf for lobby 80sf for machine room Total= 360sf		100 sf for elevator 80sf for lobby 80sf for machine room Total= 360sf											
Criteria: Square footage	Attribute:																
	Advantage:							No space affected	80	No space affected	80	No space affected	80	No space affected	80	No space affected	80
Factor: Amount of Revisions to existing roof		Relocate elevator exhaust		Relocate MAU-1 and Kitchen exhaust fans and ductwork		Relocate some mechanical equip and fans		Relocate elevator exhaust Relocate elev equip		Relocate elevator exhaust Relocate elev equip		Relocate elevator exhaust Relocate elev equip		Relocate elevator exhaust		No MEP revisions required to roof	
Criteria: Amount of MEP revisions Scale:1-10most	Attribute:																
	Advantage:	1	17	7	3	5	10	3	13	3	13	3	13	2	17	No rev. required	20
Factor: Meets Zoning Criteria		Does not require variance		Does not require variance		Does not require variance		Requires Variance		Requries Variance		Does not require variance		Does not require variance		Does not require a variance	
Criteria: Cannot be over 18'-6" above roof	Attribute:																
	Advantage:	Variance Not Req.	50	Variance Not Req.	50	Variance Not Req.	50					Variance Not Req.	50	Variance Not Req.	50	Variance not required	50
Factor: Amount of Space in Leased Space affected		0		2 exam rooms in classroom area 170 sf		Conference Room in Classroom area 300 sf											
Criteria:	Attribute:																
	Advantage:	None required	80	130sf less	40			None required	80	None required	80	None required	80	None required	80	None required	80
Factor: Requires Life Safety Modifications to Level 6		Yes, blocks exit corridor		Minor Life Safety		Minor Life Safety											
Criteria: Degree of difficulty ofmodifications required and affect on operations- Scale 1-10(most)		Will have to reasses exiting from Psych		Modifications if careful with placement		Modifications if careful with placement											
	Attribute:	Difficulty 5		Difficulty 3		Difficulty 3											
	Advantage:		30	Minor required	60	Minor required	60	None required	70	None required	70	None required	70	None required	70	None required	70
Factor: Structural Analysis Required		40 hours		40 hours		40 hours		40 hours		40 hours		40 hours		80 hours		40 hours	
Criteria: Estimated amount of hours	Attribute:																
	Advantage:	40 hours less	10	40 hours less	10	40 hours less	10	40 hours less	10	40 hours less	10	40 hours less	10			40 hours less	10
Factor: Maintain 8'-0" Path to Elevators		40' of Path at 6'-6" wide		Can maintain 8'-0" for length of Path		Can maintain 8'-0" for length of Path		40' of Path at 6'-6" wide		40' of Path at 6'-6" wide		40' of Path at 6'-6" wide		40' of Path at 6'-6" wide		Can maintain 8'-0" for length of Path	
Criteria: Length of Path at 8'-0"	Attribute:																
	Advantage:		25	Entire Path	40	Entire Path	40		25		25		25		25	Entire Path	40
Factor: Amount of Above Ceiling Modifications on Level 5/6		Large amount of piping Fuel lines, and conduit above ceiling		Small amount of HVAC above ceiling to serve adjacent rooms		Small amount of HVAC above ceiling to serve adjacent rooms		None required		None required		None required.		None required.		Outside air intake at end of patient room will need to be modified -3	
Criteria: Amount of modifications/ affect on operations affect on operations - Scale 1-10 (most)	Attribute:	8		4		4											
	Advantage:		10		25		25	None	60	None	60	None	60	None	60		30
			362		398		370		478		408		528		472		510
	COST	3 ,167,701.00		2 ,675,389.00		2 ,680,592.00		2,359,853.00		2,360,335.00		2,374,787.00		2,374,787.00		2,374,787.00	
	RANKING	8		6		7		3		5		1		4		2	

Appendix 13

THE OAKS - CBA

		Alternative 1 M &OP bld 100 % new		Alternative 2 M w/ Reno in 2 bldgs		Alternative 5 enlarge M		Alternative 6 Orig. M + 4 Reno		Alternative 7 1story and split foors		Alternative 8 steped slab M		Alternative 14 100% new Her. Tree Free	
Factor:	Building Pad														
Criteria:	less tons is better														
	Attribute:	40,771		35,545		43,645		33,963		30,499		33,967		16,302	
	Advantage:	(2,874)	10	(8,100)	25	0		(9,682)	30	(13,146)	40	(9,678)	30	(27,343)	95
Factor:	Cuts & Fills														
Criteria:	less cost is better														
	Attribute:	628,731		536,737		663,224		517,758		505,468		547,084		429,930	
	Advantage:	-34,493	10	-126,487	35	0		-145,466	40	-157,756	50	-116,140	35	-233,294	70
Factor:	Regualar Caliper Trees														
Criteria:	less caliper inches is better														
	Attribute:	1,497		1,275		1,354		1,189		1,497		1,497		707	
	Advantage:	0		-222	15	-143	10	-308	20	0		0		-790	35
Factor:	Exterior Walls														
Criteria:	less lf of perimeter is better														
	Attribute:	2,503		2,023		2,322		1,961		2,503		2,718		2,219	
	Advantage:	-215	10	-695	25	20		-757	30	-215	10	0		-499	20
Factor:	Parking Relationship														
Criteria:	less distance in lf is better														
	Attribute:	570		570		600		755		570		570		380	
	Advantage:	-185	25	-185	25	-155	20	0		-185	25	-185	25	-375	50
Factor:	Additional Abatement Requirement														
Criteria:	less cost is better														
	Attribute:	71,136		156,939		71,136		177,840		71,136		71,136		71,136	
	Advantage:	-106,704	20	-20,901	5	-106,704	20	0		-106,704	20	-106,704	20	-106,704	20
Factor:	Wet Site Utilities														
Criteria:	less lineal ft is better														
	Attribute:	2,970		2,930		2,590		2,930		2,970		2,970		2,540	
	Advantage:	0		-40	1	-380	4	-40	1	0		0		-430	5
Factor:	Structural Concrete														
Criteria:	min/mod/max - min is best														
	Attribute:	max		max		max		max		mod		mod		min	
	Advantage:									mod	45		45	min	95
Factor:	Site Concrete														
Criteria:	min/mod/max - min is best														
	Attribute:	max		max		max		max		mod		mod		min	
	Advantage:									mod	35	mod	35	min	70
Factor:	Paving														
Criteria:	less sf is better														
	Attribute:	19,500		19,500		19,500		19,500		19,500		19,500		14,000	
	Advantage:	0		0		0		0		0		0		-5,500	10
Factor:	Speed of Const.														
	faster is better														
	Attribute:	14		14		14		14		13		14		12	
	Advantage:	0		0		0		0		-1	15	0		-2	30
Factor:	MEP Systems														
	no renovation is better														
	Attribute:	none		28,601		none		35,568		none		none		none	
	Advantage:	none	60	-6,967	15	none	60			none	60	none	60	none	60
Factor:	Exterior Material Options														
	no restriction of material selection is better														
	Attribute:	no		yes		no		yes		no		no		no	
	Advantage:	no	40	yes		no	40	yes		no	40	no	40	no	40
Factor:	Kitchen Distance From Fuilding Entrance														
	less footage distance and inside is better														
	Attribute:	0		0		0		300		0		0		0	
	Advantage:	-300	50	-300	50	-300	50	0		-300	50	-300	50	-300	50
Factor:	Ferticle Transport														
	no elevetor is best														
	Attribute:	no		no		no		no		yes		no		no	
	Advantage:	no	100	no	100	no	100	no	100			no	100	no	100
Factor:	Construction Type														
	2B (less than 55000 sf) is better														
	Attribute:	IIB		IIB		IIA		IIB		IIB		IIB		IIB	
	Advantage:	IIB	50	IIB	50	IIA		IIB	50	IIB	50	IIB	50	IIB	50
	SCORE		375		346		304		271		440		490		800
	RANKING										3		2		1

Appendix 13

BASIC PRINCIPLES OF SOUND DECISIONMAKING

Jim Suhr

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2877 N. 1050 E., North Ogden, Utah 84414-1770, USA
801-782-6168

ABSTRACT

Choosing By Advantages (CBA) is a decisionmaking system. One of its applications is in Value Analysis (VA). The CBA System includes definitions, principles, models, and methods for practically all types of decisions. The principles are central. The definitions and models explain the principles, and the methods apply the principles. Following are four of the sound–decisionmaking principles upon which the CBA System is based:

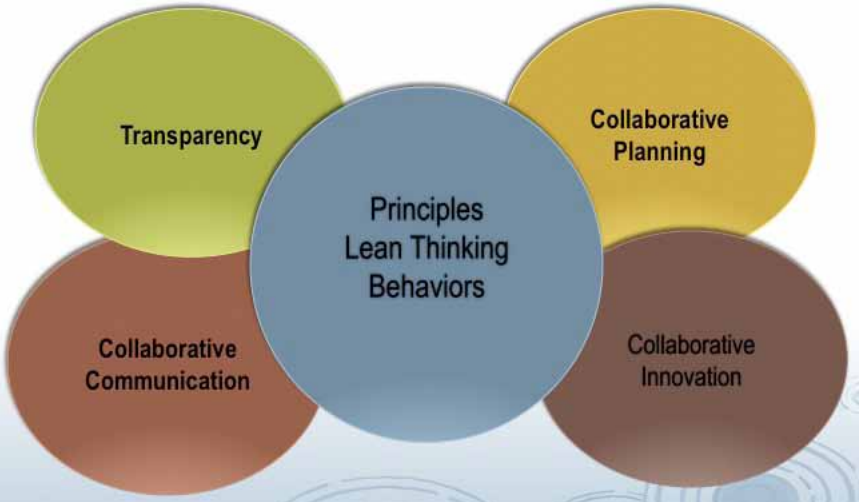
1. Sound methods base decisions on the importance of prospective differences among the alternatives—not factors, criteria, goals, roles, categories, objectives, attributes, pros and cons, and so forth. (This principle was recognized and validated at least three centuries ago.)
2. Sound methods base decisions on the importance of advantages—not advantages and disadvantages. (An advantage is a difference between the attributes of two alternatives.)
3. Sound methods base decisions on the relevant facts. (In the CBA vocabulary, methods that do not base decisions on the relevant facts are called unsound methods.)
4. Engineers, architects, leaders in organizations, and so forth are professional decisionmakers. They need to learn and skillfully use sound methods of decisionmaking.

Understanding Target Cost Delivery

InsideOut Consulting
Kristin Hill
September 13, 2011

1

Operating System: Principles + Tools



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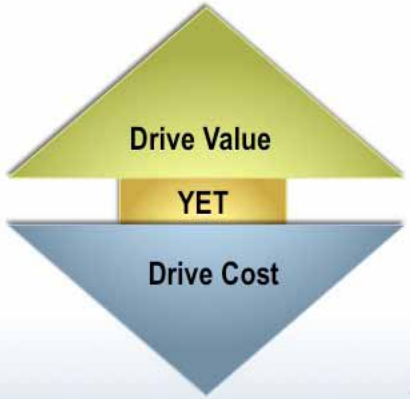
3

Target Cost

A management approach that drives design to deliver to defined customer values within project constraints.



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Appendix 14

Guideline 1

Develop clear Conditions of Satisfaction (CoS) – what is of value to the client

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Economics of Trust

From "The Speed of Trust"

↓ Trust = ↓ Speed ↑ Cost

↑ Trust = ↑ Speed ↓ Cost

6

Traditional Risk Management

Used with permission from Will Lichtig, Boldt Construction

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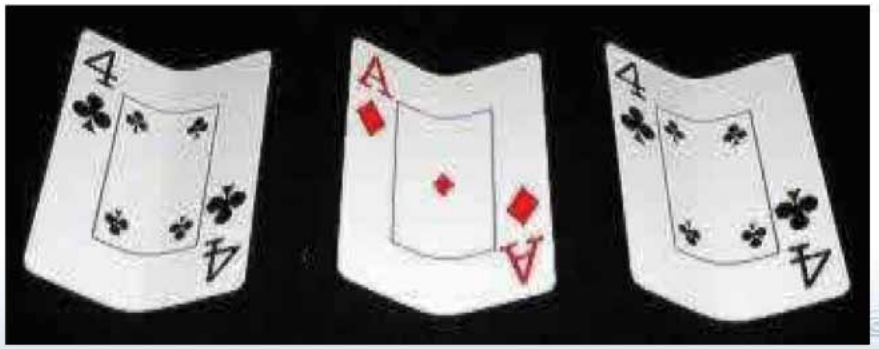
Open-Face Risk Management



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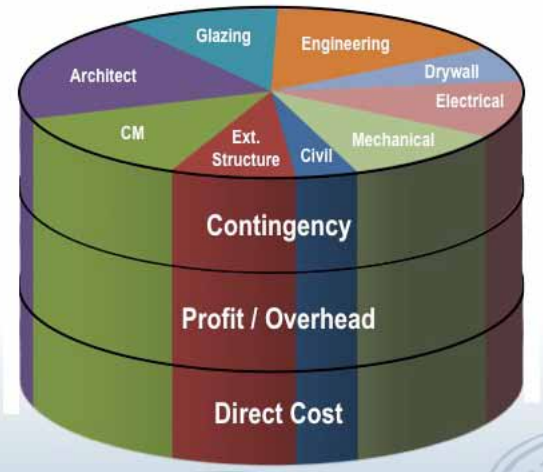
Appendix 14

Profit Pool / Combined Contingency



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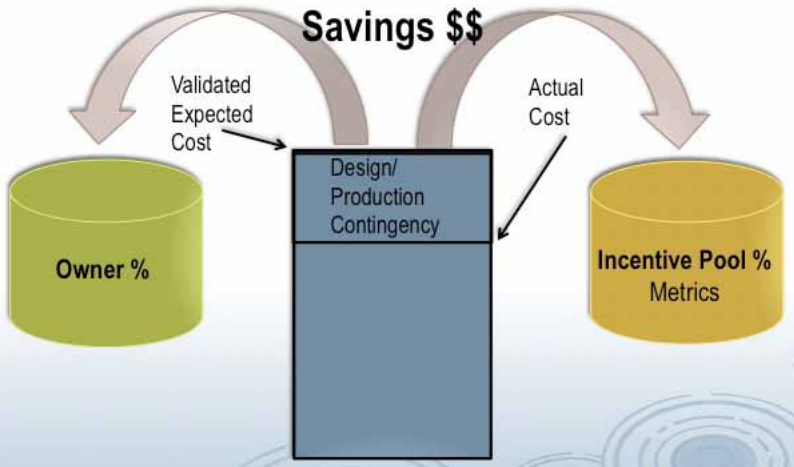
Sharing of Savings



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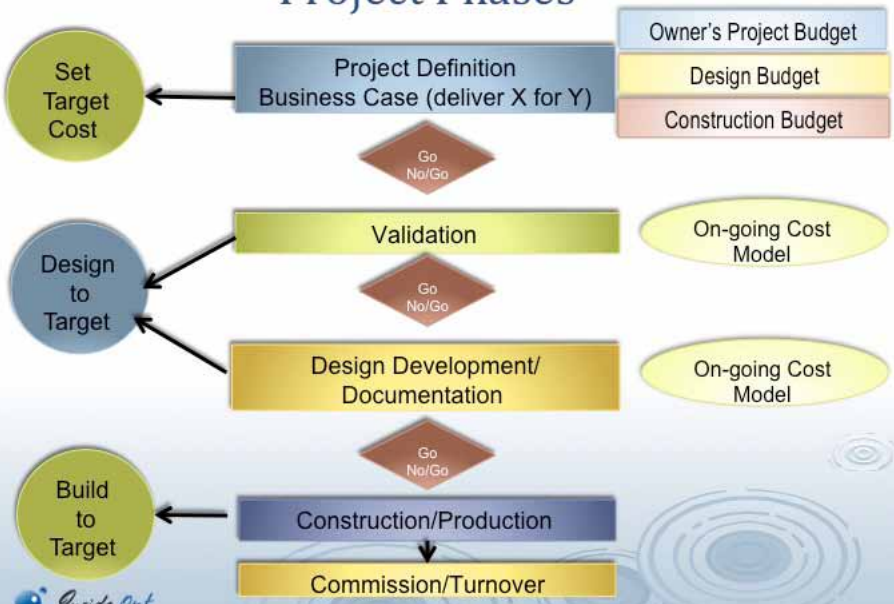
Project Phases



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CONSENSUSDOCS 300
STANDARD FORM OF TRI-PARTY AGREEMENT FOR COLLABORATIVE PROJECT DELIVERY

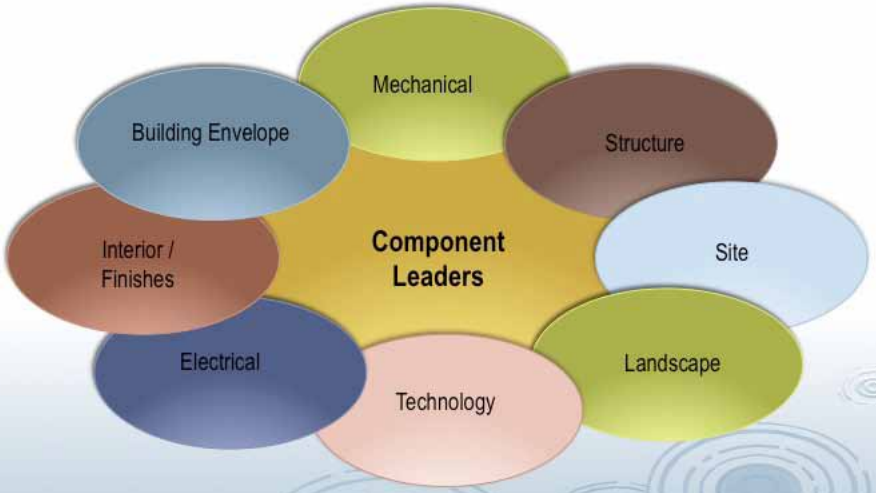
ARTICLE 8
CONSTRUCTION BUDGET AND COST MODELING AND CONSTRUCTION CONTROL ESTIMATE

12

Guideline2

- Develop a detailed estimate and design to it – any cost over run is a team wide problem
  - Estimate real-time through-out the design to keep the design on "target"
  - Embed estimation with all components/clusters - estimators become part of the design team
  - Traditional – estimate after the fact and value engineer

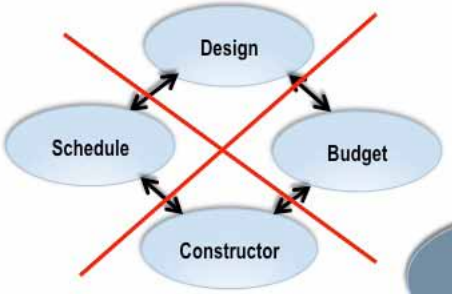
Target Cost Components



Component-Based Design

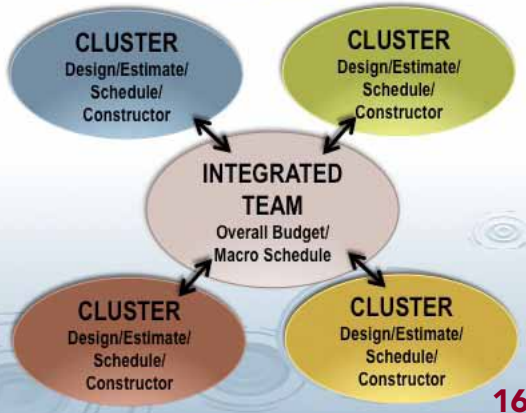
Site	Building Envelope	Interior/ Finishes	Mechanical	Electrical	Technology
Leader: Civil Engineer	**Leader:** Project Designer	**Leader:** Project Designer	**Leader:** Senior Engineer	**Leader:** Senior Engineer	**Leader:** Senior Engineer
Team: Project Designer, Project Architects, Mechanical Engineer, Electrical Engineer, Construction Mgr.	**Team:** Project Architect, Structural Engineer, Mechanical Engineer, Construction Mgr.	**Team:** Project Architect, Architects, Medical Planners, Interior Designers, Mechanical Engineer, Electrical Engineer, Construction Mgr.	**Team:** Mechanical Engineer, Electrical Engineer, Project Architect, Structural Engineer, Services Tech. Group, Construction Mgr.	**Team:** Electrical Engineer, Mechanical Engineer, Project Architect, Project Designer, Interior Designer, Services Tech. Group, Construction Mgr.	**Team:** Electrical Engineer, Mechanical Engineer, Project Architect, Project Designer, Interior Designer, Services Tech. Group, Construction Mgr.

Design/Budget/Schedule/Constructor

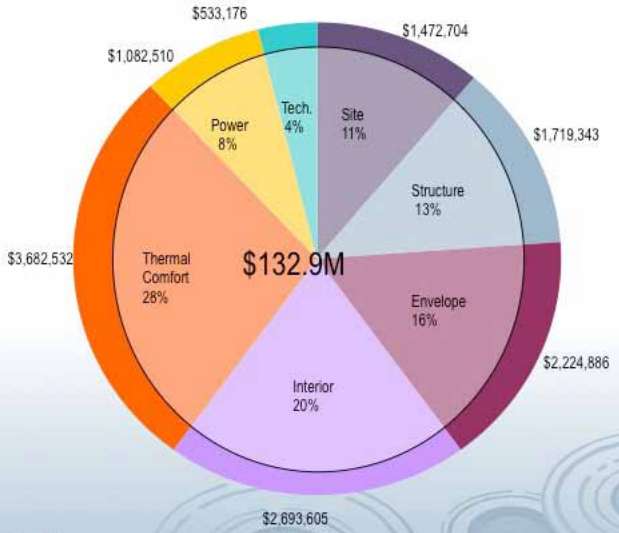


Leads to break-downs/ miscommunication

Each cluster should integrate estimating, schedule, and constructor with design



Target – Based Cost Modeling



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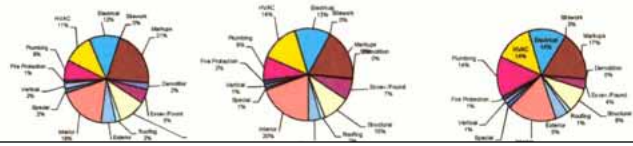
Report Date: February, 2011

Cost Summary	Large Urban Hospitals Totals	Large Urban Hospitals Unit Costs	Small Greenfield Hospitals Totals	Small Greenfield Hospitals Unit Costs	I Occupancy Target Estimate Totals	I Occupancy Target Estimate Unit Costs
Demolition & Patching	$2,883,058	$16.29	$281,091	$1.58	$0	$0.00
Excavation & Foundations	$6,421,550	$36.15	$6,562,845	$36.95	$3,318,722	$18.68
Structural Frame	$12,533,960	$70.56	$8,732,233	$49.16	$8,096,264	$45.58
Roofing & Waterproofing	$2,325,624	$13.08	$1,494,016	$8.41	$1,389,895	$7.82
Exterior Wall	$6,839,998	$38.51	$3,901,268	$21.96	$4,208,606	$23.69
Interior Finishes & Partitions	$21,610,060	$121.65	$17,584,759	$99.05	$16,734,383	$94.21
Special Requirements/Equip	$1,924,435	$10.83	$792,860	$4.46	$1,682,726	$9.47
Vertical Transportation	$2,400,695	$13.51	$886,417	$4.99	$1,340,700	$7.55
Fire Protection	$1,354,778	$7.63	$1,478,381	$8.31	$1,295,131	$7.29
Plumbing	$9,067,146	$51.04	$7,237,433	$40.74	$13,252,850	$74.61
HVAC	$13,529,127	$76.16	$12,296,285	$69.22	$12,658,463	$71.26
Electrical	$14,325,122	$80.64	$11,579,199	$65.18	$12,897,600	$72.61
Subtotal Building	**$95,223,555**	**$536.06**	**$72,634,787**	**$410.02**	**$76,875,340**	**$432.77**
Sitework	$0	$0.00	$0	$0.00	$0	$0.00
Tenant Finishes	$0	$0.00	$0	$0.00	$0	$0.00
Subtotal	**$95,223,555**	**$536.06**	**$72,634,787**	**$410.02**	**$76,875,340**	**$432.77**
P&P Bond	$1,122,637	$6.32	$480,935	$2.71	$0	$0.00
Construction Contingency	$3,782,388	$21.29	$1,543,233	$8.69	$3,670,667	$20.66
General Conditions	$11,373,827	$64.03	$7,745,518	$43.60	$4,251,000	$23.93
General Requirements	$2,889,724	$16.27	$2,485,451	$13.99	$2,585,571	$14.56
Insurance	$2,489,645	$14.02	$1,128,932	$6.36	$2,649,917	$14.92
Subguard	$461,201	$2.60	$0	$0.00	$0	$0.00
Fee	$3,501,473	$19.71	$2,935,132	$16.52	$2,943,456	$16.57
Combined Markups	**$25,620,895**	**$144.23**	**$16,319,200**	**$91.87**	**$16,100,611**	**$90.64**
Total Cost	**$120,844,450**	**$680.29**	**$89,153,987**	**$501.89**	**$92,975,951**	**$523.40**



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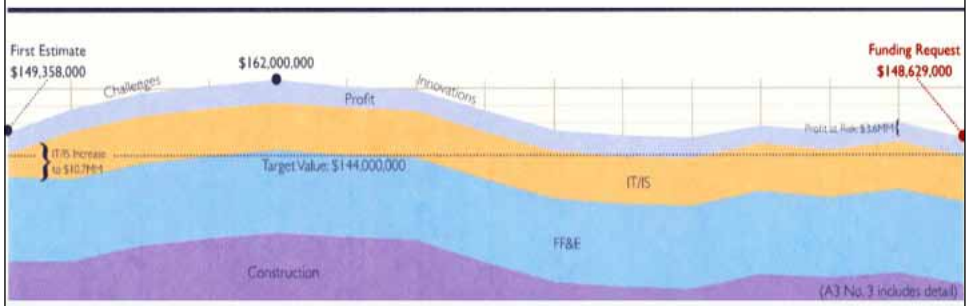

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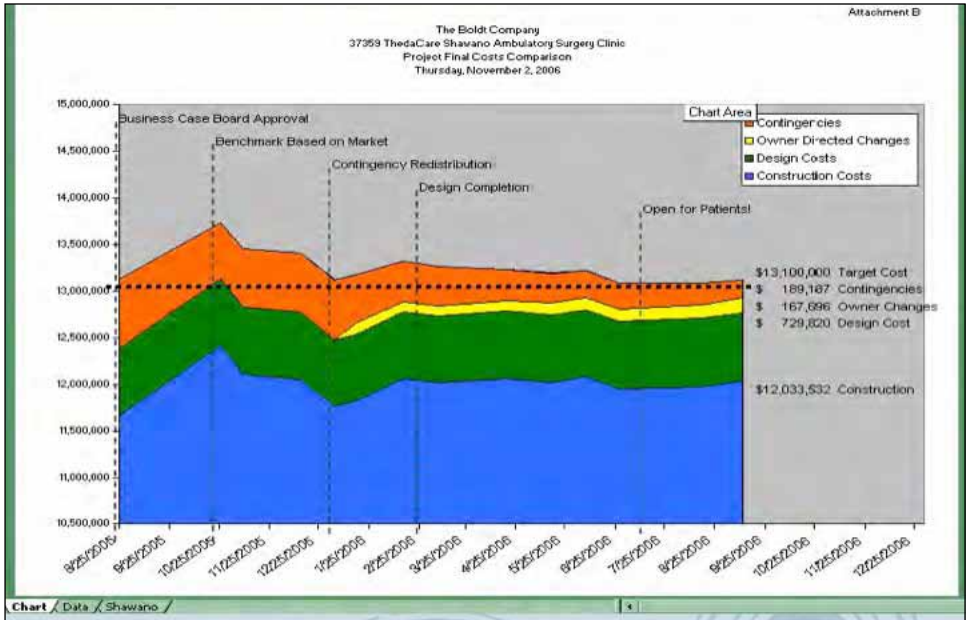
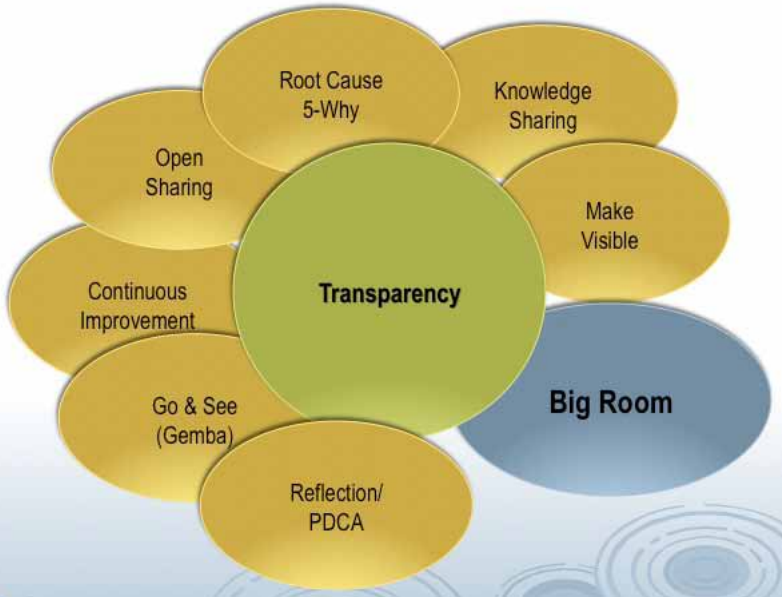
Appendix 14





Guideline 3

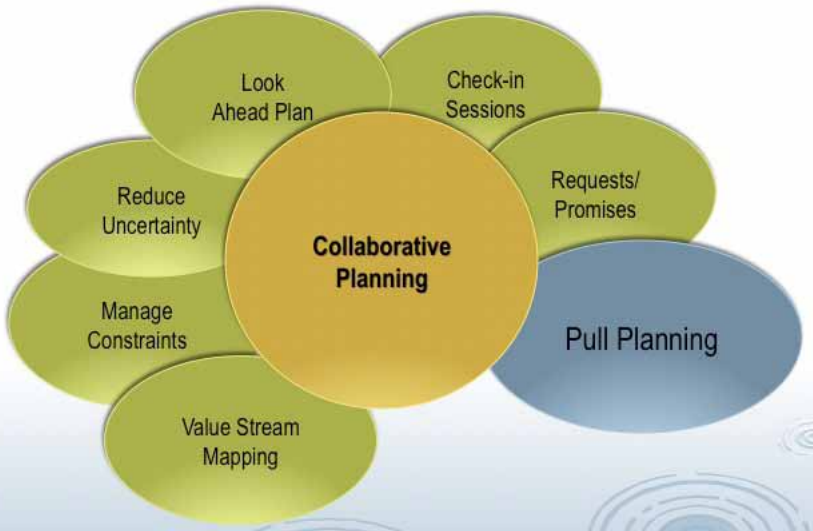
- Spend time together – work in with a "big room" concept
  - Set detailed agendas about the day(s) together – set expected outcomes/ required participants
  - Traditional – work in isolation and throw work over the wall

25

Guideline 4

- Constantly plan together – how are you going to meet the schedule
  - Pull plan weekly in the big room – re-plan constantly
  - Traditional – Schedules are done in isolation and are not a "plan" (but a hope and a prayer)

26



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Guideline 5

- Design in conversation prior to drawing
  - Determine the issues from multiple perspectives and form decision together – design to the decisions
  - Traditional - is to design then discuss and revise

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Guideline 6

- Collaborate with the Constructors for constructability of the design
  - Include constructors in the conversations and development of the design at a detailed level – constructors are designers
  - Traditional - is to "review, comment and revise"

30

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Guideline 7

- Design in "sets of solutions" and hold off converging on a solution until right time
  - Gain input from all stakeholder perspectives – use A3 process to gain alignment and document

  - Make decisions based on optimizing the whole
  - Traditional - is to make decisions from narrow perspectives and revise – value engineer

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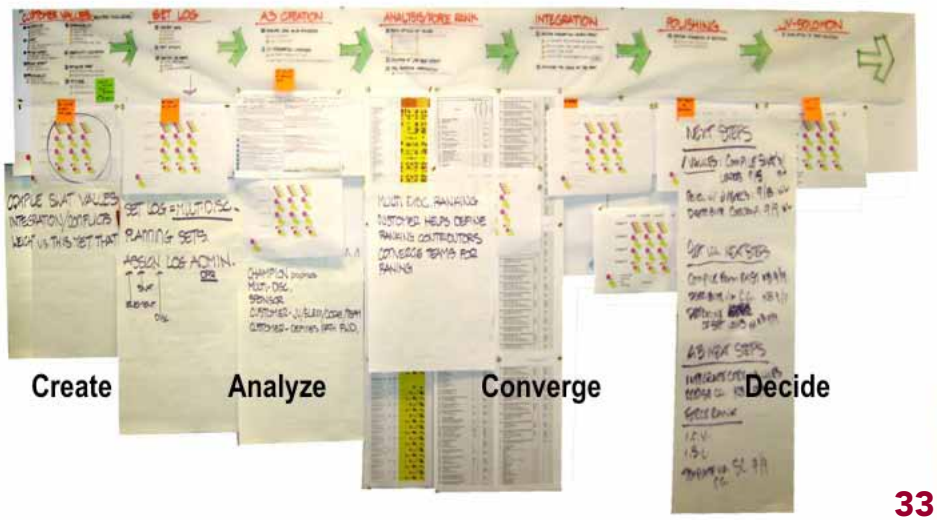
Appendix 14

Set-Based Solutions

From CPR Program



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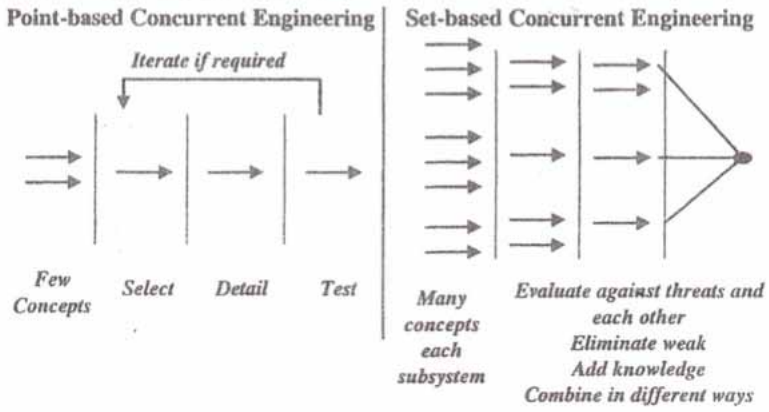
Inside Out

34

Set-based Design is

A simple, repetitive development cycle that achieves high innovation in products and manufacturing systems without risk through redundancy, robustness, and knowledge capture.



(Figure 5b)

"Product Development for the Lean Enterprise", Michael Kennedy

Inside Out

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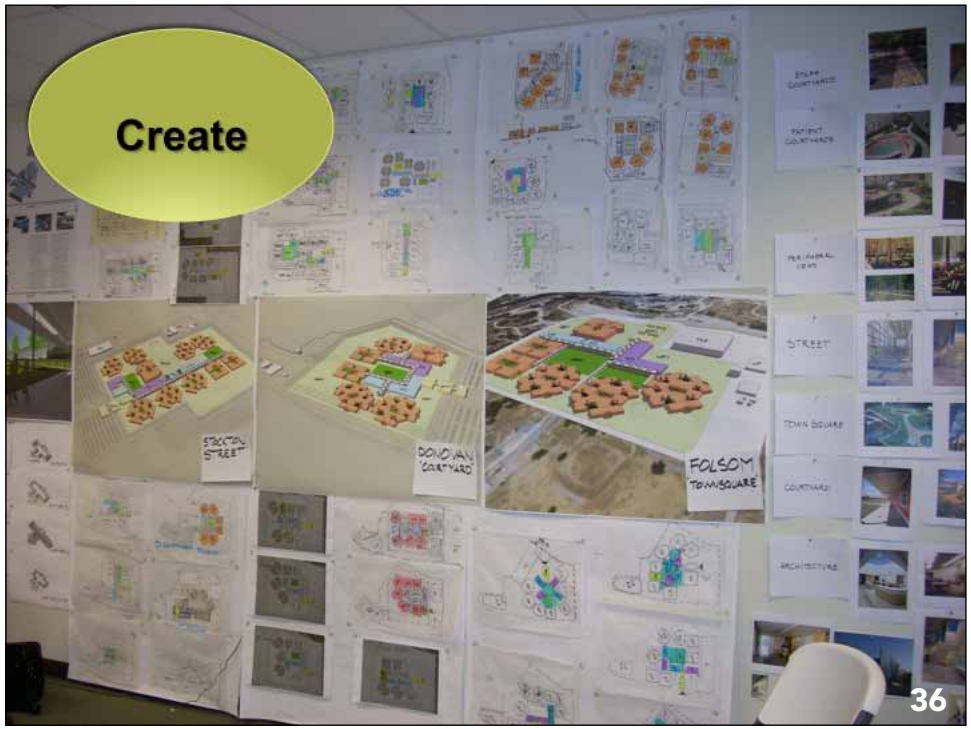

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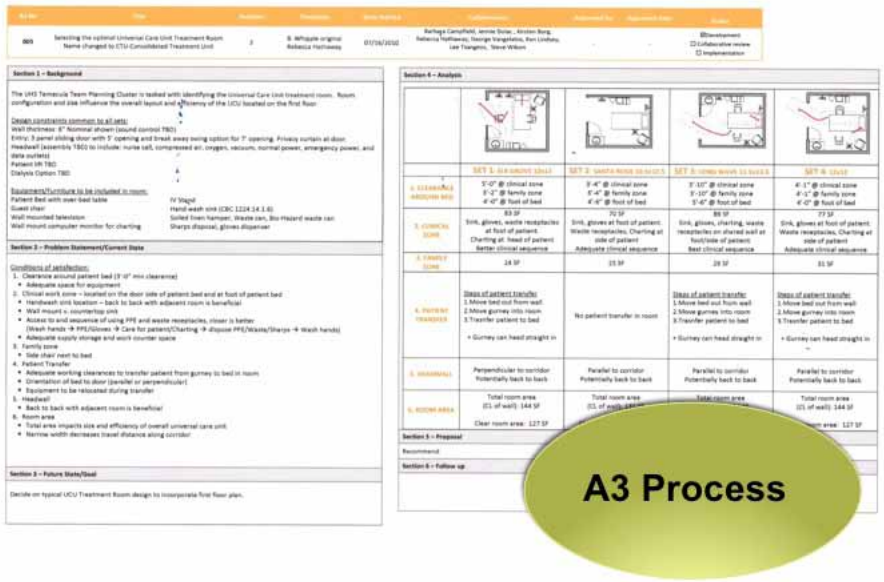
Appendix 14



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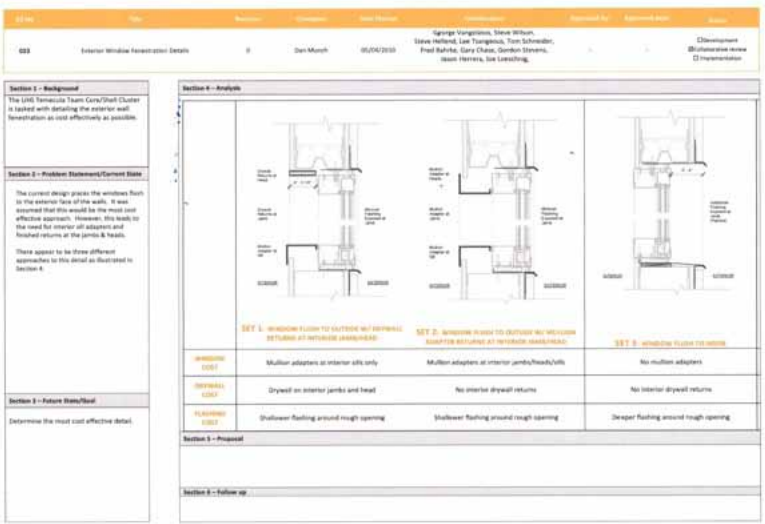

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Guideline 8

- Set "no-compromise" goals – creative tension
  - The 3-legged stool

  - Traditional – one leg must be compromised

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48 **Creative Tension** The Toyota Way

1. Great high-speed handling/stability	YET	A pleasant ride
2. Fast and smooth ride	YET	Low fuel consumption
3. Super quiet	YET	Light weight
4. Elegant styling	YET	Great aerodynamics
5. Warm	YET	Functional interior
6. Great stability at high speed	YET	Great C_D value (low friction)

Figure 5-4. "No-compromise" goals

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Appendix 14

Creative Tension
CoS

COS

Maintain a construction budget of $25 million ***YET*** implement new features to improve employee efficiency and safety.

Provide infrastructure to allow growth of services &/or building ***YET*** minimize construction budget impact.

Design a facility that allows for a Phase II expansion ***YET*** minimizes construction impact on site, patients and staff.

Foster staff involvement to solicity, understand, receive and respond to any needs, real or perceived ***YET*** not grow the building or bust the target value.

Learn through an improving process and outcome ***YET*** reduce rework and wasted energy.

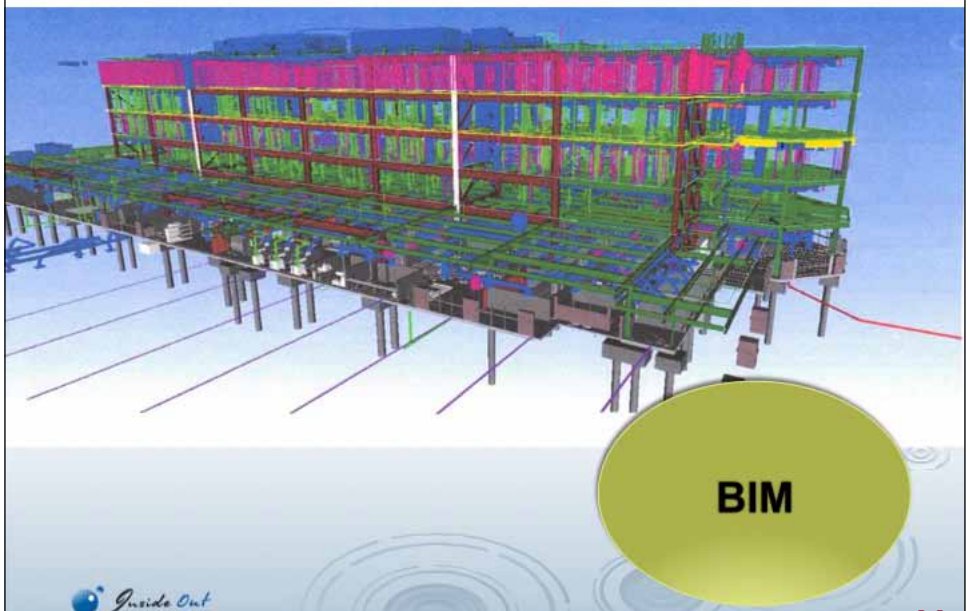
Inside Out

Guideline 9

- Eliminate waste and innovate
  - Learn to "see" waste and become creative in eliminating
  - Drive cross-team innovative ideas – create a focus
  - Traditional – waste, waste, waste and fear of innovation

Inside Out

Inside Out



Inside Out

Coordinated Design to Fabrication

3D Model

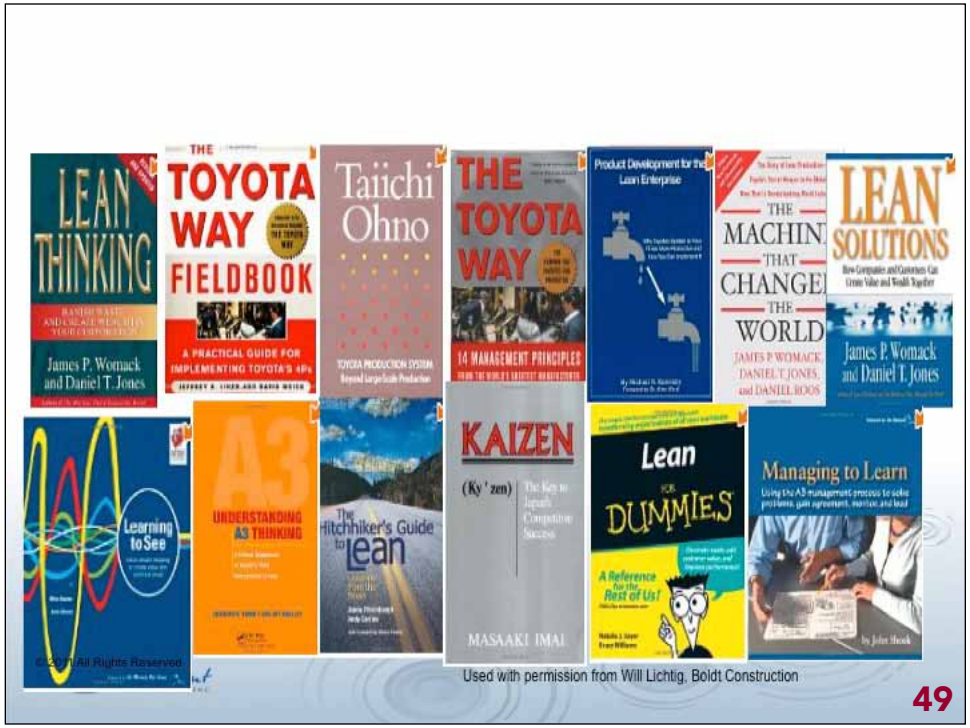
Field Installation

Pre-fab

The 40% Dividend (World-class Trust)

from "The Speed of Trust"

- High collaboration & partnering
- Effortless communication
- Positive, transparent relationships
- Fully aligned systems & structures
- Strong innovation, engagement, confidence & loyalty



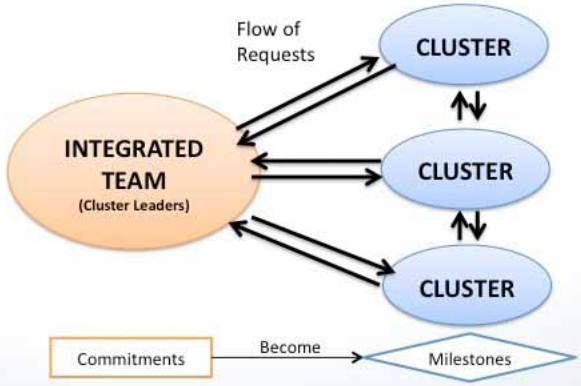
Used with permission from Will Lichtig, Boldt Construction

CLUSTER ADJUSTMENT

- Propose Cluster/IPD Relationship
- Review Check-in Call Structure
- Agree on Appropriate Clusters
- Determine Cluster Leaders & Members

1

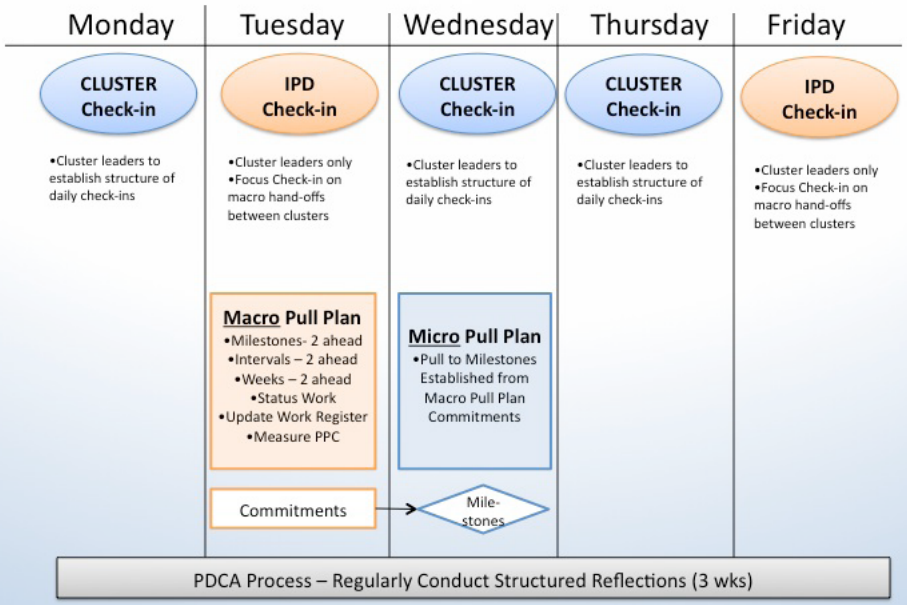
UHS Temecula – Cluster Integration



	INTEGRATED TEAM	CLUSTERS
Pull Plan Level	Macro	Micro
Check-ins Occur	2x per week	Daily or As-Needed
Milestones Come From	Master Schedule	Macro Pull Plan Commitments
Hand-offs Between	Cluster Leaders	Cluster Members
Break Down Work	1 week max	2 day max
Reflections	Every 3 weeks	Every 3 weeks

2

UHS Temecula – Daily Check-in/Pull Plan Schedule



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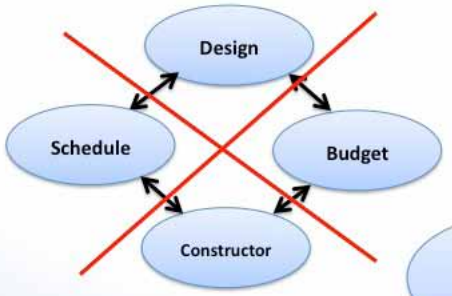
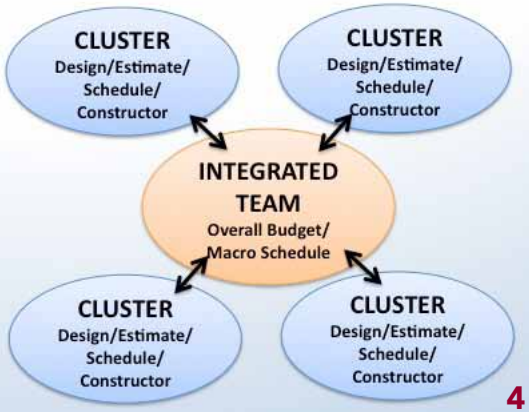
UHS Temecula – Design/Budget/Schedule/Constructor



Leads to break-downs/ miscommunication

Each cluster should integrate estimating, schedule, and constructor with design



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Appendix 15

CLUSTER MEMBERSHIP/ REPRESENTATIVES

- Same cluster members thru the life of the project – IPD Continuity
- Cluster leader may change depending on the phase of project
- Individual members' time commitments may vary over time

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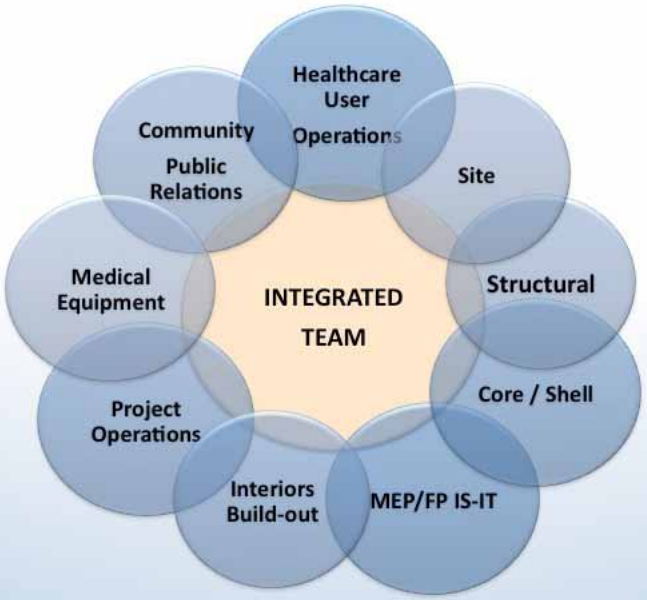
UHS Temecula - Cluster Formation



6

UHS Temecula - Cluster Details

Healthcare User Operations

UHS Dept. Heads
UHS Subject Matter Experts
HMC H/C Planners

Rebecca Hathaway-Leader
Frank L., Tara L., Chuck D.,
George V., Seena H.,
Nancy S., Kathy D.,
Barbara C., Terry M.,
Dave Smith

Community Public Relations

UHS Regional Mgr.
UHS P/R
Local P/R

Frank Lopez to determine Leader
Rebecca H., Tara L., Steve W.

Medical Equipment

UHS Planner
UHS IS/IT
HMC
DPR/Turner
Vendors

Nancy Squartino - Leader
_____- ? JV rep TBN
Marius Nimitz, Seena H.
Dave Smith, Kathy Duffy
Imelda Flores
Tara Laski
Steris Rep? Seimens Rep? ***on***
Toshiba Rep? _____? ***call***

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UHS Temecula - Cluster Details

Project Operations

Master Schedule
Production Planning
Purchasing
Budget - Estimating
Safety
Quality – BIM Coord.
Cost Accounting

Steve Yots - Leader
Tom M., Ed S., Jim R.,
Frank V. (IOR), Danny P.
Chris O., Vanessa V.
Kelley R., Richard S., Doug A.
Lee T., Tom S., Raul R.

Interiors Build-Out

Framing / Drywall (DPR)
Kitchen
Casework
Lab Casework
Doors Frames Hardware
T-Grid Ceiling, Flooring, Paint

Ward Thompson – Leader
Marius N., Steve W.,
Steve H., Eric S.
Mike B. (Mission Bell)
Jenna S., Sheldon V.,
Joseph M.,

MEP / FP / IS-IT

Plumbing
HVAC
Electrical
Fire Prot./Alarm
IS/IT, PTS

Ken Lindsey - Leader
Dean S., Corey L.,
Bob K., Dave Smith,
Nate
Kathy D., Price B., Mark O.

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Appendix 15

UHS Temecula - Cluster Details

Core and Shell	HMC DPR Framing Kone Elevator PCI Vision Systems Roofing	**Dan Munch - Leader** Steve H., Tom M. Manish S. (Kone) Gordon S. (PCI) Gary C. (Vision sys) Tom S.,
Structural	Saiful Bouquet HMC DPR Concrete Schuff Steel Driller (TBN)	**Ed Straub – Leader** YK, Dan M., Steve W., Steve H. Mike P. (Schuff), Marc L. (Schuff) Bryan Fiehler (DPR/C Supt) Tyler Boland (DPR/C PM) Tom S.
Site	URS HMC Site Work Geotech Soil Report Soil Testing Surveyor	**Tom M. - Leader** Dan M, Steve W, Margie D, Cynthia G, Emily H, Tom W, Dean S. Doug A.

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UHS Temecula – Support Teams

Core Team	Coordination and overall day-to-day management and administration of the Project consistent with Integrated Project Delivery principles	Bill S, Tara L, Steve W, Rebecca H, George Z, Dave S, Ken L, Scott D, Bob K
Community of Practice	Advance the teams application of lean behaviors, skills, processes and tools	George Z, Dean S, Steve Y, Corey L, Dan M, Chris O, Tara L, Kristin H (Coach)

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Cluster Member/Leader Responsibilities

CLUSTER LEADER

- Role Model / Motivate
- Use pull planning to organize work of cluster
- Ensure that cluster's commitments are being met
- Verify cluster member constraints are being removed
- Verify that cluster topics make their way on to agenda
- Represent the cluster in integrated team meetings
- Organize daily cluster check-in structure as appropriate
- Assist with On-Boarding process
- Foster A3 process in decision making
- Foster lean learning and principles

CLUSTER MEMBER

- Make reliable commitments
- Manage commitments to completion
- Make cluster leader aware of any and all constraints
- Actively participate in pull planning
- Actively participate in development of A3's
- Fill in for cluster leader as needed
- Actively pursue lean principles and learning

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UHS Temecula –Implementation Strategy

By May 31st:

- Cluster Leaders to meet with anticipated cluster members
- Cluster Leaders to agree with cluster members which days & times to use for check-in
- Cluster Leaders to reinforce/clarify responsibilities of cluster members
- Report-out required on 31st by each cluster leader discussing cluster membership, daily check-in structure, etc

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Appendix 15

Plus / Delta

Learning Resources only available online at UHSPOM.COM

Appendix 16 A3 Advancing Skills of Lean Teams

Appendix 17 COAA Project Leadership Awards Nomination for GW by Bernita Beikmann, HKS Architects

Appendix 18 GWB Lean Story

Appendix 19 Links to Informational Videos

Appendix 20 Another Approach to Project Delivery: Creating a Shared Mind, Kristin Hill, Christine Slivon, John Draper

Appendix 21 Project Delivery is Broken: If's it Broke, Fix it, Kristin Hill

Appendix 22 Learning Guide for a High Performing Team

Notes

UHS®

Lean Project

DELIVERY GUIDE