Lean Construction Institute

Building Knowledge in Design and Construction

An Update on Target Value Design

Glenn Ballard
Design Forum
June 18-19, 2009
St. Louis, MO

Outline

- Where did Target Value Design (TVD) come from?
- What's been done with what results to date?
  - Cases
    - Tostrud Fieldhouse Project (2002)
    - ARC Project (2005)
    - Shawano Clinic (2006)
    - Fairfield MOB (2007)
    - Cathedral Hill Hospital (current)
    - CPMC MOB (current)
  - P2SL Target Value Design Process Benchmarks
    - November, 2005
    - June, 2009
- What is TVD, really? How explain its results?
- What's to come?

Target Value Design…

…is an adaptation of target costing, a method used in product development to manage product profitability.

The key idea is to set a target cost (what you are willing to spend to design, produce and sell a product) based on expected revenues and desired profit margin [Price-Profit=Cost versus Price-Cost=Profit].

Toyota is one among many Japanese manufacturers who have perfected this method in their product development system. [Key texts are by Cooper & Slagmulder, 1997 & 1999]

Target Value Design…

…has had some anticipations in construction:

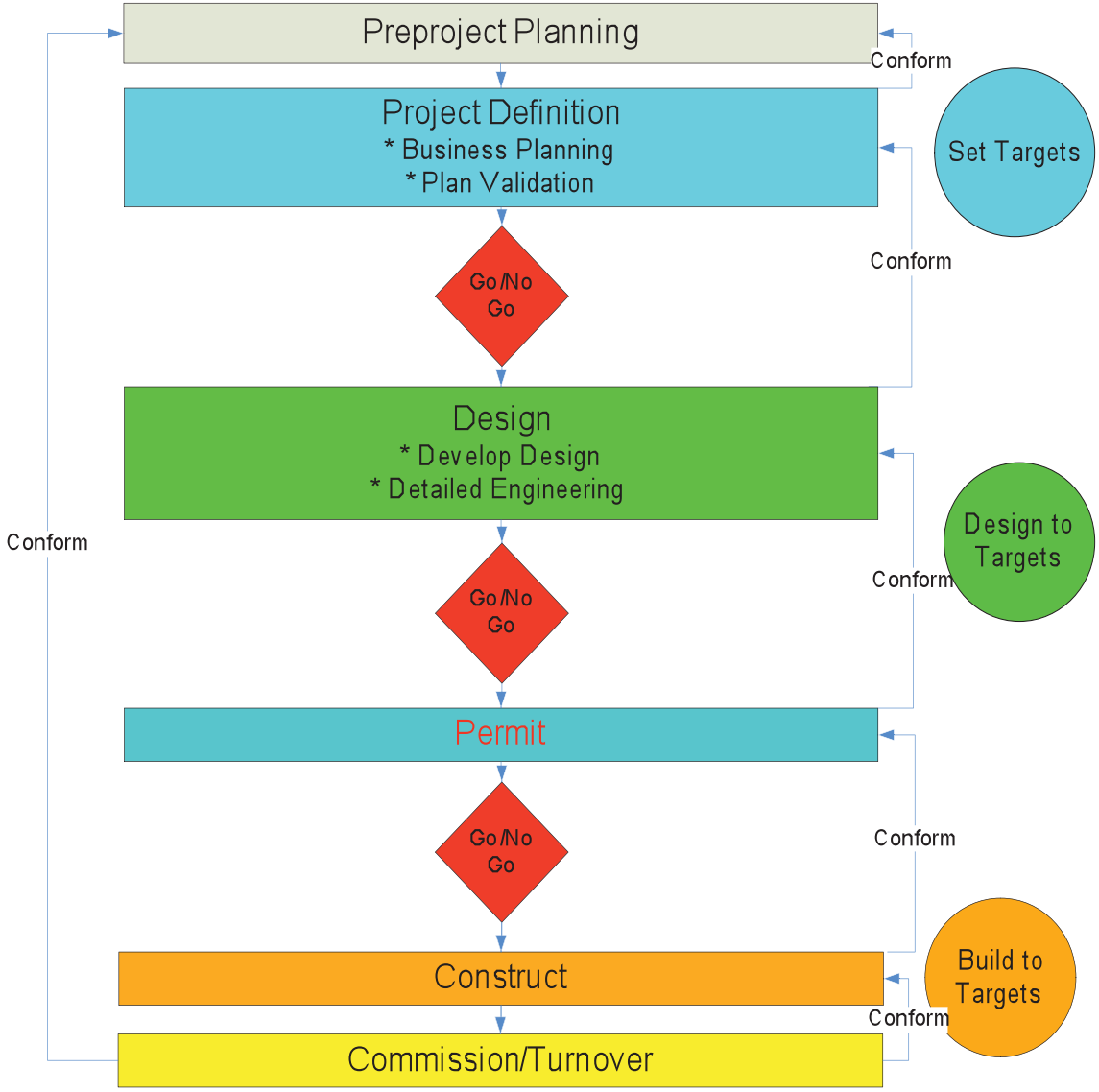
- the U.S. Dept. of Defense's 'Designing to Cost' process from the 1980's. This was an attempt to steer design to cost targets, but did not ground those targets in the business case of buyers nor use positive incentives to align the interests of producers.
- The U.K. Ministry of Defense experimented with target costing on a construction project. Unfortunately the experiment failed. Reported in 2000 by Nicolini, et al.
- Haahtela's TaKu method and steering design, reported by Pennanen in 2003.
- Kristoffersen, et al's experimentation with value workshops—1st reported in 2004.

Two outcomes of TVD that look to be repeatable (at least within the healthcare and education sectors)

1. Projects are completed below market cost—so far as much as 19% below.

2. Expected cost falls as design develops.

Project Phases and Target Value Design



St. Olaf’s Fieldhouse Project

Target Cost Model

Legend:	Const TOTAL per SF	D-B TOTAL per SF
Worth (Target)		
Current Estimate	89.33	94.12

Project: Fieldhouse Expansion
Location: St. Olaf College Northfield MN
Phase of Design: Schematic Target
Date: June 21, 2001

Construction	+	Owner Reserves	+	Escalation	=	Construction TOTAL	Design-Build TOTAL
9,840,302		343,115				10,183,417	10,729,883

Incl Design at $504,886+41600

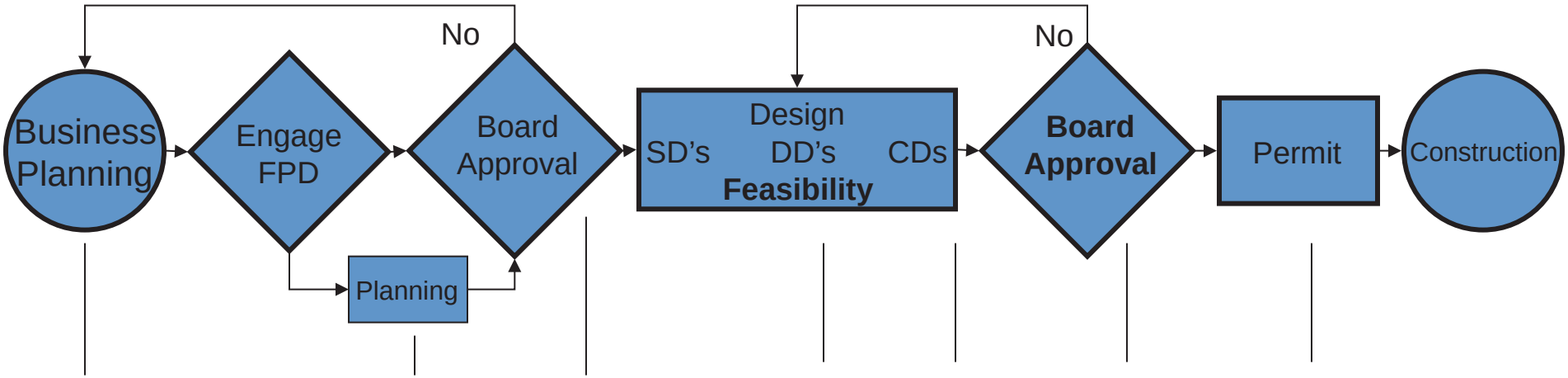
NOTES:
Bldg. Type: Recreational
Target (SQFT) 114,000
Floors: Single story plus mezzanines

SITE WORK	BUILDING
594,500	9,245,802

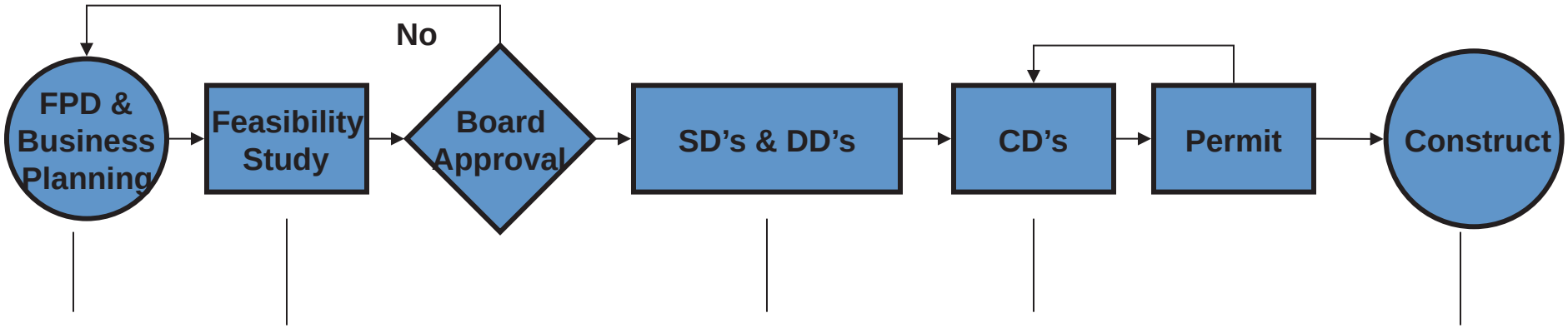
Site GC OH&P	SHELL	INTERIOR	MECHANICAL	ELECTRICAL	SPECIAL	GENERAL
	4,334,488	1,710,386	1,111,402	794,890	706,862	587,774
G10 Site Prep, Demo & Excav	A10 Foundation A20 Basement	C10 Interior Construction	D20 Plumbing	D5010 Service and Distribution	E10 Specialties & Equipment	Z1010 Project Administration
146,500	1,006,004	528,427	85,927	739,390	492,534	
G20 Site Improvements	B10 Superstructure	C20 Stairs	D30 HVAC	D5020 Lighting & Branch Wiring	E20 Furnishings Fixed/Movable	Z1030 General Conditions
373,000	1,218,797	62,639	824,160		34,000	
G30+40 All Utilities	B20 Exterior Closure	C30 Interior Finishes	D40 Fire Protection	D5030 Security Comm/Data	F10 Special Construction	Z1060 Fee
75,000	2,007,061	1,069,320	109,740		89,520	
G90 Other Site Structures	B30 Roofing	D10 Conveying	Testing and Special Mech	D5090 Other Electrical	F20 Selective Demolition	Z20 Risk and Contingency
	102,626	50,000	91,575	55,500	90,808	587,774

	St. Olaf College Fieldhouse	**Carleton College Recreation Center**
Completion Date	August 2002	April 2000
Project Duration	14 months	24 months
Gross Square Feet	114,000	85,414
Total Cost (incl. A/E & CM fees)	$11,716,836	$13,533,179
Cost per square foot	$102.79	$158.44

Sutter Old Process



Target Value Design Process Flow



What Have We Learned?

- <u>Establish A Baseline</u>

  Do a Feasibility Study integrated with a detailed budget preparation. The results of the study provide the basis of understanding of the scope and budget of the project.

- <u>Change the Traditional Relationships</u>

  Include everyone who will impact the project at the start of the project, and build those relationships!

  (Collaborate ……..Really Collaborate!)

Tools

- Feasibility Study With Detailed Budget (Target)
- Engage all parties at earliest possible time
- Scheduling (At ARC the end users were divided into clear groups for SD's and beyond)
- Use a room data sheet
- Full engagement from the Affiliate
- Estimating at the design table
- Empowerment to declare a breakdown
- Clear conditions of satisfaction to teams
- Willingness to say no (need to have or want to have)
- Target team matrix

Results

- ED project - 3 Fundings
- Bed Tower - 4 Fundings
- ARC - 1 Funding

  On Time

  50% CD's w/ 16% Cont.

  [ultimately completed on budget, but with some space shelled]

Changes Needed from Current Practice (11/2005)

- Clients spend more time and money in the project definition phase of projects than they traditionally have done.
- The major players on the project delivery team are not selected through competitive bidding but rather through value based proposals.
- Architects relinquish their exclusive access to clients.
- Design professionals embrace true collaboration with facility users, suppliers and builders – collectively exploring problems and jointly developing solutions.

Changes Needed-continued (11/2005)

- Suppliers and builders understand and respect designers and learn how to contribute and participate in project definition and design processes.
- Design solutions are developed with cost, schedule, and constructability as design criteria.
- Designers' work is restructured based upon completing smaller batches of design documents and releasing work to other members of the team.
- General contractors allow and encourage specialty contractors to have an equal seat at the table.
- The incentives of all team members are aligned with pursuit of project objectives.

Selected Research Questions/Issues (11/2005)

1. Hypothesis: Implementation of Target Value Design will reduce variability of work flow, and reduce the uncertainty of project ends and means.
2. Hypothesis: The contingency needed to absorb variability and uncertainty will decline as variability is reduced.
3. How best to assure that the use of the facility is explored and agreed upon before attempting to design the facility itself?
4. Is the alignment of incentives through forms of relational contracting measurably effective in generating increased value and eliminating more waste than when incentives are not aligned?

Selected Research Questions/Issues (11/2005)

5. Does the investment in upstream processes pay off in a) the avoided costs of bad projects that are not allowed to continue, b) in the increase in value from more effective processes for articulating values and controlling design and construction to the delivery of those values, c) in the reduction in waste from incomplete and inaccurate drawings, from duplicated efforts, from rework, d) from more reliable delivery to quality, time and cost expectations, e) from the ability to respond more quickly to changes and discoveries?

Brief Update on Developments since the 2005 Benchmark

1. More data points showing that TVD projects are delivered below market cost and that cost estimates decrease over time; e.g., Sutter Fairfield MOB, healthcare projects in the Midwest, K-12 projects in California.
2. Shift of attention to business planning and determination of allowable cost. Understood the need to design how facilities will be used before designing facilities.
3. Joint owner/team business planning: Cathedral Hill MOB.
4. More experience/experiments with aligning interests (Fairfield was the first IFOA project).

Brief Update on Developments since the 2005 Benchmark

5. Model-based estimating
6. Big room (Camino MOB); co-located teams
7. Integration of TVD and set-based design.
8. Use of A3 format for proposals.
9. Use of Choosing by Advantages method for choosing between alternatives.

Attachment B

The Boldt Company
37359 ThedaCare Shawano Ambulatory Surgery Clinic
Project Final Costs Comparison
Thursday, November 2, 2006

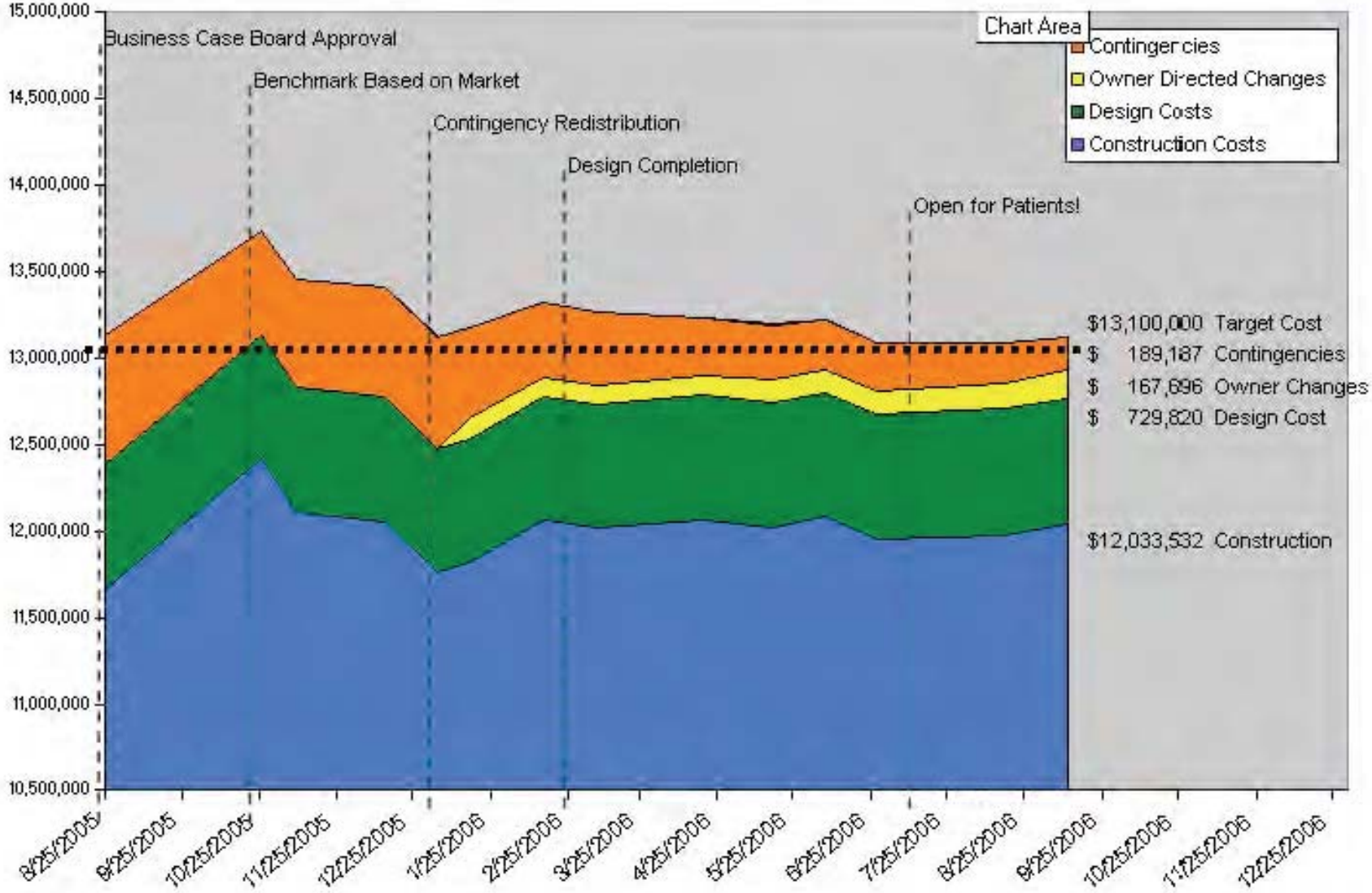


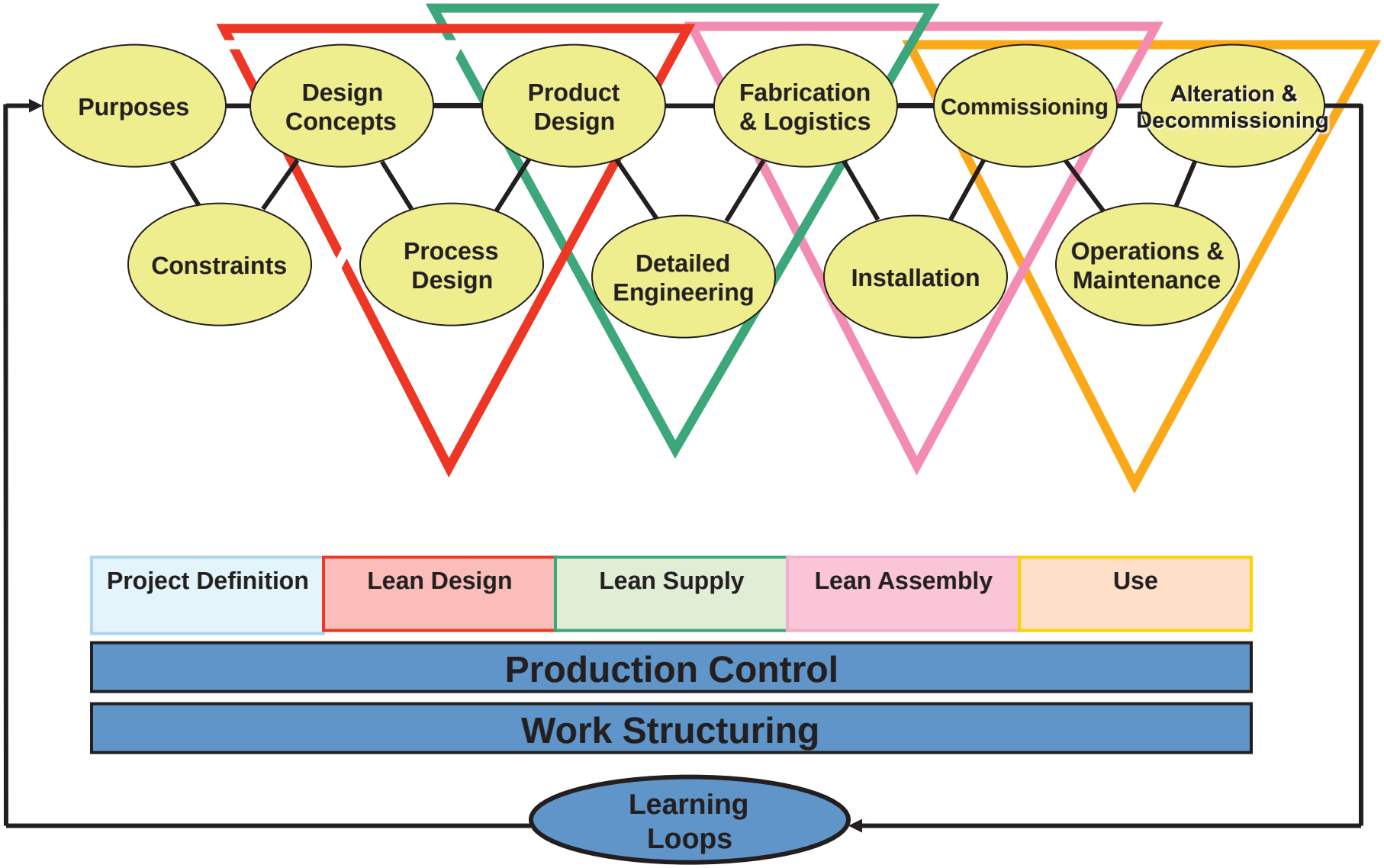
Chart / Data / Shawano

Shawano Clinic

•The target cost (construction budget) was set 3.6% below market, the actual cost was 14.6% below target, and 17.6% below the benchmark. Most of the released funds were used to provide value-adding scope, especially for imaging capability, with the remainder returned to the client.

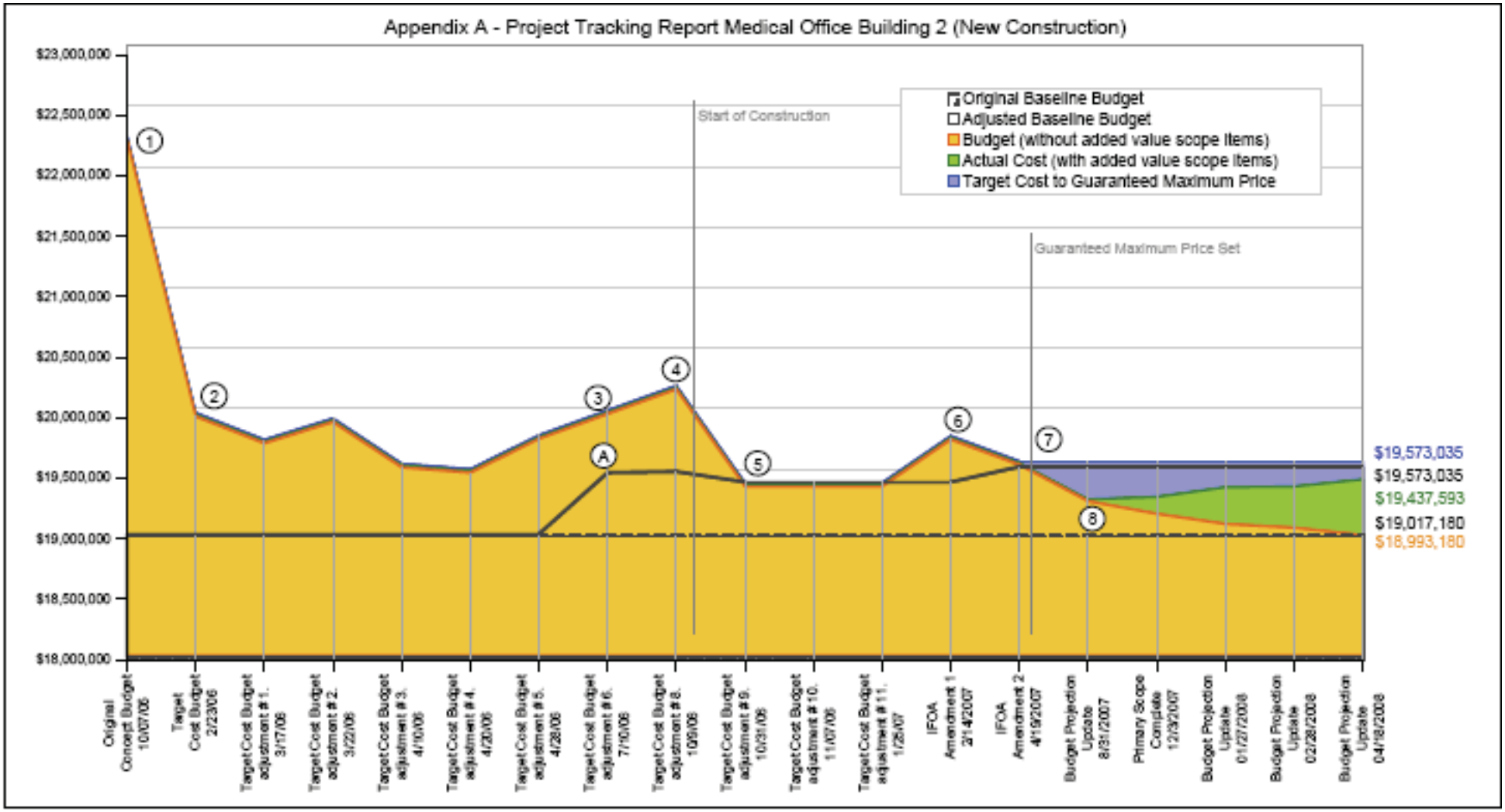
•Completed 3.5 months ahead of schedule –70 additional days of clinic revenue translating into nearly $1 mil. in the expanded imaging service line functions and additional revenue in the 2006 year.

Lean Project Delivery System



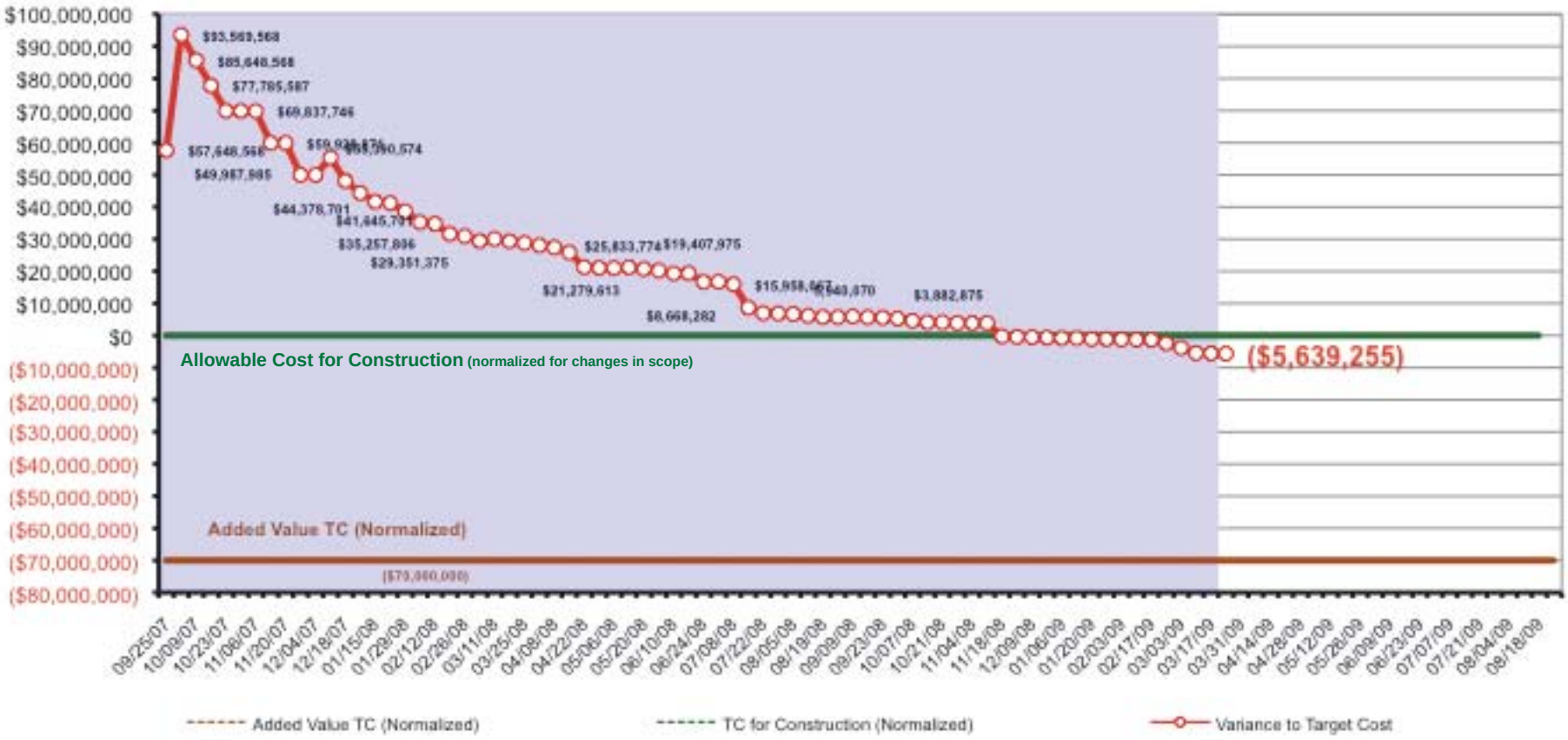
The project was completed in 25 months, despite a 3 month delayed construction start, i.e., construction duration was reduced from 25 to 22 months.

The target cost ($18.9 million) was set 14.1% below the benchmark ($22.0 million). The actual cost ($17.9 million) for the original scope underran the target by 5.3% and underran the benchmark by 18.6%.


Appendix A - Project Tracking Report Medical Office Building 2 (New Construction)
$23,000,000
$22,500,000
$22,000,000
$21,500,000
$21,000,000
$20,500,000
$20,000,000
$19,500,000
$19,000,000
$18,500,000
$18,000,000
Start of Construction
Guaranteed Maximum Price Set
Original Baseline Budget
Adjusted Baseline Budget
Budget (without added value scope items)
Actual Cost (with added value scope items)
Target Cost to Guaranteed Maximum Price
1
2
3
4
5
6
7
8
A
$19,573,035
$19,573,035
$19,437,593
$19,017,180
$18,993,180
Original Concept Budget 10/07/06
Target Cost Budget 2/23/06
Target Cost Budget adjustment # 1. 3/17/06
Target Cost Budget adjustment # 2. 3/22/06
Target Cost Budget adjustment # 3. 4/10/06
Target Cost Budget adjustment # 4. 4/20/06
Target Cost Budget adjustment # 5. 4/28/06
Target Cost Budget adjustment # 6. 7/10/06
Target Cost Budget adjustment # 8. 10/9/06
Target Cost Budget adjustment # 9. 10/31/06
Target Cost Budget adjustment # 10. 11/07/06
Target Cost Budget adjustment # 11. 1/26/07
IFOA Amendment 1 2/14/2007
IFOA Amendment 2 4/19/2007
Budget Projection Update 8/31/2007
Primary Scope Complete 12/3/2007
Budget Projection Update 01/27/2008
Budget Projection Update 02/28/2008
Budget Projection Update 04/18/2008

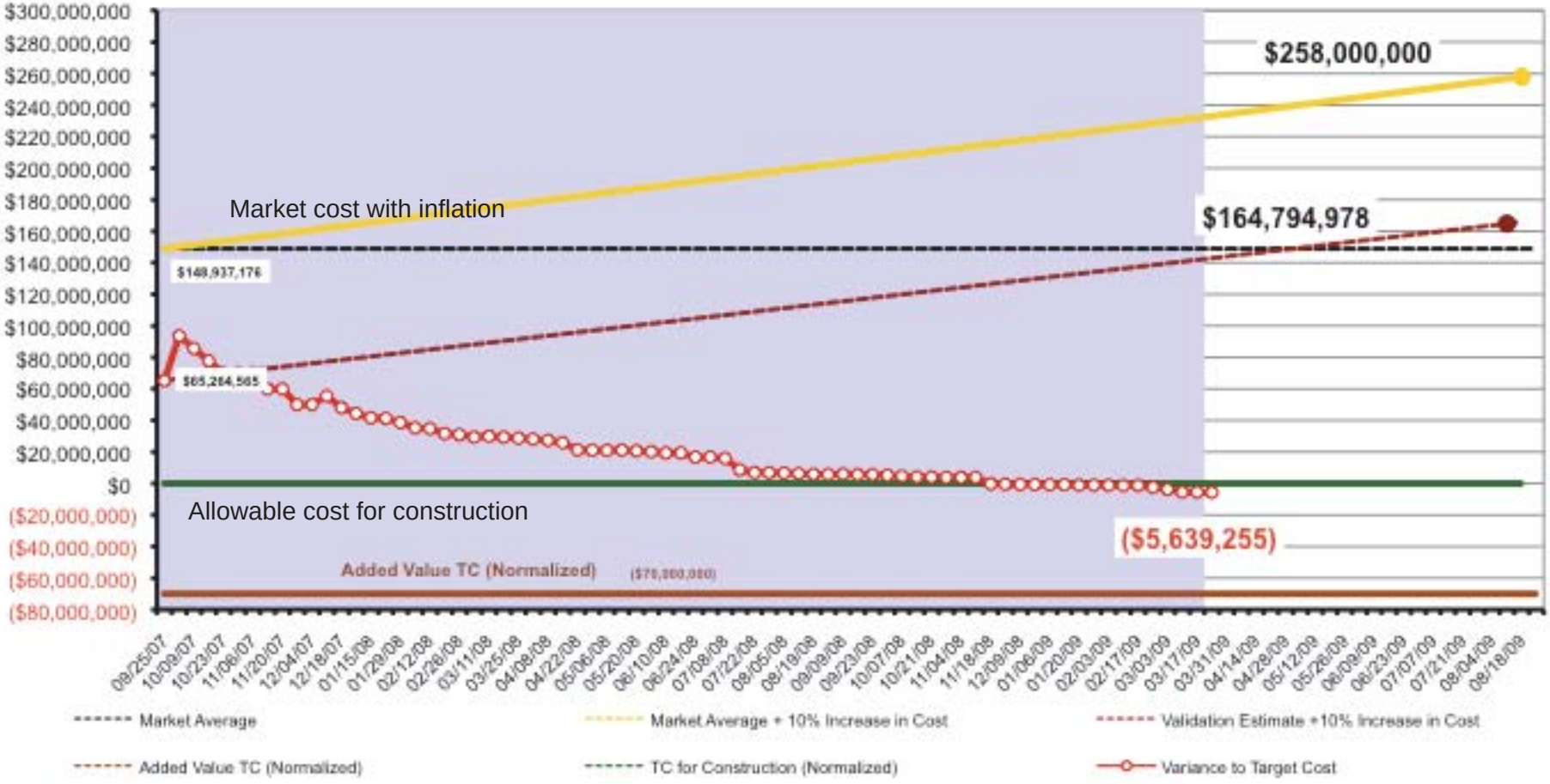
Cathedral Hill Hospital Project:

Expected, Allowable & Target Cost



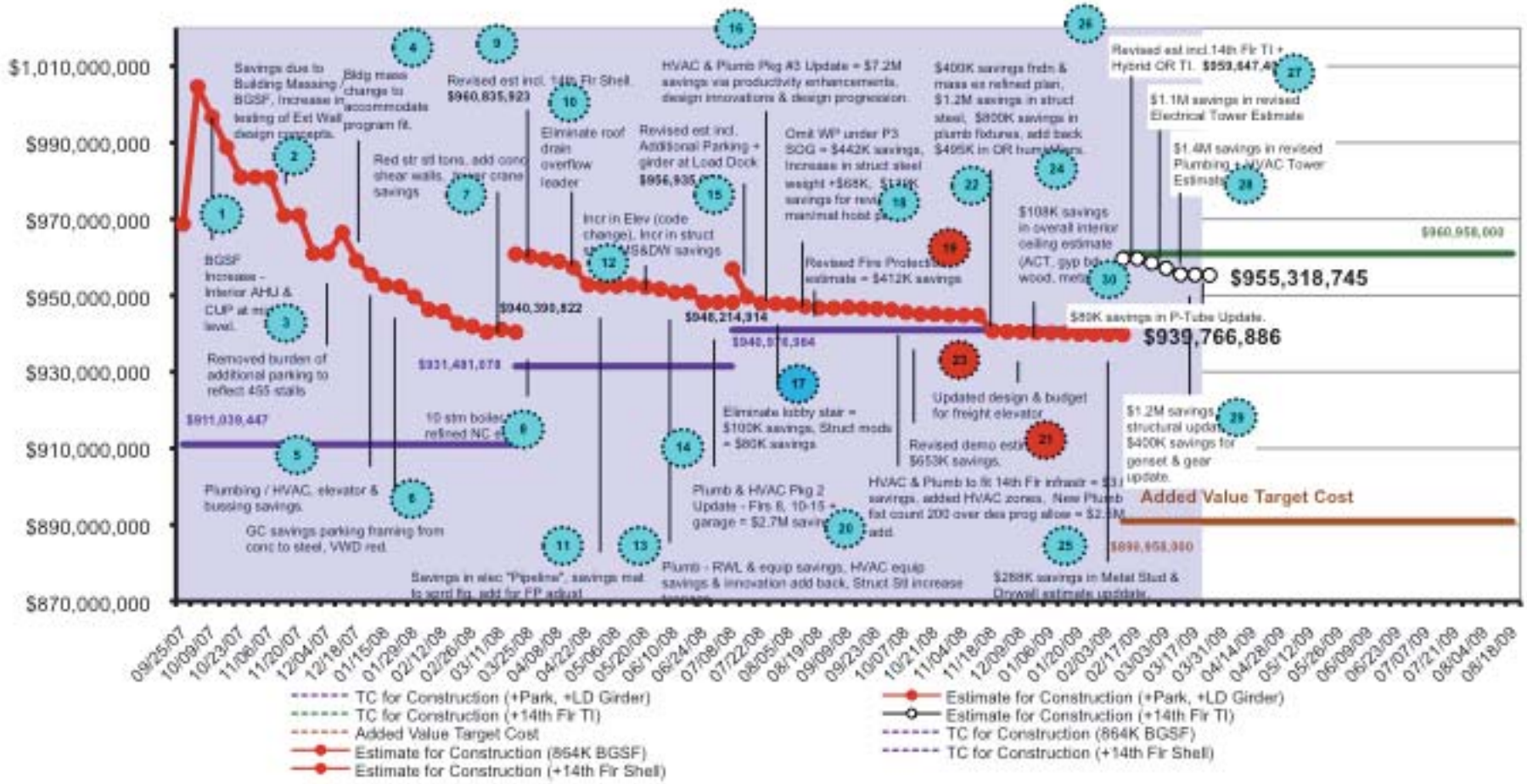
Cathedral Hill Hospital Project:

Market, Allowable, Expected & Target Cost



Cathedral Hill Hospital Project:

Changes in Expected Cost



	Performance	Focus	Innovations	Comments
St. Olaf's	10 months faster & 2/3 $/sf compared to Carleton	Designing to target cost	Proactive value engineering, target cost teams by building system	
Acute Rehabilitation Center	near target in period of high cost escalation	Designing to target cost	Business plan validation	Provoked Sutter Health to commit to TVD
Shawano Outpatient Surgery Center	3.5 months early, 18% under market	Setting and Designing to target cost	More rigorous determination of target cost	
Fairfield MOB	19% under market	Setting and Designing to target cost	Key subcontractors involved in plan validation	Owner did not set an allowable cost
Cathedral Hill	Now $6 million below allowable cost, which was set 13% below market. Target cost recently set $70 million below allowable, with gainsharing provisions.	Setting and Designing to target cost	Allowable cost, rapid estimating and weekly budget reconciliation, co-located during validation and design, value-adds incorporated into design in anticipation of cost savings	
CPMC MOB	NA	Business planning, setting targets, designing to targets	Project team and owner co-created project business plan	

P2SL 6/2009 TVD benchmark

- Targets are set as stretch goals to spur innovation.
- Target cost and scope are allocated to cross-functional TVD teams, typically by facility system; e.g., structural, MEP, interiors, exterior…. (an oversight in 2005).
- TVD teams update their cost estimates frequently—usually every 3 weeks during design development.
- The project cost estimate is frequently updated (often weekly) to reflect TVD team updates (could be a plus/minus report), and reviewed in a weekly meeting of TVD team coordinators and discipline leads, but open to all project team members.

P2SL 6/2009 TVD benchmark

- The cost and quality implications of design alternatives are discussed prior to major investments of design time.
- Design is managed with a set based strategy, so that all time and resources available within project constraints are used to test and develop alternatives.

What is Target Value Design really? Why does it work so well?

- TVD is a management practice that drives design to deliver customer values within project constraints.
- TVD is an application of Engineer Ohno's advice to "lower the river to see the rocks"; i.e., to self-impose necessity as a means to innovation and continuous improvement

Chief Engineer Suzuki's YETs

- Great high-speed handling/stability
- Fast and smooth ride
- Super quiet
- Elegant styling
- Warm
- Great stability at high speed

YET YET YET YET YET YET YET

- A pleasant ride
- Low fuel consumption
- Light weight
- Great aerodynamics
- Functional interior
- Low aerodynamic friction

Target Value Design:

…rests on a production management foundation and treats cost as an outcome of production system design, operation and improvement.

For those who only buy and do not produce (design or make), cost is driven by market pricing and cleverness in deal making. But buying for less is not the only available strategy. Actual cost is a function not only of what you pay but also of how you use what you buy. Design of product and process can change the type of materials required and their quantities, and can improve the productivity of design and construction professionals.

Why does the expected cost fall as design develops?

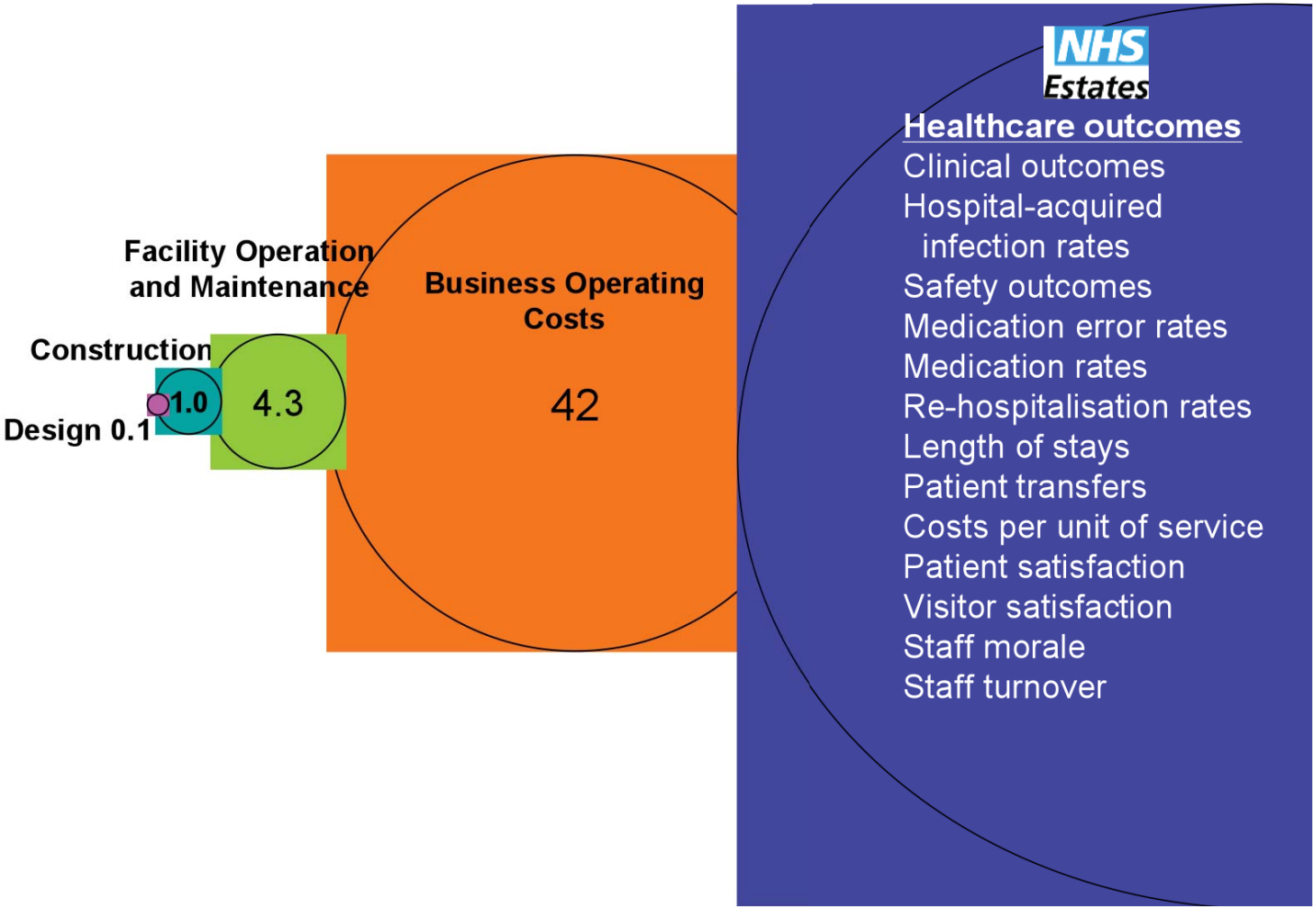
- Scope control – steering design to targets
- Scope refinement/Buildability/Contingency reduction – involvement of specialists in designing
- Proactive value engineering

Why Change a Winning Game?

To enable better investment of cost savings.

On the case study projects, cost savings were assured late in the project, when investment opportunities had shrunk. How can we make investments when the lever arm is longer?

Relative Costs



What Changes?

- Give the design team a tool to calculate the impact of design alternatives on facility life cycle costs and benefits.
- Keep the budget alive during design, recalculating the allowable and target cost based on the anticipated impact of design alternatives on life cycle costs and benefits.

Challenges

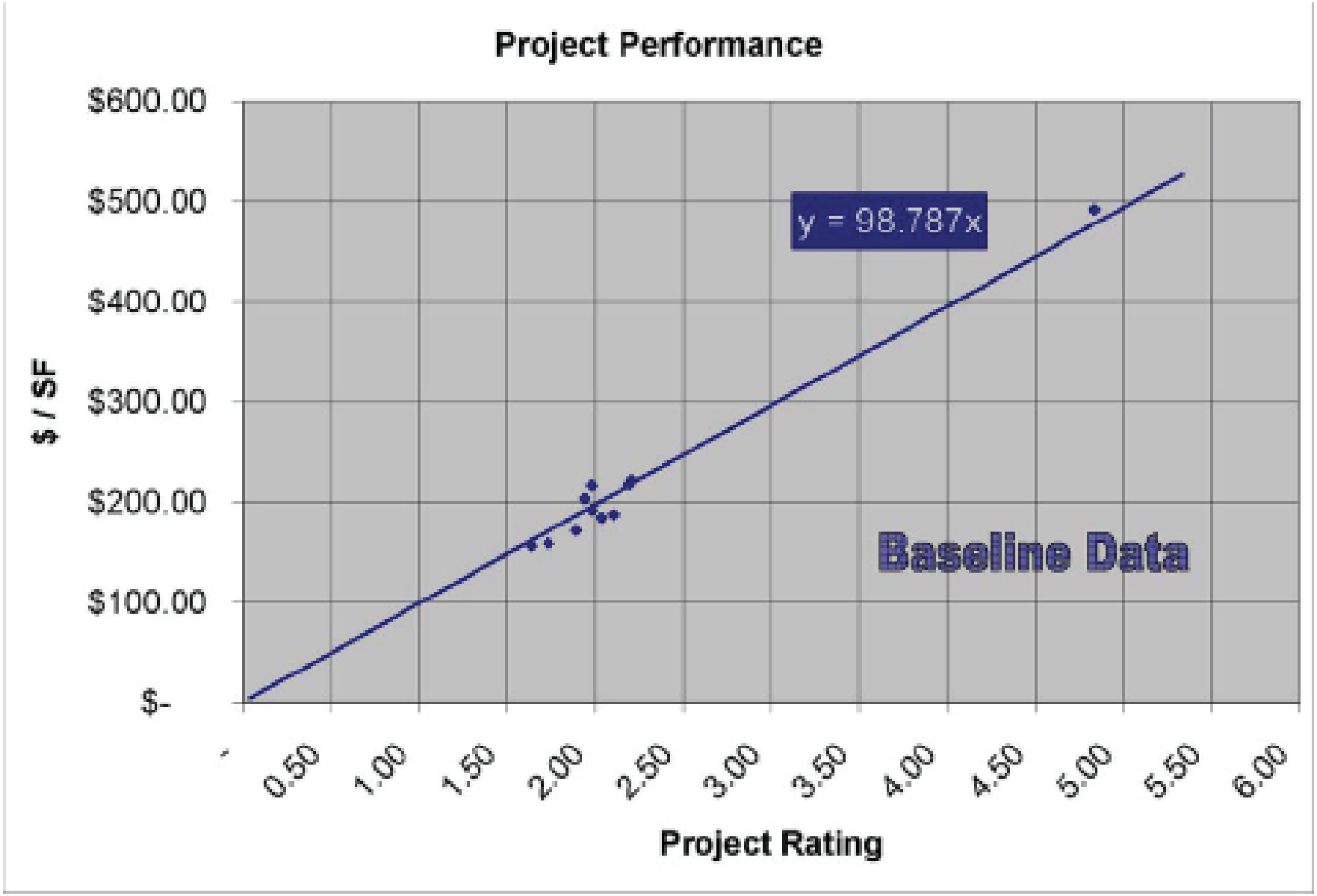
1. Persuade clients to develop an operations cost model and use it to calculate their return on investment, and hence what they are willing to invest to get that return.
2. Persuade clients to give the operations cost model to the design team.
3. Learn how to link the product and operations models so changes in the former are reflected in the latter.
4. Persuade financiers to allow a floating budget during design.
5. Learn how to design to a moving target.

Prospects for moving forward

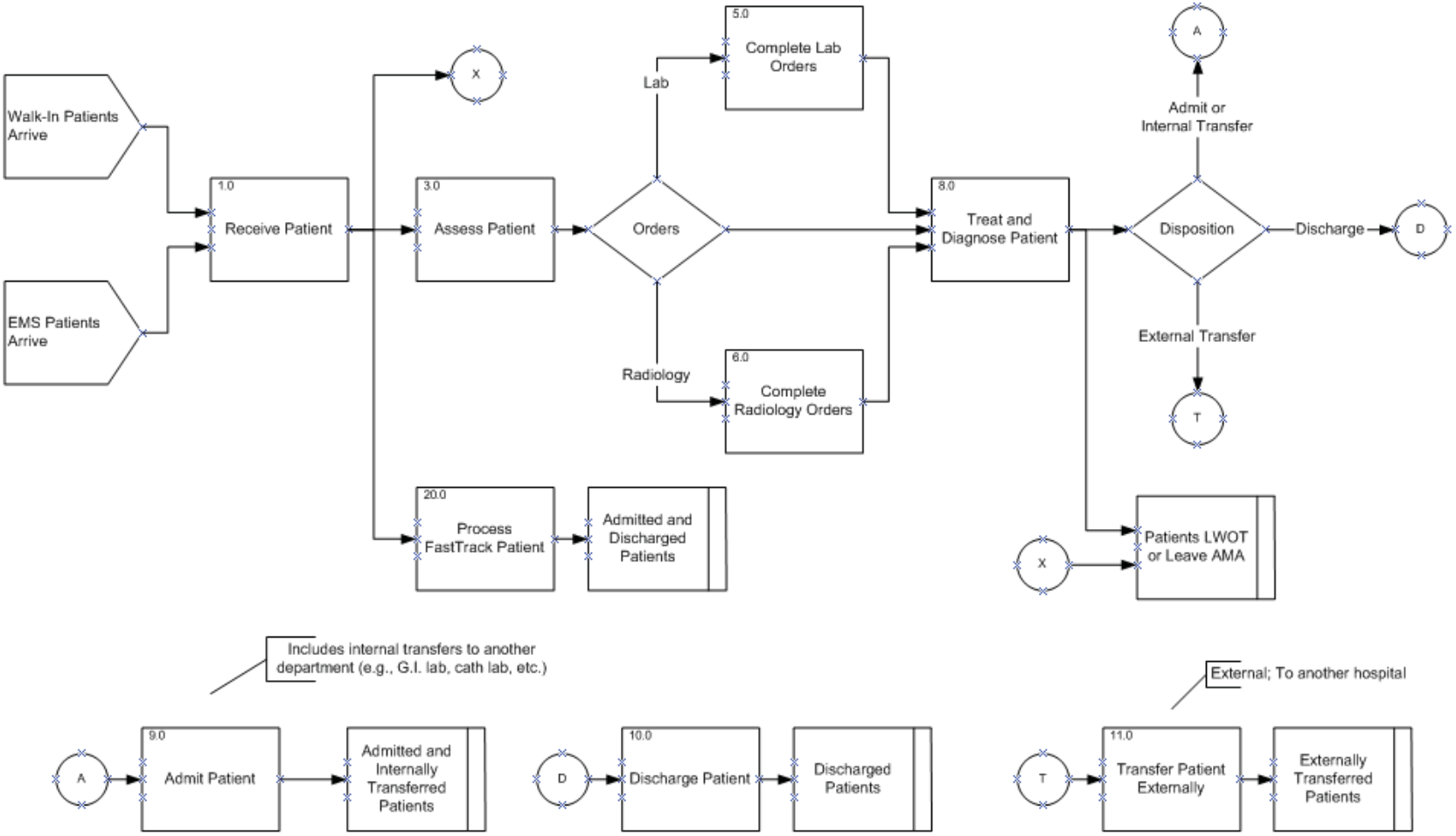
- Cal Berkeley has initiated international collaboration on TVD research: Haahtela (Finland), Loughborough U. (U.K.), Niras & the Danish Technical U. (Denmark)
- Research proposals have been submitted to the U.S. Dept. of Energy and to the California Energy Commission on improving investment in the energy efficiency of buildings. Partners include the Fisher School of Real Estate at Cal Berkeley's Business School and the Lawrence Berkeley National Laboratory.

What are your takeaways?

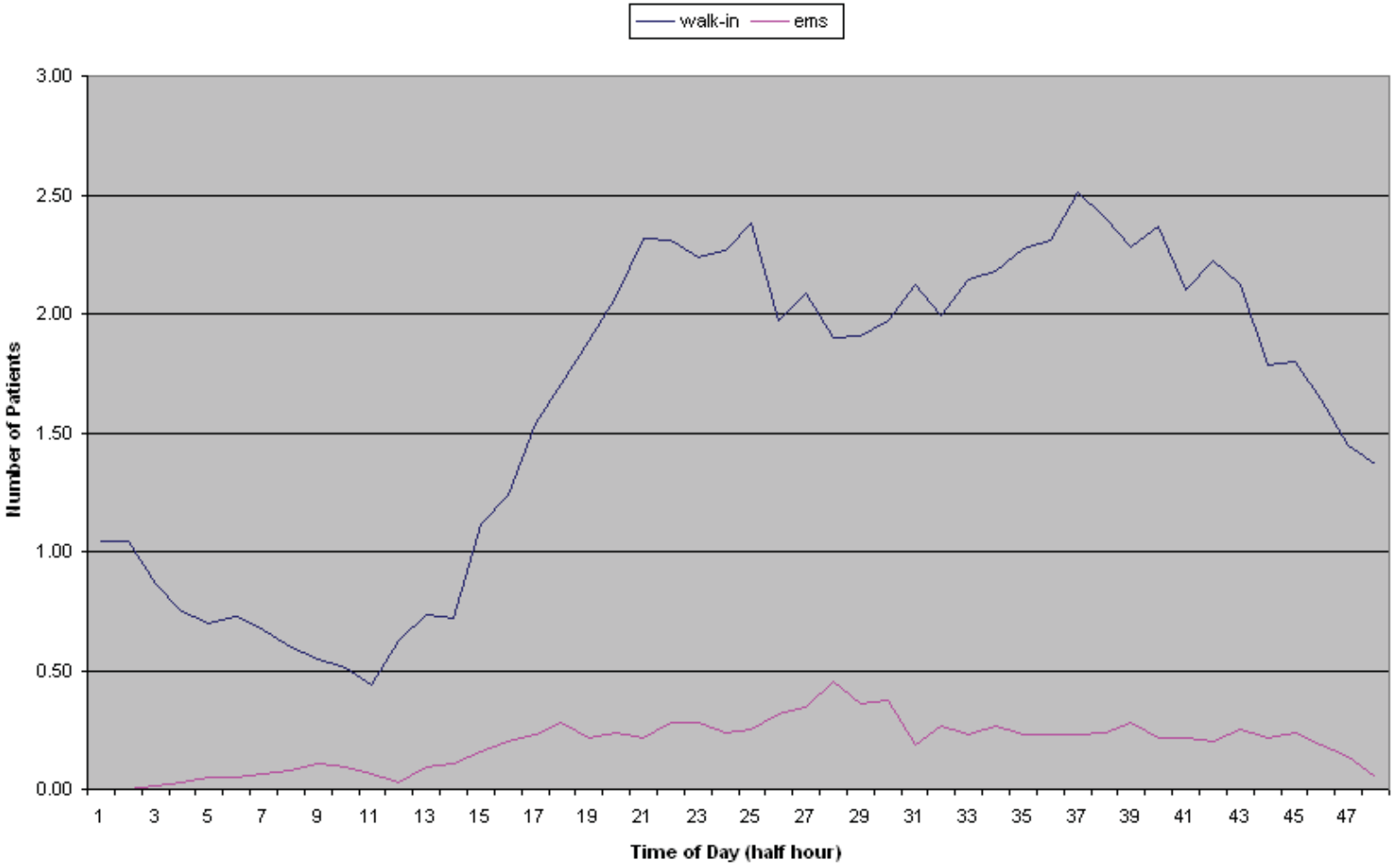
What questions have been provoked?


Project Performance
$600.00
$500.00
$400.00
$300.00
$200.00
$100.00
$-
$ / SF
y = 98.787x
Baseline Data
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00
Project Rating

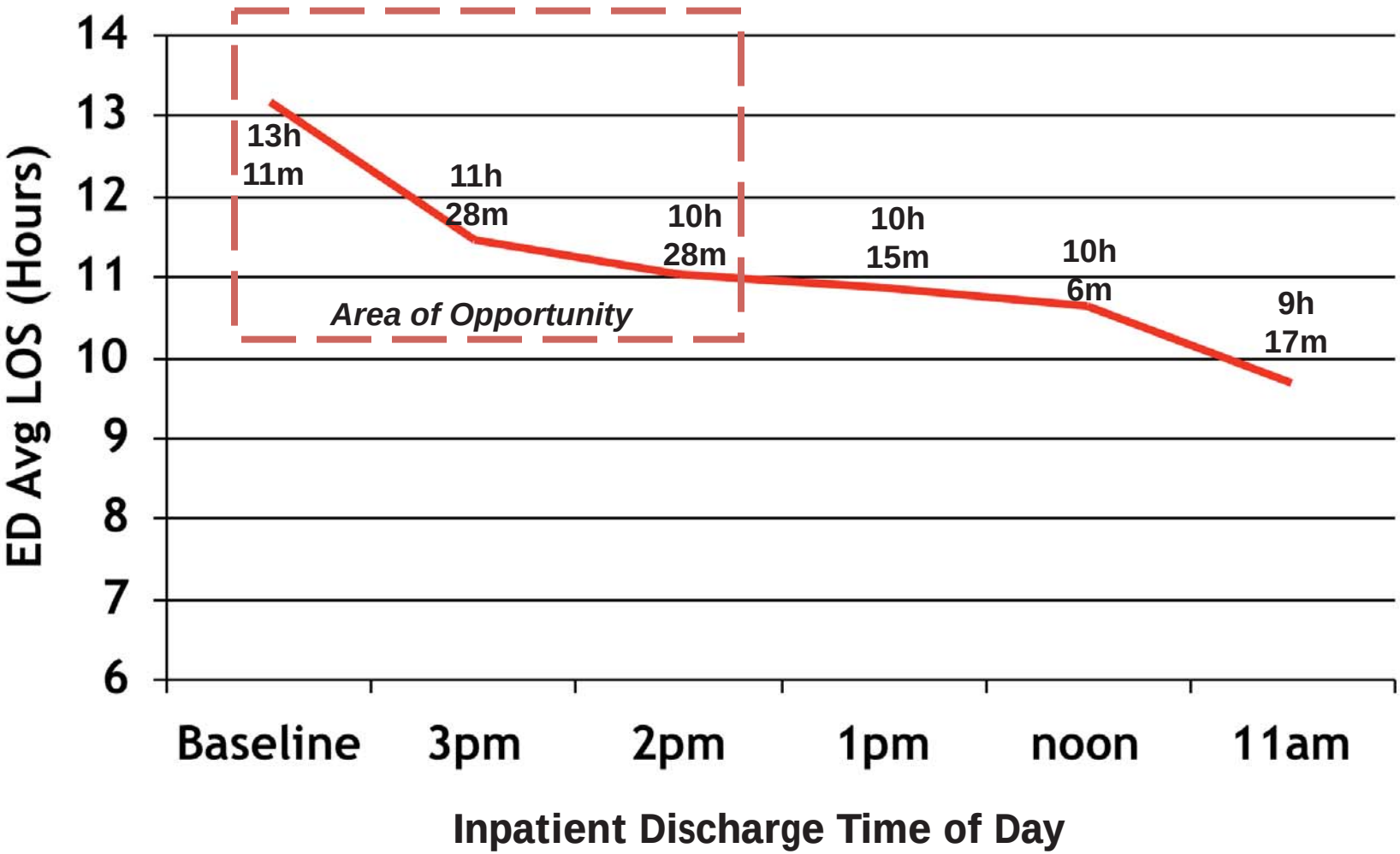
A Process Map of an Emergency Department



Number of ED Arrivals By Time of Day

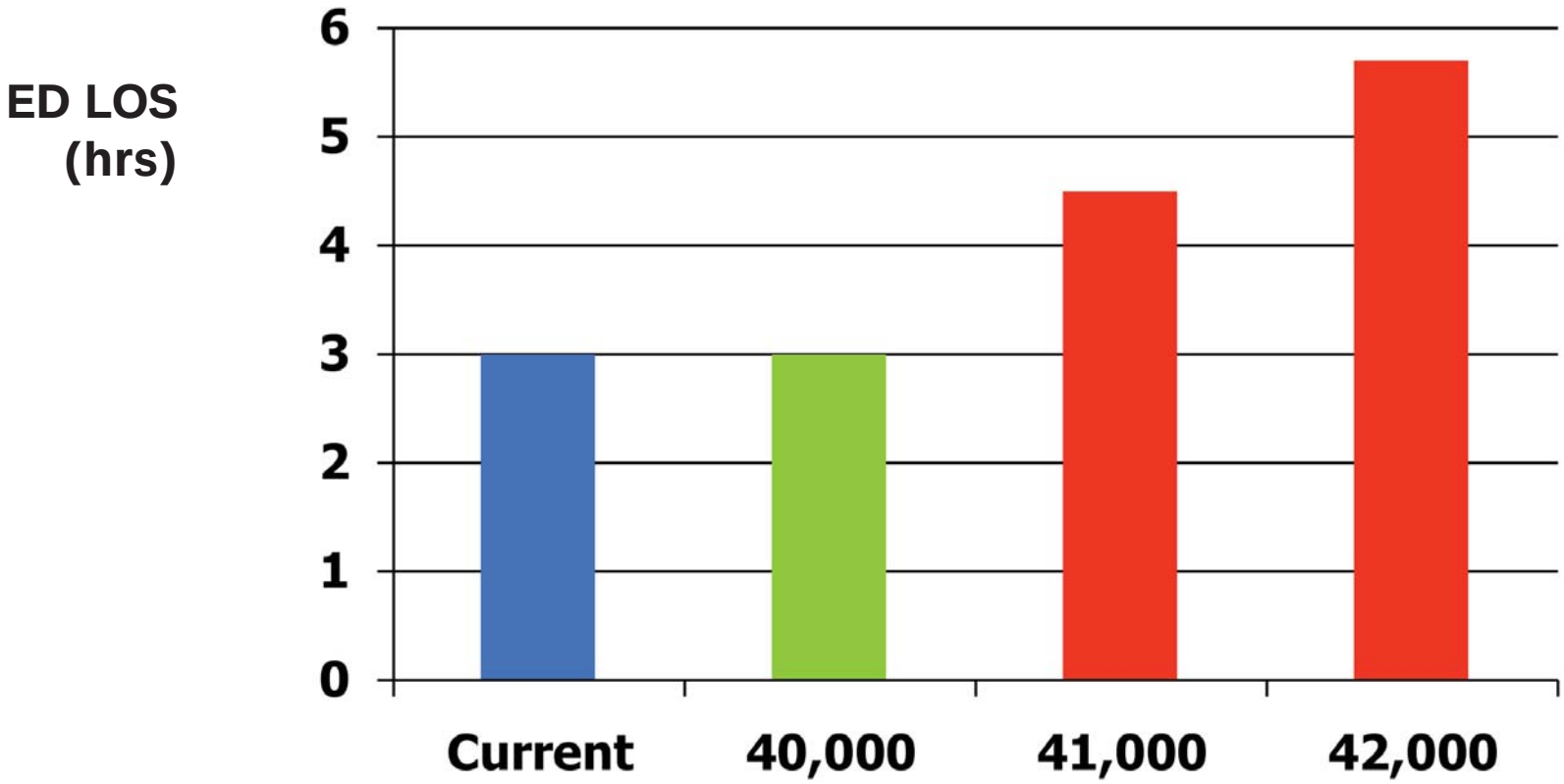


Impact of Inpatient Discharge Time of Day on ED Length of Stay



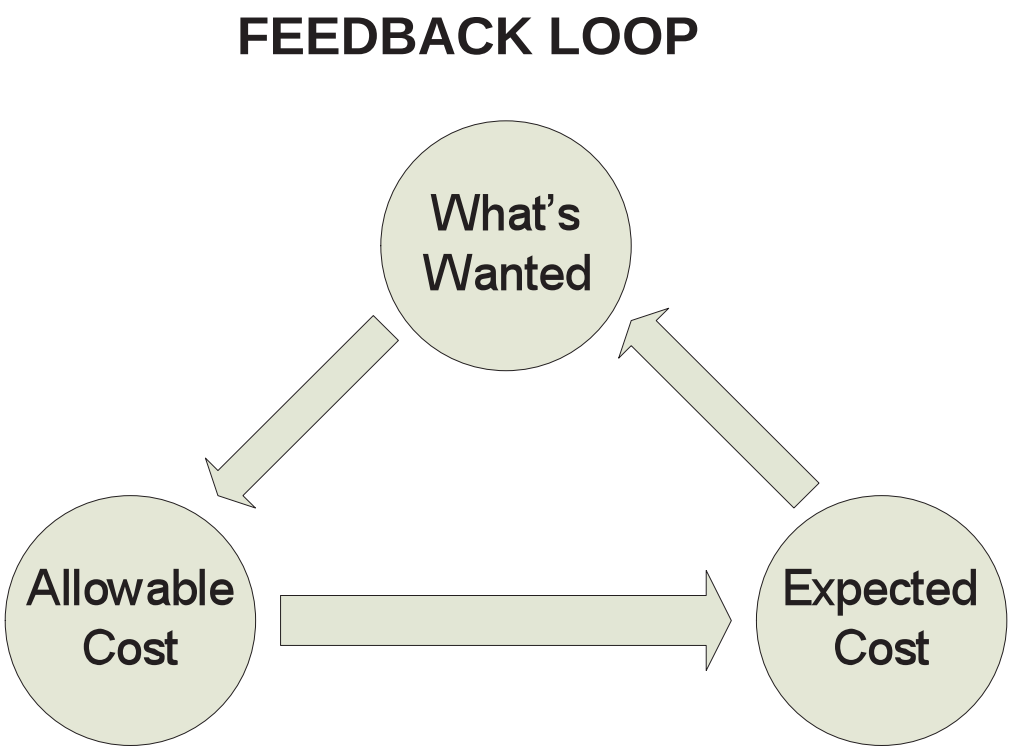
Identifying a Facility "Break Point"

How many visits to the Emergency Department can our facility handle as designed with 32 ED Beds and 370 IP Beds?



Target Value Design

- Integrated team validates facility can be built for available funds
- Sets target cost at or below allowable cost
- Owner, architect and contractors work within market constraints (allowable cost)



LCI Design Forum

The "Quarterback Rating" for Projects
A Unique Analysis of Project Performance

St. Louis, Missouri

June 13, 2008

BOLDT

How Does it Work?

- Co
  -
  -
  -
  -

Site Factor

A) Unlimited Access	1.000
B) Limited Access	1.067
C) Restricted Access	1.133
D) Severely Restricted	1.200

Schedule Impact

Accelerated	1.025
None	1.000

Building Type

A) Wood Framed	0.850
B) B Occupancy	0.900
C) 2 Hour Structure	1.000
D) High-Rise Construc	1.100

Building Envelope

A) Economy	0.950
B) Standard	1.000
C) High	1.050
D) Premium	1.100
E) High Eff Premium	1.150

Interior Finishes

A) Economy	0.975
B) Standard	1.000
C) High	1.025
D) Premium	1.050

MEP Systems

A) Economy	0.950
B) Standard	1.000
C) High	1.050
D) Premium	1.100

MEP Services

A) None Required	1.000
B) Chilled or Hot Wate	1.025
C) Chilled & Hot Wate	1.050

Seismic Zone

A) Low	1.000
B) Moderate Low	1.125
C) Moderate High	1.250
D) High	1.375
E) Very High	1.500

OSHPD Construction Type

A) N/A	1.000
B) MOB	0.925
C) Hospital	1.400

Taxable?

No
Yes

New / Renovation

A) Minor Renovation	0.50
B) Major Renovation	1.00
C) New Construction	1.00

ram
or
chmark
x
75
1.73
35
1.64
33
2.04
1.34

Haahtela's Taku Cost Model

Expected cost of functional components.

Waiting for design solutions for counting luminaires and switchboards would last months, whereas feedback to the customer must be given in days. We do not know future design solutions, but we know some "design customs" because of the past design solutions; for 400 lux illuminance in a space we need lamps, cables, switchboards etc. Number of luminaries needed is

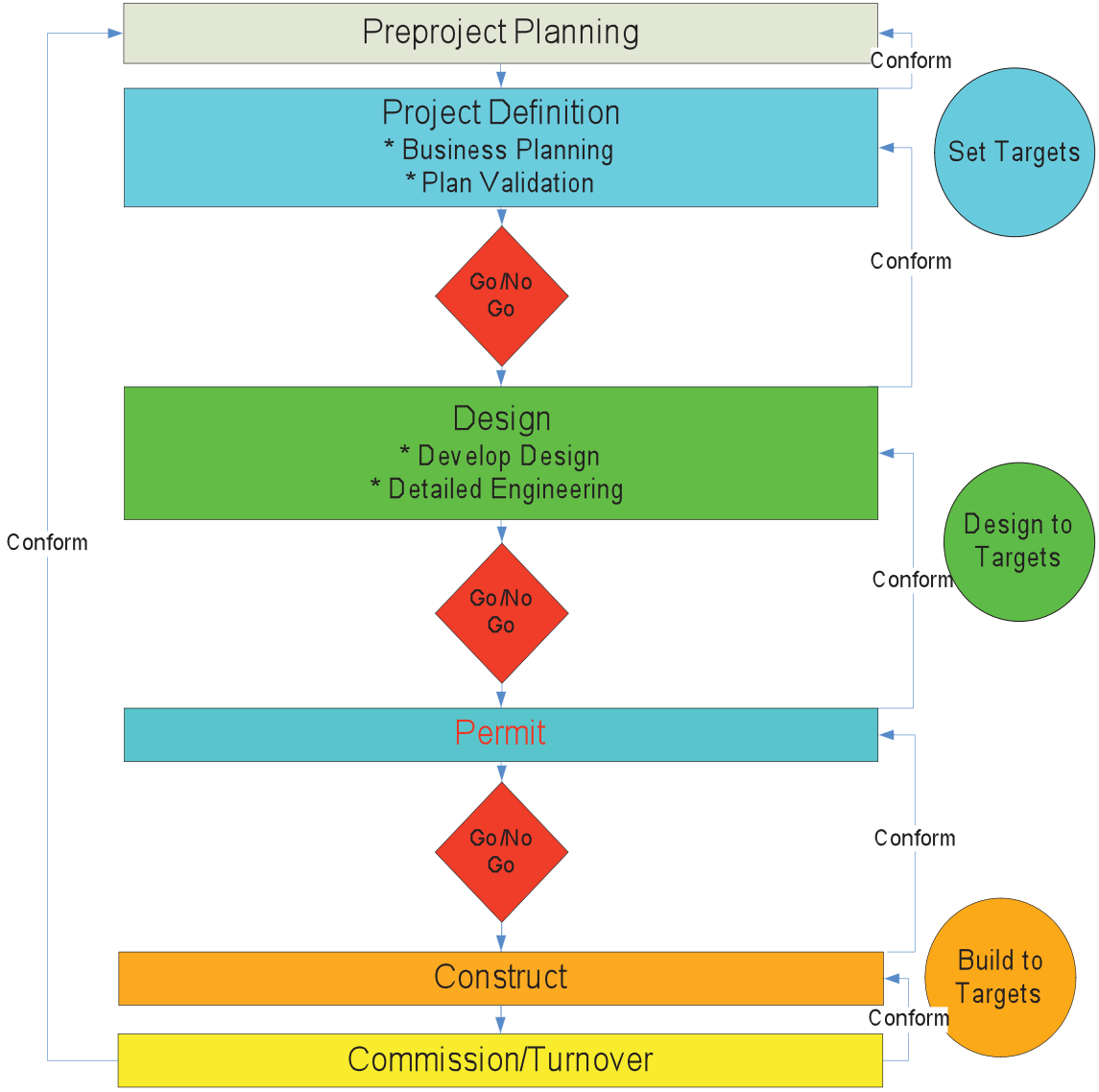
N= ExA/(FxnxUfxMf)

where
E is illuminance required
A is size of the space
F is efficiency of the lamp
n is number of lamps in the luminaire
Uf is a certain factor (dealing with the absorption of surfaces)
Mf is a factor (dealing with probability that lamps work)

It is not necessary to design first a design solution to count out the number of luminaries (or size of main switchboard, or…) as the designers use the same formula to determine the number of luminaries, if we know client requirements (assembly hall 1200 m2, 600 lux). Cost then can be based on component level market data. Luminaries can be priced by unit prices of luminaries sold in the market.

Taku™ – product model models all the components of a building basing on requirements the customer sets on the spaces, on the building as part of urban environment and basing on the conditions in the site. The result is always "reference system" that exists in the market.

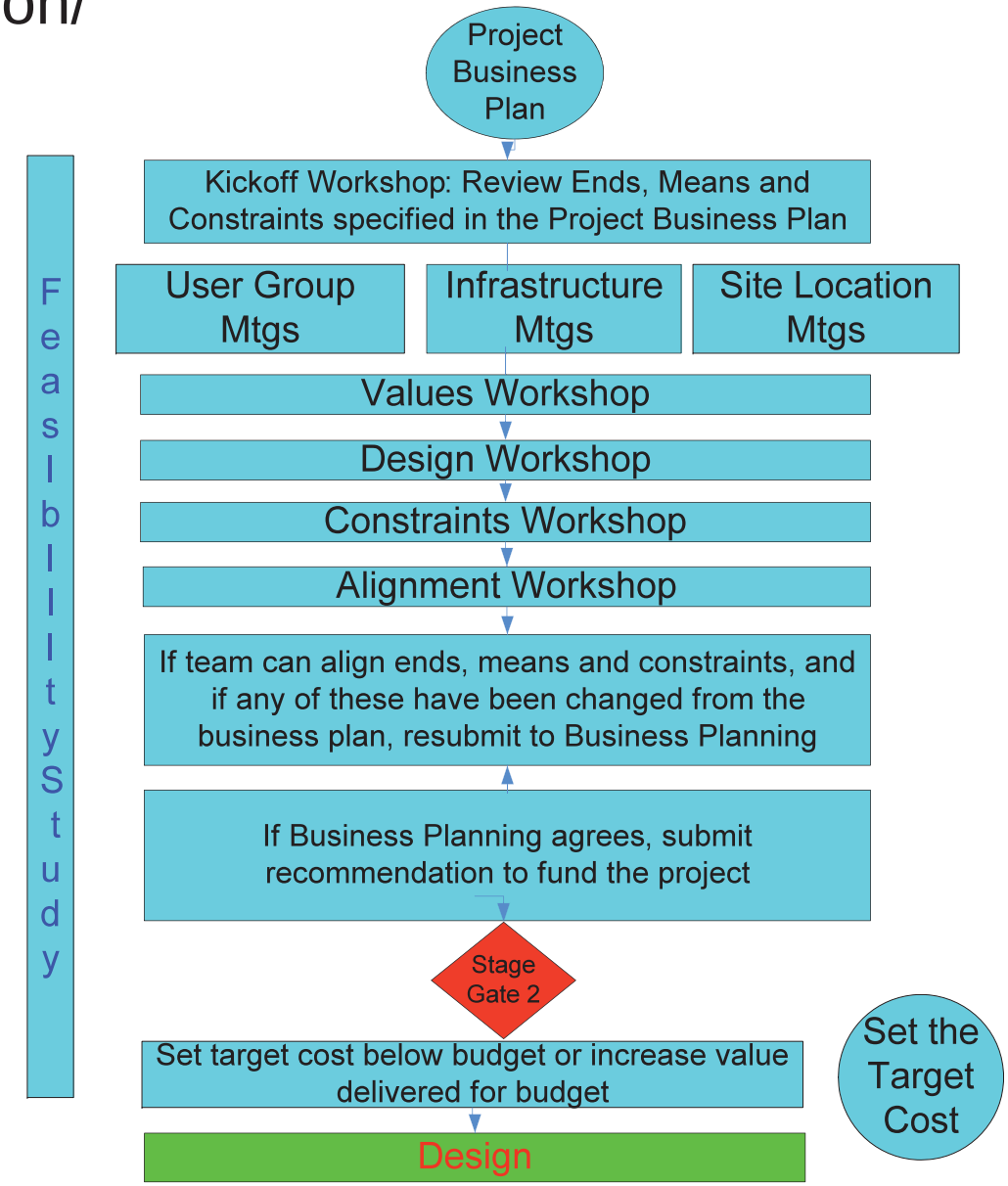
Project Phases and Target Value Design



Business Planning

1. Assess the business case (demand, revenues), taking into account the cost to own and use the facility (business operations, facility operations, facility maintenance, adaptability, durability) as well as the cost to acquire it.
2. Determine minimum acceptable ROI or maximum available funds --set the allowable cost for the facility.
3. Answer the question: If we had a facility with which we could achieve our specific purposes, and if we could have that facility within our constraints of cost, location and time, would we do it?
4. If the answer is positive, and if project delivery is not considered risky, fund the project. If the answer is positive and project delivery is considered risky, fund a feasibility study to answer the question: Can we have the facility we have in mind, will it enable us to achieve our purposes, and can we acquire it within our constraints?

Plan Validation/ Feasibility



Plan Validation/Feasibility

1. Select key members of the team that will deliver the project if judged feasible.
2. Determine stakeholder values.
3. Explore how the facility will perform in use through process modeling and simulation.
4. Describe the facility that will deliver the values.
5. Determine the expected cost if the facility were provided at current best practice.
6. If expected cost exceeds available funds or violates ROI, attack the gap with innovations in product/process design, restructure commercial relationships, etc.
7. If expected cost still exceeds available funds or violates ROI, adjust scope by sacrificing lesser ranking values.
8. If the scope and values that support the business case can be provided within financial constraints, fund the project. Otherwise, change the business plan or abandon the project.


Validated Business Plan
Design Development
Set the target cost
Form cross functional teams by system and allocate project target cost
Kickoff Workshop: Review Ends, Means and Constraints specified in the Project Business Plan after Plan Validation
User Group Mtgs
System Team Mtgs
Special Studies
TVD Workshop
User Group Mtgs
System Team Mtgs
Special Studies
TVD Workshop
Continue alternating meetings and TVD workshops as time allows and time is needed to develop, explore and select alternative product and process designs
Submit design for acceptance
Go/No Go

Design Development

- Set the target cost—typically lower than the budget that assumed current best practice
- Form Target Value Design teams by system and allocate the target cost to each team
- Hold a kickoff workshop
- Launch meeting schedule
- Use a set based approach, evaluating sets against target values
- Provide cost and constructability guidelines for design; e.g., product/process standardization
- Promote collaboration: have designers get cost input before developing design options
- Do rapid estimating; hold frequent budget alignment sessions
- Use value engineering proactively
- Hold design reviews with permitting agencies

	Purpose	Finance	Action	Example	Comments
Developer	Create something to sell to others	Maximum available funds or minimum acceptable ROI	Target cost	Property developer	
Producer	Create means for producing products or services	Maximum available funds or minimum acceptable ROI	Target cost	Oil refiner, healthcare company, university	
Shopper	Acquire commodities	Ability to afford	Buy at lowest price	Law firm, insurance company	But note: If facilities are not commodities and can impact use benefits through different designs, then Shoppers are actually Producers, and buying at lowest price is not likely to deliver greatest value.
Art Collector	Create something without predefinable properties	Within initially indeterminate limits, funds can be acquired based on the attractiveness of the design	Design, then estimate cost, then acquire funds	Municipal library, performing arts theater	At some point, maximum available funds will constrain the design. That point may occur earlier or later in the design process.

“The hospital is a machine the design of which impedes or facilitates its fitness for use.”

Dave Chambers

Chief Architect

Sutter Health

The Current Prescription-Briefly

- Assumption: Project teams are responsible for helping customers learn what they want

- Process:
  - Customers: tell the team what you are able and willing to spend to get what you want—the allowable cost for the project.
  - Develop values from purposes and design criteria/specifications from values.
  - Design how the facility will be used before designing the facility.
  - Engage key members of the project delivery team to help validate and improve project business plans.
  - If expected cost exceeds allowable, redo the business plan or abandon the project.
  - Set target costs below expected as stretch goals to spur innovation.
  - Steer design toward targets using a set based approach in which alternatives are evaluated against values and decisions are made at the last responsible moment.

Research Questions/Issues (11/2005)

1. Can industry advisors play a useful role in client business planning?
2. How best to select project delivery teams; e.g., test for compatibility, engage self assembled teams?
3. How best size and manage contingency to achieve target costs?
4. Hypothesis: Implementation of Target Costing will reduce variability of work flow, and reduce the uncertainty of project ends and means.
5. Hypothesis: The contingency needed to absorb variability will decline as variability is reduced.

Research Questions/Issues (11/2005)

6. How to improve on current benchmarks as regards the integration of cost modeling and designing?
7. What information technologies can be used to support Target Costing practices; e.g., integrating product, process and cost models?
8. How best to assure that the use of the facility is explored and agreed upon before attempting to design the facility itself?
9. Involving downstream players in upstream processes produces more detailed design earlier than in the past. Now that the level of detail and accuracy achieved in feasibility is equivalent to that previously achieved at the end of schematic design or even into design development, are those traditional phases or phase names still appropriate, or do they cause confusion?

Research Questions/Issues (11/2005)

10. Does the investment in upstream processes pay off in a) the avoided costs of bad projects that are not allowed to continue, b) in the increase in value from more effective processes for articulating values and controlling design and construction to the delivery of those values, c) in the reduction in waste from incomplete and inaccurate drawings, from duplicated efforts, from rework, d) from more reliable delivery to quality, time and cost expectations, e) from the ability to respond more quickly to changes and discoveries?
11. Is co-location of project delivery team members beneficial and feasible?
12. How do we collaborate when team members cannot co-locate regularly?
13. Is an evergreen, ranked list of stakeholder values beneficial and feasible as a tool for value management?

Research Questions/Issues (11/2005)

14. Can the concept of accurately estimating future cost based on benchmark practice be effectively implemented?
15. Is the practice of setting a target cost below a current benchmark budget ("expected cost") in order to drive innovation beneficial and achievable?
16. Is the alignment of incentives through forms of relational contracting measurably effective in generating increased value and eliminating more waste than when incentives are not aligned?
17. How/can value engineering/value management tools and techniques be beneficially and practically applied in the Target Costing process?
18. Is it better for specialty contractors to be engaged on a design-assist or a design-build basis?

P2SL 6/2009 TVD benchmark

1. The client with the help of key service providers evaluates the business case and decides whether to fund a feasibility study.
2. The feasibility study involves all key members (designers, constructors, and client stakeholders) of the team that will deliver the project if the study findings are positive.
3. The client is an active and permanent member of the project delivery team.
4. The feasibility study produces a detailed budget aligned with scope.

P2SL 6/2009 TVD benchmark

5. All team members understand the business case and stakeholder values.
6. A cardinal rule is agreed upon by all performers – the Target Cost cannot be exceeded and the Target Program and Quality cannot be changed, except by the client.
7. Cost estimating and budgeting is done continuously through intimate collaboration between owner, design professionals and cost modelers (all team members)—'over the shoulder estimating'.

P2SL 6/2009 TVD benchmark

8. The Last Planner system is used to coordinate the actions of team members.
9. Targets are set as stretch goals to spur innovation.
10. Target cost and scope are allocated to cross-functional TVD teams, typically by facility system; e.g., structural, MEP, interiors, exterior….
11. TVD teams update their cost estimates frequently—usually every 3 weeks during design development.
12. The project cost estimate is frequently updated (often weekly) to reflect TVD team updates (could be a plus/minus report), and reviewed in a weekly meeting of TVD team coordinators and discipline leads, but open to all project team members.

P2SL 6/2009 TVD benchmark

13. The cost and quality implications of design alternatives are discussed prior to major investments of design time.
14. Design is managed with a set based strategy, so that all time and resources available within project constraints are used to test and develop alternatives.

Research Questions/Issues for going beyond the 6/2009 Process Benchmark

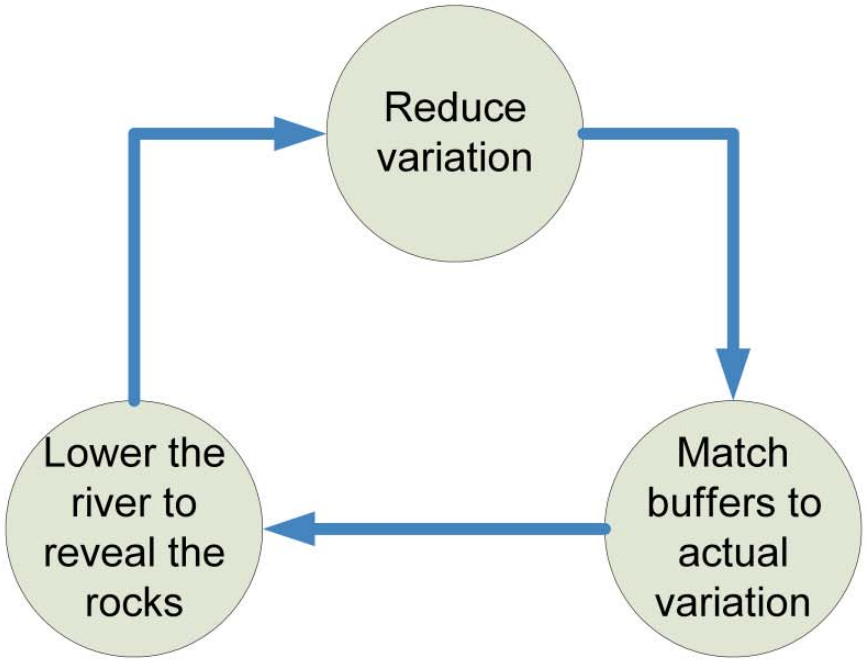
1. Refine methods and verify the benefits of using A3 proposals and Choosing by Advantages.
2. How to sort out stakeholder value earlier and better?
3. What training to provide?
4. How best facilitate needed behavior through relational contracting—aligned incentives…., leadership?

Research Questions/Issues for going beyond the 6/2009 Process Benchmark

6. Find out how to do TVD on projects without relational contracts such as IFOA, where interests are not fully aligned; e.g., public sector projects.
7. Understand when an owner should shift cost risk (e.g., through a GMP) and when not.
8. Find out how to apply/adapt TVD to different types of products (e.g., infrastructure) and different types of owners (e.g., developers)
9. Describe experience and data on aligning interests/ incentives throughout the life of a project.

Research Questions/Issues for going beyond the 6/2009 Process Benchmark

10. Can we figure out how to better do benchmarking against market?
11. Scheduling/cost interdependency.
12. Work structuring/TVD connection
13. Confirm the widely held opinion that projects delivered traditionally typically experience an increase in cost estimate with increasing design detail and overrun their budgets.
14. Explain why TVD projects do the opposite; namely, cost estimates decrease over time and projects are delivered on or under budget.


Reduce variation
Match buffers to actual variation
Lower the river to reveal the rocks

Overview

- Assumption: Project teams are responsible for helping customers learn what they want

- Process:
  - Develop values from purposes and design criteria from values
  - Design how the facility will be used before designing the facility
  - Engage key members of the project delivery team to help validate and improve project business plans
  - Customers: tell the team what you are able and willing to spend to get what you want
  - Set targets as stretch goals to spur innovation
  - Steer design toward targets using a set based approach in which alternatives are evaluated against values and decisions are made at the last responsible moment

Research Questions/Issues for going beyond the 6/2009 Process Benchmark

5. TVD projects release funds for investment in value-adding features of facilities, but the availability of these cost underrun-based funds is determined late in projects, reducing the potential return on investment. CHH embedded some value-adding changes in the facility design in anticipation of cost underruns, but that is obviously a partial and limited solution.

Hence this proposal for a Life Cycle TVD:

- Learn how to derive an allowable cost from a facility operations cost model, together with the ability to finance investment.
- Give that allowable cost and model to the project team so they can recalculate the allowable cost based on expected impact of design alternatives on life cycle costs and benefits, again within the limits of ability to finance.
- Learn how to finance projects where the budget varies during design, and where life cycle investment decisions are made during design.

Target Value Design…

- …strives to reduce the waste and rework in the Design/Estimate/Redesign cycle.
- ...requires a fundamental shift in thinking from ’expected costs’ to ’target costs’.
- …necessarily involves cross functional teams. No one person has all the knowledge.
- …cries out for an integrated product/process /cost model.

P2SL TVD Process Benchmark issued Nov 2005

1. The client evaluates the business case and decides whether to fund a feasibility study.
2. The feasibility study involves all key members (designers, constructors, and client stakeholders) of the team that will deliver the project if the study findings are positive.
3. The client is an active and permanent member of the project delivery team.
4. The feasibility study produces a detailed budget aligned with scope.

P2SL TVD Process Benchmark issued Nov 2005

5. All team members understand the business case and stakeholder values.
6. A cardinal rule is agreed upon by all performers – the Target Cost cannot be exceeded and the Target Program and Quality cannot be changed, except by the client.
7. Cost estimating and budgeting is done continuously through intimate collaboration between owner, design professionals and cost modelers (all team members)—'over the shoulder estimating'.
8. The Last Planner system is used to coordinate the actions of team members.