

Target Value Design

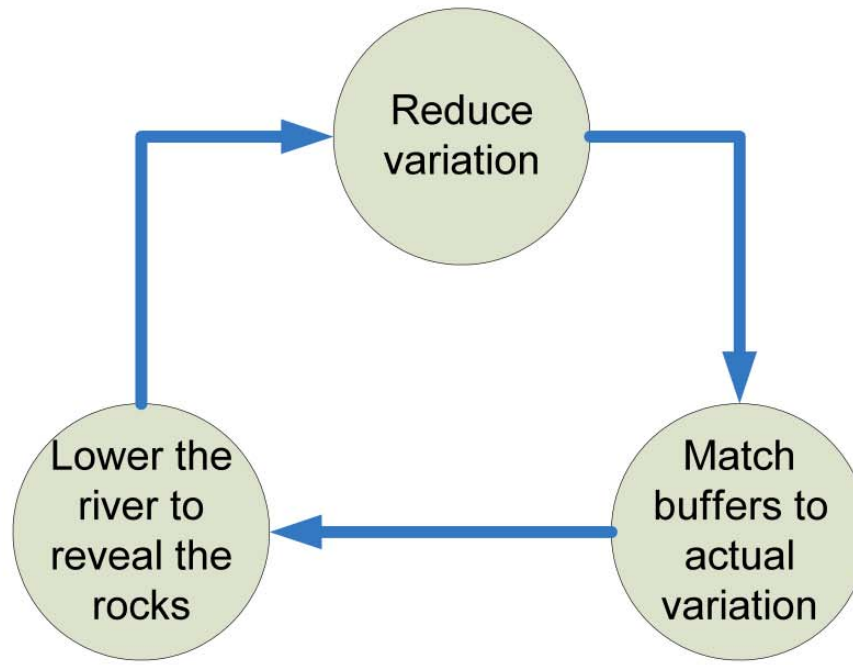
Glenn Ballard

Lean Construction Institute

University of California, Berkeley

Target Value Design is:

- **a management practice that drives design to deliver customer values, and develops design within project constraints.**
- **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**



Reducing needed buffers to spur innovation

- **Remove traditional design solutions**
- **Set a target cost below allowable cost**
- **Delay start date**
- **Reduce laydown space**
- **Set a target productivity better than previous best**

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



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

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.

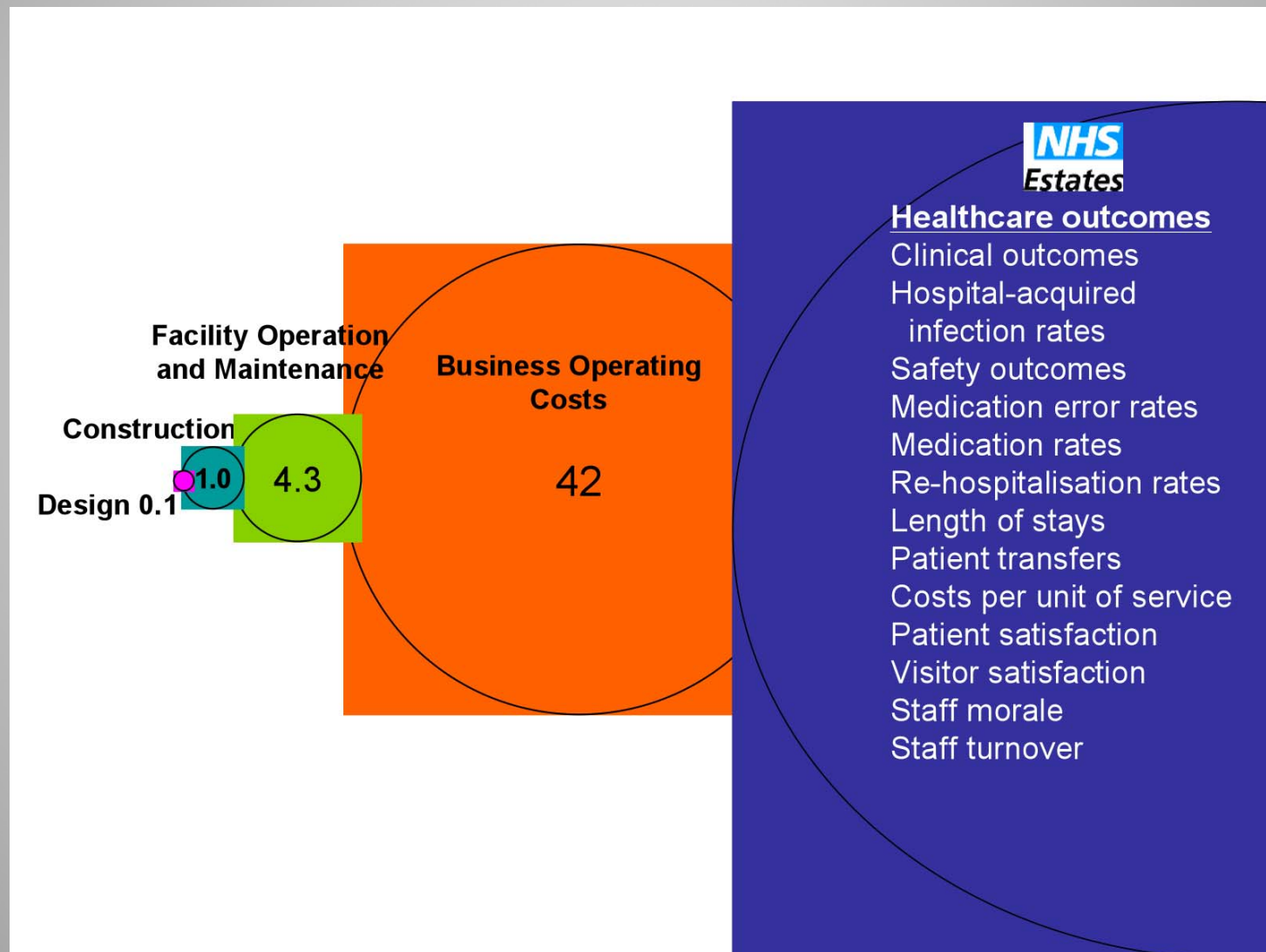
“The hospital is a machine the design of which impedes or facilitates its fitness for use.”

Dave Chambers

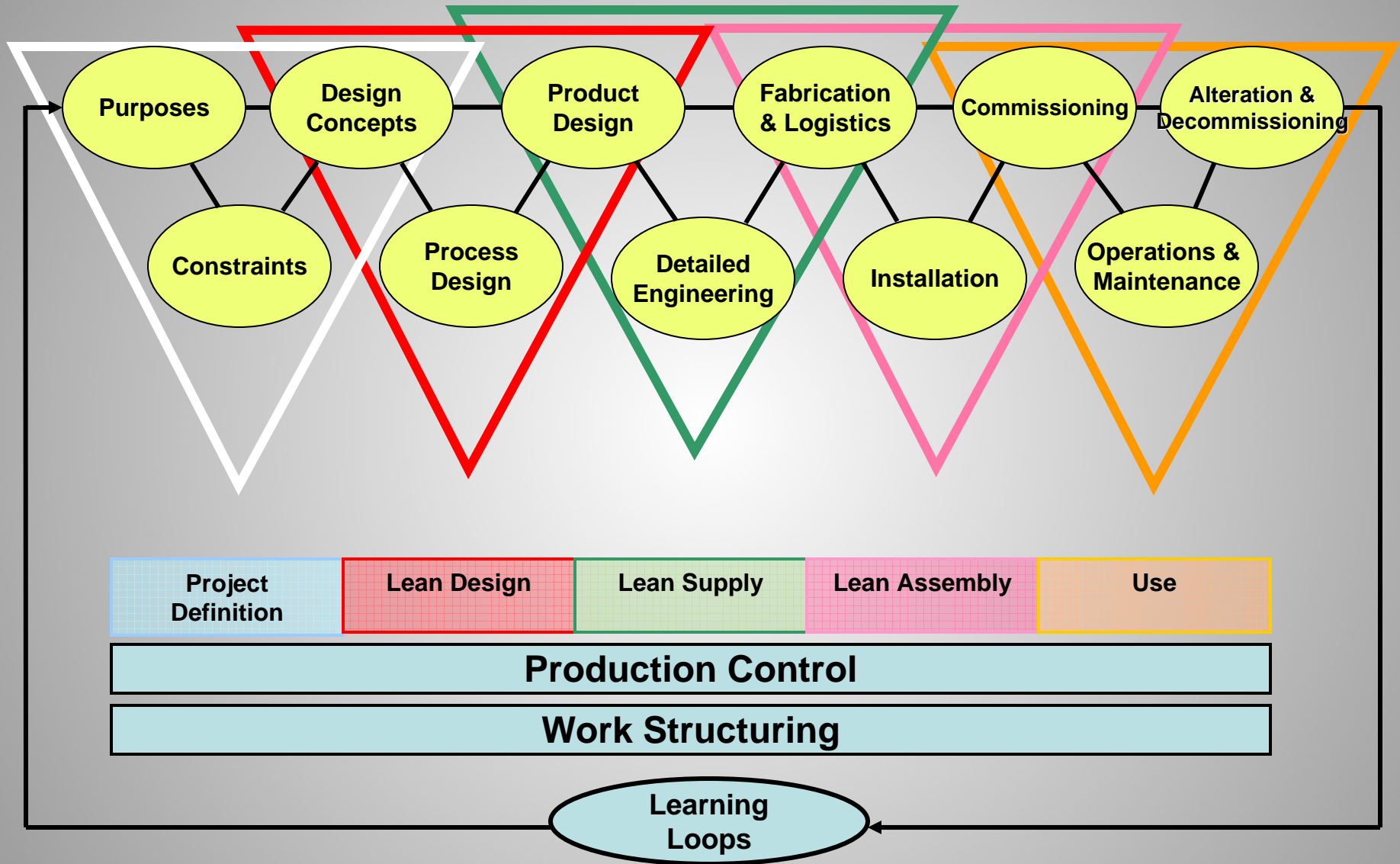
Chief Architect

Sutter Health

Relative Costs



Lean Project Delivery System



Ends

- Provide shelter for my family
- Capture the carpet market in Curitiba
- Reduce the time to drive from point A to point B

Means

- A flat
- A carpet factory
- A bridge

Constraints: Location, Time, Cost, Regulations

What is the job of the
project delivery team?

To provide what the customer wants?

or

To first help the customer decide what
they want?

	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.

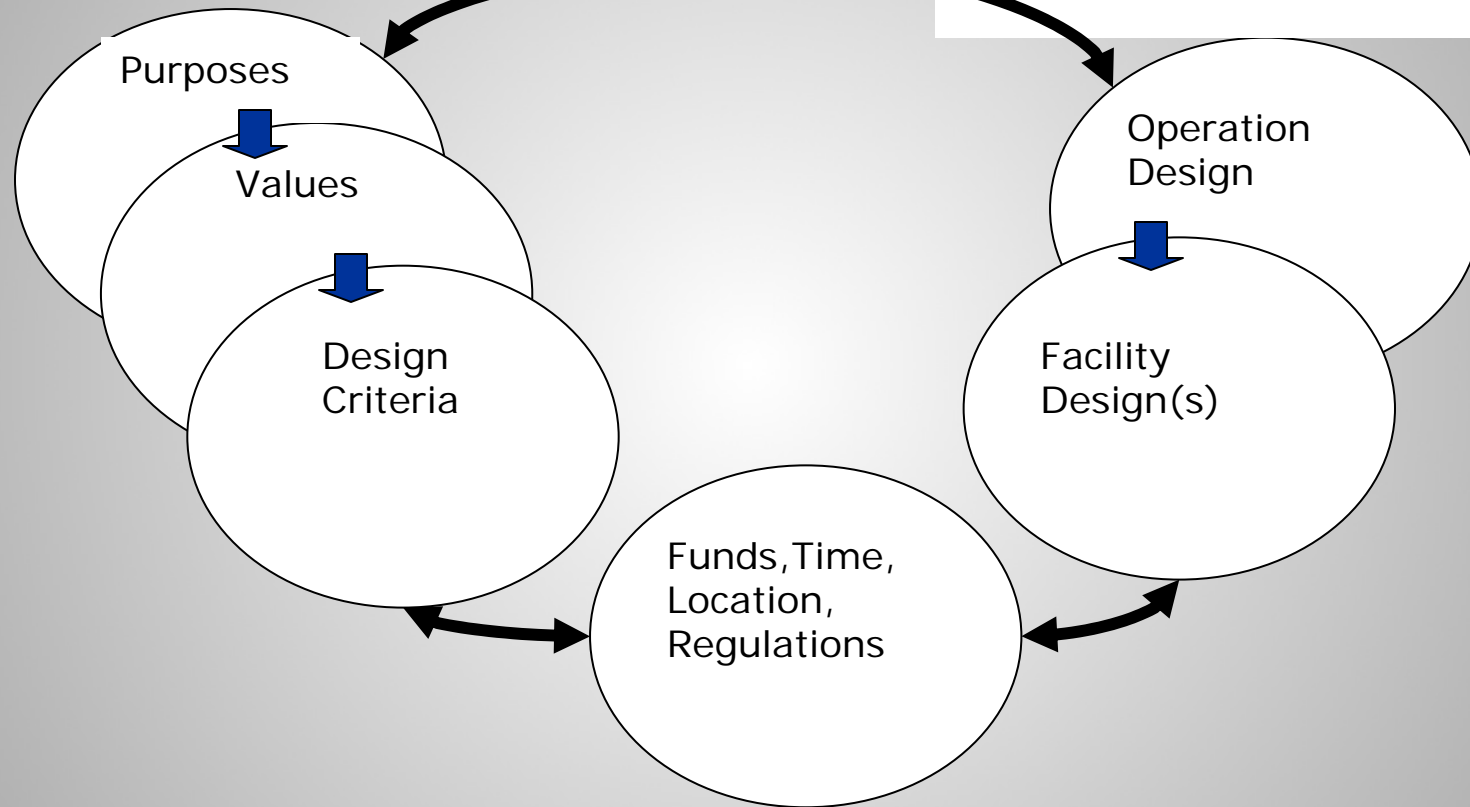
Summary

- **Claim: Lean Project Delivery delivers greater value with less waste**
- **Assumption: Project teams are responsible for helping customers learn what they want**
- **Process:**
 - **Develop design criteria from values and values from purposes**
 - **Design how the facility will be used before designing the facility**
 - **Customers engage key members of the project delivery team to help validate and improve project business plans**
 - **Customers specify what they are able and willing to spend to get what they want**
 - **Target values and constraints are set as stretch goals to spur innovation**
 - **Design is steered toward targets using a set based approach in which alternatives are evaluated against targets and decisions are made at the last responsible moment**
 - **Users produce instructions for use of the design (purchasing, permitting, fabrication, installation, commissioning), from an integrated model**

Project Definition Process

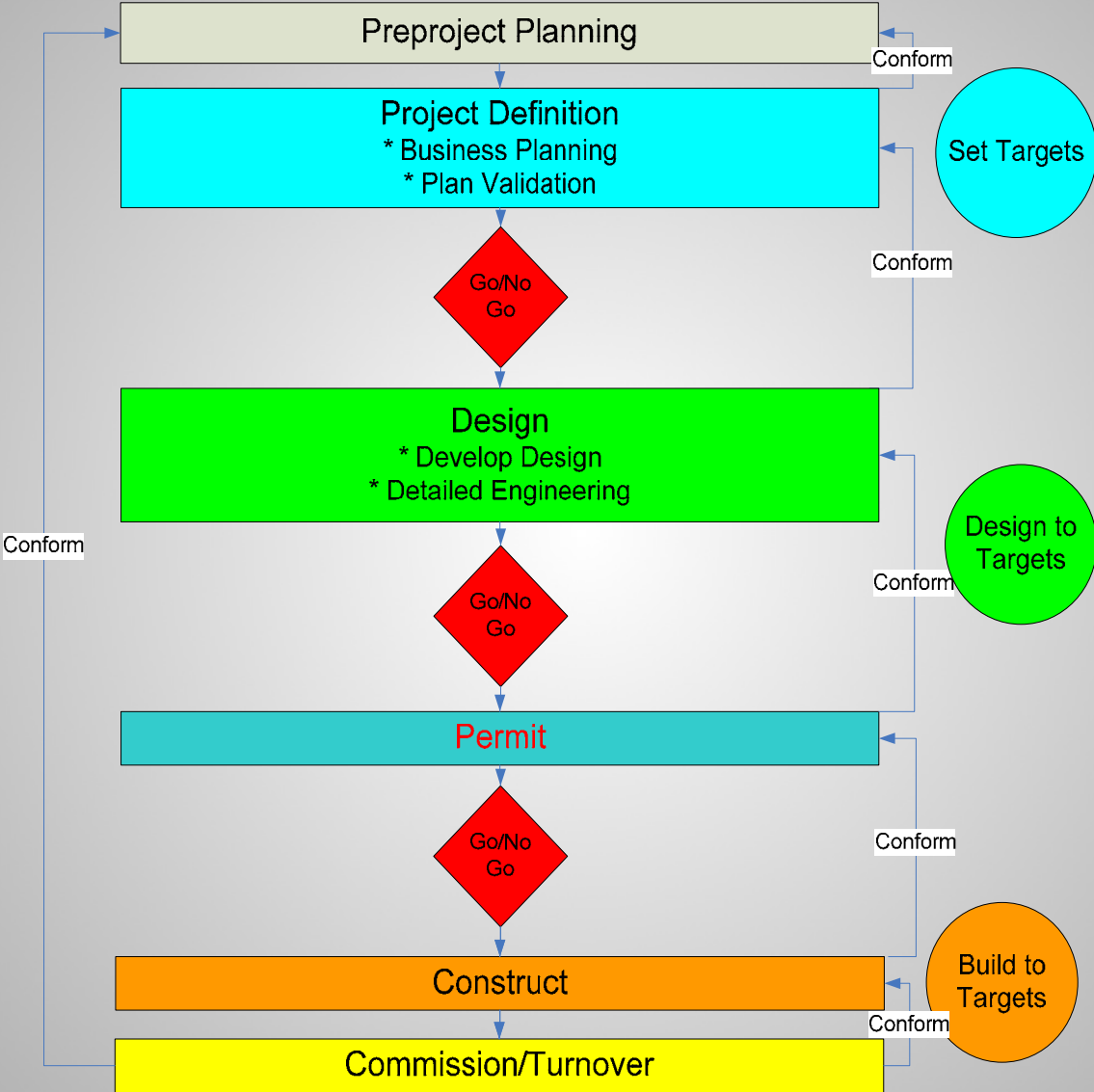
What's Wanted (Ends)

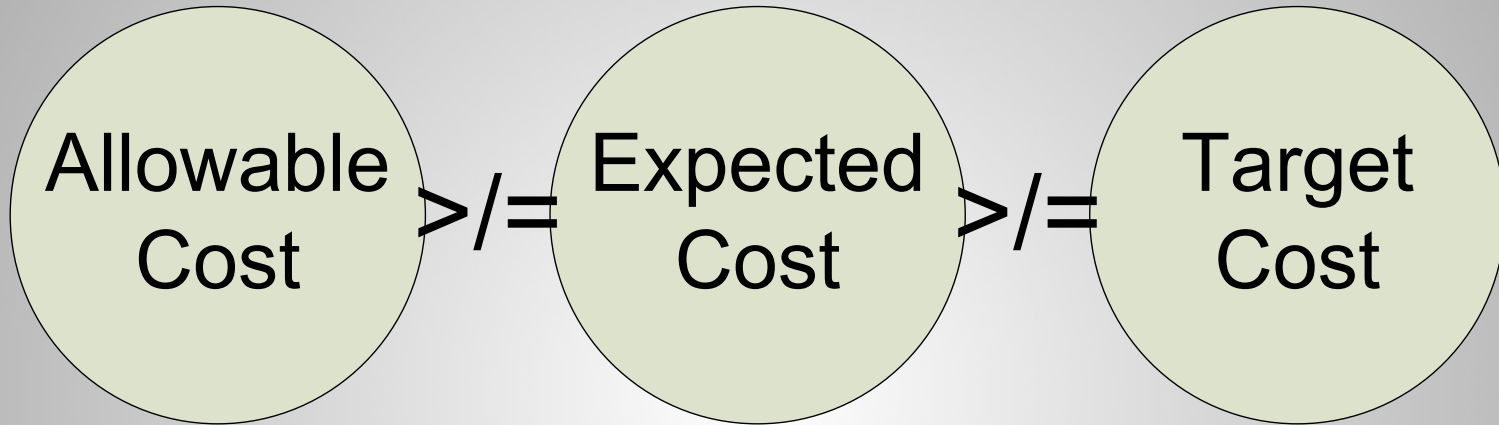
What Provides (Means)



Constraints

Project Phases and Target Value Design





CI Design Forum

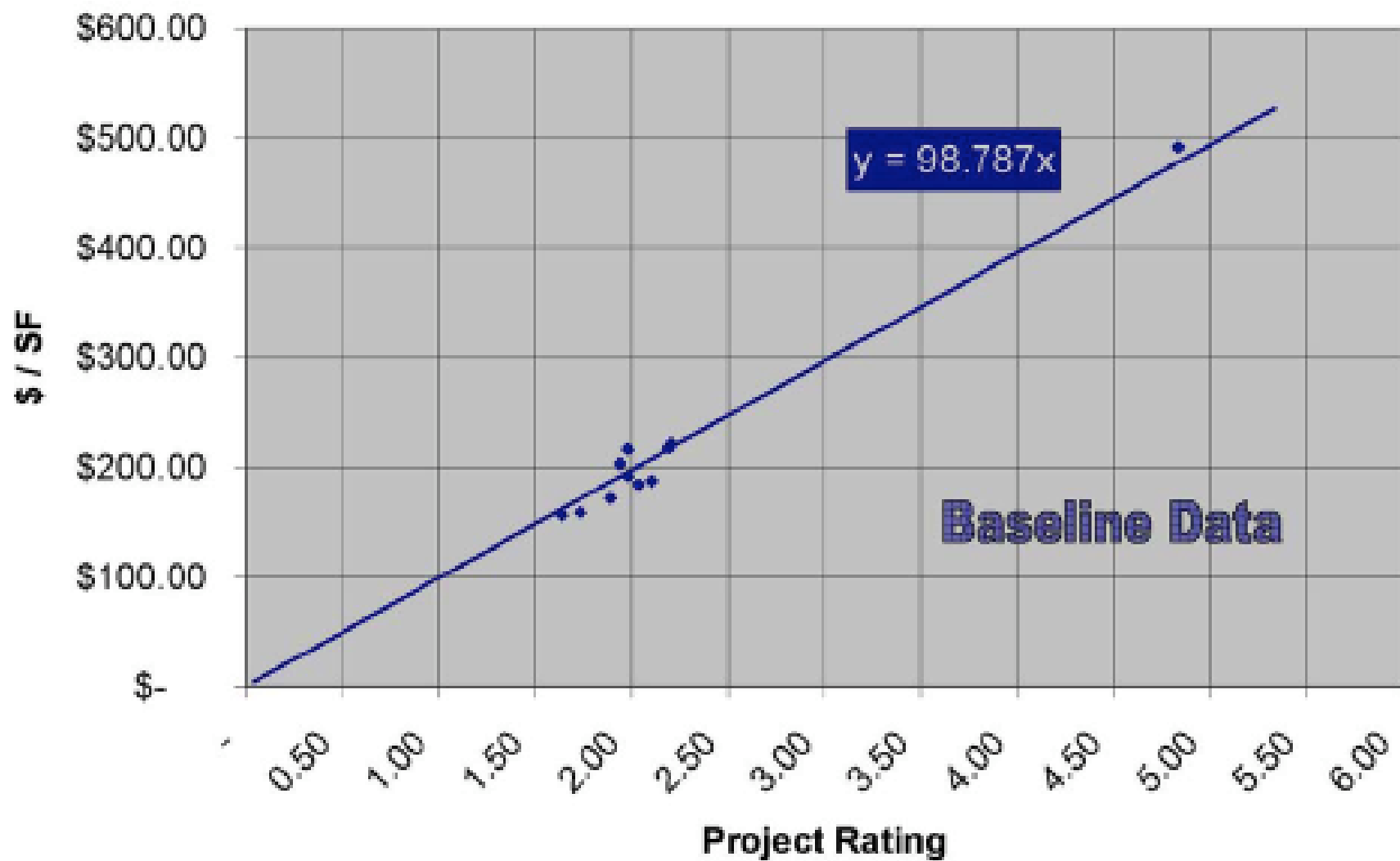
The “Quarterback Rating” for Projects
A Unique Analysis of Project Performance

St. Louis,
Missouri
June 13, 2008

BOLDT



Project Performance



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

$$N = \frac{E \times A}{(F \times n \times U_f \times M_f)}$$

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

U_f is a certain factor (dealing with the absorption of surfaces)

M_f is a factor (dealing with probability that lamps work)

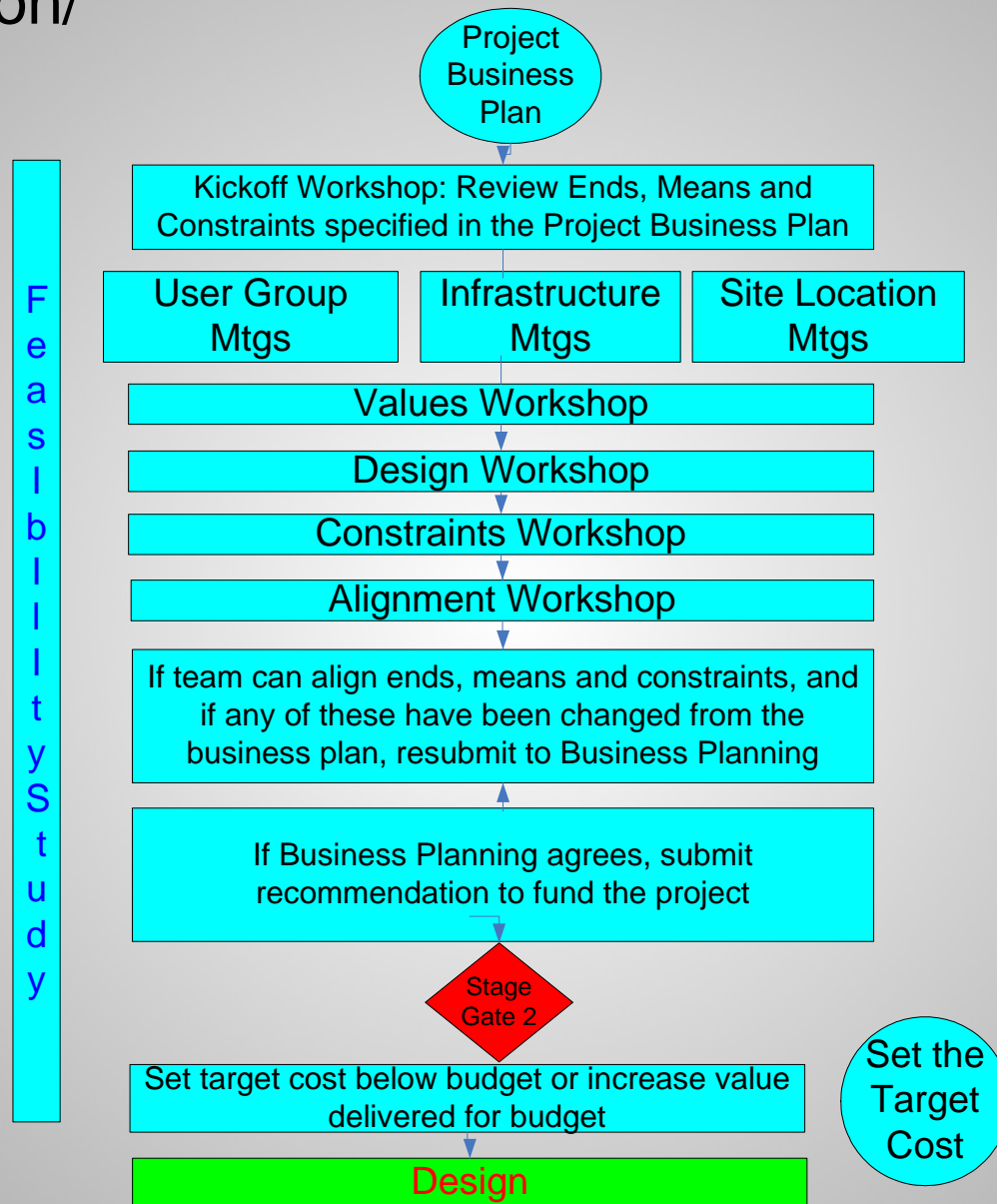
It is not necessary to design first a design solution to count out the number of luminaries (or size of main switchboard, or...) as the designers use the same formula to determine the number of luminaries, if we know client requirements (assembly hall 1200 m², 600 lux). Cost then can be based on component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

TakuTM – 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.

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 and rank 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.



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**

Target Cost Model

Legend:
Worth (Target)
Current Estimate

Const TOTAL per SF
89.33

D-B TOTAL per SF
94.12

Construction TOTAL
10,183,417

Design-Build TOTAL
10,729,883

Incl Design at \$504,886+41600

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

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

Construction
9,840,302

Owner Reserves
343,115

Escalation

SITE WORK
594,500
Site GC OH&P
G10 Site Prep, Demo & Excav
146,500
G20 Site Improvements
373,000
G30+40 All Utilities
75,000
G90 Other Site Structures

BUILDING
9,245,802
SHELL
4,334,488
A10 Foundation A20 Basement
1,006,004
B10 Superstructure
1,218,797
B20 Exterior Closure
2,007,061
B30 Roofing
102,626

INTERIOR
1,710,386
C10 Interior Construction
528,427
C20 Stairs
62,639
C30 Interior Finishes
1,069,320
D10 Conveying
50,000

MECHANICAL
1,111,402
D20 Plumbing
85,927
D30 HVAC
824,160
D40 Fire Protection
109,740
Testing and Special Mech
91,575

ELECTRICAL
794,890
D5010 Service and Distribution
739,390
D5020 Lighting & Branch Wiring
D5030 Security Comm/Data
D5090 Other Electrical
55,500

SPECIAL
706,862
E10 Specialties & Equipment
492,534
E20 Furnishings Fixed/Movable
34,000
F10 Special Construction
89,520
F20 Selective Demolition
90,808

GENERAL
587,774
Z1010 Project Administration
Z1030 General Conditions
Z1060 Fee
Z20 Risk and Contingency
587,774

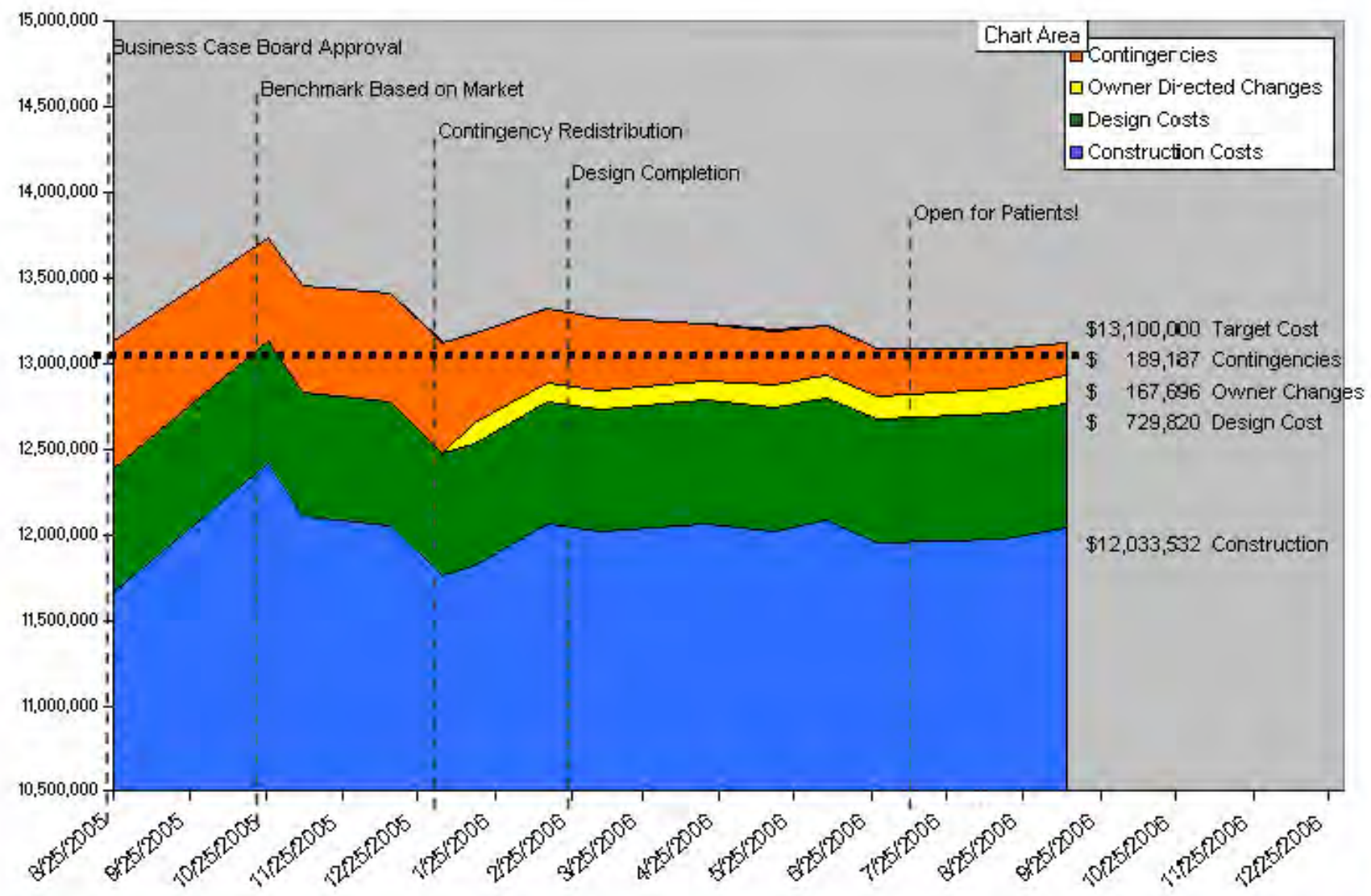
Applying the Cardinal Rule

- Ensuring that whatever target costs increase somewhere in the facility, costs are reduced elsewhere by an equivalent amount without compromising program and quality.
- Refusing to add scope to a project that will overrun the target cost.
- Managing the transition from design to construction to ensure the target cost is never exceeded.

The Cardinal Rule
The Target Cost of the Facility Can Never Be Exceeded

	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

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



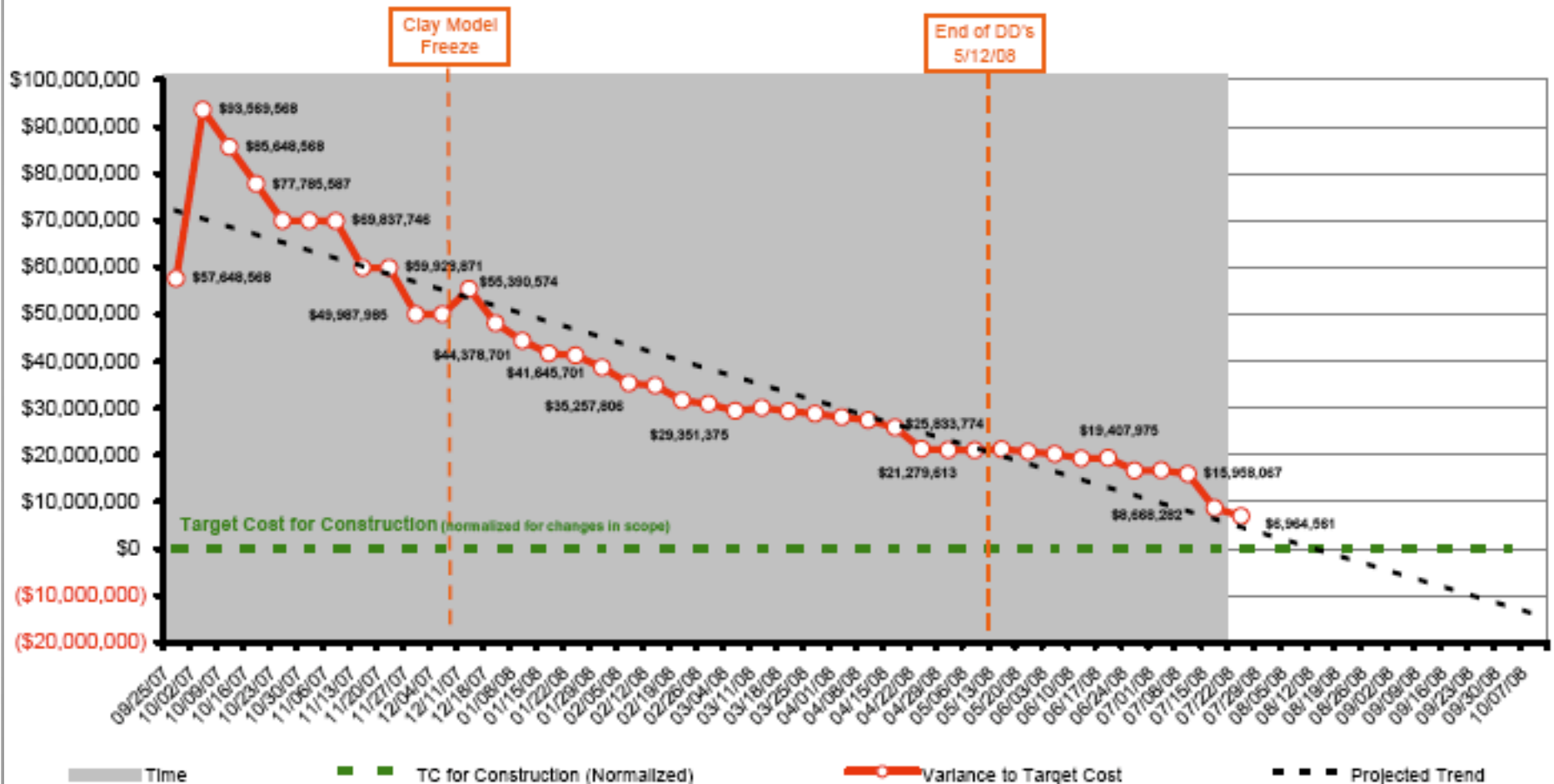
Shawano Clinic

- **Under Budget and Ahead of Schedule**
- **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.**
- **below the budget in spite of additional equipment costs and added service line**



CPMC Cathedral Hill Hospital TARGET VALUE DESIGN CLUSTER GROUP WEEKLY UPDATE

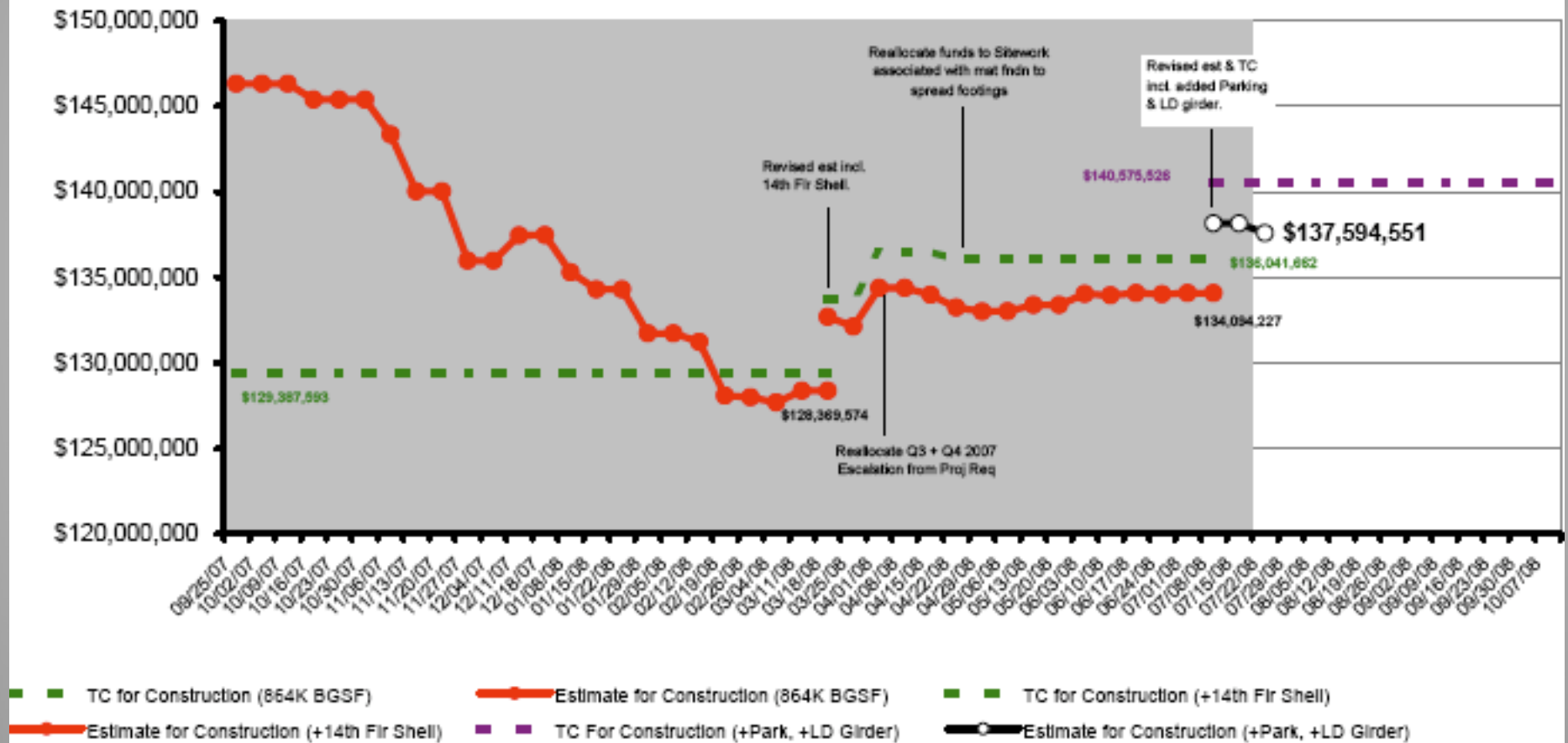
Construction Estimate Total - Gap Analysis to Target Cost for Construction





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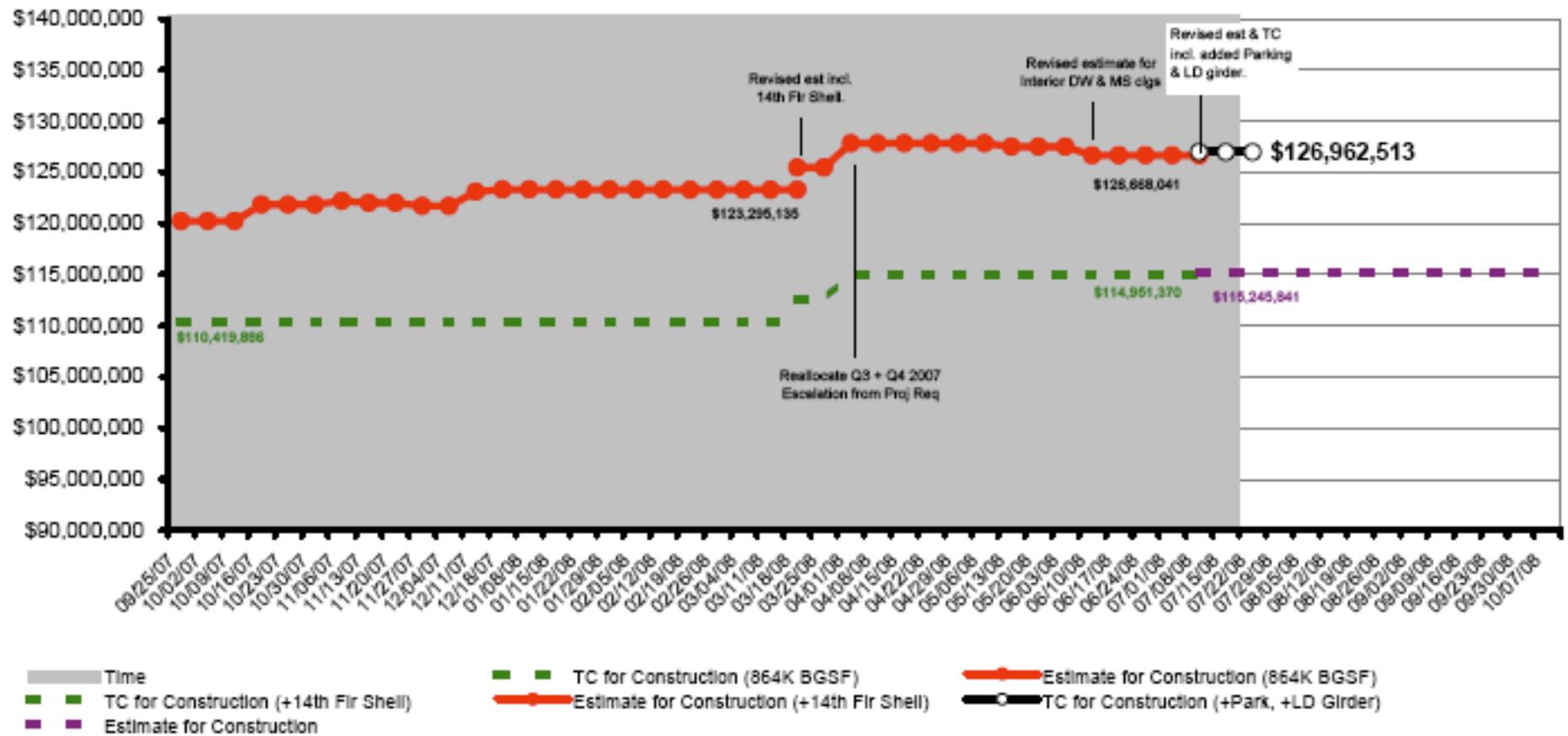
Structural





CPMC Cathedral Hill Hospital TARGET VALUE DESIGN CLUSTER GROUP WEEKLY UPDATE

Interiors



Takeaways?

Questions?

Plus

Delta

For discussion in our next meeting

- What actions will you need to take as leaders to help target value design be successful on CPR?