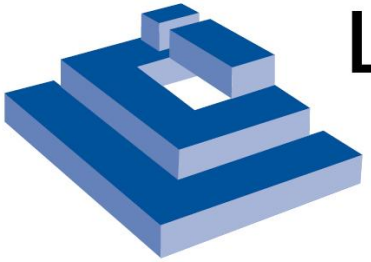

Lean Construction Institute

Building Knowledge in Design and Construction

Target Costing

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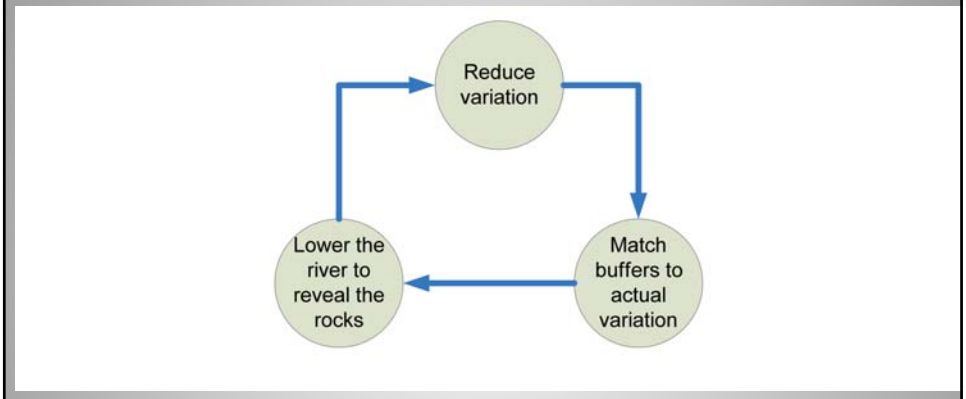
Target Costing is:

- a management practice that drives design to deliver customer values 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

Target Costing…

- …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.



Chief Engineer Suzuki's YETs

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

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

Overview

- Assumption: Project teams are responsible for helping customers learn what they want
- Process:
  - Develop values from purposes and 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
  - 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

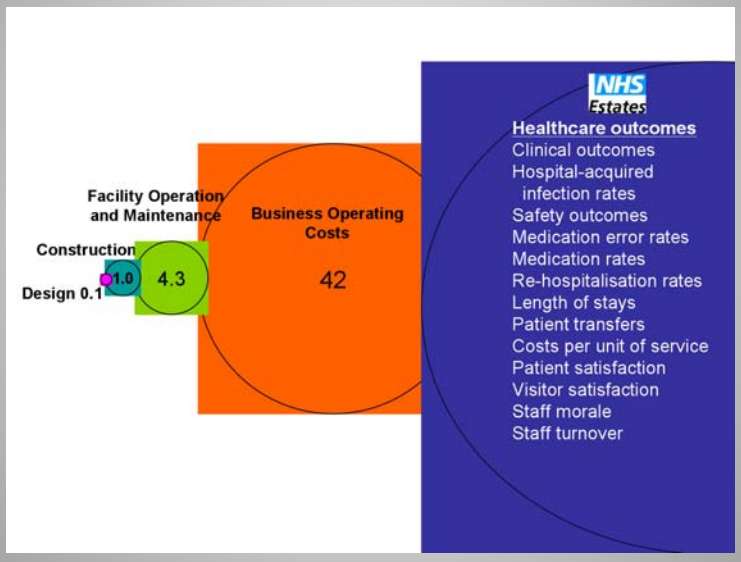
“The hospital is a machine the design of which impedes or facilitates its fitness for use.”

Dave Chambers

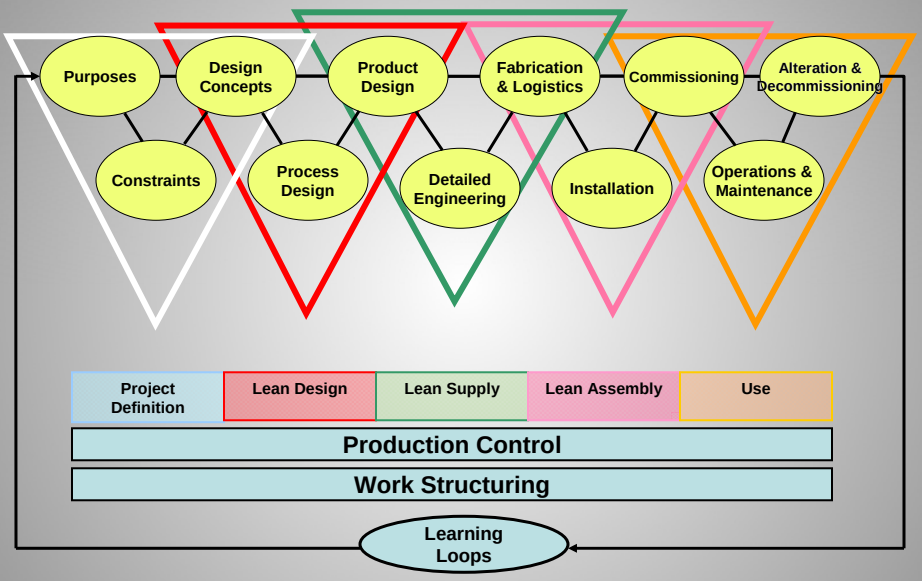
Chief Architect

Sutter Health

Relative Costs

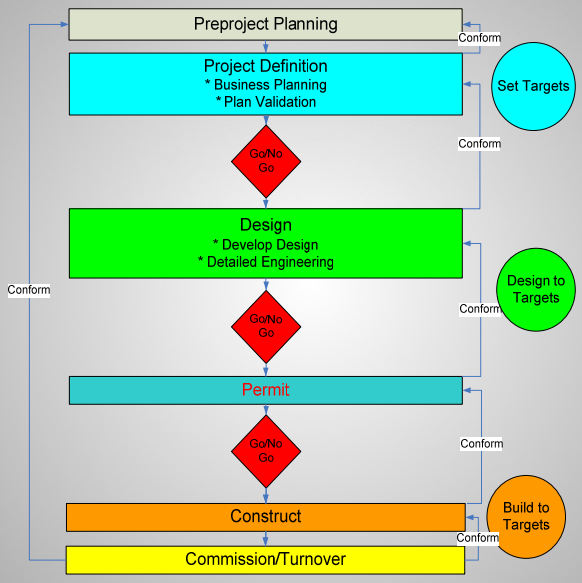


Lean Project Delivery System



	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.

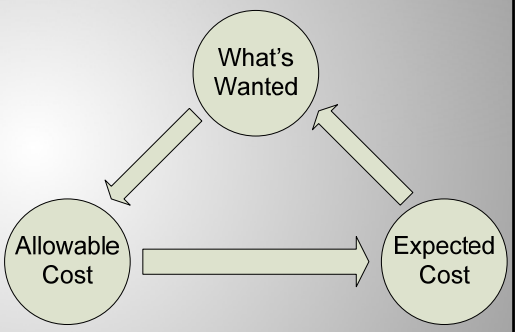
Project Phases and Target Costing



Target Costing

- 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

FEEDBACK LOOP



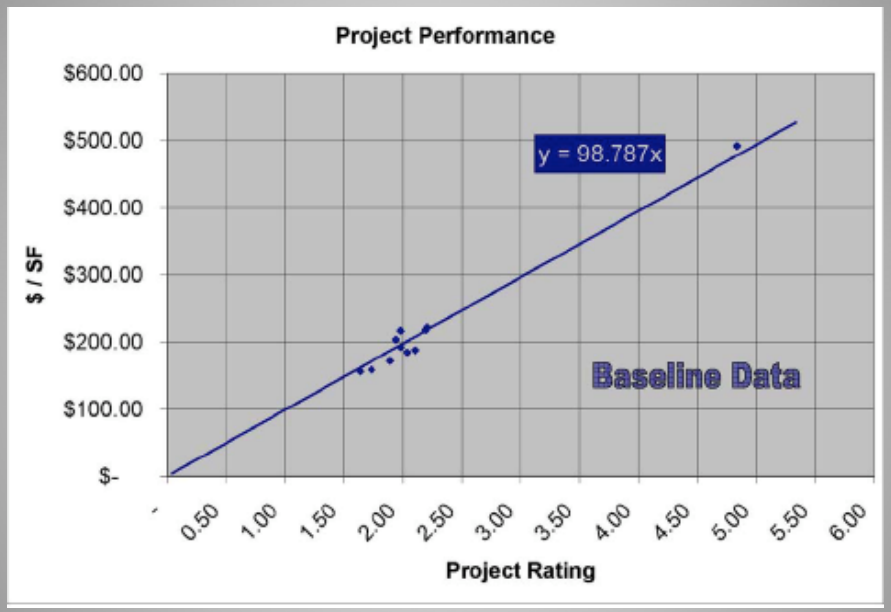
LCI Design Forum

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

St. Louis,
Missouri

June 13, 2008

BOLDT



How Does it Work?

Site Factor		Interior Finishes		OSHPD Construction Type	
A) Unlimited Access	1.000	A) Economy	0.975	A) N/A	1.000
B) Limited Access	1.067	B) Standard	1.000	B) MOB	0.925
C) Restricted Access	1.133	C) High	1.025	C) Hospital	1.400
D) Severely Restricted	1.200	D) Premium	1.050		
Schedule Impact		**MEP Systems**		**Taxable?**	
Accelerated	1.025	A) Economy	0.950	No	
None	1.000	B) Standard	1.000	Yes	
		C) High	1.050		
		D) Premium	1.100		
Building Type				**New / Renovation**	
A) Wood Framed	0.850			A) Minor Renovation	0.50
B) B Occupancy	0.900	**MEP Services**		B) Major Renovation	1.00
C) 2 Hour Structure	1.000	A) None Required	1.000	C) New Construction	1.00
D) High-Rise Construc	1.100	B) Chilled or Hot Wate	1.025		
		C) Chilled & Hot Wate	1.050		
Building Envelope		**Seismic Zone**			
A) Economy	0.950	A) Low	1.000		
B) Standard	1.000	B) Moderate Low	1.125		
C) High	1.050	C) Moderate High	1.250		
D) Premium	1.100	D) High	1.375		
E) High Eff Premium	1.150	E) Very High	1.500		

Haahtela's Taku Cost Model

Expected cost of functional components.

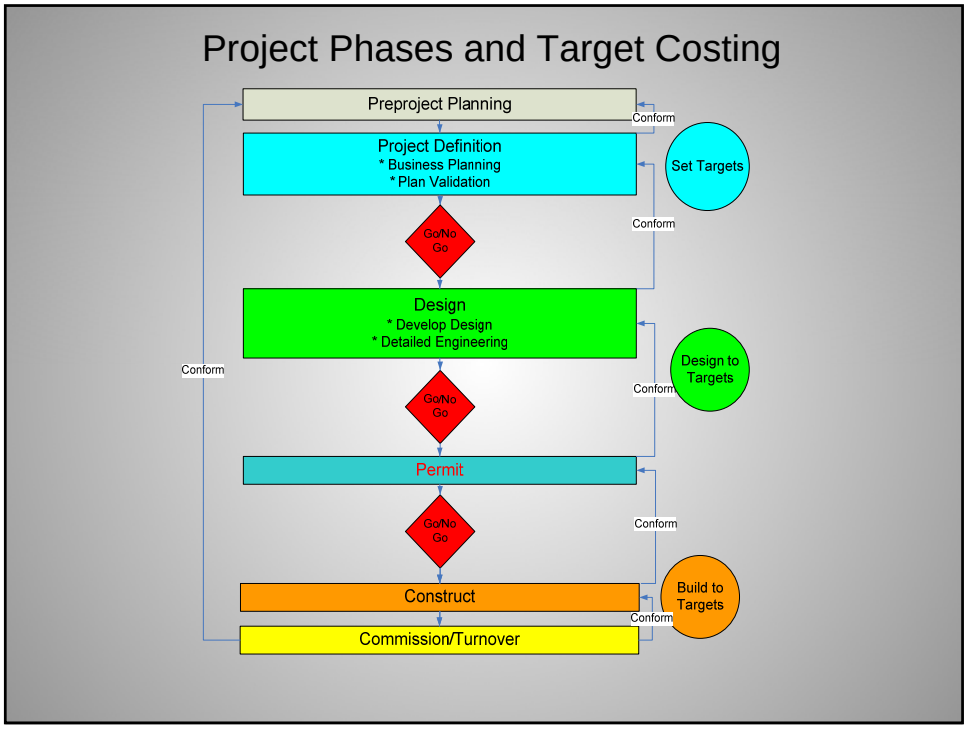
Waiting for design solutions for counting luminaires and switchboards would last months, whereas feedback to the customer must be given in days. We do not know future design solutions, but we know some "design customs" because of the past design solutions; for 400 lux illuminance in a space we need lamps,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



Target Cost Model

Legend:
Worth (Target)
Current Estimate

Const TOTAL per SF	D-B TOTAL per SF
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

Overview

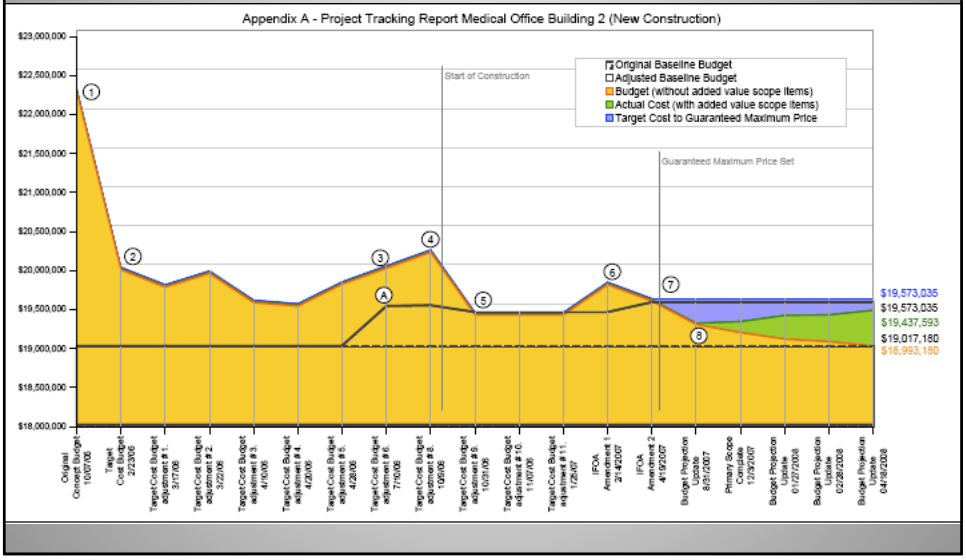
- **Assumption: Project teams are responsible for helping customers learn what they want**
- **Process:**
  - **Develop values from purposes and design criteria from values**
  - **Design how the facility will be used before designing the facility**
  - **Engage key members of the project delivery team 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**

Sutter Fairfield MOB

The project was completed in 25 months, despite a 3 month delayed construction start.

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%.

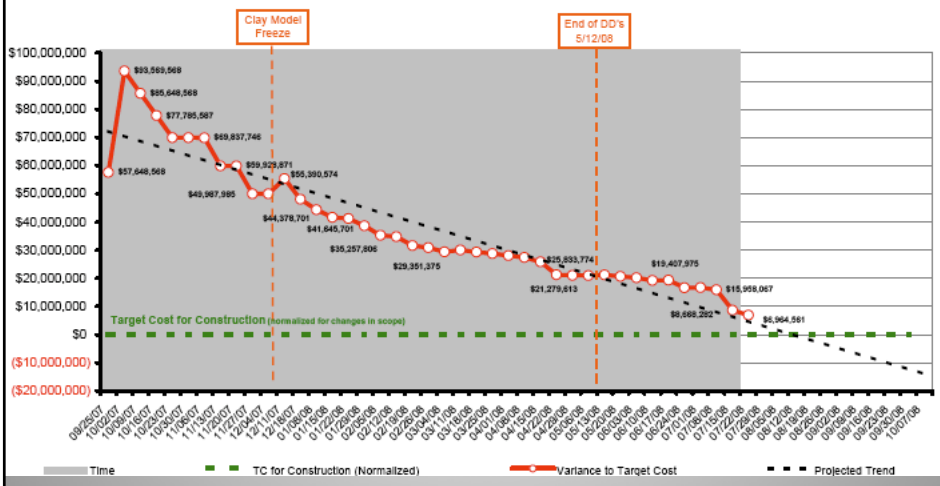
Sutter Fairfield MOB



HerreroBOLDT

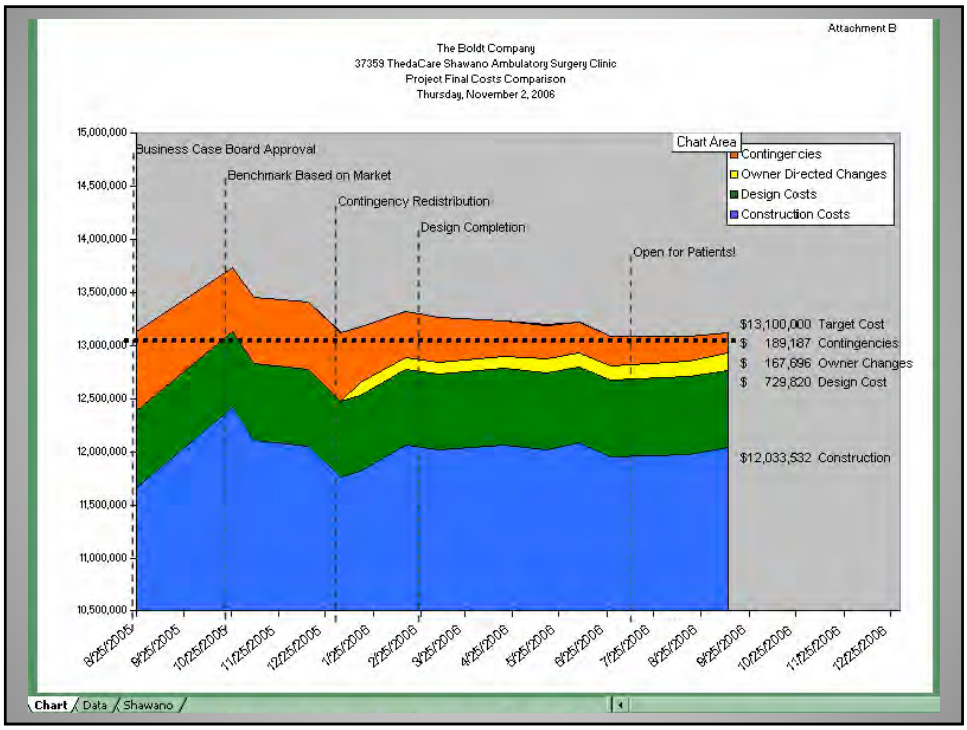
CPMC Cathedral Hill Hospital
TARGET VALUE DESIGN CLUSTER GROUP WEEKLY UPDATE

Construction Estimate Total - Gap Analysis to Target Cost for Construction



Patrick will now present his case study

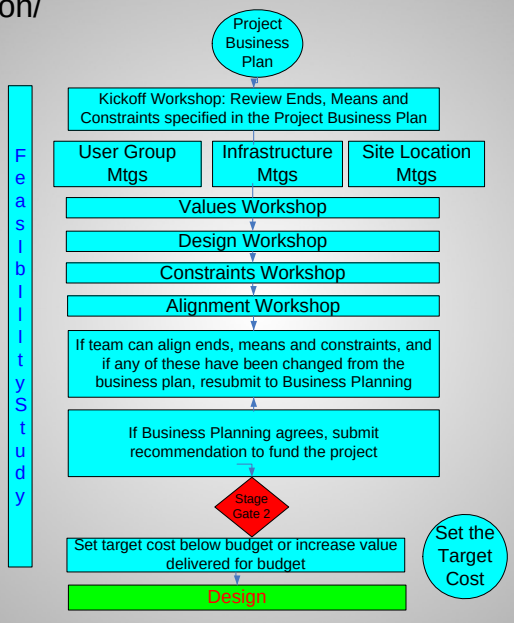
	St. Olaf College Fieldhouse	Carleton College Recreation Center
Completion Date	August 2002	April 2000
Project Duration	14 months	24 months
Gross Square Feet	114,000	85,414
Total Cost (incl. A/E & CM fees)	$11,716,836	$13,533,179
Cost per square foot	$102.79	$158.44



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**

Plan Validation/
Feasibility

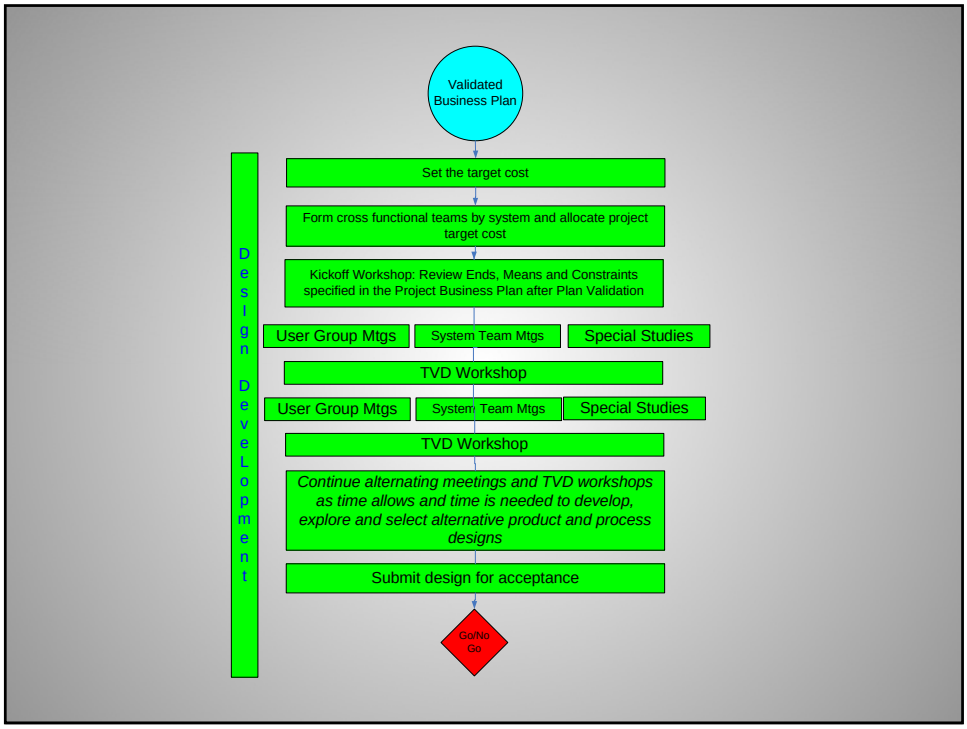


Business Planning

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

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**