Value Tools Applied to Everyday Problems

A Tutorial for the

Baltimore Section of the American Society for Quality

12 December 2005

Life Cycle ΛXEA Engineering Associates

Topics

- Concepts of Value
- Concepts of Cost
- Value Engineering Tools
- Pitfalls in Analysis

Wisdom Through the Ages

"give me a lever and a place to stand and I can move the world" ...Archimedes, 3d century BC

" to measure is to know." ....James Maxwell, 1871

"If you can't measure it…you can't manage it."

.... ???, ???

" I can measure anything... or derive a reasonable value for it" ...???, 17 September 2001

Goals of this Session

- Give examples of how to begin the value analysis process using everyday examples
- Show that imagination must compliment data in arriving at product/service valuations
- Perceptions must also be quantified and normalized to tangible values
- Identify some of the pitfalls in valuations

What is Value?

- A measure of appropriate cost and performance
  - value always increases by decreasing cost
  - value increases by increasing performance

  [if Customer needs, wants & is willing to pay for]
- Maximum Value is never achieved

Value in 'Qualitative' Terms

- Simply:

$$\textbf{Value} = \frac{\text{What is received [benefit]}}{\text{What is paid [cost]}}$$

- More detailed:

$$\text{Value} = \frac{\text{Actual Benefit + Perceived Benefit}}{\text{Price+ Inconvenience + Perceived Cost}}$$

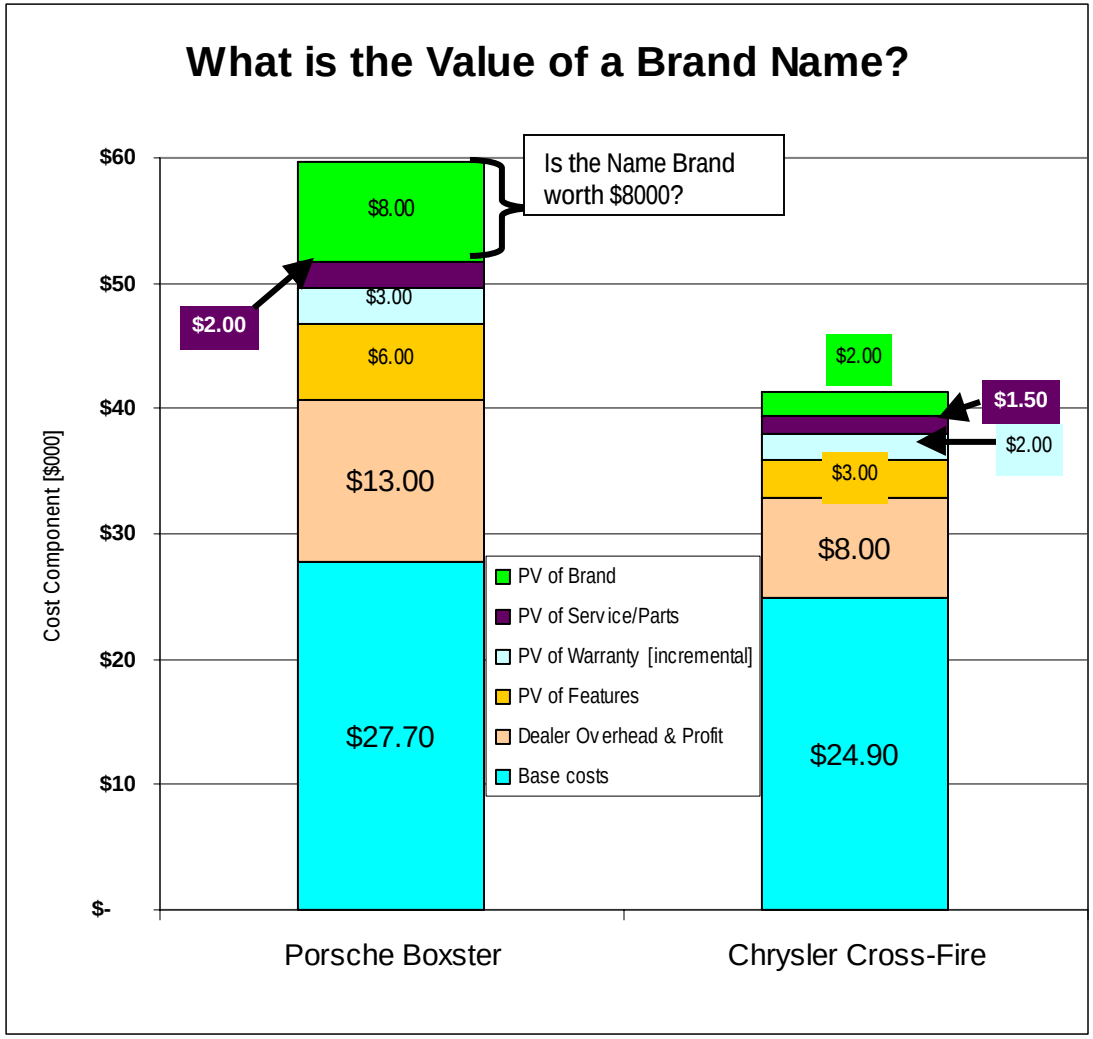
Finding Data on Value

- Sources
  - survey data
  - focus groups
  - Comparison shopping
    - market research companies
    - includes market share, income/expenses, product cost
- More on surveys
  - structured to get results
  - ask how much you would pay for the feature of service
  - ask about compensation expected if needs aren't met

Sample Survey Questions

- Question is designed to get more information about what customers would pay for reliable appliances:
  - given the inconvenience of getting warranty work done, would you prefer not to have warranty work in the first place?
  - How much would you pay for this level of convenience?
    - < $10
    - $11-$50
    - $51-$100
    - $101-$150
    - $151-$200
    - >$200

Concepts of Cost



How can we verify that the brand name is actually worth $8000?

- Surveys,
- focus groups
- comparison shopping

* PV = perceived value

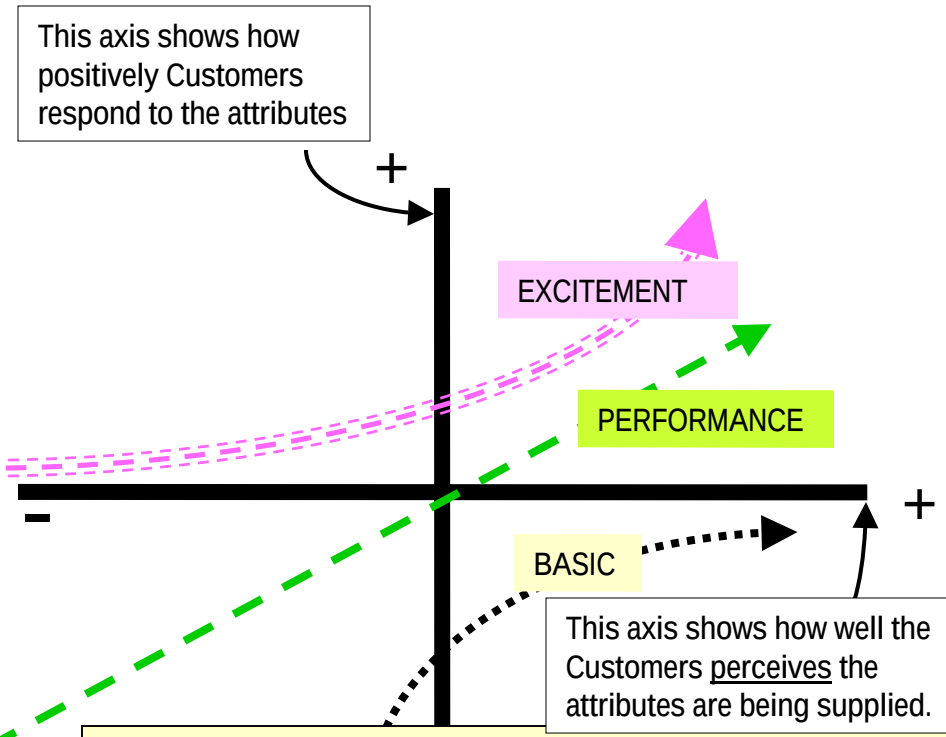
Value Engineering Tools

- Kano
- Value Analysis Matrix [VAM]
- Spider web chart
- Value stream map
- F.A.S.T. diagram

KANO Modeling: Finding "Breakthrough" Opportunities

Overview of the Model

Human response to product attributes falls along these three main curves. Suppliers of products/services need to know how to react to these attributes



EXCITEMENT curve -

- "delights Customers"[even when not well executed]
- commands a price "premium"; advertise
- accumulate "profit" on these features as long as possible

PERFORMANCE curve -

- roughly a 1-to-1 relationship on how well a supplier delivers an attribute and future Customer loyalty
- strategy: advertise those that are done well; downplay others
- accumulate "profit" on these features as long as possible

BASIC curve -

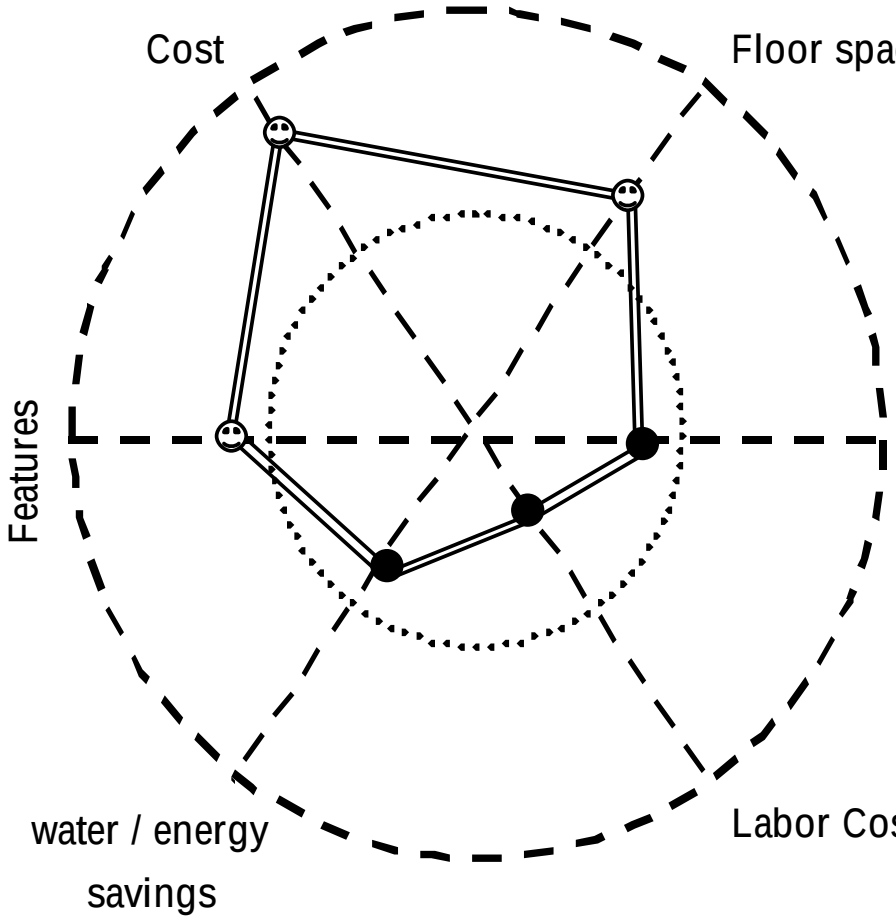
- must provide these attributes just to stay in the market.
- If poorly executed/delivered, will definitely lose the "offended" Customer, plus may lose others through poor 'word-of-mouth'
- strategy: don't waste money on advertising or sales force training, because cost would outweigh benefits; look at cost-effective quality improvement programs

Value Analysis Matrix [VAM]

variables	Offenslive Dimesnsions of Baseball	IMPORTANCE	How well does this measure success of dimensions? On-base %	Batting Average	Slugging %	sacrifice bunts	sacrifices flies	Stolen Base	RBI	Strikeouts at the plate	% contribution to winning
b	getting on base	4	5	4	1	3		2	1	-3	0.775
a	Advancing the runner	5	1	4	3	3	3		3		0.812
s	speed on the basepath	3	1	0.5	1	4		5			0.425
cl	Clutch hitting	4	2	2.5	3	2	1		4		0.458
ch	Contact hitting	3	3	4	4	3			3		0.905
	average for the league		0.295	0.255	0.450	3	12	7	84	125	Sum of calc. Contri-
	95% tile		0.385	0.307	0.577	5	15	23	125	129	bution to success
	calculated contribution to success		32.6	44.7	32.9	38.4	14.0	12.6	30.8	(9.3)	**196.70**
	Ball Player's peformance		0.375	0.269	0.469	1	29	2	96	134	$ Value of Premium
	Value of HOW's($M)		1.66	2.27	1.67	1.95	0.71	0.64	1.56	(0.47)	Player
	relative performance of ball player		0.305	0.204	0.282	0	0.95	0	0.488	0	**$10 M**
	compenstation for performance[$M]		0.51	0.46	0.47	-	0.68	-	0.76	-	

TOTAL COMPENSATION $ 2,881,933 PER YEAR

Spider Web Chart



How much do the '☺' items outweigh the ' ● ' items?

═══ = typical competitive offering

HIGH CAPACITY WASHER DRYER

Value Stream Map [changing a tire]

TASK: After noting a flat tire while driving down the Interstate, safely & quickly change it [without outside help]

Step in the Operation	PRE-OPERATION CHECKS	BRING VEHICLE TO A STOP	JACK UP THE VEHICLE	REMOVE WHEEL	MOUNT THE SPARE	DRIVE OFF & RETURN TO HIGHWAY

BRING VEHICLE TO A STOP

Critical Success Factors [CSF]	Look and signal to get over to right shoulder		get as far to right on shoulder as possible		avoid loose gravel and slanted surface		turn on flashers		Put out flares	
Time [min] not to exceed	0.5		0.5		1-5		0.1		5-10	
Safety *	3		2-3	**	1		1-3	**	1-3	**

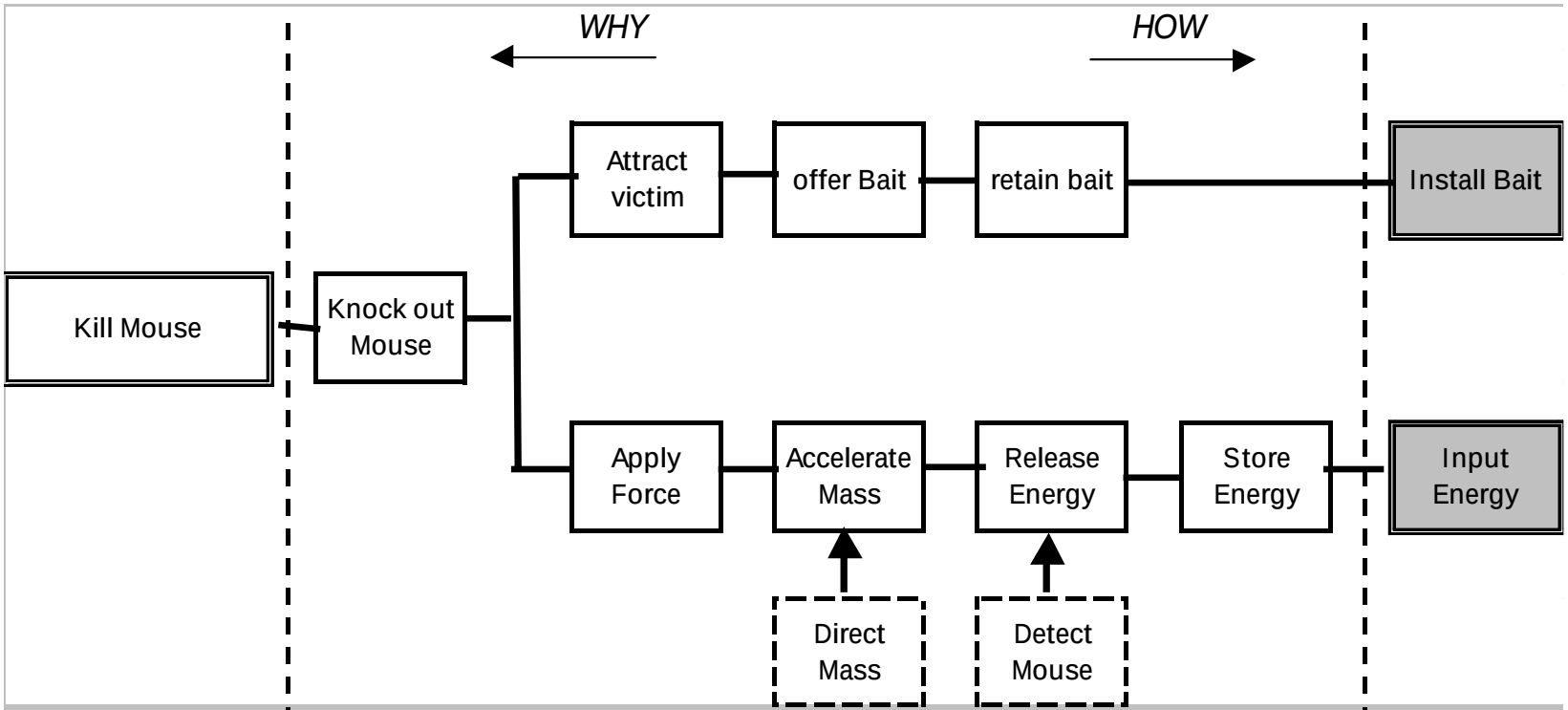
NOTES:

* If you don't perform the CSF, you risk

- 5 > very good chance of injury or death
- 4 1 in 5 chance of injury
- 3 <5% chance of injury; or > 50% chance of damage
- 2 >25% but < 50% chance of light damage; small chance of injury
- 1 <10% chance of light damage to equipment or small chance of injury
- <blank> no impact on safety

** **Depending on visibility**

F.A.S.T. Diagram [Mouse Trap]



Pitfalls [part 1]

Problem: Your clothes washer is dead and your dryer is > 20 years old.. You decide to replace both. Your spouse suggests that the new large capacity units may cost more up front, but will probably save money in the long run.

Facts: **1.** you do 5 loads a week; all on one day.

2 it takes 1 hour per load per wash or dry cycle
It takes 10 min between cycles to get to the laundry room, move clothes out of the dryer, between washer to dryer and

3 to put new load into the dryer.

4 New high capacity appliances can do 25% greater load for both washer and dryer

5 Assume the value of house work equals $ 10 /hour

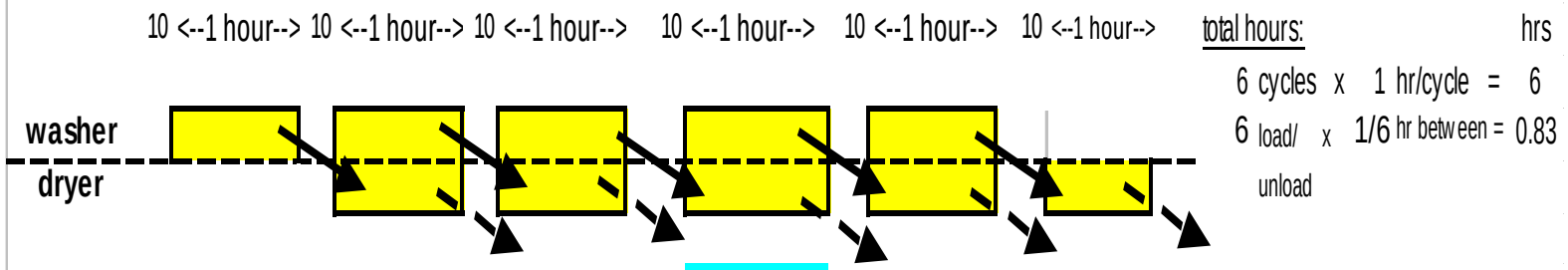
6 Cost of New High-Capacity Washer/Dryer = $ 2,000

7 Cost of New Lower Capacity Washer/Dryer = $ 750.00

Working the Problem:

1 Calculate today's costs to operate today's appliances

a. Assume the wash is done concurrently as shown below:



total hours: hrs

6 cycles x 1 hr/cycle = 6

6 load/ unload x 1/6 hr between = 0.83

b Cost to do a load = (6 + .83) hrs x $10/hr = $68.33

Pitfalls [part 2]

2 Calculate the cost of doing the wash with the newer high capacity washer:

a 25% more capacity means doing only 4 wash/dry cycles and 4 10 min gaps

b cost to do a week's load = (5+.67) hrs x $10/hr = 56.70

3 Difference in labor cost per week is: **($11.63 x 50 weeks** = $ 582 per year

4 Life Cycle cost over 10 years [including purchase price]

$20,875 for High Capacity Washer/Dryer

$23,621 for Lower Capacity Washer/Dryer

5 BUT!... other work can be done while the wash is being done and dried. Assume 75% of the time is doing other housework

ACTUAL SAVINGS IS $ 2.91 per week or $ 145 per year

Life Cycle cost over 10 years [including purchase price]

$6,608 for High Capacity Washer/Dryer

$6,426 for Lower Capacity Washer/Dryer

Life Cycle Cost for this scenario is $182 LESS for the lower capacity Washer/Dryer pair

Summary

- Much of Value is perceived
- One can always measure/calculate value
- Imagination is required in determining value
- Branding can add much to the bottom line
- Many ways of determining value; most are easy
- Be careful of the pitfalls

Other Examples

[not covered in the session]

Customer Feedback:

Survey Questions to Support KANO

- Questions should address
  - satisfaction
  - importance
- Provides numeric data
- Provides a status
- What else can be done with the data . . .

How important is price to you when you go on personal travel?

1----------2----------3----------4----------5

Not Very Important — Indifferent — Very Important

How satisfied were you with the price of your most recent personal airline travel?

1----------2----------3----------4----------5

Not Very Satisfied — Indifferent — Very Satisfied

How satisfied were you with the ticket price for the last air travel you did with one of our competitors?

1----------2----------3----------4----------5

Not Very Satisfied — Indifferent — Very Satisfied

Value Stream Map [housekeeping]

	strip rooms		make bed		clean bath		dust room		vacuum room		Honor bar		check closet		restock room		update status	TOTAL TIME	MAX End-to-End time
ONE PERSON																			
time [minutes]	2	1.5	6	1.5	15	1.5	6	1.5	4	1.5	5	1.5	3	1.5	7	1.5	6	66	66
probability for error	*0.0017%*		*0.013%*		*0.120%*		*0.013%*		*0.013%*		*0.350%*		*0.014%*		*0.210%*		*0.490%*	1.2%	

ALTERNATIVE (3 PERSON TEAM):

										TOTAL TIME	MAX End-to-End time
strip rooms		make bed		restock room		Honor bar					
2	1.5	**2**	1.5	**7**	1.5	**5**				20.5	20.5
		make bed		dust room		vacuum room		update status			
		2	1.5	**6**	1.5	**4**		3		18	
clean bath						check closet					
15					1.5	3				19.5	
probability for error	0.0017%	0.11%	0.0104%	0.15%	0.0117%	0.2%	0.01170%	0.013%	0.3430%	0.8911%	

assume: 10 min break per hour; 15 min for lunch; $8 per hour

Calculating # of rooms per shift

One Person concept	10	hrs per shift		
	1.10	hrs/room		
	1.58	break plus lunch		
	7.7	rooms per shift		
	10.0	Maids needed to do	80	Rooms
		$673.33 labor cost		
3 Person concept	10	hrs per shift		
	0.34	hrs/room		
	1.58	break plus lunch		
	25	rooms per shift		
	3.0	Teams needed to do	80	Rooms
		$571.51 labor cost		

RESULTS	1 Person Concept	3 Person Team		% Improved
Time to clean Single Room	66	20.5	min. MAX	**68.9%**
Labor Cost	$673.33	$571.51	per day	**15.1%**
Quality Improvement	1.225%	0.891%		**27.2%**

Cost of Losing Customers

	INITIAL CONTACT		LEADS			TO QUALIFY		SEND PROPOSAL		CLOSE THE DEAL	
Type of Prospect Contact	#	$ per	# generated	% revisit	$ per	# to qualify	$ per	# Qualified	$ per	WINS	COST TO FINALIZE
Cold Calls	1000	$ 5	3	50%	$ 2,200	2.5	$ 1,200	2	$ 7,500		
Advertising Campaign	1	$ 500,000	5	75%	$ 2,200	3	$ 1,000	2	$ 7,500	1.5	$ 11,000
referrals	5	$ 75	2	25%	$ 2,200	1.5	$ 750	1	$ 7,500		
trade show	1	$ 225,000	15	30%	$ 2,200	1	$ 550	3	$ 7,500		
Cost per Phase		$ 730,375			$ 22,550		$ 7,675		$ 60,000		$ 16,500

TOTAL COST	$ 837,100

For more information, contact...

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