Function Analysis and the Functional Performance Specification to Define Clients' Needs and Develop the Best Value

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AGENDA

- Introduction
- What are Value Engineering and Function analysis?
- How is it done?
- What is a FPS?
- Why use this?
- Conclusion
- Question period

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WHO AM I?

- Industrial engineer, over 30 years experience
- 25 years in Value Engineering
- Certified Value Specialist (CVS)
- Business owner for 15 years
- Clients in:
  - Construction: mining, infrastructures
  - Manufacturing: discreet or process
  - Government
- Past president of CSVA
- Current VP communications
- President of the conference committee
- Member of SAVE International
- Certified Trainer in VE/VM
- Frequent Speaker

DEFINITION OF VALUE

$$\text{Value} = \frac{\text{Satisfaction of needs}}{\text{Cost (resources)}}$$

VALUE ENGINEERING JOB PLAN

- Pre-workshop activities
  - What is the goal of the VE session and why?
  - Who will participate?
- Workshop activities
  - Information
  - Function and cost analysis
  - Creativity and evaluation
  - Development of Value proposals
  - Presentation of Value proposals
- Post-Workshop activities
  - Implement best proposals
  - Follow up

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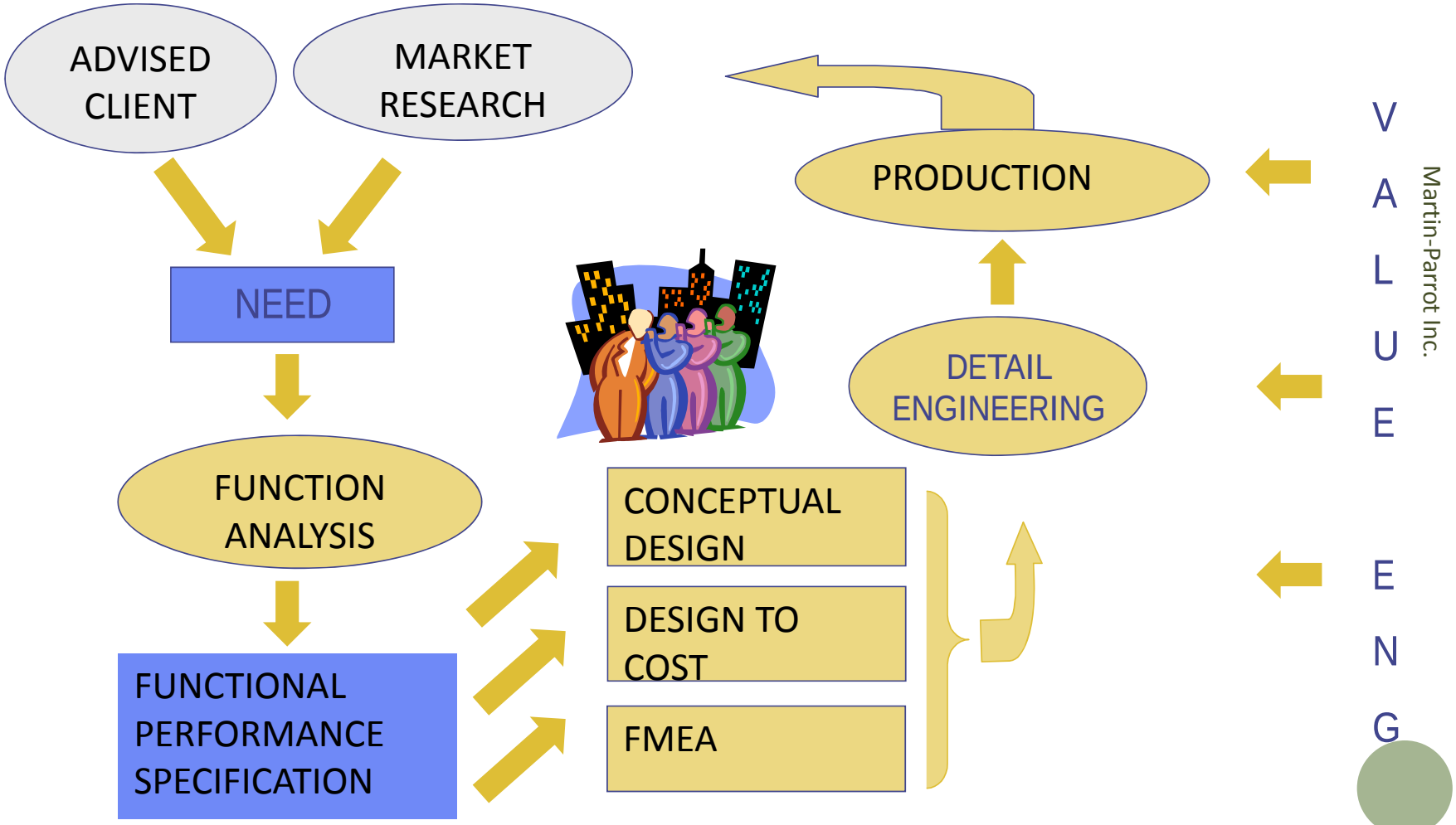
DESIGN STRATEGY



FUNCTION ANALYSIS

- Identify functions
- Organize functions
- Characterize functions
- Prioritize functions
- Estimate the cost of functions

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WHAT ARE FUNCTIONS?

- Functions describe **needs**
- Functions describe what must be done to fulfill the user's needs
- Functions do not describe solutions or deliverables
- Active verb and measurable noun

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FUNCTIONS FOR...

- the users
- the installer
- recycling
- marketing
- assembly/manufacturing

6 METHODS TO IDENTIFY FUNCTIONS

- Intuitive research
- Environment analysis
- Sequential analysis
- Reference product analysis
- Efforts and movement analysis
- Rules and regulations analysis

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EXAMPLE: METRO DOORS

- Open/close door
- Prevent injuries
  - Detect obstruction
  - Prevent slamming
  - Announce closure
- Maintain door system
  - Download states and events
  - Remove door
- Isolate failed door (operations)

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ORGANIZING FUNCTIONS

Functional diagram:

- Logic diagram
- Why-How relation
- Model of what needs to be done
- Not a WBS
- No chronology (not a CPM)

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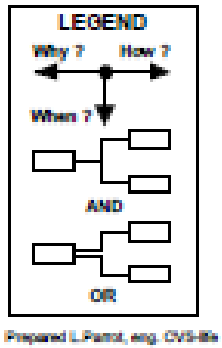
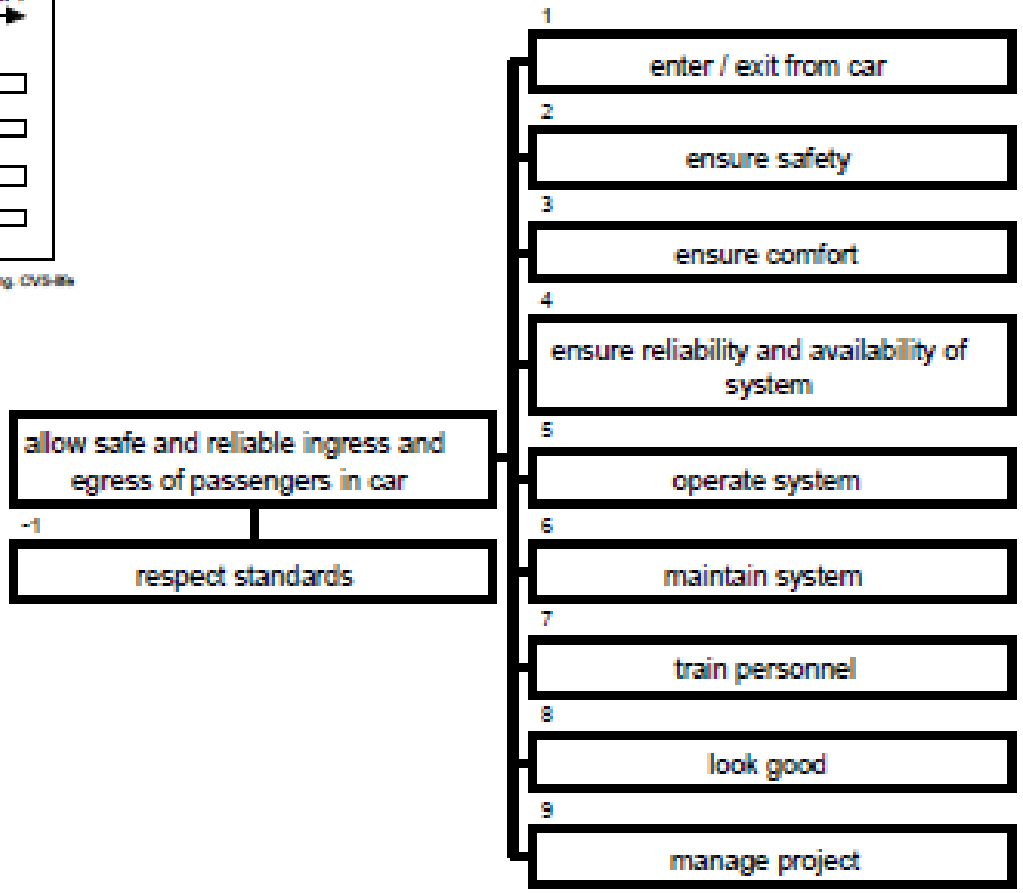
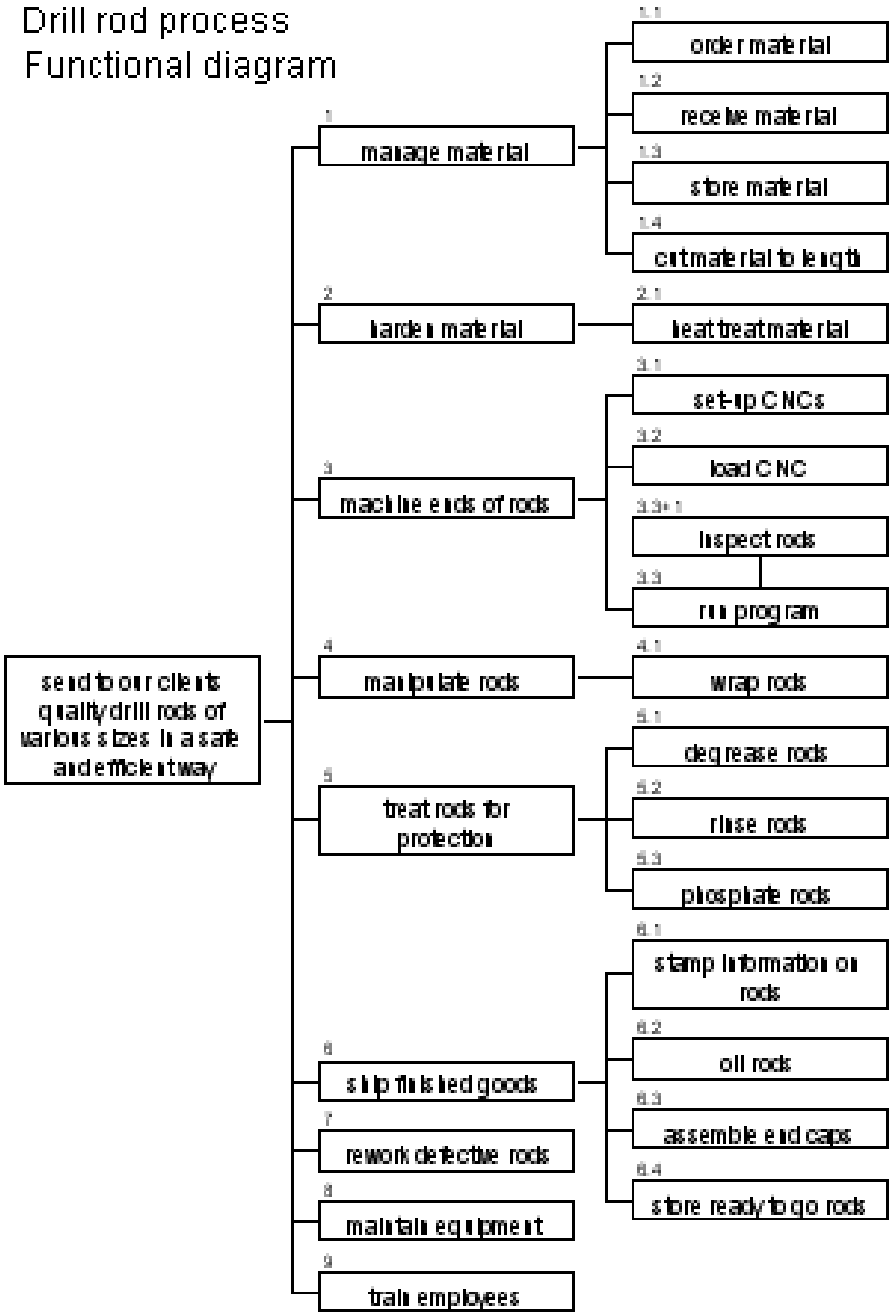
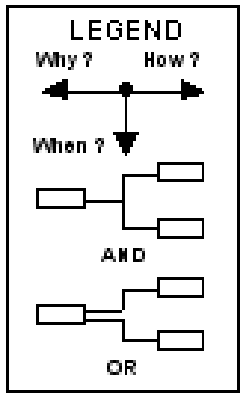
Function analysis - Door system





Drill rod process
Functional diagram





Prepared by Lucie Parrot, eng. CVS - Rev 1-Jan 28th

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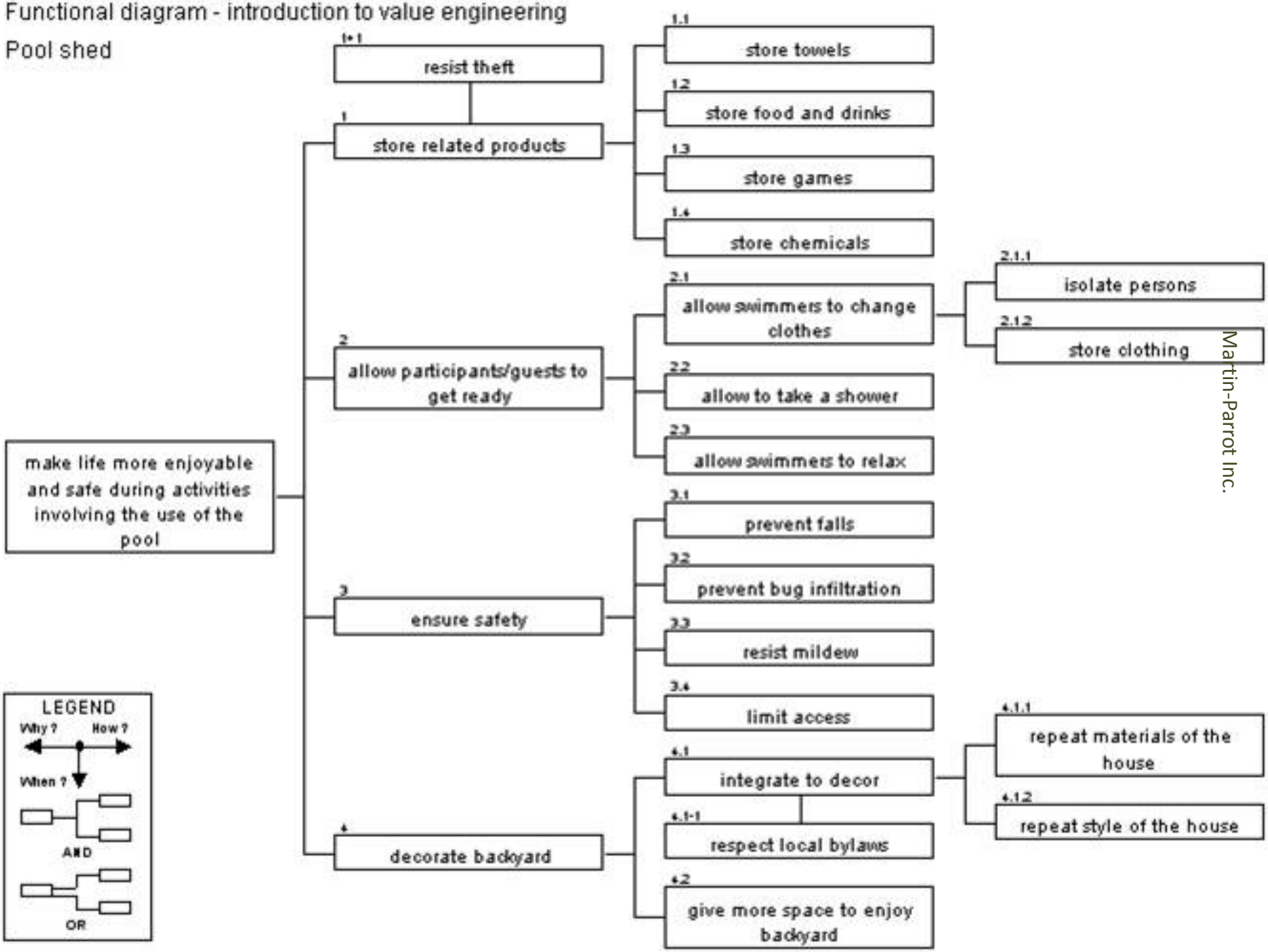
Functional diagram - introduction to value engineering

Pool shed



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CHARACTERIZING FUNCTIONS

- State performance criteria for each function (what will be measured)
- State performance level, expected to be achieved
- State the flexibility of the client – how negotiable the level is

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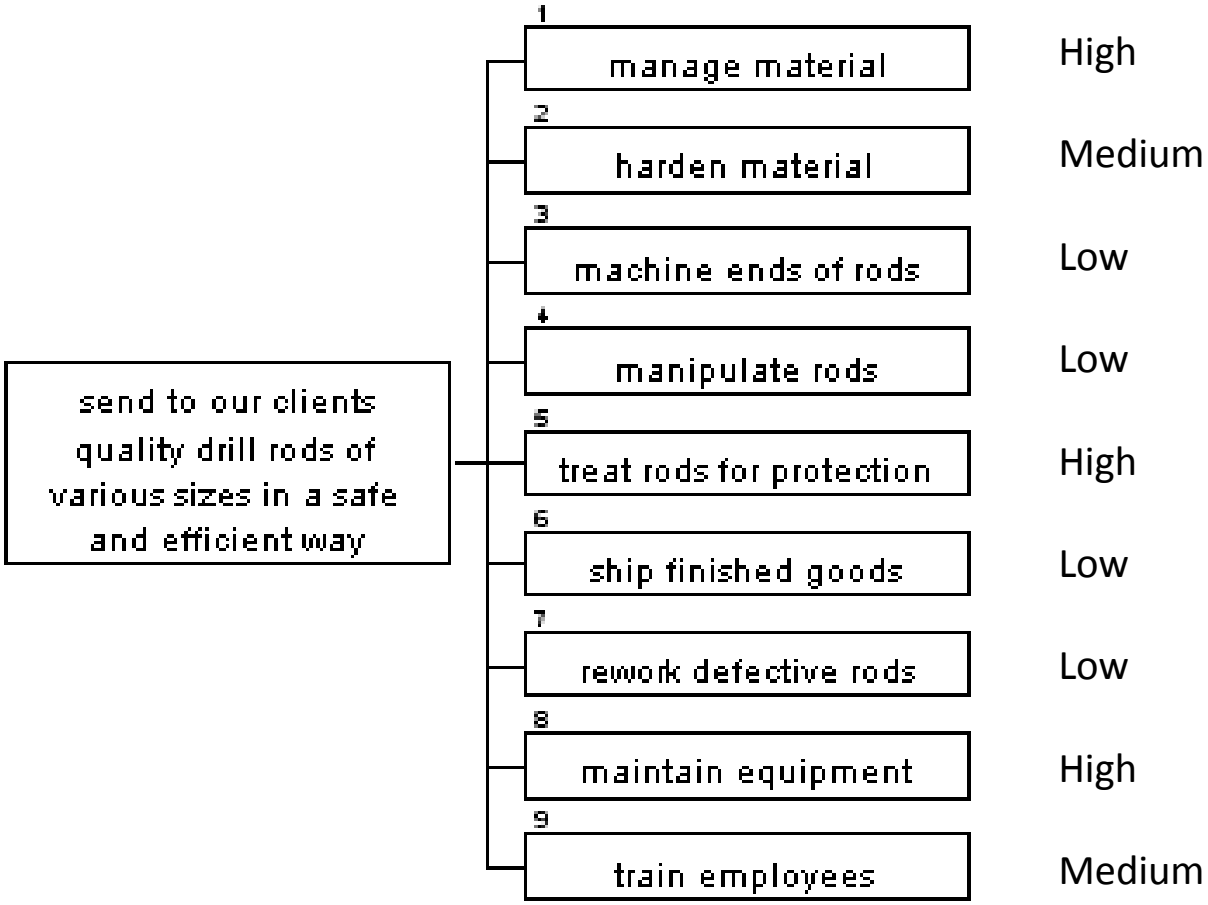
CHARACTERIZING FUNCTIONS

Function	Criteria	Level	Flex
Order material	Occurrence	On demand	F0
Receive material	Arrival rate	Twice a day	F0
Cut to length	Duration	3 hours	F2
Heat treat material	Duration	4 hours	F1
Set up machines	Duration	2 hours	F2
Load machines	Number of employees	2	F0
	Time	½ hour	F2
Run program	Supervision	none	F1
Wrap rods	Number of employees	2	F0
	Time	½ hour	F2

Functional performance specification - Pool shed

number	function	criteria	level	flex	comments
0	**make life more enjoyable and safe during activities involving the use of the pool**				
1	**store related products**				
1+1	resist theft				
1,1	store towels	number of clean towels number of dirty towels	8 8	F2	
1,2	store food and drinks	type of refrigerator storage space	bar 5 cu ft	F0 F1	open storage for dishes and glasses
1,3	store games	storage space access type of storage	18 cu ft large adjustable	F2 F0 F0	
1,4	store chemicals	linear ft of storage access to products	6 limited	F1 F0	
2	**allow participants/guests to get ready**				
2,1	allow swimmers to change clothes				
2.1.1	isolate persons	number of persons together	2	F1	
2.1.2	store clothing	organization	separated spaces	F2	
2,2	allow swimmers to take a shower	number of persons together	2	F1	could be outside cabana
3	**ensure safety**				
3,1	prevent falls	risk of fall with wet feet water accumulation	none none	F1 F0	
3,2	prevent bug infiltration	infiltration	none	F2	
3,3	resist mildew	mildew on inside walls	none	F1	
3,4	limit access				
4	**decorate backyard**				
4,1	integrate to decor	integration	pleasant	F1	
4.1-1	respect local bylaws				
4.1.1	repeat materials of the house	percent repetition	80%	F2	Brick, wood, cement…
4.1.2	repeat style of the house	number of architectural characteristics repeated	as much as possible	F1	roof shape, doors and windows

PRIORITIZING FUNCTIONS



Based on Level of IT involvement

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RESULTS

- You understand your client's business better
- You know what your project must deliver
- You can allocate resources accordingly

WHY USE FUNCTION ANALYSIS?

- ” Effective Use of Resources
- Mid-course Spec Changes Minimized
- Use of Disciplined Methodologies
- Tradeoffs Between Cost / Features / Performance
- “Voice of Customer” instead of “Voice of Engineer or Management

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What is a Functional Performance Specification?

Document by which a client
expresses his needs
in terms of functions and constraints.

It presents the results of the function analysis.

(European standards)

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FINDING THE BEST PROJECT

- Identify functions with their Criteria-Level-Flexibility
- Find all potential solutions to fulfill functions
- Select comparison/evaluation criteria
- Evaluate performance of each = level of satisfaction
- Estimate cost of each
- Plot Value Graph = level of satisfaction/cost

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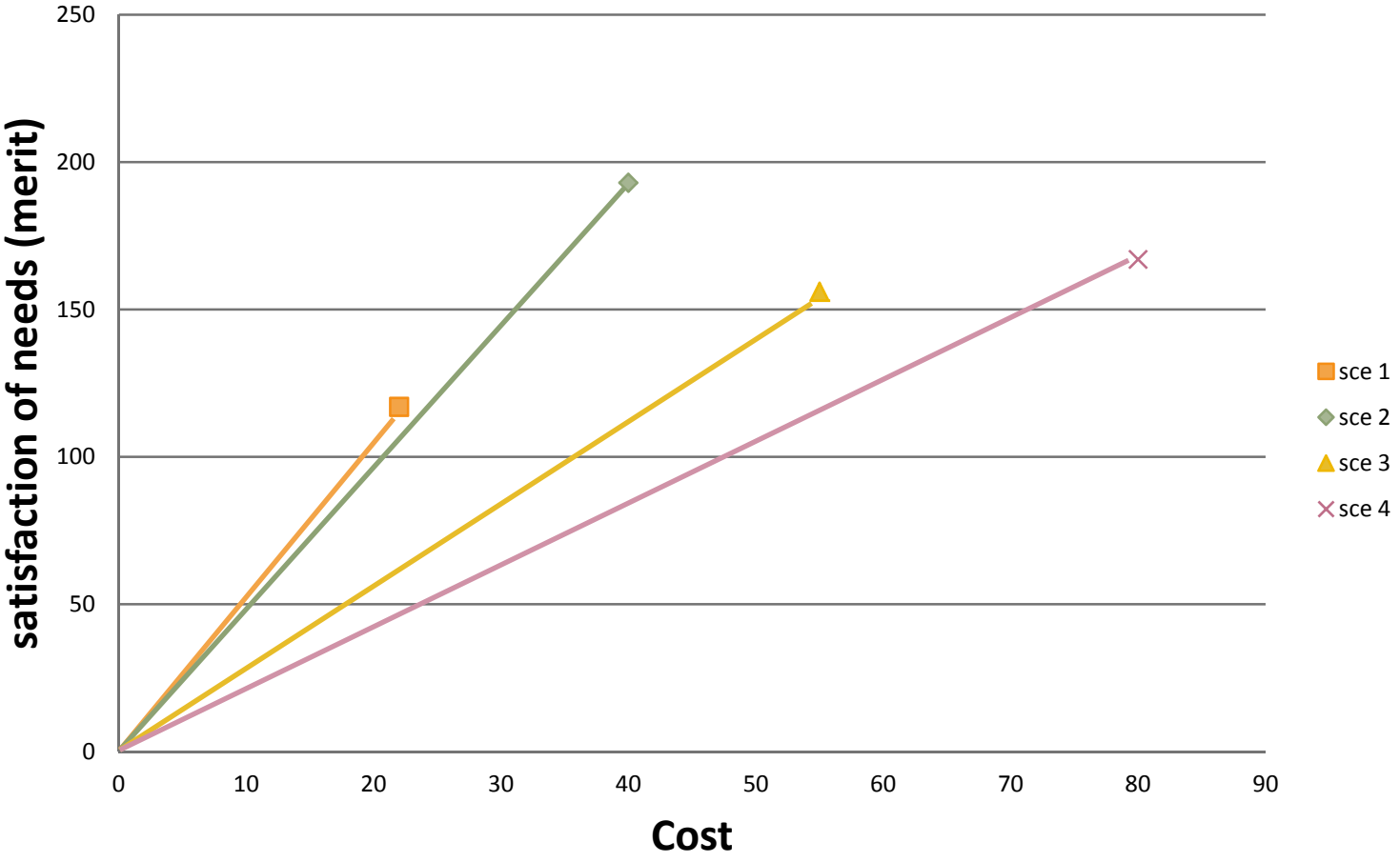
VALUE GRAPH



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CONCLUSION

- Function analysis helps identify better the clients' needs
- Results of a Function analysis study is documented in a Functional Performance Specification (FPS)
- It gives the designers more latitude to chose the best solution
- A value graph will help identify the solution with the most value

QUESTIONS?

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Thank you!