



BME 590: FUNDAMENTALS OF  
ENGINEERING DESIGN

# DECISION MAKING

*Salinas*

# AFTER BRAINSTORMING

teams can have upwards of 30-40 solutions

- team needs to narrow down selection to 1-2 good solutions for further testing
- scoring matrix structured method for evaluating ideas



# HOW TO CHOOSE?

You take the blue pill

THE STORY ENDS,  
YOU WAKE UP IN YOUR BED  
AND BELIEVE WHATEVER  
YOU WANT TO BELIEVE

You take the red pill

YOU STAY IN WONDERLAND,  
AND I SHOW YOU  
HOW DEEP THE  
RABBIT HOLE GOES.

# DECISION MATRICES ARE:



**STRUCTURED**



**EVALUATED  
RIGOROUSLY**



**INFORMED BY  
DATA**



**TRANSPARENT  
DOCUMENT**

# SCORING MATRICES

FOR A METHOD TO ELIMINATE IMPROPER SOLUTIONS AND SELECT 1-2 GOOD IDEAS



## DESIGN CRITERIA

- YOUR DESIGN CRITERIA WILL GUIDE YOUR ELIMINATION OF POSSIBLE SOLUTIONS
- EACH CRITERIA WILL NEED TO BE WEIGHTED FOR IMPORTANCE ("1" NORMAL, "2" IMPORTANT, "3" VERY IMPORTANT)
- USED AS MULTIPLIER



## ESTABLISH A STANDARD

- PUGH MATRIX TYPICALLY ON 1-5 SCALE WITH "3" BEING AVERAGE
- SCORE SOLUTIONS AS ABOVE OR BELOW A STANDARD

# SCORING MATRICES

FOR A METHOD TO ELIMINATE IMPROPER SOLUTIONS AND SELECT 1-2 GOOD IDEAS



## EVALUATE SOLUTIONS

- MOVE THROUGH CRITERIA BY CRITERIA
- EVALUATE AGAINST "AVERAGE" OF 3



## CHECK SCORING MATRIX

- CHECK YOU USED A RANGE OF 1-5
- CHECK YOU USED AN AVERAGE OF "3"



## SUM SCORES

- MULTIPLY WEIGHTED CRITERIA BY SCORE
- SUM VALUES FOR FINAL SCORE OF EACH SOLUTION

# EXAMPLE

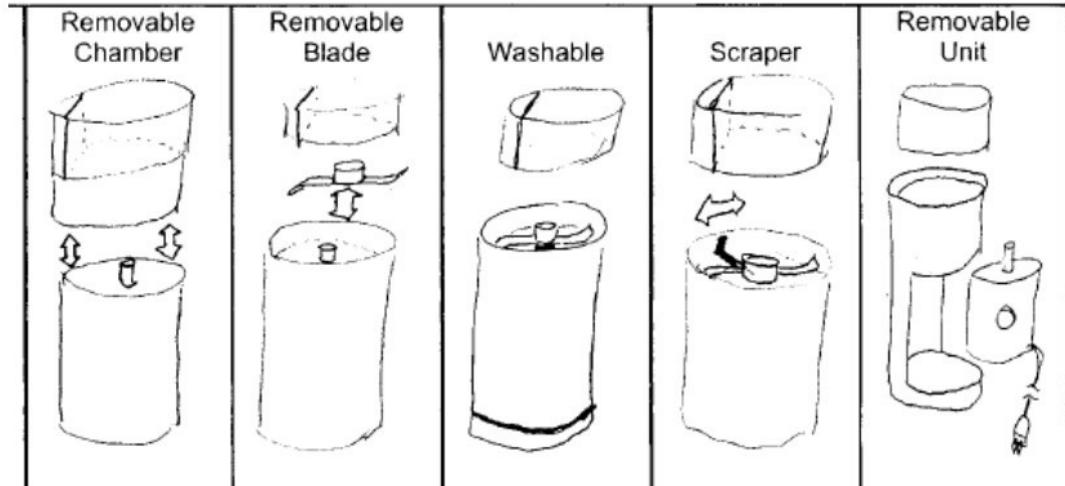
**PROBLEM NEED:** Improved coffee grinding mill

**DESIGN CRITERIA:** Cost, grinder storage, ease of putting beans in, ease of taking coffee out, ease of power setup, cleanable,

# **STEP 1: LIST DESIGN CRITERIA & WEIGHT**

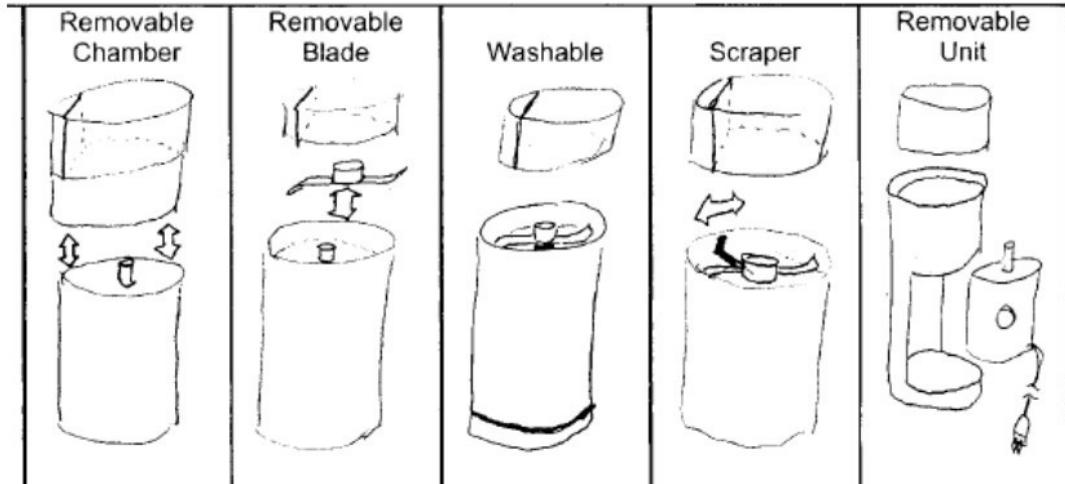
Criteria	Weight	Soln 1	Soln 2	Soln 3	Soln 4	Soln 5
Cost	2					
Storage	2					
Beans In	1					
Coffee Out	2					
Power	1					
Cleanable	3					
<b>SUM</b>						

## STEP 2: LIST SOLUTION IDEAS



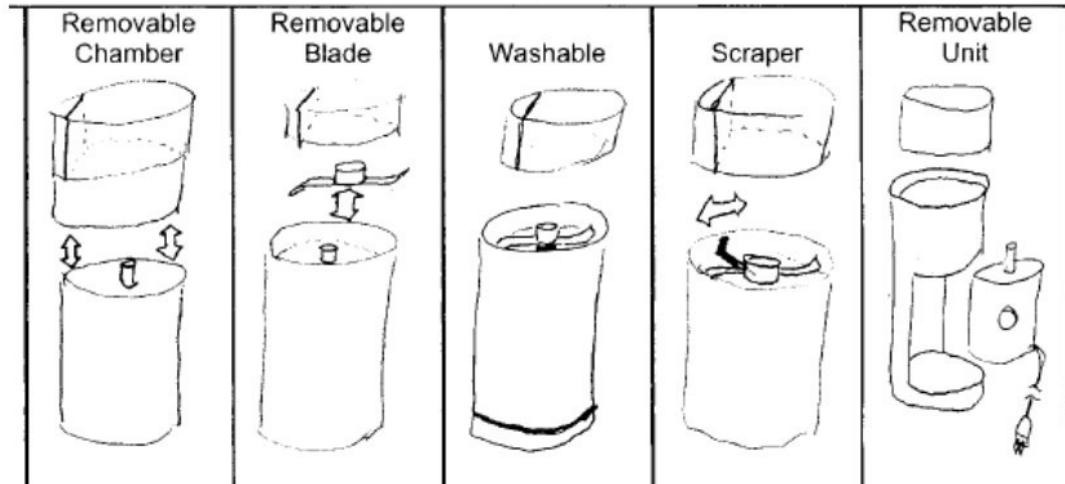
Criteria	Weight	Soln 1	Soln 2	Soln 3	Soln 4	Soln 5
Cost	2					
Storage	2					
Beans In	1					
Coffee Out	2					
Power	1					
Cleanable	3					
<b>SUM</b>						

## STEP 3: SET STANDARD



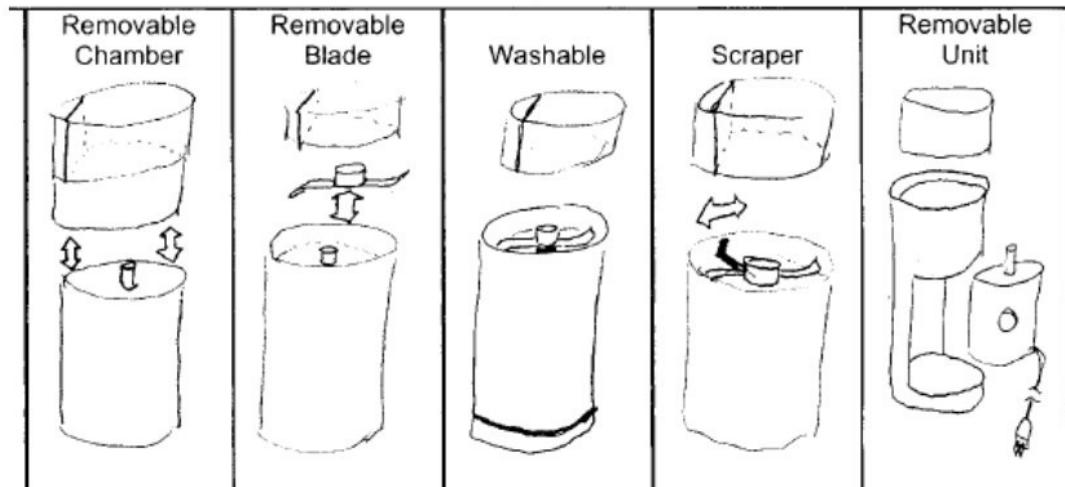
Criteria	Weight	Soln 1	Soln 2	Soln 3	Soln 4	Soln 5
Cost	2	3				
Storage	2	3				
Beans In	1	3				
Coffee Out	2	3				
Power	1	3				
Cleanable	3	3				
<b>SUM</b>						

## STEP 4: EVALUATE SOLUTIONS

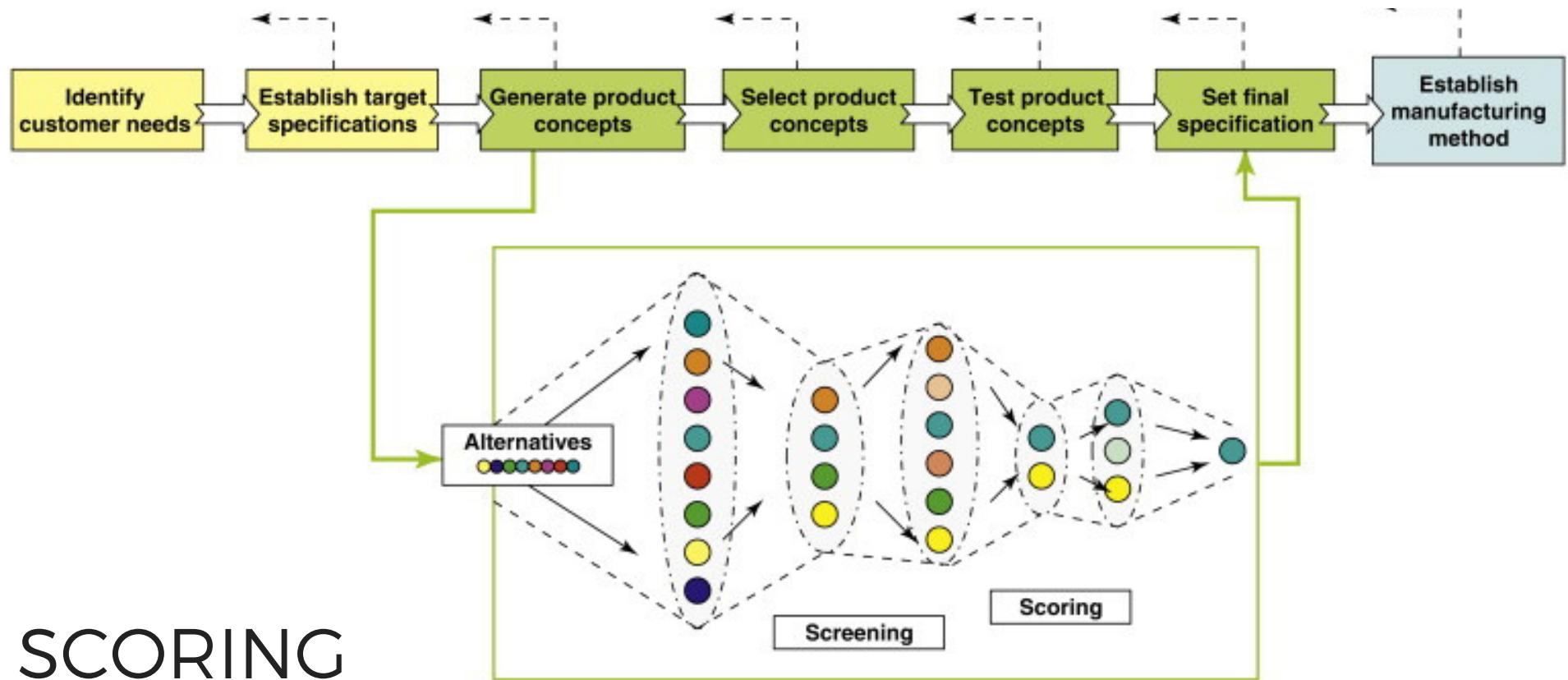


Criteria	Weight	Soln 1	Soln 2	Soln 3	Soln 4	Soln 5
Cost	2	3	4	1	5	3
Storage	2	3	4	5	4	3
Beans In	1	3	3	1	2	3
Coffee Out	2	3	2	2	2	2
Power	1	3	3	3	3	3
Cleanable	3	3	5	3	2	3
<b>SUM</b>						

## STEP 5: SUM THE SCORES



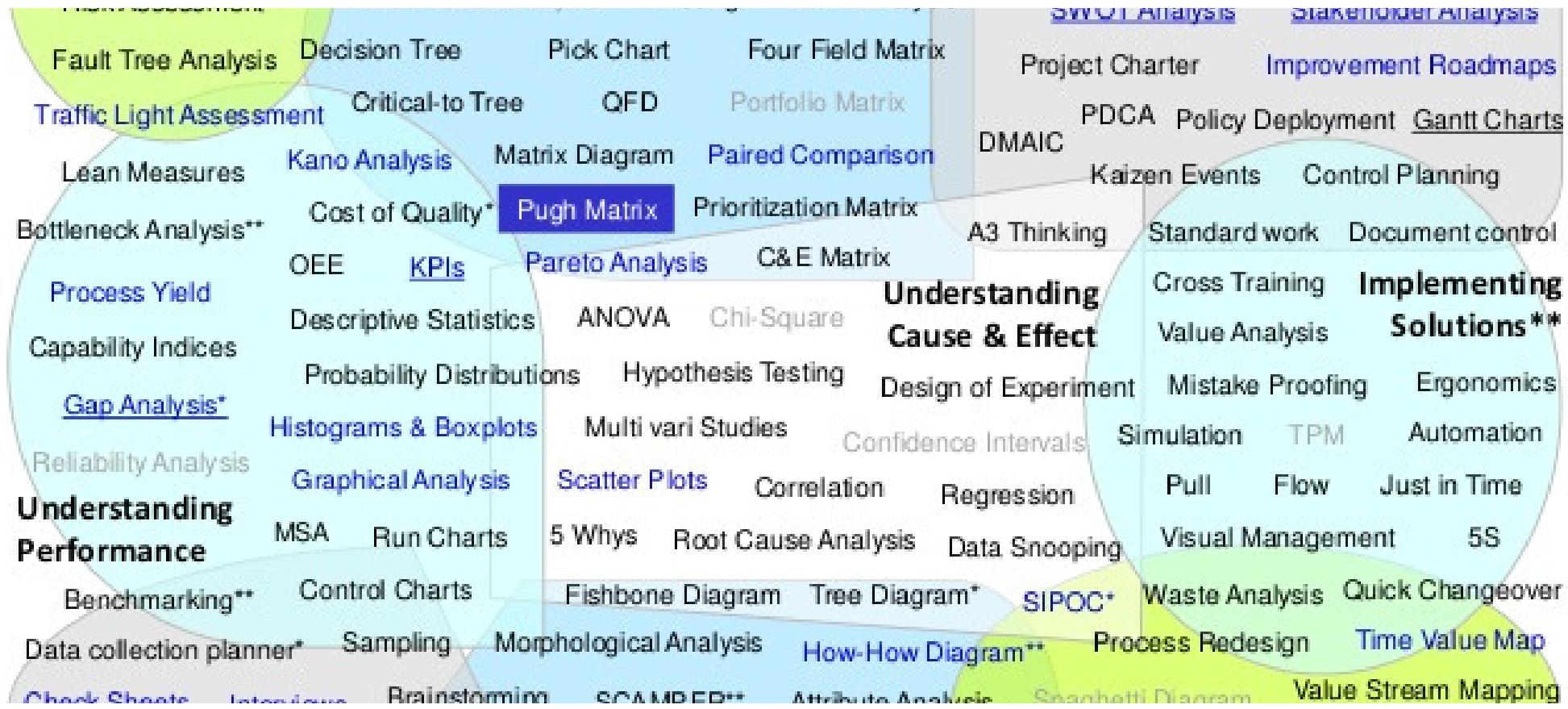
Criteria	Weight	Soln 1	Soln 2	Soln 3	Soln 4	Soln 5
Cost	2	3	4	1	5	3
Storage	2	3	4	5	4	3
Beans In	1	3	3	1	2	3
Coffee Out	2	3	2	2	2	2
Power	1	3	3	3	3	3
Cleanable	3	3	5	3	2	3
<b>SUM</b>		<b>33</b>	<b>41</b>	<b>29</b>	<b>33</b>	<b>31</b>



## SCORING

- highest scores are top solutions
- similar scored solutions can be reevaluated
- consider feasibility of solution and combination of ideas

## DECISION MAKING



\*Goal of decision making is not to select best solution but to develop best solution