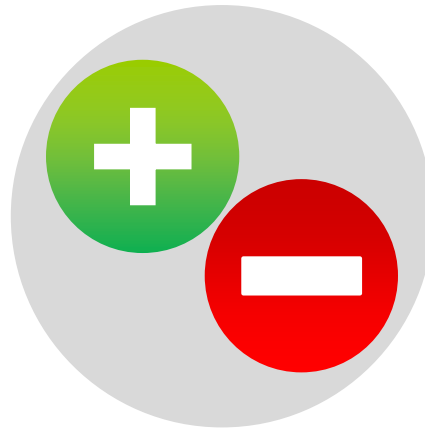


Continuous Improvement Toolkit

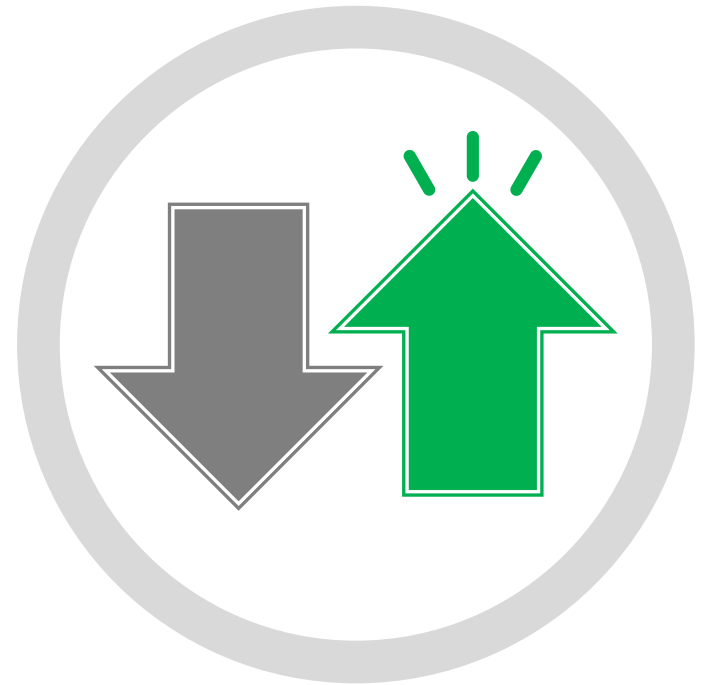
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A decision method used to **compare** and **select** the best option from a set of alternatives.

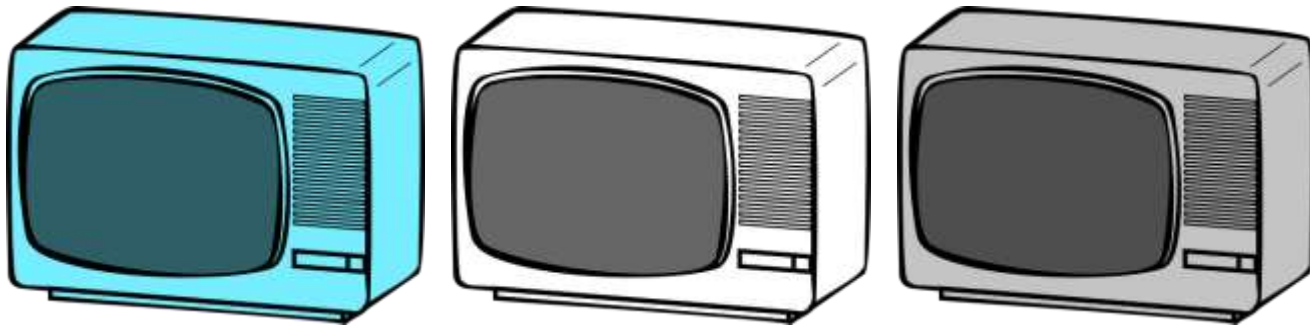
A qualitative technique that is used to determine which alternative is more valuable than the others based on predefined criteria.



A form of prioritization matrix

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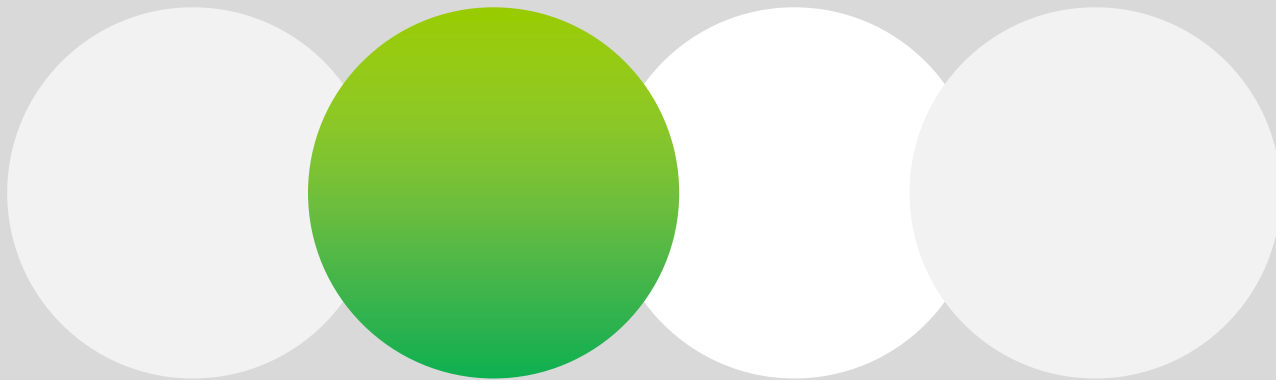
It allows for example to compare multiple design concepts versus a **baseline design** using customer requirements as the criteria for comparison.



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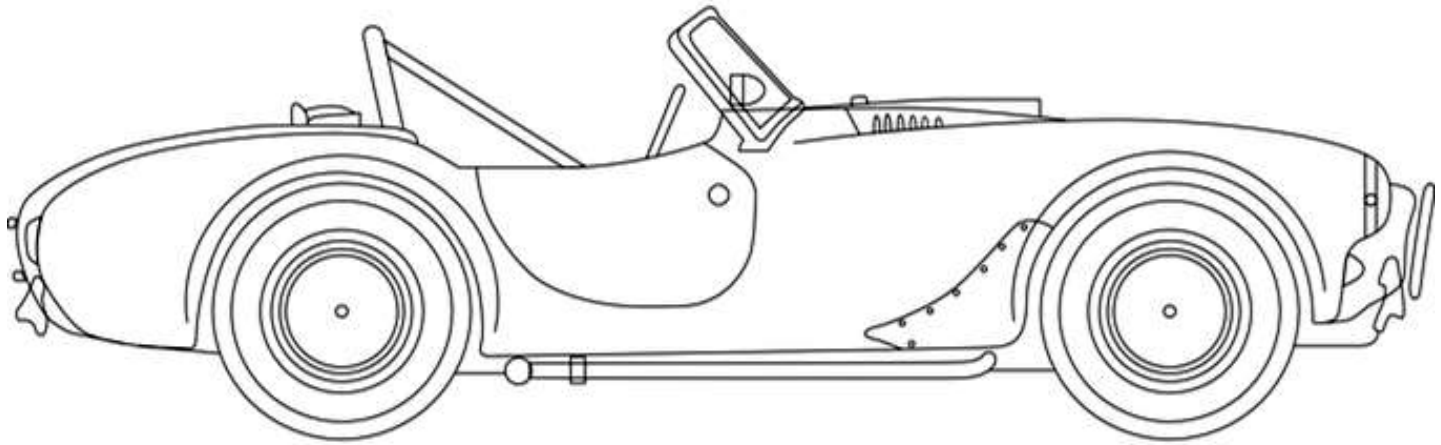
In a Pugh matrix, the candidate alternatives are compared against a reference or **standard** which might be . . .

- ▶ The **current solution** that already exists.
- ▶ A goal or benchmark to be reached in the future.



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Often used by engineers when making **design** decisions during the product development cycle.



Which product design proposal best matches customer needs and other organizational goals?

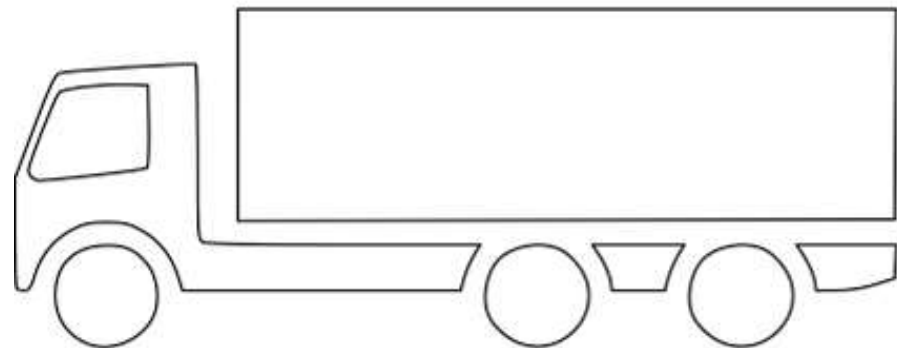
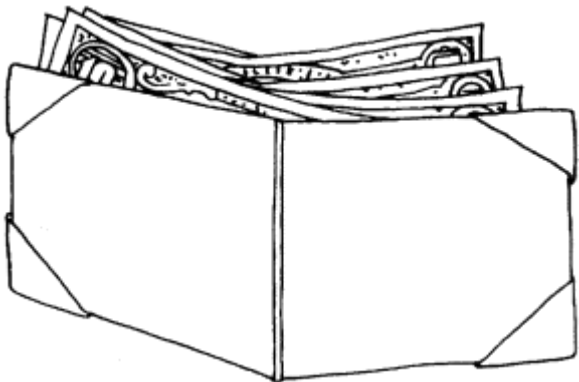
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Other uses . . .

Deciding which **investment** to take

Deciding which **vendor** to select

Deciding which **improvement project** to initiate



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Other uses . . .

When improving or redesigning processes to select the solution that will achieve the best performance results.



Which improvement option best matches customer and organizational goals?

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BENEFITS

Helps making more informed and justifiable decisions



Subjective opinions about one alternative versus can be made more objective



Does not require a great amount of quantitative data



Allows the team to agree on priorities and move toward the action collectively

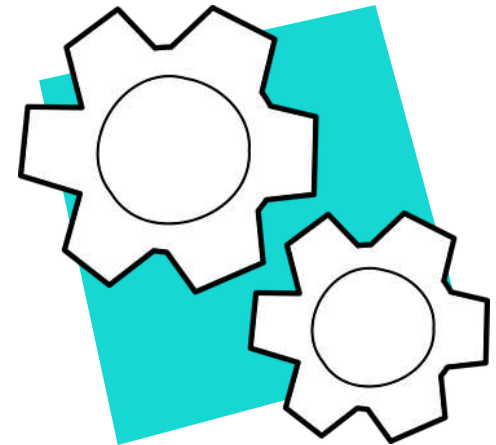


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Evaluation Criteria

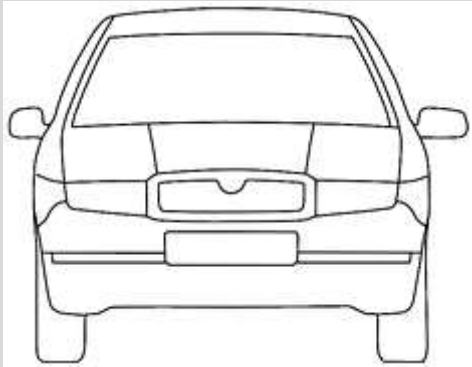
Represent defined **standards** by which the different alternatives can be measured and compared.

Developing a **list of criteria** is the first step before evaluating the candidate alternatives.

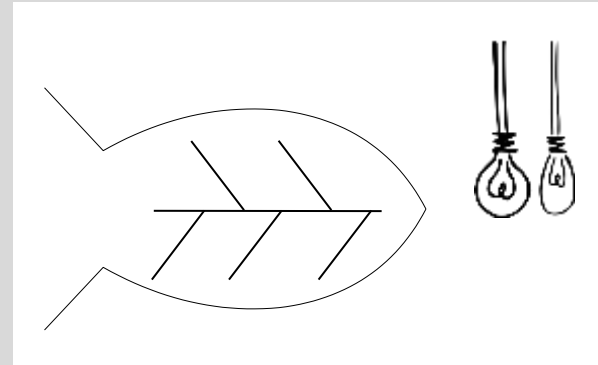


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Evaluation Criteria



For **product design**,
consider customer
requirements to develop
the evaluation criteria



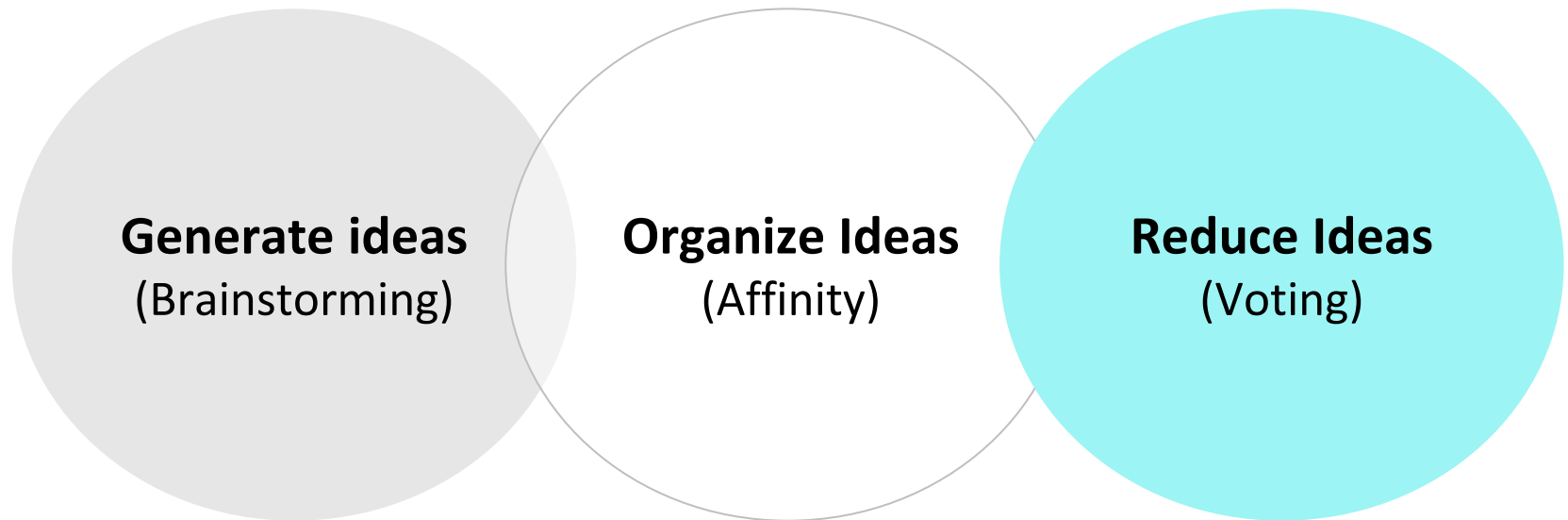
For **process design**,
consider the voice of the
customer to develop the
evaluation criteria

Should be easily measured and relevant to the situation

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Evaluation Criteria

How to develop evaluation criteria?

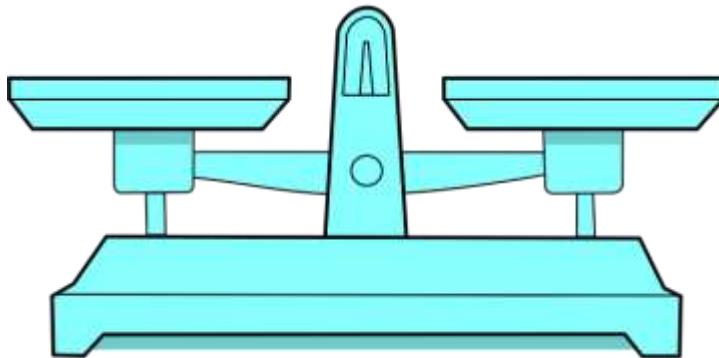


An evaluation criteria development **session**

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Evaluation Criteria

- ▶ Each criteria item can optionally be given a **weight value** to indicate its importance as perceived by the team and other stakeholders.
- ▶ These weights can be set by a group of experts or by the team.



*The more important
the criteria, the higher
the weight it can be
given*

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Baseline Solution

Criteria	Weight	Baseline	1	2
			Score	
			Rank	

The baseline solution is
always set to **Zero**

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Comparing and Scoring

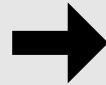
Criteria	Weight	Baseline	1	2
1	1	0	+	-
2	3	0	-	-
3	1	0	+	+
4	5	0	0	+
Score				
Rank				

Indicate how the baseline solution is **compared with** each of the candidate alternatives by placing a plus, minus, or zero

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Comparing and Scoring

For each candidate alternative, determine whether it is better, same or worse than the baseline.



Better than baseline



Worse than baseline



About the same

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Final Scoring

The **final scores** can be obtained by adding up the weighted scores for each candidate alternative.

Criteria	Weight	Baseline	1	2	3	4
1	1	0	+	-	+	0
2	3	0	-	-	0	-
3	1	0	+	+	+	0
4	5	0	0	+	+	-
		Score				
		Rank				

Typically, the best alternative is the one with the most pluses and the fewest minuses

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How to Construct and Use the Pugh Matrix?

A Pugh matrix exercise is best when it is conducted in team.

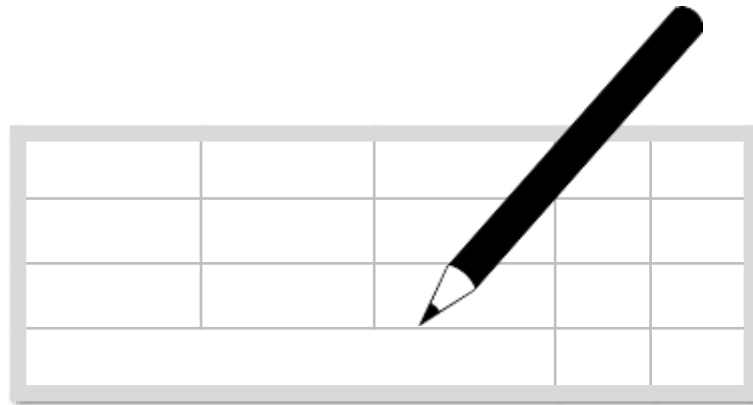
It is important to include people with **enough knowledge** of the situation to avoid missing any critical point.



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How to Construct and Use the Pugh Matrix?

1. With your team, clearly explain the **purpose** for constructing the Pugh matrix.
2. Prepare the list of candidate **alternatives** and Identify the relevant evaluation **criteria**.

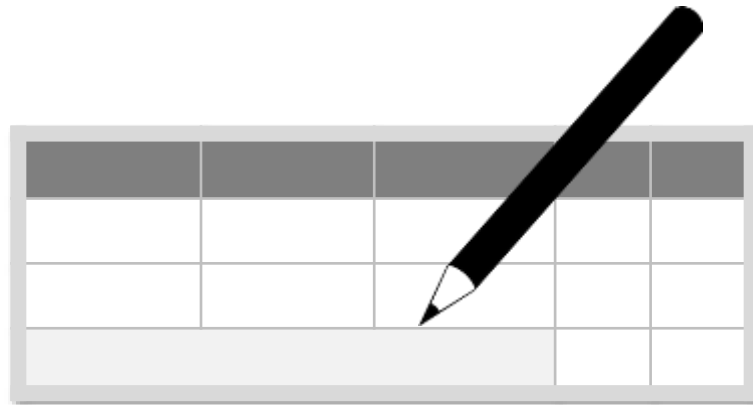


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How to Construct and Use the Pugh Matrix?

3. Draw a table, then place the evaluation criteria in the left-hand column and the candidate alternatives in the top row.

4. Select a **baseline solution** or benchmark to be used as the standard for comparison.

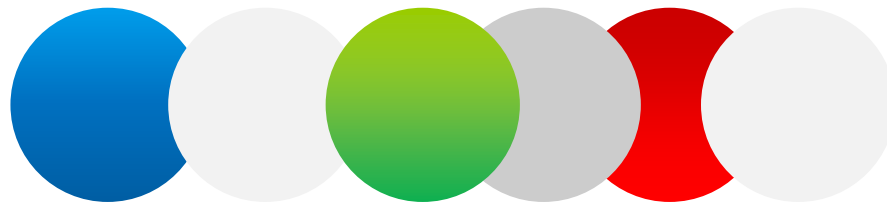


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How to Construct and Use the Pugh Matrix?

5. Ask the team to indicate how the baseline solution is compared with each of the alternatives by placing a plus, minus, or zero.

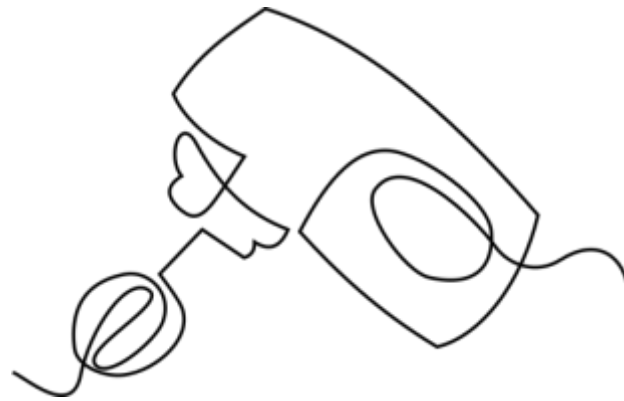
6. Notice the highest score solutions, the one with the most pluses and the fewest minuses.



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How to Construct and Use the Pugh Matrix?

7. Look for opportunities to **combine** the best aspects of different solutions.



An **ideal solution** can be developed by mixing the positive aspects from multiple options

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Example – Concept selection from among three alternatives.

Criteria	Alternative 1	Alternative 2	Alternative 3	Baseline	Weight
Safe	-	-	0	0	
Durable	+	0	-	0	
Weight	-	-	+	0	
Easy to assemble	+	0	-	0	
Reliable	-	-	-	0	
Cost	+	0	+	0	
NET SCORE	0	-3	-1		
RANK	1	3	2		
CONTINUE?	Yes	No	No		

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Example – Concept selection from among three alternatives – Weighting Factor Applied

Criteria	Alternative 1	Alternative 2	Alternative 3	Baseline	Weight
Safe	-1	-1	0	0	1
Durable	+2	0	-2	0	2
Weight	-1	-1	+1	0	1
Easy to assemble	+2	0	-2	0	2
Reliable	-1	-1	-1	0	1
Cost	+3	0	+3	0	3
NET SCORE	+4	-3	-1		
RANK	1	3	2		
CONTINUE?	Yes	No	No		

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