


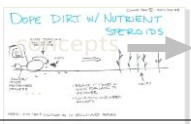
Decision Process

Convergent thinking ... Narrowing the # of ideas and making a selection

Discussion: During the design process or problem solving we need to apply convergent thinking to narrow our option to a selection. When we have many options and are not comparing any to an existing one, the best option is to create a decision matrix where we establish a set of judgment criteria down the Y axis and weight each to its importance to judge our possibilities.

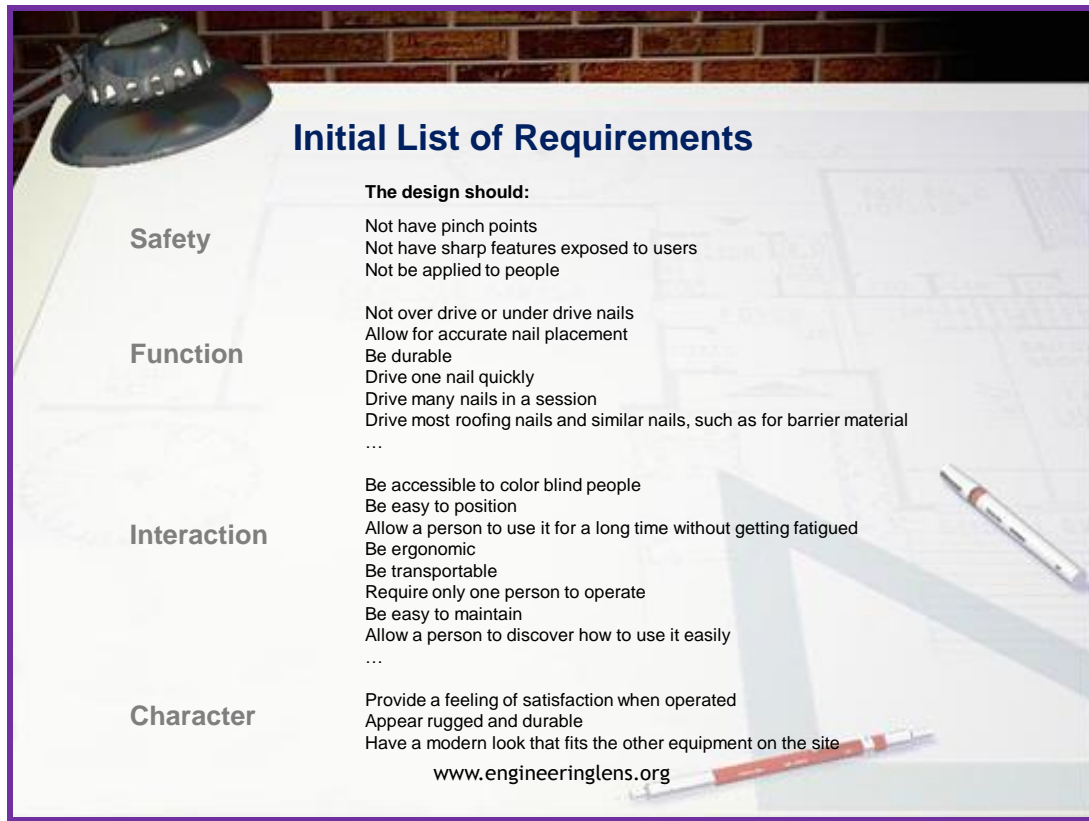
- If we are looking to compare our options against an existing choice, we can use the Pugh-method to compare against whether the criteria are better (+), less (-) or the same (S). this allows us to see where one is better but also what still are open items that can be improved.

For the items that we are going to judge one against another, we use a scale of 1-10 to rate them and then we multiple that number by the weight to get the total # for that cell.

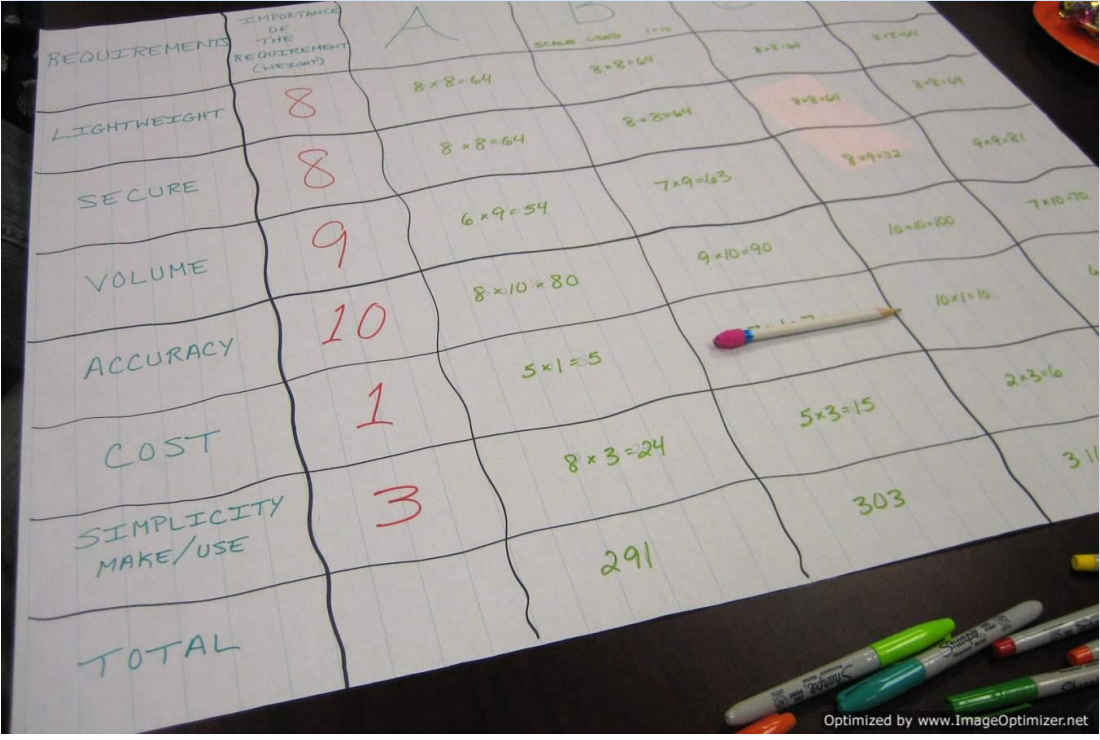
| Requirement | Weight |  |  |
|---------------|--------|---|--|
| environment | | | |
| simple | | | |
| low cost | | | |
| Total= | | | |

Requirements:

- Formalize what the design has to accomplish
- Safety, function, interaction, character
- “The design should...”
- Specify the need, not the solution:
 - Good: “provide space for a family of six to eat together”
 - Bad: “include a dining table in the middle of the room.”
- Science Constraints are requirements you impose on your students



Example:



A handwritten decision matrix on lined paper. The matrix has columns for requirements and their importance, and rows for requirements and their weights. The requirements are: LIGHTWEIGHT, SECURE, VOLUME, ACCURACY, COST, SIMPLICITY MAKE/USE, and TOTAL. The importance values are: 8, 8, 9, 10, 1, 3. The weights are: 8, 8, 6, 5, 8, 2. The matrix is filled with calculations: $8 \times 8 = 64$, $8 \times 8 = 64$, $6 \times 9 = 54$, $8 \times 10 = 80$, $5 \times 1 = 5$, $8 \times 3 = 24$, 291 , $8 \times 8 = 64$, $8 \times 8 = 64$, $7 \times 9 = 63$, $9 \times 10 = 90$, $5 \times 3 = 15$, 303 , $8 \times 8 = 64$, $8 \times 8 = 64$, $8 \times 9 = 72$, $10 \times 10 = 100$, $10 \times 10 = 100$, $2 \times 3 = 6$, $9 \times 9 = 81$, $7 \times 10 = 70$, $3 \times 11 = 33$. A pencil and several markers are visible on the paper.

| REQUIREMENTS | IMPORTANCE OF THE REQUIREMENT (WEIGHT) | A | B | C | D |
|---------------------|--|--------------------|--------------------|----------------------|----------------------|
| LIGHTWEIGHT | 8 | $8 \times 8 = 64$ | $8 \times 8 = 64$ | $8 \times 8 = 64$ | $8 \times 8 = 64$ |
| SECURE | 8 | $8 \times 8 = 64$ | $8 \times 8 = 64$ | $7 \times 9 = 63$ | $8 \times 9 = 72$ |
| VOLUME | 9 | $6 \times 9 = 54$ | $8 \times 10 = 80$ | $9 \times 10 = 90$ | $10 \times 10 = 100$ |
| ACCURACY | 10 | $8 \times 10 = 80$ | $5 \times 1 = 5$ | $10 \times 10 = 100$ | $7 \times 10 = 70$ |
| COST | 1 | $5 \times 1 = 5$ | $8 \times 3 = 24$ | $5 \times 3 = 15$ | $2 \times 3 = 6$ |
| SIMPLICITY MAKE/USE | 3 | $8 \times 3 = 24$ | 291 | 303 | $3 \times 11 = 33$ |
| TOTAL | | | | | |