

prodriVE

PERFORMANCE | UNLIMITED

Product Development

STEVE PRICE  
ADVANCED TECHNOLOGY

**prodriue**

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## Your Idea, your baby

- Invested time and effort into idea
- Emotional attachment
- Product development will involve you taking logical decisions around your invention
- It will feel personal at times: people will criticise your product
- It may change you
- You may end up not liking what you're doing
- Still want to carry on?



## Problem statement

- What is the problem to which your product is the solution?
- Why are you developing this product?
- Writing a problem statement may give you a better understanding of your goal and your potential customer. It may help you when you need to make decisions.
- Measure your product against your problem definition
- “Existing folding bicycles, whilst being very compact in some instances, are still not easy to carry, due to their weight and awkwardness. This makes it difficult for lighter people to take advantage of the added flexibility of using a folding bicycle, for example when climbing the stairs, or placing it in an overhead locker”



## Positioning - Attributes

- Attributes are high level targets that you would like your product to meet
- Product positioning may help you to decide what values those attributes have, e.g. Lighter than a Brompton, easier to carry than a Dahon
- Other examples could include durability, performance, safety
- Can be subjective or objective
- Some attributes may be mandatory



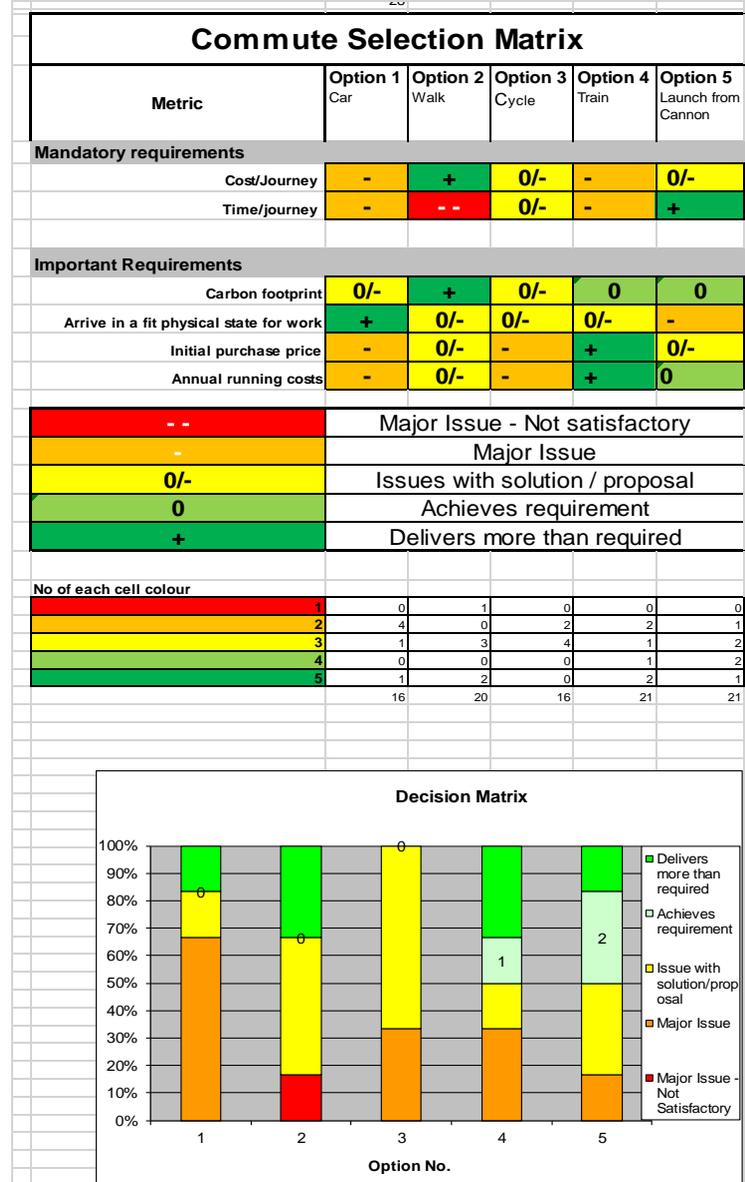
## Benchmarking

- What attributes do the products in your market sector have?
  - Allows you to put a value to some of your attributes
- Are there any problems with your product?
  - Are there other products out there that do things better than your product?
  - What's good about their product?
  - Copy with pride



## Concept Selection

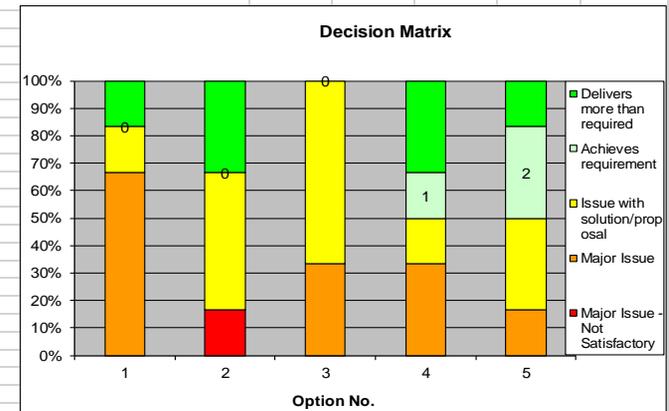
- How are you intending to solve this problem?
- Is there more than one way to solve this problem?
- Concept generation
- Select a broad group of people to help – Experience is useful
- Come up with basic ideas.
- Don't waste time embellishing the idea
- How do you decide which concept to take forward?
- Concept selection matrix
- Not just to be used for the entire product



## Concept Selection - Conclusions

- Did your favourite solution win? If not, did you use the right metrics?
- Don't take a design forward with a major issue, unless you have a backup plan, e.g. a backup design

Commute Selection Matrix					
Metric	Option 1 Car	Option 2 Walk	Option 3 Cycle	Option 4 Train	Option 5 Launch from Cannon
<b>Mandatory requirements</b>					
Cost/Journey	-	+	0/-	-	0/-
Time/journey	-	--	0/-	-	+
<b>Important Requirements</b>					
Carbon footprint	0/-	+	0/-	0	0
Arrive in a fit physical state for work	+	0/-	0/-	0/-	-
Initial purchase price	-	0/-	-	+	0/-
Annual running costs	-	0/-	-	+	0
--	Major Issue - Not satisfactory				
-	Major Issue				
0/-	Issues with solution / proposal				
0	Achieves requirement				
+	Delivers more than required				
<b>No of each cell colour</b>					
1	0	1	0	0	0
2	4	0	2	2	1
3	1	3	4	1	2
4	0	0	0	1	2
5	1	2	0	2	1
	16	20	16	21	21



## Specification

- The specification converts the product attributes into tangible items. It is a technical document
- Start with high level
- Add detail, needs to become objective, e.g. carbon fibre frame
- Ultimately the specification becomes an issue level controlled and frozen document

No.	Item	Property	Remarks
1	Output voltage	Max. $\pm 400 V$	Rated $\pm 350 V$
2	Output current	Max. $2 A_{rms}$	
3	Frequency range	DC - $3 kHz$	Rated (100 - 1,200) Hz
4	Channel Number	4	
5	Slew rate	$> 10 V/\mu s$	
6	Gain	Max. 100	
7	Impedance	Max. $600 \Omega$	
8	Noise	$100 mV_{pp}$	For $2\mu\text{Farad}$ load
9	Capacitance	$550 nF$	For PSt350bp/25/15VS35
10	Control method	PWM	
11	Connector	BNC	Shield
12	Vibration	MIL-STD-167-1A	Military specification
13	Shock	MIL-S-901D	Military specification
14	EMI	MIL-STD-461E	Military specification

## Bill of Material (BoM)

- Use to track almost everything
- Part count
- Cost
- Weight
- Tooling costs
- Design and development costs
- Release status
- Lead times
- Make or buy
- Assign people to parts of the BoM

As	Up-issue Required	Part Number	Ver
1	1	HD74-9001	A
2	2	HD74-9002	A
3	3	HD74-9005	A
4	4	P400RHC	A
5	5	C004BDBXCXABFEAB	
4	4	133-0004-01	
4	4	133-0001-01	
4	4	SUPPORT	
3	3	HD74-9006	A
4	4	HD35-9301	A
5	5	HD35-9302	A
6	6	HD35-9304	A
7	7	HD35-0311	A
7	7	HD35-0306	D
7	7	HD35-0301	A
7	7	HD35-0317	A
7	7	HD35-0318	A
7	7	HD35-0313	A
7	7	K20v28v25	

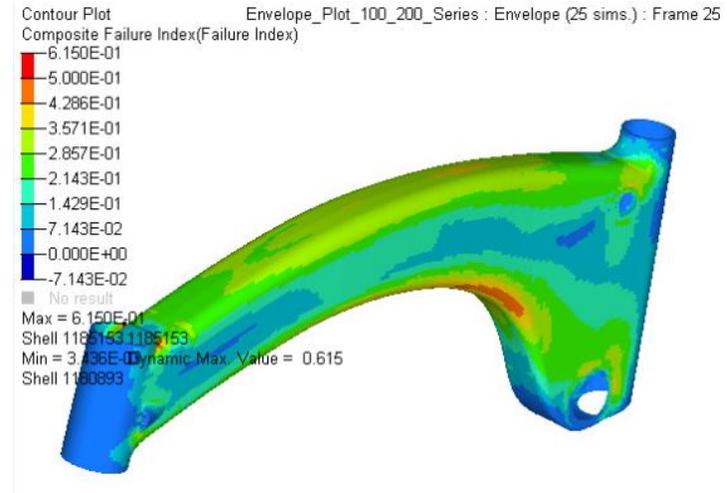
## Product life

- How many do you intend to sell per year?
- How many do you intend to sell before the design becomes obsolete, or you bring out a replacement
- Has an impact on
  - manufacturing process
    - Investment
    - Piece price
    - Sales cost
    - Profit
  - Also
    - Manufacturing facility
    - Production methods
    - Origin of manufacture



## Design Verification

- Does your product meet the attribute and specification targets?
- Is your product legal for sale?
- Ways of verifying
  - Virtual
    - Analysis - Simulation
      - Can be done at the design phase. Avoids expensive re-manufacture
  - Physical
    - Measurement - Size, weight colour
    - Testing - One-off , fatigue
      - Sometimes the only true way of verifying
- Prototypes can reduce up-front investment risks



Questions?