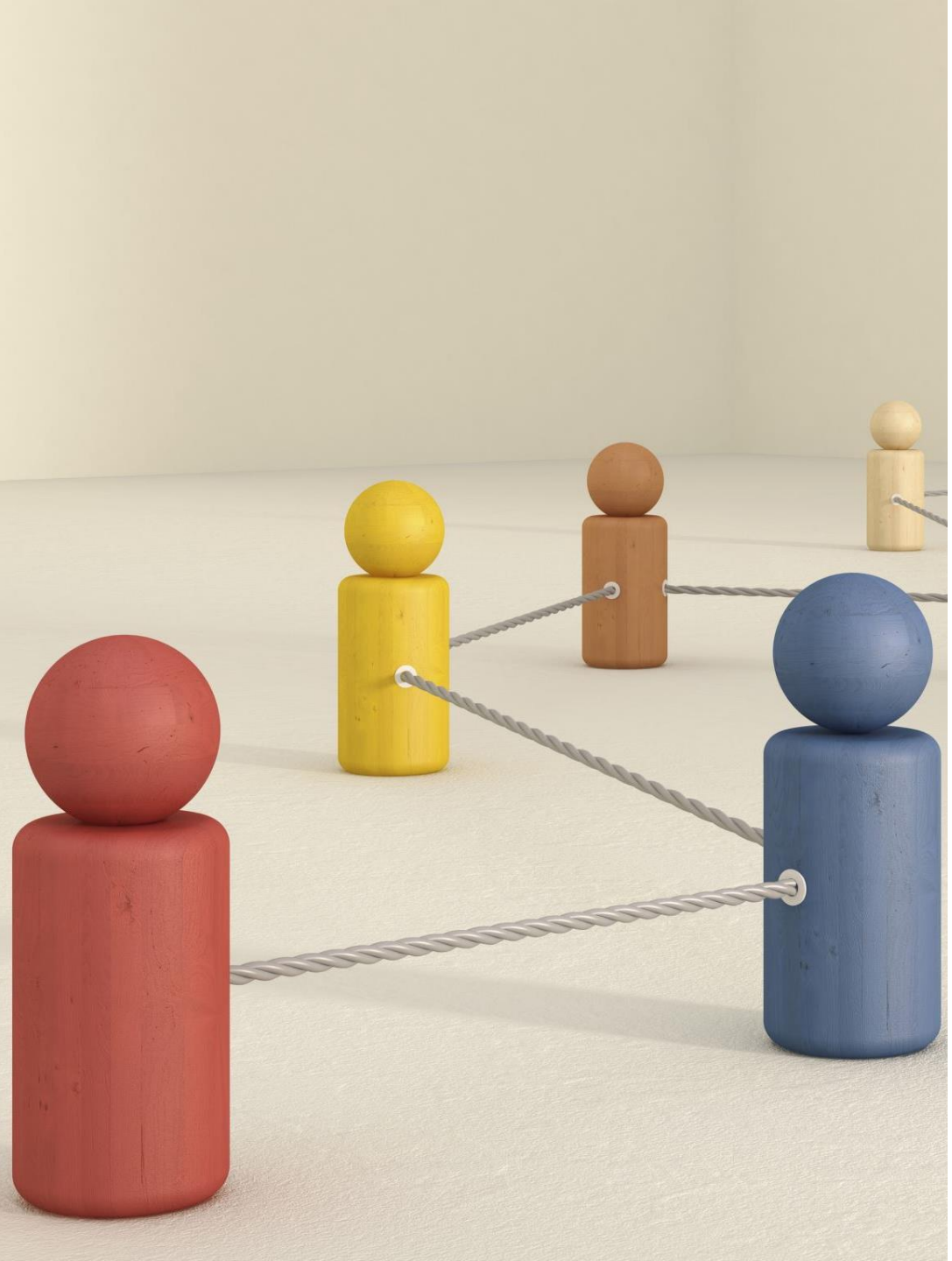
“Concept Selection”

21.09.2023



Learning Outcomes

At the end of the session,

- You’ll understand methods of concept selections
- You can apply some methods of concept selection
- You can identify several factors influencing concept selection

Concept Selection

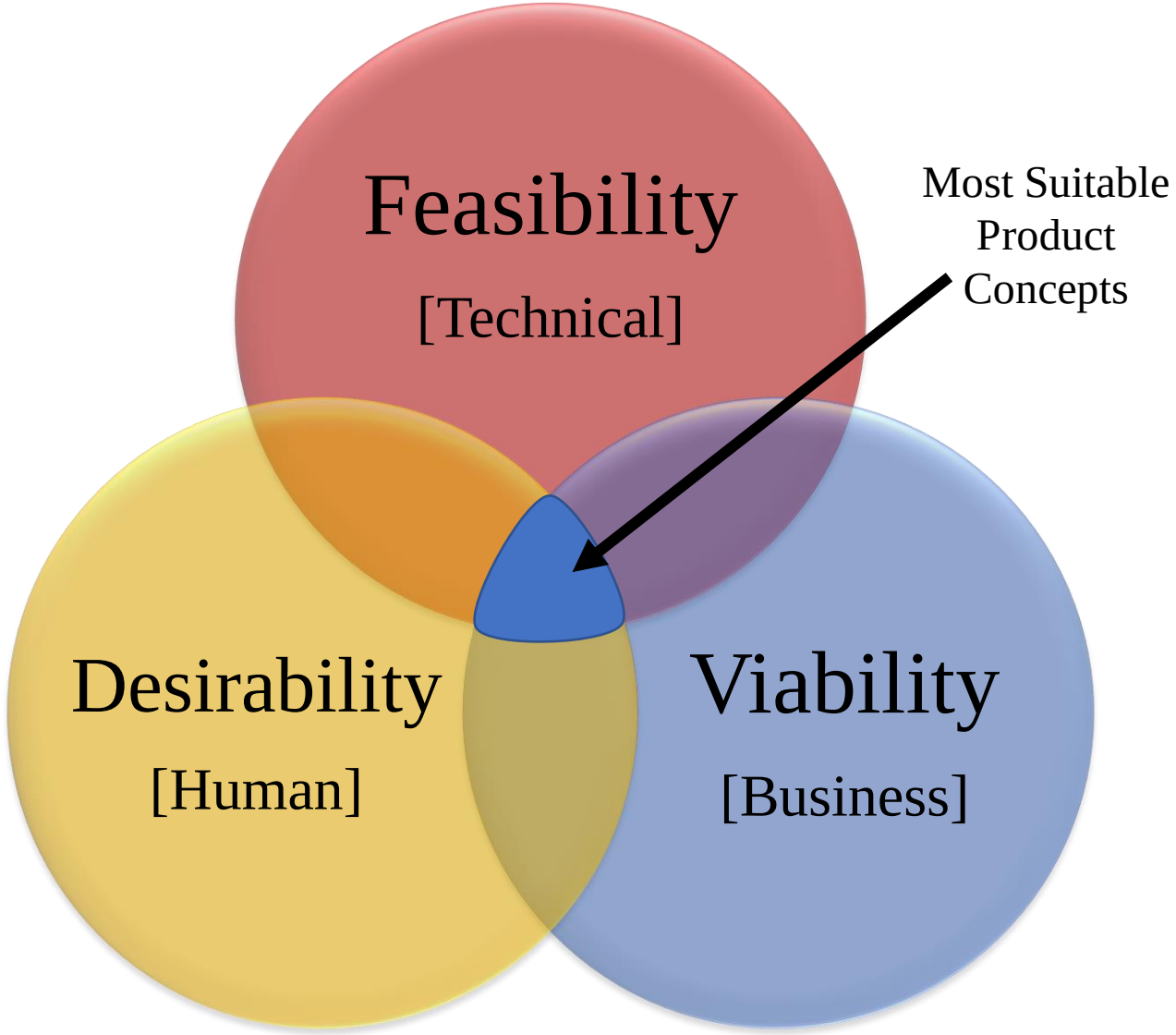
Find the best concept by,

- …narrowing down to the most promising ideas
- …evaluating those against a criteria
- …improving the concepts
- …working more on the concepts, testing them, getting more data to make the final selection

At what stages do we perform concept selection in the product design and development process?

Fuzzy Front-End Concept Selection

- Experience
- Fast decisions
- Less scientific expertise
- Better business understanding
- Market understanding



Engineering Concept Selection Approach

- Suitable for Novice Designers
- Excellent repeatability
- Systematic Approach
- No personal biases
- Some degree of Scientific expertise

Concept Selection Guidelines

01
Clarify product requirement

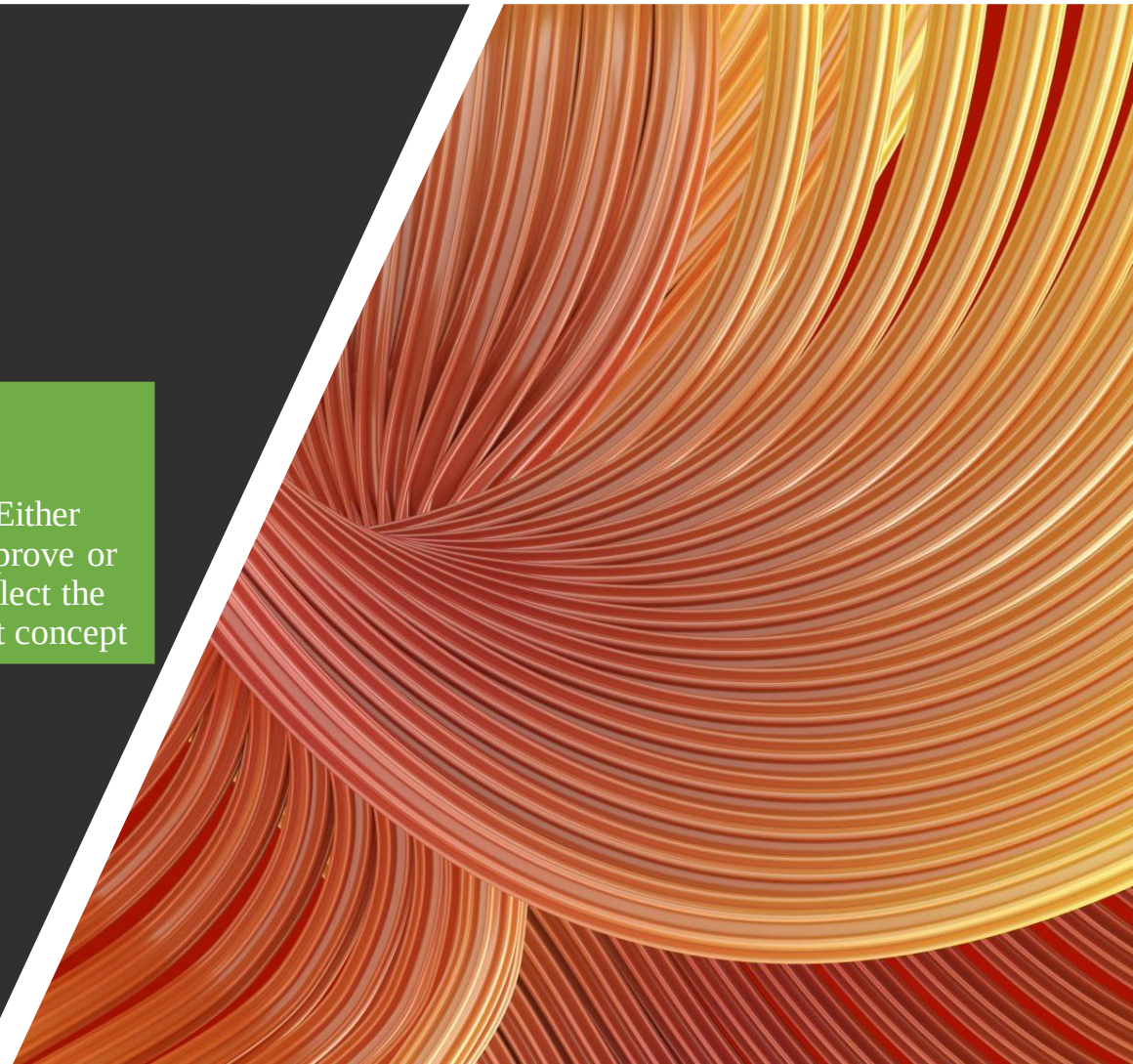
02
Determine evaluation criteria

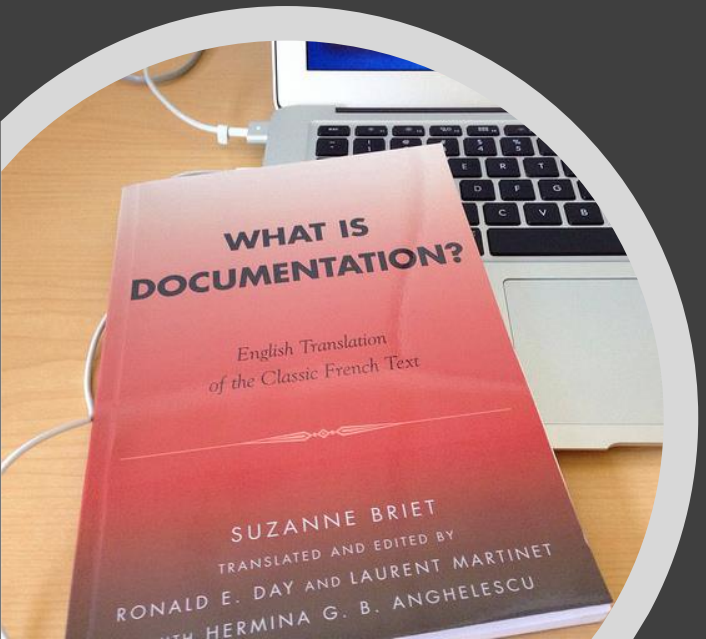
03
Identify selection metrix

04
Identify reference product

05
Run the matrix to attain scores

06
Either improve or select the best concept

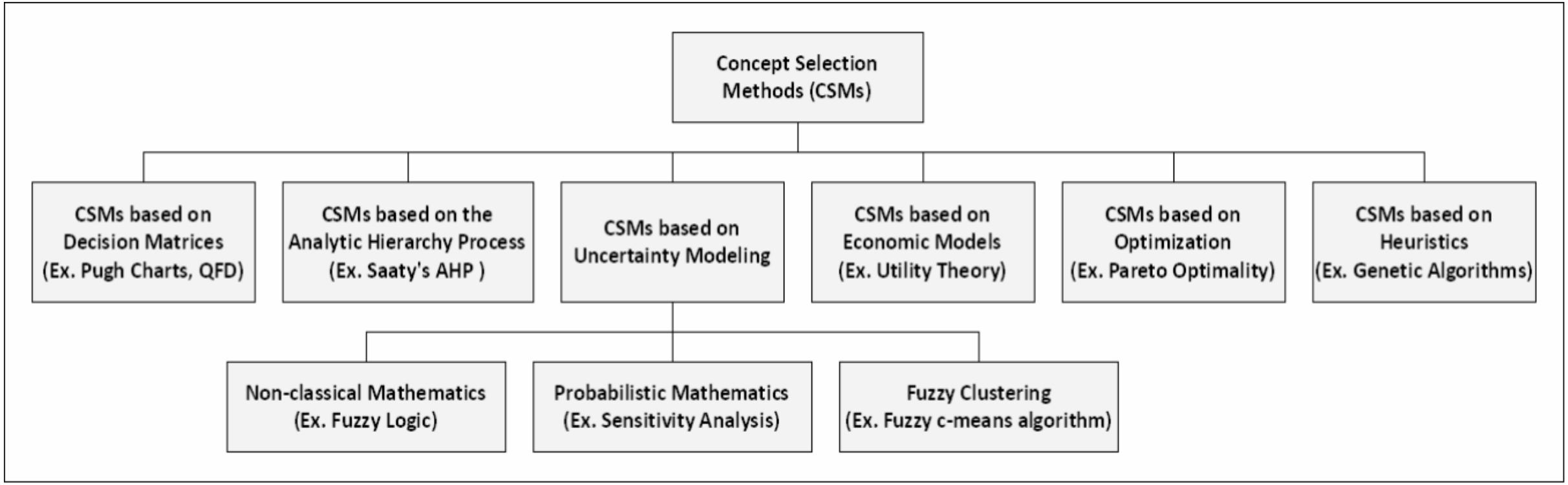




Checklist for a good concept selection approach:

- Enables comparison to customer needs/requirements
- Enables joint agreement on all selection criteria
- Enables team discussion
- Enables concept improvement
- Records the process and decision
- Removes personal biases
- Ensures process is well documented

Concept Selection Methods 1980 - 2008



Gül E. Kremer, 2013

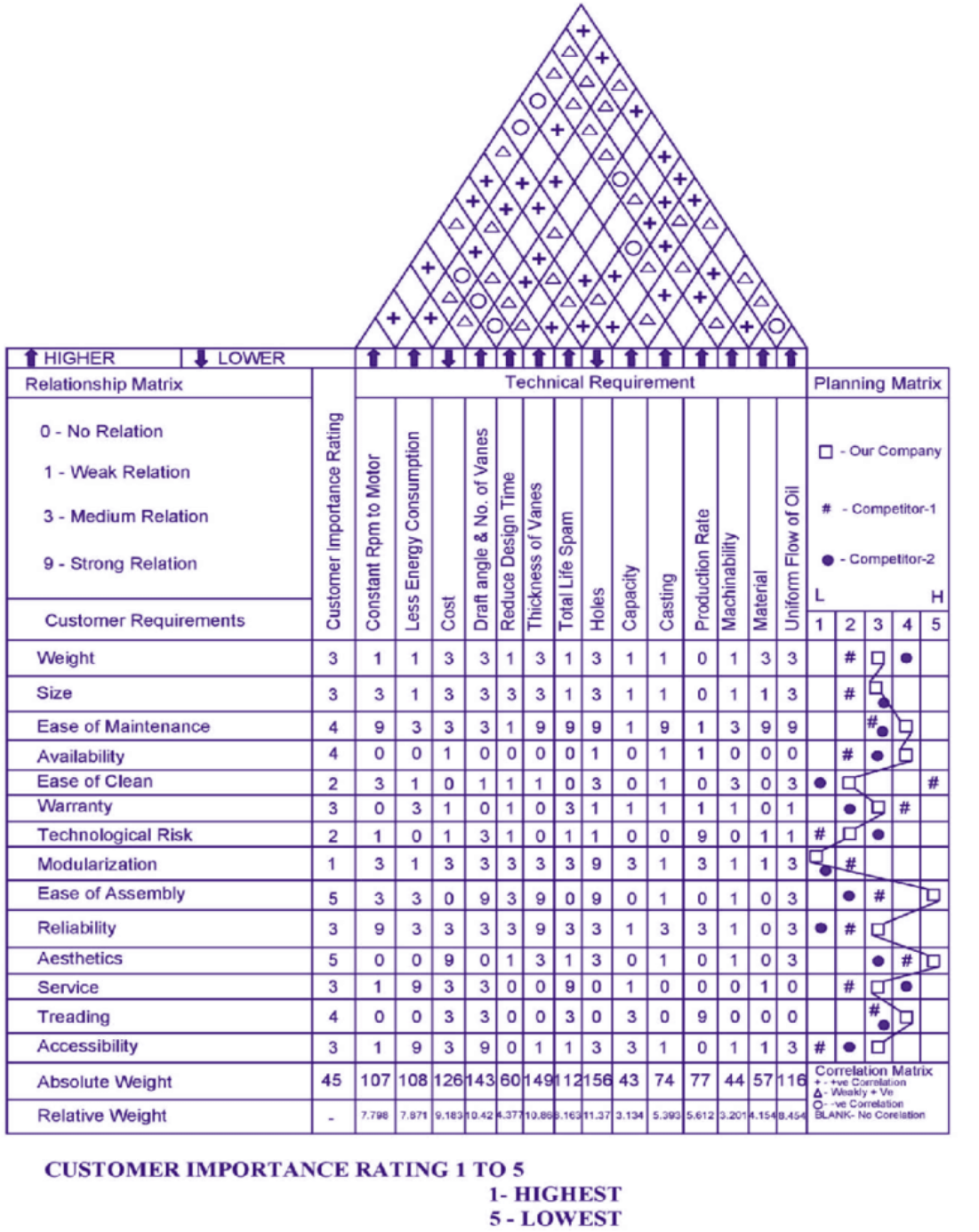
Concept Selection Tools

Most tools or techniques are some sort of multi-criteria decision-making (MCDM) methods.

A few examples of MCDM are,

- Pugh's Chart [1]
- Saaty's Analytical Hierarchy Process [2]
- Roy's Electre III (Electre) [3]
- House of Quality [4]

House of Quality



⬆ HIGHER ⬇ LOWER		Technical Requirement														Planning Matrix				
Relationship Matrix 0 - No Relation 1 - Weak Relation 3 - Medium Relation 9 - Strong Relation	Customer importance Rating	Constant Rpm to Motor	Less Energy Consumption	Cost	Draft angle & No. of Vanes	Reduce Design Time	Thickness of Vanes	Total Life Spam	Holes	Capacity	Casting	Production Rate	Machinability	Material	Uniform Flow of Oil	□ - Our Company # - Competitor-1 ● - Competitor-2				
Customer Requirements																L				H
																1	2	3	4	5
Weight	3	1	1	3	3	1	3	1	3	1	1	0	1	3	3		#	□	●	
Size	3	3	1	3	3	3	3	1	3	1	1	0	1	1	3		#	□		
Ease of Maintenance	4	9	3	3	3	1	9	9	9	1	9	1	3	9	9			#	●	□
Availability	4	0	0	1	0	0	0	0	1	0	1	1	0	0	0		#	●	□	
Ease of Clean	2	3	1	0	1	1	1	0	3	0	1	0	3	0	3	●	□			#
Warranty	3	0	3	1	0	1	0	3	1	1	1	1	1	0	1		●	□	#	
Technological Risk	2	1	0	1	3	1	0	1	1	0	0	9	0	1	1	#	□	●		
Modularization	1	3	1	3	3	3	3	3	9	3	1	3	1	1	3	□	●	#		
Ease of Assembly	5	3	3	0	9	3	9	0	9	0	1	0	1	0	3		●	#		□
Reliability	3	9	3	3	3	3	9	3	3	1	3	3	1	0	3	●	#	□		
Aesthetics	5	0	0	9	0	1	3	1	3	0	1	0	1	0	3			●	#	□
Service	3	1	9	3	3	0	0	9	0	1	0	0	0	1	0		#	□	●	
Treading	4	0	0	3	3	0	0	3	0	3	0	9	0	0	0			#	●	□
Accessibility	3	1	9	3	9	0	1	1	3	3	1	0	1	1	3	#	●	□		
Absolute Weight	45	107	108	126	143	60	149	112	156	43	74	77	44	57	116	Correlation Matrix + - +ve Correlation Δ - Weakly + Ve ○ - -ve Correlation BLANK- No Corelation				
Relative Weight	-	7.798	7.871	9.183	10.42	4.373	10.86	8.163	11.37	3.134	5.393	5.612	3.201	4.154	8.454					

CUSTOMER IMPORTANCE RATING 1 TO 5

1- HIGHEST

5 - LOWEST

Pugh Matrix

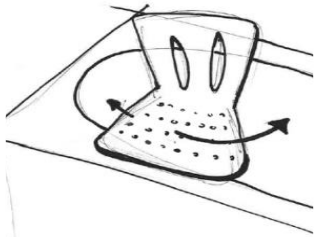
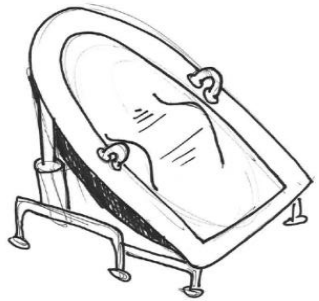
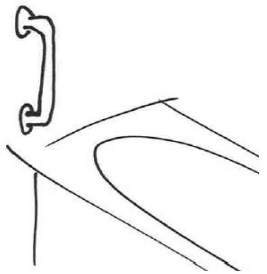
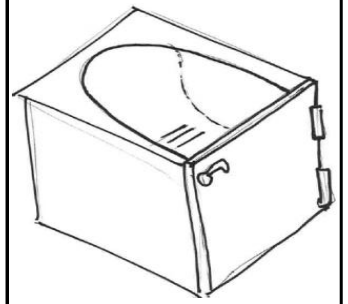
Criteria	Solutions / Ideas				
	Solution A	Solution B	Solution C	Solution D	Weighting
Can it be implemented quickly	+	+	S	S	1
Will solve the problem fully	-	S	S	-	5
Costs less than the budget	+	+	S	S	1
Wont impact the customer	+	+	S	+	2
No regulatory risks	-	-	S	-	1
Weighted Sum of Positives	4	4		0	
Number of Sames					
Weighted Sum of Negatives					

How to complete a Pugh Matrix

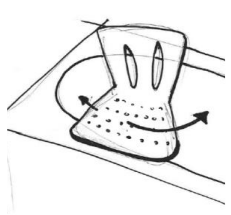
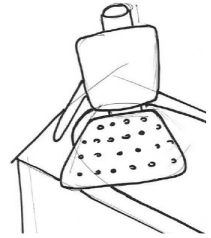
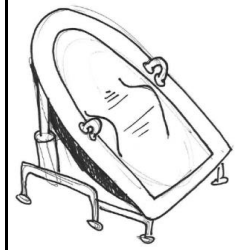
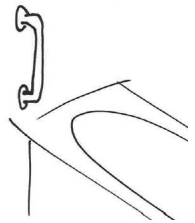
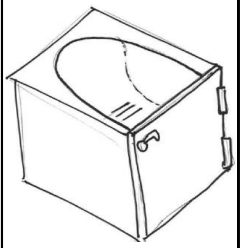
1) **Finalise** the selection of solutions, assessment criteria and weightings that you will include in your matrix
2) **Choose** a solution that be your standard
3) **Compare** each solution against the standard and note whether you think it is better, the same or worse
4) **Calculate** the Weighted Sums

Case Study:
A Bathtub For Specially Abled Individuals

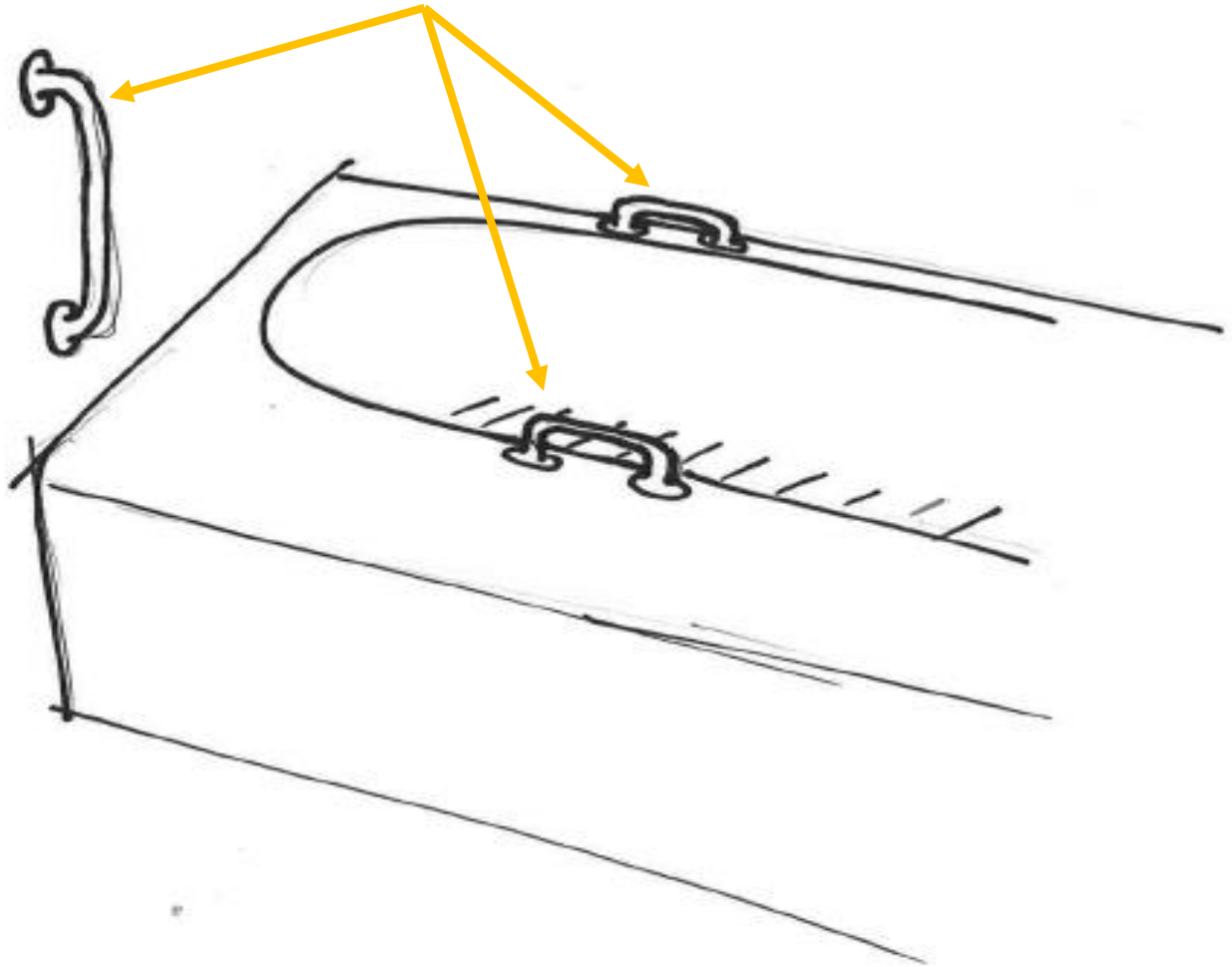
Pugh Matrix: Primary Concepts

	DATUM	OPTION 1	OPTION2	OPTION 3	OPTION 4
	Swivel Chair w/ Hinge Leg	Hydraulic Swivel Chair	Pivoting Tub	Shower Grips	Tub Door
Sketches					
CRITERIA					
Aesthetics	DATUM	0	-	+	+
Cost (low preferred)		-	-	+	0
Ease of installation		0	-	+	-
Safety in use		0	-	-	+
Ease of getting in and out of tub		+	0	-	0
Intuitive use		0	-	+	0
Ease of maintenance		-	-	+	0
Bathing comfort (ability to relax and lay in bath)		0	+	+	0
Noise		-	-	0	0
Space required		0	-	+	+
Universal		0	-	+	0
Total +	0	1	1	8	3
Total 0	0	7	1	1	7
Total -	0	3	9	2	1
TOTAL	0	-2	-8	6	2

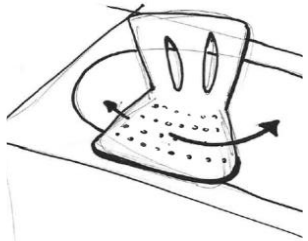
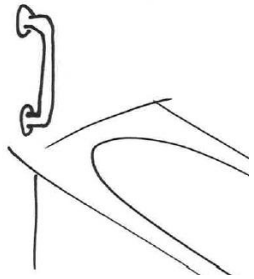
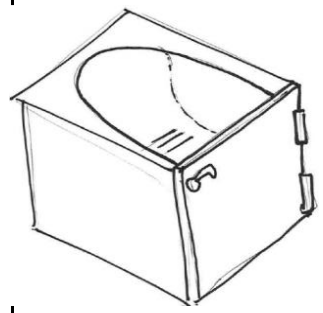
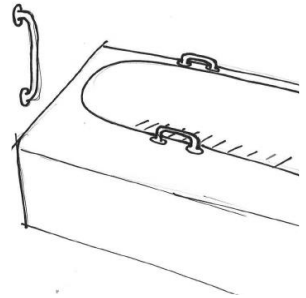
Attack The Minuses

		DATUM	OPTION 1	OPTION2	OPTION 3	OPTION 4
		Swivel Chair w/ Hinge Leg	Hydraulic Swivel Chair	Pivoting Tub	Shower Grips	Tub Door
Sketches						
CRITERIA						
Aesthetics		DATUM	0	-	+	+
Cost (low preferred)			-	-	+	0
Ease of installation			0	-	+	-
Safety in use			0	-	-	+
Ease of getting in and out of tub			+	0	-	0
Intuitive use			0	-	+	0
Ease of maintenance			-	-	+	0
Bathing comfort (ability to relax and lay in bath)			0	+	+	0
Noise			-	-	0	0
Space required			0	-	+	+
Universal			0	-	+	0
Total	+	0	1	1	8	3
Total	0	0	7	1	1	7
Total	-	0	3	9	2	1
TOTAL		0	-2	-8	6	2

Improved Concept

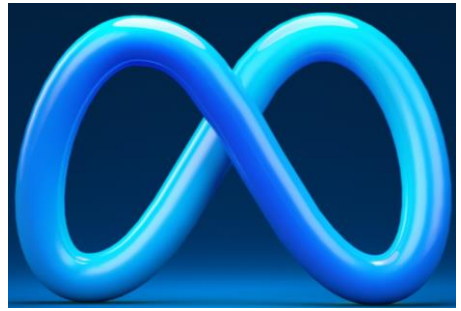


Pugh Matrix: Improved Concept

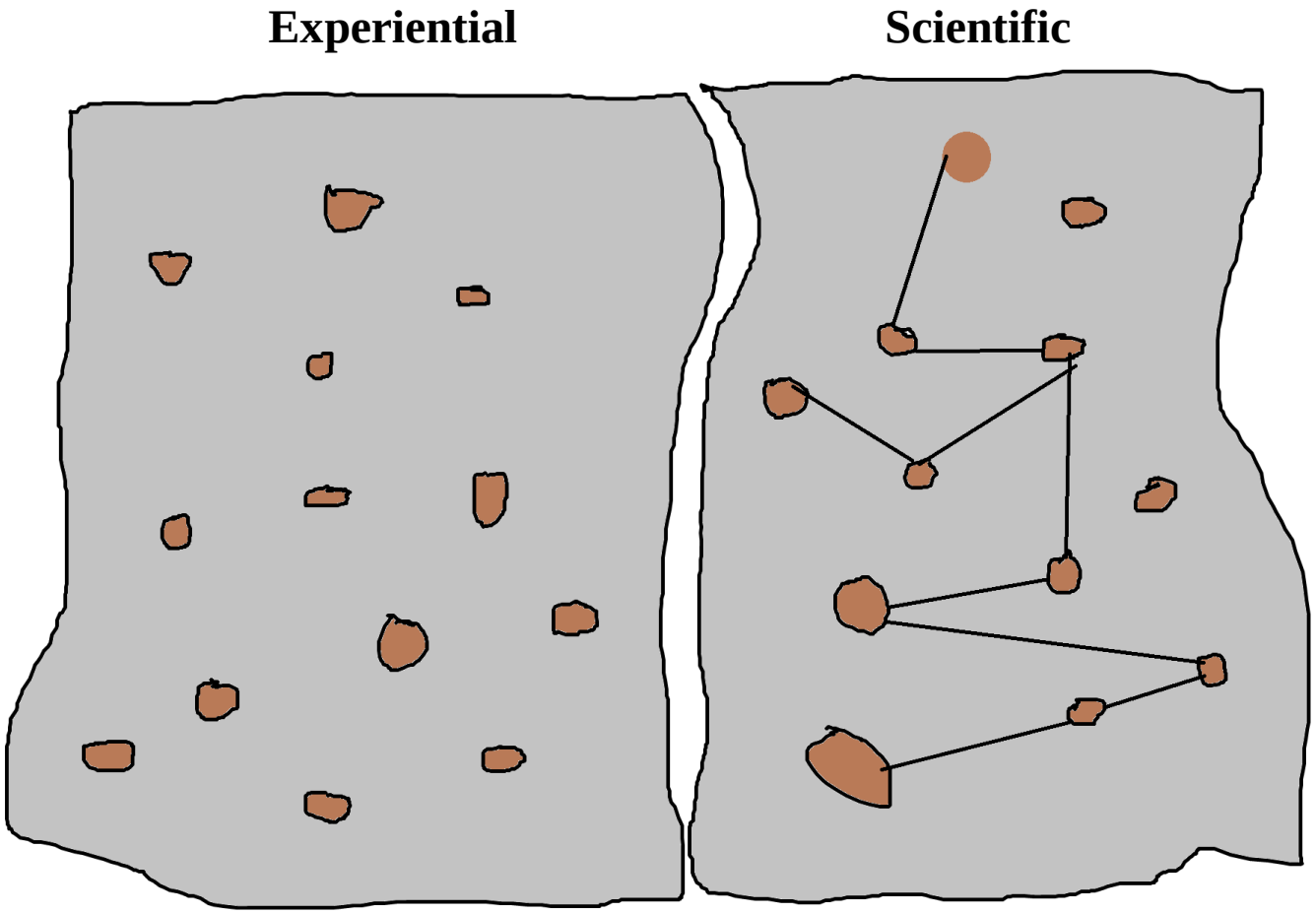
		Swivel Chair w/ Hinge Leg	Shower Grips	Tub Door	Seating ledge
Sketches					
CRITERIA					
Aesthetics		DATUM	+	+	+
Cost (low preferred)			+	0	+
Ease of installation			+	-	+
Safety in use			-	+	0
Ease of getting in and out of tub			-	0	0
Intuitive use			+	0	+
Ease of maintenance			+	0	+
Bathing comfort (ability to relax and lay in bath)			+	0	+
Noise			0	0	0
Space required			+	+	0
Universal			+	0	+
Total	+	0	8	3	7
Total	0	0	1	7	4
Total	-	0	2	1	0
TOTAL		0	6	2	7

Challenges in Concept Selection

Too Many Criteria	Incomplete Information	Forecasting Difficulties	Stakeholder Alignment	Technical Feasibility
Cost Uncertainty	Integration Challenges	Regulatory and Compliance Issues	Scalability Concerns	Competitive Landscape
Intellectual Property (IP) Concerns	Time Constraints	Cultural and Geographic Variations	Sustainability and Environmental Concerns	Bias and Groupthink
	Legacy Constraints	Resource Limitations		



Findings from Scientific Studies



Birkhofer et al. :

- Very few of the scientific methods were actually used in industry, and the ones they use are more or less based on experience rather than scientific testing
- The academia has not correctly understood the actual industrial demand and application environment [1]

Salonen & Perttula :

- Finnish industries very rarely use scientific methods. The methods they used, in reality, were most often informal in nature but
- Those who used it were satisfied and confident in their concept selection [2]

Take Home Message

Try to use more than one selection method/matrix/tool

The fundamental procedure remains somewhat similar across different fields.

Some methods simply show the best concept, and others offer the possibility of improvement in weaker ideas

Pay attention to the factors affecting concept selection such as need, time, experience, money, market etc.

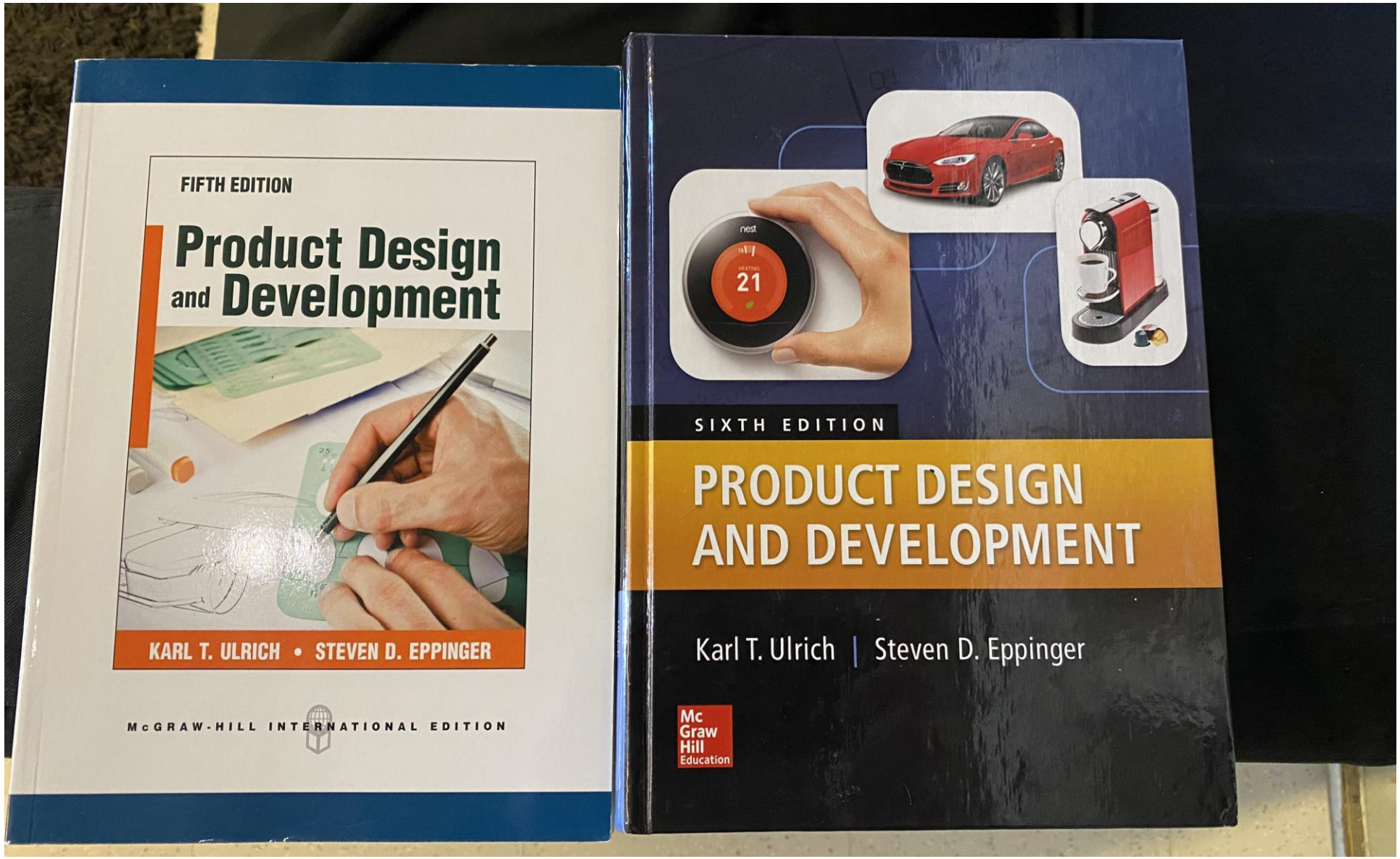
Thank You !

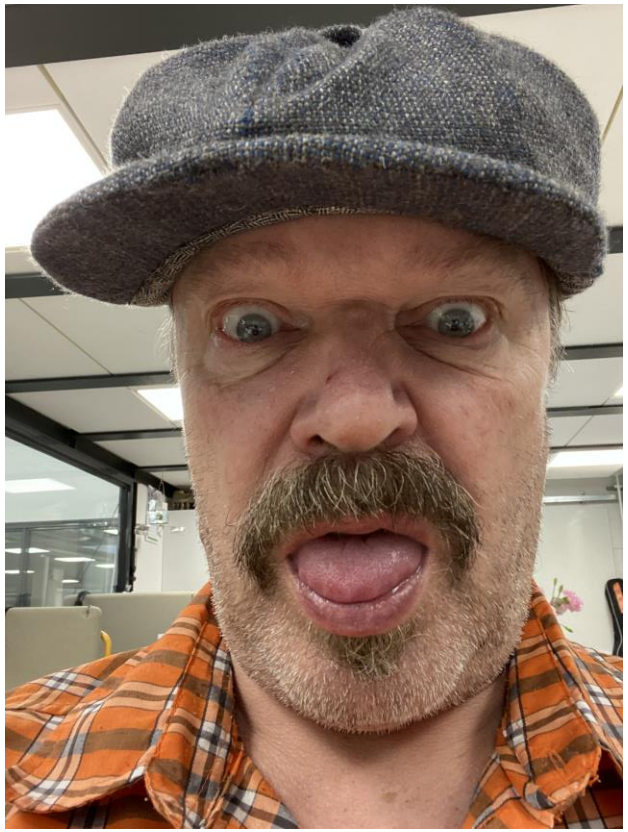
Aalto University
Design Factory

Methods in Early Product Development

personal reflection report options:

- scientific style
- pamphlet style
- manual style


FIFTH EDITION
Product Design and Development
KARL T. ULRICH • STEVEN D. EPPINGER
McGRAW-HILL INTERNATIONAL EDITION
nest
21
SIXTH EDITION
PRODUCT DESIGN AND DEVELOPMENT
Karl T. Ulrich | Steven D. Eppinger
Mc Graw Hill Education



Product Design and Development

Introduction
Identifying customer needs
Product specifications
Concept generation
Concept selection
Product architecture
Industrial design
Design for environment
Prototyping and testing
Design of services
Summary

No pictures!
No graphics!
No chapters!

Our textbook / course compared to other approaches (define your title)

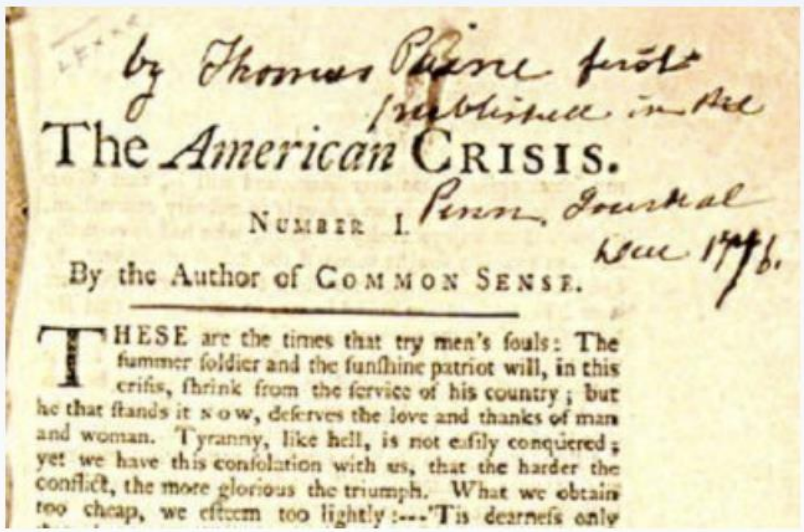
Introduction
Methods
- -litterature research
- -professional interviews (?)
- -reflection to real life projects (?)

Results
- -similarities
- -differences
- -new ideas

Discussion
- -validation of results
- -conclusions
- -suggestions

pamphlet is an unbound book (that is, without a hard cover or binding). Pamphlets may consist of a single sheet of paper that is printed on both sides and folded in half, in thirds, or in fourths, called a *leaflet* or it may consist of a few pages that are folded in half and saddle stapled at the crease to make a simple book.

The publication of Thomas Paine's *Common Sense* caused a sensation in early 1776 as it explained the need for freedom. But it was a second series of pamphlets published on December 19 of that year that inspired a huge American military victory.


by Thomas Paine first published in the Penn. Journal Dec 1776.

The *American* CRISIS.

NUMBER I.

By the Author of COMMON SENSE.

THESE are the times that try men's souls: The summer soldier and the sunshine patriot will, in this crisis, shrink from the service of his country; but he that ſtands it now, deſerves the love and thanks of man and woman. Tyranny, like hell, is not eaſily conquered; yet we have this conſolation with us, that the harder the conflict, the more glorious the triumph. What we obtain too cheap, we eſteem too lightly:---'Tis dearneſs only

"These are the times that try men's souls: The summer soldier and the sunshine patriot will, in this crisis, shrink from the service of their country; but he that stands it now, deserves the love and thanks of man and woman. Tyranny, like Hell, is not easily conquered; yet we have this consolation with us, that the harder the conflict, the more glorious the triumph," said Paine in *The American Crisis*, a new pamphlet that appeared in the *Pennsylvania Journal*.

User Manual for Cassie Robinson

Conditions I like to work in

I like a quiet working environment. I find it hard to do work that requires my concentration if there is a lot of noise and distractions

.

I like having my own desk space

I find it hard to work in heated rooms, and love fresh air (windows open **etc)**

The times/hours I like to work

I am trying to start my work day at 10am so that I can have 2 hrs from 8-10am in the mornings to do things like exercise and meditation etc.

I work best in the evenings

I don't mind being contacted at any time but I will likely only respond during week daytimes and evenings

My diary is open and accessible so everyone can see my availability. I don't mind people booking things in my diary if I am free

The best ways to communicate with me

Slack is the quickest way to get a response from me

I will never answer my phone, but I look at text messages

I keep on top of my emails each week and usually respond within a few days at the latest.

The ways I like to receive feedback

I'd rather have difficult conversations than things be unspoken or inauthentic, so just be straight with me

I like receiving feedback face-to-face

I see all feedback as a learning opportunity so I like any feedback to include examples and also suggestions on how I / it could be better/different

Things I need

I love ideas sessions with people, where we can freely think about what is possible without the if's and but's

I need time to reflect

Authenticity - I find it really hard to be around bullshit, inconsistency or incongruence

Things I struggle with

I'm an introvert so working "in the open" is something I have to work hard at

Too much critiquing and logical reasoning drains my energy

If I don't understand the wider purpose behind why we are doing something, I find it hard to engage with

Unneccessary process - I love agile and design-lead process however, it's not always necessary. I like minimum-viable-process - what is enough?

Things I love

I like hearing what others are working on and connecting up the dots of what we are doing

I love organising team things - birthday gifts, evenings out etc.

A generative, risk-taking culture that has a flag in the ground about what it stands for

Quarterly team away days

Other things to know about me

I use my intuition a lot to make decisions

My favourite saying is "the sum of the whole is greater than the sum of the parts."

I am an INFP / INFJ cusp

I don't like or drink tea

I bring my whole self to work (we should chat about what this means to me)

Diso

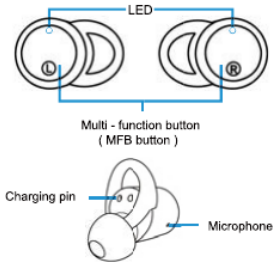
TWS BLUETOOTH EARPHONE

Patented Product

IPX3

Bluetooth

About MH802

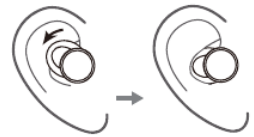


Product specification

- Bluetooth specification: support Bluetooth V4.2 HFP V1.7 HSP V1.2 A2DP V1.3 AVRCP V1.6
- Standby time: 80hours
- Support voice guide
- Talking time: 3hours
- Playing time: 2-2.5hours(depends on different volume and songs)
- Distance: up to 10meters.

Wearing

Matching the earbuds with earphone



Putting on the earphone and turn the earphone as picture
1.For optimal audio performance,select the ear tip size that gives you the best comfort
2.Each earphone is marked with an L or an R. Be sure to wear the correct one.
3.Tuck the tip under the ear ridge until they are secure.

Note: for safety, please use the smaller size earbuds than your normal size earbuds when doing outdoor sports and make sure you can hear the outside sounds.

How to use

1.Use in pair

Turn on earphone

(a)Turn on each earphone, press MFB button 3 seconds on both earphone at the same time till LED flashing blue. There will be a voice prompt "power on"

(b)After turn on earphone, the left and right earphone will automatic connect with each other with voice prompt "beep" "connected" "left channel" "right channel"

Pairing device

(a) After each earphone connected, you will hear a single beep in the right channel and an voice prompt"pairing". Only right unit will be flashing red and blue during this time.

(b) Turn on the mobile phone Bluetooth and search mode name "DISO",clicking it for connecting.

(c)After connected, led will be flashing blue. There will be a voice prompt "second device is connected"

(d)The next time earphone is turned on, they will automatically search for and attempt to connect to the last paired device.

Receiving and Ending a call

(a) Click right earphone MFB button once

Rejecting a call

(a)Double click right earphone MFB button when a call incoming

Note: You can listen to music and talk phone call. When listening to phone call, only right earphone will have sound.

How to use

2.Use single earphone

(a)Turn on left earphone or right earphone by pressing 3 seconds till LED flashing blue. This will enter the pairing mode and red and blue LED flashing.

(b)Turn on the mobile phone Bluetooth and search mode name "DISO" if using right earphone/"L channel" for left earphone, clicking it for connecting.

(c)After connected, LED will be flashing blue. There will be a voice prompt "connected".

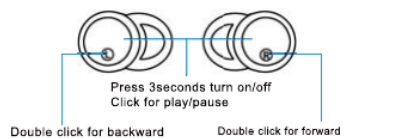
(e)The next time earphone is turned on, they will automatically search for and attempt to connect to the last paired device.

3. Listen to music

(a)Click MFB button for music play and pause

(b)Double click right earphone MFB button for track forwa

(c)Double click left earphone MFB button for track backw



Charging

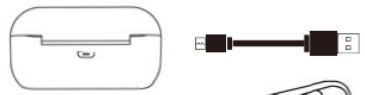
1.Charge the charging box:

Plug in the USB cable to the charging box
When charging, the red LED indicator turn on.
When full charging, about 2 hours, the red LED indicator turn off and blue LED indicator turn on.

2.Charge the earphone

Put the earphone in the charging box and close the box.
There is red LED indicator at the earphone.
When full charge,about 1 hours, earphone red LED indicator will be blue.
Note: When earphone charging full , to save power, after 1 minutes LED will be turned off

1.Charge the charging box:



2.Charge the earphone

Note: The earphone gold pin need to connect with charging box gold pin. If putting earphone in box with wrong position,ear-phone will fail in charging.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions,may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Accessories

Charging travel box

Earphone

USB charging cable

Earbuds

Manual

TWS BLUETOOTH EARPHONE
MODEL# : MH802
FCC ID:YILMH802
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
MADE IN CHINA

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Aalto Desig

FOOD PRODUCT DEVELOPMENT LAB MANUAL

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Aalto University
Design Factory

IOWA STATE UNIVERSITY DIGITAL PRESS

What is New Product Development?

New Product Development is the process of converting a new, untried idea into a digital product that solves a problem of the target audience.

1 Idea Generation

- ☐ Identify customer problems
- ☐ Use Michael Skok's 4U approach to qualify listed problems (Unworkable, Unavoidable, Urgent, Underserved)
- ☐ Look for technologies for solving the identified problem
- ☐ Choose from among: Replicate, Upgrade, and Repurpose

2 Idea Screening

- ☐ Validate PoC
- ☐ Conduct SWOT analysis

3 Concept Development & Testing

- ☐ Quantify Gain/Pain Ratio
- ☐ Conduct Competitor Analysis
- ☐ Enlist the Must-Have Features
- ☐ Create Value Proposition Chart
- ☐ Perform Concept Testing

4 Market Strategy & Pricing

- ☐ Follow McCarthy's 4Ps of Marketing Approach
- ☐ Strategize Around Pricing (cost-based pricing model, market-focused pricing)

5 Product Development

- ☐ Build a Prototype
- ☐ Build MVP (Minimum viable product)
- ☐ Test MVP