



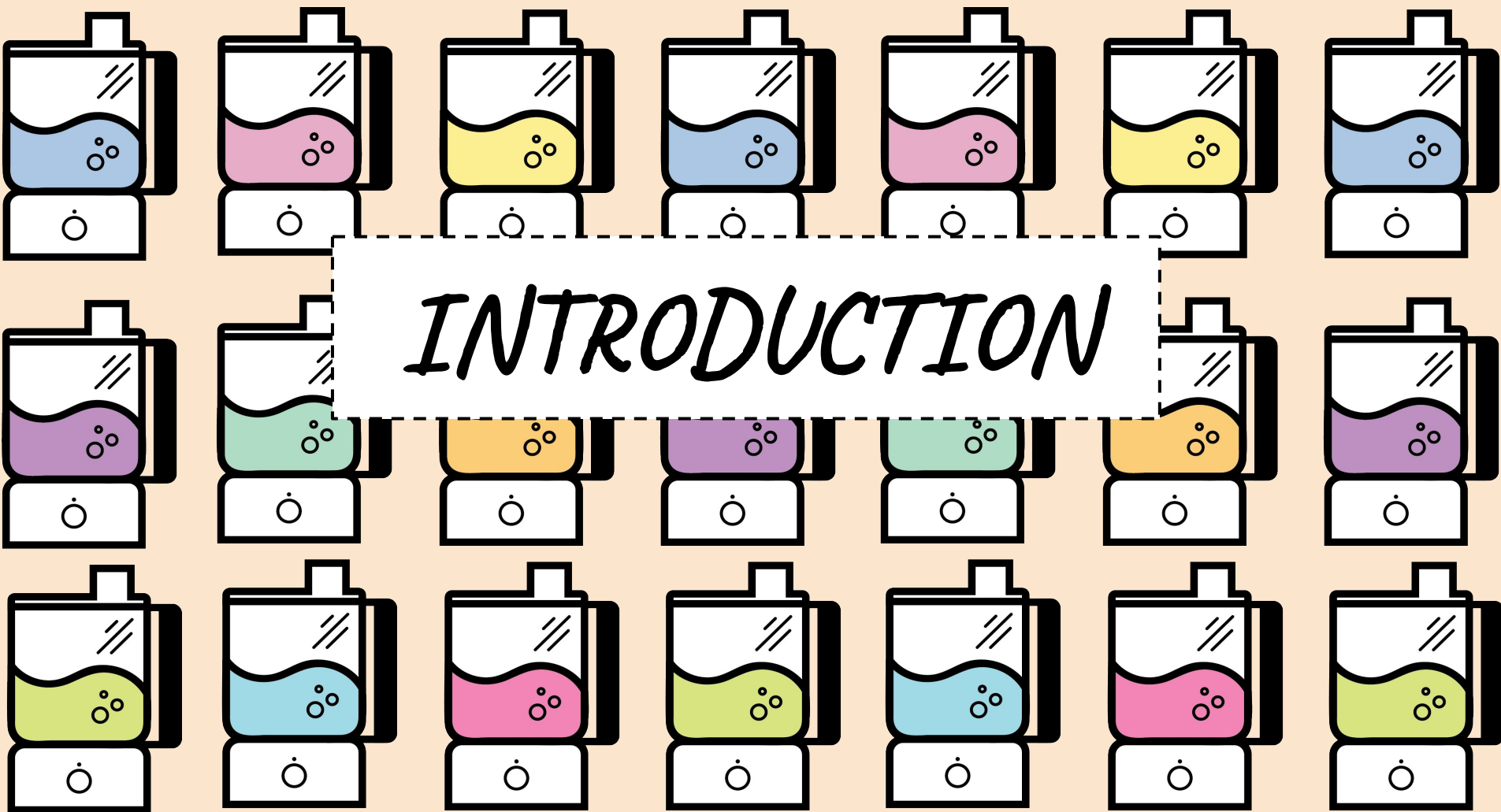
Modularisation of Food Processor

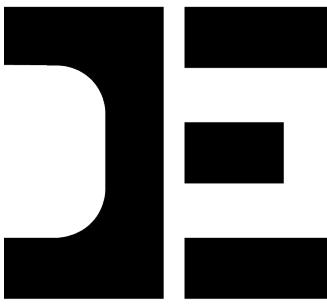
Group Food Processor 2

Nicole Arthur Cabrera, Xin Jiang, Filip Mälberg
Anubhuti Gupta, John Peter Parlour, Johanna Nugin

Agenda

1. *Introduction*
2. *Customer Segments & their Values*
3. *Customer Values to Product Properties*
4. *Function Analysis & Technical Solutions*
5. *Modular Concept Fitting Company Strategy*
6. *Modules*
7. *Modular Production & Supply Chain*





**Industrial
Elements**





wants...

Improved Sustainability

through a **Circular Product Service System**

while maintaining **Operational Excellence**

Modularization Scheme



What to include in their product assortment?

"Food processors, but also new kitchen appliances"

- **Blenders**
- **Smoothie makers**

The Brief:

"Create a modular platform covering both the existing food processors but also including new kitchen appliances. We need help to market ourselves towards professional users"

Marketing towards both private and professional users?

Easy! Private and Professionals require these products in their kitchens

Existing Variants and Features

VARIANTS	FEATURES	PRICE
Smoothie Maker	Ideal for smoothies. Smaller containers. Ability to carry.	200 - 1000 SEK
Blender	Ideal for liquids. Available in different container sizes.	300 - 5000 SEK
Food Processor	Ideal for labour-intensive tasks. Available in different container sizes.	300 - 5000 SEK





Market Focus

1. *Lower price*
2. *High performance*
3. *Aesthetics*

Trends, Development and Future Technology

- *Mature product*
- *Sustainability*
- *All in one*





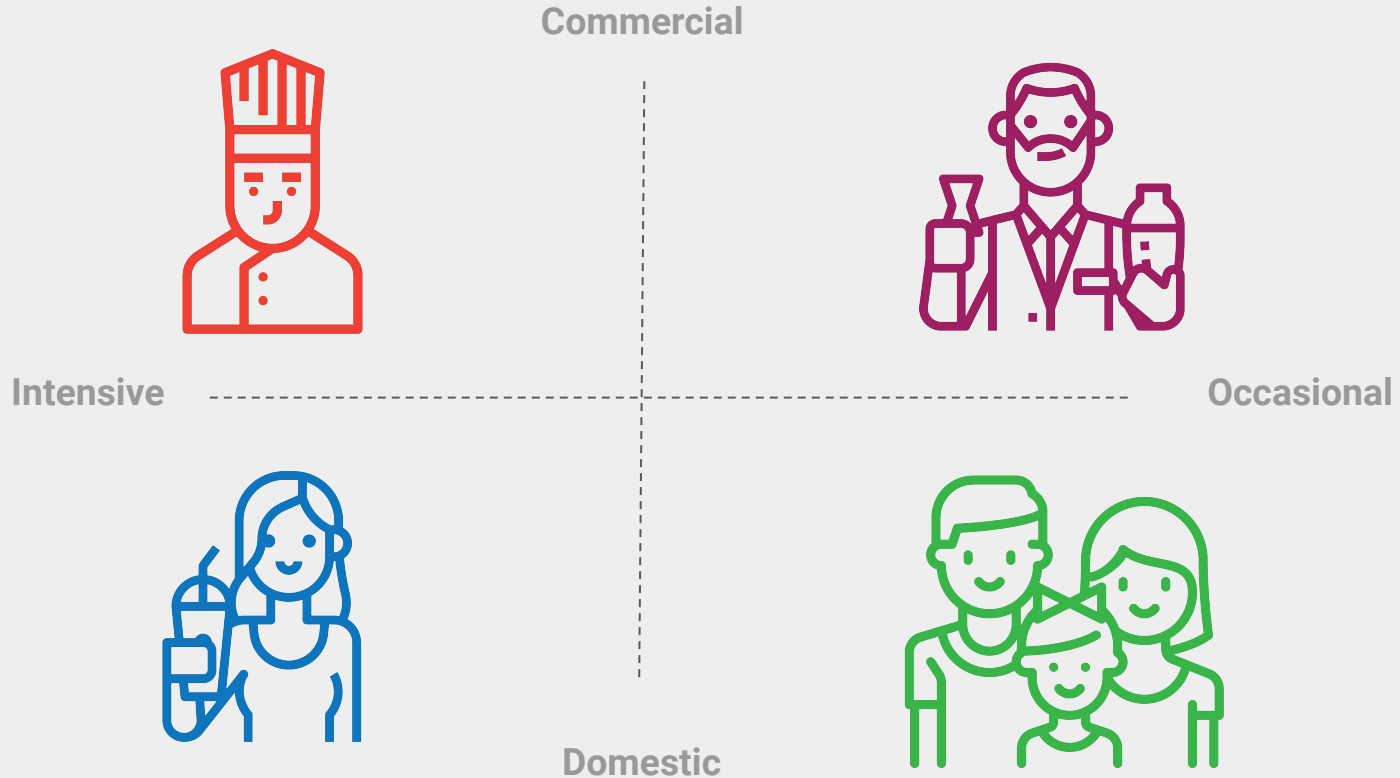
Customer Segments & their Values

CVR

The food processor can be used in a lot of different ways and also in different sectors.

From the ordinary home to professional kitchens, different environments also imply different uses.

Customer Segments





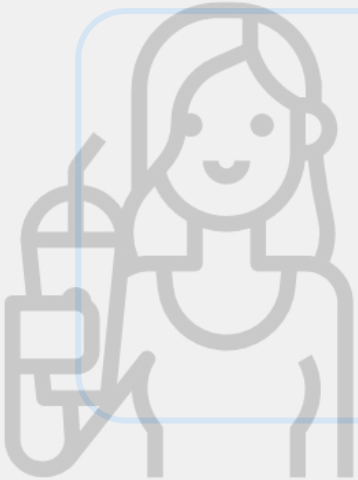
Intensive commercial

- Works in a restaurant
- Need to process a large amount of food everyday



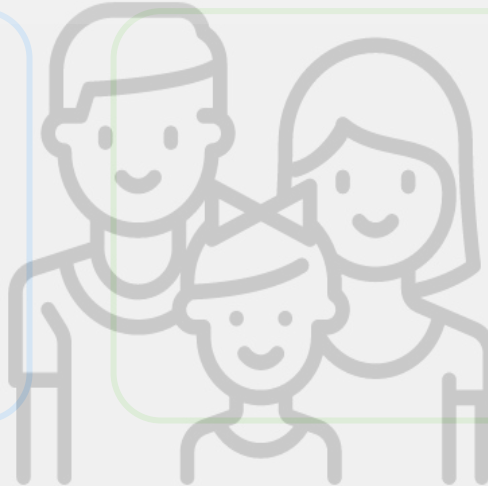
Occasional commercial

- Own a bar
- Some of the drinks need a blender



Intensive domestic

- Health freak
- Has smoothies For breakfast

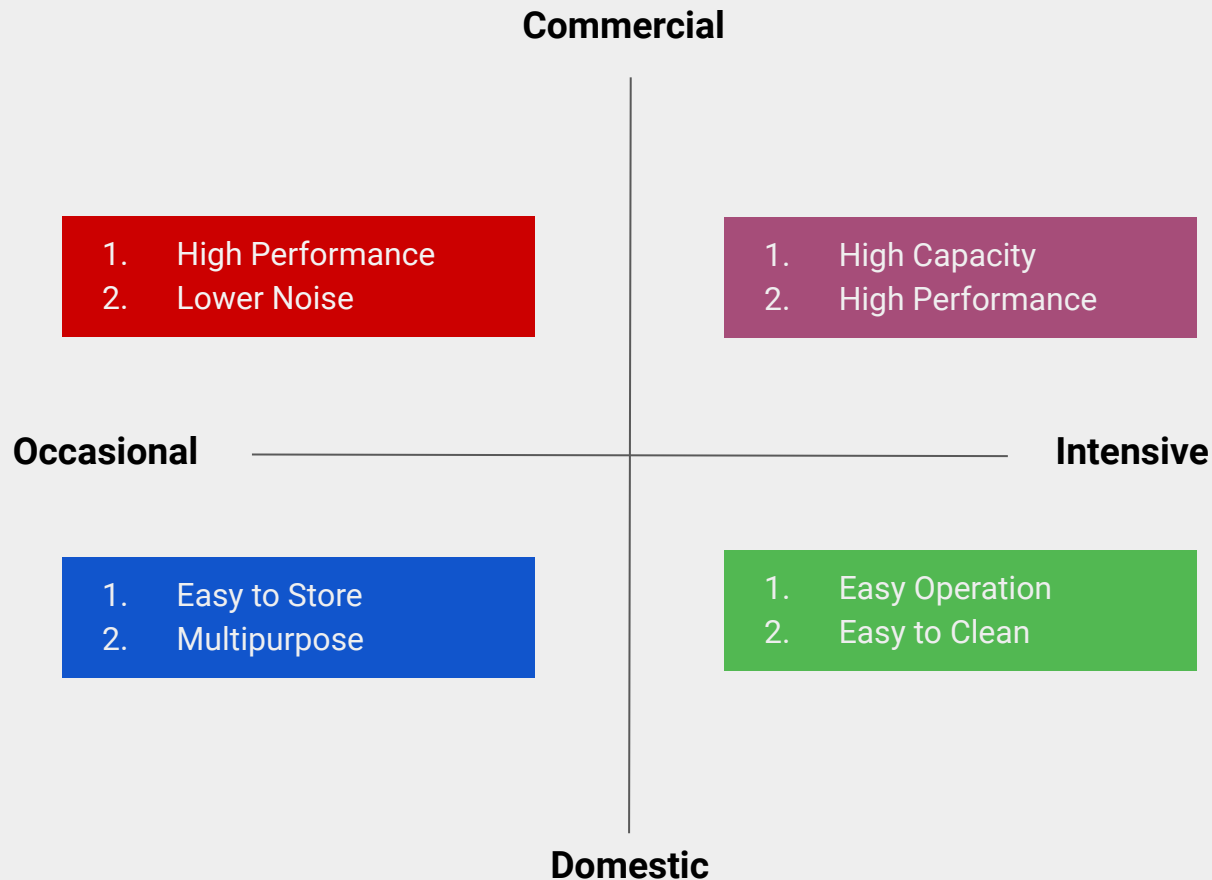


Occasional domestic

- Only uses for parties
- Needs it for different reasons
- In storage mostly

Customer Segment Values

- *High Capacity*
- ***Easy Operation***
- *Good Stability*
- ***High Performance***
- *Easy to Store*
- ***Easy to Clean***
- *Multipurpose*
- *Longer Lifetime*
- *Easy Maintenance*
- *Lower Noise*
- *Attractive Design*



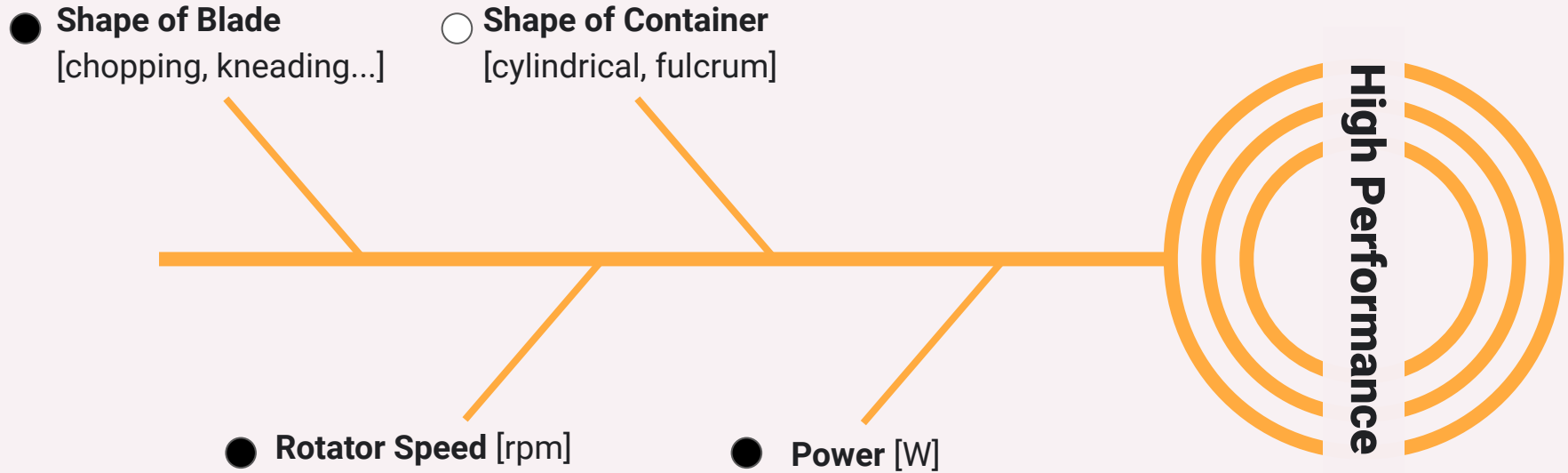


From Customer Values to Product Properties

QFD

The product properties should be identified by using customer values, goal values and the fishbone diagram.

Fishbone Diagram



Customer Values to Product Properties

Product Properties

Noise
Number of Steps
Material Container
Shape of Container
Size Container
Shape of Blade
Material Base
Size of Base
N. of Functions
Dishwasher safe
Colour Options
Rotator Speed
Power
Replaceable parts

Goal Values

60 dB
7
Plastic, Glass
Cylindrical, Frustum
3.5, 2, 1.5, 1, 0.5 L
Blender blade, S shape (chop & knead), circular (whip)
Plastic, Stainless Steel
36*20*20, 30*10*10 mm
1, 2, 3, 4
Yes/ No
White, Stainless Steel
10000, 20000, 40000 rpm
750, 1500, 2000 W
Yes/ No

Classification

Development
Base
Variance
Variance
Variance
Variance
Variance
Variance
Development
Option
Variance
Variance
Variance
Option

Customer Values to Product Properties

Product Properties

Noise
Number of Steps
Material Container
Shape of Container
Size Container
Shape of Blade
Material Base
Size of Base
N. of Functions
Dishwasher safe
Colour Options
Rotator Speed
Power
Replaceable parts







Goal Values

60 dB
7
Plastic, Glass
Cylindrical, Frustum
3.5, 2, 1.5, 1, 0.5 L
Blender blade, S shape (chop & knead), circular (whip)
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36*20*20, 30*10*10 mm
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Yes/ No
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750, 1500, 2000 W
Yes/ No

Classification

Development
Base
Variance
Variance
Variance
Variance
Variance
Variance
Development
Option
Variance
Variance
Variance
Option

QFD

Customer Values		
High Capacity	3	
High Performance	4	
Good Stability	1	
Easy to Clean	5	
Multipurpose	2	
Easy to store	2	
Longer Lifetime	3	
Easy Maintenance	2	
Lower noise	3	
Easy Operation	5	
Attractive Design	2	

	Weighted Sum
--	--------------

Code	Product Properties
n/a	Number of steps
n/a	Material Container
n/a	Shape of Blade
n/a	Material Base
n/a	Replaceable parts
n/a	Size container
n/a	Shape of Container
n/a	No. of functions
n/a	Dishwasher safe
n/a	Colour options
n/a	Size of Base
n/a	Rotator Speed
n/a	Power
n/a	Noise

					●							○	
		●				○				●	●		
										●			
	◐	○			◐	●		●					
		●					●				○	○	
						○				●			
	○		◐										
				●									
											◐		●
●													
	○		◐		○	◐			●	○			

45	20	59	15	18	44	57	18	45	18	29	47	41	27
----	----	----	----	----	----	----	----	----	----	----	----	----	----

Sum
10
28
9
25
20
10
4
9
12
9
18

The background of the entire slide is a dense, overlapping pattern of thin, circular slices of oranges. The slices are bright yellow-orange with visible pulp segments and white pith, creating a vibrant, textured background.

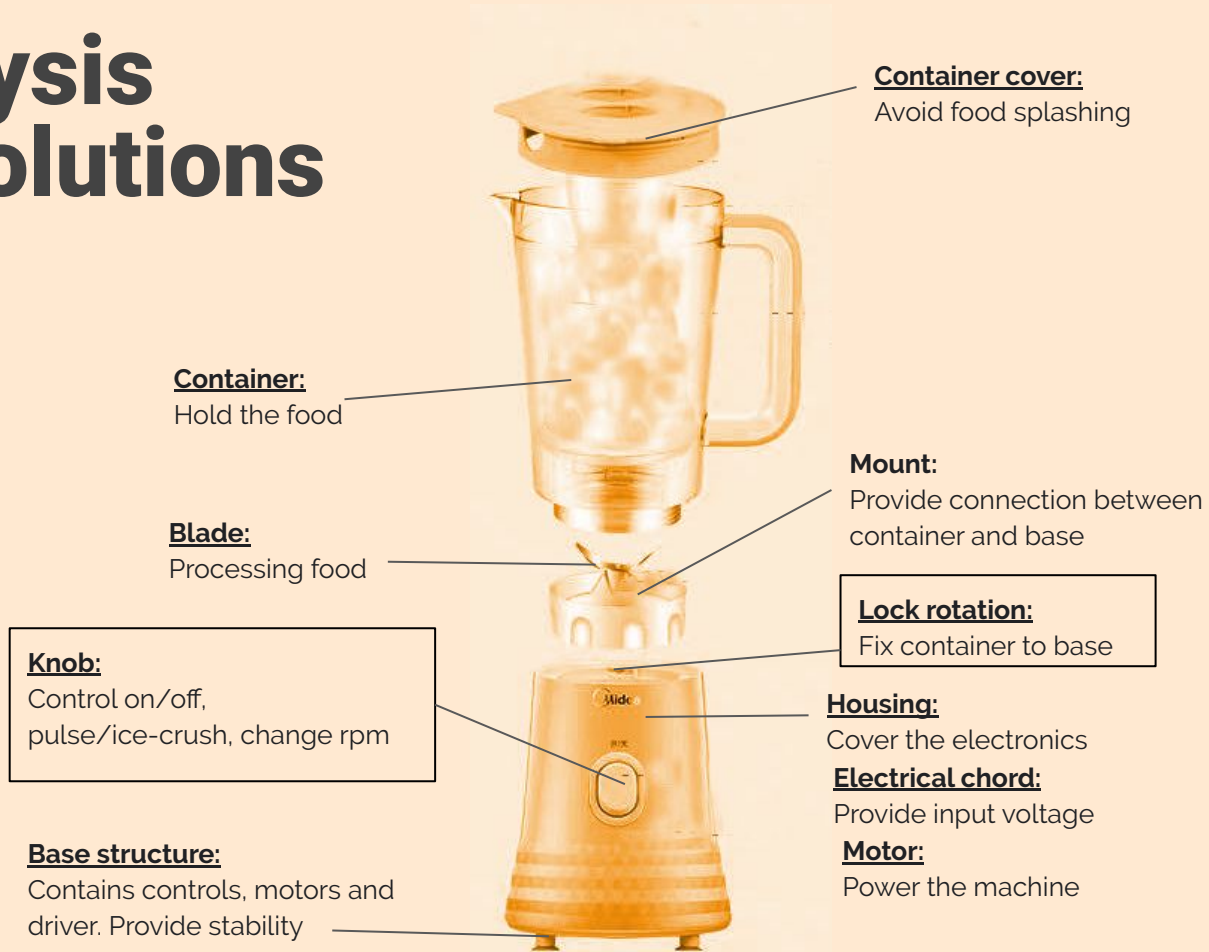
Function Analysis & Technical Solutions

DPM

Function Analysis & Technical Solutions

Bottom-up Approach

*Starting with primary
technical solutions and
deriving the functions*



Alternative Technical Solutions & Pugh Analysis

Knob:

Control on/off, pulse/ice-crush, change rpm

Knob

Display

Buttons

Switch

Market Criteria

Internal Criteria

+

↶

↷

↺

↻

↷

↶

+

⊘

Customer Values	High Capacity	High Performance	Good Stability	Easy to Clean	Multipurpose	Easy to store	Longer Lifetime	Easy Maintenance	Lower noise	Easy Operation	Attractive Design
	3	4	1	5	2	2	3	2	3	5	2
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

+

↶

↷

↺

↻

↷

↶

+

⊘

Alternative Solutions	Display	Knob	Switch	Buttons
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

				+					+	
				=					=	
				-					+	
				=					-	

Mark...	Inter...	Futur...
7	-9	
0	0	
3	9	
-5	-9	

Mark...	Inter...	Futur...
7	-9	1
0	0	0
3	9	-1
-5	-9	-4

Market Criteria		Internal Criteria										
		<div> <div>+</div> <div>↶</div> <div>↷</div> <div>↺</div> <div>↻</div> <div>↷</div> <div>↶</div> <div>+</div> <div>⊘</div> </div>										
		Internal Criteria	Component cost	Assembly time	Part number count							
		<input checked="" type="checkbox"/>	4	3	2							
		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
		<input checked="" type="checkbox"/>	-	-	-							
		<input checked="" type="checkbox"/>	+	+	+							
		<input checked="" type="checkbox"/>	-	-	-							

Alternative Solutions		Mark...	Inter...	Futur...
Display		7	-9	1
Knob		0	0	0
Switch		3	9	-1
Buttons		-5	-9	-4

DPM

The DPM provided a clear diagonal which gave a first idea how the solutions could be gathered into modules.

Functions / Technical S...	Description
► Lock rotation	Fix container to base
► Blade	Processing food
► Container cover	Avoid splashing
► Container	Hold the food
► Mount	Provide connection between...
► Electrical chord	Provide input voltage
► Knob	Control on/off, pulse/ice-cru...
► Housing	Cover the electronics
► Base structure	Contain controls, motor and ...
► Motor	Power the machine
Sum	

Product Properties	Code	No.	m...	sh...	m...	ye...	L	sh...	No.	ye...	co...	m...	rpm	W	dB
Number of steps	n/a														
Material Container	n/a														
Shape of Blade	n/a														
Material Base	n/a														
Replaceable parts	n/a														
Size container	n/a														
Shape of Container	n/a														
No. of functions	n/a														
Dishwasher safe	n/a														
Colour options	n/a														
Size of Base	n/a														
Rotator Speed	n/a														
Power	n/a														
Noise	n/a														

1	3	9	3	3	15	12	15	5	15	6	7	3	1
---	---	---	---	---	----	----	----	---	----	---	---	---	---

VCP	Score
1	45
10	762
10	549
20	1002
2	279
1	54
1.50	195
1	186
1.50	228
1.50	197

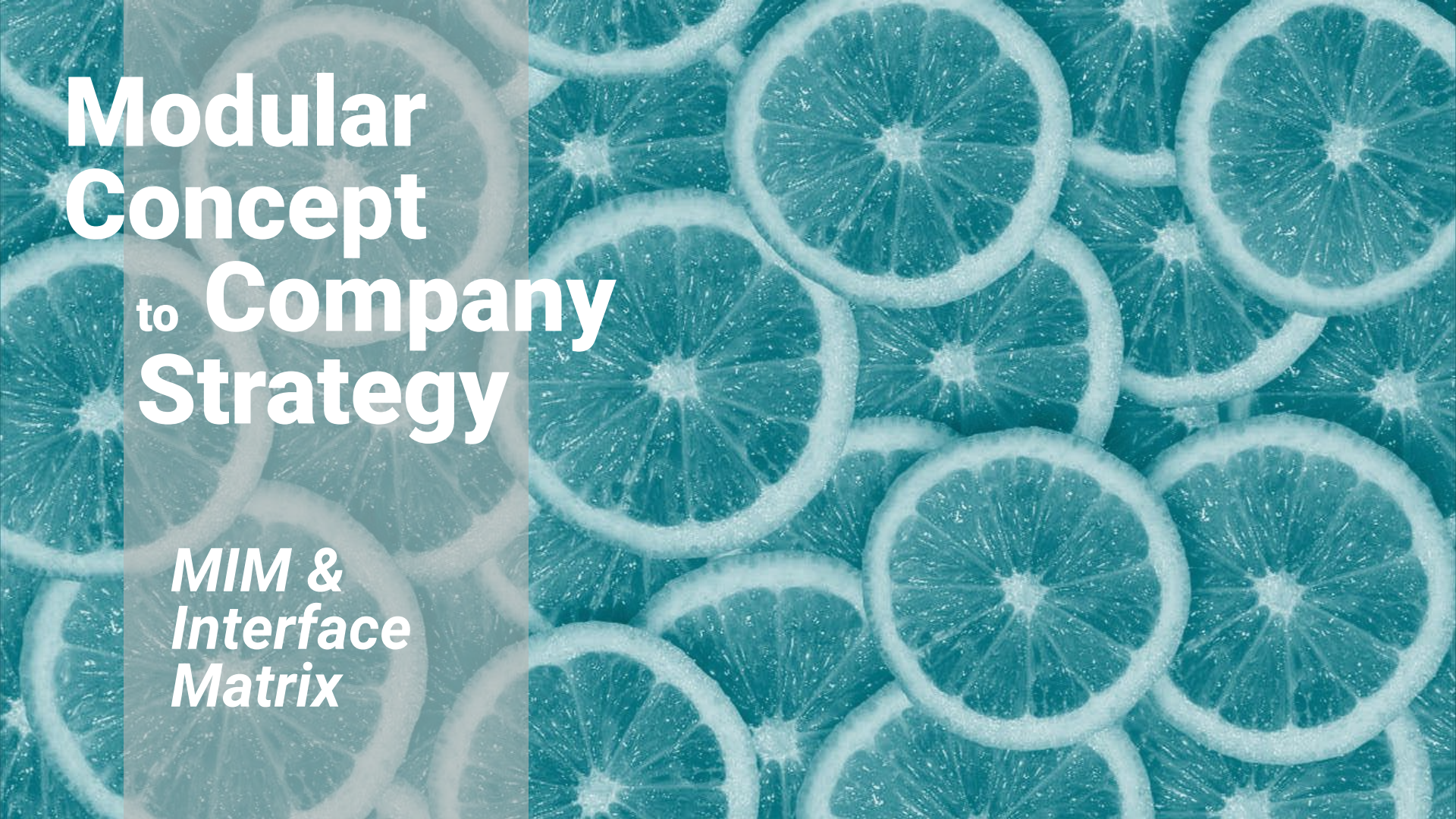
DPM

Candidate Modules

We had to adjust the list a bit since the electrical cord is, for example, obviously connected to the base structure.

With some adjustments we ended up with the table in this order.

Functions / Technical S...	Description
▶ Base structure	Contain controls, motor and ...
▶ Electrical chord	Provide input voltage
▶ Lock rotation	Fix container to base
▶ Mount	Provide connection between...
▶ Blade	Processing food
▶ Container cover	Avoid splashing
▶ Container	Hold the food
▶ Housing	Cover the electronics
▶ Knob	Control on/off, pulse/ice-cru...
▶ Motor	Power the machine

The background of the slide is a dense, repeating pattern of orange slices. The slices are arranged in a way that they overlap, creating a textured, organic feel. The color is a vibrant orange, and the lighting highlights the segments and the central pith of each slice.

Modular Concept to Company Strategy

*MIM &
Interface
Matrix*

Modules

PROPOSAL FROM DPM

MODULE BUILDER

Code	Modules / Functions	Description
M01	▶ Motor Module	
M02	▶ Container Module	
M03	▶ Blade Module	
M04	▶ Mount Module	
M05	▶ Housing Module	
M06	▶ Base Module	

Functions / Technical S...	Description
▶ Base structure	Contain controls, motor and ...
▶ Electrical chord	Provide input voltage
▶ Lock rotation	Fix container to base
▶ Mount	Provide connection between...
▶ Blade	Processing food
▶ Container cover	Avoid splashing
▶ Container	Hold the food
▶ Housing	Cover the electronics
▶ Knob	Control on/off, pulse/ice-cru...
▶ Motor	Power the machine

TECHNICAL SOLUTIONS

Code	Modules / Functions	Description
M01	▼ Motor Module	
	▶ Motor	Power the machine
M02	▼ Container Module	
	▶ Container	Hold the food
	▶ Container cover	Avoid splashing
M03	▼ Blade Module	
	▶ Blade	Processing food
M04	▼ Mount Module	
	▶ Mount	Provide connection between...
	▶ Lock rotation	Fix container to base
M05	▼ Housing Module	
	▶ Knob	Control on/off, pulse/ice-cru...
	▶ Housing	Cover the electronics
M06	▼ Base Module	
	▶ Electrical chord	Provide input voltage
	▶ Base structure	Contain controls, motor and ...

MIM- Module Indication Matrix

		Module Drivers	Carry Over	Technology Push	Planned Development	Technical Specification	Styling	Common Unit	Upgrading	Process & Organisat...	Recycling	Separate Testing	Strategic Supplier	Serviceability
Functions / Technica...	Description													
▶ Base structure	Contain controls, motor a...		○					●		◐	●			●
▶ Electrical chord	Provide input voltage		●					●				◐	●	◐
▶ Lock rotation	Fix container to base		◐					●		○	◐			
▶ Mount	Provide connection betw...		●			○		●						
▶ Blade	Processing food					○		●	●		◐	◐	●	
▶ Motor	Power the machine					○		●			○	●	●	●
▶ Container cover	Avoid splashing					◐	●			◐				
▶ Container	Hold the food				◐	●	●		●		●			
▶ Housing	Cover the electronics						●			◐	●			
▶ Knob	Control on/off, pulse/ice-c...				○		●			●				●
Sum			22	0	4	15	36	54	18	19	34	15	27	30

Strategy

Operational
Excellence

Base Module

Electrical chord
Base structure

Mount Module

Mount
Lock rotation

Motor Module

Motor

Blade Module

Blade

Customer
Intimacy

Housing Module

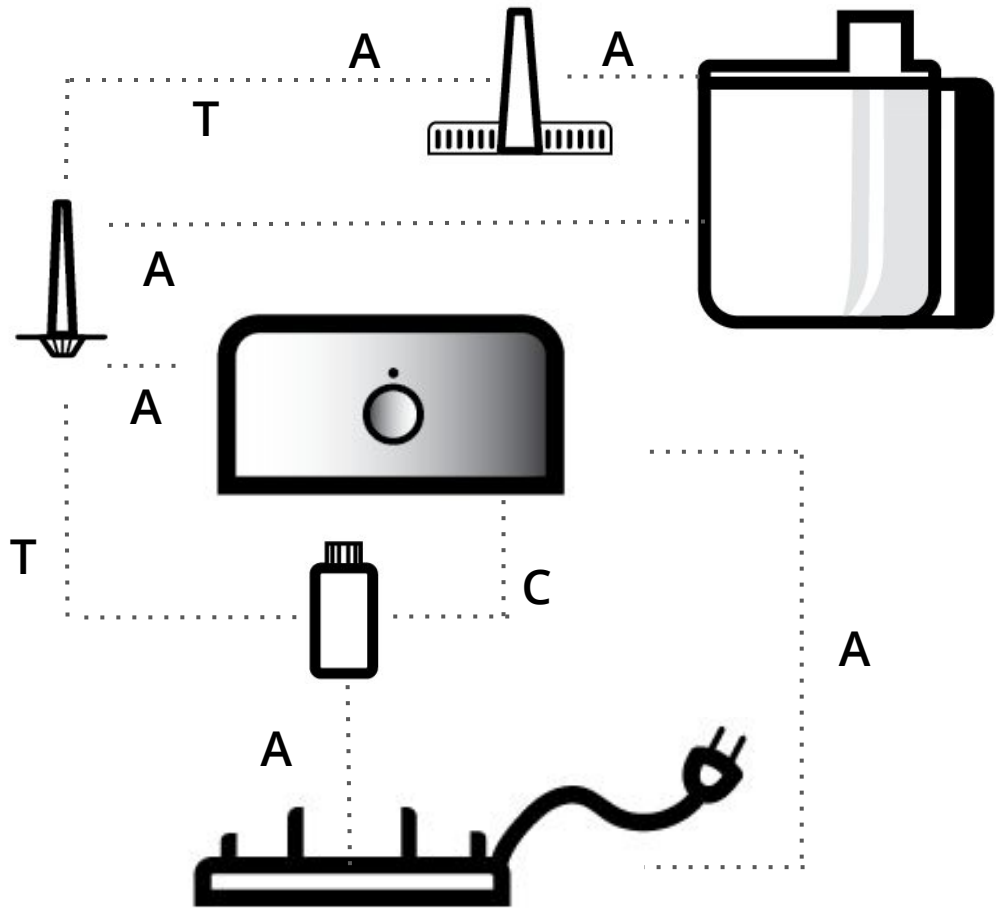
Housing
Knob

Container Module

Container
Container cover



ARCHITECTURE



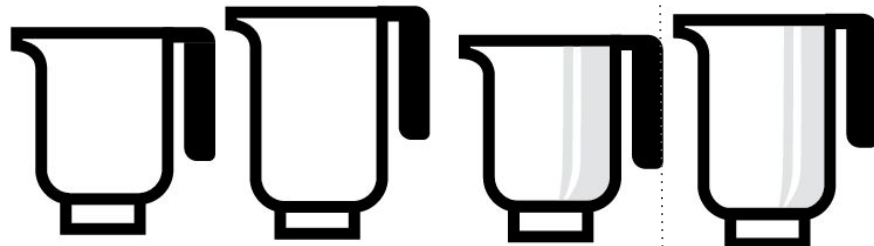
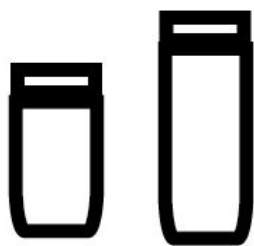


Modules

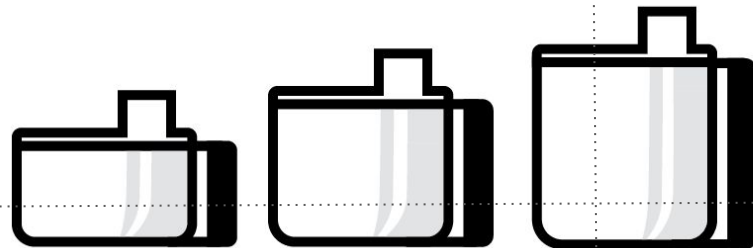
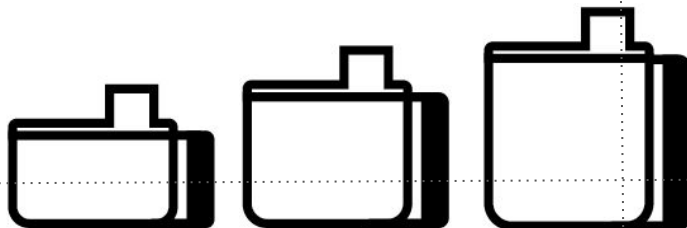
Container Module

Plastic

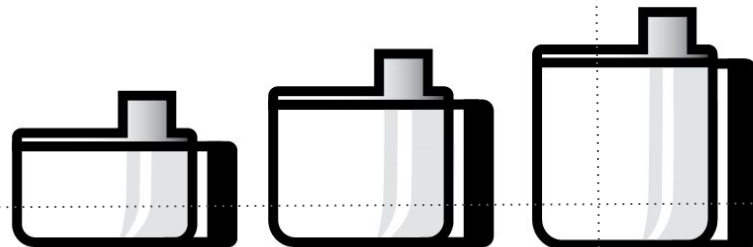
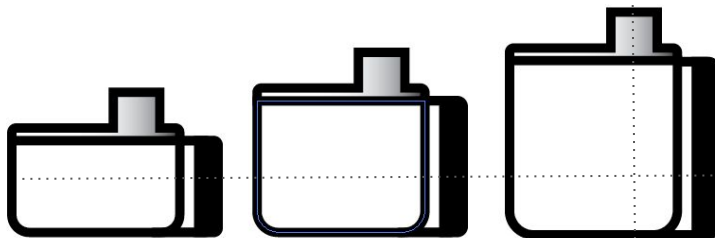
Glass



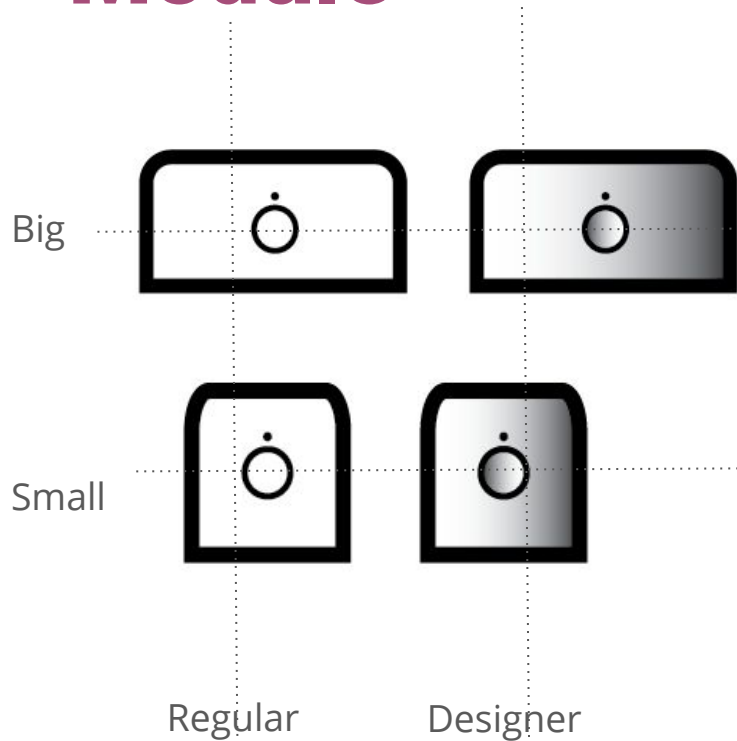
White cap



Stainless steel cap

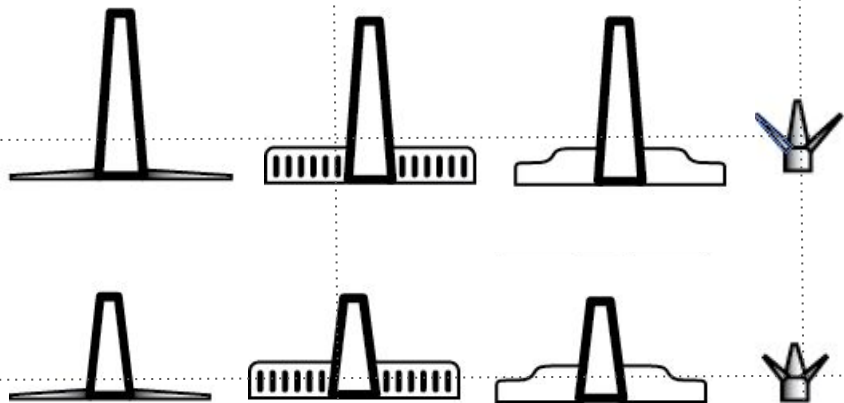


Housing Module



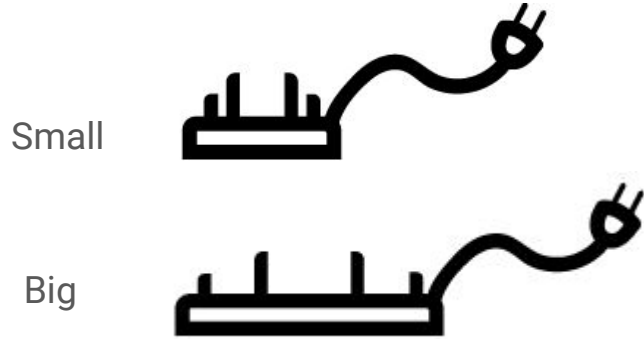
Food processor
blades

Blender- smoothie
blade



Blade Module

Base Module



Motor Module

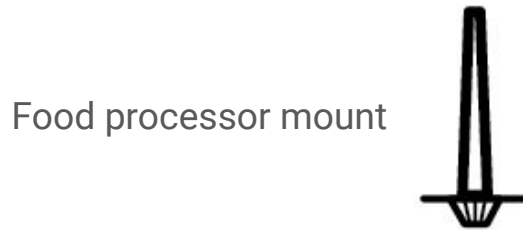


Commercial



Domestic

Mount Module



Blender mount

Product Configurations

31 *Configurations*

279 *Variants*

How do they
serve our
**Market
Segments?**

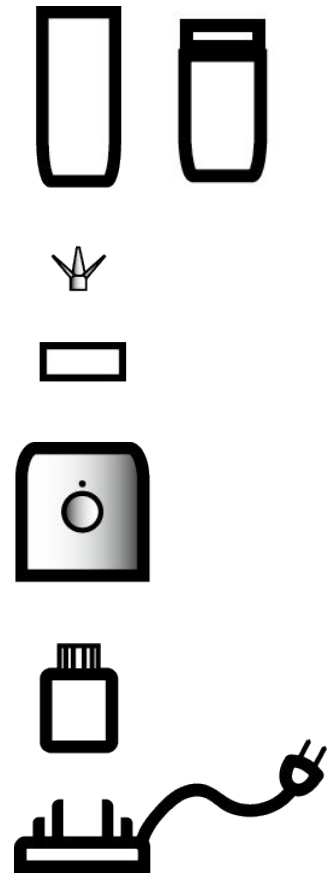


Intensive Domestic

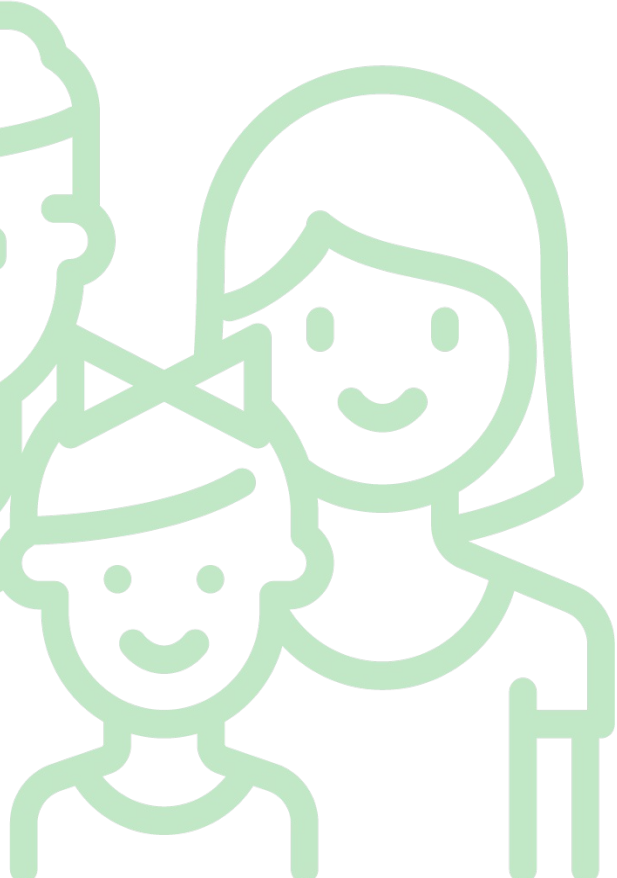


Smoothie Maker Package

- Catering to one required function
- Few steps and components
- Stainless steel finish for easier cleaning
- Good looks for daily use

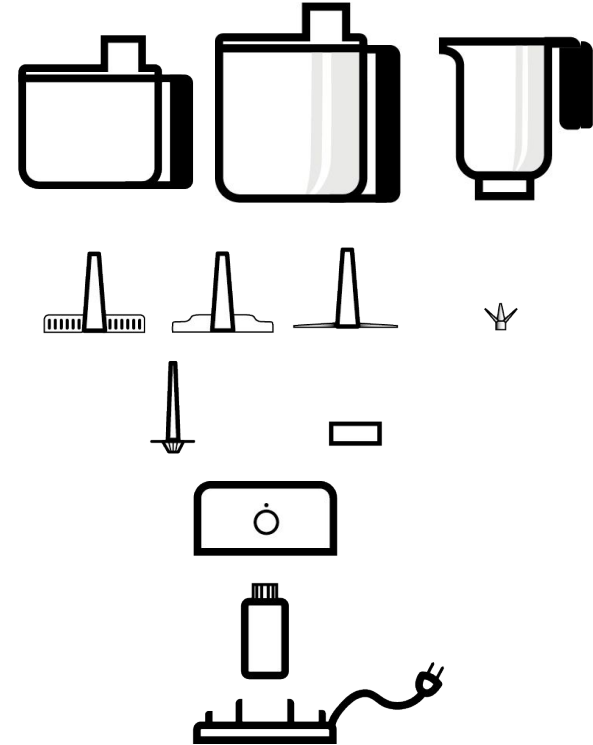


Occasional Domestic



Low cost Mixed Range

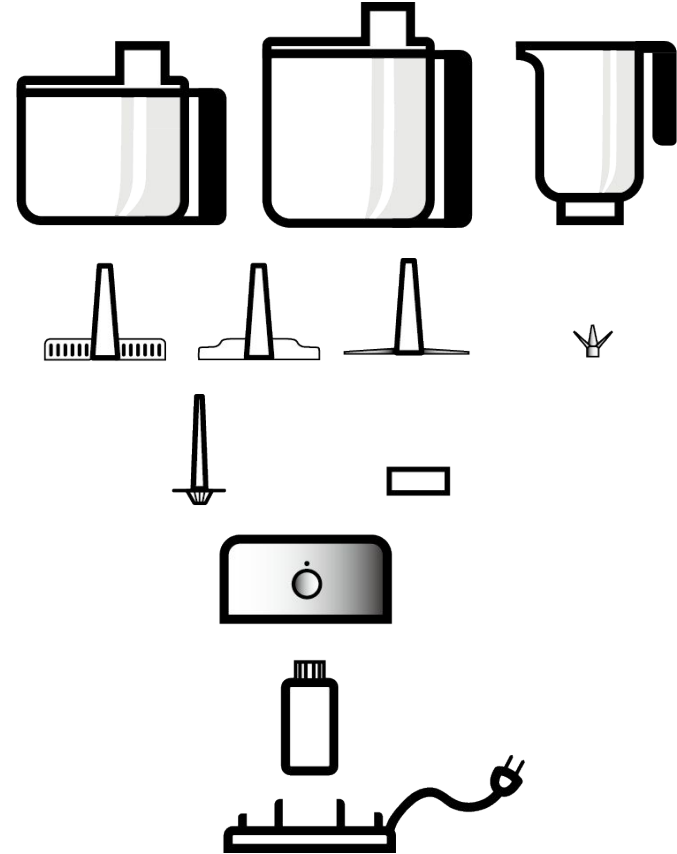
- Multipurpose catering for different occasions
- Different material of containers for different needs
- Low cost, regular housing because rarely used



Intensive Commercial

Large Food-processor Blender

- High capacity containers
- Glass for durability and increased usage options
- Stainless steel finish for easier cleaning



Commercial

Used

- High capacity for commercial use
- Regular housing for occasional cleaning, saved cost
- High end product for functional needs

Roadmap to Variation In Future

Sustainability is a growing trend which will become an integral part of both company and customer value system. Lifetime, maintenance and material will therefore be considered as more important factors.

All different modules might be change in terms of materials and traditional motors might see a change too.



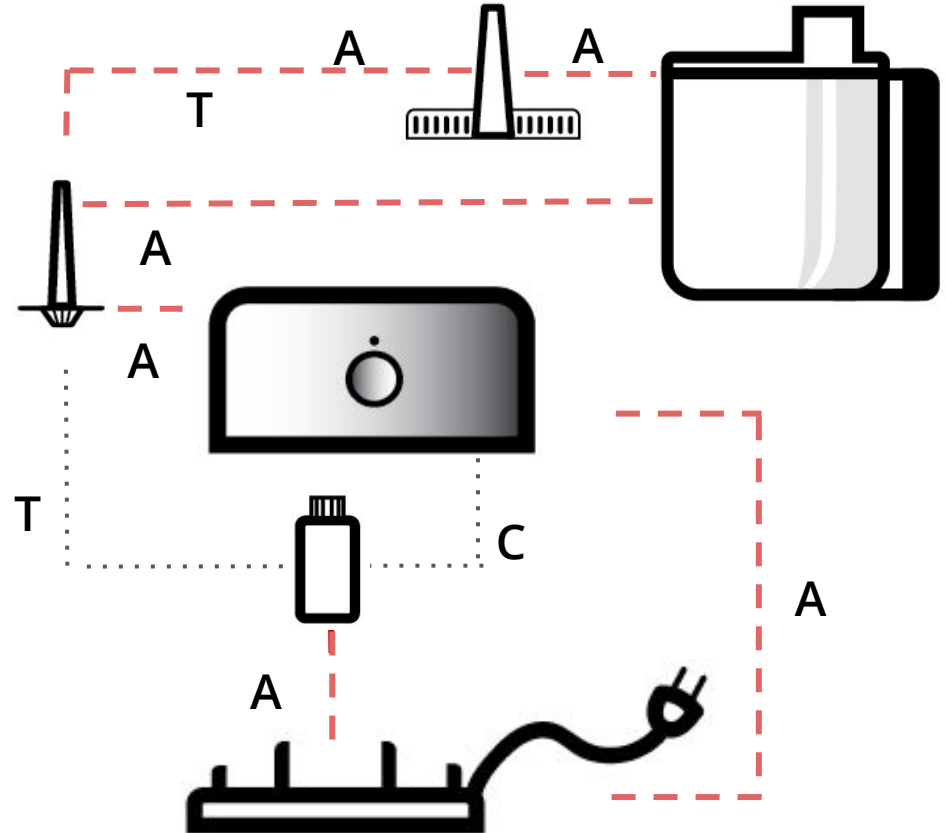


Modular Production and Supply Chain

Assembly Evaluation

	A				
T	A	A, T			
C			A		
A				A	

Hamburger
Assembly



Our Manifesto

*What kind of company
do we want to be...?*

**We want to use
modular design to
optimize:**

***Sustainability through
a circular product
service system!***

How?

- *Repairability means longer product lifetime*
- *Fewer parts means less waste material*
- *Fewer parts means less shipping*

Supply Chain Focus

- *Low number of variants*
- *Low change rate*
- *Economy of scale (mass production)*

Leveraging Module Strategy

Product Leadership

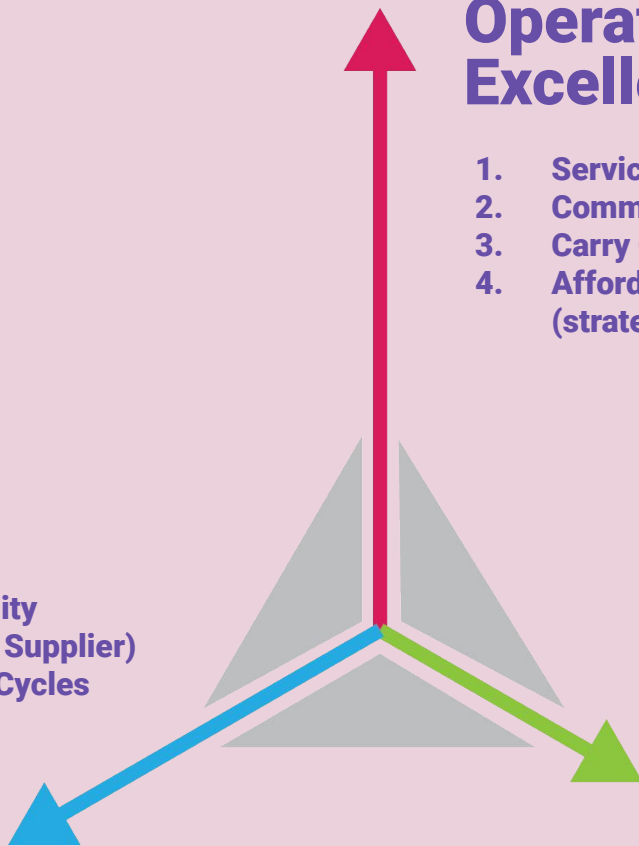
1. Build Quality (Strategic Supplier)
2. Fast R&D Cycles

Operational Excellence

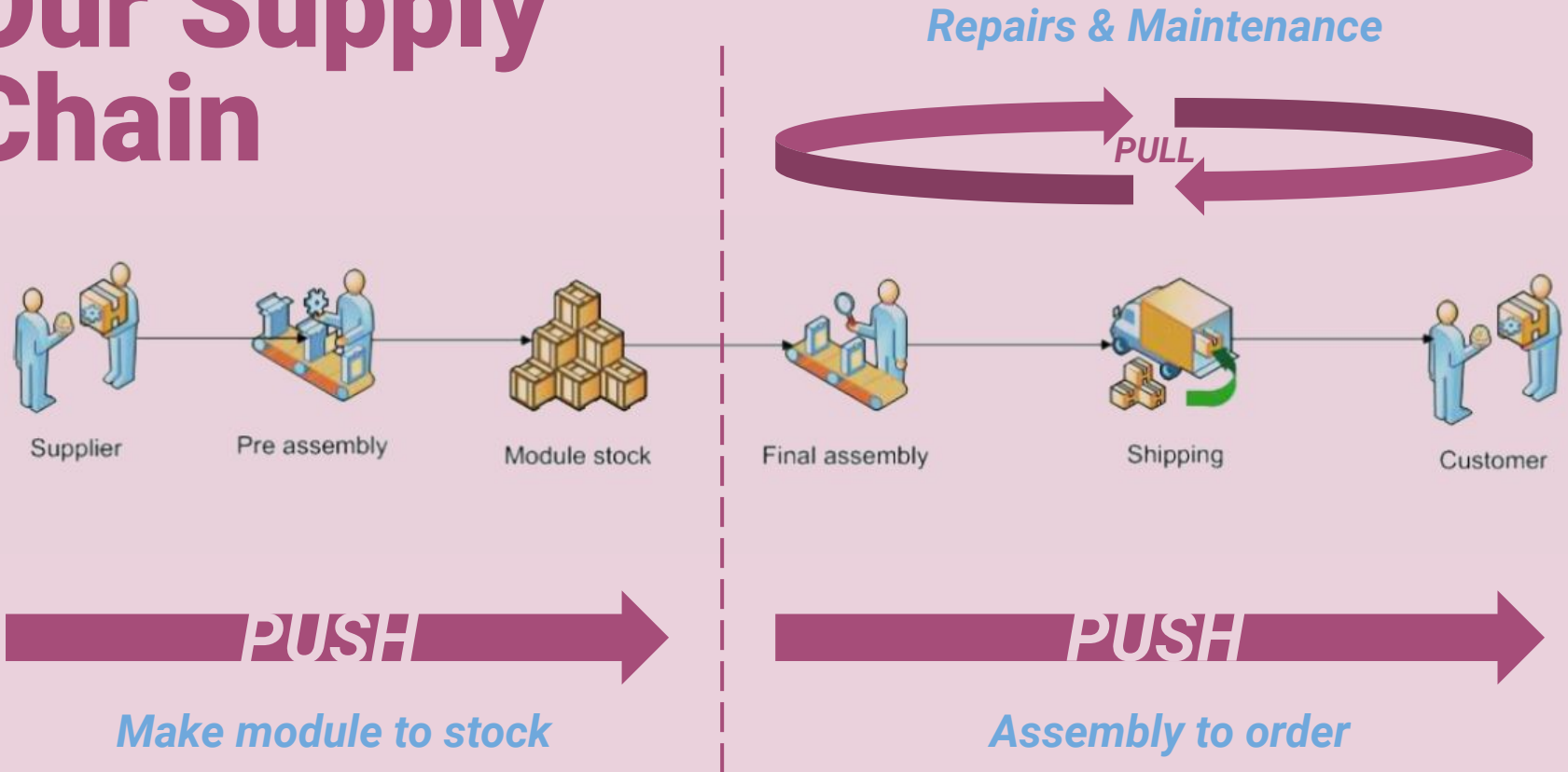
1. Service/Maintenance
2. Common Unit
3. Carry Over
4. Affordability (strategic supplier)

Customer Intimacy

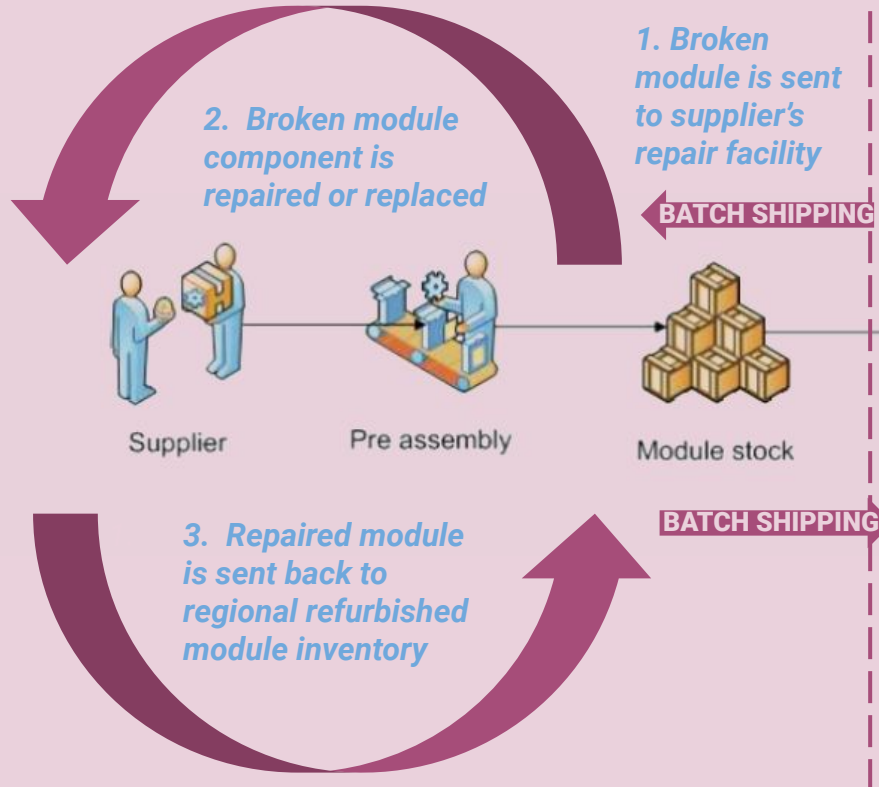
1. Local retail collaboration



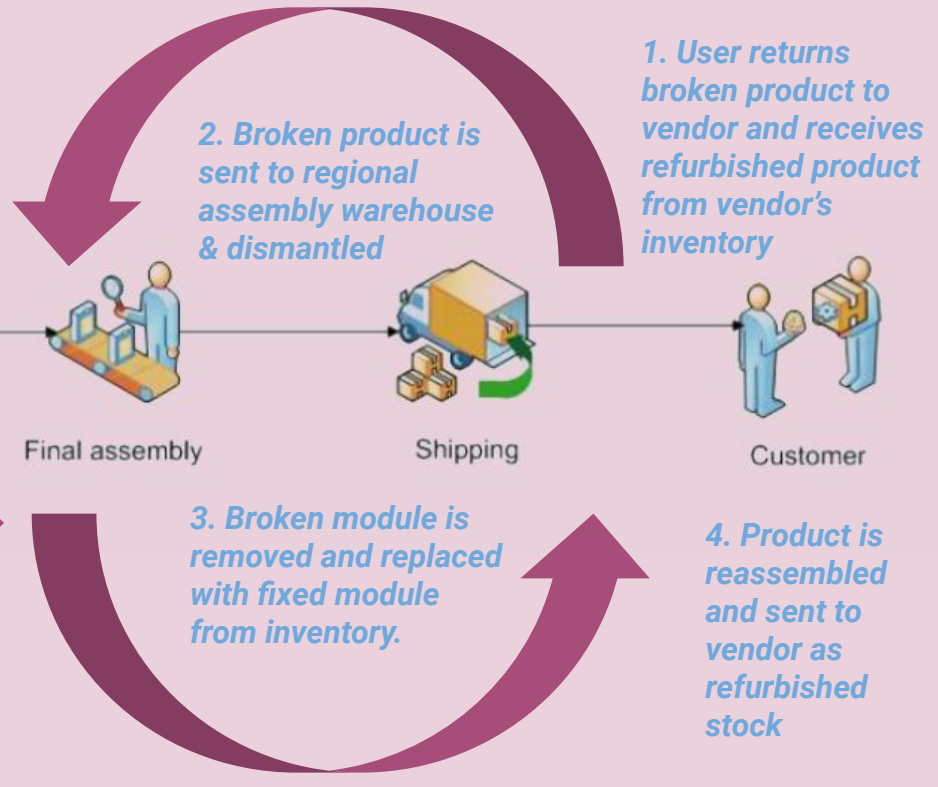
Our Supply Chain



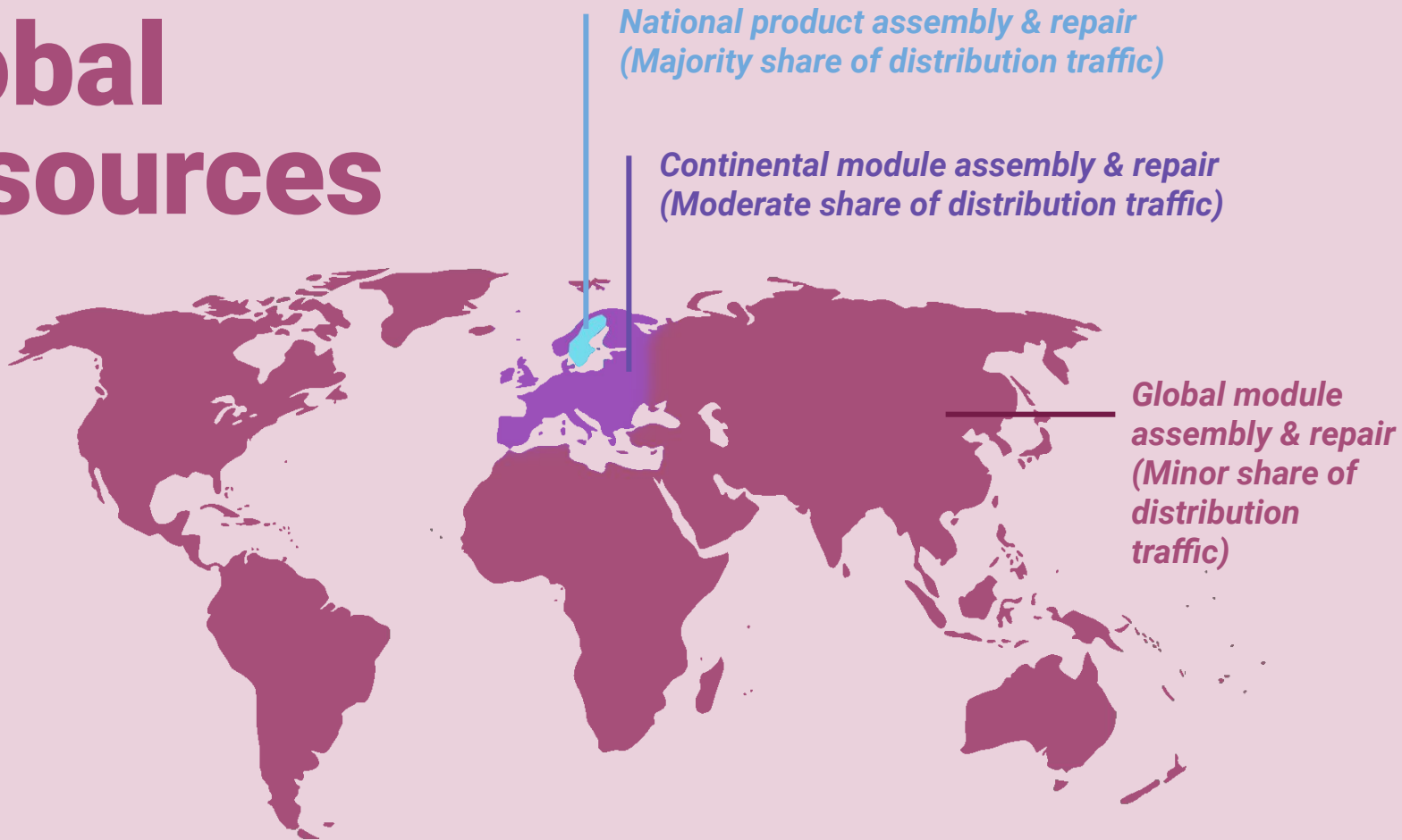
Global Repair Process



Regional Repair Process



Global Resources



Global Resources

*National product assembly & repair
(Majority share of distribution traffic)*

*Continental module assembly & repair
(moderate share of distribution traffic)*

*Global module
assembly & repair
(Minor share of
distribution
traffic)*

**Modularisation
allows companies to
reduce shipping
distances**



Balancing Lead Times

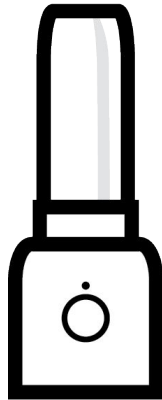
- *Standardised interfaces between parts*
- *Low change rate*
- *Economy of scale (mass production)*

Make or Buy?

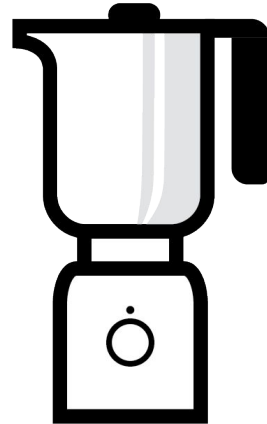
Base module	Operational Excellence	<i>Make</i> - To be in full control of the user interaction points
Mount module	Operational Excellence	<i>Make</i> - To be in full control of the user interaction points
Housing module	Product Leadership	<i>Make</i> - To be in full control of the design and user interaction points
Blade module	Operational Excellence	<i>Buy</i> - It's a common unit and no need of upgrades, therefore it's cheaper and easier to outsource it.
Container module	Customer Intimacy	<i>Make</i> - To be in full control of the design and user interaction points
Motor module	Operational Excellence	<i>Buy</i> - It's a common unit and no need of upgrades, therefore it's cheaper and easier to outsource it.

The Core Collection

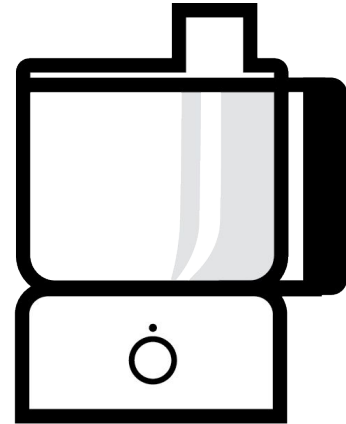
*A circular product service
system utilizing
modularity to deliver a
sustainable range of
kitchen electronics*



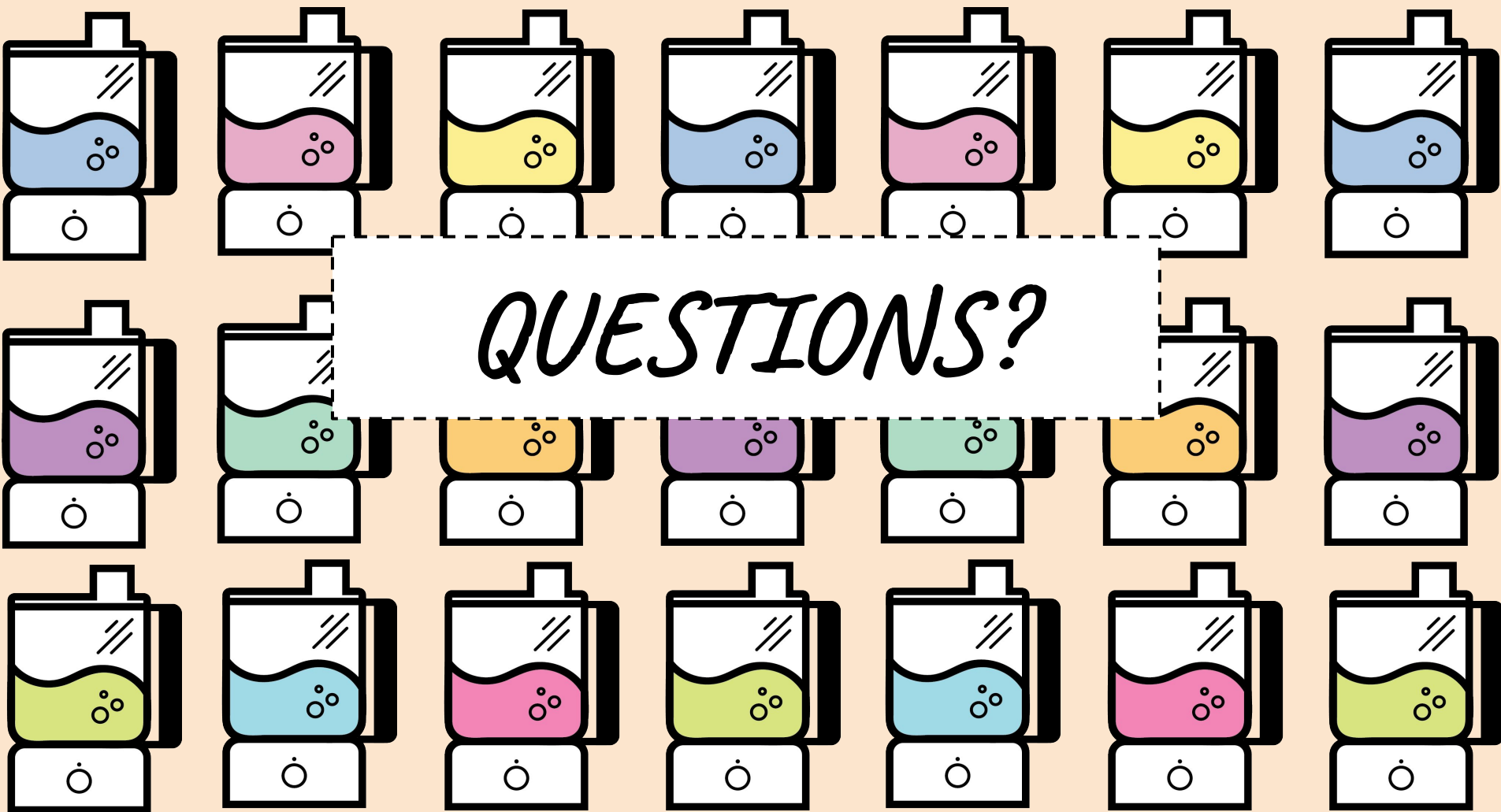
Smoothie Maker



Blender



Food Processor



APPENDIX

CVR

		Segments						
		Occasional Domestic	Intensive Domestic	Occasional Commercial	Intensive Commercial			
		1	1	1	1			
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Customer Values						Average	1-5	Order Wi...
High Capacity	<input type="radio"/>	8	1	7	11	6.75	3	1
High Performance	<input type="radio"/>	6	6	11	10	8.25	4	1
Good Stability	<input type="radio"/>	2	2	2	5	2.75	1	0
Easy to Clean	<input type="radio"/>	7	10	9	8	8.50	5	0
Multipurpose	<input type="radio"/>	10	4	1	2	4.25	2	0
Easy to store	<input type="radio"/>	11	3	3	3	5	2	1
Longer Lifetime	<input type="radio"/>	5	8	4	6	5.75	3	0
Easy Maintenance	<input type="radio"/>	3	5	5	7	5	2	0
Lower noise	<input type="radio"/>	1	7	10	4	5.50	3	0
Easy Operation	<input type="radio"/>	9	11	8	9	9.25	5	1
Attractive Design	<input type="radio"/>	4	9	6	1	5	2	0
Sum		66	66	66	66			

QFD

Customer Values			Product Properties														Sum	
			Code	Number of steps	Material Container	Shape of Blade	Material Base	Replaceable parts	Size container	Shape of Container	No. of functions	Dishwasher safe	Colour options	Size of Base	Rotator Speed	Power		Noise
High Capacity	3		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10
High Performance	4																	28
Good Stability	1																	9
Easy to Clean	5																	25
Multipurpose	2																	20
Easy to store	2																	10
Longer Lifetime	3																	4
Easy Maintenance	2																	9
Lower noise	3																	12
Easy Operation	5																	9
Attractive Design	2																	18
Weighted Sum			45	20	59	15	18	44	57	18	45	18	29	47	41	27		

DPM

	Product Properties	
Code	Number of steps	
Material	Material Container	
Shape	Shape of Blade	
Material	Material Base	
Replaceable	Replaceable parts	
Size	Size container	
Shape	Shape of Container	
No. of functions	No. of functions	
Dishwasher safe	Dishwasher safe	
Colour options	Colour options	
Size of Base	Size of Base	
Rotator Speed	Rotator Speed	
Power	Power	
Noise	Noise	

Functions / Technical S...	Description
▶ Base structure	Contain controls, motor and
▶ Electrical chord	Provide input voltage
▶ Lock rotation	Fix container to base
▶ Mount	Provide connection between...
▶ Blade	Processing food
▶ Motor	Power the machine
▶ Container cover	Avoid splashing
▶ Container	Hold the food
▶ Housing	Cover the electronics
▶ Knob	Control on/off, pulse/ice-cru...

	Sum
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[illegible]

VCP	Score
1.50	228
1	54
1	45
2	279
10	762
1.50	197
10	549
20	1 002
1	186
1.50	195

MIM

		Module Drivers												
		Carry Over	Technology Push	Planned Development	Technical Specification	Styling	Common Unit	Upgrading	Process & Organisation	Recycling	Separate Testing	Strategic Supplier	Serviceability	
Functions / Technical S...	Description													
▶ Base structure	Contain controls, motor and ...	○					●		◐	●			●	
▶ Electrical chord	Provide input voltage	●					●				◐	●	◐	
▶ Lock rotation	Fix container to base	◐					●		○	◐				
▶ Mount	Provide connection between...	●			○		●							
▶ Blade	Processing food				○		●	●		◐	◐	●		
▶ Motor	Power the machine				○		●			○	●	●	●	
▶ Container cover	Avoid splashing				◐	●			◐					
▶ Container	Hold the food			◐	●	●		●		●				
▶ Housing	Cover the electronics					●			◐	●				
▶ Knob	Control on/off, pulse/ice-cru...			○		●			●				●	
Sum		22	0	4	15	36	54	18	19	34	15	27	30	

MB

Code	Modules / Functions	Description
M01	▼ Motor Module	
	▶ Motor	Power the machine
M02	▼ Container Module	
	▶ Container	Hold the food
	▶ Container cover	Avoid splashing
M03	▼ Blade Module	
	▶ Blade	Processing food
M04	▼ Mount Module	
	▶ Mount	Provide connection between...
	▶ Lock rotation	Fix container to base
M05	▼ Housing Module	
	▶ Knob	Control on/off, pulse/ice-cru...
	▶ Housing	Cover the electronics
M06	▼ Base Module	
	▶ Electrical chord	Provide input voltage
	▶ Base structure	Contain controls, motor and ...

IM

Code		Modules						
		Modules	Motor Module	Container Module	Blade Module	Mount Module	Housing Module	Base Module
		Code	M01	M02	M03	M04	M05	M06
M01	Motor Module							
M02	Container Module							
M03	Blade Module			A				
M04	Mount Module		T	A	A, T			
M05	Housing Module		C			A		
M06	Base Module		A				A	

MVS

Code		Modules / Variants		Product Properties																			
C	S	No.	m...	sh...	V	O	V	V	ye...	L	sh...	V	D	O	V	ye...	co...	m...	rpm	V	V	V	D
M01 ▼ Motor Module																							
MV01:01 Commercial																							
MV01:02 Domestic																							
M02 ▼ Container Module																							
MV02:01 Small Plastic Sm...																							
MV02:12 Large Plastic Sm...																							
MV02:02 Small Plastic Ble...																							
MV02:04 Large Plastic Ble...																							
MV02:05 Small Glass Blen...																							
MV02:06 Large Glass Blen...																							
MV02:07 Small Plastic Foo...																							
MV02:08 Medium Plastic ...																							
MV02:03 Large Plastic Foo...																							
MV02:09 W cap small glas...																							
MV02:15 SS Small glass FPC																							
MV02:10 W Medium glass...																							
MV02:16 SS Medium glas...																							
MV02:11 W Large glass FPC																							
MV02:17 SS Large glass FPC																							
M03 ▼ Blade Module																							
MV03:01 Small Blenders...																							
MV03:05 Large Blenders...																							
MV03:02 Small Food Proc...																							
MV03:06 Large Food Proc...																							
M04 ▼ Mount Module																							
MV04:01 Blender mount																							
MV04:02 Food processor ...																							
M05 ▼ Housing Module																							
MV05:01 Regular Housing ...																							
MV05:03 Design Housing ...																							
MV05:04 Regular Housing ...																							
MV05:02 Design Housing ...																							
M06 ▼ Base Module																							

PCM

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