

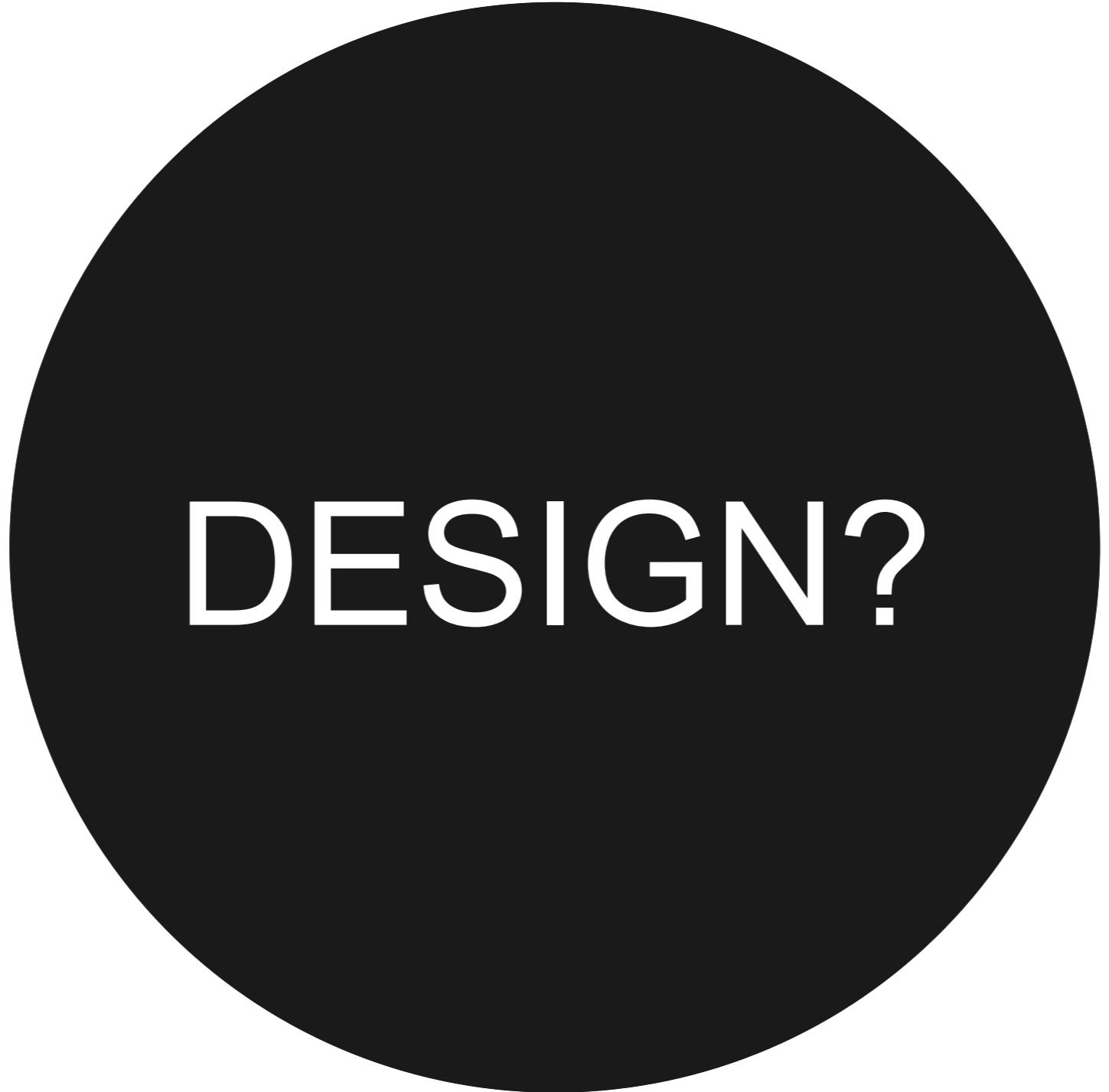


material  
concept  
center

PRESENTATIE door Adriaan Debruyne  
[adriaan@materialconcept.center](mailto:adriaan@materialconcept.center)

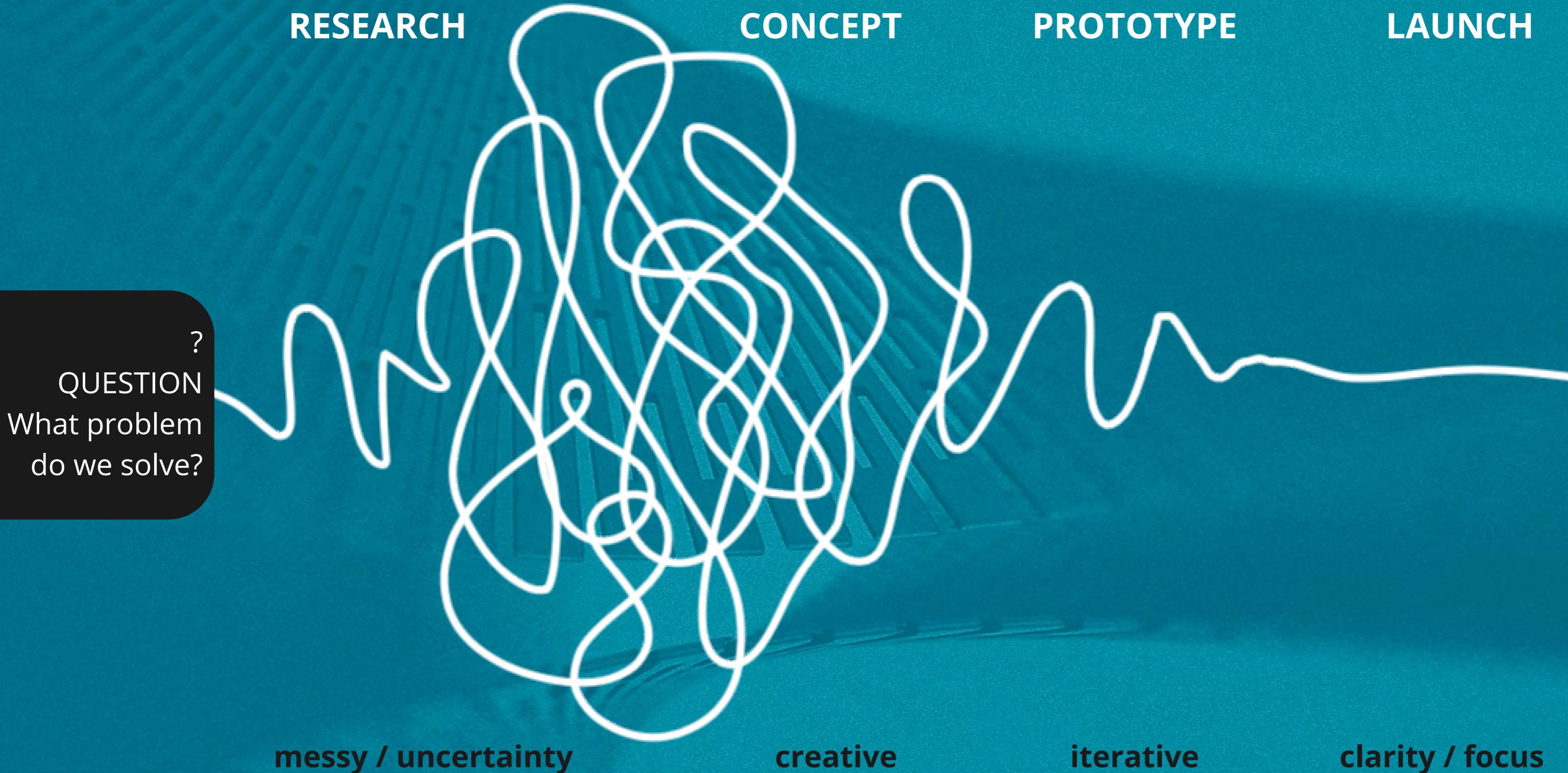


# MATERIALS & DESIGN PROCESS in the FABLAB context



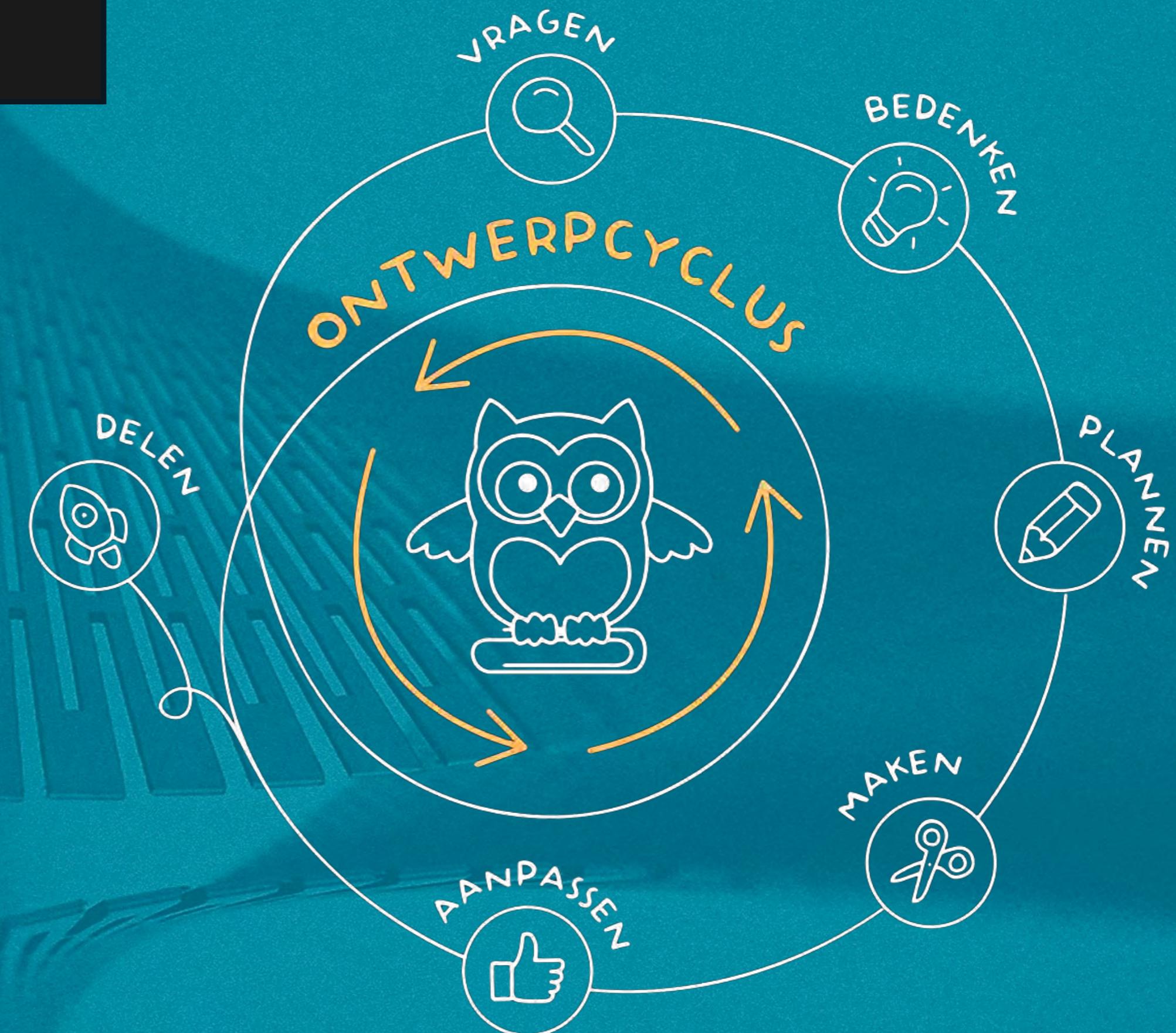
DESIGN?

# DESIGN PROCESS

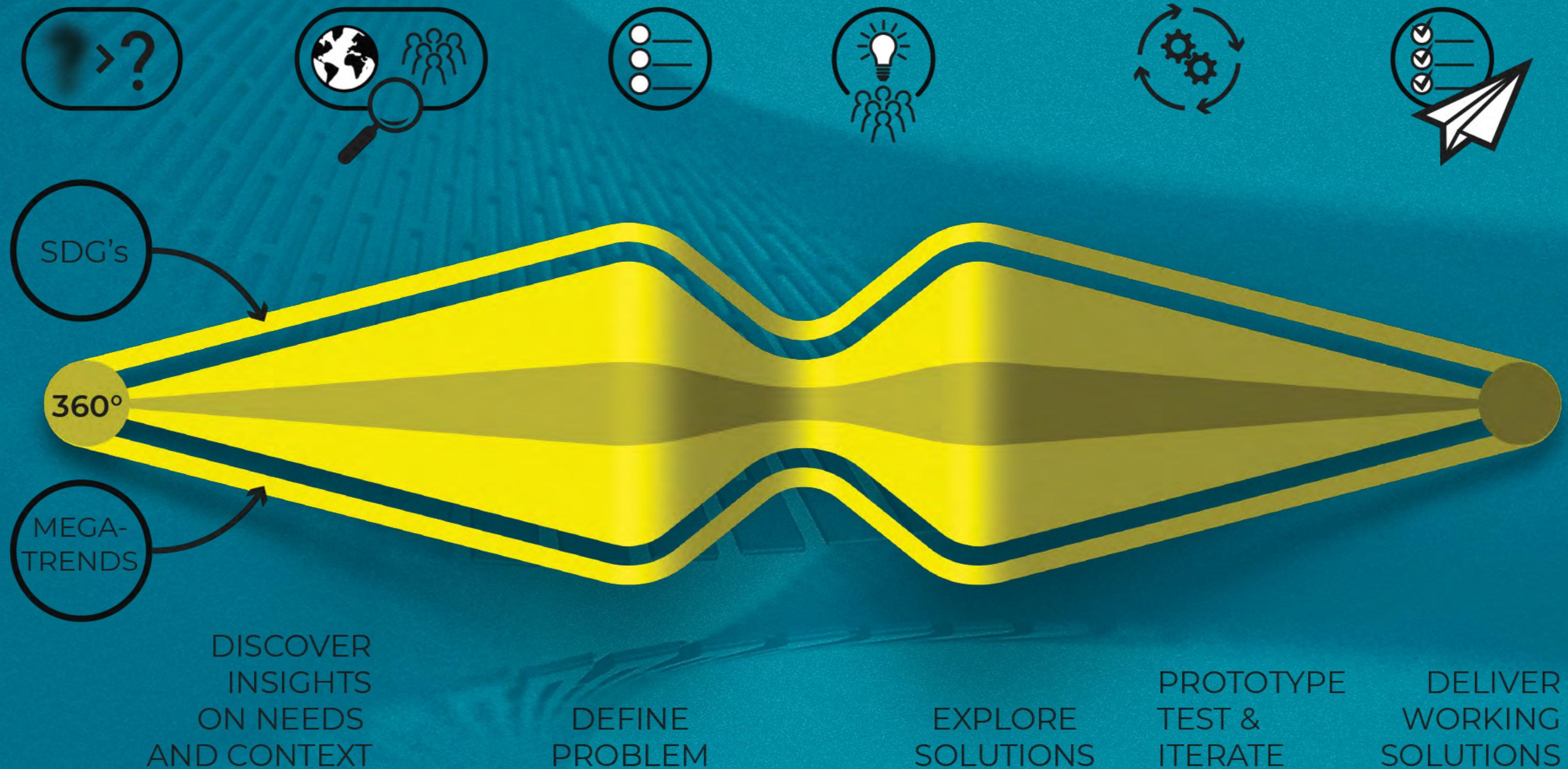


# DESIGN PROCESS

ITERATIVE  
PROCESS



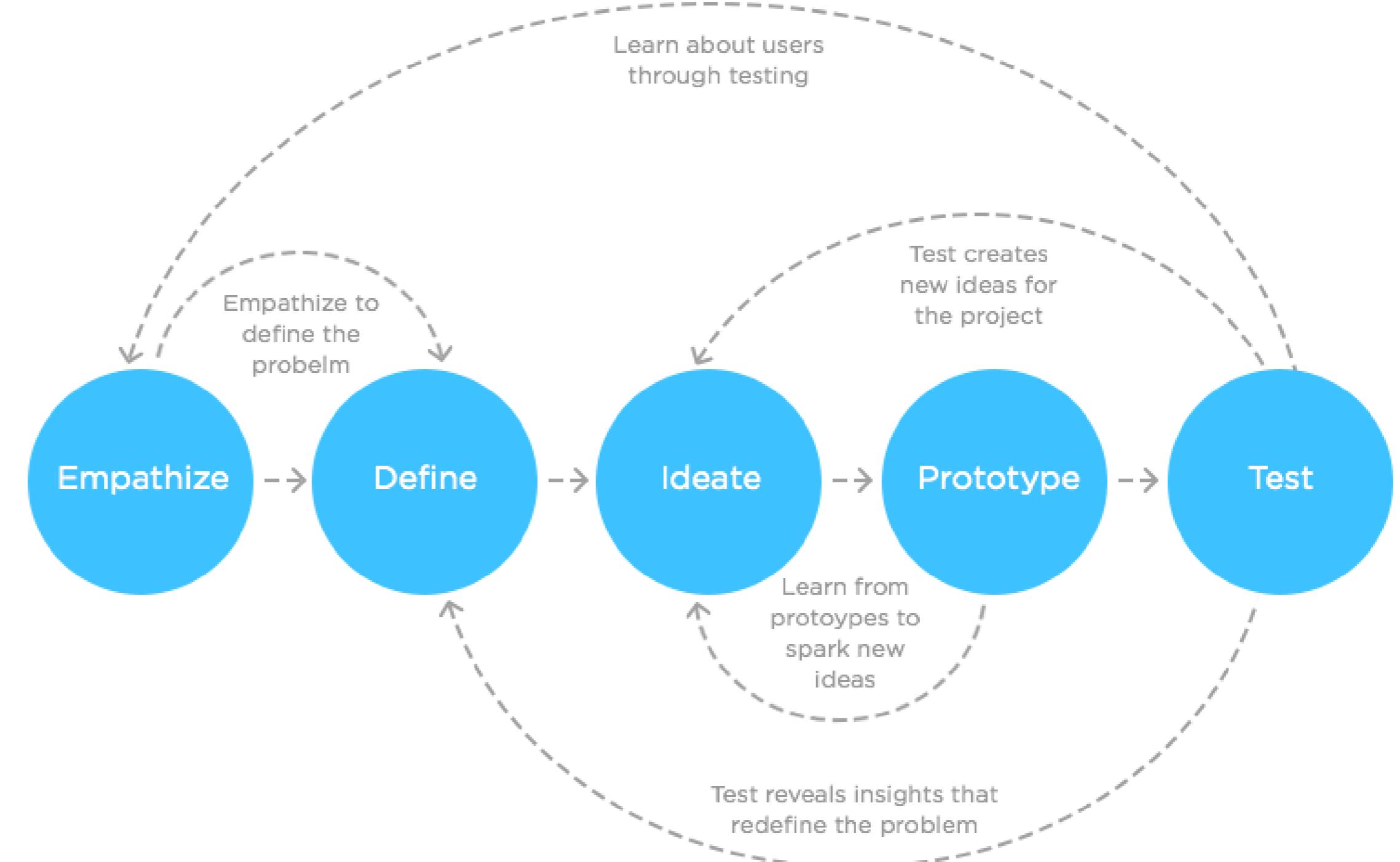
# DESIGN THINKING PROCESS



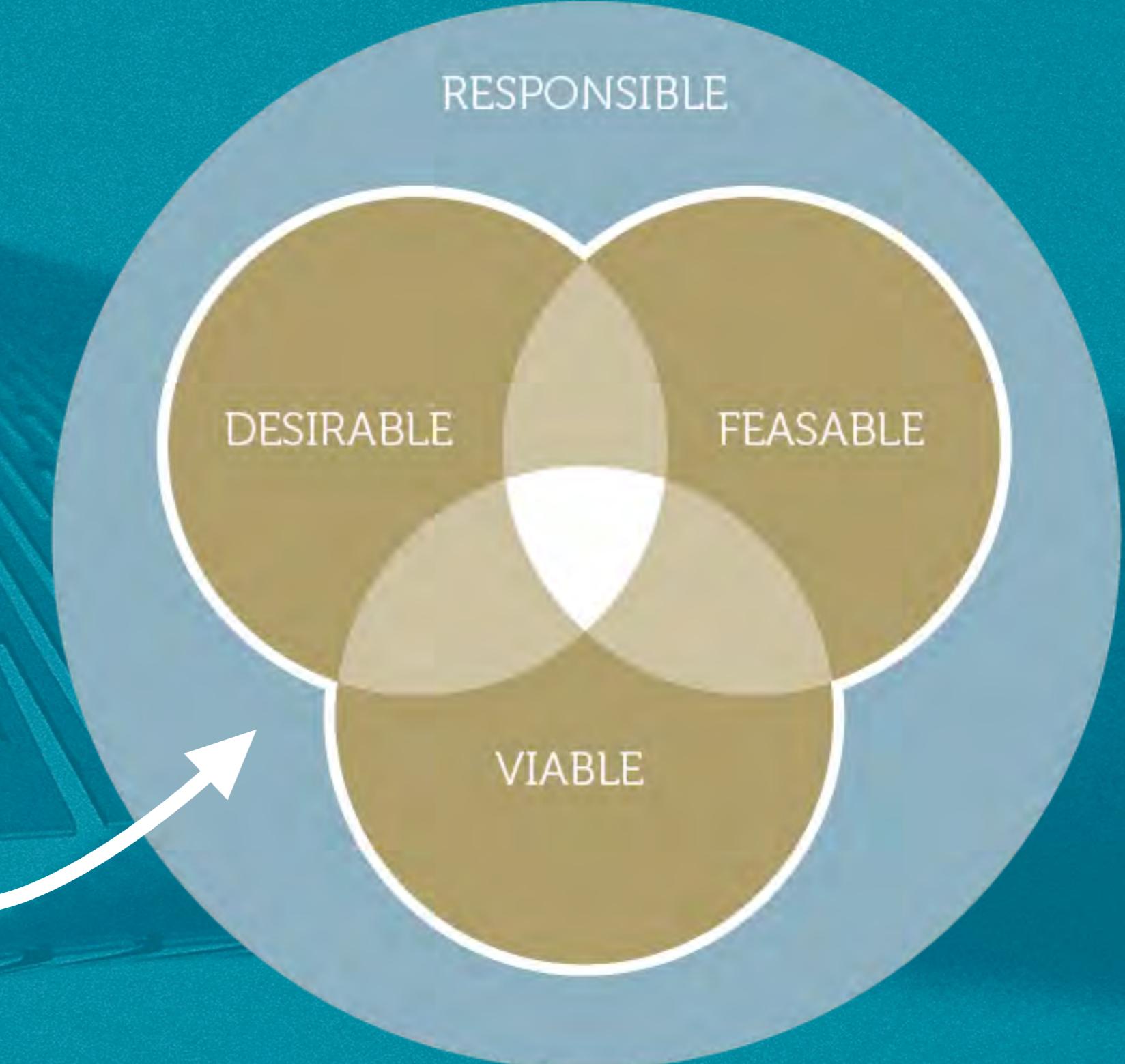
## DESIGN THINKING PROCESS

# DESIGN THINKING:

## A non-linear process



DOING THE RIGHT THINGS  
DOING THE THINGS RIGHT





DISCOVER

DISCOVER

HUMAN CENTERED

NEEDS, PROBLEMS, POSSIBILITIES, WISHES, CULTURE, ...



# DISCOVER

## FRONT & BACK



# DISCOVER

## FIELD RESEARCH

Observe and learn

Detect BUGS in peoples lives



# DISCOVER

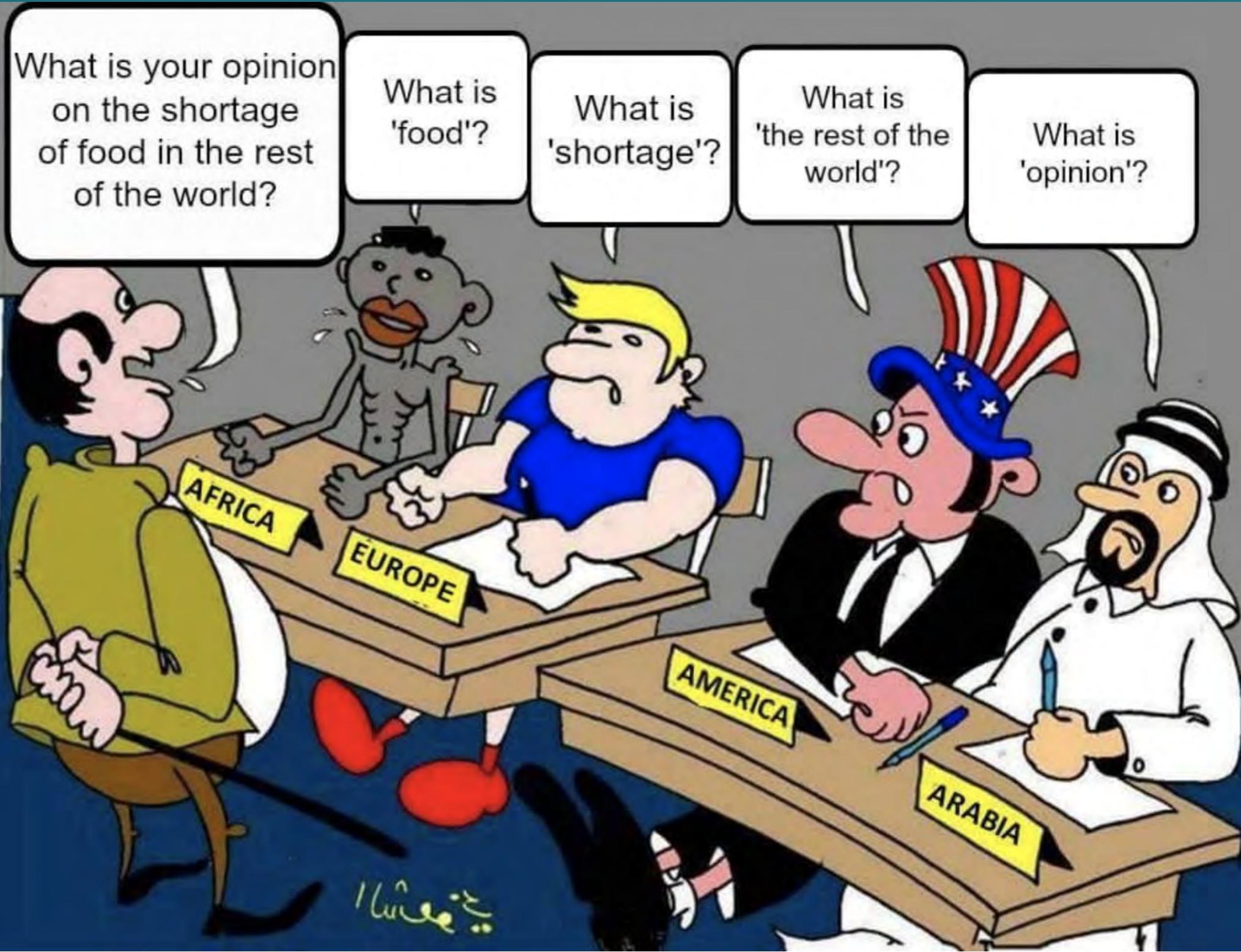


**FIELD RESEARCH**  
**Observe and learn**  
**beyond your bias**



# DISCOVER

GAIN  
INSIGHTS IN  
THE CONTEXT



# 9 WINDOWS context mapping

GAIN  
INSIGHTS IN  
THE CONTEXT

SubSYSTEM SYSTEM SUPERSYSTEM

FACTORY  
BRAND  
SHOP

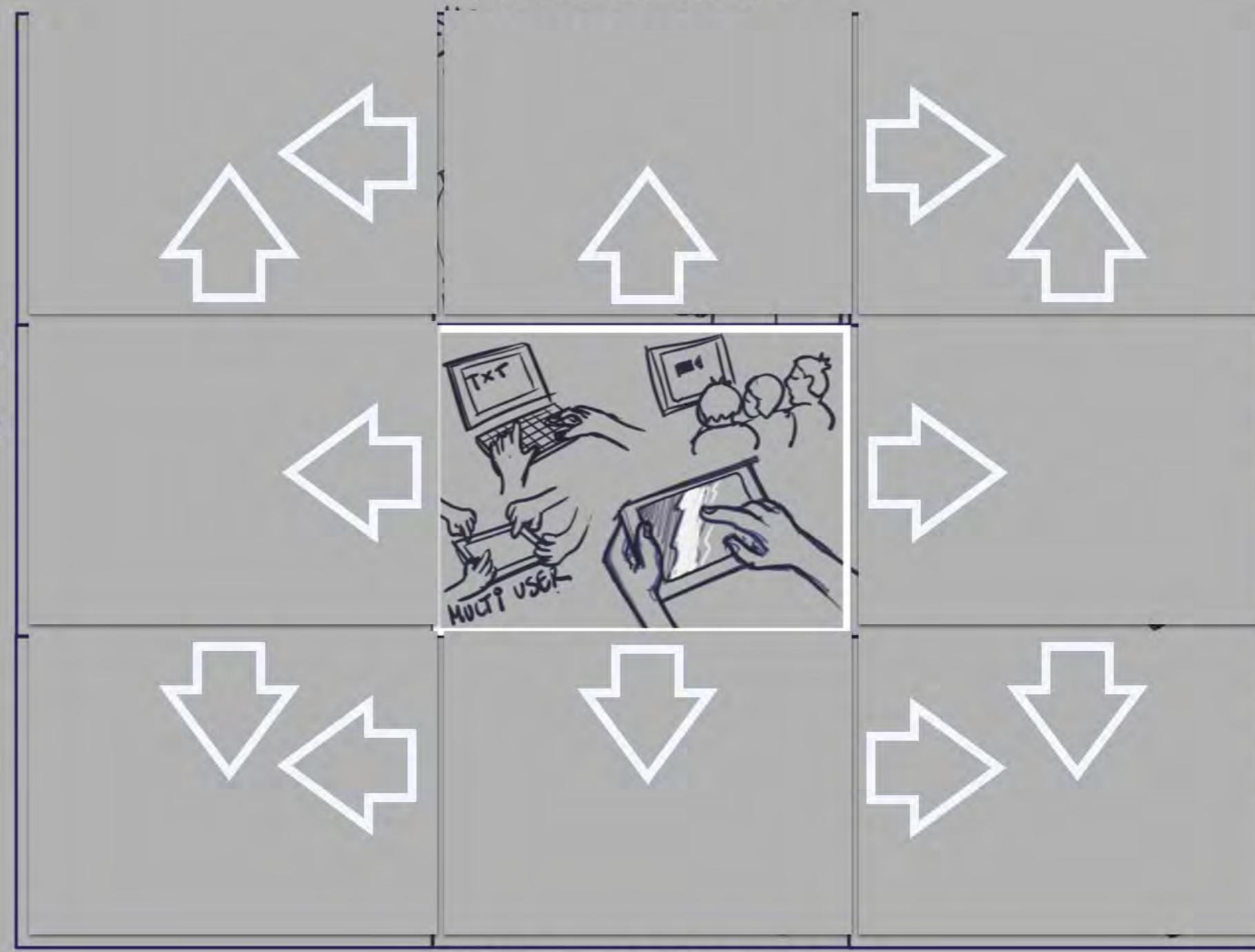
CHOOSING  
BUYING  
UNPACKING

3<sup>rd</sup> PARTY  
ACC.  
MATERIALS

ENVIRONMENTAL CIRCUMST.  
WHO/WHAT HOLDS IT?  
WHO USES IT?  
WHERE DO YOU USE IT?

STORING  
CLEANING  
CHARGING  
CARRYING

STORING PARTS  
PROTECTION  
RECYCLING  
REPLACING PARTS



PAST

PRESENT

FUTURE

# 9 WINDOWS context mapping

GAIN  
INSIGHTS IN  
THE CONTEXT

SubSystem      SYSTEM      SUPERSystem

FACTORY  
BRAND  
SHOP

CHOOSING  
BUYING  
UNPACKING

3<sup>rd</sup> PARTY  
ACC.  
MATERIALS

ENVIRONMENTAL CIRCUMST.  
WHO/WHAT HOLDS IT?  
WHO USES IT?  
WHERE DO YOU USE IT?

STORING  
CLEANING  
CHARGING  
CARRYING

STORING PARTS  
PROTECTION  
RECYCLING  
REPLACING PARTS

PARTS / SOFTWARE / ACC.

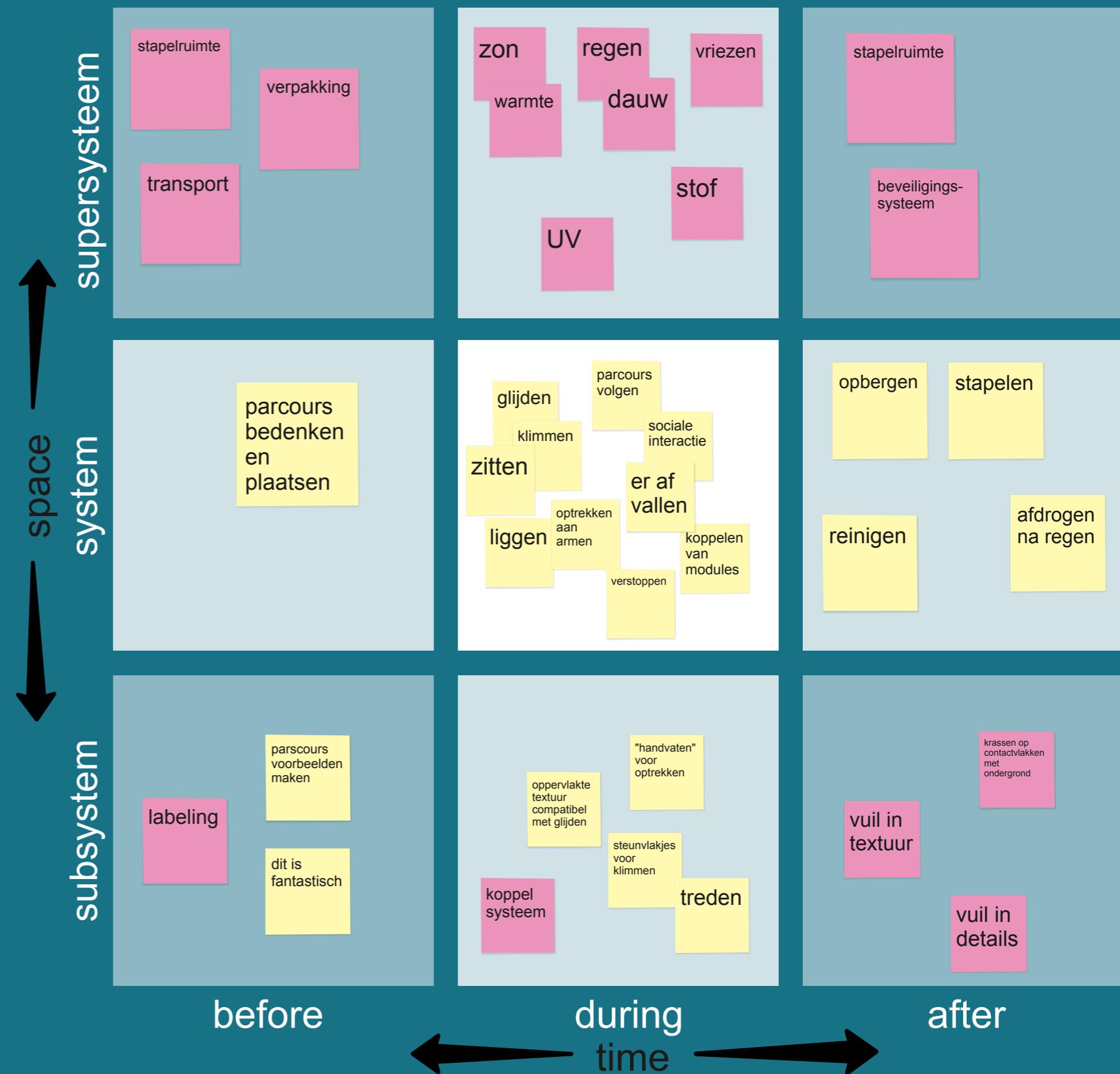
PAST

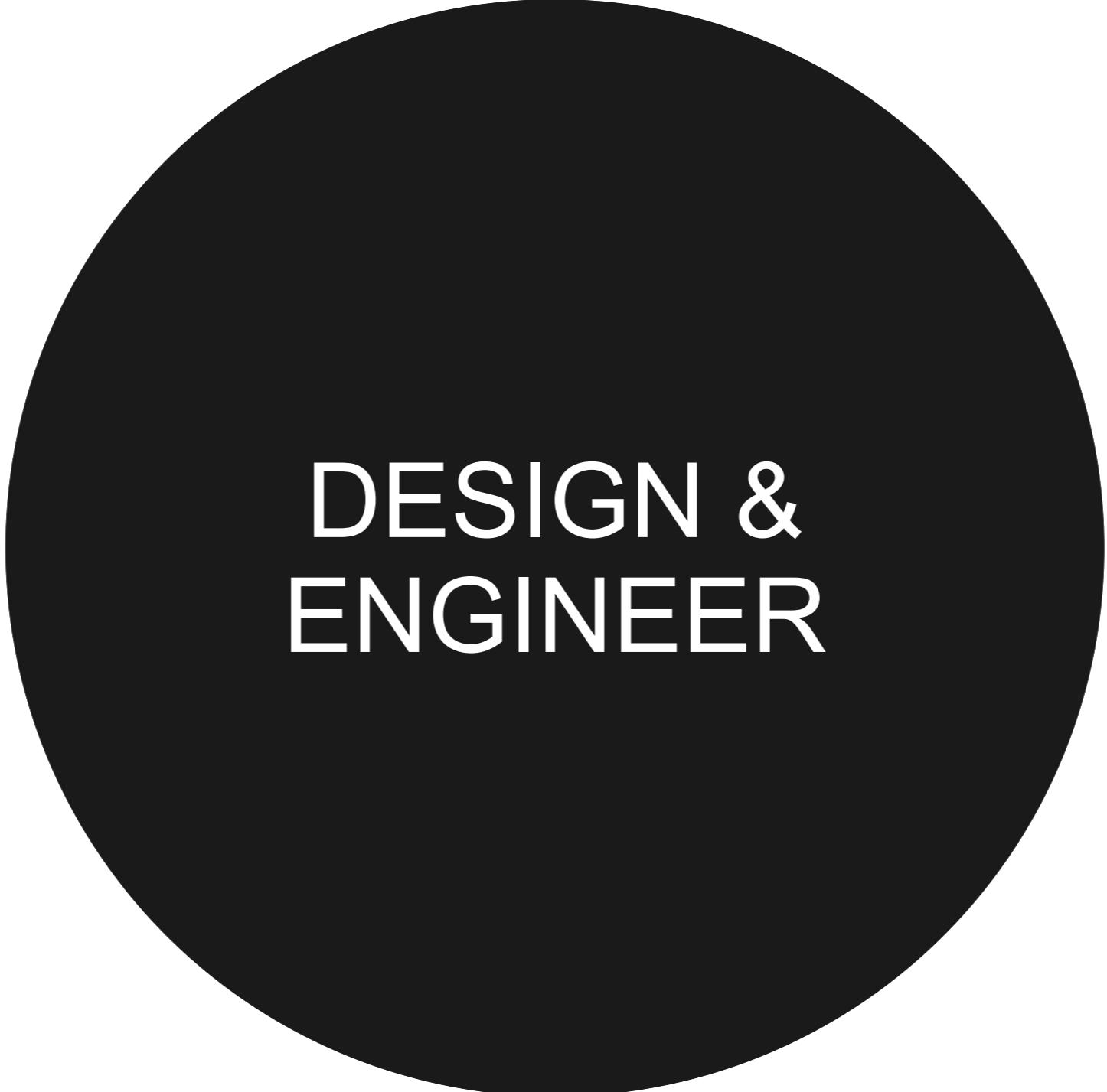
PRESENT

FUTURE

# 9 WINDOWS context mapping

GAIN  
INSIGHTS IN  
THE CONTEXT





DESIGN &  
ENGINEER

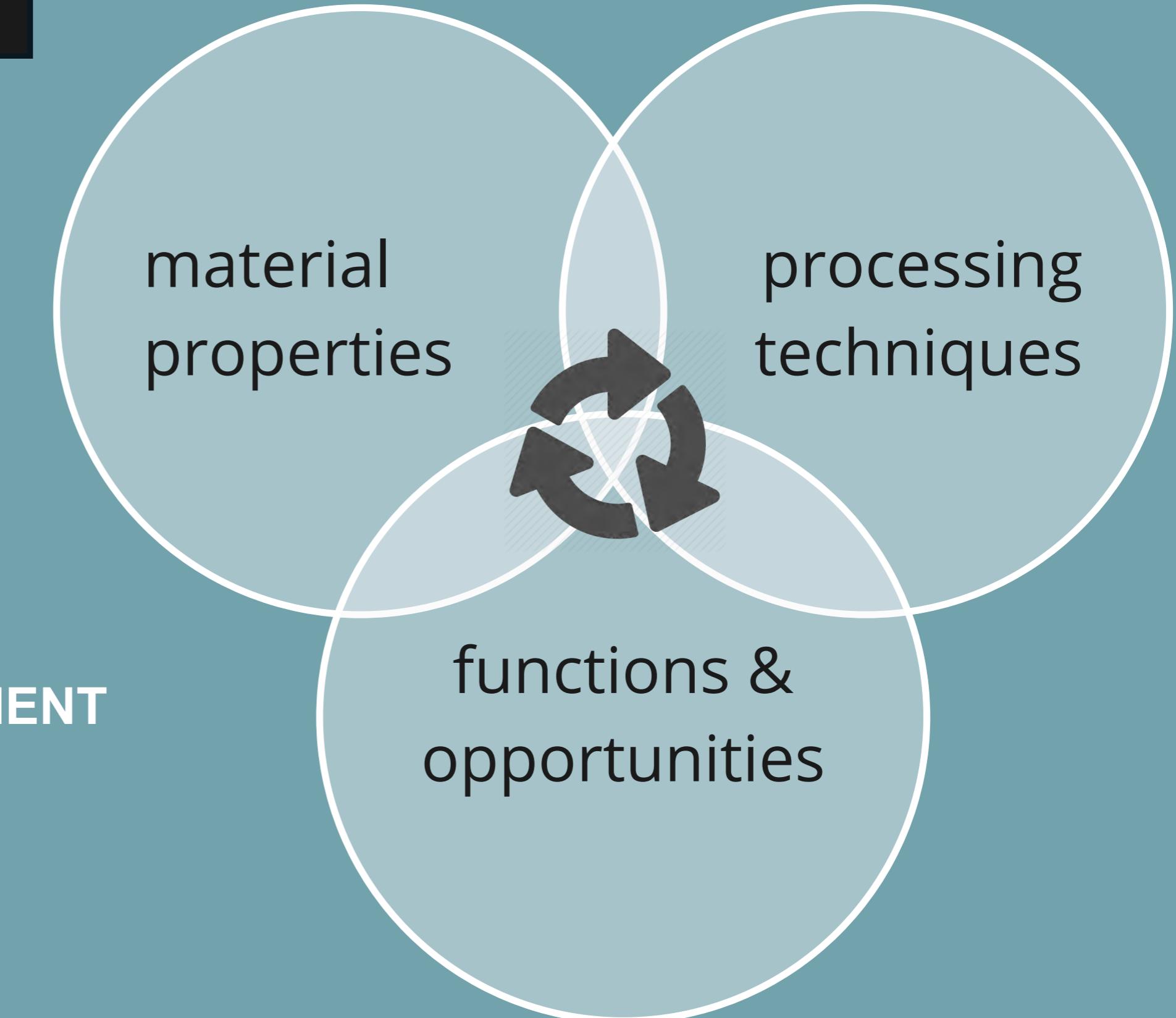
FORM FOLLOWS MATERIAL

INSIGHTS

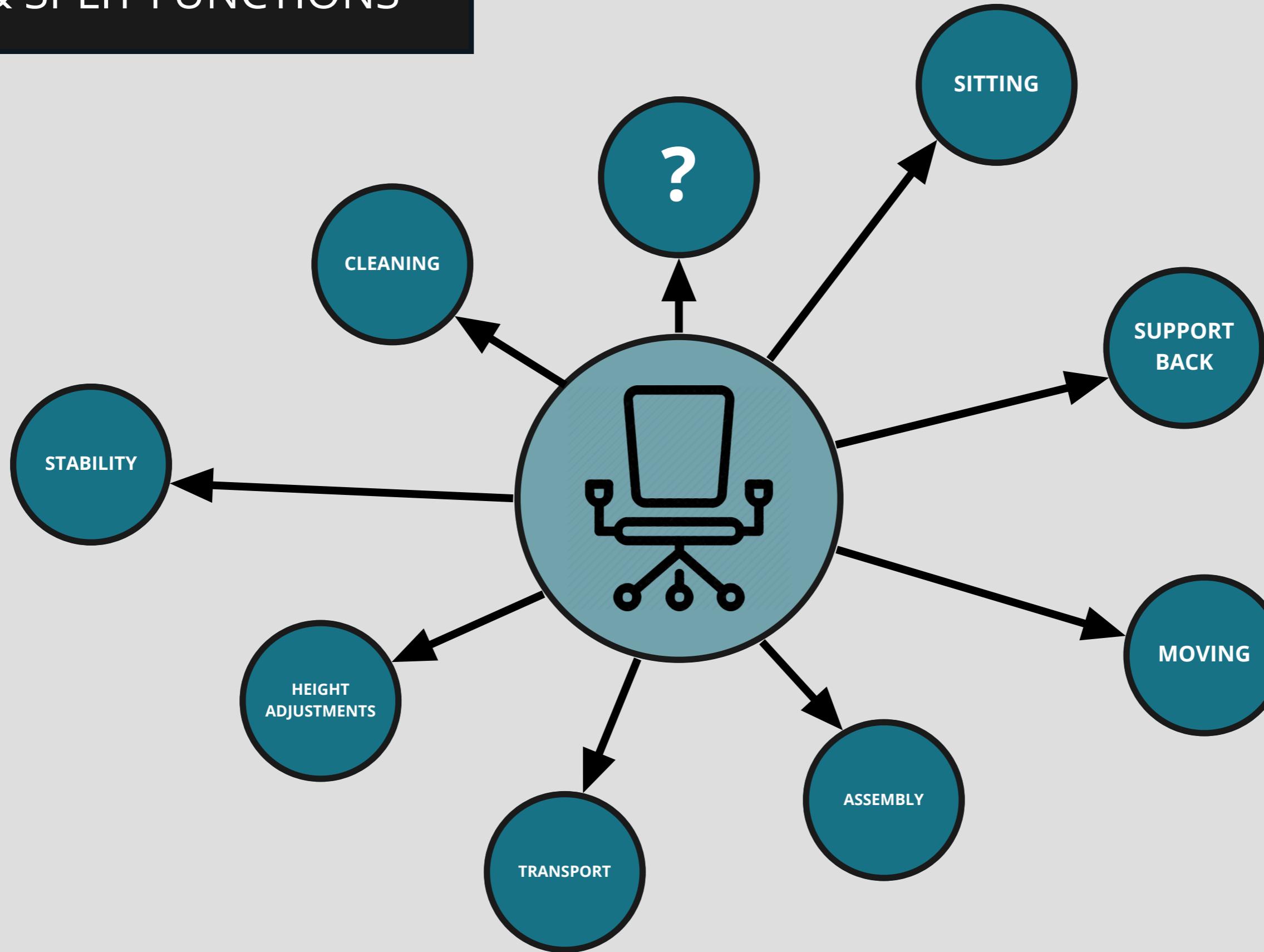


ITERATE

EXPERIMENT



# DEFINE & SPLIT FUNCTIONS

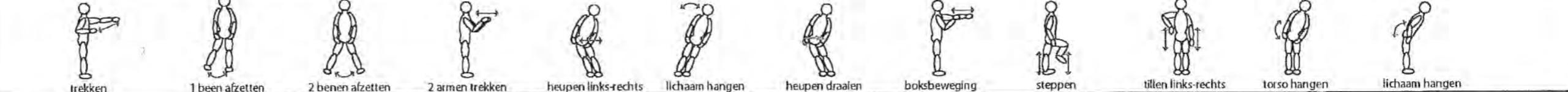
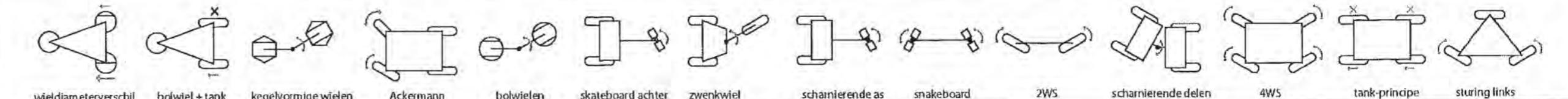
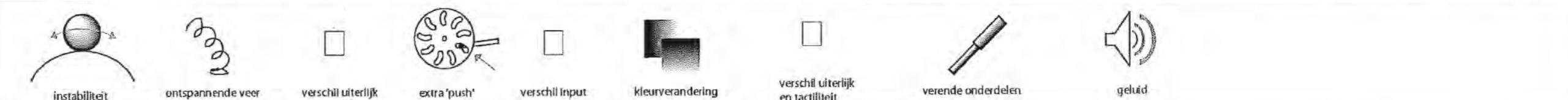
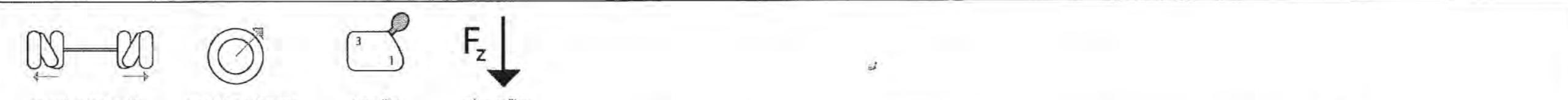
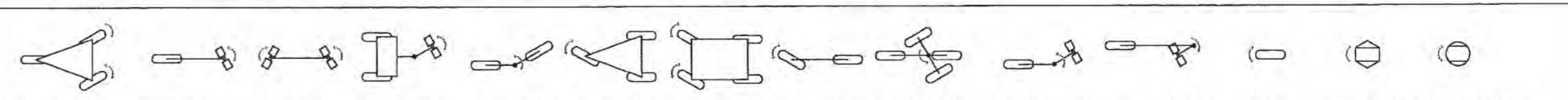


# MORFOLOGIC CHART

morfologische kaart bagagedragers (Bosch-E, curana 2.0)

# MORFOLOGIC CHART

solutions →

sub functions	'human power'	
	steering	
	transmition	
	surprise	
	learning effect	
	acceleration	
	'human power' 2	
	steering 2	

FORM FOLLOWS EMOTION

## DESIGN LANGUAGE



geometrisch



figuratief



natural

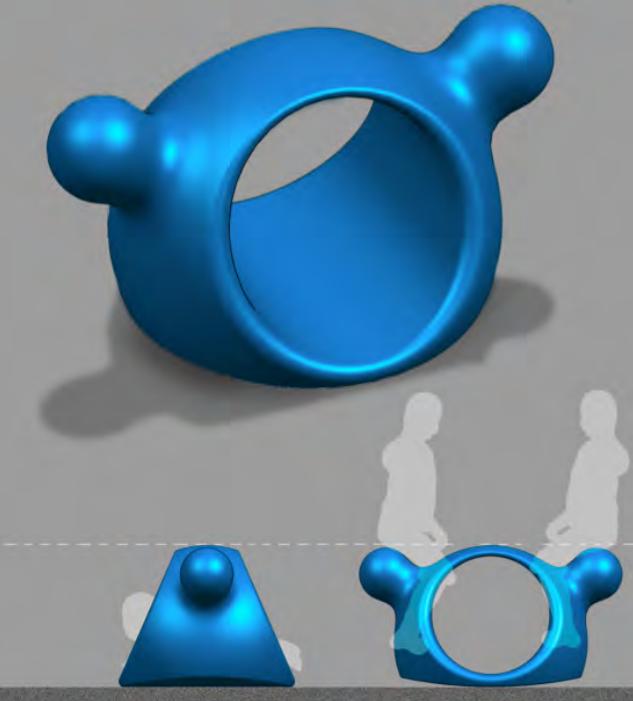
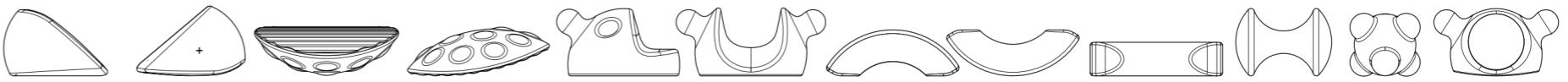


super soft

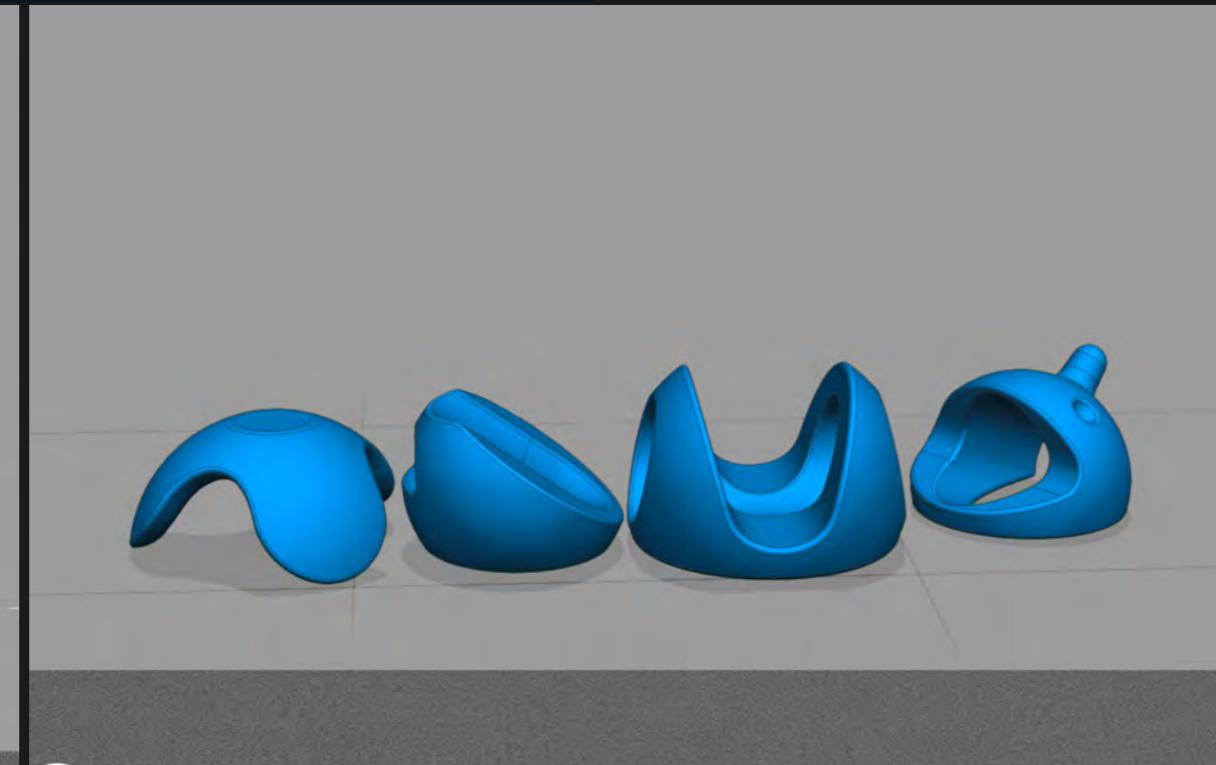
# IDEATE



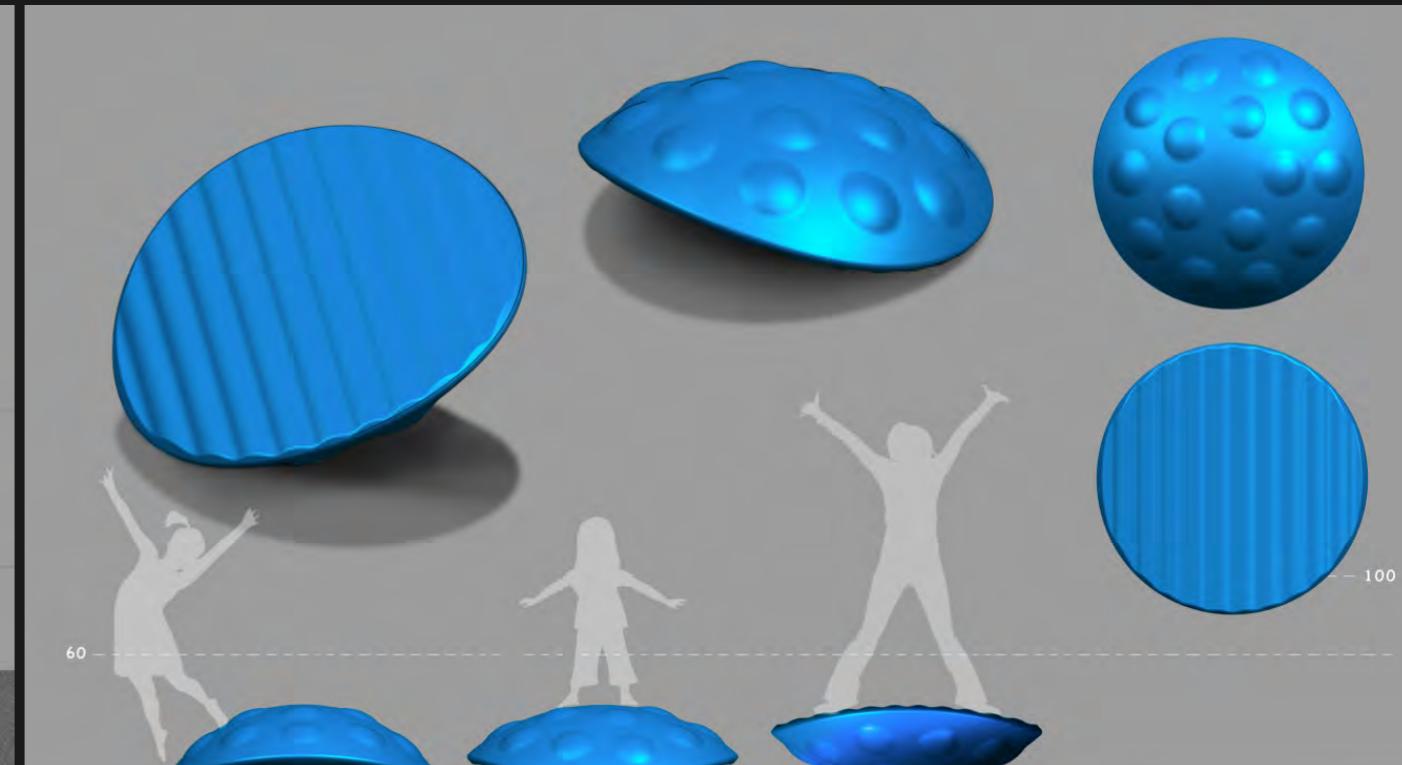
# IDEATE



saflot creative consultants

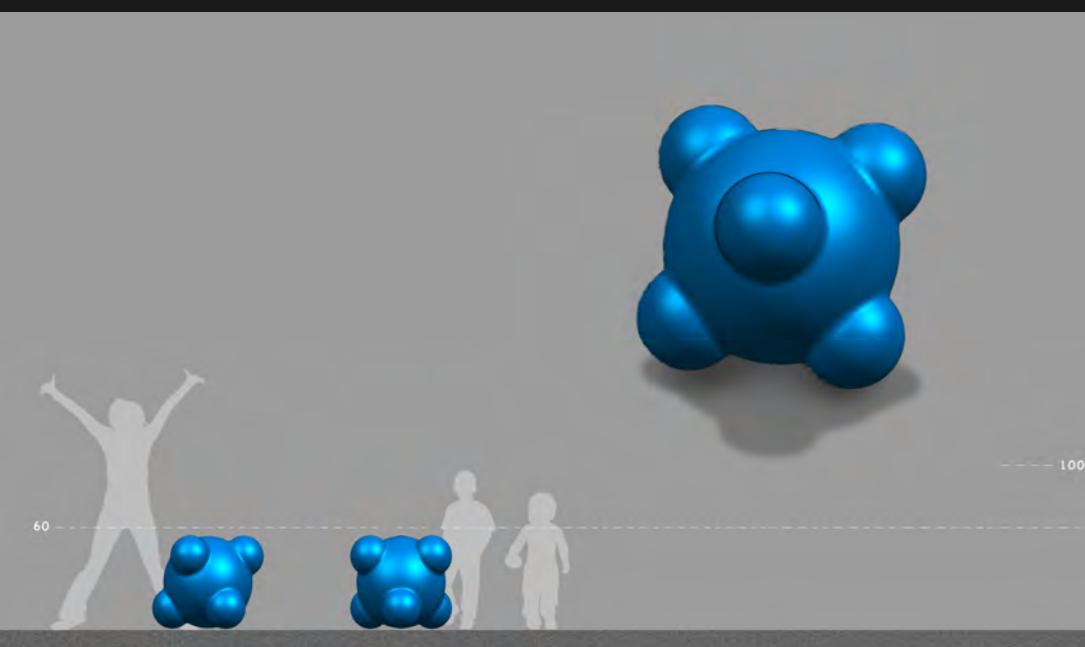


SPEELTUIGEN MEDIOS CONCEPTEN

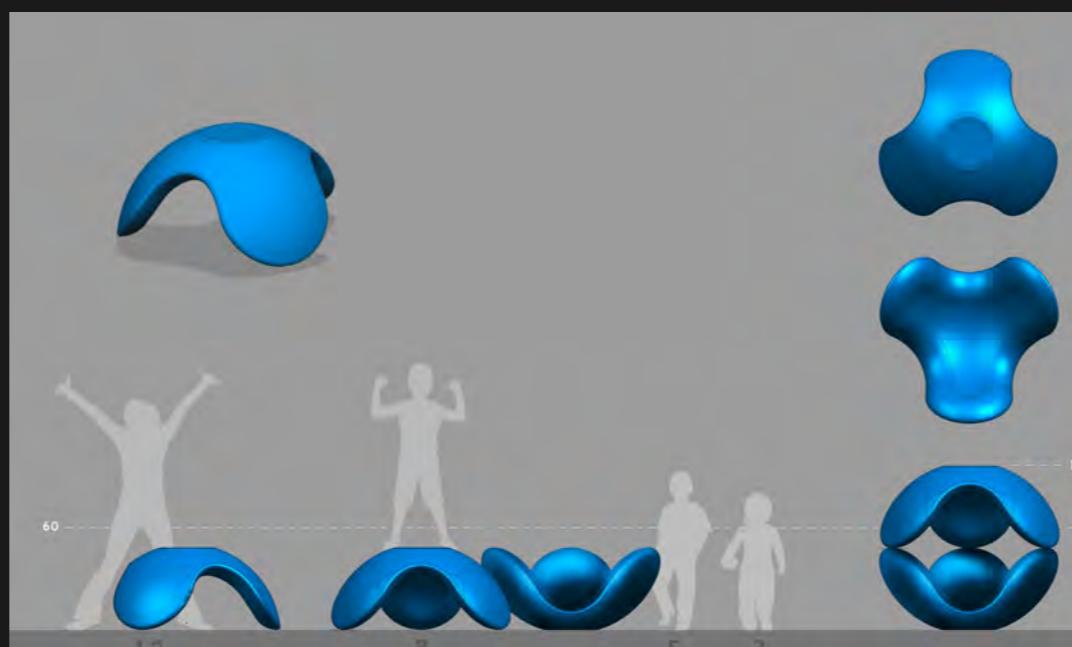


60

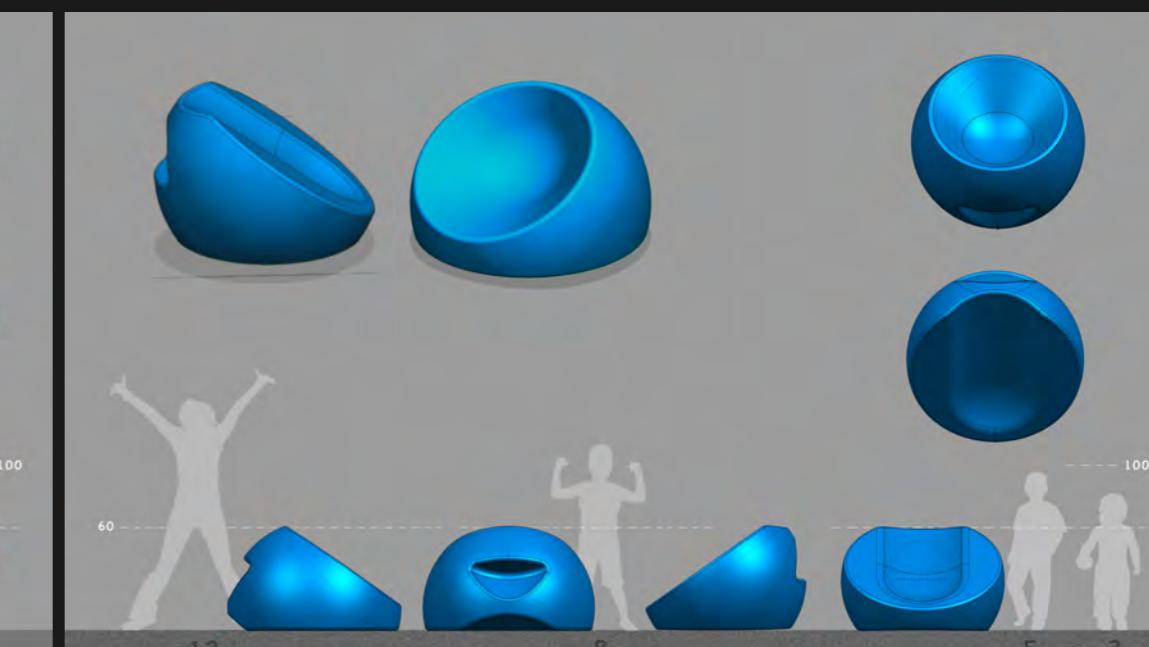
100



saflot creative consultants



SPEELTUIGEN MEDIOS CONCEPTEN



SPEELTUIGEN MEDIOS CONCEPT 1

SPEELTUIGEN MEDIOS CONCEPT 2



PROTO  
TYPING

# PROTOTYPING

Make It

Vimeo



# PROTOTYPE

## VERTICAL

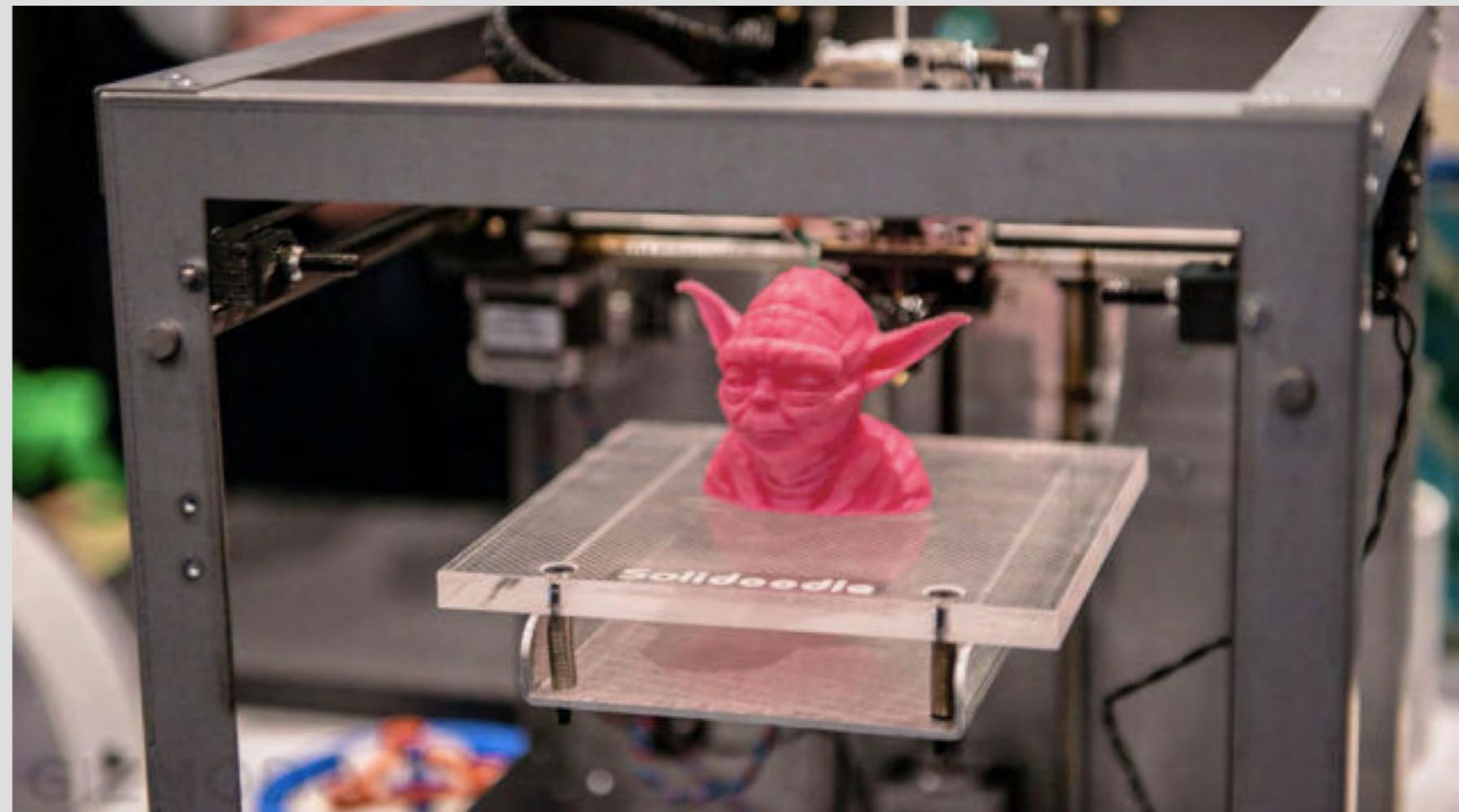
test one specific or a few aspects with a **HIGH FIDELITY**  
**TARGET:** gain insights into the functionality, reliability and desirability of features

## HORIZONTAL

test al lot of aspects at once with **LOW FIDELITY**  
**TARGET:** gain insights into the combinations of functions

# PROTOTYPE

Quick & Dirty  
SPEED MATTERS



# PROTOTYPE

**SIZE MATTERS**



A great way to start is to build many smaller scale versions before switching to full size, for the simple reason of speed.

# PROTOTYPE



# SIZE MATTERS

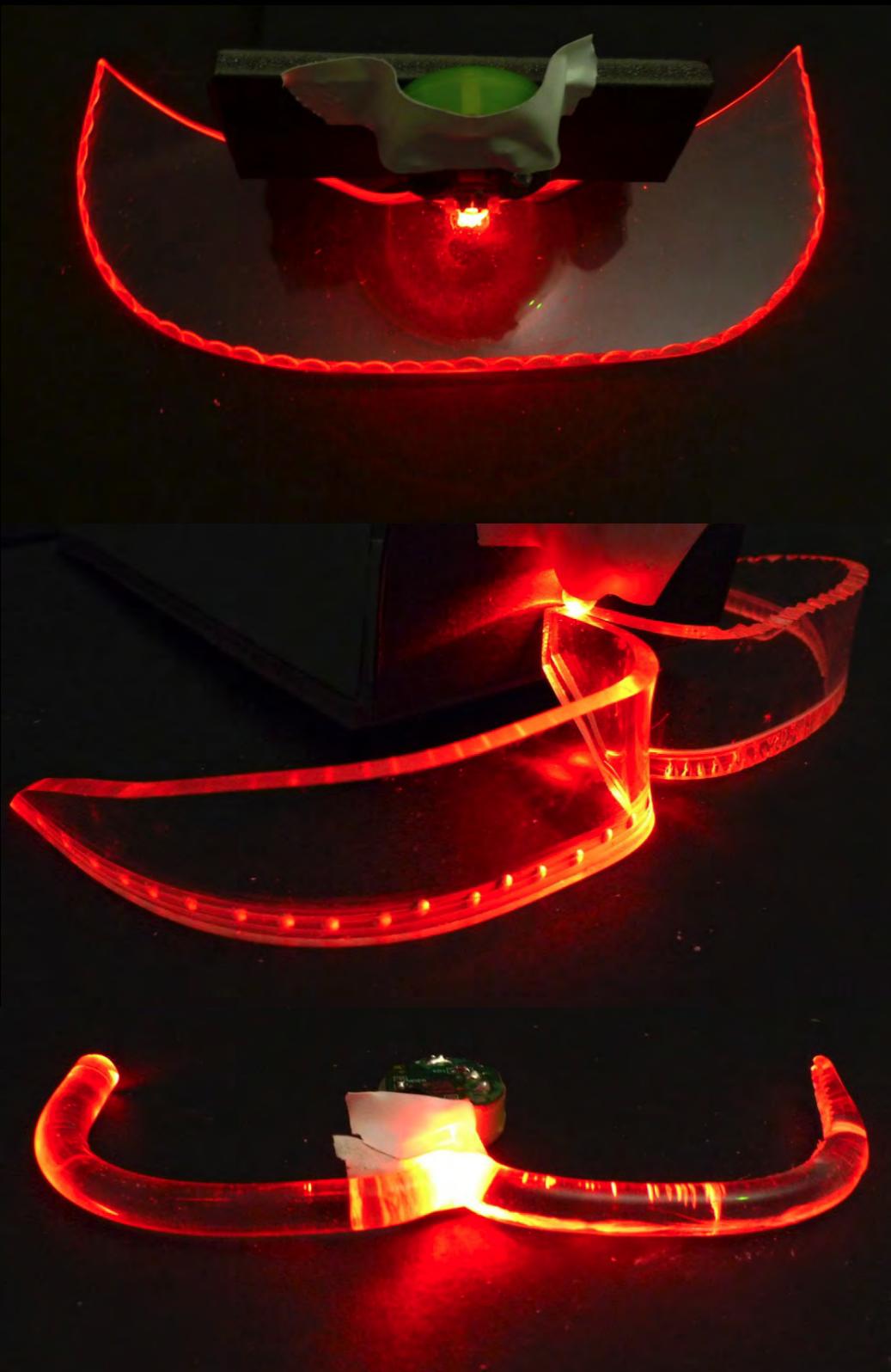


# PROTOTYPE

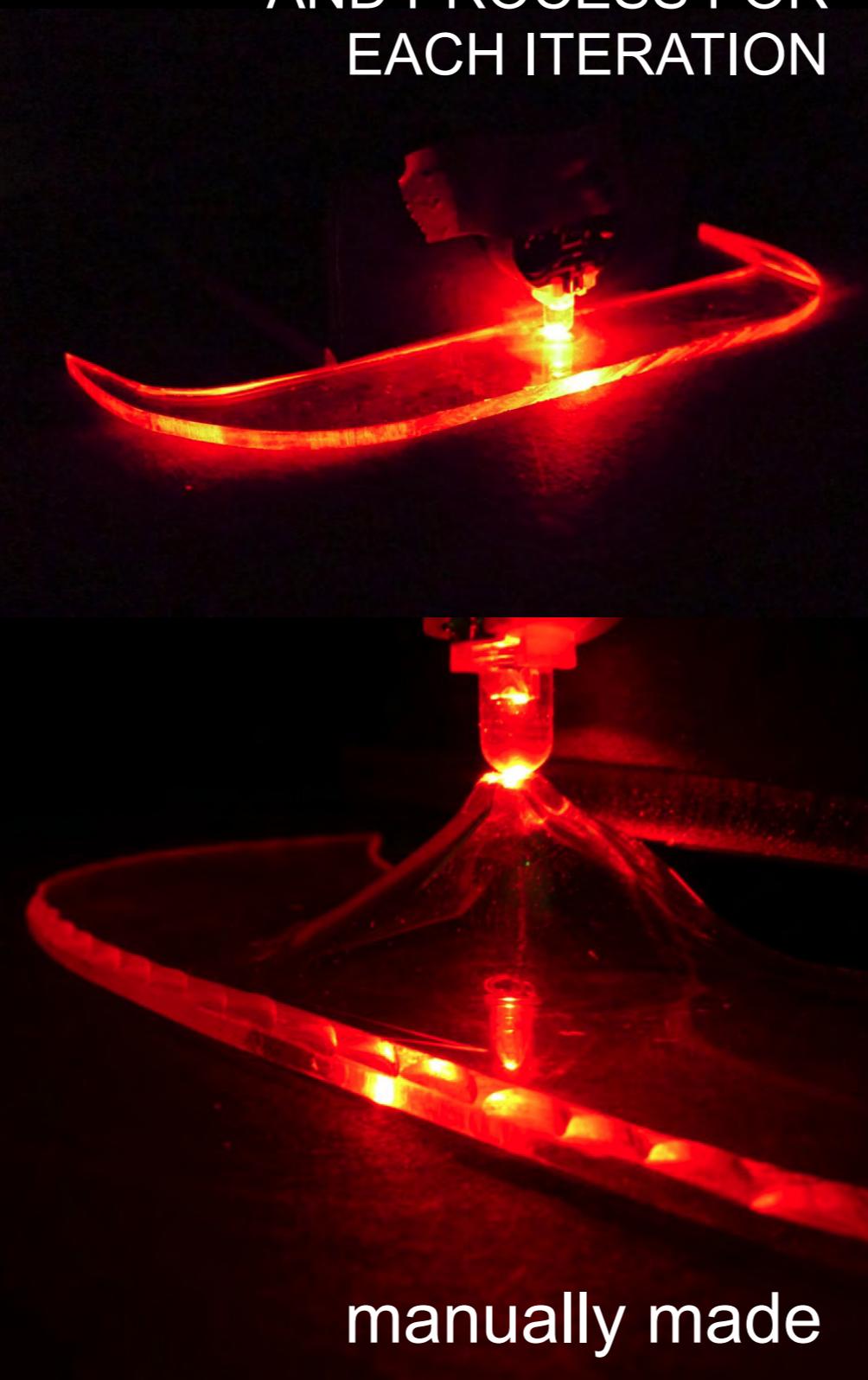
CHOOSE THE  
RIGHT MATERIAL  
AND PROCESS FOR  
EACH ITERATION



PROTOTYPE



CHOOSE THE  
RIGHT MATERIAL  
AND PROCESS FOR  
EACH ITERATION



PROTOTYPE

LEARN CHEAP AND FAST



PROTOTYPE



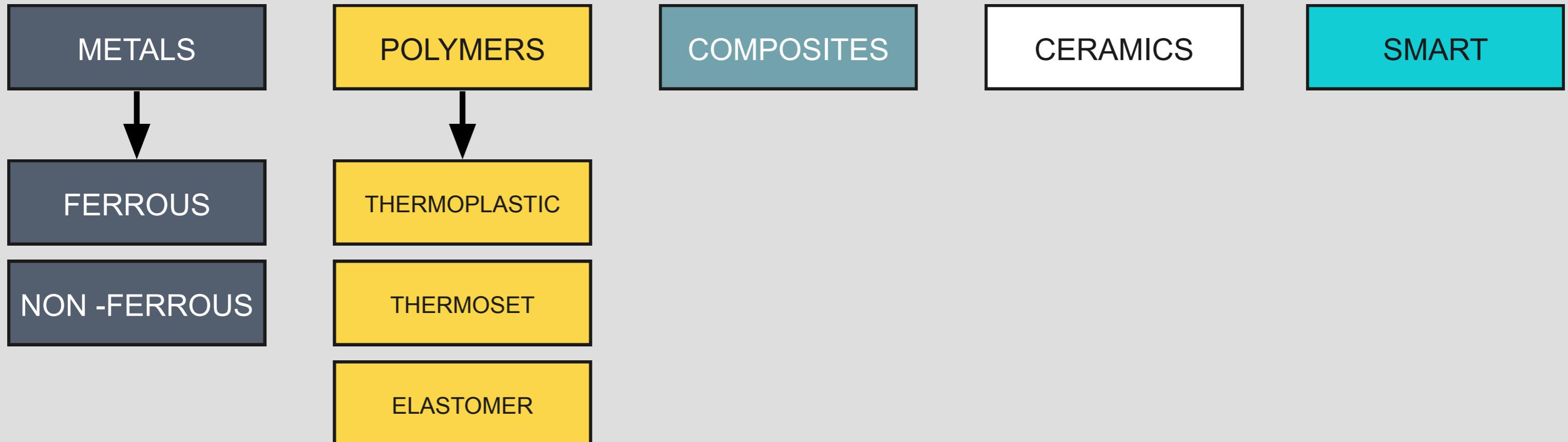
# FINAL PRODUCT





MATERIALS

# MATERIAL CLASSIFICATION

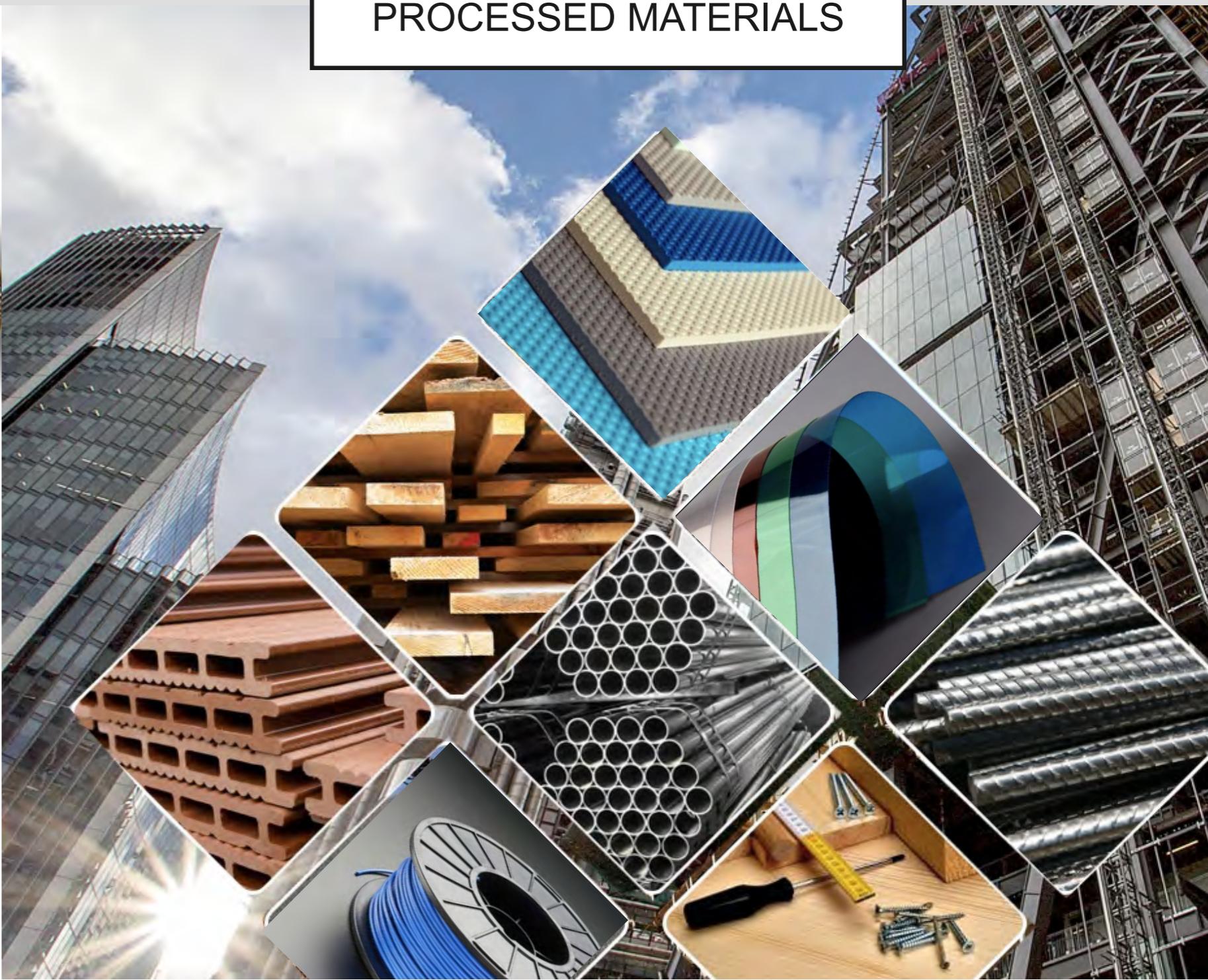


# MATERIAL CLASSIFICATION

## RAW MATERIALS



## PROCESSED MATERIALS



# MATERIAL APPLICATIONS



# MATERIAL PROPERTIES

mechanical

chemical

thermal

physical

acoustical

optical

sensorial

electrical

surface

ecological

time related

directional

esthetical

magnetical

radioactive

# Materials

There are lots of different types of materials and they all have different properties. They can be...

**hard**

**SOFT**

**TRANSPARENT**

**STRONG**

**OPAQUE**

**RIGID**

**brittle**

**flexible**

**STRETCHY**

**COMPRESSED**

**HEAVY** **light**





FABLAB  
PROCESSES

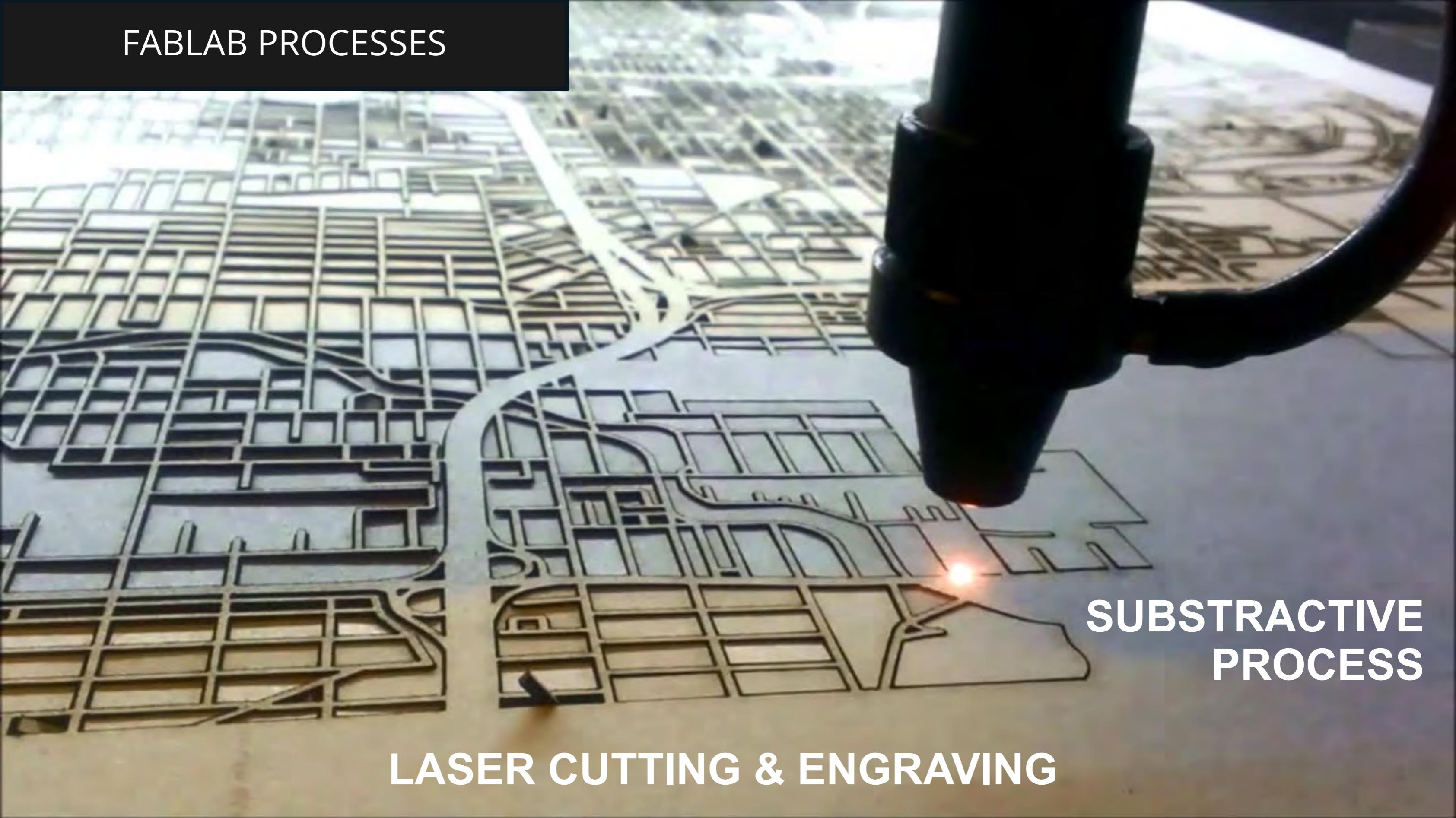
# FABLAB PROCESSES

3D PRINTING

ADDITIVE  
PROCESS



## FABLAB PROCESSES

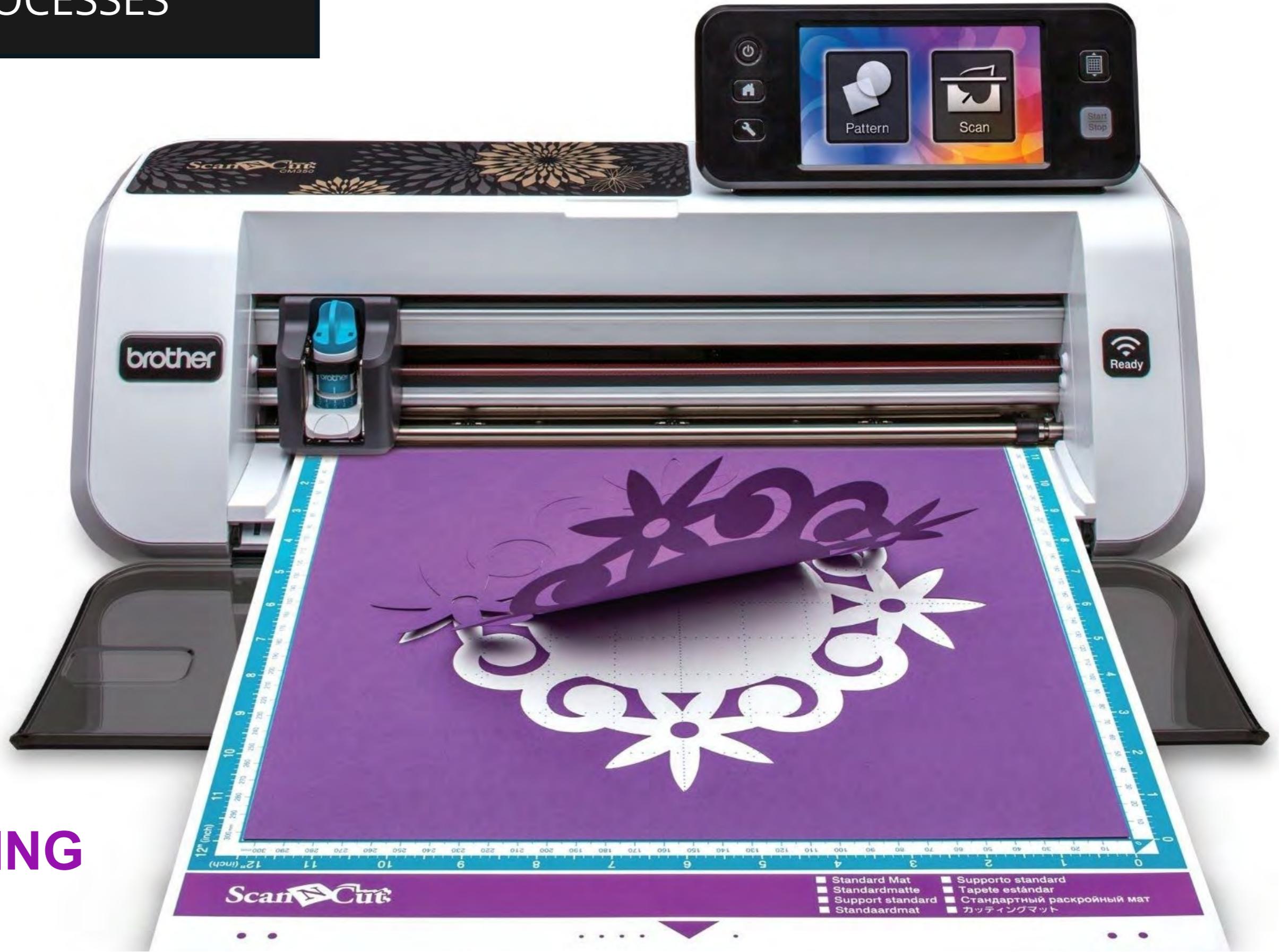


LASER CUTTING & ENGRAVING

SUBSTRACTIVE  
PROCESS

# FABLAB PROCESSES

## CNC CUTTING

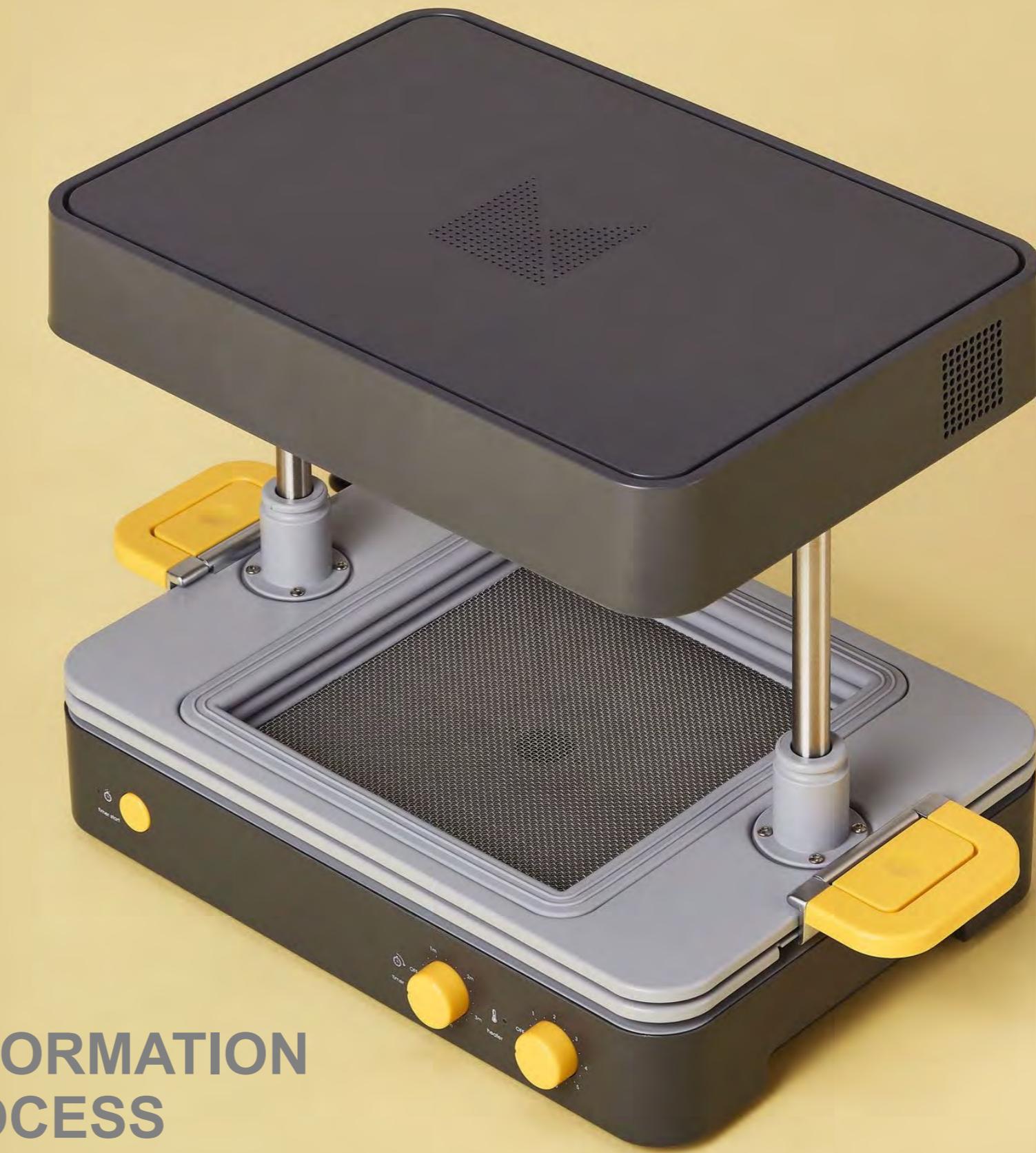


## FABLAB PROCESSES



CNC MILLING

## FABLAB PROCESSES



# FABLAB PROCESSES



HOT WIRE  
CUTTING

CNC



MANUAL

# FABLAB PROCESSES

## EMBROIDERY MACHINE



# FABLAB PROCESSES

## MOULDING AND CASTING



## FABLAB PROCESSES

### HEAT TRANSFER





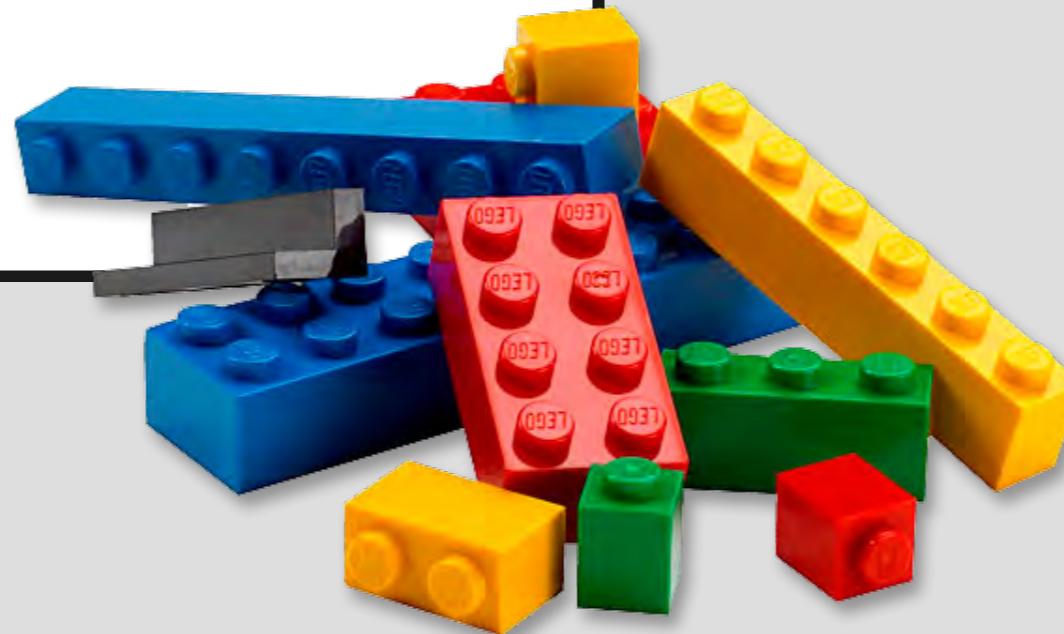
FABLAB  
MATERIALS

## 3D PRINTING filament



ABS

Acrylonitrile butadiene styrene  
injection moulding  
electronic enclosures



- flexible (clips)
- End of use applications where strength, ductility, machinability and thermal stability are required.
- glass transition around 105 degrees celsius
- recyclable
- finishing possible (acetone)

## 3D PRINTING filament



PLA  
Polylactic acid  
biodegradable  
made from corn or sugar cane

PLA

- lower printing temperature
- less warping
- sharp corners
- preferred for prototyping where form is important
- glass transition around 60 degrees celsius
- biodegradable
- food related items



## 3D PRINTING RECYCLING

<https://preciousplastic.com/>



## LASER CUTTING

- paper & cardboard
- wood, MDF, veneer, plywood, cork,
- leather, fabrics
- plexiglass (PMMA, acrylic)
- ABS and PS (critical for melting)
- PP en PE (critical for melting)
- POM

## LASER ENGRAVING

- All the above
- Glass
- coated metal
- stone, marble, concrete

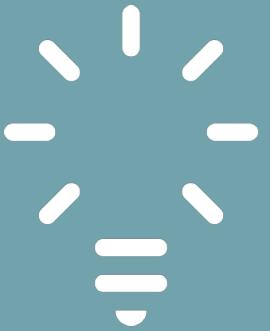


## LASER CUTTING & ENGRAVING

### NOT ALLOWED !!

- metal (too much reflection)
- reflective materials and mirrors
- plastics with chlorine (toxic gasses)
  - sysnthetic leather
  - PVC (hard and soft)
  - vinyl
- XPS (styrofoam and isomo)
- Polypropilene foam
- Polycarbonate (lexan)
- fibrereinforced sheets (glass and carbon)
- PCB (printed circuit boards)





## CURRENT AND POTENTIAL FABLAB PROCESSES

VACUUM  
FORMING

FOLDING

WIRE  
BENDING

3D  
PRINTING

HOT LINE  
BENDING

LASER  
CUTTING &  
ENGRAVING

HOT WIRE  
CUTTING

SMART  
MATERIALS

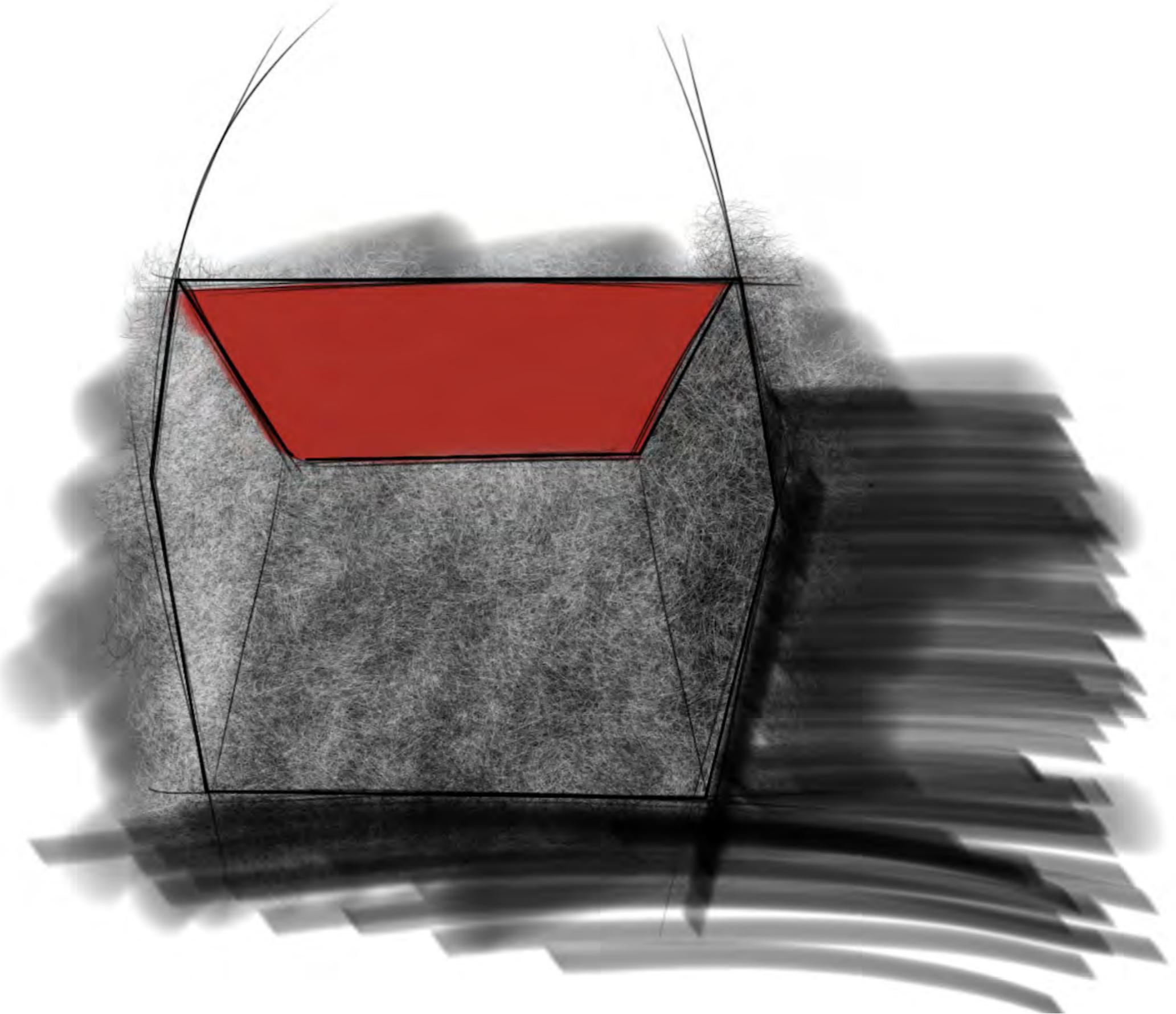


CASE  
bicycle bag

## CASE STUDY

### CONCEPT:

- local production/materials
- now manual labour
- unique look
- innovative material use
- easy customisable



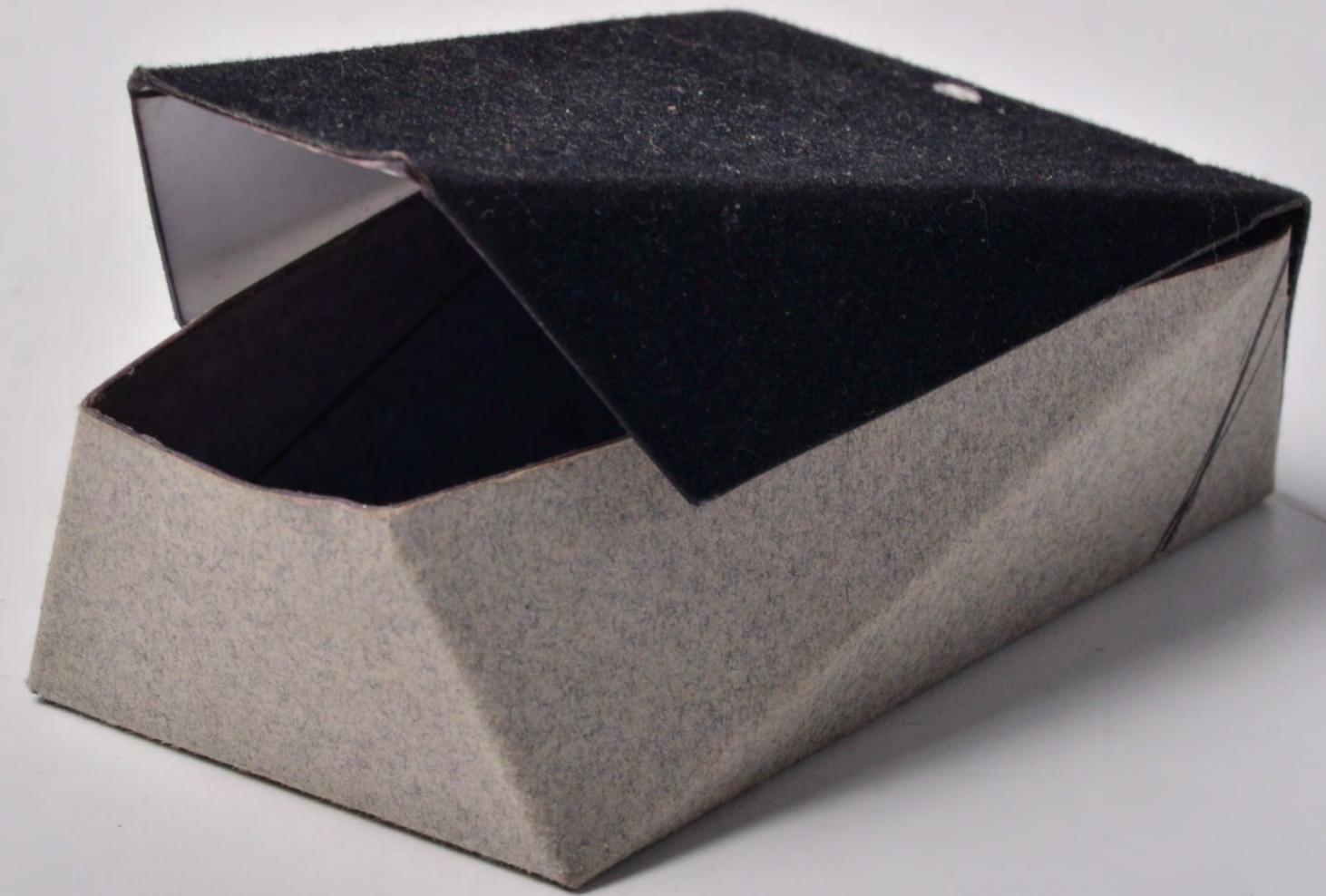
PET FELT BICYCLE BAG

**EARLY FOLDING CONCEPTS @ small scale**

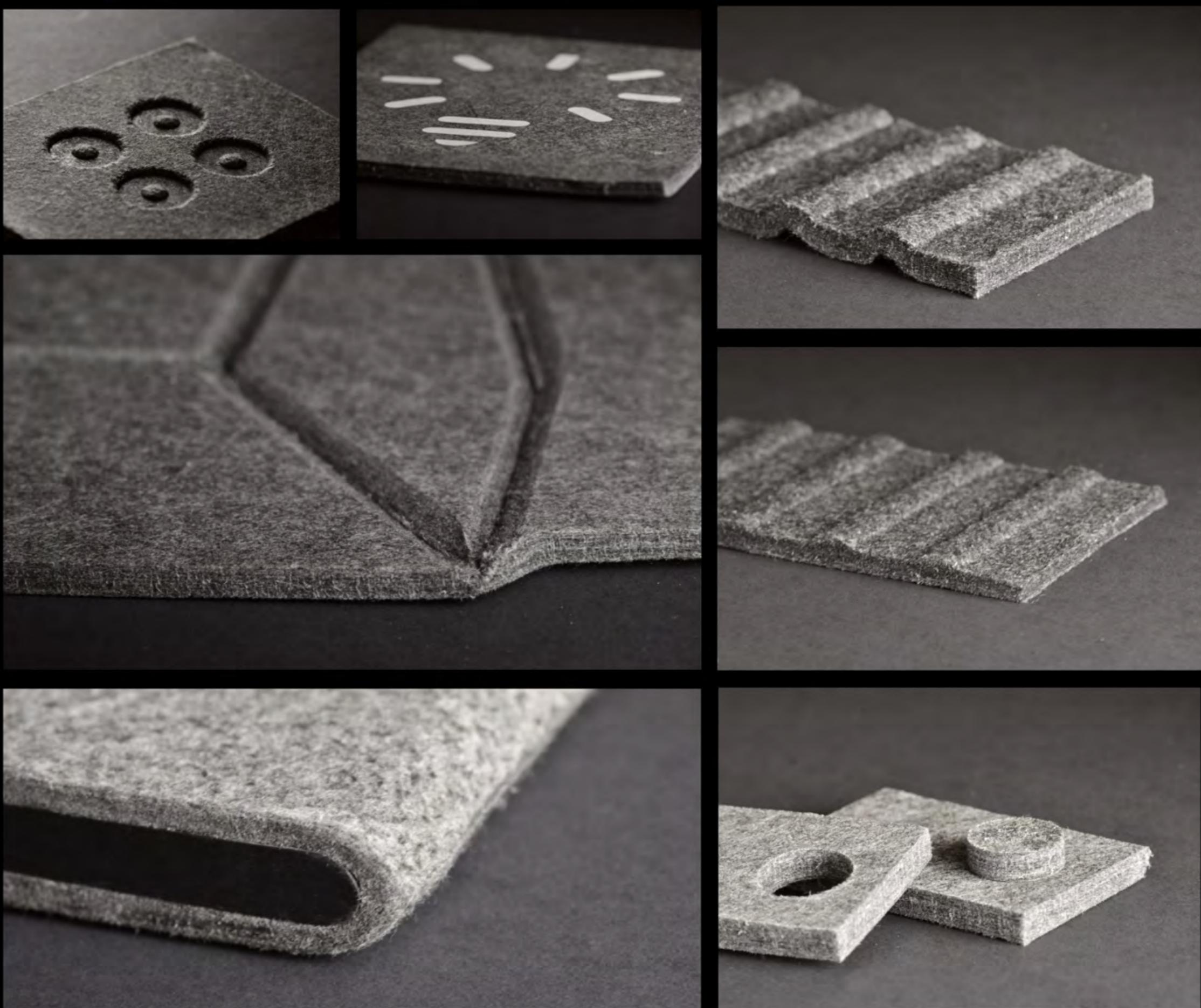
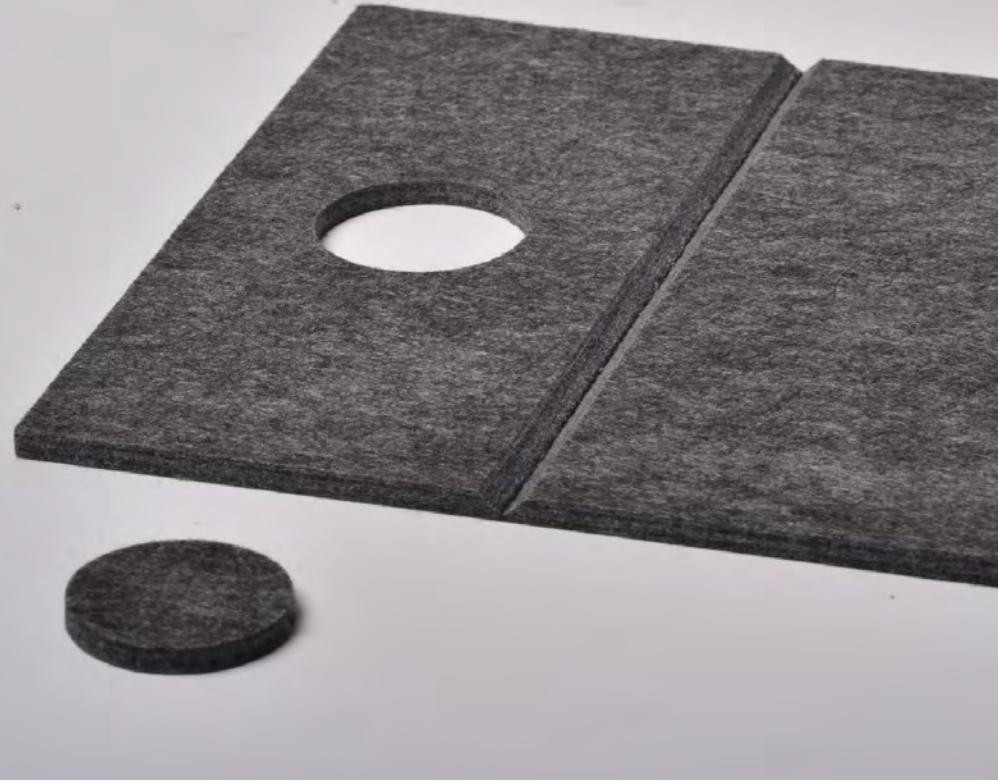


PET FELT BICYCLE BAG

EARLY FOLDING CONCEPTS @ small scale



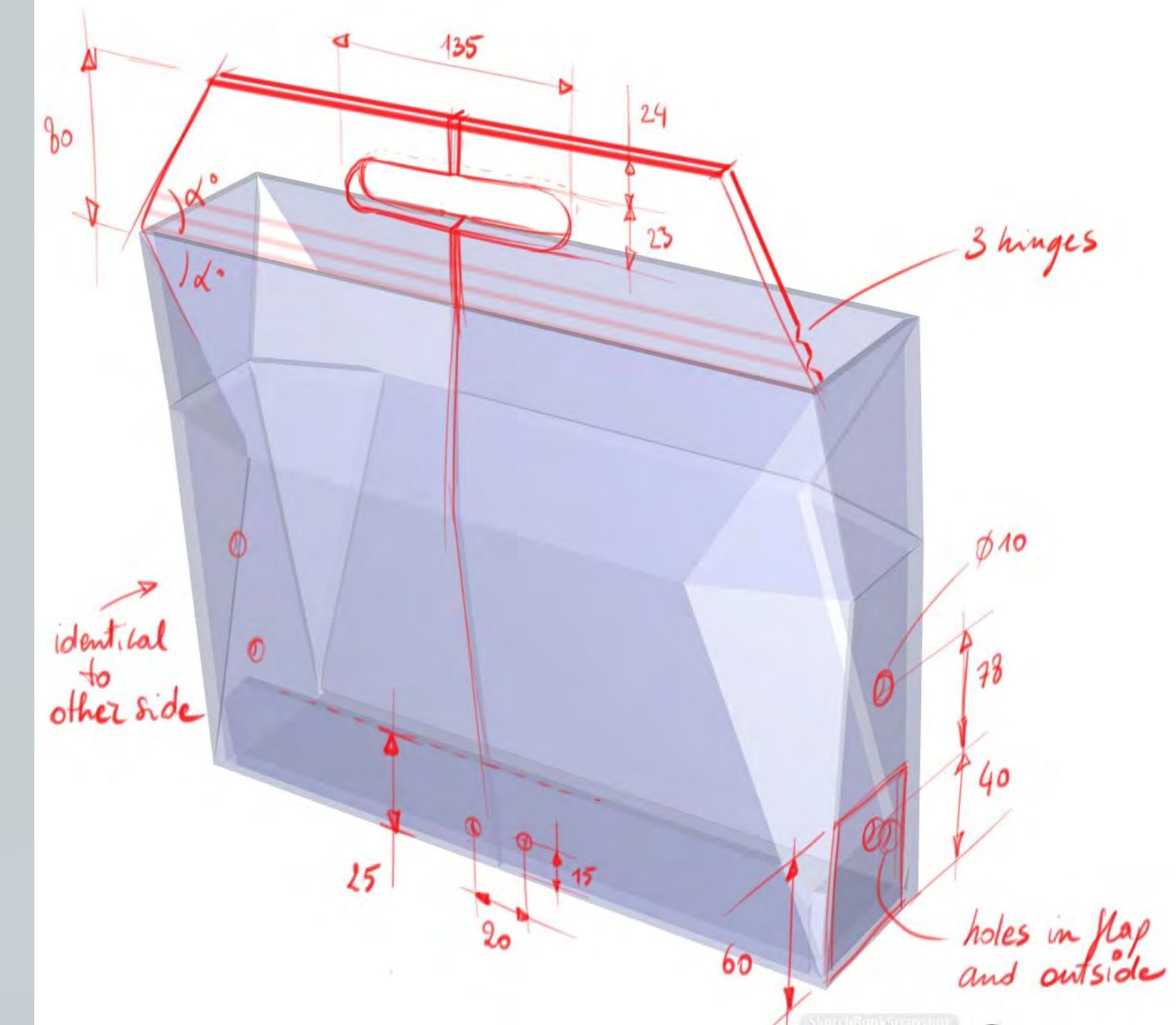
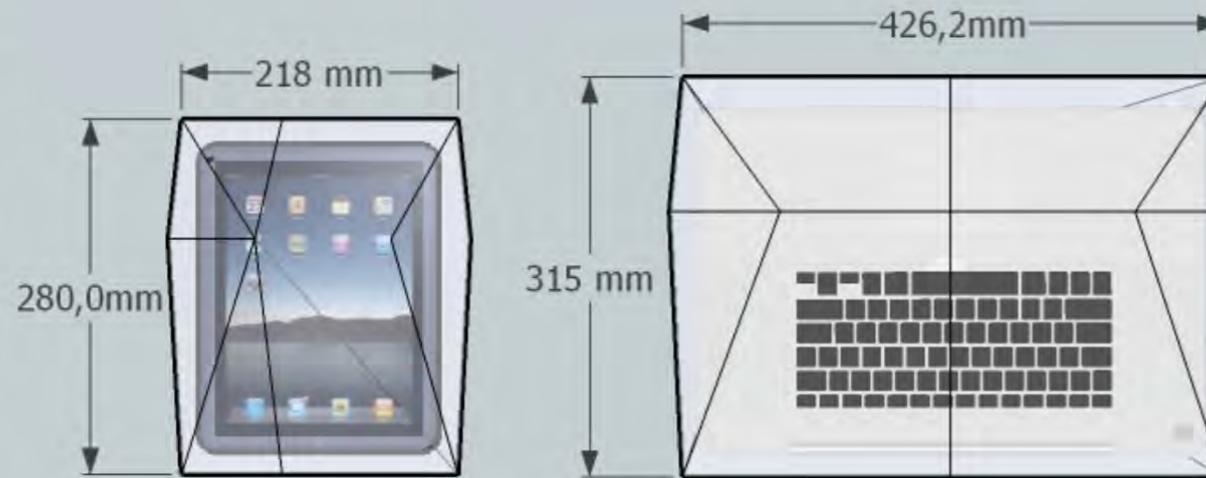
## PET FELT BICYCLE BAG



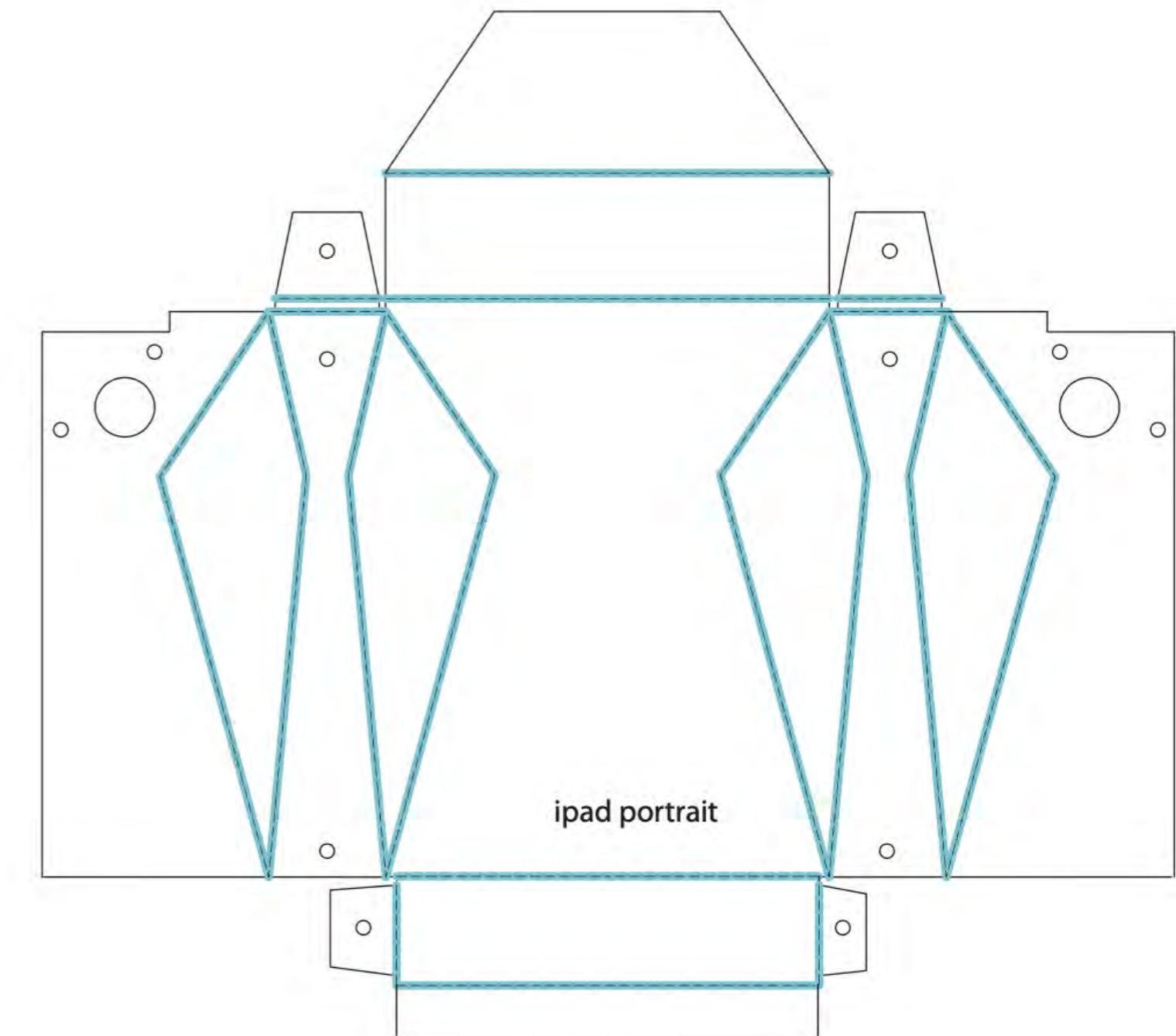
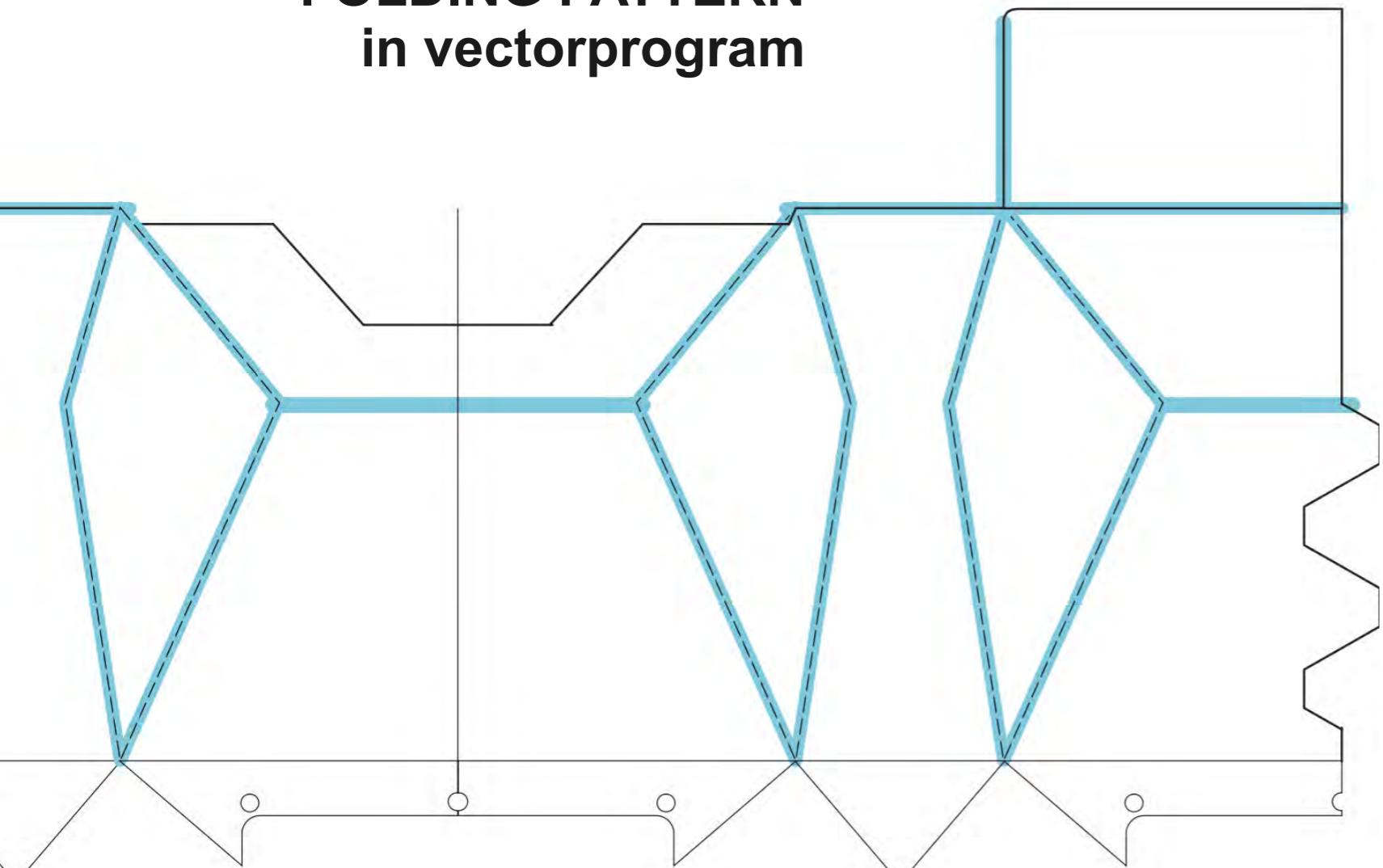
## MATERIAL & PROCESS EXPERIMENTS

# PET FELT BICYCLE BAG

# DIMENSIONING based on functions



**FOLDING PATTERN**  
in vectorprogram

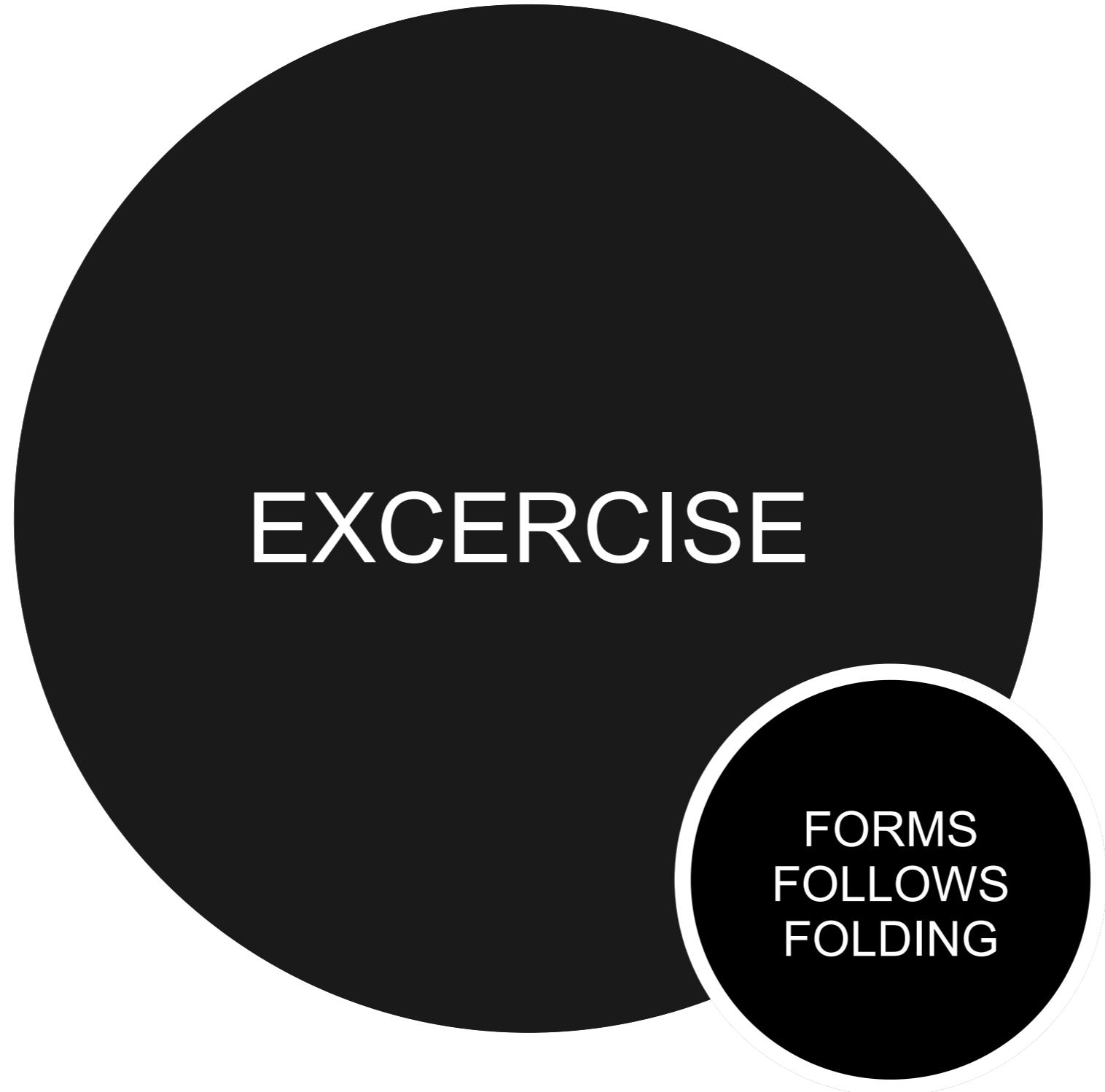


# PET FELT BICYCLE BAG



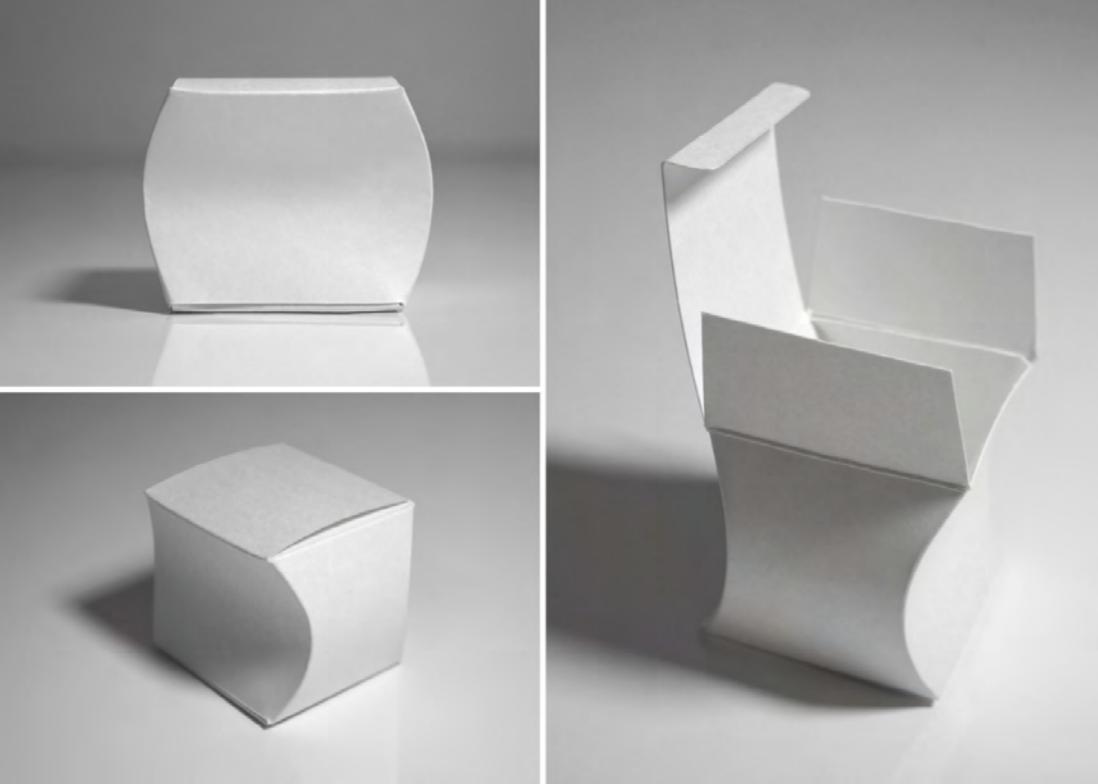
# PET FELT BICYCLE BAG



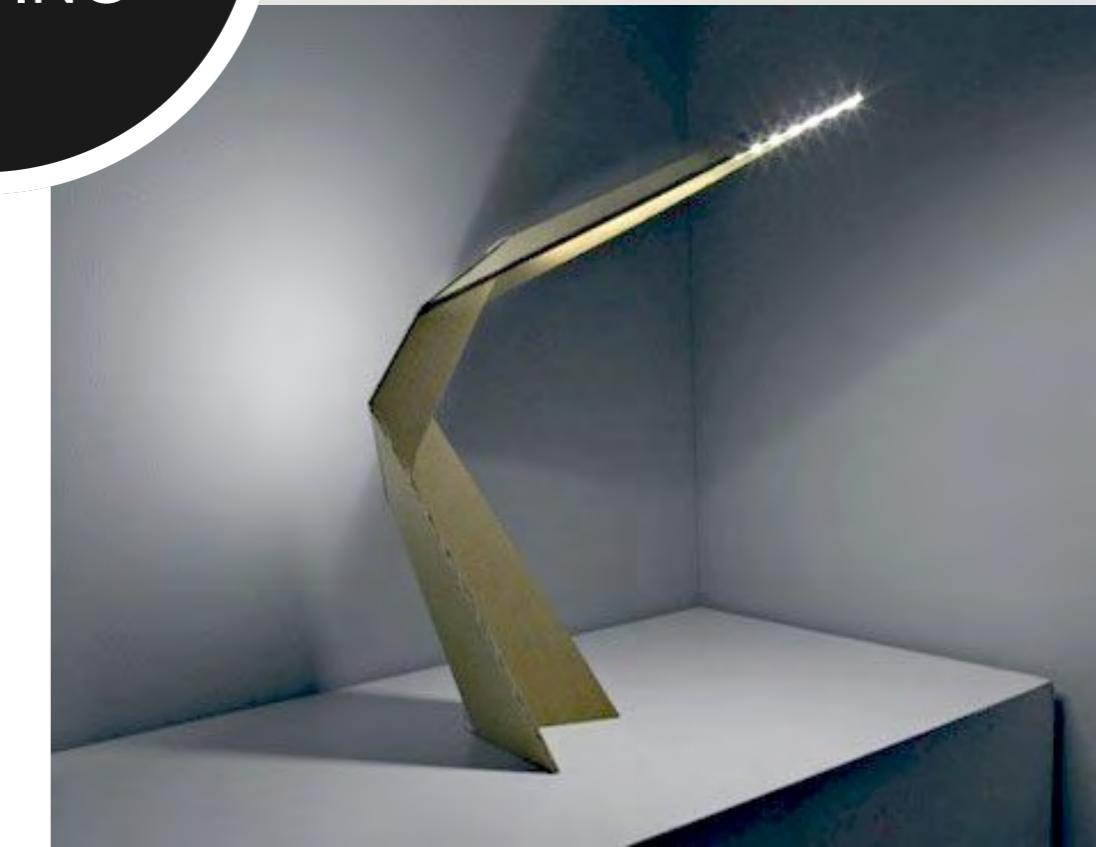


EXERCISE

FORMS  
FOLLOWS  
FOLDING



FORMS  
FOLLOWS  
FOLDING



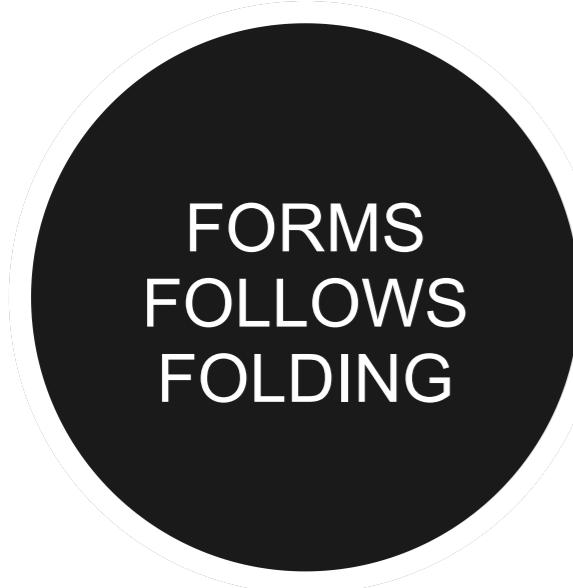


FORMS  
FOLLOWS  
FOLDING

# FOLDING PROCESS

Three ways of folding

1. cold bending by machine (mostly metal)
2. hot line bending (thermoplastics)
3. bending on creased or weakened line



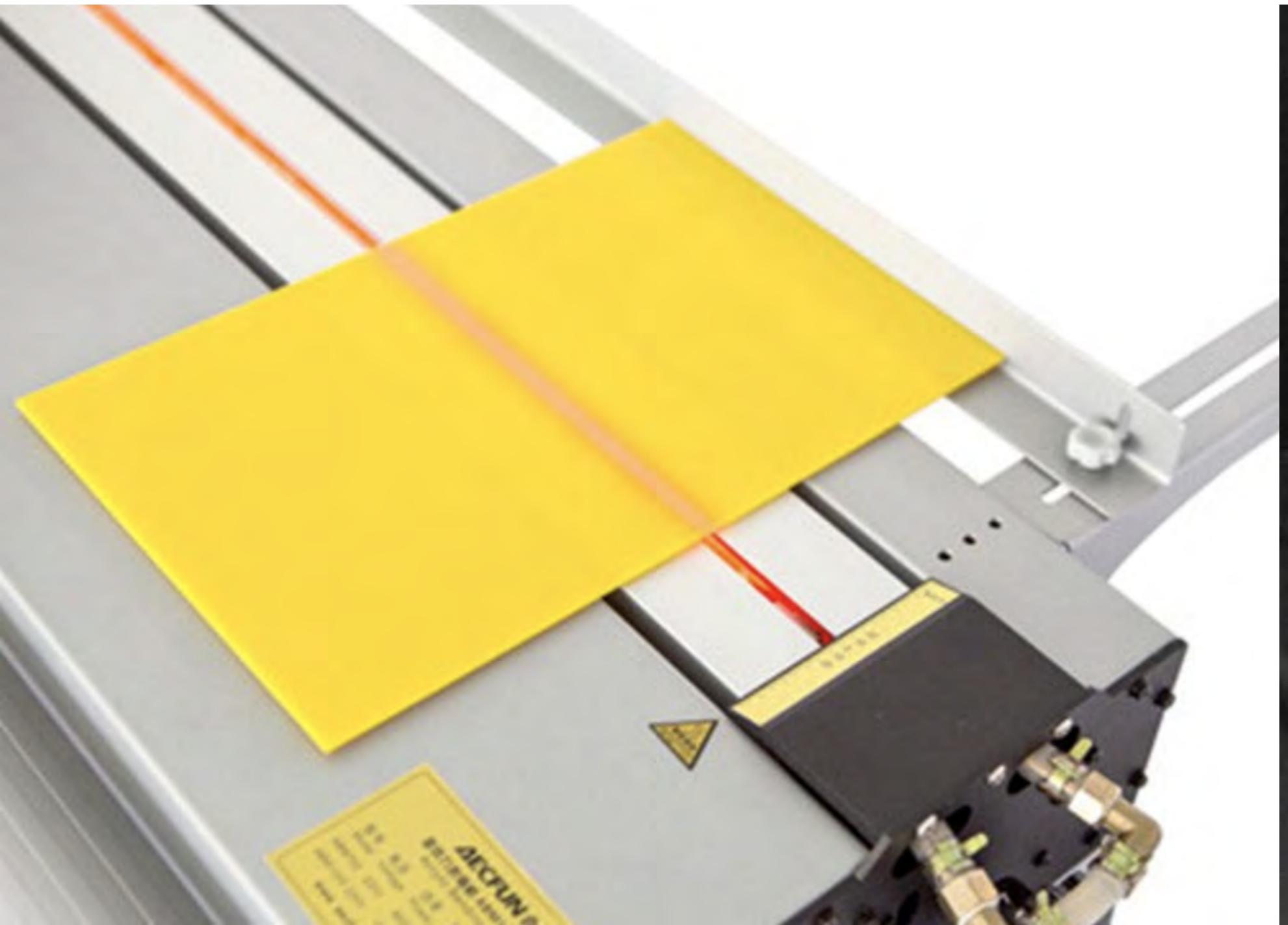
FORMS  
FOLLOWS  
FOLDING

# FOLDING PROCESS

cold bending by machine  
mostly metal



# FOLDING PROCESS

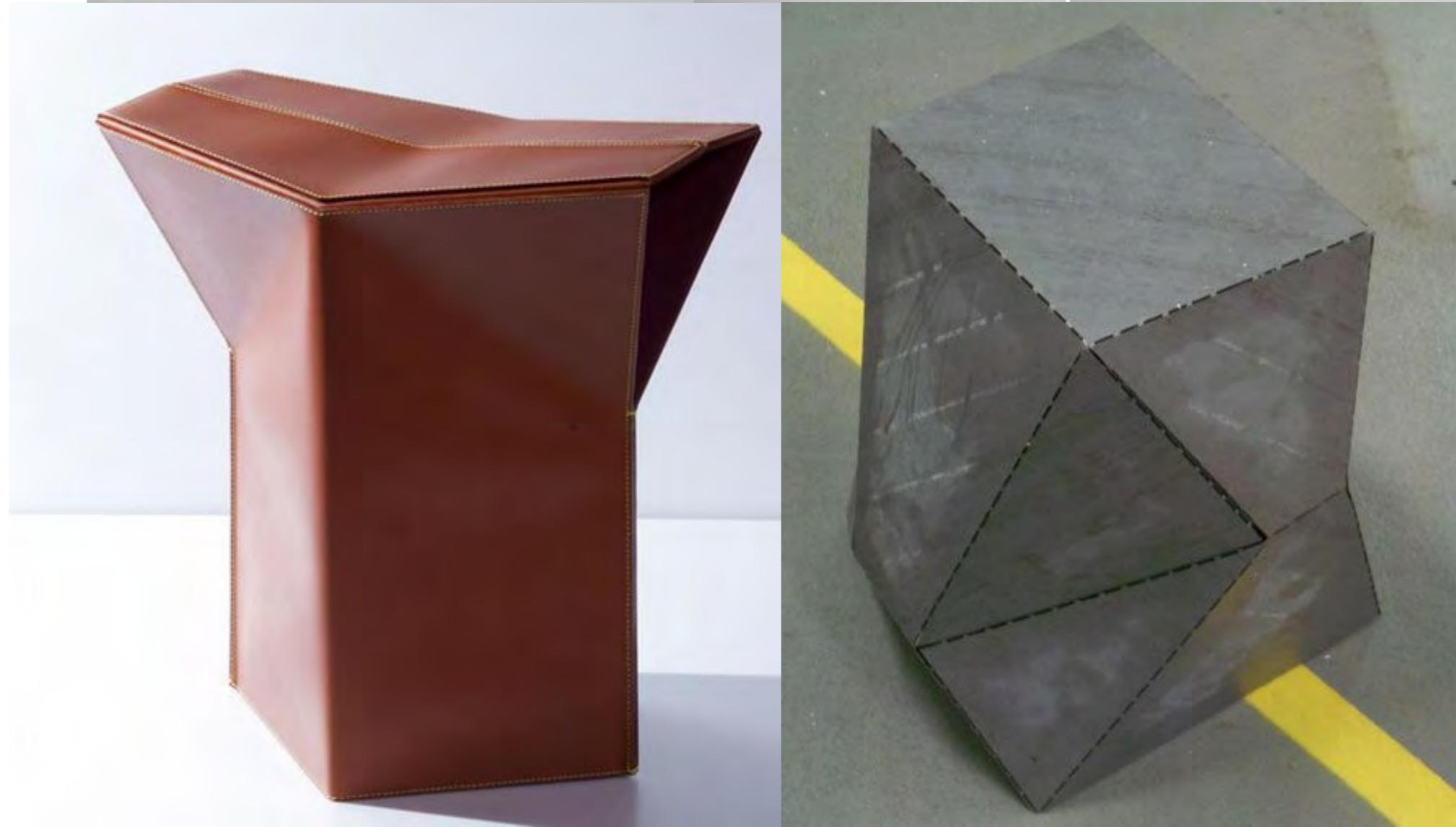
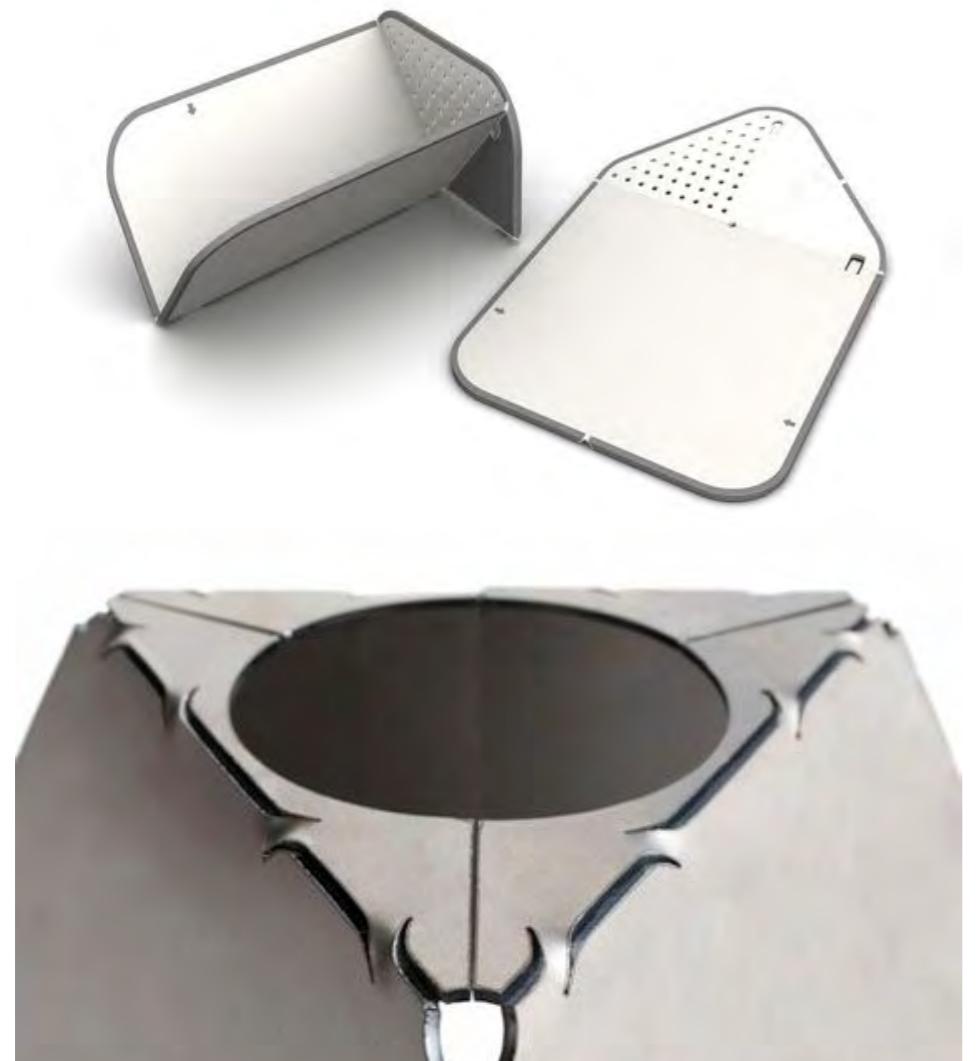
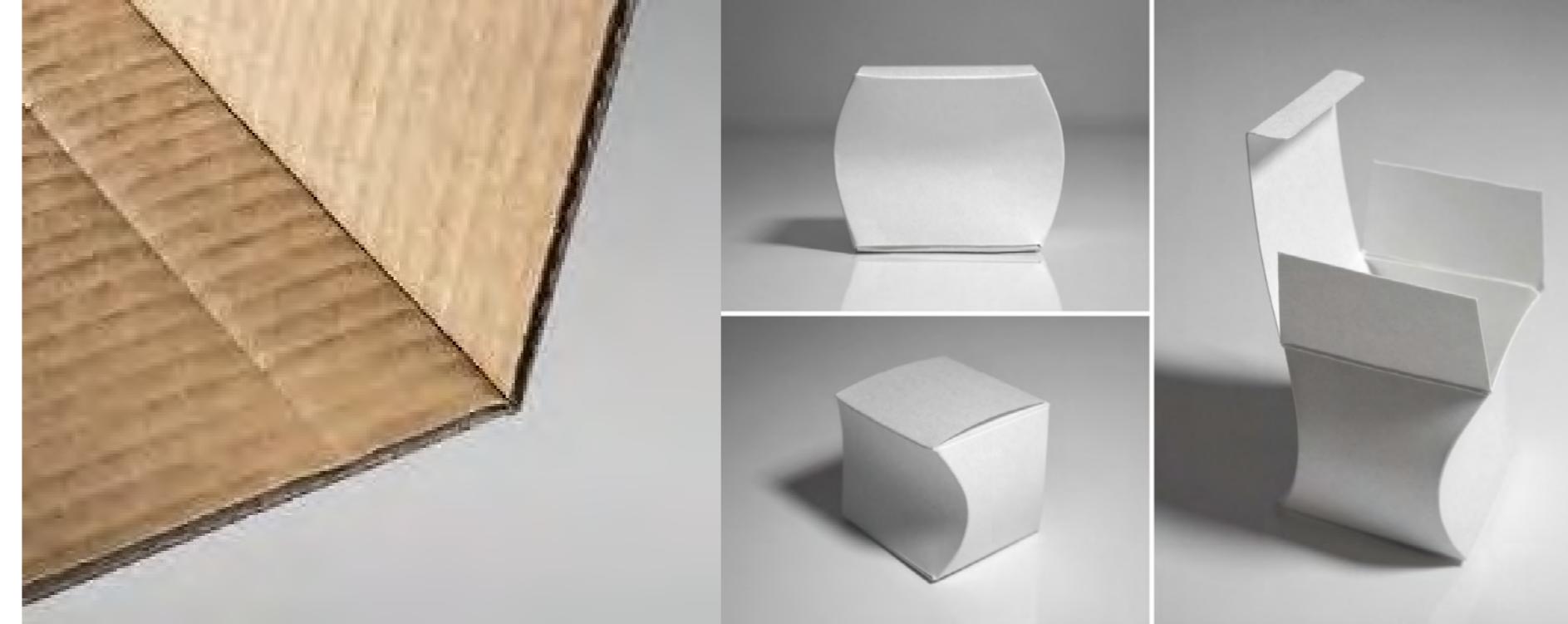


hot line bending  
thermoplastics



# FOLDING PROCESS

bending on creased or  
weakened line  
all materials that are not  
brittle



# FOLDING EXERCISE

let's make something

get into dialogue with the material!



M medium.com

**Flux Foldable Chair**

I stumbled upon this sleek and elegant Flux chair the other day. Its leaf-like lean-back shape is refreshingly natural and smart. It can.....

