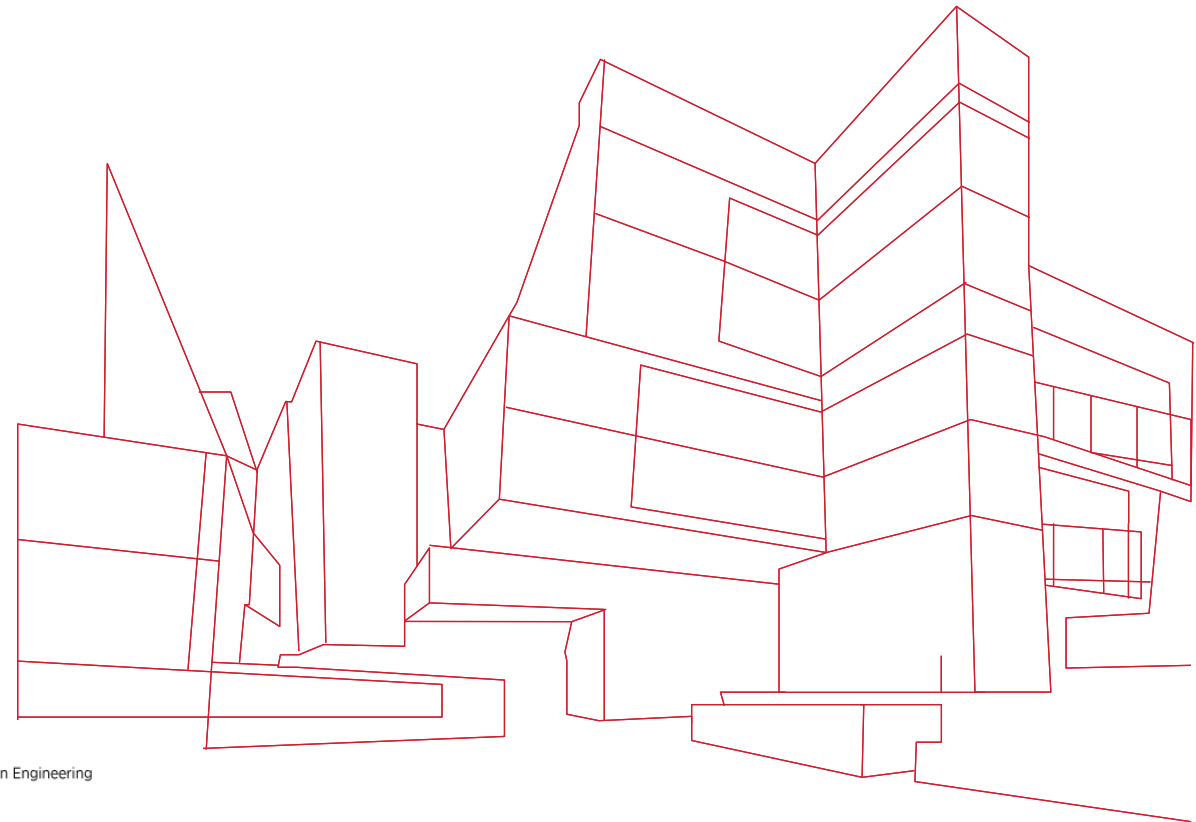


Ulsan, Korea

Interaction Design and Use Innovation for Interactive Products

Geehyuck Jeong, Dr. James Self

UNIST(Ulsan National Institute of Science and Technology)



Introduction

Design-driven Innovation

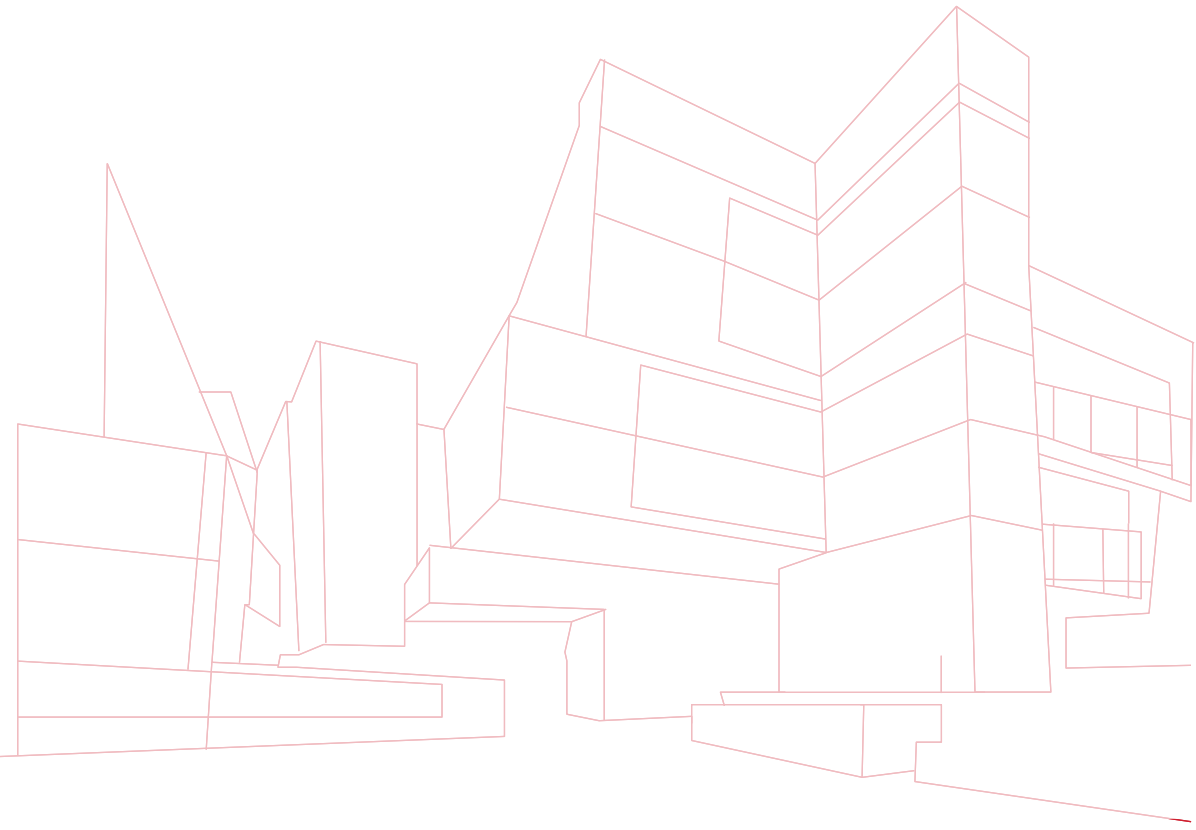
(Verganti, 2013)

Existing Game Console



Game

A virtual experience accessible
to only by avid gamers



Introduction

Design-driven Innovation

(Verganti, 2013)

Existing Game Console



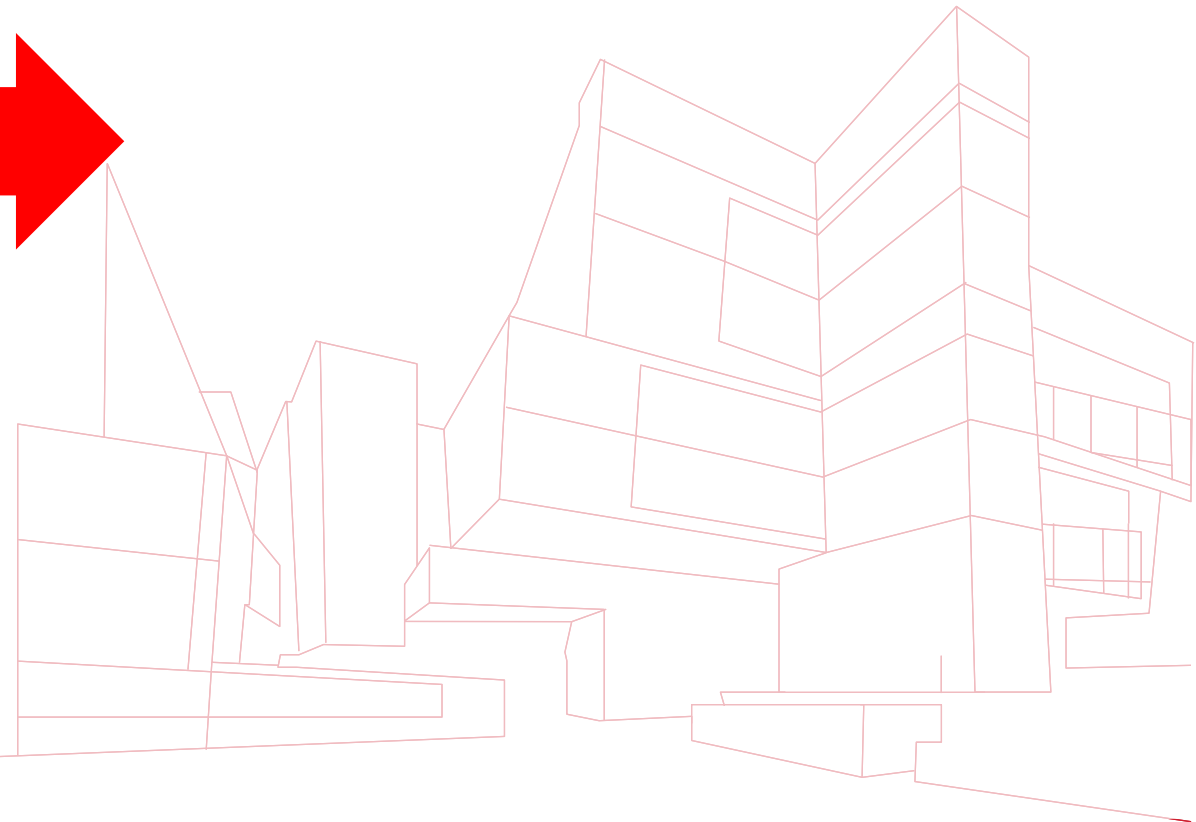
Game

A virtual experience accessible
to only by avid gamers



Innovation

**By Different
Meaning**



Introduction

Design-driven Innovation

(Verganti, 2013)

Existing Game Console



Game

A virtual experience accessible to only by avid gamers

Innovation

**By Different
Meaning**

Nintendo Wii



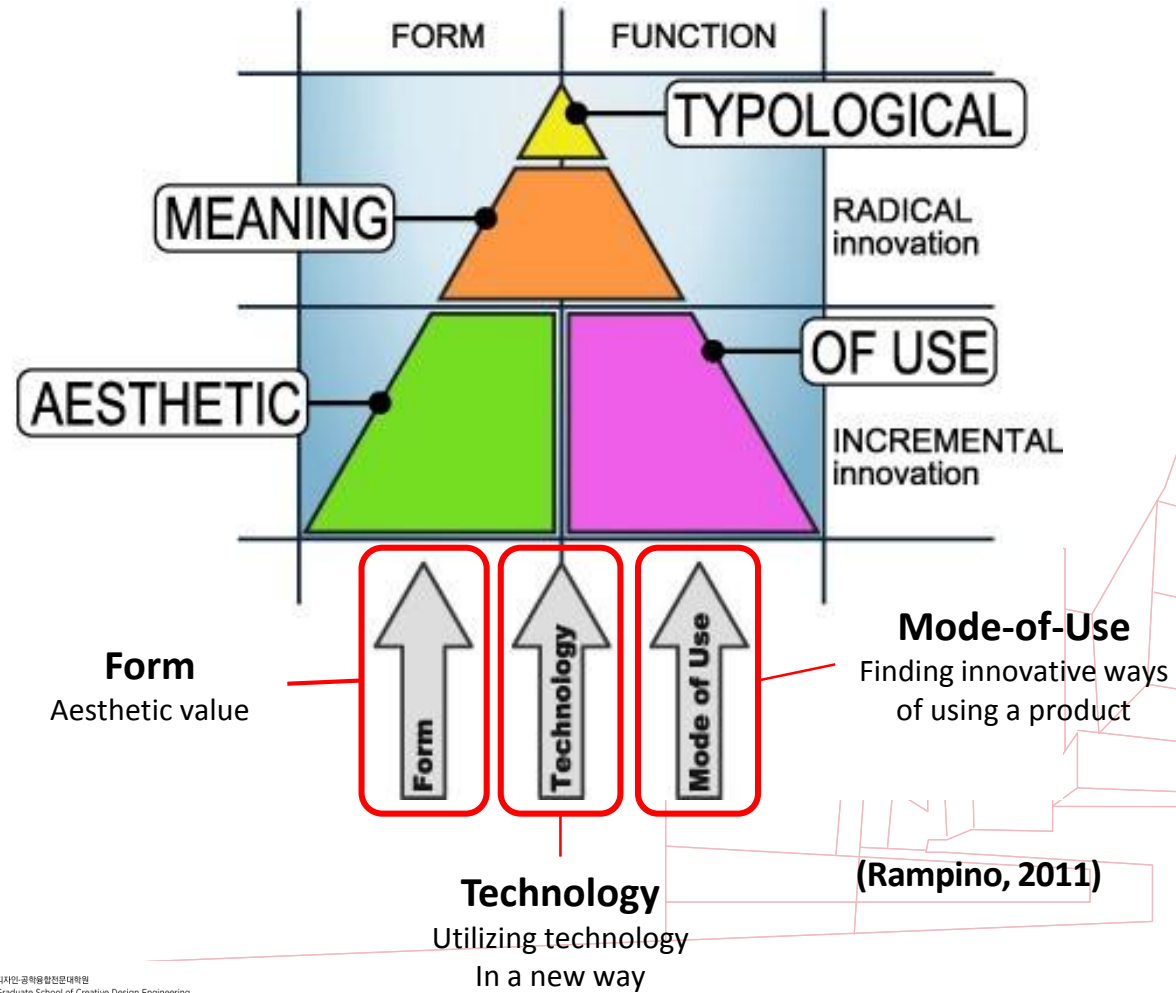
Game

An active, participatory experience that everyone can enjoy

Introduction

Design-driven Innovation

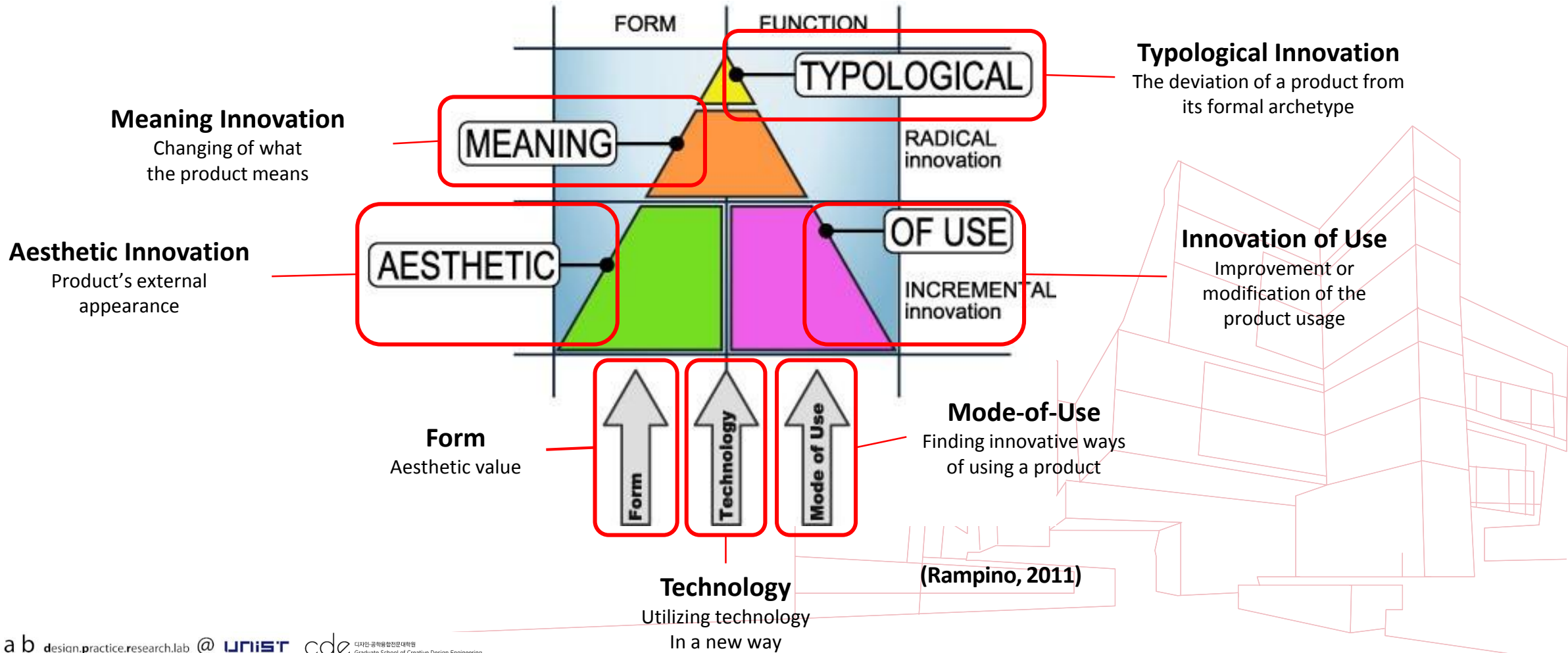
Design-driven innovation is driven by three levers, Which results in four type of Innovations.



Introduction

Design-driven Innovation

Design-driven innovation is driven by three levers, Which results in four type of Innovations.



Meaning Innovation

Changing of what the product means

Aesthetic Innovation

Product's external appearance

AESTHETIC

MEANING

TYPOTOLOGICAL

Typological Innovation

The deviation of a product from its formal archetype

OF USE

Innovation of Use

Improvement or modification of the product usage

Mode-of-Use

Finding innovative ways of using a product

Technology

Utilizing technology in a new way

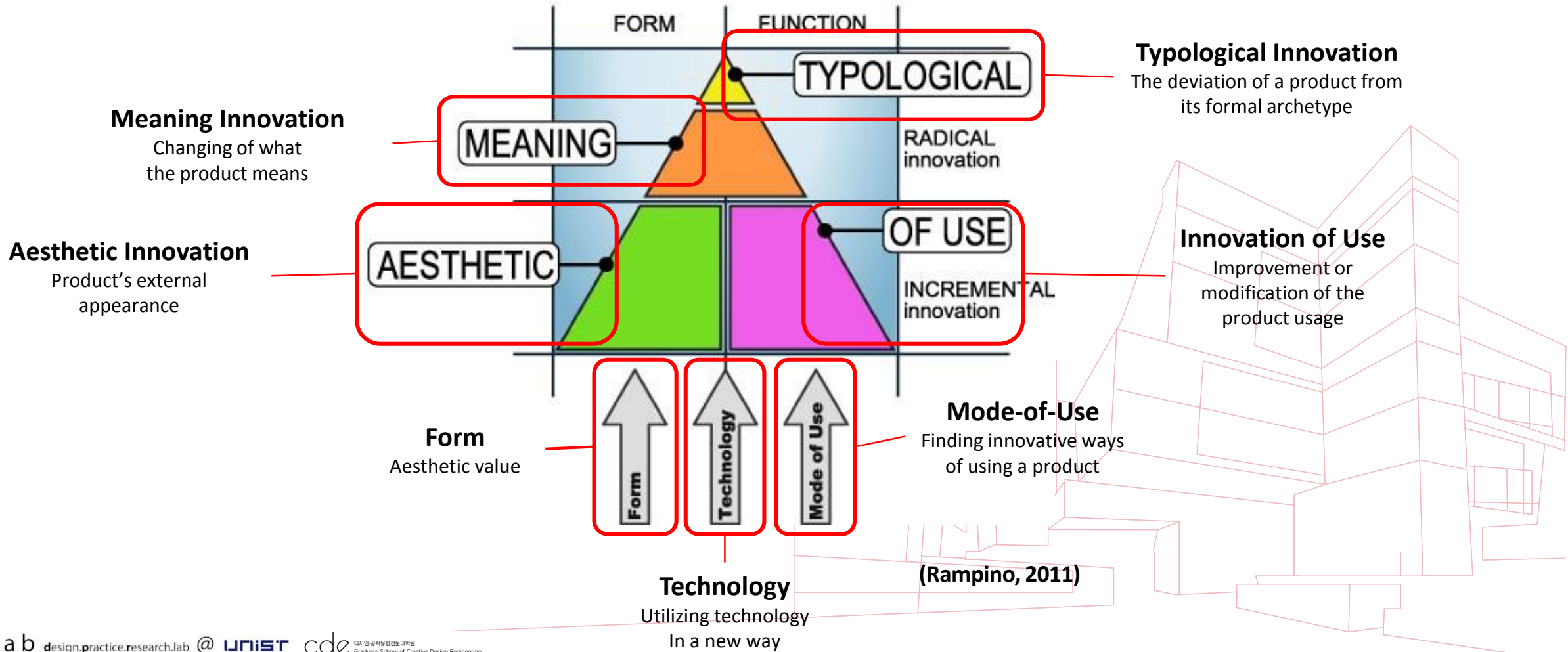
(Rampino, 2011)

Introduction

Design-driven Innovation

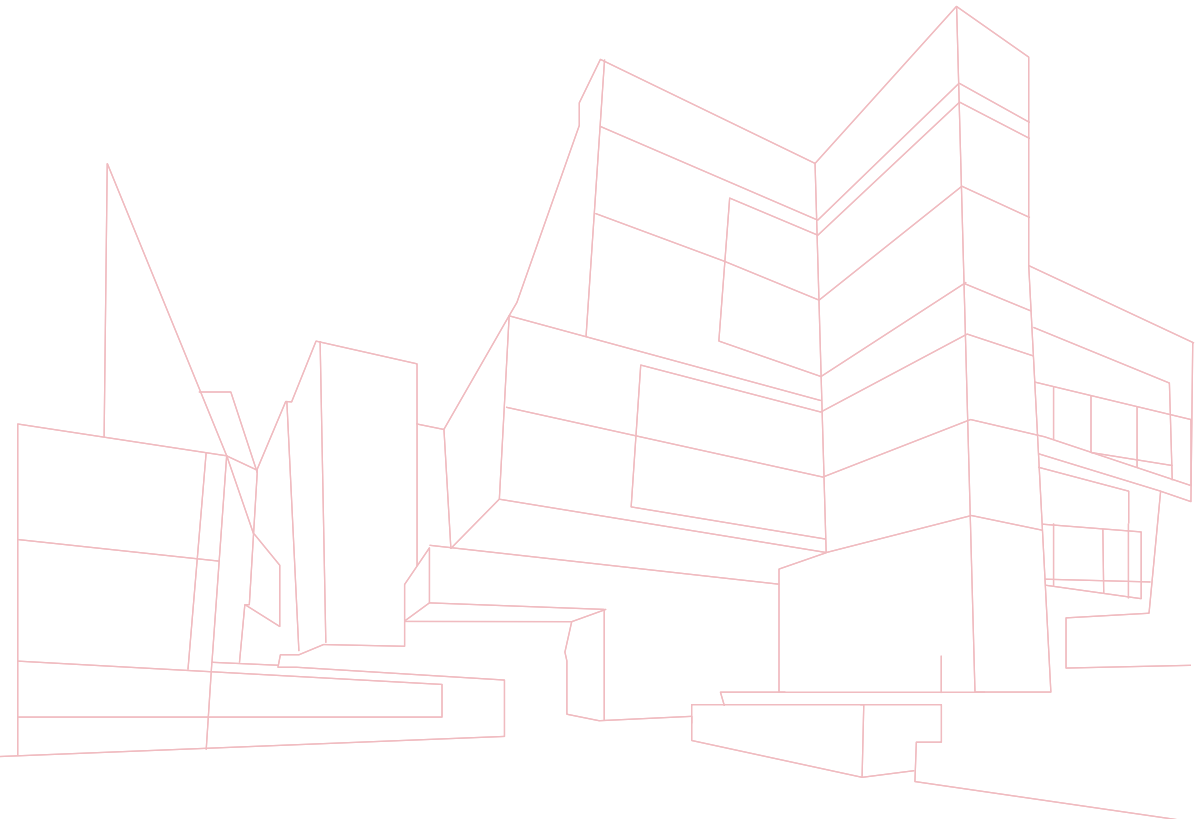
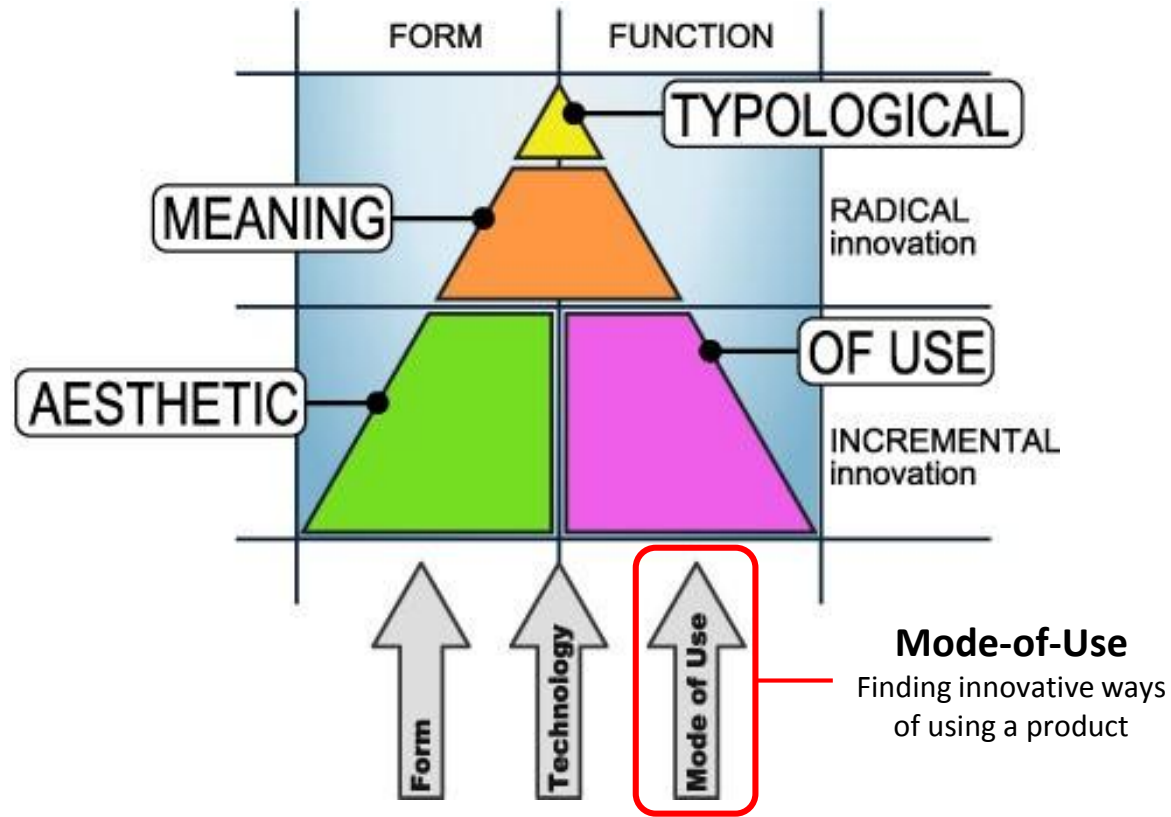
Design-driven innovation is driven by three levers, Which results in four type of Innovations.

How might the design of smart products implicate a notion of design-driven innovation?



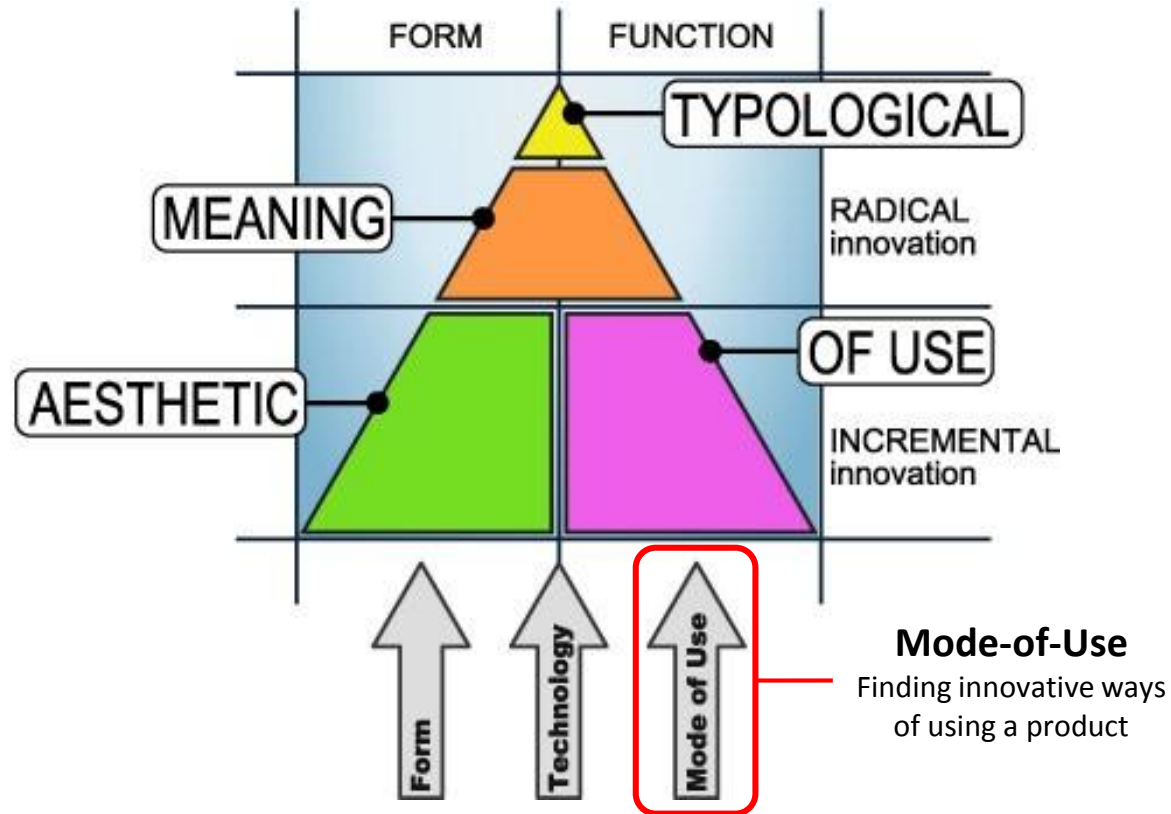
Introduction

Extending to Interactive Product Field



Introduction

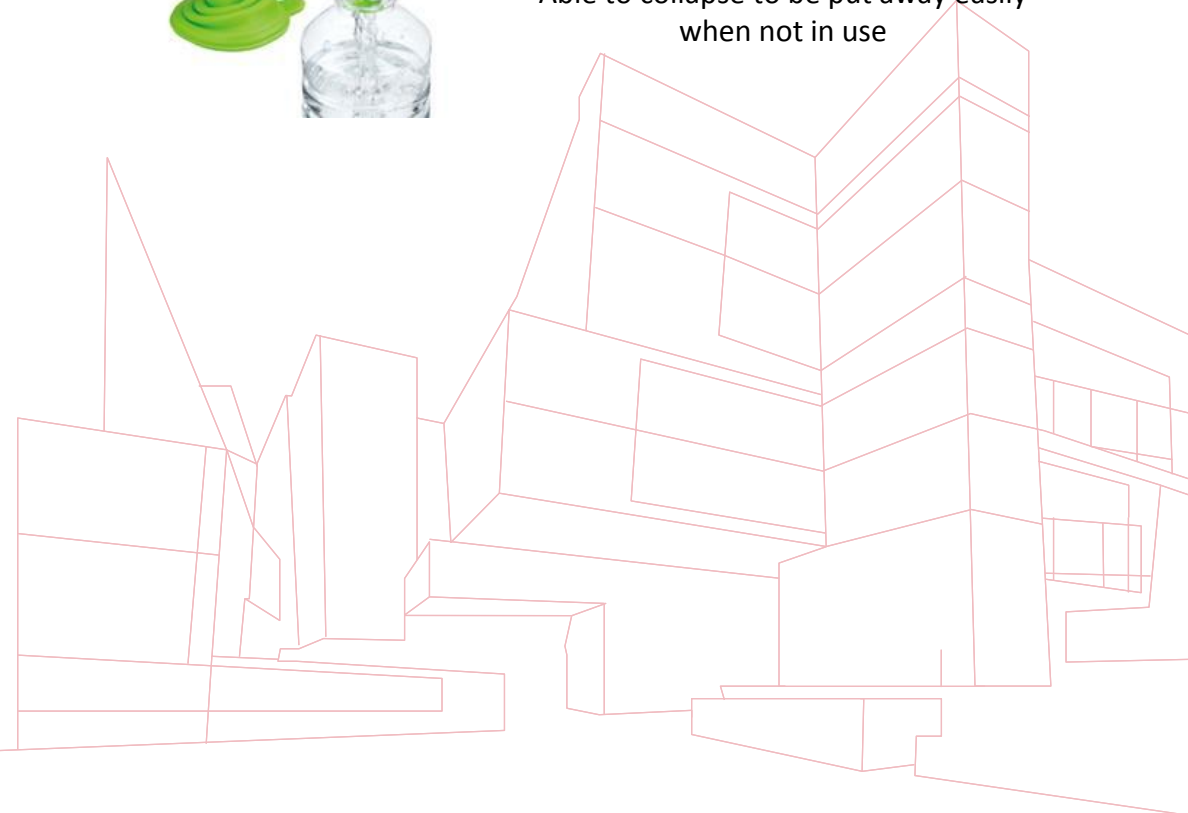
Extending to Interactive Product Field



TRADITIONAL

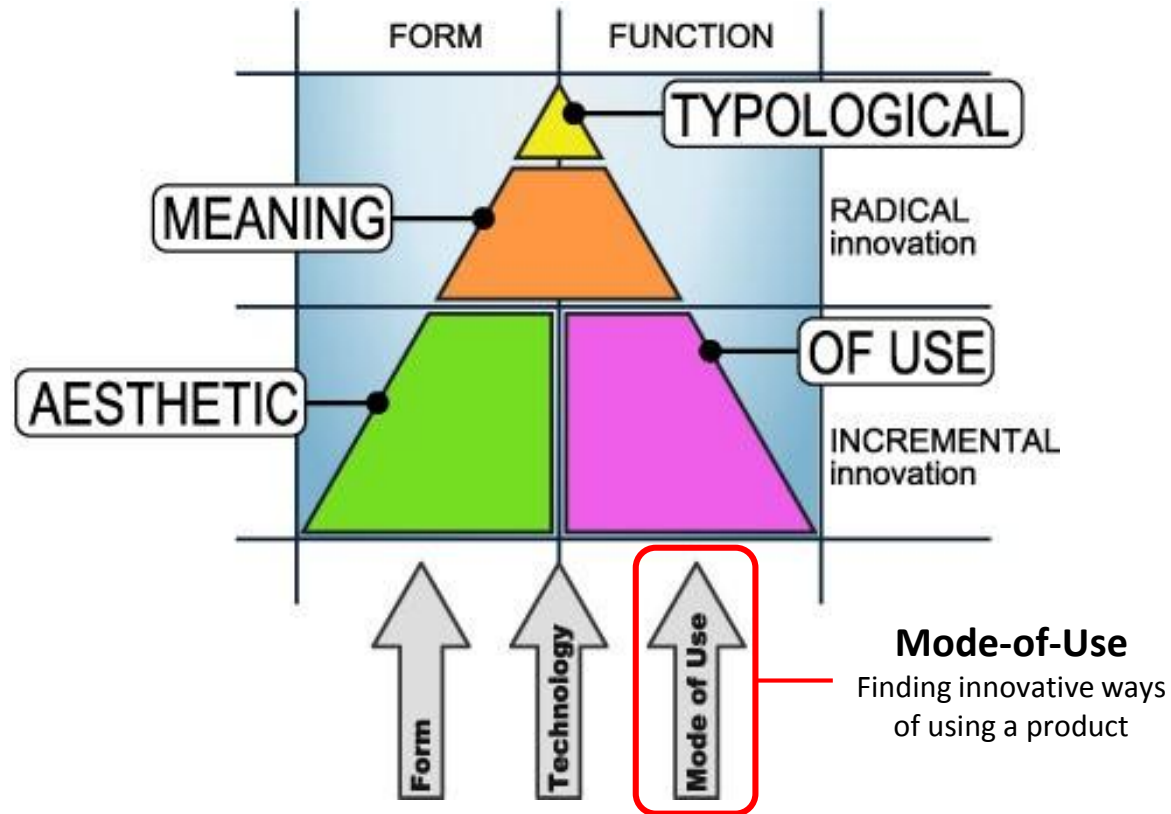
Collapsible Funnel

Able to collapse to be put away easily when not in use



Introduction

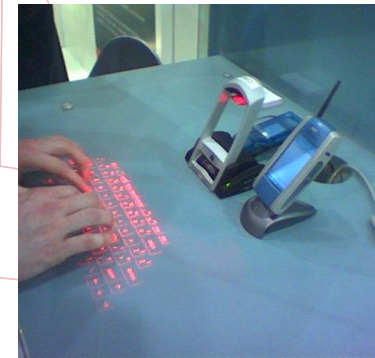
Extending to Interactive Product Field



TRADITIONAL

Collapsible Funnel

Able to collapse to be put away easily when not in use



INTERACTIVE

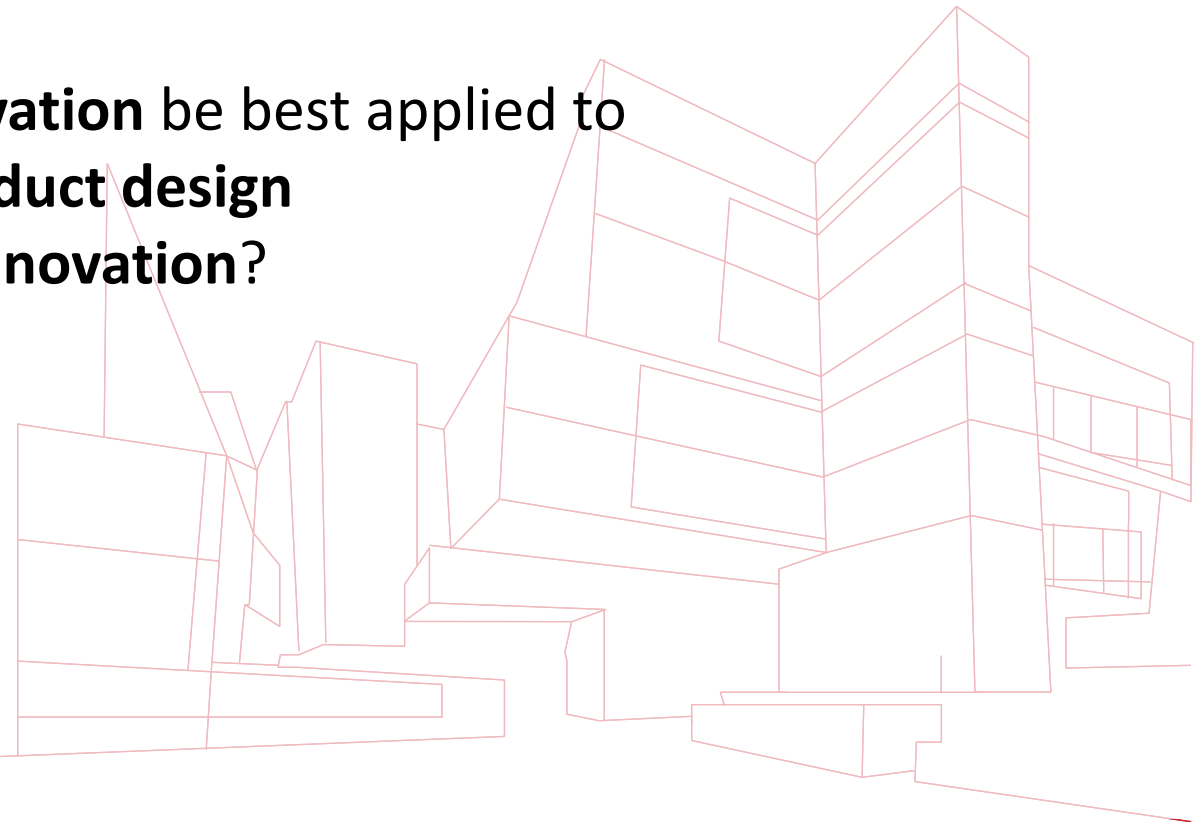
Projection Keyboard

Altering the mode-of-use of keyboard

Introduction

Research Question

How can **mode-of-use innovation** be best applied to **interactive product design** as driver for **innovation**?

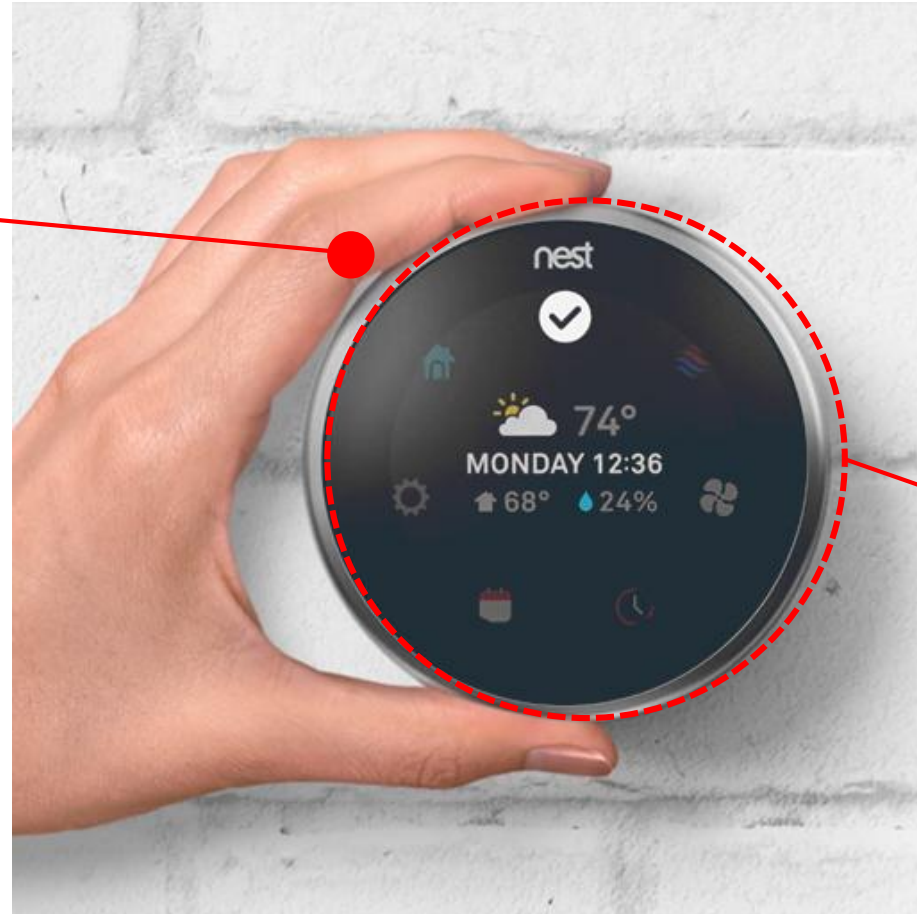


Background

Interactive Products

Interaction

The relation, in use, between product and its user mediated by its interface.

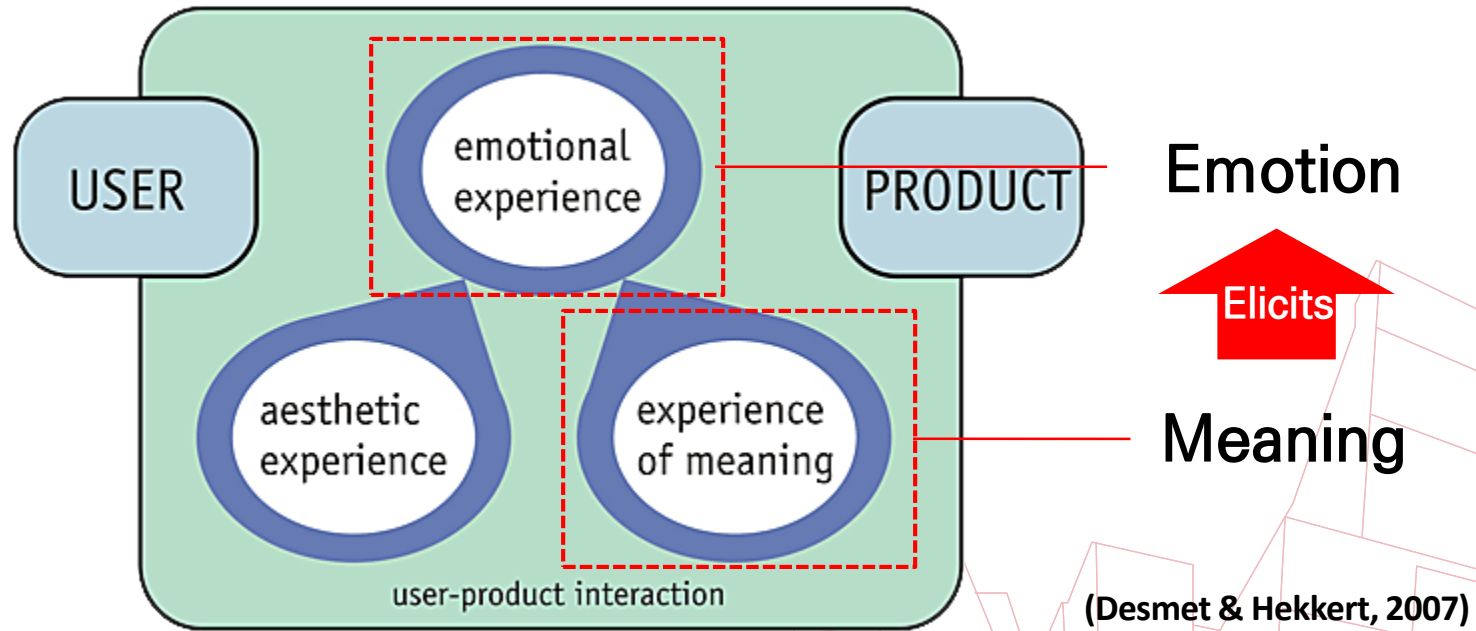


Interface

Combination of the controls and feedback elements of an interactive product.

Background

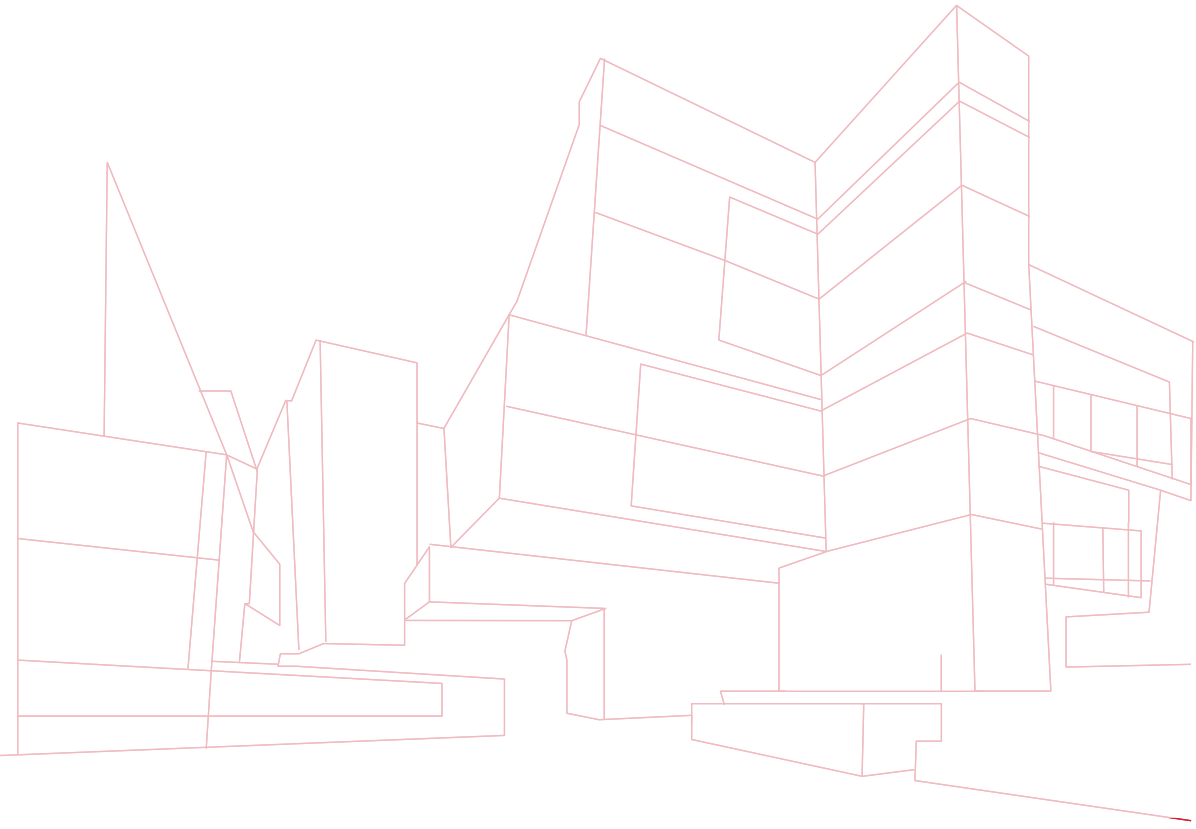
Product Experience



Design-driven Innovation can be seen as a radical change of emotion

Background

Generic Interaction Styles



Background

Generic Interaction Styles

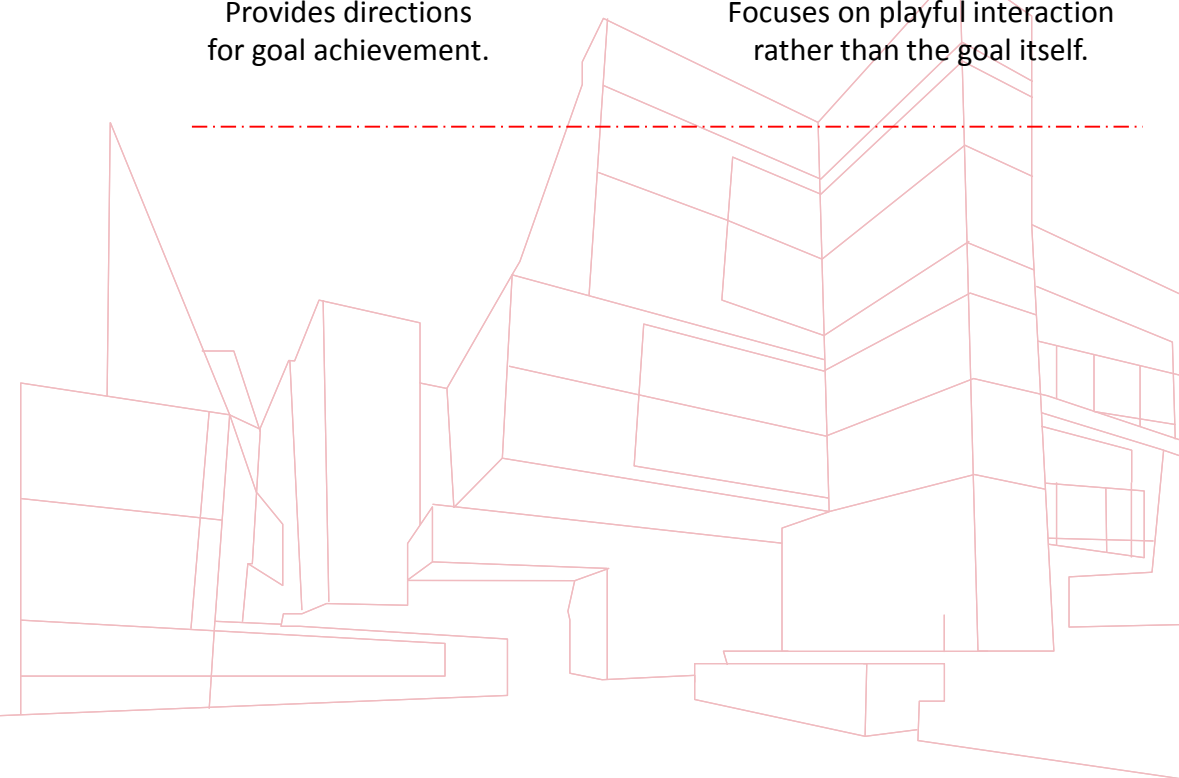


Explanatory

Provides directions for goal achievement.

Exploratory

Focuses on playful interaction rather than the goal itself.



Background

Generic Interaction Styles



Explanatory

Provides directions for goal achievement.

Exploratory

Focuses on playful interaction rather than the goal itself.



Discrete

Provide links between one control - one function

Composite

Have general controls to access various functions

Background

Generic Interaction Styles



Background

Generic Interaction Styles



Explanatory
Provides directions for goal achievement.

Exploratory
Focuses on playful interaction rather than the goal itself.



Discrete
Provide links between one control - one function

Composite
Have general controls to access various functions

Research Method

Research-through-Design



Tangible Control

Giving information for successfully carrying out certain functions



Control hue/brightness with knobs mapped with each function



Touch-free Magic

A minimal UI and interaction with unpredictable feedback



Control hue/brightness by waving hand



Research Method

Research-through-Design



Tangible Control

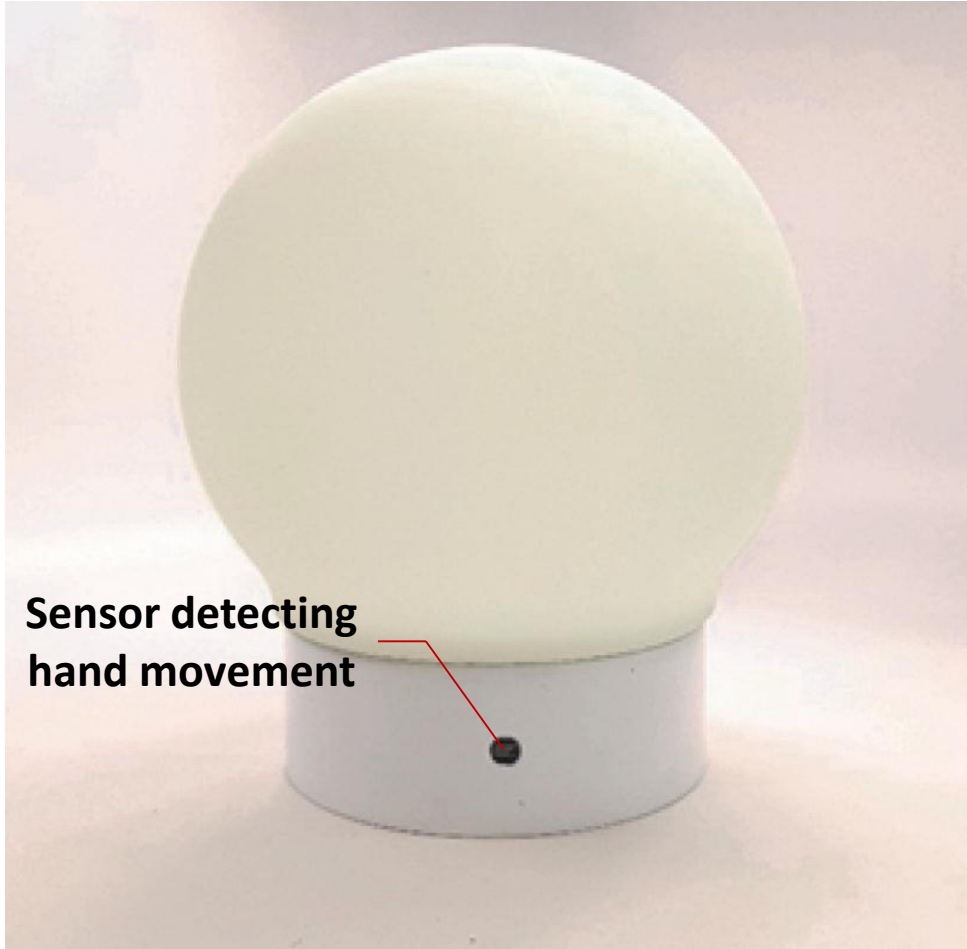
The interface consists of several discrete controls.

The spatial arrangement controls support product understanding.

Lamp controlling
hue/brightness with each knobs

Research Method

Research-through-Design



Touch-free Magic

The product reacts in surprising ways.

The controls themselves may not have one clear identity.

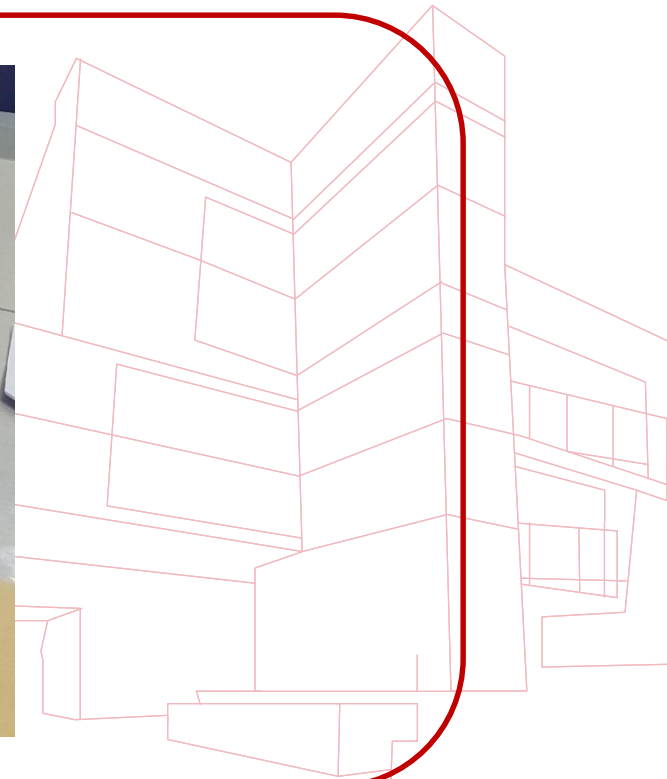
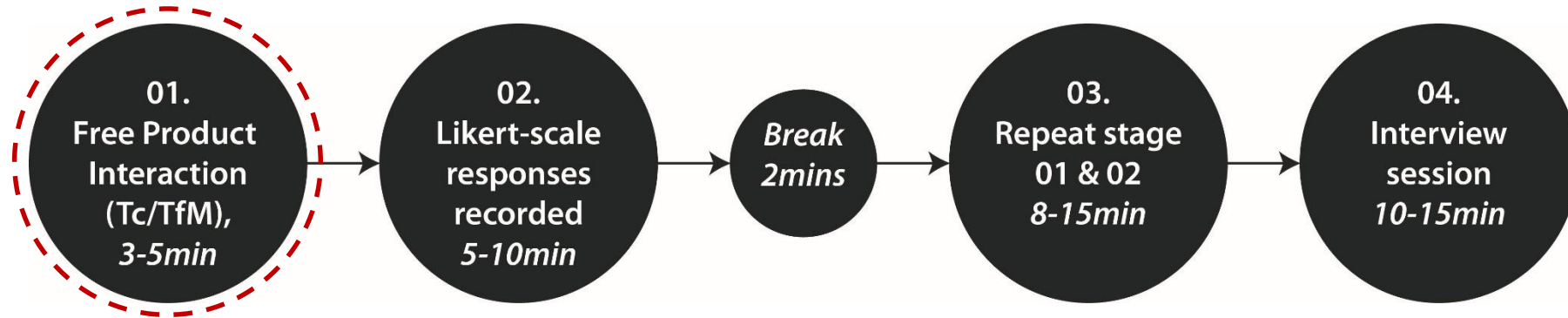
The product focuses on playful interaction.

It may move and respond physically, but with no tactile feedback.

Lamp controlling hue/brightness by waving hand

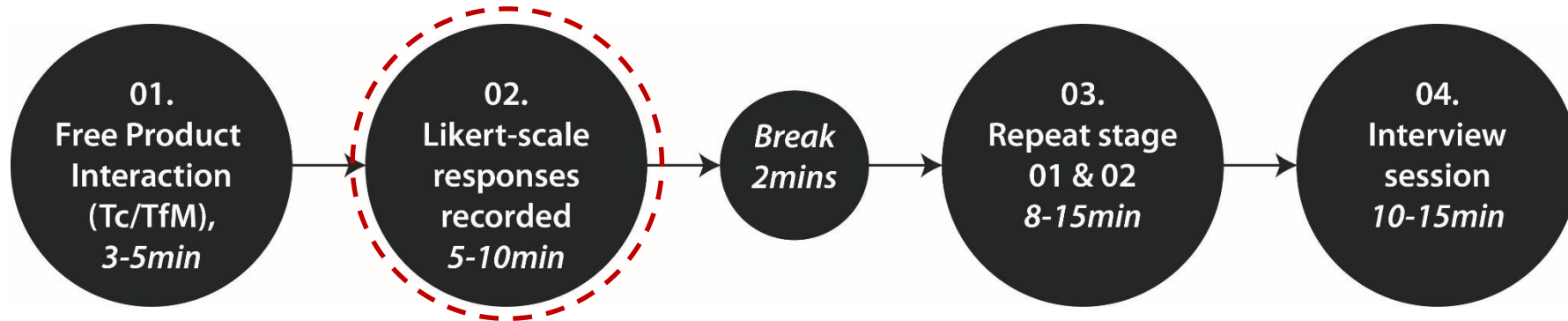
Research Method

Experiment Design



Research Method

Experiment Design



Desire

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Satisfaction

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Pride

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Hope

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Joyful

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Fascination

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Admire

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Disgusted

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Dissatisfied

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Fearful

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Shameful

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Bored

0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Sad

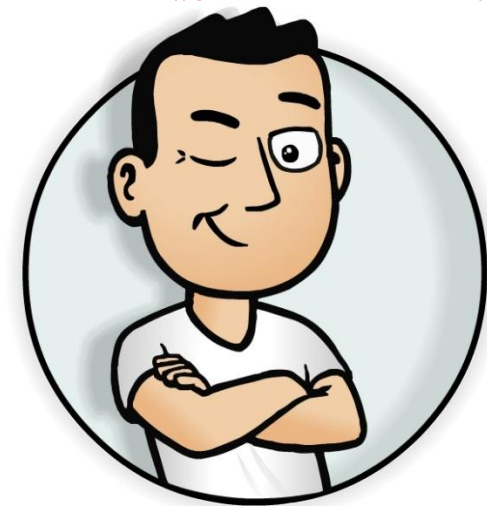
0 1 2 3 4

I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly

Contempt

0 1 2 3 4

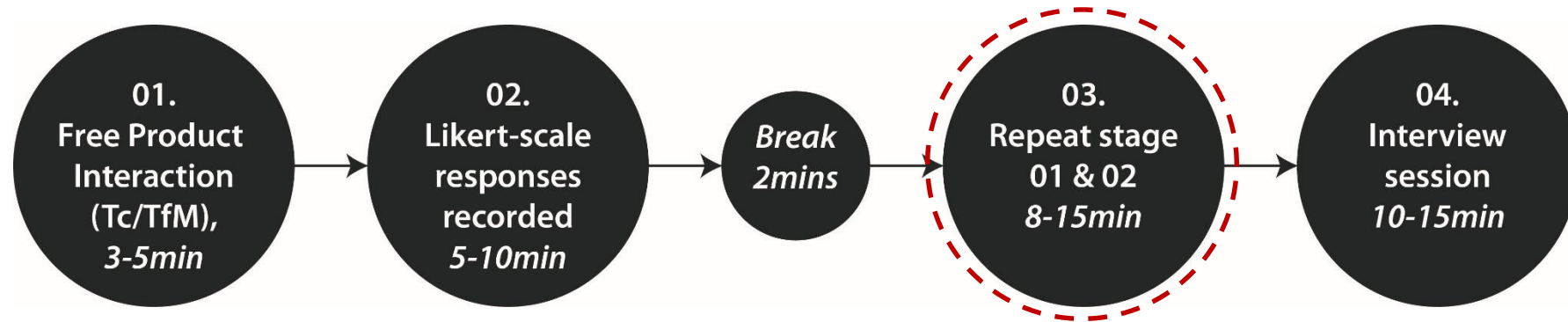
I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly



premo
v 2 0 0 8

Research Method

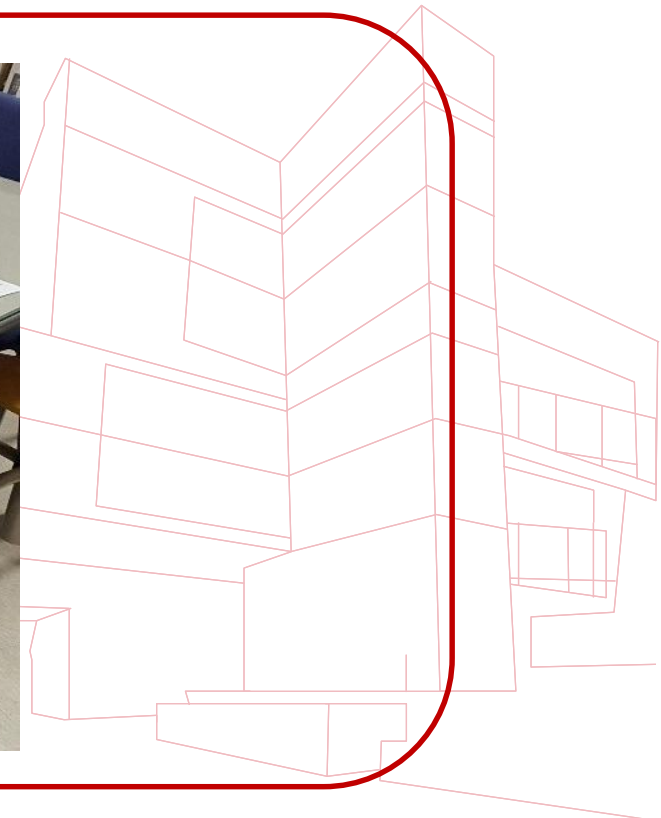
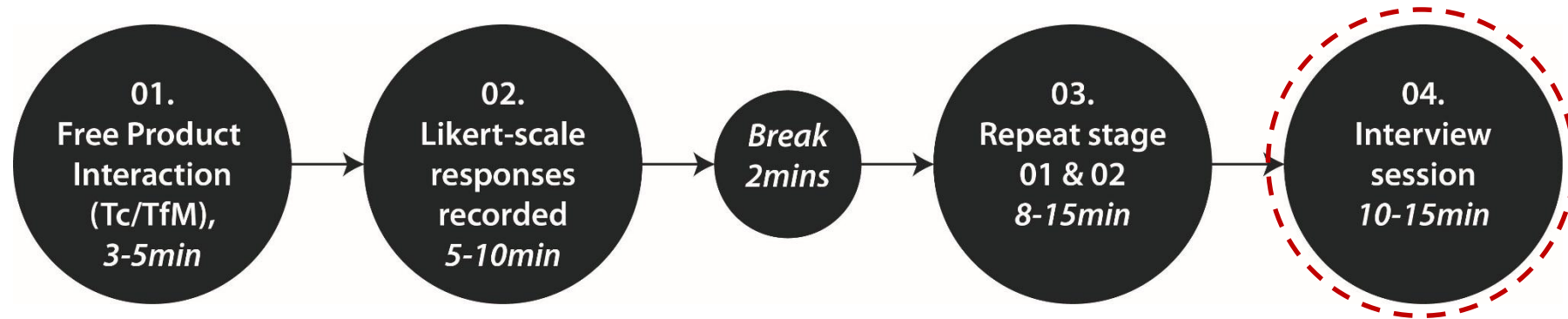
Experiment Design



<p>Desire</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Disgusted</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>
<p>Satisfaction</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Dissatisfied</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>
<p>Pride</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Fearful</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>
<p>Hope</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Shameful</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>
<p>Joyful</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Bored</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>
<p>Fascination</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Sad</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>
<p>Admire</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>	<p>Contempt</p> <p>0 1 2 3 4</p> <p>I do not feel this I feel this a little I feel this somewhat I do feel this I do feel this strongly</p>

Research Method

Experiment Design

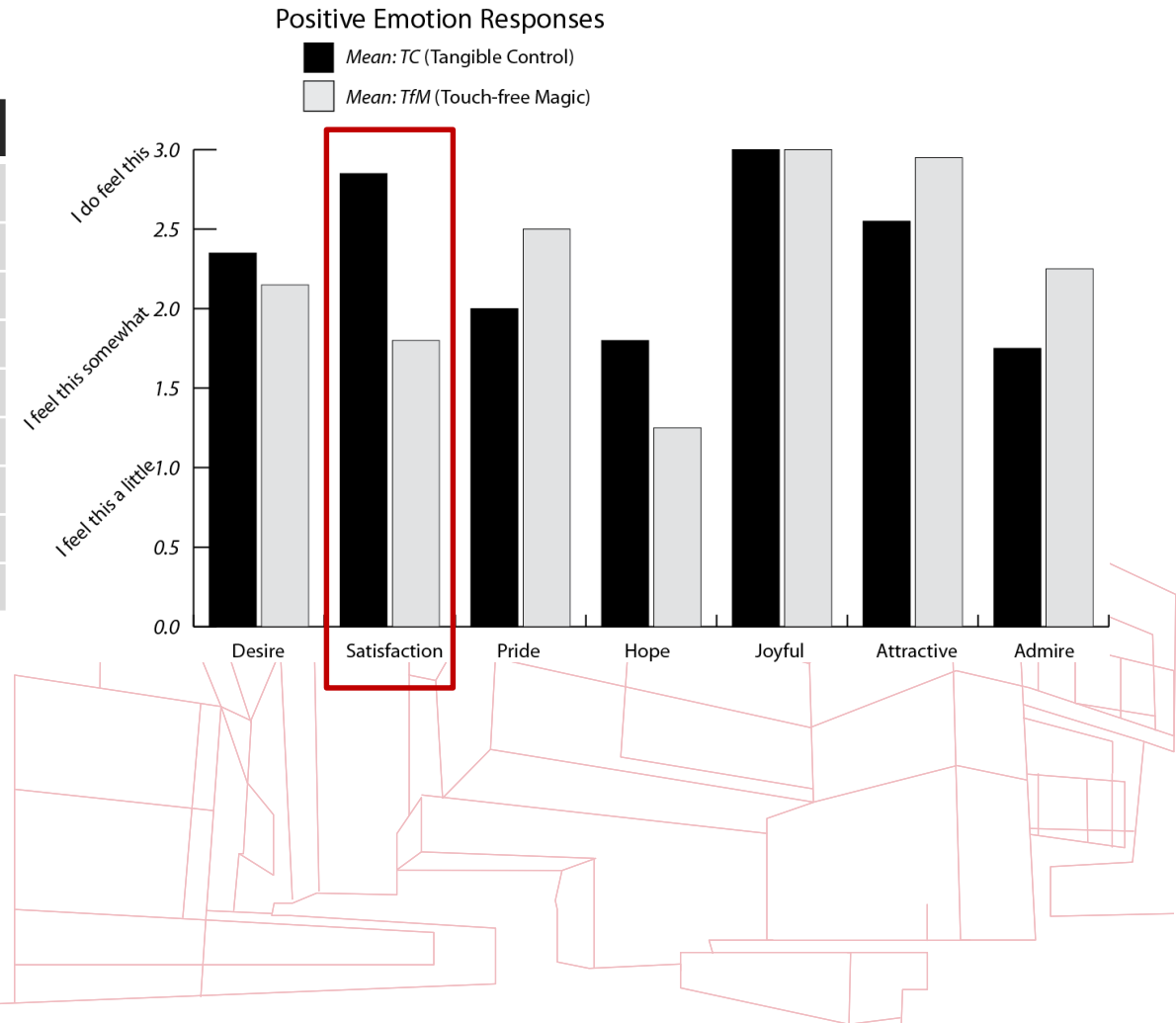


Results

Likert Scale Responses

Response item	Positive Emotion Responses					
	TC (Tangible Control)			TfM (Touch-free magic)		
	Σ	M	SD	Σ	M	SD
P01.Desire	47	2.35	1.11	43	2.15	1.11
<u>P02.Satisfaction</u>	57	2.85	0.85	36	1.8	0.75
P03.Pride	40	2.0	1.18	50	2.5	1.07
P04.Hope	36	1.8	1.12	25	1.25	1.26
P05.Joyful	60	3.0	0.95	60	3	0.98
P06.Attractive	51	2.55	0.92	59	2.95	0.92
P07.Admire	35	1.75	0.94	45	2.25	0.99

Response Indicators	Mann-Whitney U Test Result		
	U	M	p
<u>P02.Satisfaction</u>	<u>75</u>	<u>2.85</u>	<u><0.01</u>

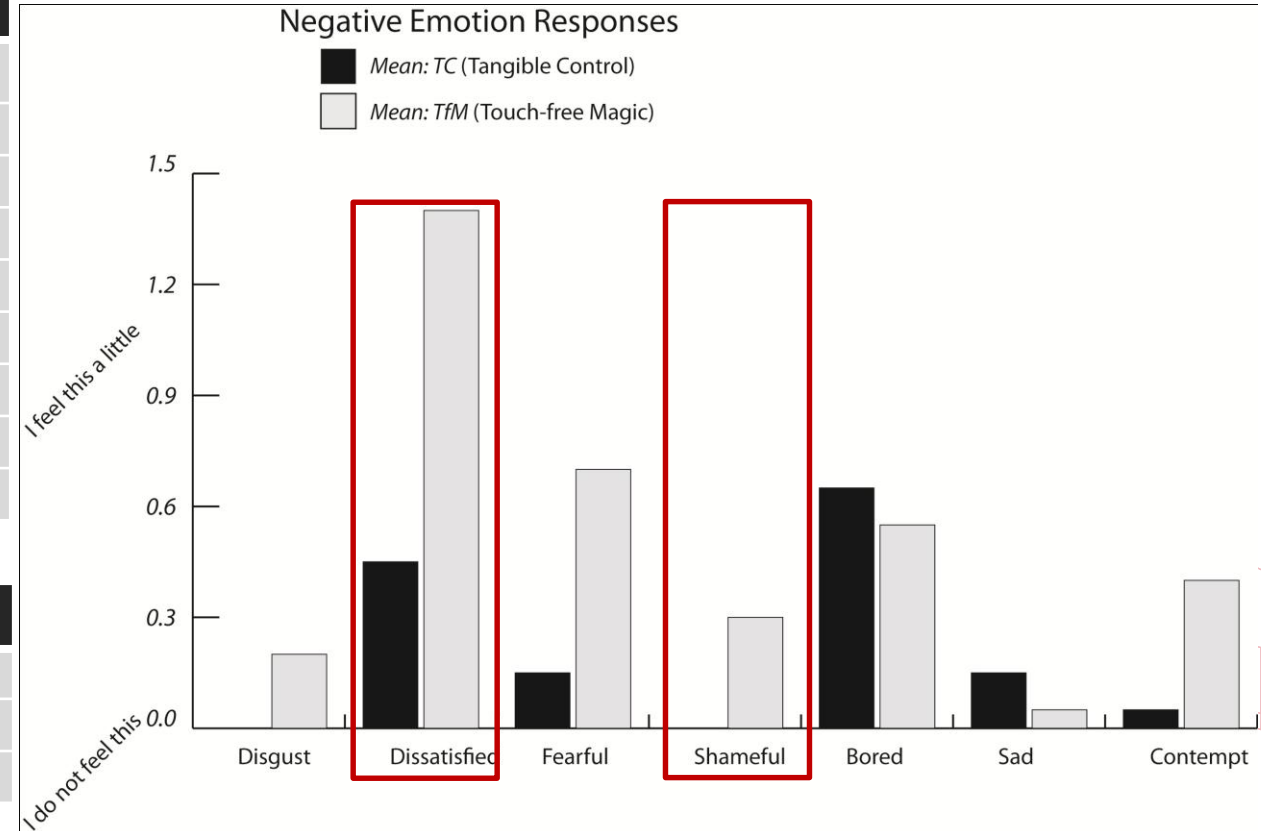


Results

Likert Scale Responses

Response item	Negative Emotion Responses					
	TC (Tangible Control)			TfM (Touch-free magic)		
	Σ	M	SD	Σ	M	SD
N01.Disgust	0	0.0	0.0	4	0.2	0.51
N02.Dissatisfaction	9	*0.45	0.67	28	1.4	0.92
N03.Fear	3	0.15	0.36	14	0.7	1.0
N04.Shameful	0	*0.0	0.00	6	0.3	0.56
N05.Bored	13	0.65	0.65	11	0.55	0.67
N06.Sad	3	0.48	0.48	1	0.05	0.22
N07.Contempt	1	0.05	0.22	8	0.4	0.92

Response Indicators	Mann-Whitney U Test Result		
	U	M	p
N02.Dissatisfaction	86	0.45	<0.05
N04.Shameful	150	0.0	<0.05



Results

Qualitative Results

1. Paradoxically, the novelty of the TfM interaction made it **less satisfying** in terms of meeting subjects' expectations.

“I feel more satisfied with this (TC) because the interaction is more natural”

“This (TfM) shows less credibility than the one with the knob.”

“I feel more satisfied with this (TC) because it's more intuitive.”

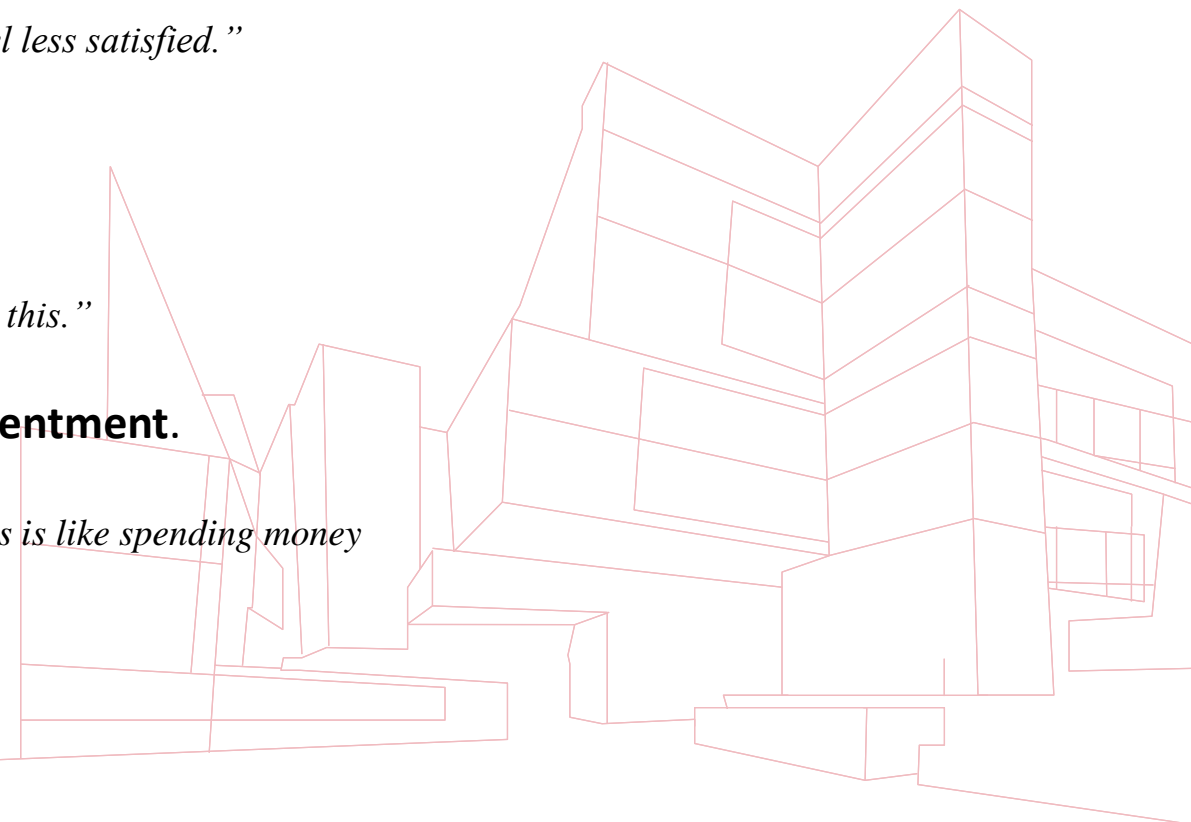
“In order to interact with this (TfM) you have to think a bit. That's making me feel less satisfied.”

2. This **dissatisfaction** also may have lead to **shame** in the participants' ability to achieve the desired result.

“I felt ashamed because when I first got this (TfM), I didn't know what to do with this.”

3. This **dissatisfaction** also appeared to move to feelings of **resentment**.

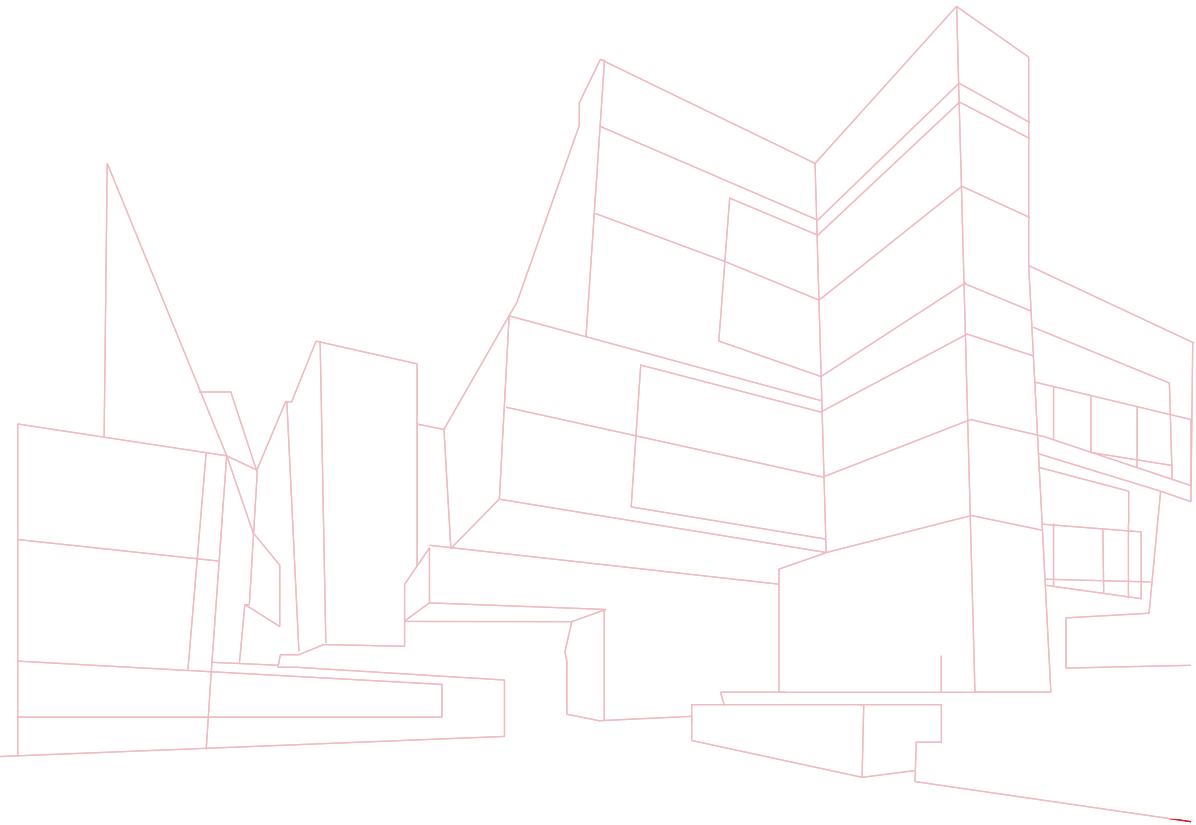
“If I ever buy this (TfM) that would look pretentious and silly, because buying this is like spending money on something that's doubtful whether it would work or not.”



Discussion

Back to Research Question...

How can **mode-of-use innovation** be best applied to **interactive product design** as driver for **innovation**?



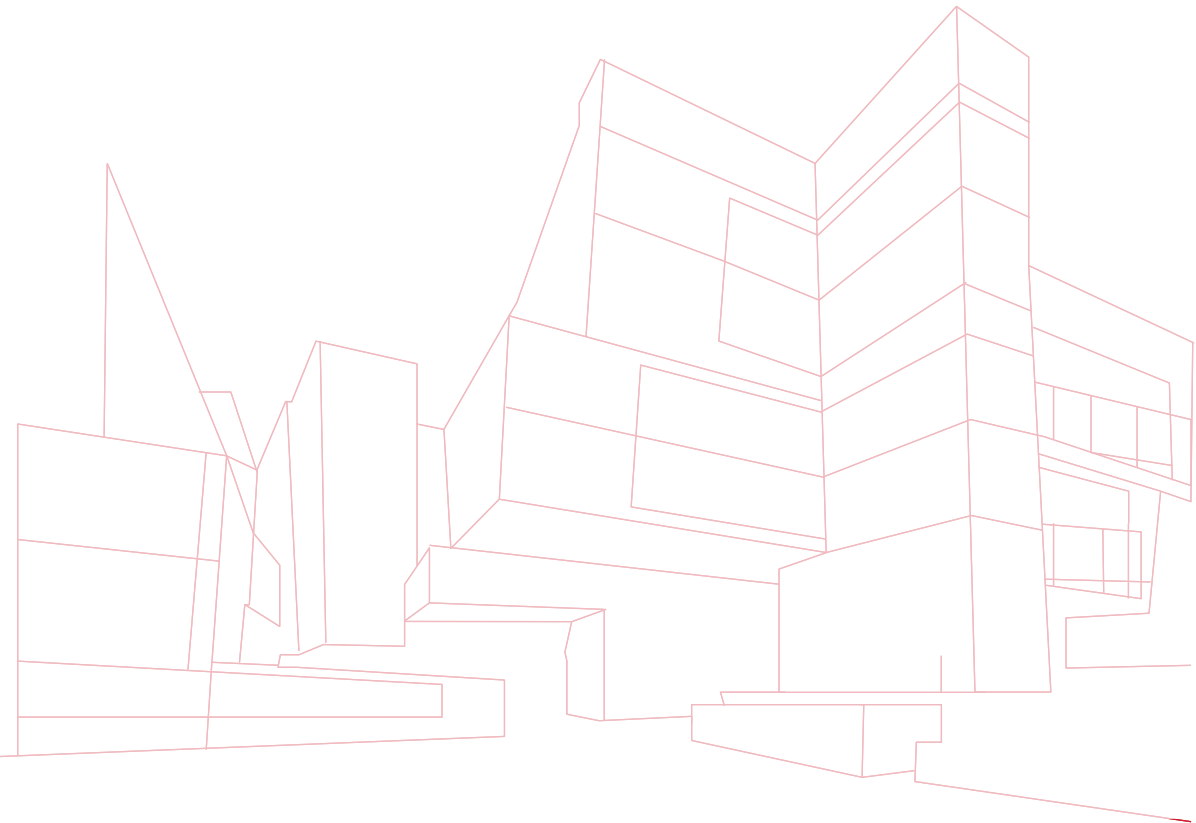
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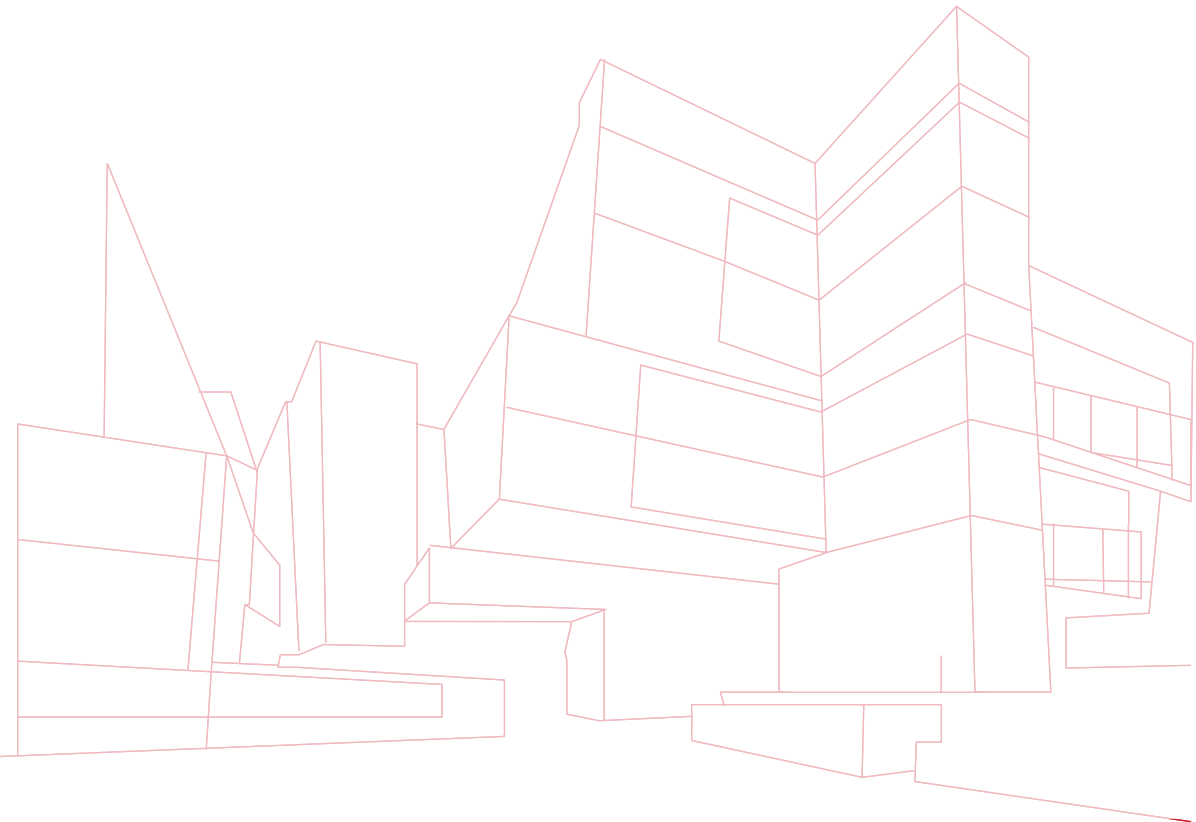
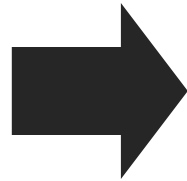
Novel application of use affordance to provide both **improved function** and **change in meaning**



Discussion

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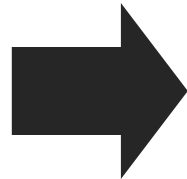


Novel application of use affordance to provide both **improved function** and **change in meaning**

Discussion

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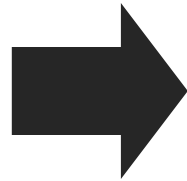
Novel application of use affordance to provide both **improved function** and **change in meaning**

TC Type
Achieved higher **satisfaction**

Discussion

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How can **mode-of-use innovation** be best applied to **interactive product design** as driver for **innovation**?



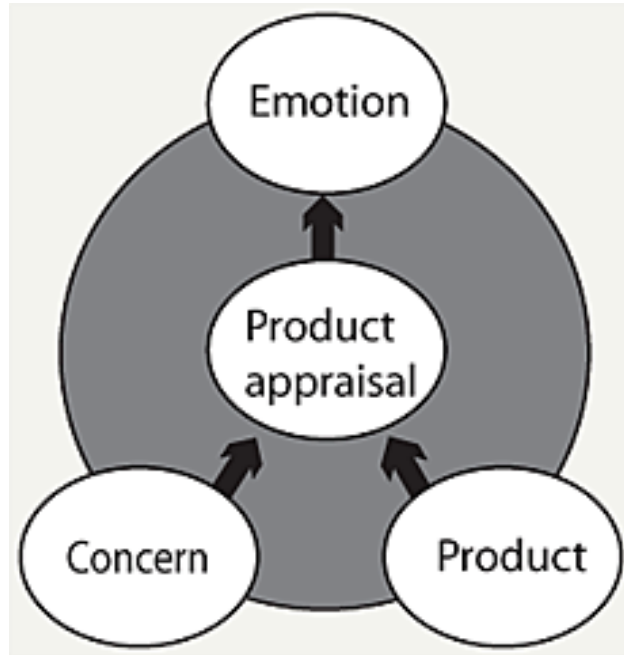
Novel application of use affordance to provide both **improved function** and **change in meaning**

TC Type
Achieved higher **satisfaction**

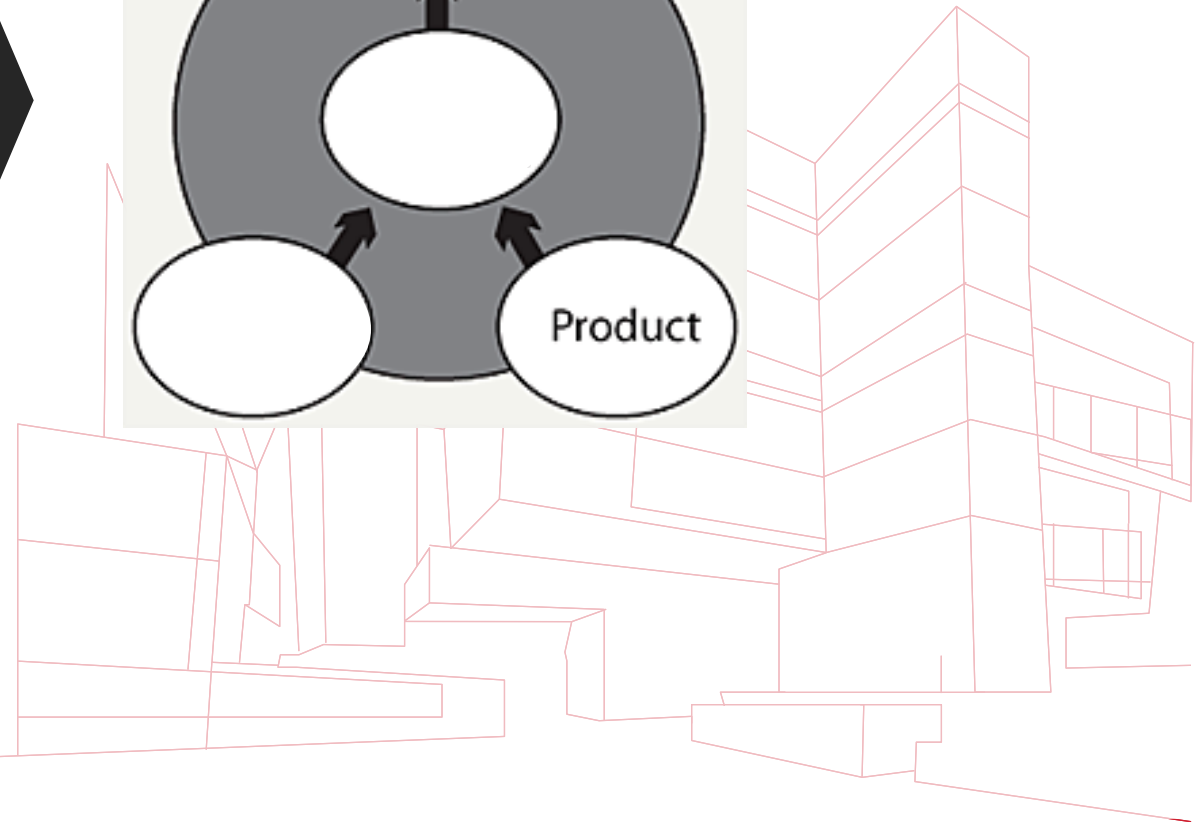
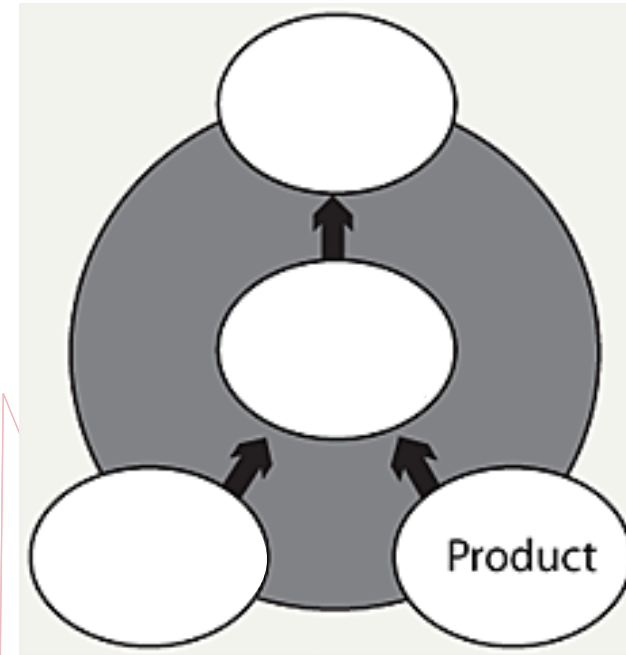
TfM Type
Significantly more **dissatisfaction**

Discussion

Conclusion

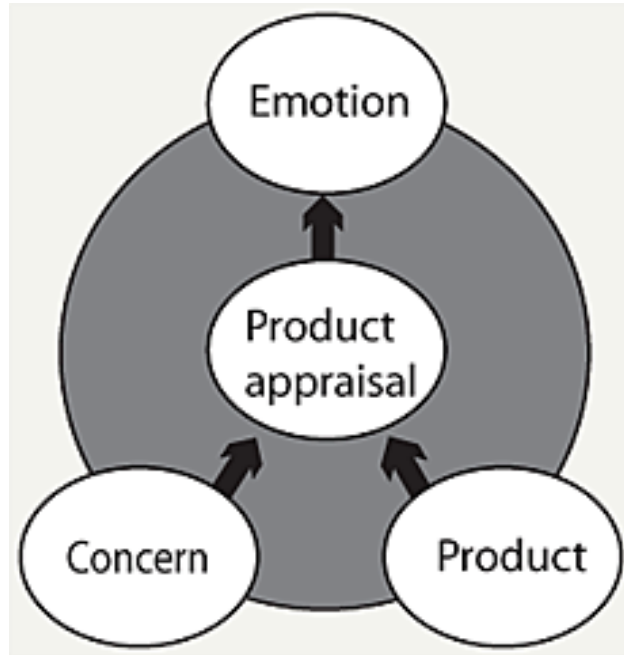


(Desmet & Hekkert, 2002)

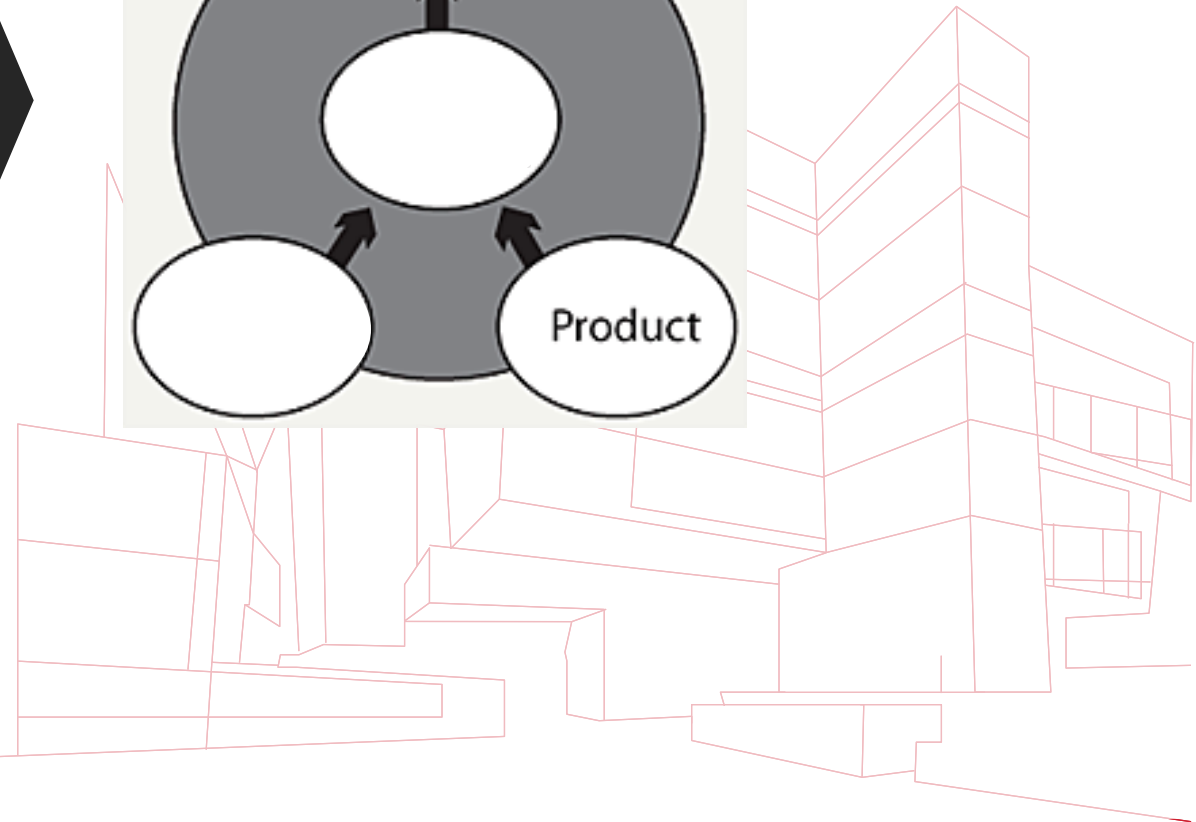
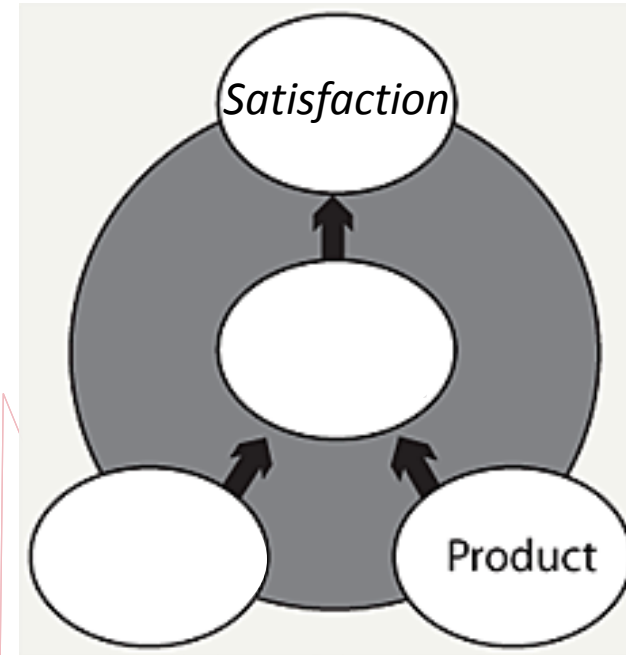


Discussion

Conclusion

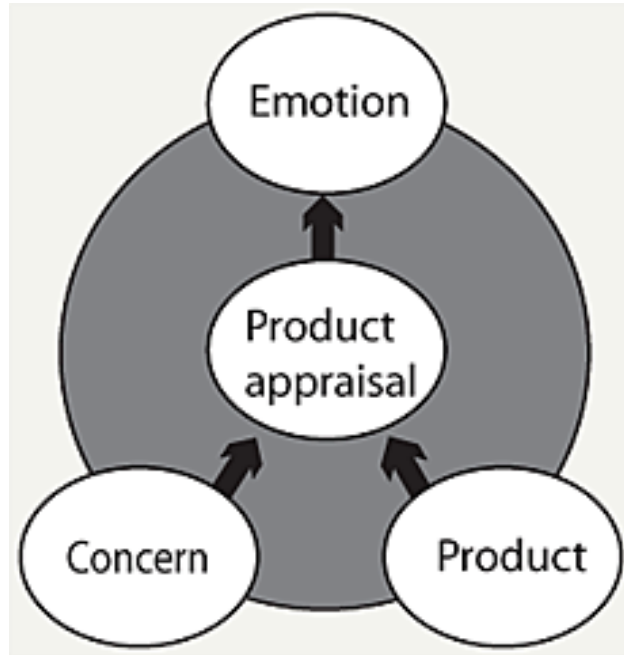


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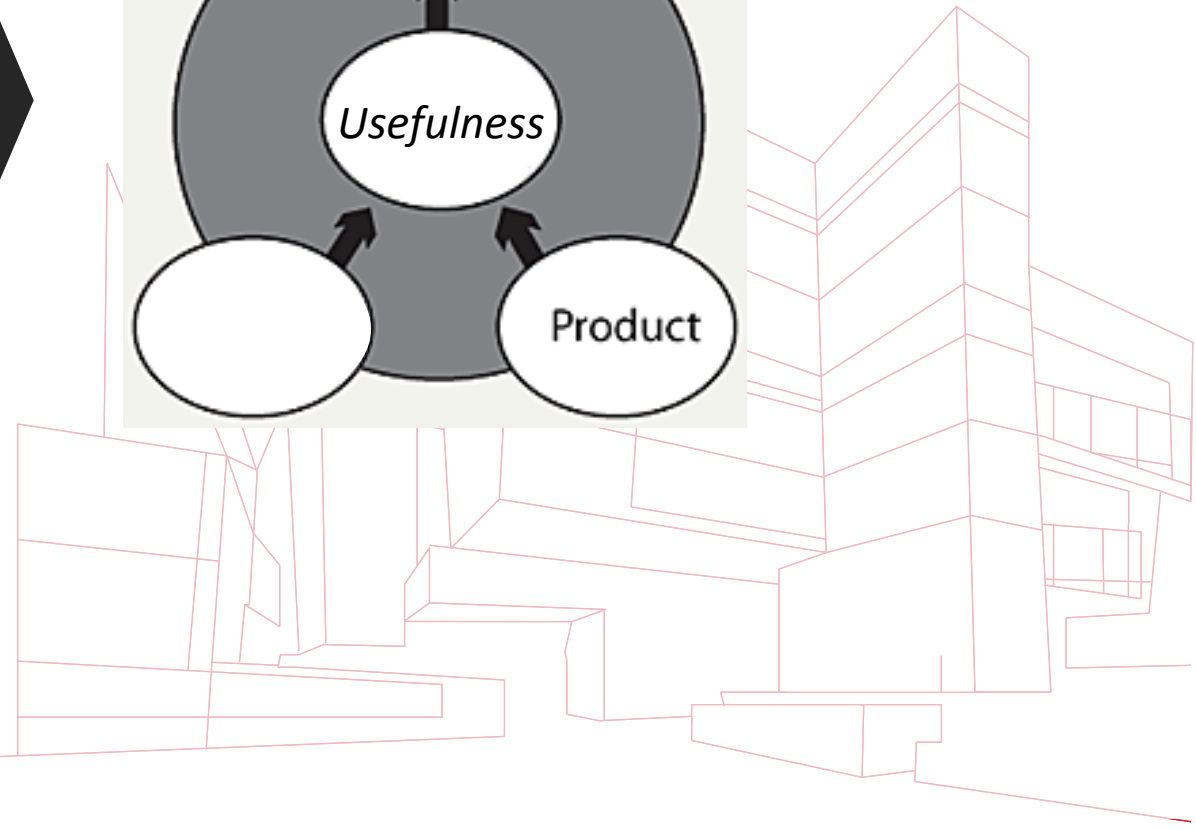
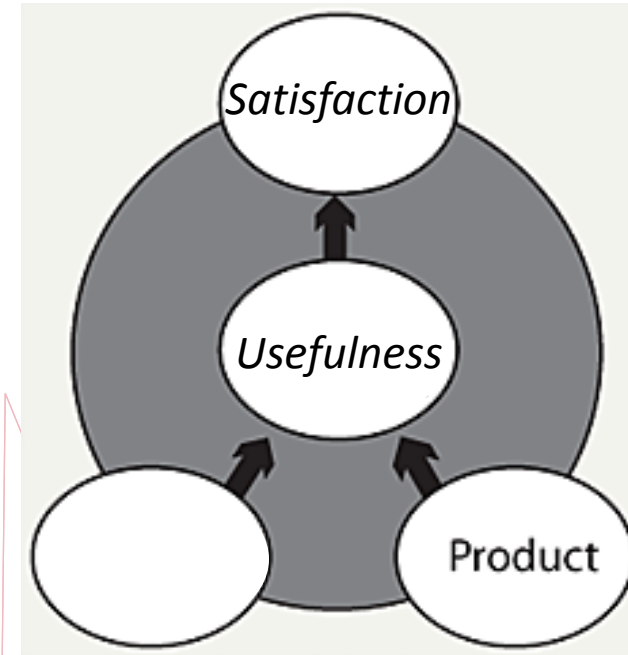


Discussion

Conclusion

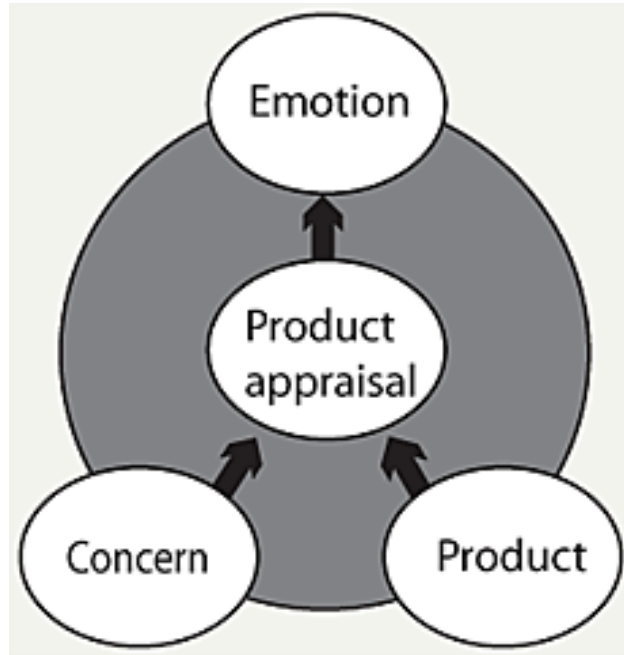


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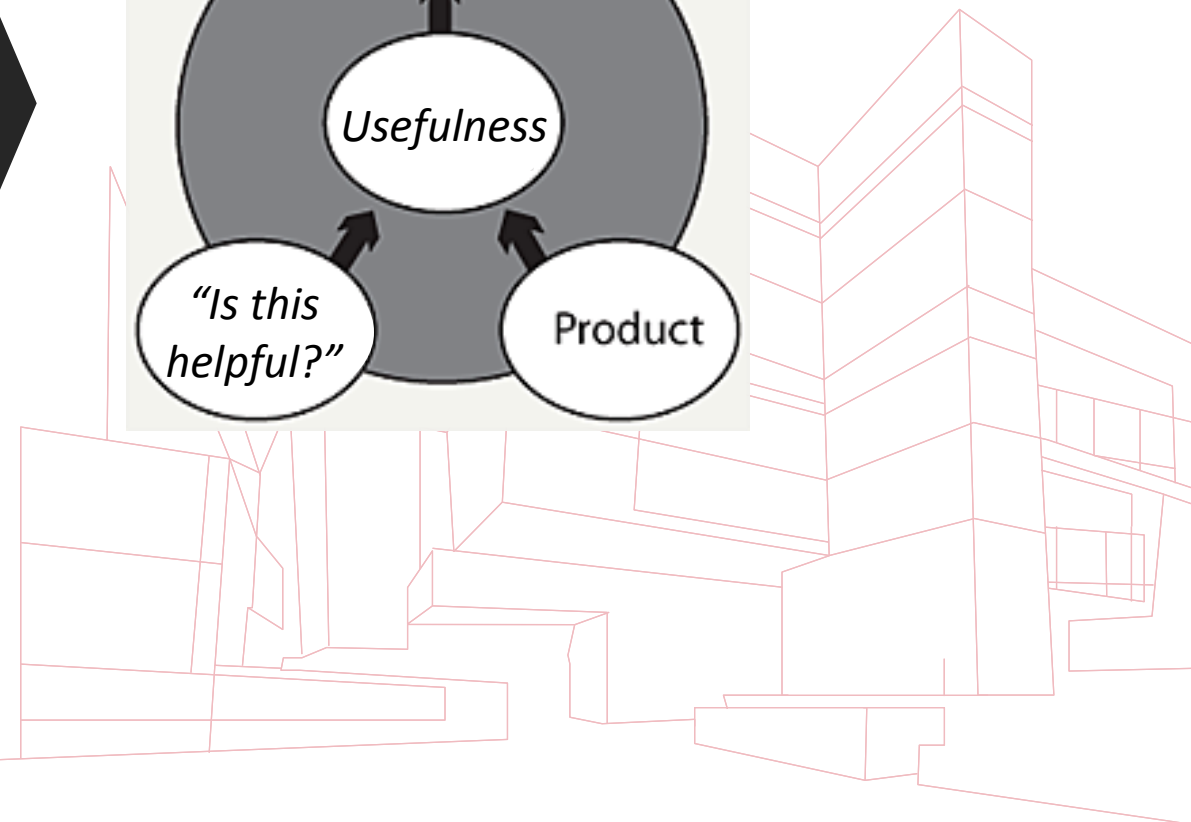
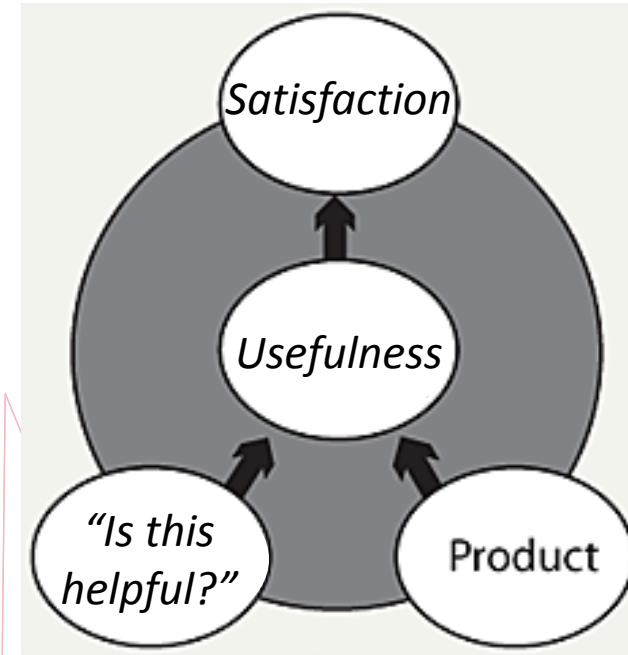


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Conclusion

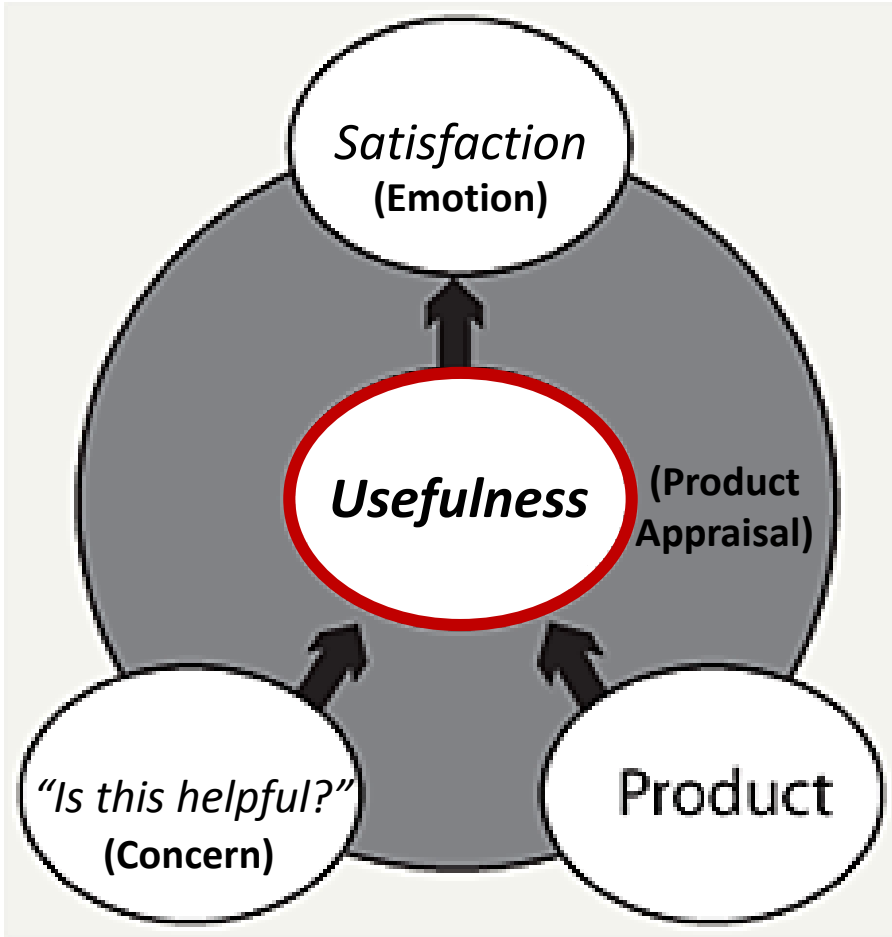


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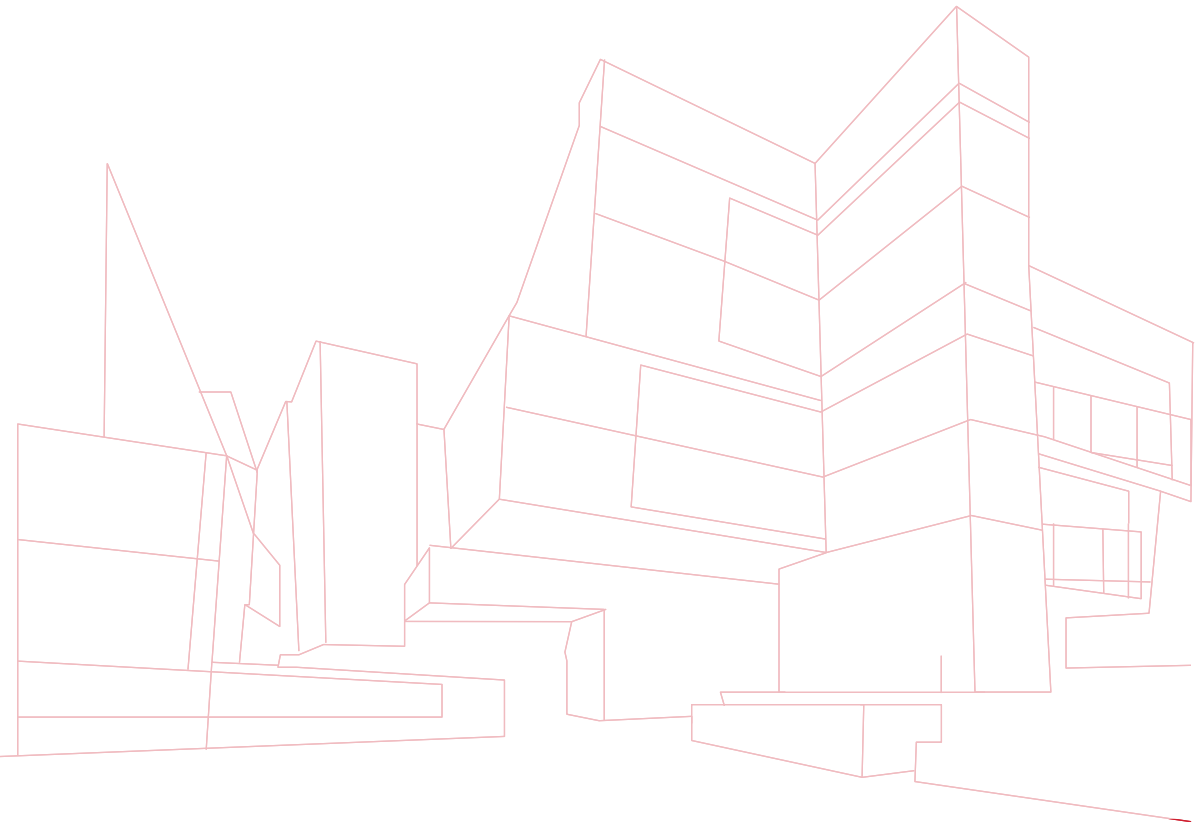


Discussion

Conclusion

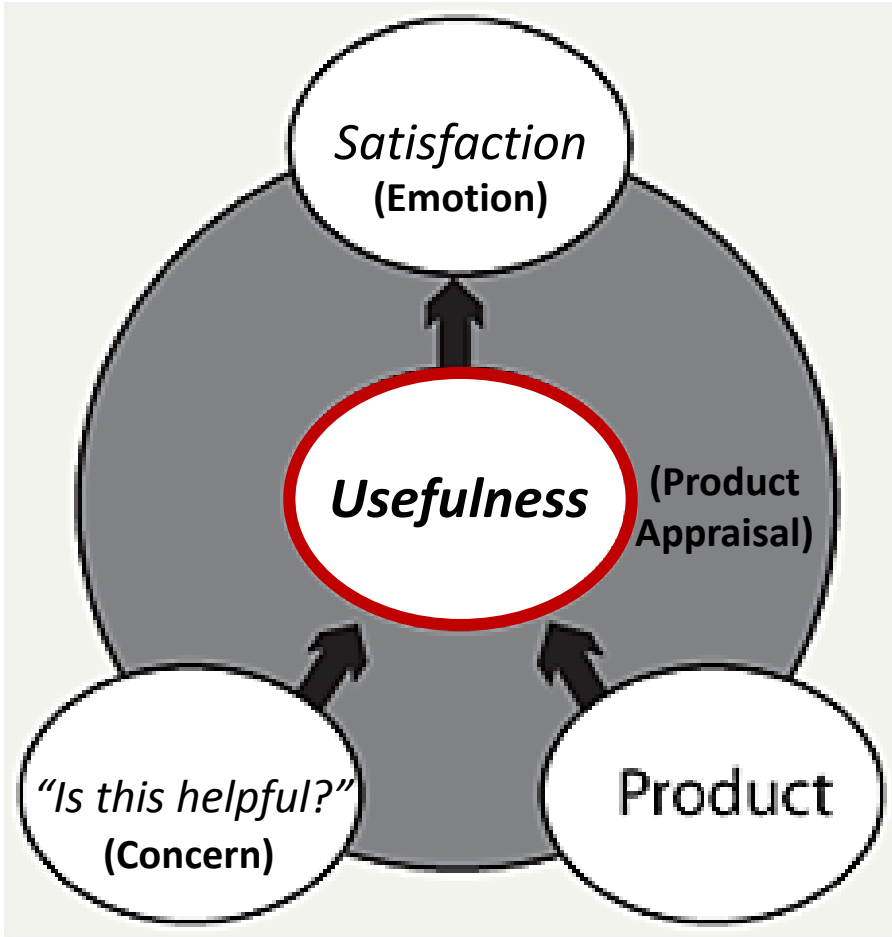


Concern of whether the product supports users or not in achieving their goals appears critical.



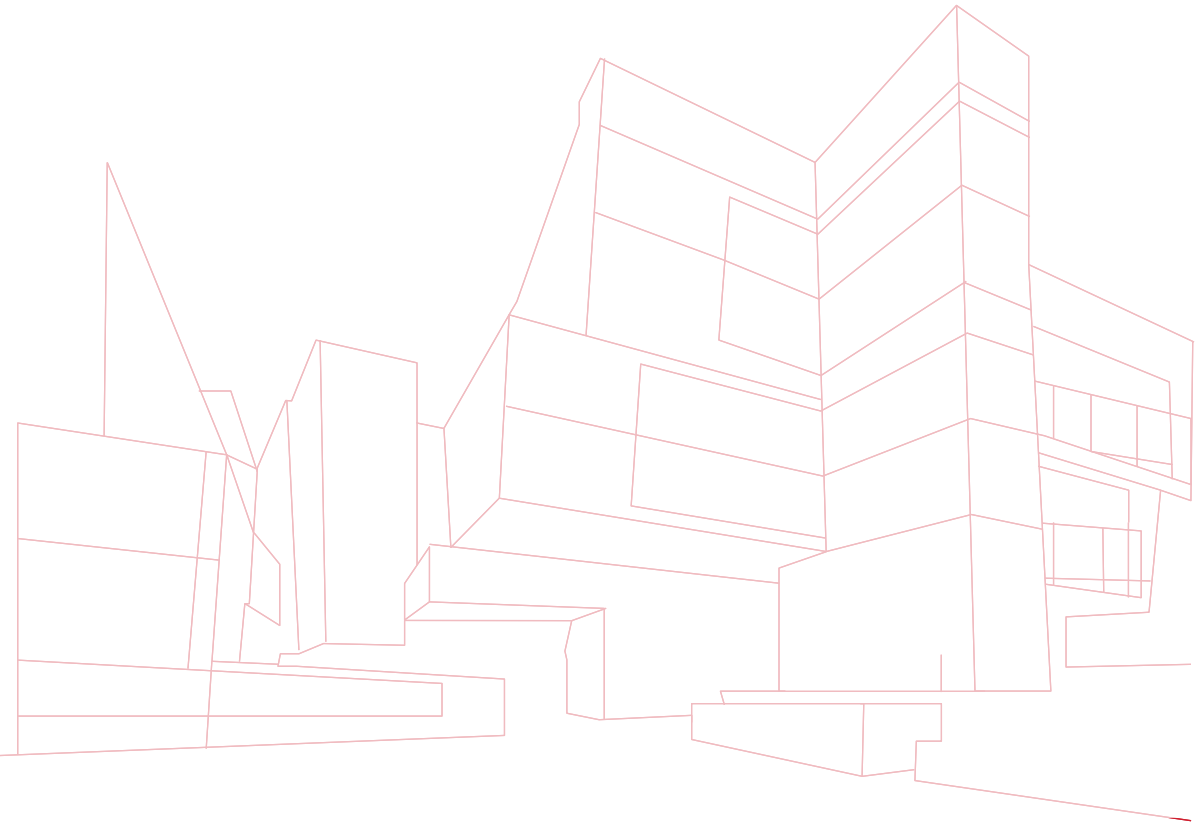
Discussion

Conclusion



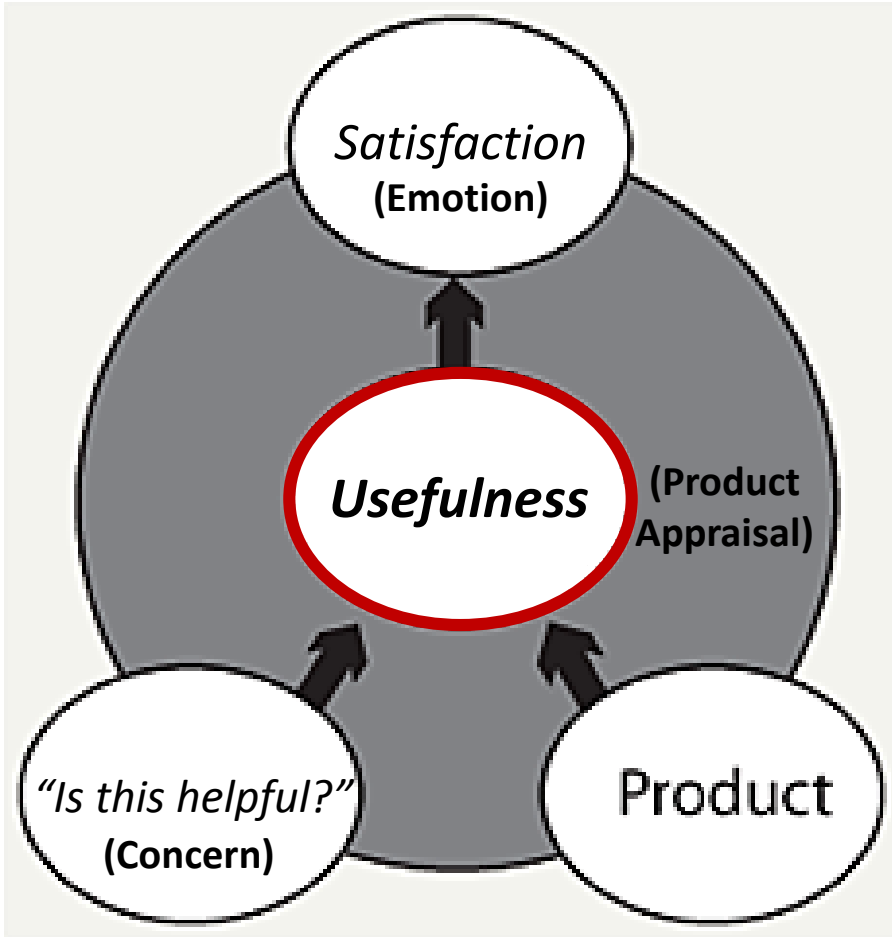
Concern of whether the product supports users or not in achieving their goals appears critical.

When applying **mode-of-use** innovation in **interactive product**, balancing between **novel interaction** and **successful goal achievement** should be made.



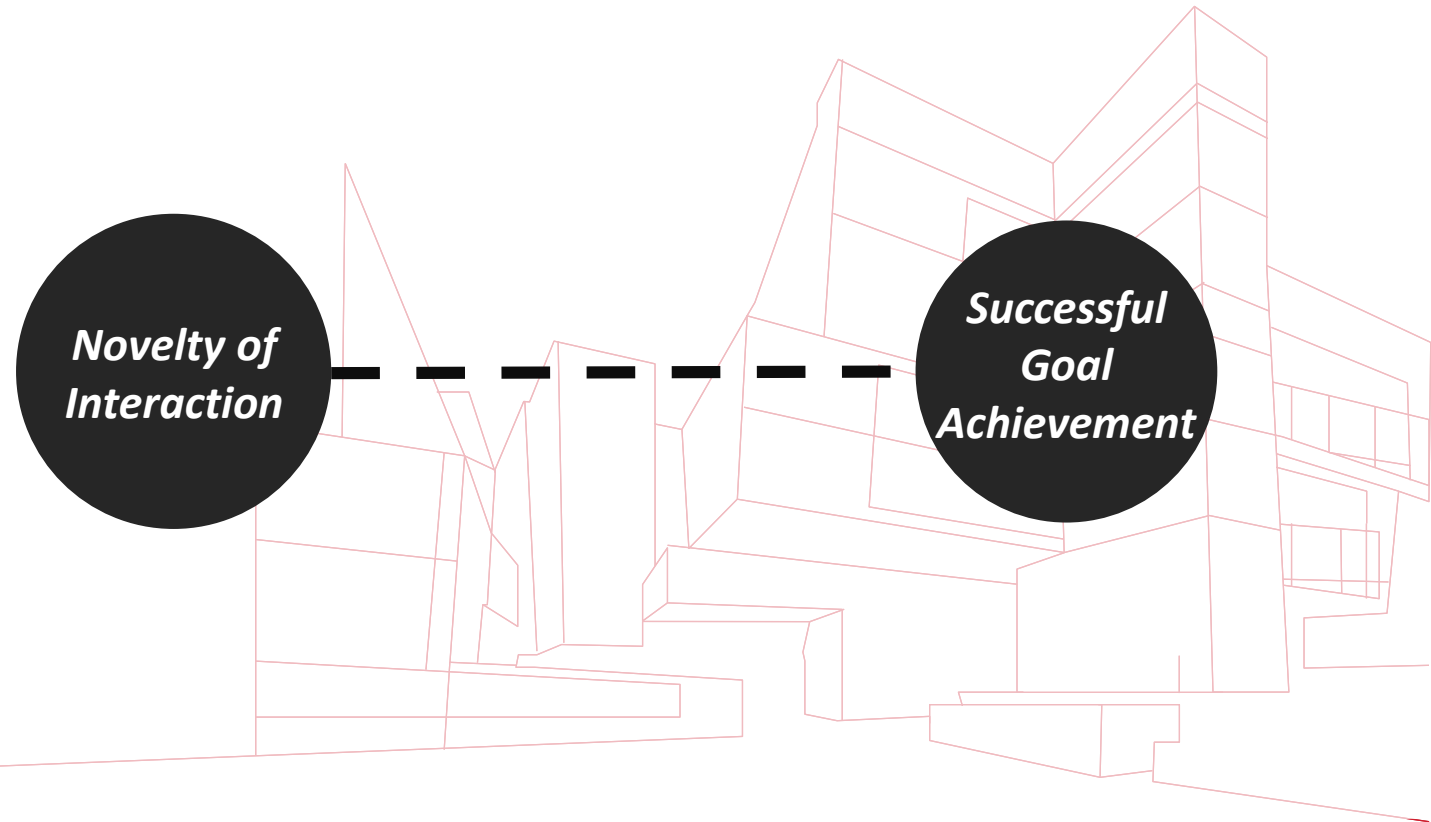
Discussion

Conclusion



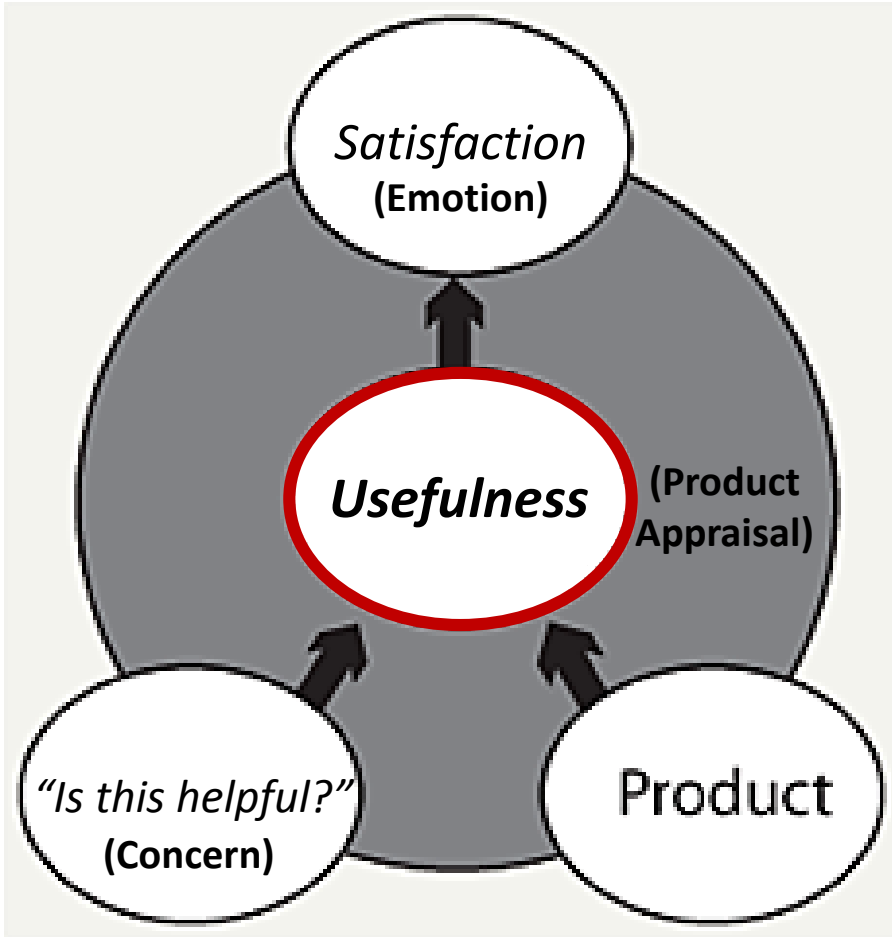
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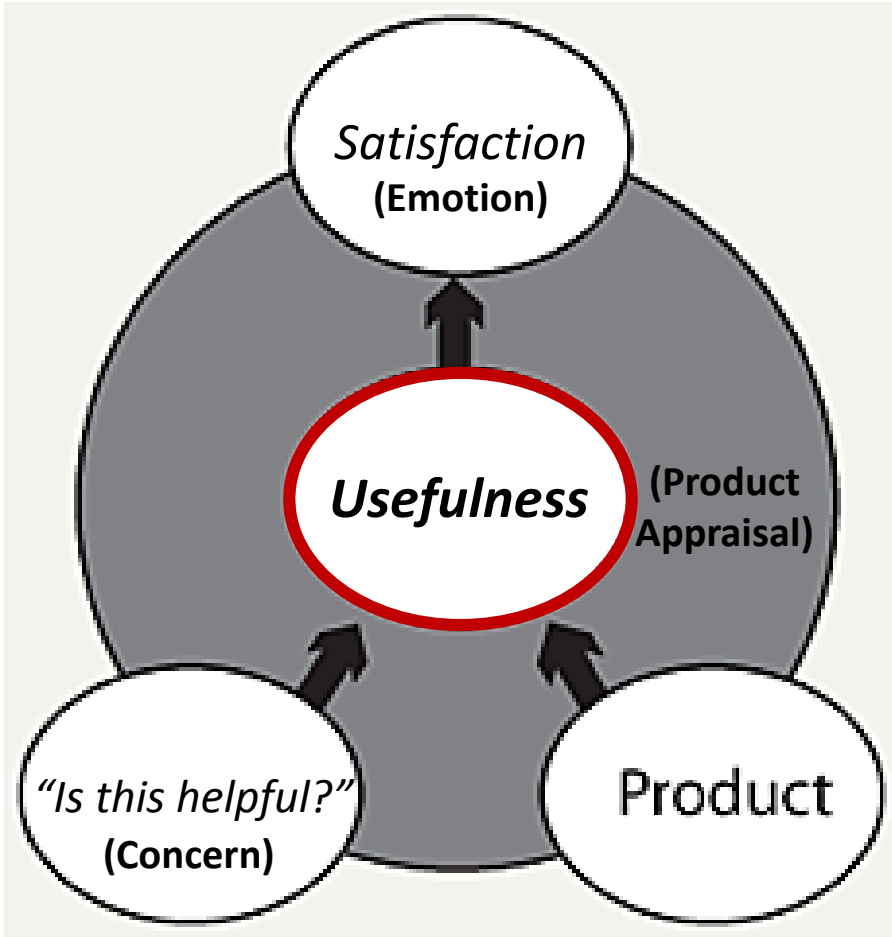
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Thank you!
Any questions?

