Interaction Design and Use Innovation for Interactive Products

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Introduction
Design-driven Innovation

(Verganti, 2013)

Existing Game Console

Game
A virtual experience accessible to only by avid gamers
Introduction
Design-driven Innovation

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Existing Game Console

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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 types of innovations.

Form
Aesthetic value

Technology
Utilizing technology in a new way

Mode-of-Use
Finding innovative ways of using a product

(Rampino, 2011)
Introduction
Design-driven Innovation

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

- **Aesthetic Innovation**
  Product’s external appearance

- **Technological Innovation**
  Utilizing technology in a new way

- **Mode of Use**
  Finding innovative ways of using a product

- **Meaning Innovation**
  Changing of what the product means

- **Typological Innovation**
  The deviation of a product from its formal archetype

- **Incremental Innovation**
  Improvement or modification of the product usage

(Rampino, 2011)
Introduction
Design-driven Innovation

Design-driven innovation is driven by three levers, which results in four types of innovations.

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

- **Form**
  - Aesthetic value

- **Function**
  - Utilizing technology in a new way

- **Meaning**
  - Changing of what the product means

- **Mode of Use**
  - Finding innovative ways of using a product

- **Typological Innovation**
  - The deviation of a product from its formal archetype

- **Innovation of Use**
  - Improvement or modification of the product usage

- **Aesthetic Innovation**
  - Product’s external appearance

- **Meaning Innovation**
  - Changing of what the product means

- **Incremental Innovation**

- **(Rampino, 2011)**
Introduction
Extending to Interactive Product Field

Mode-of-Use
Finding innovative ways of using a product
Introduction
Extending to Interactive Product Field

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

Mode-of-Use
Finding innovative ways of using a product
Introduction
Extending to Interactive Product Field

Mode-of-Use
Finding innovative ways of using a product

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
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.
Design-driven Innovation can be seen as a radical change of emotion (Desmet & Hekkert, 2007).
Background
Generic Interaction Styles

Explanatory
Provides directions for goal achievement.

Exploratory
Focuses on playful interaction rather than the goal itself.
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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
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Tangible Control
Elastic Play

Rhythmic Logics
Touch-free Magic

Explanatory
Exploratory

(Buur & Stienstra, 2007)
Background
Generic Interaction Styles

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Rhythmic Logics

Touch-free Magic

(Buur & Stienstra, 2007)
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

Sensor detecting hand movement
Research Method

Experiment Design

01. Free Product Interaction (Tc/TfM), 3-5min

02. Likert-scale responses recorded 5-10min

Break 2mins

03. Repeat stage 01 & 02 8-15min

04. Interview session 10-15min
Research Method

Experiment Design

01. Free Product Interaction (Tc/TfF), 3-5min

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[Diagram showing the sequence of activities]
Research Method
Experiment Design

01. Free Product Interaction (Tc/TfM), 3-5min

02. Likert-scale responses recorded 5-10min

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### Results

#### Likert Scale Responses

<table>
<thead>
<tr>
<th>Response Item</th>
<th>TC (Tangible Control)</th>
<th>TfM (Touch-free magic)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Σ</td>
<td>M</td>
</tr>
<tr>
<td>P01.Desire</td>
<td>47</td>
<td>2.35</td>
</tr>
<tr>
<td>P02.Satisfaction</td>
<td>57</td>
<td><strong>2.85</strong></td>
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<tr>
<td>P03.Pride</td>
<td>40</td>
<td>2.0</td>
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<tr>
<td>P04.Hope</td>
<td>36</td>
<td>1.8</td>
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<tr>
<td>P05.Joyful</td>
<td>60</td>
<td>3.0</td>
</tr>
<tr>
<td>P06.Attractive</td>
<td>51</td>
<td>2.55</td>
</tr>
<tr>
<td>P07.Admire</td>
<td>35</td>
<td>1.75</td>
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</tbody>
</table>

#### Positive Emotion Responses

<table>
<thead>
<tr>
<th>Response Indicators</th>
<th>Mann-Whitney U Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U</td>
</tr>
<tr>
<td>P02.Satisfaction</td>
<td>75</td>
</tr>
</tbody>
</table>
## Results

### Likert Scale Responses

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<tbody>
<tr>
<td></td>
<td>Σ</td>
<td>M</td>
</tr>
<tr>
<td>N01.Disgust</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>N02.Disatisfaction</td>
<td>9</td>
<td>*0.45</td>
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<tr>
<td>N03.Fear</td>
<td>3</td>
<td>0.15</td>
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<tr>
<td>N04.Shameful</td>
<td>0</td>
<td>*0.0</td>
</tr>
<tr>
<td>N05.Bored</td>
<td>13</td>
<td>0.65</td>
</tr>
<tr>
<td>N06.Sad</td>
<td>3</td>
<td>0.48</td>
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<tr>
<td>N07.Contempt</td>
<td>1</td>
<td>0.05</td>
</tr>
</tbody>
</table>

### Mann-Whitney U Test Result

<table>
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<th>Response Indicators</th>
<th>U</th>
<th>M</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N02.Disatisfaction</td>
<td>86</td>
<td>0.45</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>N04.Shameful</td>
<td>150</td>
<td>0.0</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>
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.”
How can **mode-of-use innovation** be best applied to **interactive product design** as driver for **innovation**?
Discussion
Back to Research Question...

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**
Discussion
Back to Research Question...

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.
Discussion
Back to Research Question...

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**
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

(Desmet & Hekkert, 2002)
Discussion

Conclusion

(Desmet & Hekkert, 2002)
"Is this helpful?" (Desmet & Hekkert, 2002)
Concern of whether the product supports users or not in achieving their goals appears critical.
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When applying mode-of-use innovation in interactive product, balancing between novel interaction and successful goal achievement should be made.
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Thank you!
Any questions?