LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

# Visual Design

## of Physical Interfaces for NFC/RFID-based Mobile Interaction

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**Diploma Thesis**

**Supervisors:** Alexander Wiethoff und Gregor Broll

**Responsible Professor:** Prof. Dr. Heinrich Hußmann

# Motivation & Goals

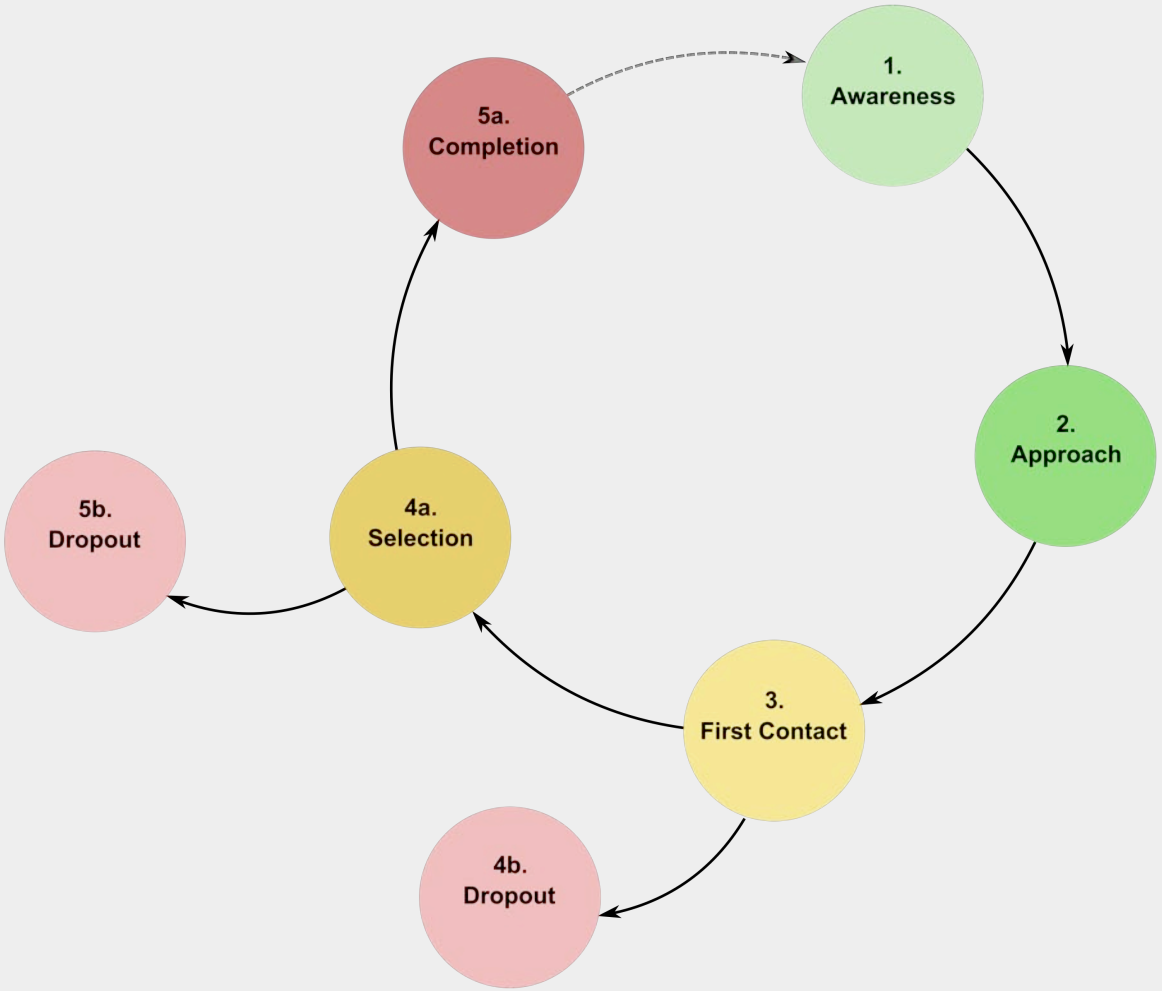
Images taken from the SmartTouch project: www.smarttouch.org

- design of physical interfaces for their discovery
- representation of NFC-tags as visual elements
- visualization of the functionalitites of NFC-tags
- guidance cues to support the interaction workflow

# Outline

- Low-fidelity Prototypes and Preliminary Results
- High-fidelity Prototypes
- Final User Study and Results
- Conclusion
- Design Recommendations

# Phases of Interaction



# Adhesive Symbols

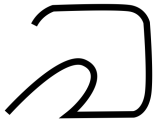
Based on symbol
used in NFC-trial in Caen

Based on N-Mark
Copyright NFC Forum

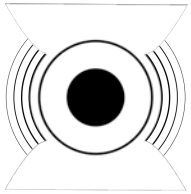
Based on ztamp:s
Copyright Violet

Based on Oyster Card
Copyright London Transportations

Based on Nokia's NFC symbol
Copyright Nokia



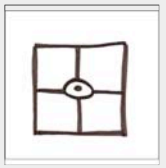
Based on Sony FeliCa
Copyright Sony

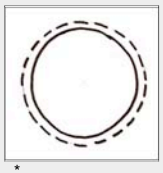


Based on Touch&Travel
Copyright Deutsche Bahn

Based on symbol for tikitag
Copyright Alcatel-Lucent

Based on Selecta symbol
Copyright Selecta





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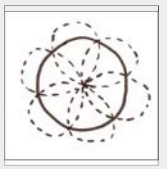

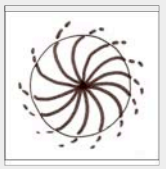

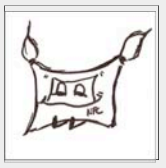

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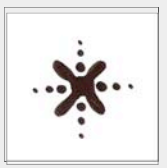
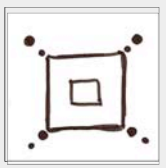
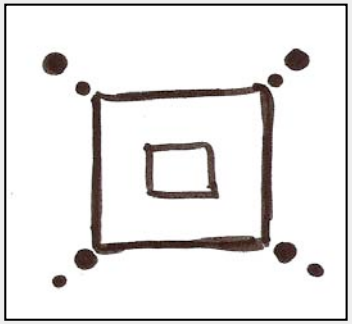




# Top 3 Adhesive Symbols

**Adhesive Symbols:**

- symbols that create awareness for NFC

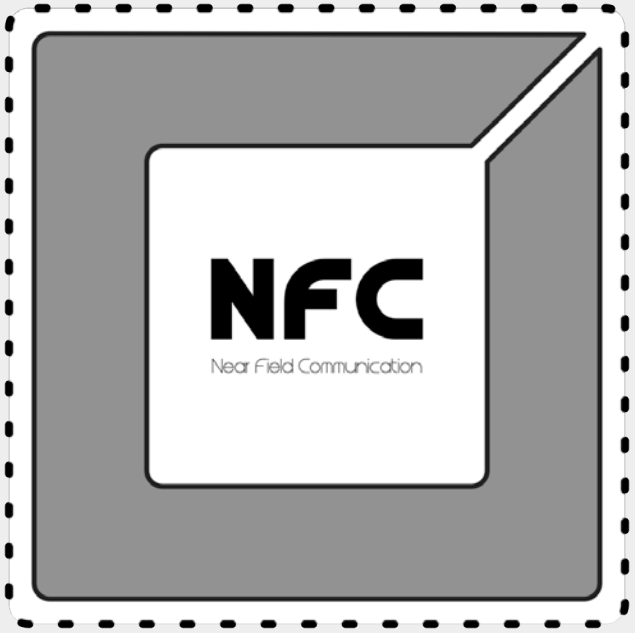


→ keep the design simple with a clear structure

→ use existing symbols to facilitate recognition

→ combine visual components with textual components

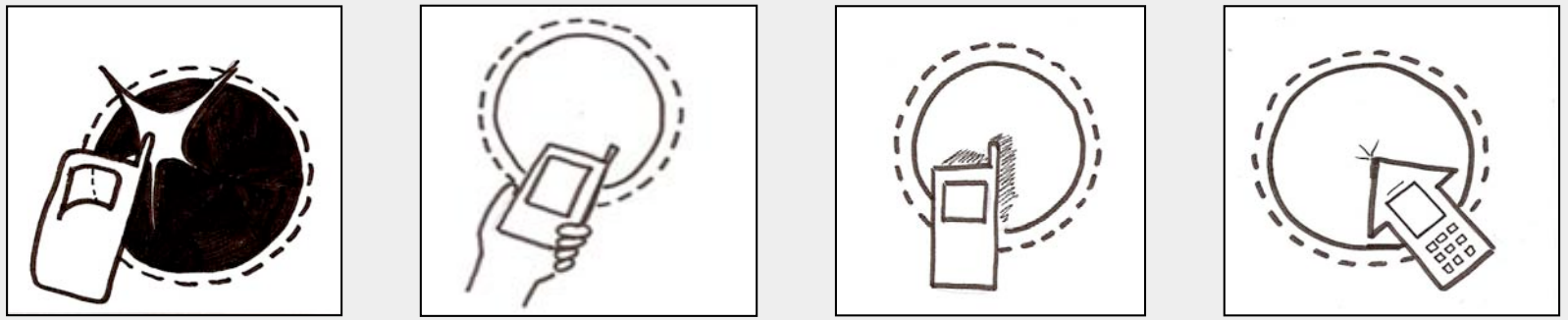
# High-fidelity prototypes I



# Top 4 Explanatory Symbols

**Explanatory Symbols:**

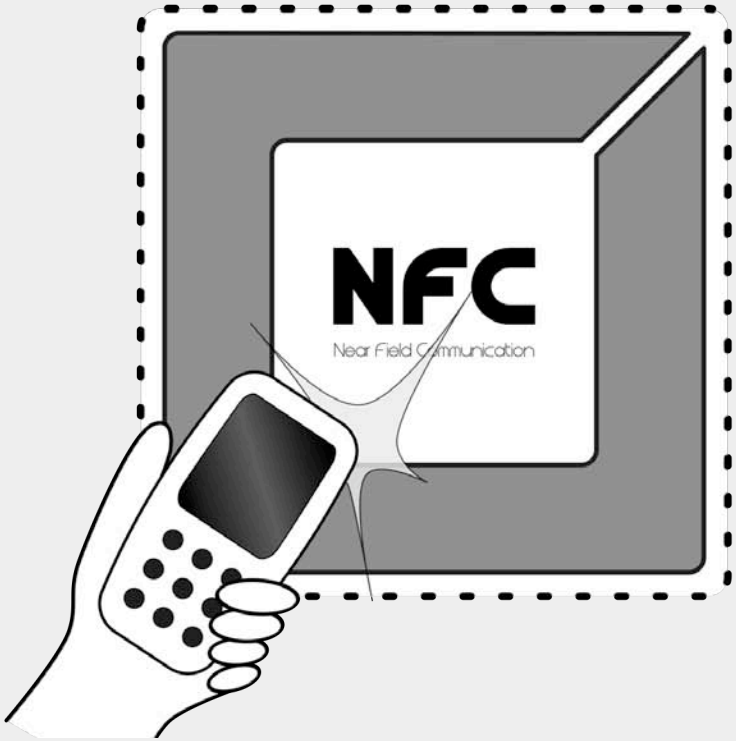
- symbols that explain the interaction



→ important components should be visualized

→ supported by dynamic components

# High-fidelity Prototypes II



# Final User Study

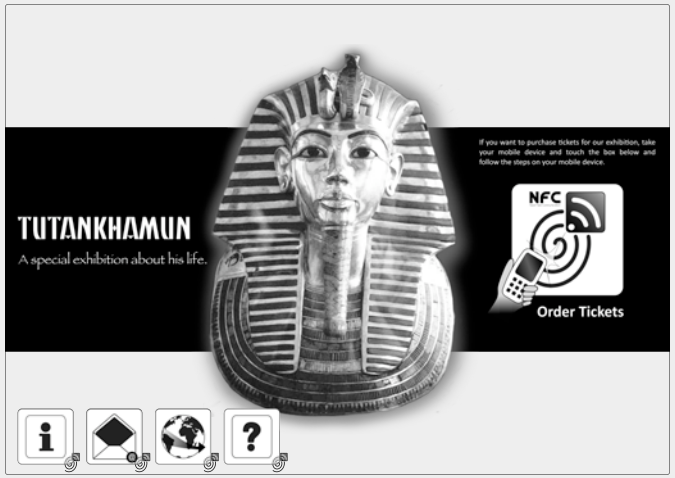
**3 Scenarios with 1 Task each:**

- interactive advertisement
- interactive door sign
- interactive catalogue

**Demographic Information:**

- 21 subjects (aged between 19-30 years)
- 6 subjects had prior experience with NFC
- 15 subjects did not

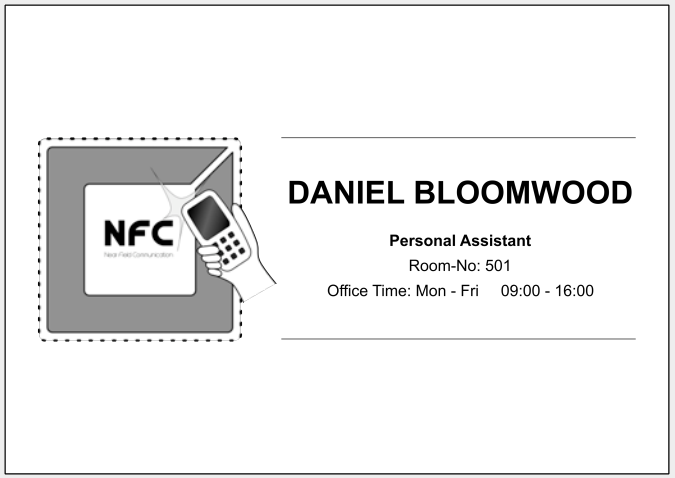
# Results: Advertisement

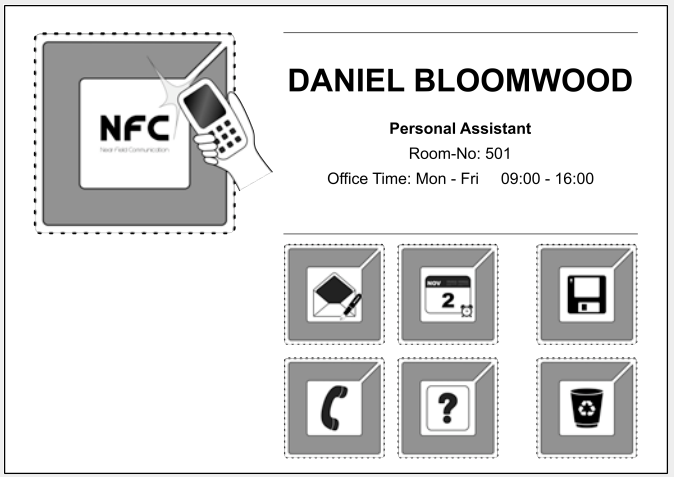


+ aesthetically appealing
+ simple, clear, trustworthy
+ simple interaction with one touch
+ remaining interaction on mobile device
- too less information

+ quick selection
- low benefit
- time for orientation needed
- overloaded, confusing, complicated
- too many attention shifts

# Results: Office




+ clear and nice
+ one NFC-tag
+ further selection on mobile device
+ simple, fast and convenient interaction
- too less information

- not intuitive and overloaded
- time for orientation needed
- order of selection unclear
- save and delete unnecessary

# Results: Catalogue I

# Results: Catalogue II

**Complete Your Order**

If you have found the products you like to order and you want to place your order now, follow the steps below. No payment will be made without your confirmation and you can cancel the process at any time!

**1. Start checkout procedure:**
Take your mobile device and touch the checkout symbol below. You will then be guided stepwise through the checkout process:

**2. Follow the steps on your mobile device.**

Information on methods of payment:
You have the possibility to purchase on account or via mobile billing. No payment will be made without your confirmation!

**Complete Your Order**

**1. Start checkout procedure:**

Touch symbol to start the checkout procedure and check your list of products.

**2. Fill out shipping address:**

Touch symbol to add shipping address and contact details.

**3. Select method of payment:**

Touch symbol to select method of payment* and place your order.

* Information on methods of payment:
You have the possibility to purchase on account or via mobile billing. No payment will be made without your confirmation!

# Conclusions

- NFC-tags should be used in moderation
- interaction should be started on the physical user interface
- further interaction design dependent on application
- overview of available functions should be provided
- concretizing input should be done on the mobile device.

# Design Recommendations

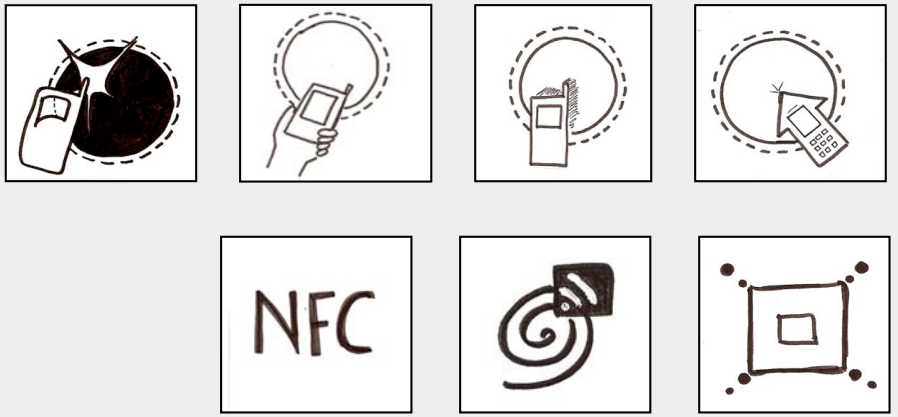
**Design recommendations for overall designs:**

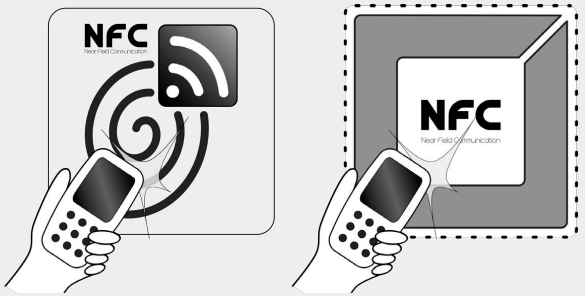
- Keep its characteristics.
- Less is more.
- Overview the functions.
- Provide a start-tag.
- Create closure.
- Take advantage of the mobile device.

**Future Work**

- further means to create awareness
- design of mobile interface for NFC-based mobile Interaction

# Thank You!




## Questions?