

# Tablet-based survey instrument

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# Structure

- Motivation
- Questionnaire Framework
  - Features
  - Architecture
  - Layout
- User study
- Conclusion & Future Work

# Motivation

## Empirical research

- Information collection
- Direct observation  
(interview)
- Indirect observation  
(questionnaire)



(<http://photo-dict.faqs.org/phrase/6515/Health-Questionnaire.html>)

# Motivation

## Paper questionnaire

- ✓ Easy to use
- ✓ Strict process
- ✗ Answer changes are dirty
- ✗ No meta-data (time)
- ✗ Limited design options

## Computer questionnaire

- ✓ Dynamic medium
- ✓ Background information e.g. time spent
- ✓ Bigger audience
- ✗ PC distracts participants
- ✗ Immobility

# Motivation

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→ Tablet approach combines the advantages of both types

# Tablet approach

- Mobile
- Meta-Data (e.g. GPS, Time)
- Growing database
- Framework
- Flexible design
- Imitates pen & paper



(<http://vr-zone.com/articles/android-3.1-update-comes-to-motorola-xoom/13144.html>)

# Tablet-based questionnaire

- Factor dependant surveys (e.g. age, occupation)
- Dynamic questions
- Time per item
- Experimental questiontypes
  - Reaction-based
  - Gesture-based



(<http://vr-zone.com/articles/android-3.1-update-comes-to-motorola-xoom/13144.html>)

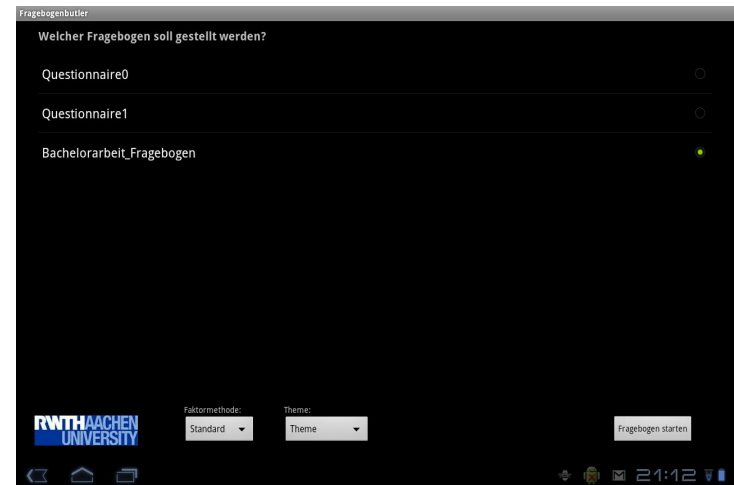
# Questionnaire Framework

## Properties

- Generating/organizing surveys
- Dynamic questionnaires
- Including existing questions
- Creating new questions

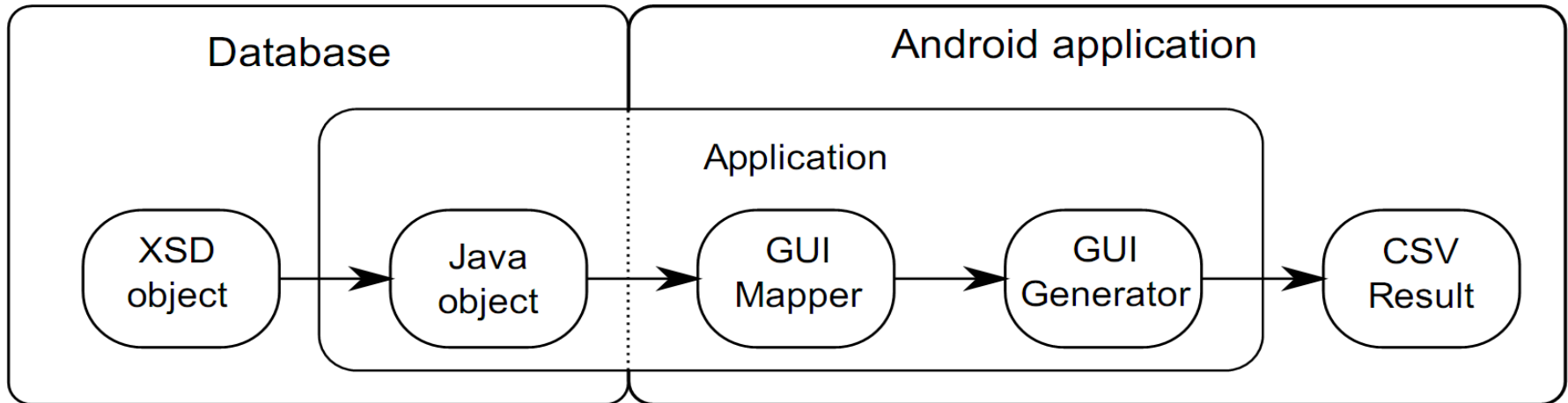
## Two types of users

- Researcher
- Participant





# Application Architecture



Database:

- Customized XSD object → Java object

Android Application:

- Mapping of the data onto the GUI

# Database

- Questionnaire structure
  - Set of questions
  - Set of corresponding answers

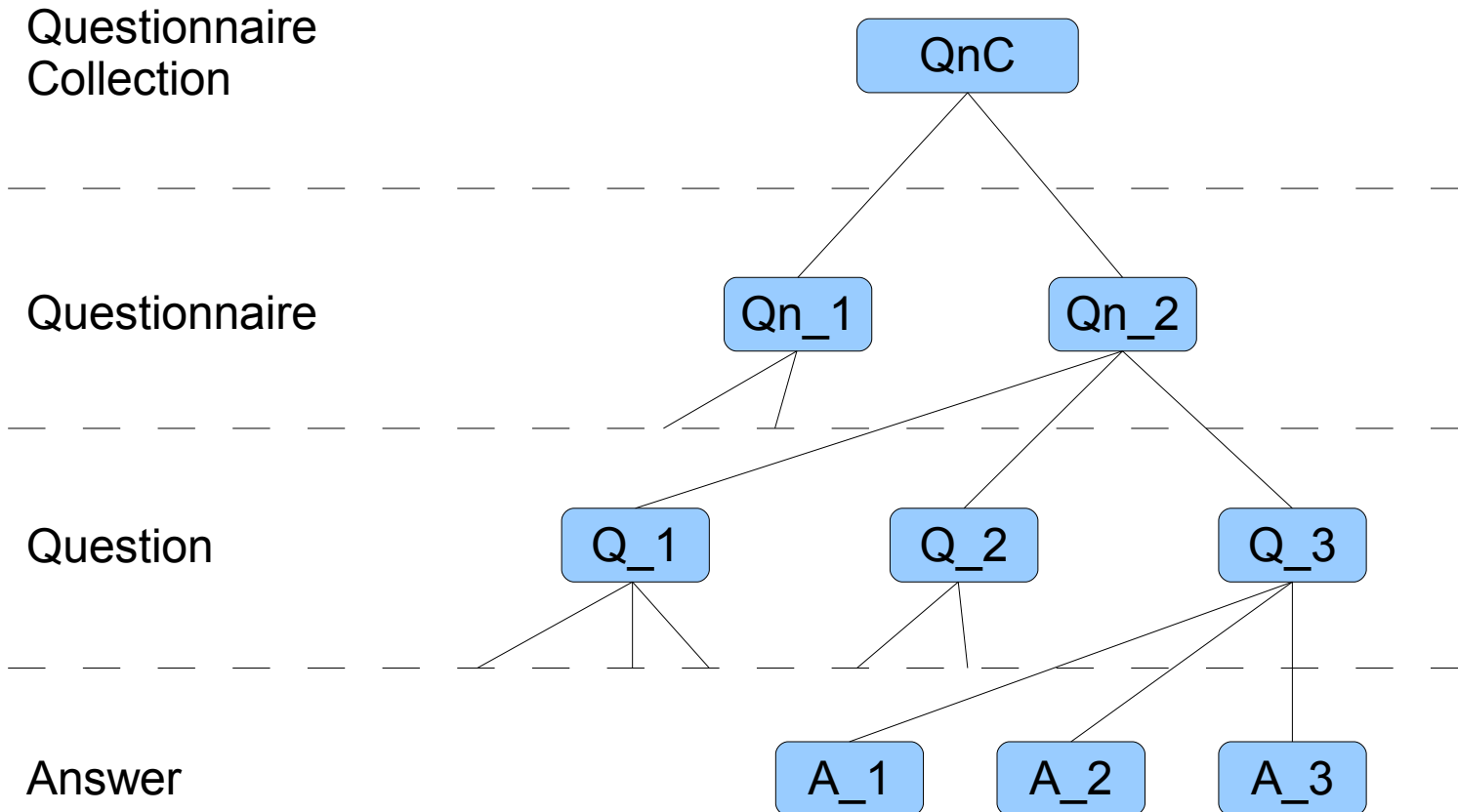
Physical Activities					
During the past week, even if it was not a typical week for you, how much <b>total</b> time (for the <i>entire</i> week) did you spend on each of the following? (Please circle <i>one</i> number for each question.)					
	none	less than 30 min/wk	30-60 min/wk	1-3 hrs per week	more than 3 hrs/wk
1. Stretching or strengthening exercises (range of motion, using weights, etc.) .....	0	1	2	3	4
2. Walk for exercise .....	0	1	2	3	4
3. Swimming or aquatic exercise .....	0	1	2	3	4
4. Bicycling (including stationary exercise bikes) .....	0	1	2	3	4
5. Other aerobic exercise equipment (Stairmaster, rowing, skiing machine, etc.) .....	0	1	2	3	4
6. Other aerobic exercise Specify .....	0	1	2	3	4

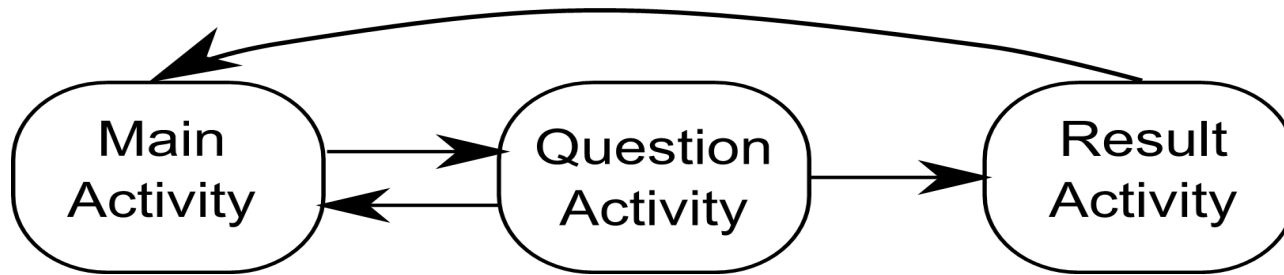
Confidence About Doing Things	
For each of the following questions, please <i>circle</i> the number that corresponds with your <b>confidence</b> that you can do the tasks regularly at the present time.	
1. <b>How confident</b> do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?	Not at all confident   1 2 3 4 5 6 7 8 9 10   Very confident
2. <b>How confident</b> do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?	Not at all confident   1 2 3 4 5 6 7 8 9 10   Very confident
3. <b>How confident</b> do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?	Not at all confident   1 2 3 4 5 6 7 8 9 10   Very confident
4. <b>How confident</b> do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?	Not at all confident   1 2 3 4 5 6 7 8 9 10   Very confident
5. <b>How confident</b> do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?	Not at all confident   1 2 3 4 5 6 7 8 9 10   Very confident
6. <b>How confident</b> do you feel that you know what	Not at all                       Very

(<http://patienteducation.stanford.edu/research/diabquest.pdf>)

# Database



# Android Application

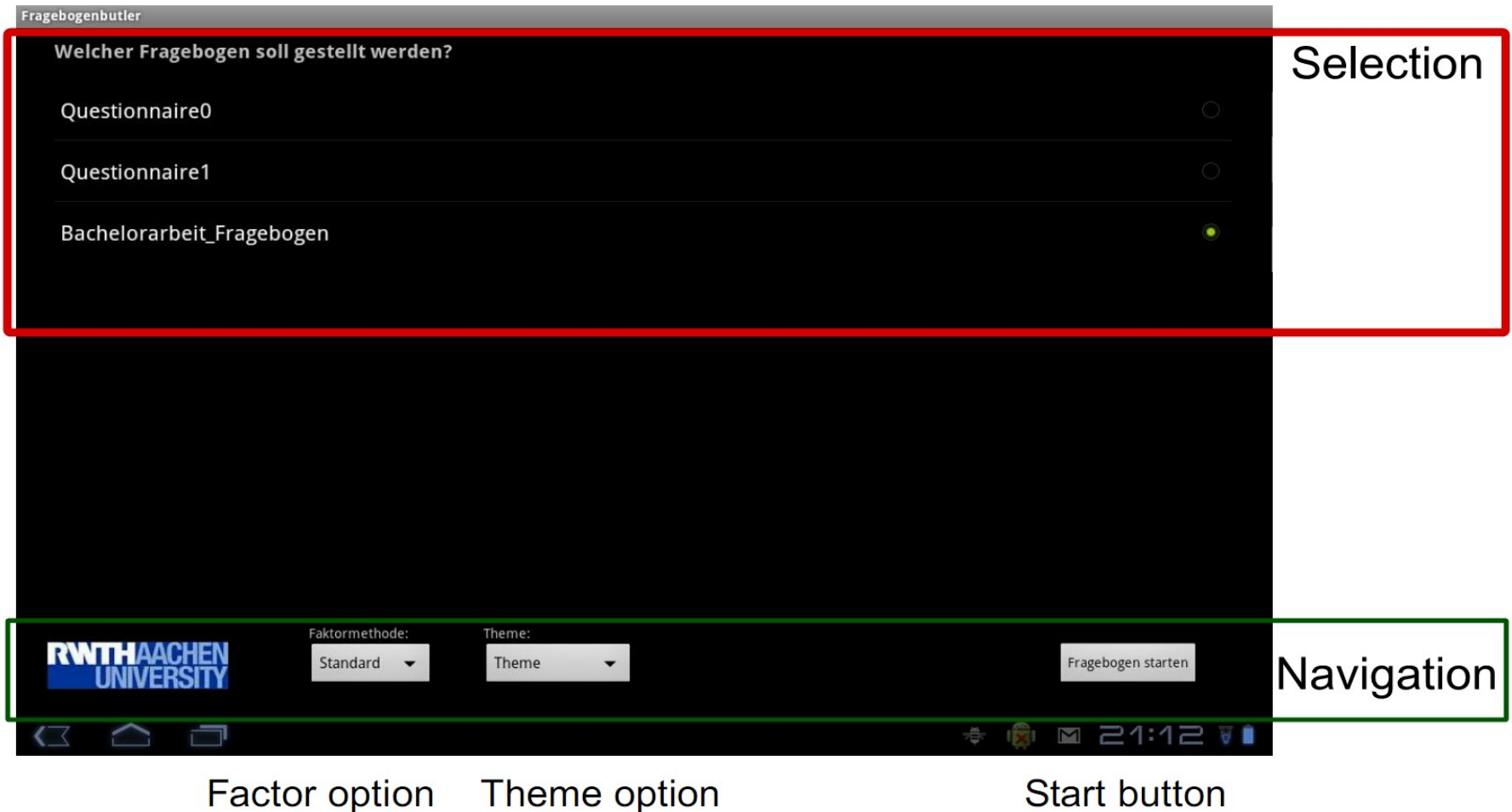


Main Activity: Questionnaire selection

Question Activity: Questionnaire display

Result Activity: Completion Screen

# Main Activity



# Question Activity

Active factor

Pages display

The screenshot shows a tablet interface for a survey titled "Fragebogenbutler". The interface is divided into three main sections: a Header, a Body, and a Navigation bar. The Header section contains a "Tablet" label and page numbers "1 2". The Body section contains several question items: "Gender" with radio buttons for "Männlich" (selected) and "Weiblich"; "Occupation" with radio buttons for "Trainee", "Student" (selected), "Employed", "Unemployed", and "Retiree"; "Hobbies" with checkboxes for "Computer", "Books", "Sport", "Music" (all selected), and "Party"; and "Age" with radio buttons for "18-24" (selected), "25-36", and "37-60". The Navigation bar at the bottom features the RWTH Aachen University logo on the left and a "Weiter" button on the right. The interface is annotated with colored boxes: a red box around the Header, a blue box around the Body, and a green box around the Navigation bar. Additionally, a blue box highlights the "Tablet" label, and a green box highlights the "Weiter" button.

Fragebogenbutler

Tablet 1 2

Header

Gender ☒ Männlich ☐ Weiblich

Occupation ☐ Trainee ☒ Student ☐ Employed ☐ Unemployed ☐ Retiree

Hobbies ☒ Computer ☒ Books ☒ Sport ☒ Music ☐ Party

Age ☒ 18-24 ☐ 25-36 ☐ 37-60

Body

RWTH AACHEN UNIVERSITY

Weiter

Navigation

Escape mechanism

Continue button

# Question Activity

## -Questionnaire display-

The screenshot shows a questionnaire interface with the following sections and data:

- Gender:** ☒ Männlich ☐ Weiblich
- Occupation:** ☐ Trainee ☒ Student ☐ Employed ☐ Unemployed ☐ Retiree
- Hobbies:** ☒ Computer ☒ Books ☐ Sport ☒ Music ☒ Party
- Age:** ☒ 18-24 ☐ 25-36 ☐ 37-60
- How often do you use Tablets:** ☒ Sehr Gut ☐ Gut ☐ Befriedigend ☐ Asureichend ☐ Mangelhaft ☐ Ungenügend
- How intuitive is the system:** ☐ Sehr Gut ☒ Gut ☐ Befriedigend ☐ Asureichend ☐ Mangelhaft ☐ Ungenügend
- Try to set the progressbar as close as possible to 15:** A progress bar with a green slider positioned at approximately 15.
- Favourite Quote:**  I used to wann change the world. Now I just wann leave the room with a little dignity.

- No scrolling
  - Page questions viewable at first glance
  - Improved overview

# Question Activity

## -Questionnaire display-

The screenshot displays a questionnaire interface with the following sections:

- Gender:** Radio buttons for ☒ Männlich and ☐ Weiblich.
- Occupation:** Radio buttons for ☐ Trainee, ☒ Student, ☐ Employed, ☐ Unemployed, and ☐ Retiree.
- Hobbies:** Checkboxes for ☒ Computer, ☒ Books, ☐ Sport, ☒ Music, and ☒ Party.
- Age:** Radio buttons for ☒ 18-24, ☐ 25-36, and ☐ 37-60.
- How often do you use Tablets:** A Likert scale with options: Sehr Gut, Gut, Befriedigend, Asureichend, Mangelhaft, Ungenügend. The ☒ for 'Sehr Gut' is selected.
- How intuitive is the system:** A Likert scale with the same options. The ☒ for 'Gut' is selected.
- Try to set the progressbar as close as possible to 15:** A slider control with a green bar and a handle positioned near the 15 mark.
- Favourite Quote:** A text input field containing the quote: "I used to wann change the world. Now I just wann leave the room with a little dignity."

- Set of default question types
- Dynamic questions
  - App. filters remaining questions



# Question Activity

Active factor

Pages display

The screenshot shows a tablet-based survey instrument interface. The interface is divided into three main sections: Header, Body, and Navigation. The Header section contains the title 'Fragebogenbutler' and a page indicator '1 2'. The Body section contains several question items: 'Gender' with radio buttons for 'Männlich' (selected) and 'Weiblich'; 'Occupation' with radio buttons for 'Trainee', 'Student' (selected), 'Employed', 'Unemployed', and 'Retiree'; 'Hobbies' with checkboxes for 'Computer' (checked), 'Books' (checked), 'Sport' (checked), 'Music' (checked), and 'Party' (unchecked); and 'Age' with radio buttons for '18-24' (selected), '25-36', and '37-60'. The Navigation section contains the RWTH Aachen University logo and a 'Weiter' button. The interface is annotated with colored boxes: a red box around the Header, a blue box around the Body, and a green box around the Navigation. The text 'Active factor' is positioned to the left of the survey form, and 'Pages display' is positioned above the page indicator.

Fragebogenbutler

Tablet 1 2

Header

Gender ☒ Männlich ☐ Weiblich

Occupation ☐ Trainee ☒ Student ☐ Employed ☐ Unemployed ☐ Retiree

Hobbies ☒ Computer ☒ Books ☒ Sport ☒ Music ☐ Party

Age ☒ 18-24 ☐ 25-36 ☐ 37-60

Body

RWTHAACHEN UNIVERSITY

Weiter

Navigation

Escape mechanism

Continue button

# User Study

## Description

- 7 participants (18-36)
- Interview & questionnaire
- Course of user study
  - 1) General questions
  - 2) Test the application
  - 3) Evaluate the app.
  - 4) Final opinion

Fragebogen: Tablet based survey instruments

Allgemein:

1. Wie oft benutzen Sie Tablets ?
2. Wie gut können Sie mit diesen umgehen ?
3. Wenn Sie einen Fragebogen bekommen, welches Medium würden Sie zur Beantwortung bevorzugen? Bitte begründen Sie ihre Antwort.
  - a) Tablet
  - b) PC
  - c) Smartphone
  - d) Papier
4. Haben Ihnen bestimmte Fragetypen gefehlt ? Wenn ja welche ?
5. Finden Sie den Escape-Mechanismus, um auf die Startseite zu gelangen?

Interaktivität:

1. Wie intuitiv war die Bedienung für Sie ?
2. Hatten Sie Probleme das Gerät ohne Instruktionen zu bedienen?
3. Wie gut konnten Sie mit der App arbeiten ?
4. Wie responsive war das System für Sie ?

Design:

1. Wie gefiel Ihnen das allgemeine Design ? (Aussehen)
2. War das Design angebracht ?
3. Wie gut konnten Sie die einzelnen Elemente lesen?
4. Wie gefiel Ihnen die Page darstellung ? (progress display)
5. Sind die Hilfestellungen bei Fehlerausgabe ausreichend?  
Wenn nein, was würden Sie tun?

Zusatz:

1. Gibt es bestimmte Dinge die Ihnen noch bei dem Produkt fehlen?
2. Wie ist ihr Gesamt Eindruck?

# User Study

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- 7 participants (18-36)
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  - 4) Final opinion

## Results

- ✓ Tablet preferred survey form
- ✓ Intuitive interface
- ✓ Appropriate design
- ✗ Difficulties for participants with bad-eyesight
  - Textsize
  - Text and background

# Conclusion

- Creation of dynamic tablet-based questionnaire
  - Considers participants input
  - Reusing existing questions
- Questionnaire fully customizable
  - Factor distribution method option
  - Layout option
- Managing questionnaire distribution
  - In respect of the active factor
  - Current iteration

# Future Work

- **Design**
  - **Text size**
  - **Layout**
- Editor
- Experimental questiontypes

The screenshot shows a tablet interface for a survey titled 'Fragebogenbutler'. The interface is divided into sections for different demographic and interest-based questions. The 'Gender' section has radio buttons for 'Männlich' (selected) and 'Weiblich'. The 'Occupation' section has radio buttons for 'Trainee', 'Student' (selected), 'Employed', 'Unemployed', and 'Retiree'. The 'Hobbies' section has checkboxes for 'Computer', 'Books', 'Sport', 'Music', and 'Party', all of which are checked. The 'Age' section has radio buttons for '18-24' (selected), '25-36', and '37-60'. At the bottom left, there is a logo for 'RWTH AACHEN UNIVERSITY'. At the bottom right, there is a 'Weiter' button. The bottom status bar shows the time as 15:39 and various system icons.

# Future Work

- Design
  - Text size
  - Layout
- **Editor**
- Experimental questiontypes

```
<xsd:complexType name="Questionnaire0Type">

  <xsd:sequence>

    <xsd:element name="Question1"
      type="Boolean"/>

    <xsd:element name="Skip" type="Skip"/>

    <xsd:element name="Question4"
      type="openEnded"/>

    <xsd:element name="Question5"
      type="Skala"/>

  </xsd:sequence>

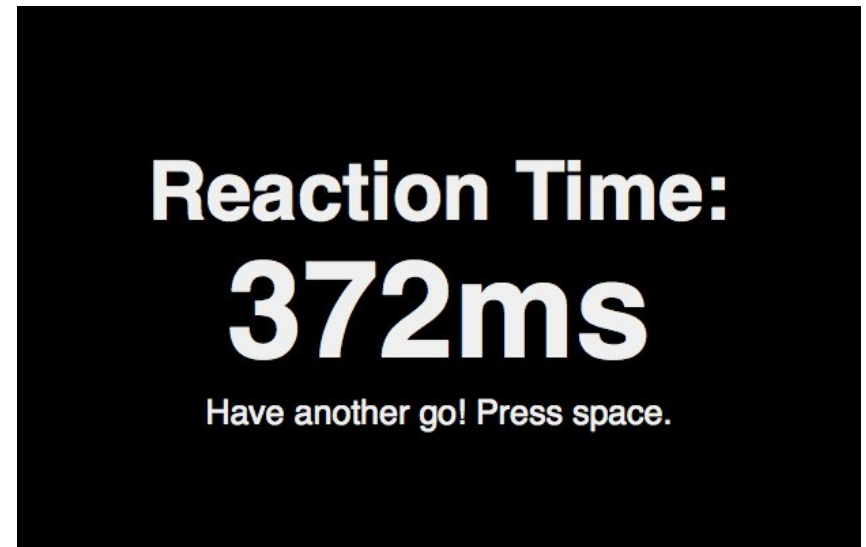
  <xsd:attribute fixed="Factor" name="PC"
    use="required"/>

  <xsd:attribute fixed="Factor" name="Tablet"
    use="required"/>

</xsd:complexType>
```

# Future Work

- Design
  - Text size
  - Layout
- Editor
- **Experimental questiontypes**



([http://www.playmycode.com/dynamic/project\\_avatars/360/360.1314669965.jpeg](http://www.playmycode.com/dynamic/project_avatars/360/360.1314669965.jpeg))

# First Design Prototype

Page 1      Page 2      Page 3      Page 4

1      2      3

1. Questionnaire-ID:

2. Gender: ☐ Male ☐ Female

3. Birthday:  -  -

4. What grade would you give this test? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

5. What do you think of this design?

Back      Submit      Continue

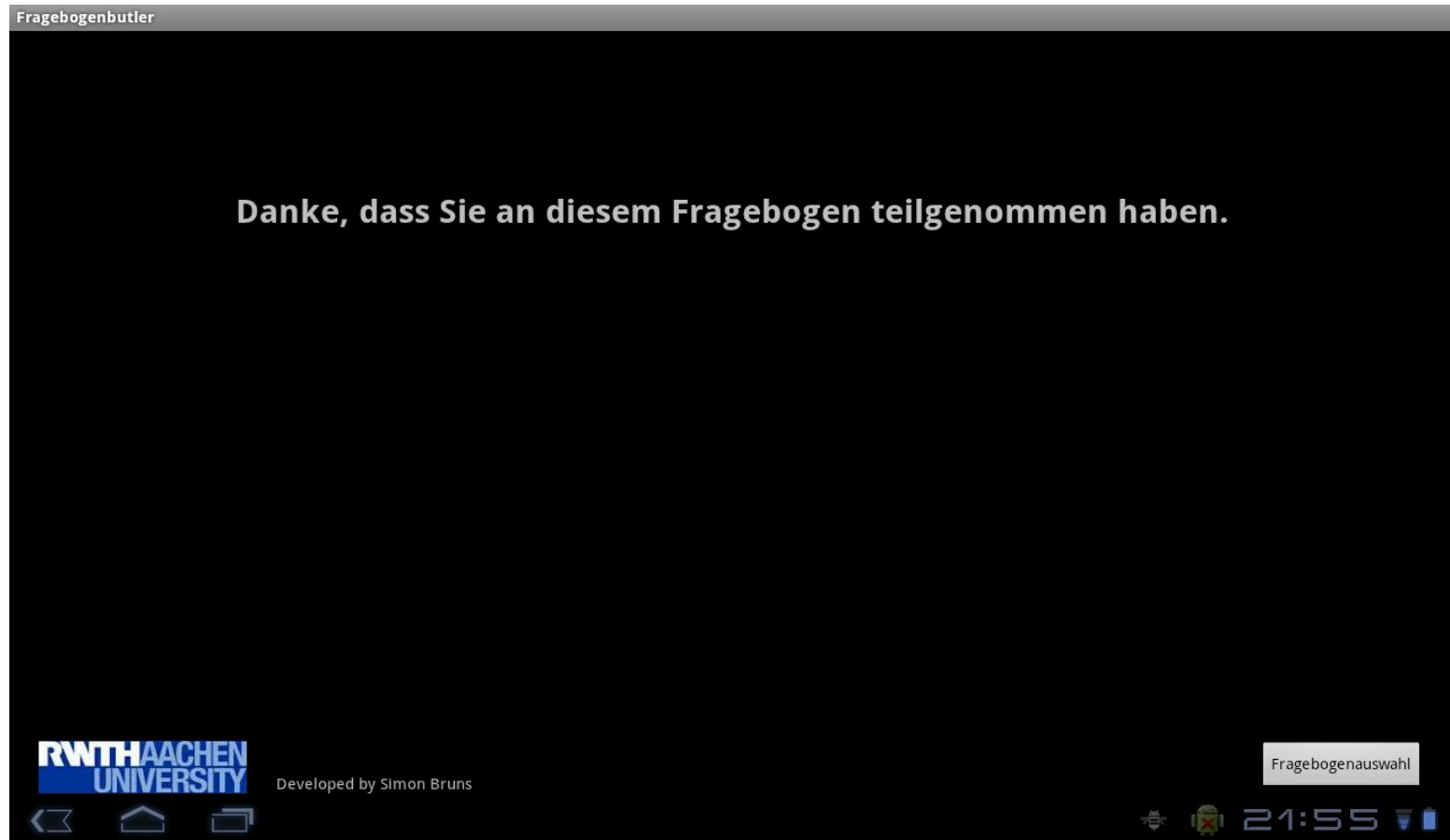
Navigation icons: back, home, recent apps, status bar (5:07, battery, signal, etc.)

Header

Body



# Result Activity



# Calculation: Combination X

0 1 2 3 4	Start value	1. value
0 1 2 4 3	1. Permutation	2. value
0 1 3 2 4	2. Permutation	3. value

---

<b>2 4 1 0 3</b>	68. Permutation	69. value
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---

lexographical ascending

---

Calculation:

68	mod	4!	=	2	rest	20
20	mod	3!	=	3	rest	2
2	mod	2!	=	1	rest	0
0	mod	1!	=	0	rest	0

<b>2</b>	is the	(2.+1)-smallest digit
<b>4</b>	is the	(3.+1)-smallest digit remaining
<b>1</b>	is the	(1.+1)-smallest digit
<b>0</b>	is the	(0.+1)-smallest digit
<b>3</b>	is the	remaining digit

---

24	6	2	1
4!	3!	2!	1!
<b>2</b>	<b>4</b>	<b>1</b>	<b>0 3</b>