Outline

- *Concepts*
- *Usability testing*
- *Formal usability tests*
- *Simplified usability tests*
- **Use cases** *(Read & Study the document uploaded to the "racó")*
  - Guerrilla testing: WhatsApp web app
  - Measure test: Depth perception in VR
- Exercises

Use case. WhatsApp web app

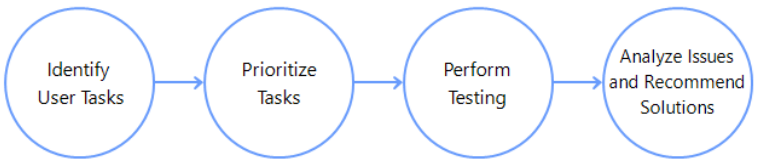
- Web application

Use case. WhatsApp web app

- Type of usability test: Guerrilla
- Objective
  - Identify common problems on WhatApp web
- Testing parameters
  - What is tested: Just two common tasks
  - Participants: 3 users, 2 never used it previously
  - Test procedure: Observation + interview

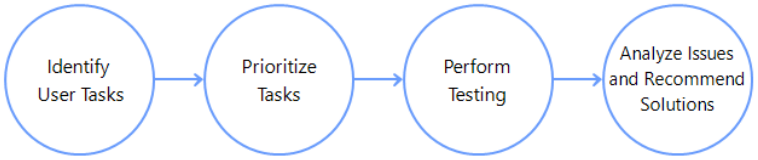
Use case. WhatsApp web app

- Test process



Use case. WhatsApp web app

- User tasks
  - Send a message to a friend
  - Share photos with a friend



Use case. WhatsApp web app

- Development (perform testing)
  - Give the instructions to the users
    - Users are observed with performing actions
    - Asked about the experience on certain subtasks

Use case. WhatsApp web app

- Development of task 1

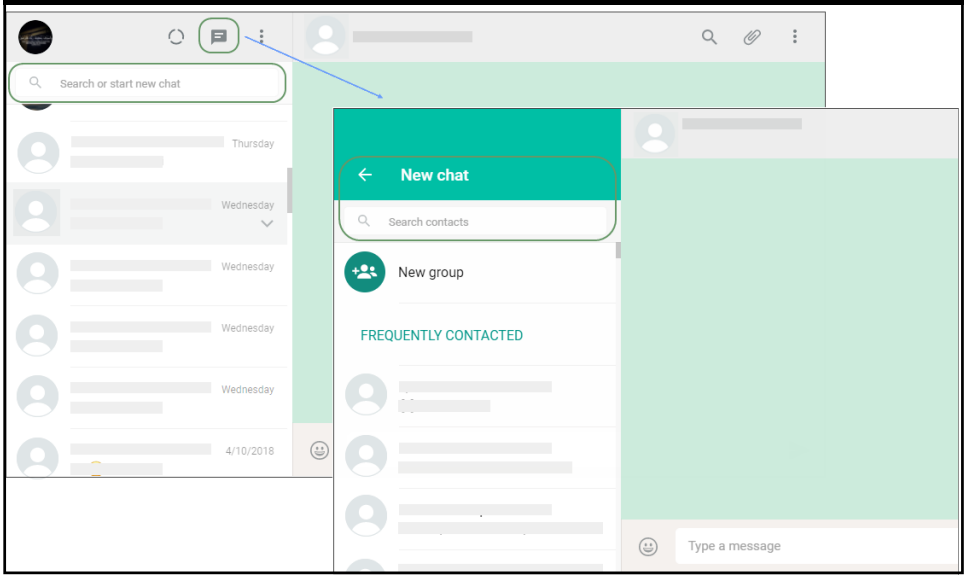
Use case. WhatsApp web app

- Development of task 2

Use case. WhatsApp web app

- Analyse problems. **Finding a contact**:
  - There are two ways to start a new chat:
    - (i) Search within Chats list
    - (ii) Go to New Chat icon on top and search contact
  - The user was not clear to differentiate between these two options

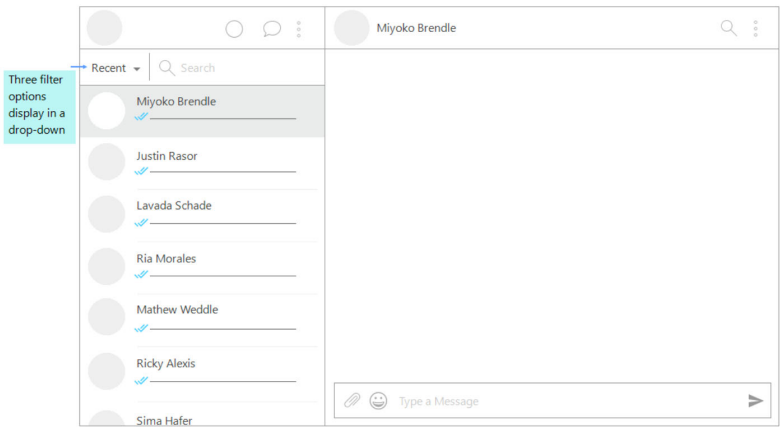
Use case. WhatsApp web app



Use case. WhatsApp web app

- **Recommendation:**
  - A clear separation between Chats and Contacts is needed
    - Can be done by giving a filter option in Contact list, or a single list can be sorted based on Recent Chats or Contact names.

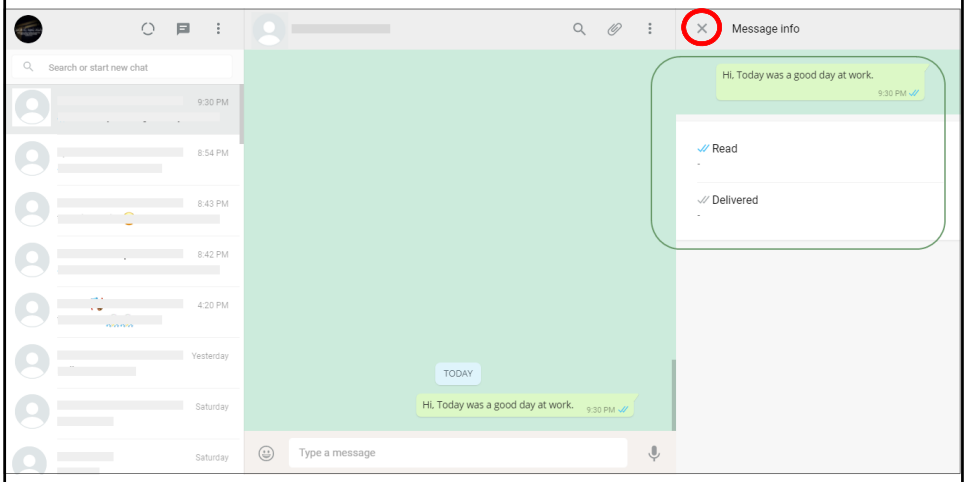
Use case. WhatsApp web app



Use case. WhatsApp web app

- Analyse problems. **Viewing Message Receipt**:
  - In Message Info pane, the area showing message status is merged with the Message pane
  - Also, it is not clear that user is viewing status of which message
  - Also, it took time for the user to find Close icon on top on Message Info pane

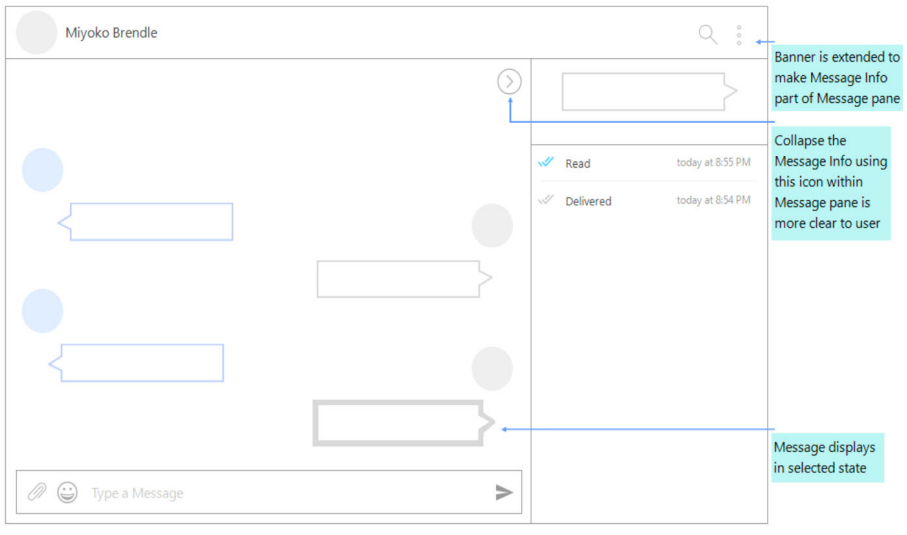
Use case. WhatsApp web app



Use case. WhatsApp web app

- **Recommendation:** The area of Message info pane and Message pane needs to differentiate clearly
  - Since this is desktop version and Message area is still visible when Info pane is opened, the link between message and its info could be made more prominent

Use case. WhatsApp web app

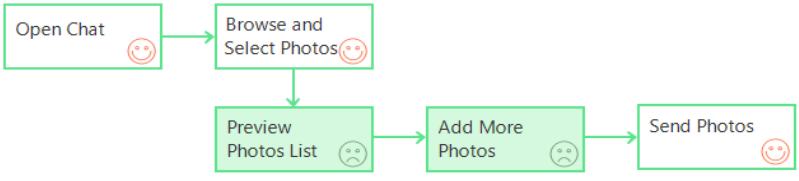


Use case. WhatsApp web app

- Development of task 2

Use case. WhatsApp web app

- Analyse problems. **Using attach**
  - The Attach menu and tooltips do not match with the UI
    - Shows a totally different theme and experience in current screen



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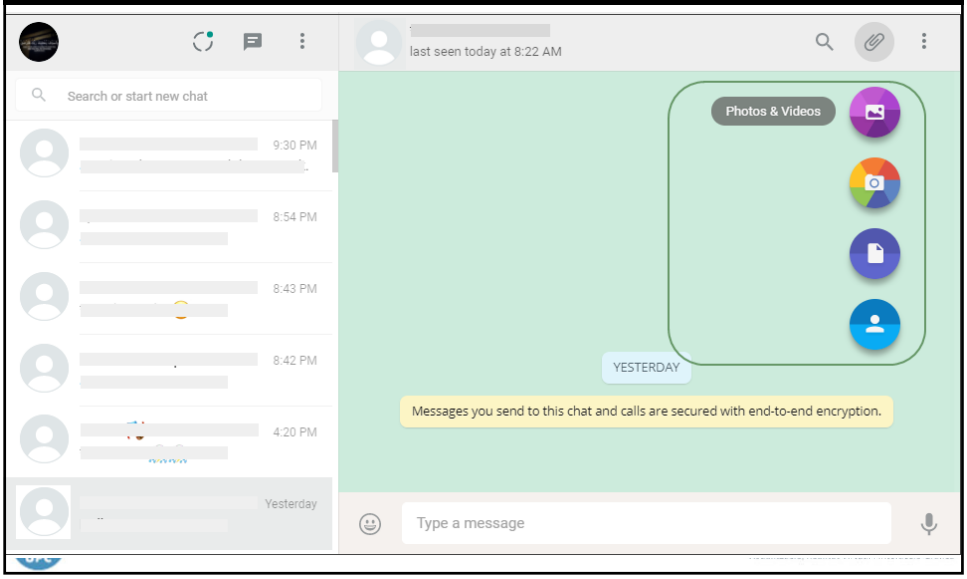
Use case. WhatsApp web app



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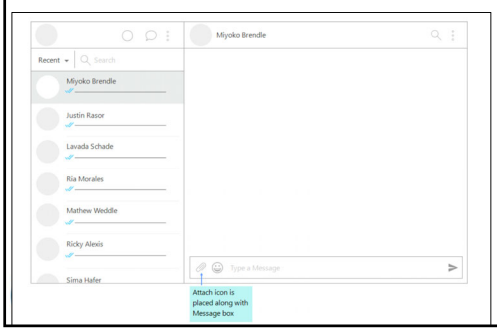
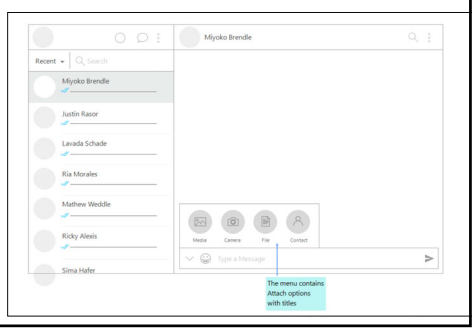
Use case. WhatsApp web app

- **Recommendation:** Make menu placement and theme consistent with UI.
  - Instead of Tooltips, the option names along with icons seems more helpful.

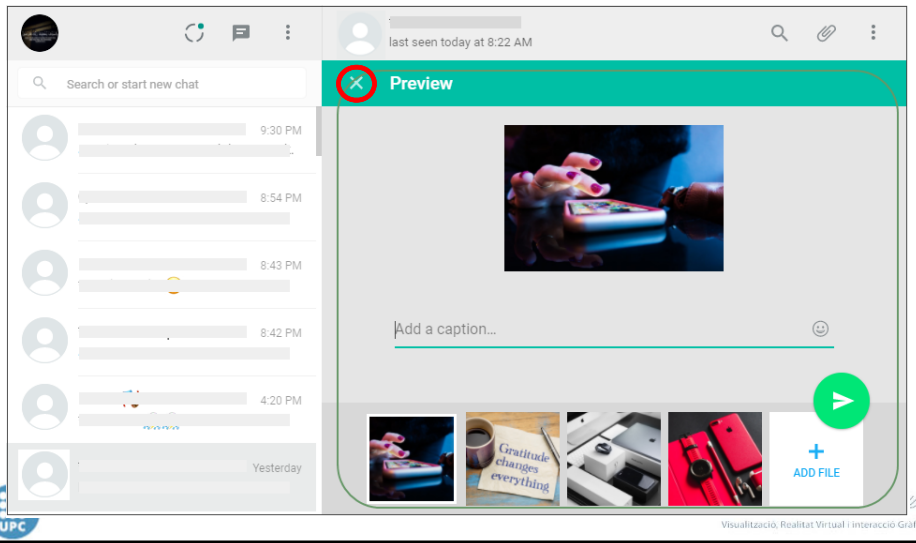




Use case. WhatsApp web app

- Analyse problems. **Attaching photos:**
  - Close icon with Preview title is confusing.
    - The user clicked it just to close the preview of selected photos, but it discards all the selected photos.
  - Adding more files option is not clear.
    - The Attach icon still displays on top, but it is not functional. The user clicked on that icon first.
  - It is difficult to navigate large number of selected files.

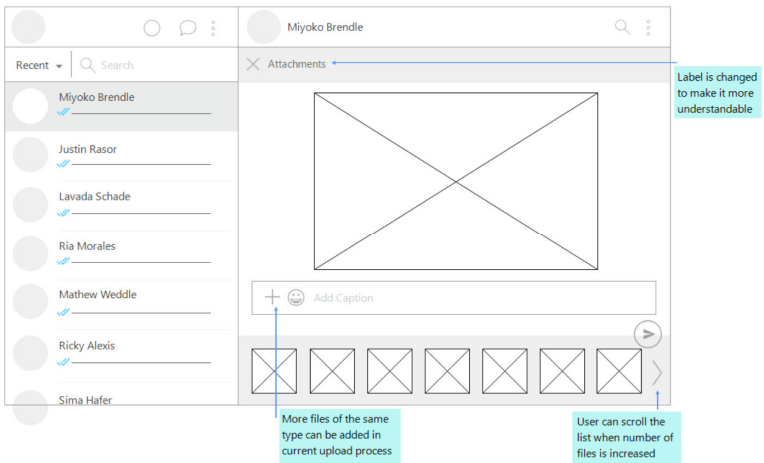
Use case. WhatsApp web app



Use case. WhatsApp web app

- **Recommendation:**
  - Rename preview area to Attachments to avoid any confusion for the user.
  - Scrolling in thumbnails area
  - User should be able to add more files by clicking an Add icon with caption

Use case. WhatsApp web app



Use case. WhatsApp web app

- More Observations
  - Using a scrollbar requires high accuracy to hold the bar and scroll it
    - Cursor is changed to resize when user tries to scroll Message pane
    - No keyboard scroll allowed in Contacts & Contact/Group Info
  - Little visibility of actions' visual feedback (bottom left)
    - Were skipped multiple times
  - Status cannot be updated on desktop version
    - Users cannot see others' status

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Outline

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Professors IDI

IDI – Usability Testing

Use case. Depth perception in VR

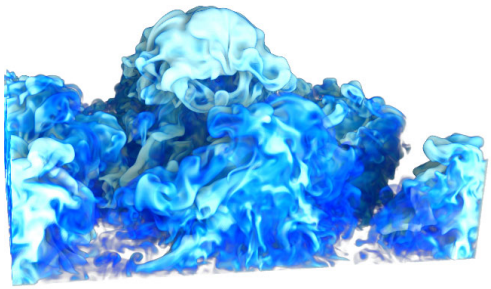
- Goal:
  - Evaluate performance of shading technique in VR environments
- Context:
  - Perception of complex, volume datasets is difficult in VR
  - Shading techniques may enhance shape and depth perception

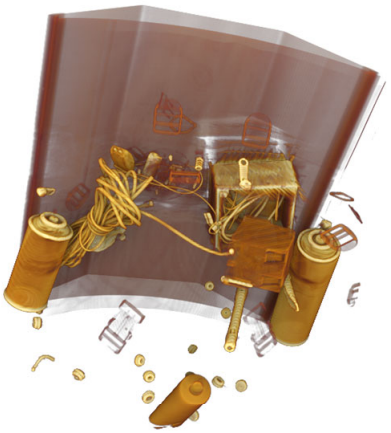
Use case. Depth perception in VR

- Purpose of the test:
  - Analyze whether shading techniques influence the perception of shapes and depth in VR
- Methodology:
  - Provide images under different shading conditions
  - Ask the users to classify two points of the scene placed at different depths
  - Analyze the results obtained

Use case. Depth perception in VR

- Sample images:





Use case. Depth perception in VR

- Test preparation:
  - Select shading models (4)
  - Select models (likely unknown to users)
  - Determine number of participants, iterations
    - Low level perception problem -> should be > 10
    - Latin squares balance results -> 16 per experiment
  - Two tasks

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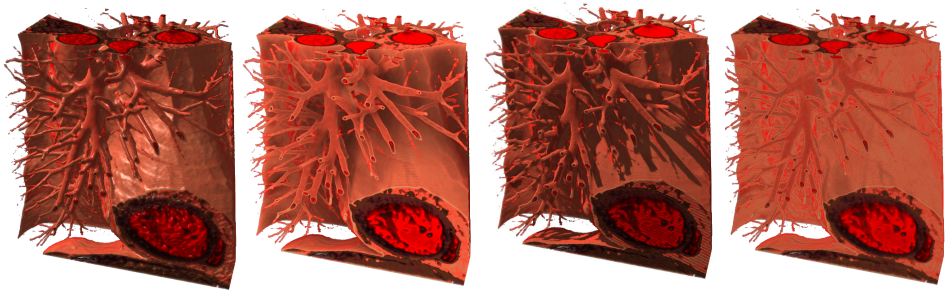
Use case. Depth perception in VR

- Shading techniques:

Phong | Soft shadows | Hard shadows | No shading



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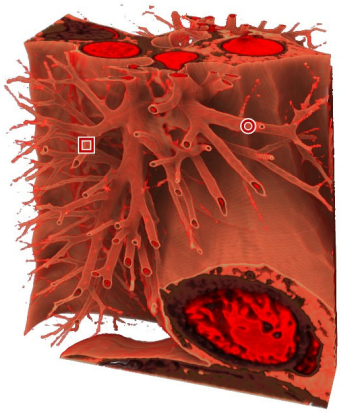
Use case. Depth perception in VR

- Images selection:
  - Select models likely unknown
    - Avoid previous knowledge
  - Random shading sorting
    - Avoid learning (shading)
  - Random model sorting
    - Avoid learning (model)
  - Latin squares
    - Avoid fatigue and learning (within users)

Use case. Depth perception in VR

- Task: Select the closer point. 2-alternative forced choice (2AFC)



Use case. Depth perception in VR

- Measures (what we measure in the test):
  - Time to answer
  - Correctness

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Use case. Depth perception in VR

- Variables to include in the analysis (to discard confounding or correlating variables)
  - Shading technique
  - Depth values
    - May analyze if absolute difference correlates with correctness
  - Previous VR background
  - Information of images for left and right eye
  - Luminance of the points' environment
  - Correlation between depth and shading maps

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Use case. Depth perception in VR

- Experiment setup:
  - 3D TV
  - Users placed at fixed distance
    - Chair to reduce movements
      - Avoid parallax as confounding variable
  - Dark room
  - External light (for virtual light source consistency analysis)

Use case. Depth perception in VR

- Experiment setup:

Use case. Depth perception in VR

- Experiment setup:
  - Modified keyboard to facilitate entry
    - Will compute timings

Use case. Depth perception in VR

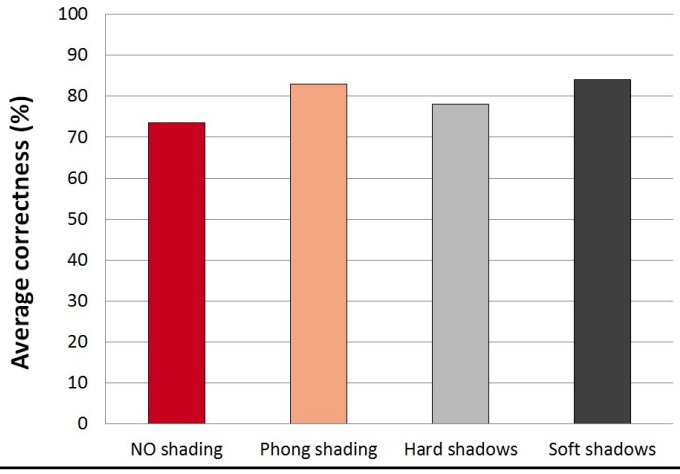
- Experiment setup:
  - Initial questionnaire (background, VR exposition…)
  - Initial training
  - Tasks
    - May rest between tasks
  - Post questionnaires

Use case. Depth perception in VR

- Task: Select the closer point. 2-alternative forced choice (2AFC)

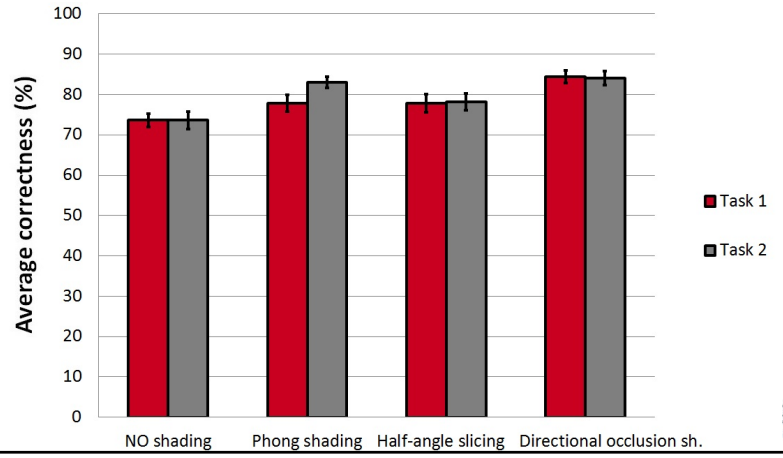
Use case. Depth perception in VR

- Analysis of results



Use case. Depth perception in VR

- Analysis of results



Use case. Depth perception in VR

- Statistical analysis:
  - **ANOVA test:** One-way analysis of variance to reject the null hypothesis that all correctness means are equal between shading techniques.
  - For a significance level of $\alpha = 0.05$, a Bonferroni post-hoc test with the same acceptance level to reveal differences between the individual shading techniques
  - **Result:** reject the null hypothesis when $p < 0.05$

Use case. Depth perception in VR

- Statistical analysis.
  - Chi-square test of association for the categorical variables relative depth and users' answers from tasks 1 and 2

Variables	χ^2	p value	Correct answers for each depth category
T1: relative depth vs. users' answers	5.991	<0.0001	<0.05: 66 % 0.05–0.1: 88 % >0.1: 86 %
T2: relative depth vs. users' answers	5.991	<0.0001	<0.05: 63 % 0.05 0.1: 86 % >0.1: 87 %

Use case. Depth perception in VR

- Statistical analysis:
  - The ANOVA analysis ($\alpha = 0.05$, $p < 0.0001$) of the NMI values shows that there is a significant difference between the images shaded with DOS with respect to the images shaded using HA or PH. A further Bonferroni's test revealed that DOS provides a significantly higher NMI (average NMI = 3.327) than HA (average NMI = 1.84) and PH (average NMI = 1.88).
    - Instead, there is no significant difference between the NMI means of HA and PH.

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Use case. Depth perception in VR

- Guidelines and recommendations
  - Using advanced volumetric shading improves depth perception
    - Among the tested shading models the simulation of soft shadows by using directional occlusion shading for desktop-based VR seem to yield better results

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Use case. Depth perception in VR

- Guidelines and recommendations
  - Real illumination does not affect depth perception when using advanced volume illumination techniques
  - External lighting may be carefully controlled to provide a pleasant environment
    - Specular highlights on the screen, reflections, or over-illuminated areas will certainly affect the correct perception of the data

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Use case. Depth perception in VR

- Guidelines and recommendations
  - When trying to judge depth in volume models, the X/Y relative position of the markers or the luminance of the points to classify seems to have no importance

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Usability. Test Planning: Measures

- For problem discovery:
  - Focus on prioritizing problems
    - Include frequency of occurrence
    - Likelihood of occurrence in normal usage
    - Magnitude of impact on the participants
  - Pre-planned number of iterations
  - Number of participants small, but multiple iterations,…

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Usability. Test Planning: Measures

- For measurement tests:
  - Categories
    - Goal achievement indicators (success rate and accuracy)
    - Work rate indicators (speed and efficiency)
    - Operability indicators (error rate and function usage)
    - Knowledge acquisition indicators (learnability and learning rate)

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Usability. Test Planning: Measures

- For measurement tests:
  - Fundamental global Measures
    - Successful task completion rates
    - Mean task completion times
    - Mean participant satisfaction ratings (on a task-by-task basis)
      - There are standardized questionnaires for this
    - Other measurements could be:
      - Number of tasks completed within a specified time limit, number of wrong menu choices, number of user errors, number of repeated errors (same user)

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Usability. Test Planning

- After measurements choice, usability objective can be determined
  - It's usually better to set goals that make reference to an average (mean) than to a percentile
    - Sample means drawn from a continuous distribution are less variable than sample medians
    - Unless there is missing data due to participants failing to complete tasks
  - Percentile goals require large sample sizes
    - You can't measure accurately at the 95 percentile unless there are at least twenty measurements