Research knows best, but how to communicate distraction measures practically in an industrial context

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Overview

1) Introduction
2) Development and Evaluation
3) Outlook
4) Final Conceptual Interface Design

Introduction

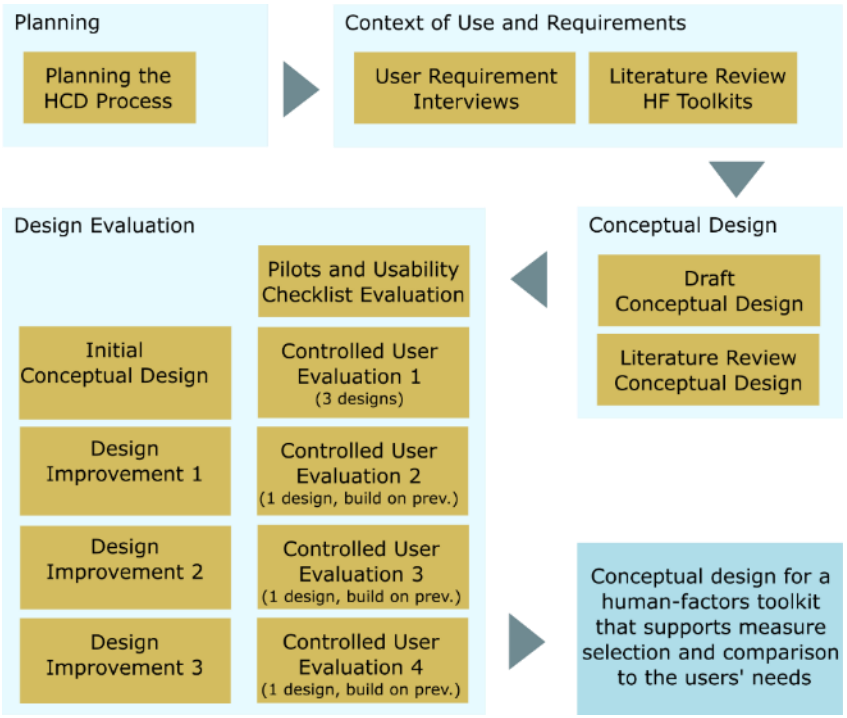
- *"Kevin and Linda are planning a user trial to evaluate the distraction of a new voice-based in-vehicle navigation system. Both are familiar with user studies and experts for workload measurement, but they do not have experience with driver distraction measures yet. They start gathering information from different sources and arrange them in a table. But with many measures in the growing table, Kevin and Linda are not sure which of the measures is the best to use."*

- Wouldn't it be nice if some information about the measures would be already collected and presented in a form for a non-expert in driver distraction?
- Wouldn't it be nice to find a format for an easy comparison of multiple measures?

Introduction

- What is the toolkit:
  - Easy accessible organisation of human factors related measures for evaluation of driving in automotive context, e.g. driver distraction, workload, user experience …
- For whom:
  - People who plan a user study
- To do what:
  - Support for measure selection and comparison

Development and Evaluation



- Developed through co-design with future users, automotive HMI engineers in each design step:
  1) User requirements interviews
  2) Four paper prototype iterations

Development and Evaluation

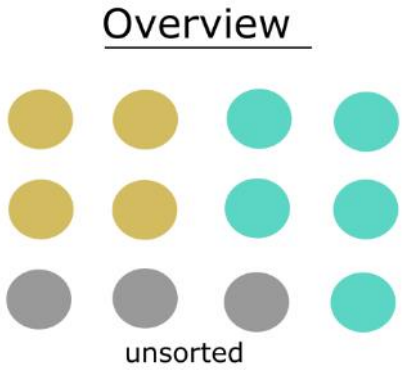
- Interviews revealed the key criteria that HMI practitioners from automotive industry use to decide about a measure were:
  - Suitability to research question
  - Frequency of use in research literature
  - Effort to administer
  - Interference with driving
  - Information about implementation and analysis

Development and Evaluation

- Visual Information Seeking (VIS), the mantra:

“Overview first, details on demand.”

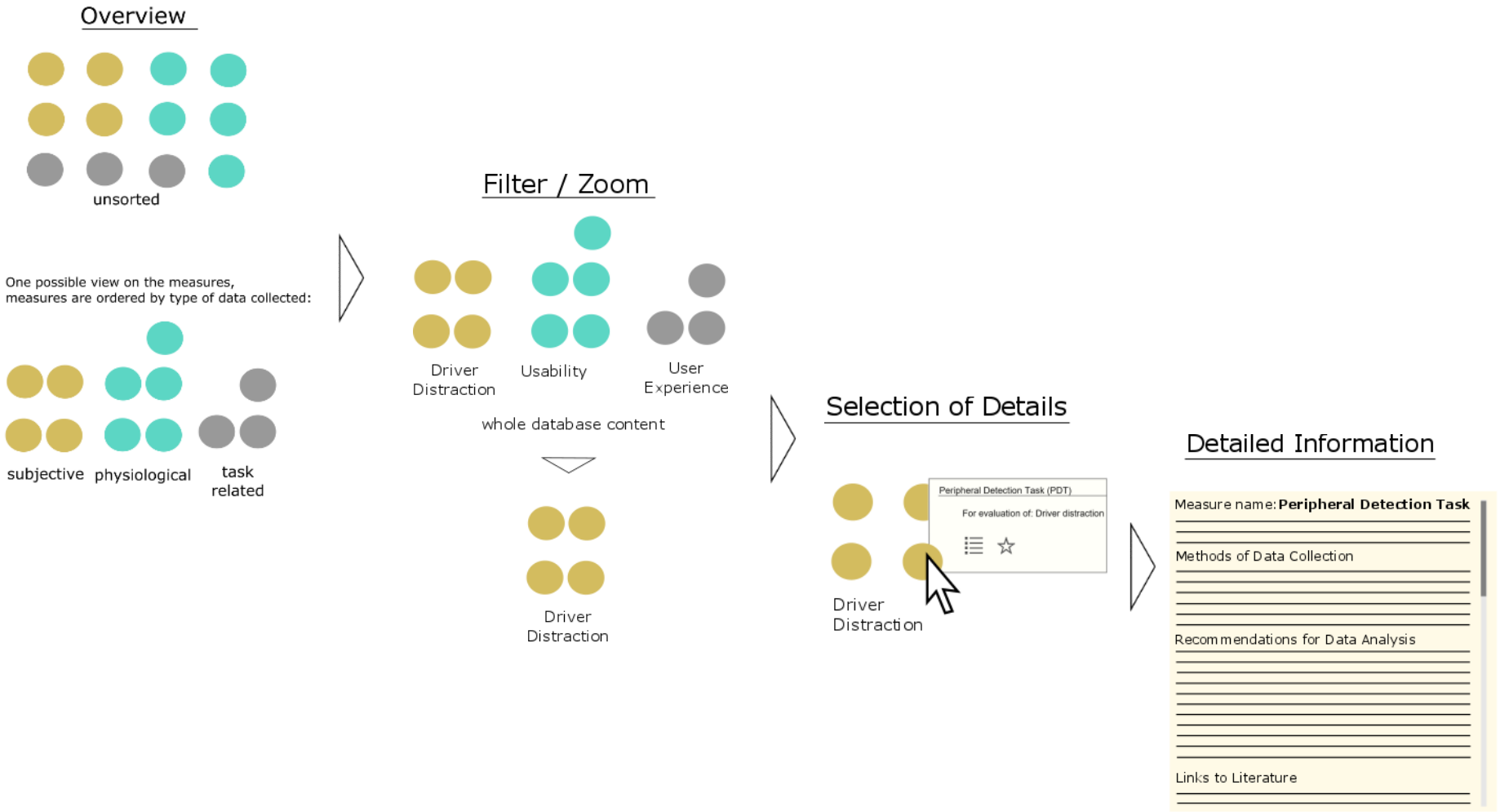
- Avoids information overload



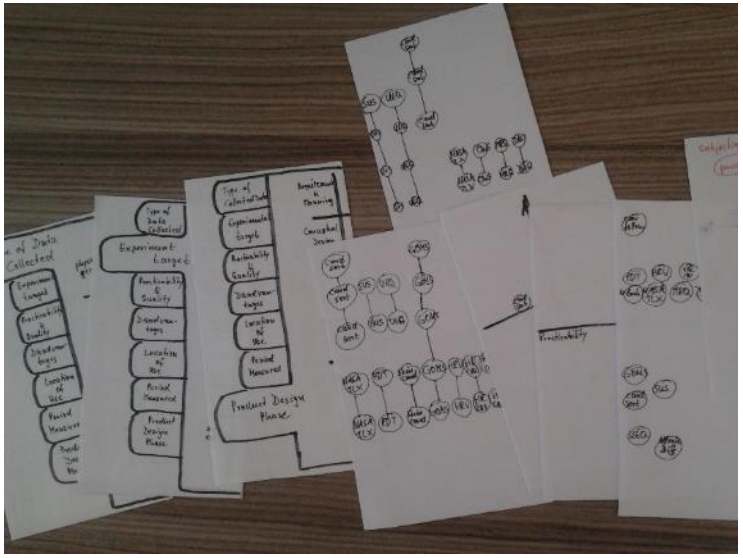
One possible view on the measures,
measures are ordered by type of data collected:

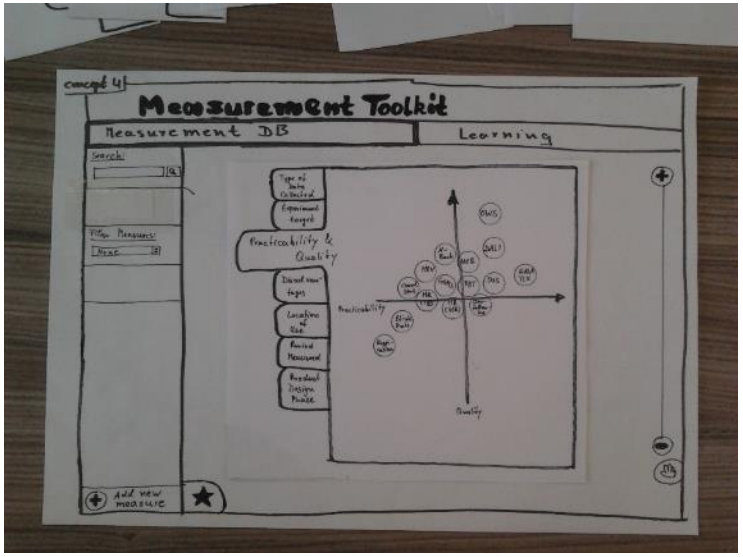
Development and Evaluation

“Overview first, details on demand.”



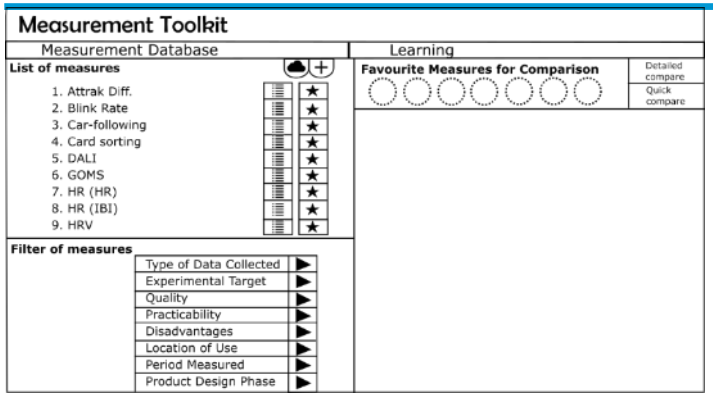
Development and Evaluation

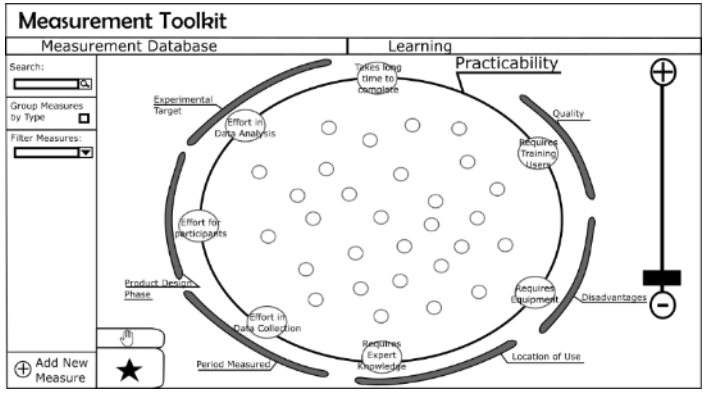


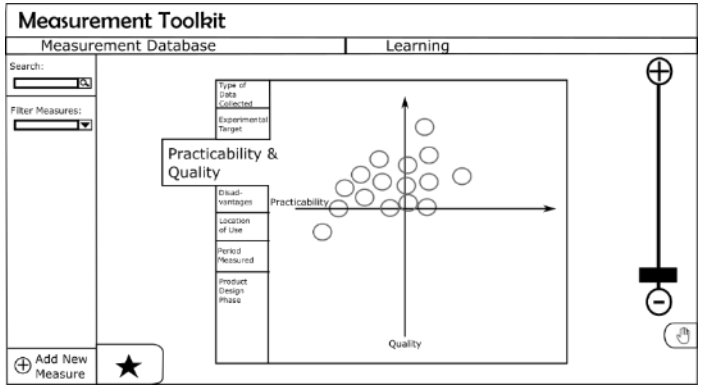


- Paper prototypes
  - For rapid design iteration
  - Paper based interface
  - Interaction mimics that with a computer interface
  - Good to test:
    - General arrangement
    - Navigation
    - Available functions
    - Structure of information in the interface

Development and Evaluation

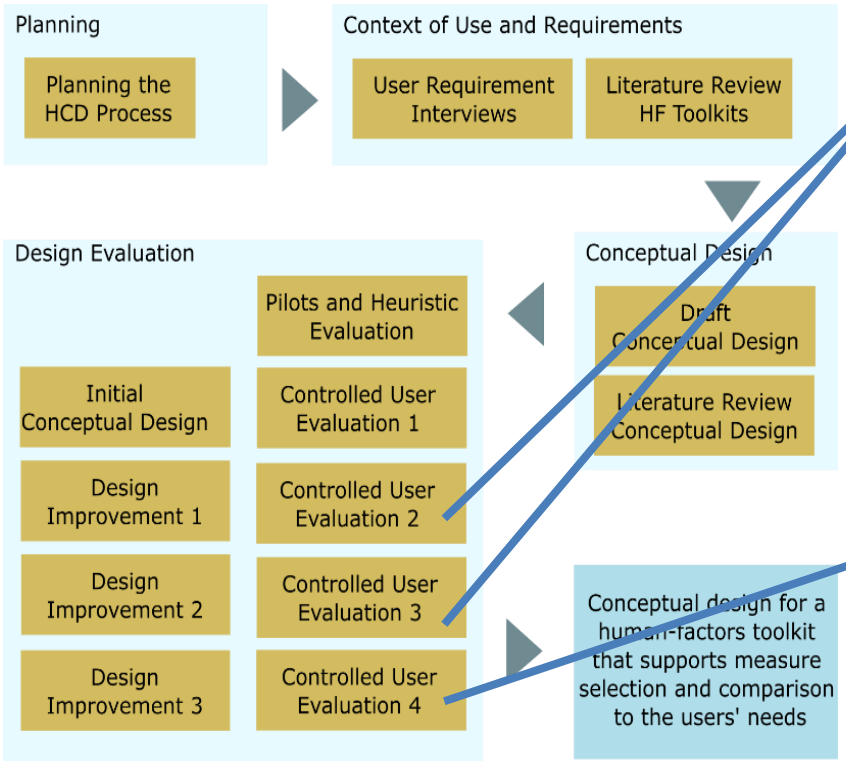






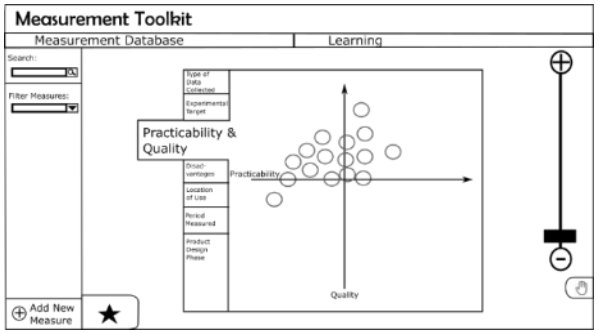
- First round to compare three designs (left, top to bottom):
  - Spreadsheet
  - VIS visual
  - VIS with diagram
- The best performing design from round 1 was subsequently evaluated in 3 further iterative studies

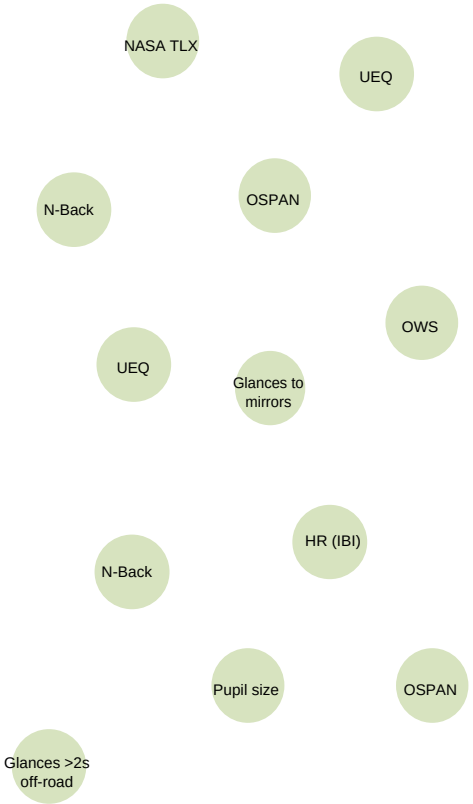
Development and Evaluation



- Iterations 2 and 3 considered specifically the categories for overview and filter information
- Iteration 4 considered all functions of the toolkit

Outlook and Conclusion

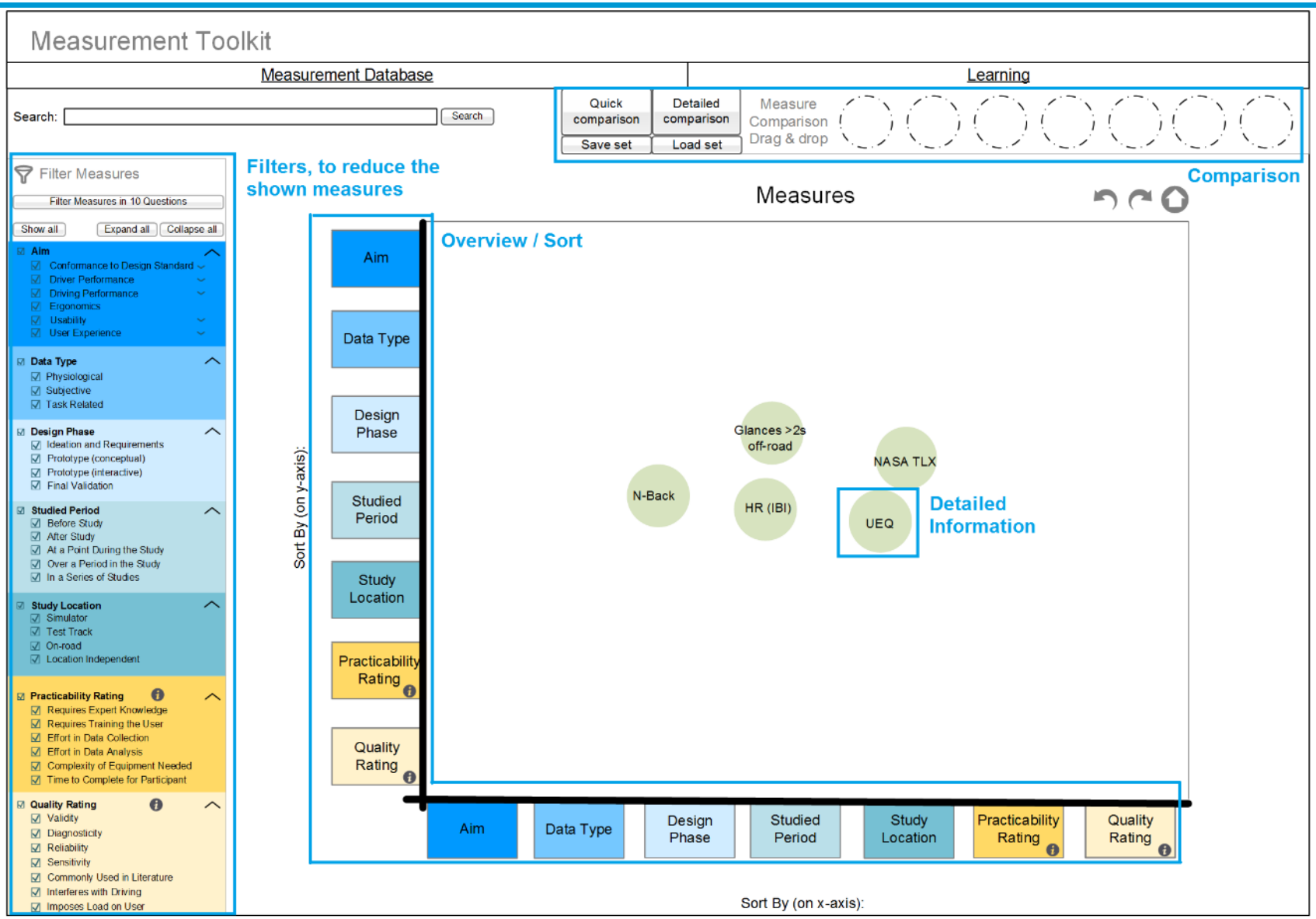




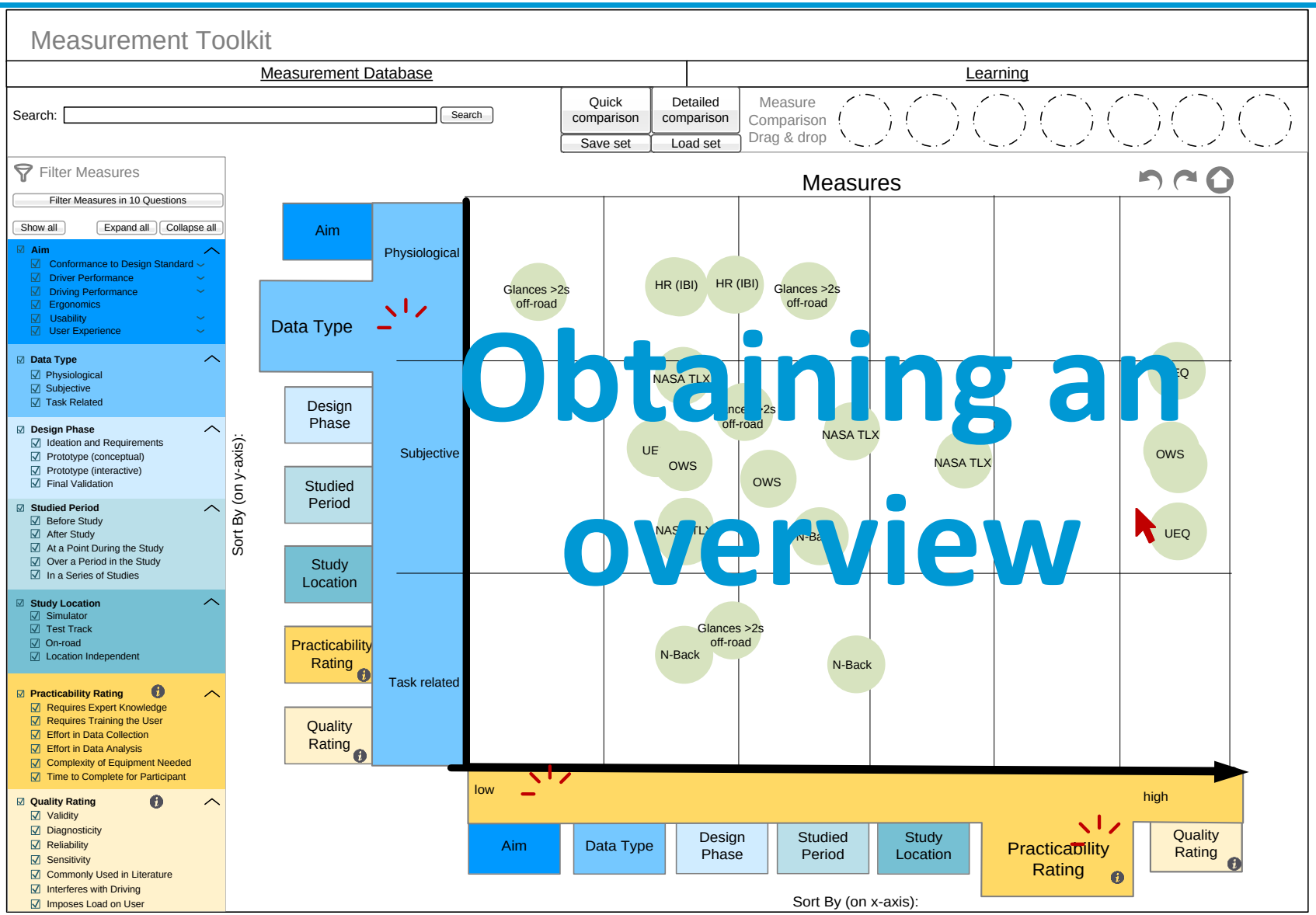
- Participants preferred the interface with the visual information seeking approach
- Users quickly understand the concept of the division between overview and detailed information
- Specific challenge was defining appropriate names for categories for overview information
- Final interface attained a positive rating in usability and user experience

- Implementation ongoing
- Portal for measure selection and use
  - Integration with existing procedures
  - Integration with available software for data collection and data analysis

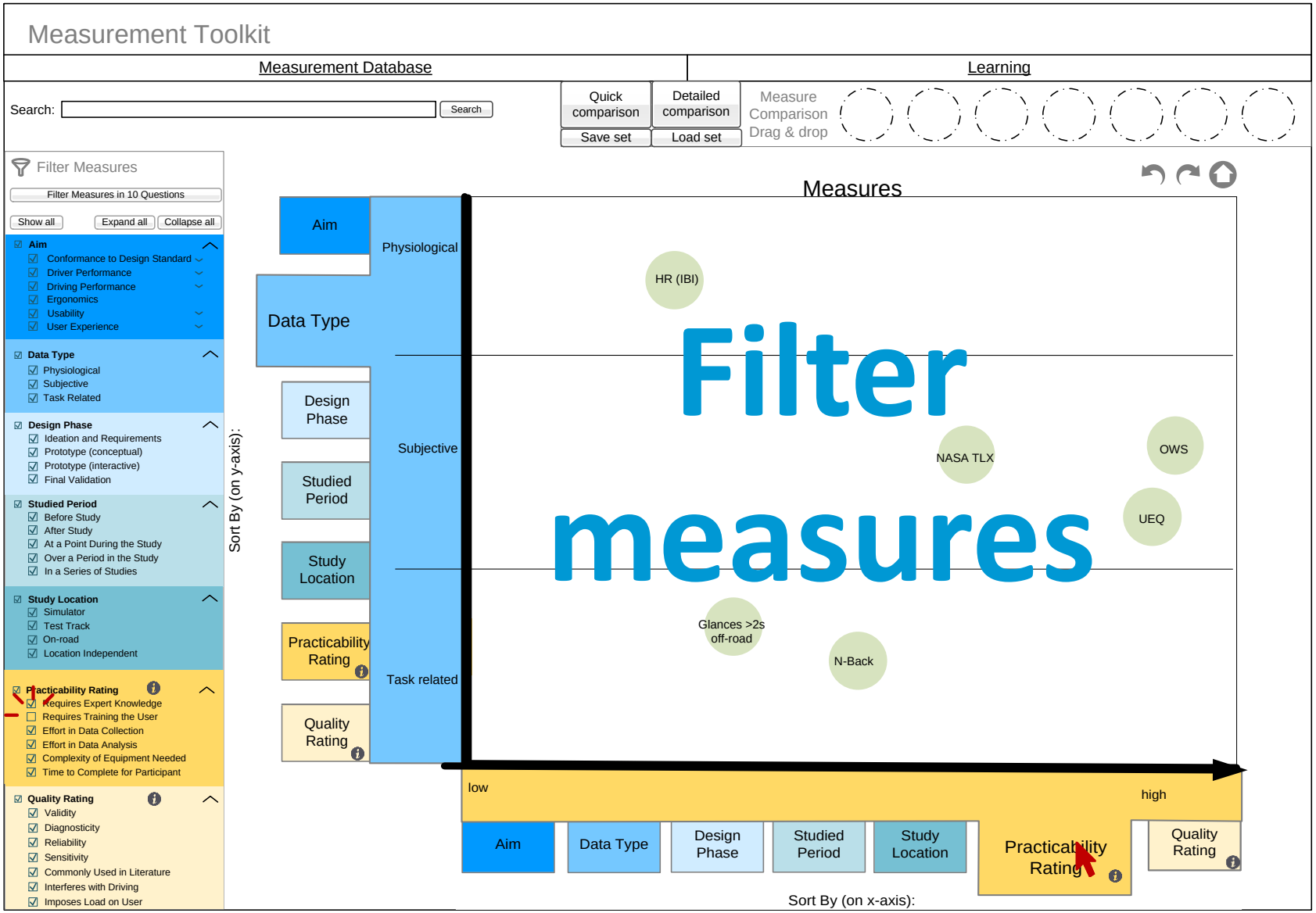
Final Conceptual Interface - Overview



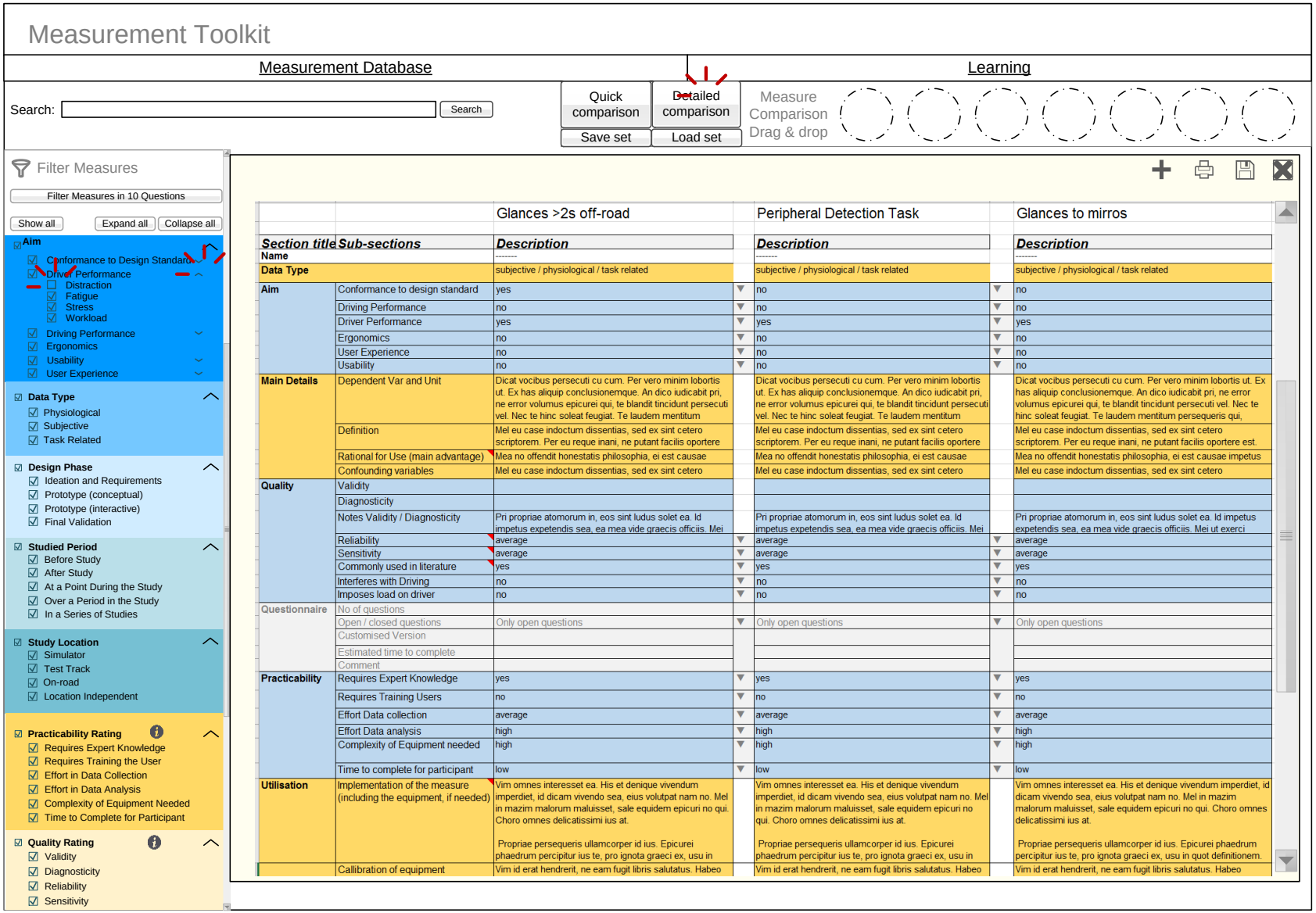
Outlook: prototype toolkit



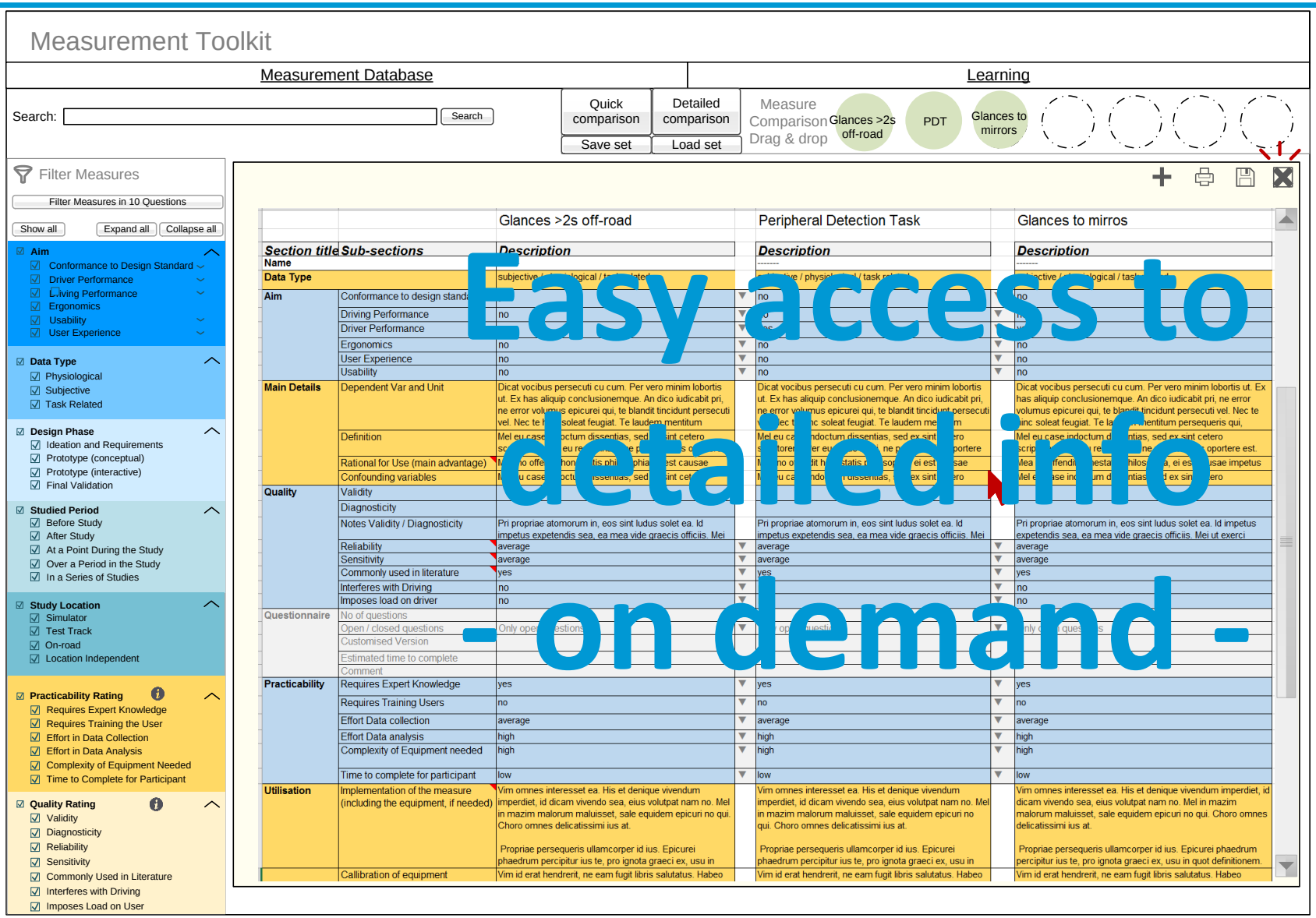
Outlook: prototype toolkit



Outlook: prototype toolkit



Outlook: prototype toolkit



Do you have any questions?

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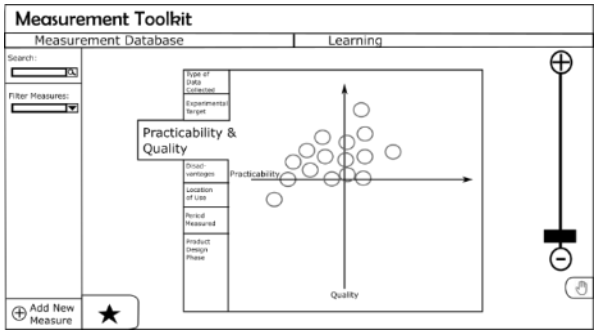
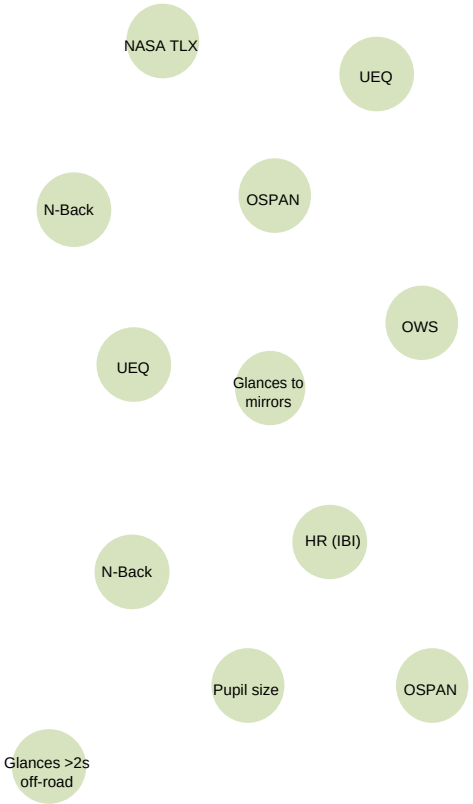
Summary:

- A conceptual interface for an electronic aid to compare / select human factors related measures for the evaluation of in-vehicle devices
- Employs methodology from visual information seeking
- Evaluated over expert interviews and in four paper prototyping studies

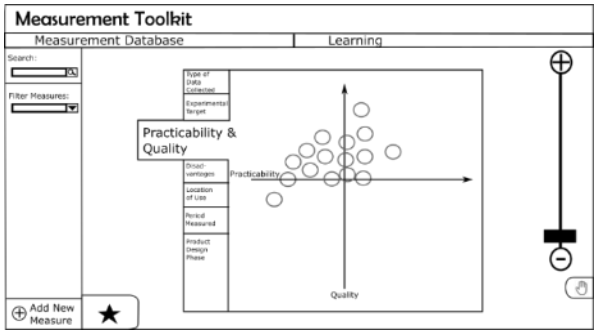
Evaluation – Paper Prototype Iterations

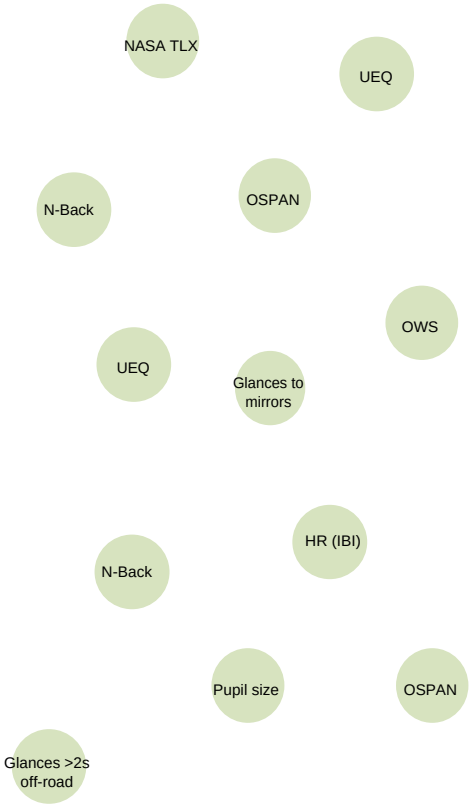




- Paper prototype 1
  - Four tasks with the interface
  - Usability rating
- Paper prototype 2 and 3
  - Four tasks with the interface
  - Tree analysis
  - Usability rating and user experience rating
- Paper prototype 4
  - Free interaction
  - Usability rating and user experience rating

Evaluation – Tree Analysis





- Tree analysis
  - From web-design
  - Specific test for structure of information
    - Question for every category that is going to be evaluated to participant, requesting to look for a certain information that is in that category; e.g. Where would you look for a driver distraction measure?
    - Participant points on the category where he/she expects that information
    - Analysis of answers
      - Information that could not be found
      - Attempts needed

Tree-analysis paper prototype two and paper prototype three.

Paper prototype two	Average			
	1st answer	2nd answer	3rd answer	Not found
Study Target	5	4	2	1
Type of Data Collected	8	1	1	2
Product Design Phase	8	3	-	1
Period Measured	5	2	2	3
Location of Use	9	1	-	2
Practicability	4	3	2	3
Quality	10	1	-	1
Disadvantages	3	2	-	7

Paper prototype three	Average			
	1st answer	2nd answer	3rd answer	Not found
Objective	10	3	-	1
Data Type	13	-	1	-
Design Phase	6	5	1	2
Studied Period	8	-	2	4
Study Location	13	-	1	-
Practicability Rating	12	1	1	-
Quality Rating	5	2	1	6