At-a-Glance: Selecting Metrics for Evaluating sDHT Usability

Are you a tech developer looking to evaluate and demonstrate the usability of your sensor-based digital health technology (sDHT)?

Are you a researcher or healthcare provider reviewing the results of a usability study to determine whether an sDHT is fit-for-purpose?

Here's what you need to know about selecting metrics for evaluating sDHT usability.

Usability is a multi-domain concept, and many methods exist to capture this information. Some of the most common metrics and data capture methods are described below.

There are two types of usability evaluations:

1. A **formative evaluation** is a research study or activity undertaken to evaluate the usability of a prototype sDHT, with the goals of understanding user interactions with the product, gathering information to inform design modifications, and collecting the preliminary data necessary for summative evaluations.

2. A **summative evaluation** is a research study undertaken using the final or marketed version of an sDHT to demonstrate usability amongst a representative user sample under conditions reflecting the intended use or context of use.

Jump to a usability-related domain:

Satisfaction

Usefulness

Ease of use

Learnability

Efficiency

Memorability

Understandability

Actionability

Readability

Use-errors

What do you want to learn about your sDHT?

- To what extent does the user find the sDHT **pleasant** to use?

- To what extent does the user **trust** the data generated by the sDHT? Do they trust that the sDHT works as it should, trust that their data will be used appropriately, and trust the company who developed the sDHT?

- To what extent does the user find the sDHT to be **comfortable** to use and/or wear?

- To what extent does the user find the sDHT to be **aesthetically** pleasing?

- To what extent does the user **want or desire** to use the sDHT?

- To what extent does the user wish to **engage** with the sDHT?

- What **emotional reaction(s)** does the user experience in relation to the sDHT?

How will you capture this information directly from usability study participants?

Suitable methods include:

- ✔ Qualitative surveys or diaries allowing written responses
- ✔ Quantitative surveys with checkboxes and scales
- ✔ Think-aloud evaluations, during which study participants verbalize their thoughts while interacting with the sDHT
- ✔ Interviews
- ✔ Focus groups

How will you capture this information objectively?

These metrics are always reported by users and can't be captured objectively.

Usability-related domain:

Usefulness

To what extent does the user find the sDHT **valuable**, **productive**, and/or **helpful**?

Usability-related domain:

Ease of use

To what extent does the user find the sDHT tasks **easy** to perform?

How will you capture this information directly from usability study participants?

Suitable methods include:

✔ Qualitative surveys or diaries allowing written responses

✔ Quantitative surveys with checkboxes and scales

✔ Think-aloud evaluations, during which study participants verbalize their thoughts while interacting with the sDHT

✔ Interviews

✔ Focus groups

How will you capture this information objectively?

These metrics are always reported by users and can't be captured objectively.

How will you capture this information objectively?

Direct or indirect observation; for example:

- How many actions does each task require?
- How many attempts does it take to complete each task successfully?
- How long does it take to complete each task?

Using data generated by the sDHT; for example:

- Error reports
- Timestamps
- Page load times

Usability-related domain: Learnability

How easy is it for users to perform tasks **the first time** they use the sDHT?

How will you capture this information?

✔ First, identify a method of capturing **ease of use**, described above.

✔ Then, ensure you are capturing ease of use amongst participants who have not used the sDHT before.

Usability-related domain: Efficiency

How easy is it for users to perform tasks **once they have experience** with the sDHT?

How will you capture this information?

✔ First, identify a method of capturing **ease of use**, described above.

✔ Then, ensure you are capturing ease of use amongst participants who have experience using the sDHT.

Usability-related domain: Memorability

How easy is it for users to perform tasks **after a period of non-use**?

How will you capture this information?

✔ First, identify a method of capturing **ease of use**, described above.

✔ Then, capture ease of use in a test-retest paradigm by comparing data collected before and after a period of non-use.

Does your sDHT present clinical data to users?

What about written information in the form of text on a screen, instructions for use, cautions, warnings, and/or contraindications?

If so, it's essential that you evaluate understandability and actionability, and you may wish to evaluate readability too.

Remember, 'users' includes end-users - the patients or participants from whom the sDHT are captured - and any other individuals who interact with the product, including carepartners, clinicians, investigators, and administrators.

Usability-related domain: Understandability

To what extent does the user **understand** the clinical data and/or written information presented to them?

How will you capture this information?

✔ Evaluation by an expert based on surveys, interviews, focus groups, think-aloud, observation, and/or using data generated by the sDHT.

Usability-related domain: Actionability

To what extent does the user understand the appropriate **action(s)** to take in response to clinical data and/or written information presented to them?

How will you capture this information?

✔ Evaluation by an expert based on surveys, interviews, focus groups, think-aloud, observation, and/or using data generated by the sDHT.

Usability-related domain: Readability

What **reading skills** does the user need to possess to understand written information presented to them?

How will you capture this information?

✔ Evaluation by an expert and/or via specialized software. Typically reported as a reading grade.

Finally, it is helpful to capture the number and type of use-errors, which are actions (or lack thereof) that may result in harm. It's also helpful to catpure any user interactions that are different than expected but do not result in harm.

The term "use-error" is preferable to "user-error" as it avoids the implication that the user is at fault.

Usability-related domain: Use-errors

What do you want to learn about your sDHT?

How many use-errors were captured or observed?

How can the use-errors be logically **categorized**?

Does the frequency of use-errors **differ** within or between user groups?

How frequently were users able to **recover** from use-errors without assistance?

How will you capture this information?

Observation, direct or video; for example:

- What do users do immediately after seeing an error message?
- What additional steps do users take while attempting to fix the problem?
- How often are users able to get back on track?

Using data generated by the sDHT, for example:

- Error reports
- Timestamps

It's tempting to jump straight into usability study design, but make sure you have developed your use specification and use-related risk analysis first.

Check out our quickstart guides here and here.

See the V3+ Usability Validation Glossary for key terms and definitions.