

# Measuring The Quality of GUI Usability

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Traditionally, Graphical User Interfaces (GUI) are designed based on style guides and validated with reference to the GUI specification, which formalizes the GUI design. Often, end users experience difficulties in using GUIs that are derived from specification. The reason for this is that design based on style guides is often not suited for a particular application and that GUI designers often fail to anticipate the user's problems. GUI developers are challenged by the need to understand the ways end users actually operate the application. Accordingly, GUI validation should rely on record of the Computer Human Interaction (CHI) rather on the GUI specification.

Common practices of usability validations are by manual procedures, using questionnaires, video recording and observations. The measures of operation obtained by these techniques are subjective and they suffer from low reliability and low validity. The procedures involved in manual validation are lengthy and expensive.

In order to decide that an operational procedure should be changed, the measurement of operability should be objective, valid and reliable. Objectivity may be obtained by using a tool that collects data consistently, independent of the tester's observations. Validity may be obtained by observing real end users while performing real tasks in their real working environments, using measures that express organizational needs, such as operation costs. Reliability may be obtained by statistics of the measurements of the operational procedures and of the user's failure mode. Obviously, automation is required for achieving objectivity and reliability. Nevertheless, methodology is essential for obtaining face validity.

A common measure of GUI operability is the "user profile", typically consisting of an array of frequencies of operation of either GUI components or operational procedures. User profiles of these types allow the developer to identify those components and procedures that end-users prefer over their alternatives. An improvement of the user profile may be obtained by changing the measure, by summing up the time that users spend while operating each of the components or procedures. This measure is preferred over mere counting, because it expresses the real costs of operation.

A user's profile that describes the user's operation is not sufficient for GUI validation. About 50% of typical data entry procedures are wasted because of user's errors. The situation is even worse for education and utility applications, which are not operated frequently. Typically, users of such an application waste most of the operation time trying to figure out the basic functions, the concepts underlying the application, the meanings of terms used in the application and the procedures required to actuate the user's tasks. For this reason, the user's profile should include not only information about the operational procedures that users perform, but also information about the procedures that user's fail to perform.

While the user's operational procedures may be measured transparently, based on the user's actions, measuring the user's failure modes require elicitation of the user's intention, through dialog with the end user. Besides the user's intention, the dialog with the end-user provides information about deficiencies in the user's documentation, on-line help, the training program and also about error prone GUI components and operation modes. Statistics of repeating failure modes may provide measures of the costs of design deficiencies.

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