

EXTENDING THE CONCEPT OF SATISFACTION IN ISO STANDARDS

Nigel BEVAN

Professional Usability Services
mail@nigelbevan.com

ABSTRACT

Traditional approaches to usability based on the definition in ISO 9241-11 in terms of user performance and satisfaction have been criticised as too narrow. The concept of satisfaction, defined as comfort and acceptability of use in ISO 9241-11, has been broadened in the new system and software quality model in ISO/IEC FCD 25010 (which replaces ISO/IEC 9126-1) to include achieving pleasure through the attainment of hedonic goals and the experience of use. Satisfaction is broken down into four sub-characteristics: purpose accomplishment, trust, pleasure and comfort. The new definition should promote a broader interpretation of satisfaction.

Keywords: *usability, satisfaction, quality in use, standards*

1. TRADITIONAL APPROACHES TO SATISFACTION

In 1997 ISO 9241-11 introduced the definition of usability in terms of user performance and satisfaction in a particular context of use, with satisfaction defined in terms of comfort and acceptability of use. A survey by Hornbæk [9] of papers including usability measures published in 2000 and 2001 found that 62% of the papers included some measure of satisfaction. These measures included expressed preferences, comments made by users and use of established questionnaires. Hassenzahl [4] points out that current approaches to satisfaction typically assess primarily the users' perception of effectiveness and efficiency, so that if users perceive the product as effective and efficient, they are assumed to be satisfied. Sauro and Kinlund [19] found that current measures of satisfaction are highly correlated with performance, and could be combined into a single usability metric. This supports Lindgaard and Dudek's [15] contention that traditionally HCI concerns itself primarily with

effectiveness and efficiency, with satisfaction being regarded mainly as a by-product of great usability. Does this mean that measures of satisfaction are redundant?

ISO 9241-11 defines satisfaction as: “freedom from discomfort, and positive attitudes towards the use of the product”. Most approaches to satisfaction assess how particular user groups respond to product features. Although the measures may be classified (for example in WAMMI [22] into Attractiveness, Controllability, Efficiency, Helpfulness and Learnability), the scope of the measures is not clear (are they related to the whole product, the interface or the interaction), and the mechanism by which these attitudes are generated is not questioned, as the emphasis is (as in some Kansei Engineering) on commonly shared responses to particular product features.

2. SATISFACTION AND PLEASURE

Most measures of satisfaction ignore fun and enjoyment, but there is evidence that this is an aspect of user experience that also contributes significantly to overall satisfaction with a product [3], and as Hassenzahl [5] points out, the ISO 9241-11 definition of satisfaction as a positive attitude towards the product is superficial. Hassenzahl conceptualises satisfaction as being pleased about the confirmation of the prospects of a desirable event, and distinguishes two categories of desired events [8]:

- Do-goals: to achieve pragmatic objectives related to tasks (which will be influenced by the utility and ease of use of the product).
- Be-goals: to achieve hedonic objectives:
 - a) Stimulation: through new impressions, opportunities, and insights.
 - b) Identification: communicating self-identity through products and activities.
 - c) Evocation: provoking memories of past events, relationships or thoughts.

This interpretation of satisfaction puts the focus on mental processes rather than the traditional focus on attitudes to product attributes.

Hassenzahl distinguishes between satisfaction with intended outcomes and spontaneous pleasure. However, a common dictionary definition of satisfaction is: “the feeling of pleasure that comes when a need or desire is fulfilled” [16]. This broad view of satisfaction encompasses both pleasure resulting from the achievement of do-goals and be-goals, and other sources of pleasure such as those identified by Norman [17]:

- a) Visceral: an automatic prewired response to physical features such as look, feel and sound.
- b) Behavioural: pleasure from the experience of use of a product.
- c) Reflective: reflections on the experience, including appreciation of aesthetics, quality and self-image.

Thus satisfaction can be used as a concept to encompass aspects of pleasure and joy that some authors (e.g. [3]) have contrasted with traditional approaches to usability.

3. THE APPROACH TO SATISFACTION IN ISO/IEC 25010

3.1. The ISO/IEC 25010 model for usability and quality in use

ISO/IEC FCD 25010* [12] (and ISO/IEC 9126-1 [10] which it replaces) contain a model for software product quality consisting of characteristics and sub-characteristics that can be used as a checklist of issues when defining quality requirements or when evaluating quality. (The relative importance of each characteristic and sub-characteristic will depend on the nature of the product and the context of use.)

The concept of satisfaction has been broadened in ISO/IEC 25010 to encompass the overall user experience.

Satisfaction is now part of the definition of usability in ISO/IEC 25010, which replaces the narrower definition of usability in ISO 9126-1, and now uses the same definition of usability as ISO 9241-11:

Usability: the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

The quality model also includes a broader concept of quality in use [1] that takes account of “safety” (the avoidance of the risk of adverse economic, health and safety or environmental consequences) that is missing from most approaches to usability:

Quality in use: the degree to which a product used by specific users meets their needs to achieve specific goals with effectiveness, efficiency, safety and satisfaction in specific contexts of use.

3.2. The ISO/IEC 25010 model for satisfaction

Hassenzahl provides evidence that the fulfillment of universal psychological needs is the major source of positive experience with interactive products and technologies [7]. The definition of satisfaction in ISO/IEC 25010 is consistent with this interpretation:

Satisfaction: the degree to which stakeholder needs are satisfied when a product is used in a specified context of use.

Satisfaction is currently broken down into four sub-characteristics intended to identify the most important issues: purpose accomplishment, trust, pleasure and comfort.

Purpose accomplishment is the stakeholder’s satisfaction with the perceived achievement of the pragmatic do-goals of effectiveness, efficiency and safety. This is cognitive satisfaction:

Purpose accomplishment: the degree to which the stakeholder is satisfied with their perceived achievement of pragmatic goals, including acceptable perceived results of use and consequences of use.

* FCD refers to Final Committee Draft. There may be further minor changes before the standard is published later in 2010.

Trust is the stakeholder's satisfaction with the perceived pragmatic do-goal of using a system that is secure. (Security is defined as protection of information and data so that unauthorized persons or systems cannot read or modify them and authorized persons or systems are not denied access to them.) This is satisfaction with security:

Trust: the degree to which the user is satisfied that the product will behave as intended.

Table 1: Ten human needs [20] and their relevance to ISO/IEC 25010

Need	Description	ISO/IEC FCD 25010
Competence – effectance	Feeling that you are very capable and effective in your actions rather than feeling incompetent or ineffective	Purpose achievement
Relatedness – belongingness	Feeling that you have regular intimate contact with people who care about you rather than feeling lonely and uncared for	Pleasure
Influence – popularity	Feeling that you are liked, respected, and have influence over others rather than feeling like a person whose advice or opinion nobody is interested in	
Self-actualizing – meaning	Feeling that you are developing your best potentials and making life meaningful rather than feeling stagnant and that life does not have much meaning	
Pleasure – stimulation	Feeling that you get plenty of enjoyment and pleasure rather than feeling bored and understimulated by life	
Security – control	Feeling safe and in control of your life rather than feeling uncertain and threatened by your circumstances	Trust
Physical thriving – bodily	Feeling that your body is healthy and well-taken care of rather than feeling out of shape and unhealthy	Comfort
Autonomy – Independence	Feeling like you are the cause of your own actions rather than feeling that external forces or pressure are the cause of your action	Eliminated by [7] as factor analysis showed it related to Self-actualizing – meaning
Self-esteem – self-respect	Feeling that you are a worthy person who is as good as anyone else rather than feeling like a "loser"	Excluded by [7] as it is an outcome of need fulfillment rather than a need in itself
Money – luxury	Feeling that you have plenty of money to buy most of what you want rather than feeling like a poor person who has no nice possessions	Excluded by [7] due to its marginal role

Pleasure covers satisfaction with hedonic be-goals, visceral pleasure and pleasure from using a product. This is emotional satisfaction:

Pleasure: the degree to which the user obtains pleasure from fulfilling their personal needs.

Pleasurable goals can be categorised as of stimulation (the need to acquire new knowledge and skills), identification (the need to to communicate personal identity) and evocation (the need to provoke pleasant memories).

Comfort is a be-goal that is a pre-requisite for satisfaction. This is physical satisfaction:

Comfort: the degree to which the user is satisfied with physical comfort.

Sheldon et al [20] identified the top ten psychological needs. Table 1, adapted from [7], lists these needs and shows how they map onto the sub-characteristics of satisfaction in ISO/IEC 25010.

This analysis suggests that purpose achievement, pleasure, trust and comfort cover all the relevant needs contributing to satisfaction.

4. MEASURING SATISFACTION

Many software developers regard satisfaction as a personal response that cannot be quantified, and in much usability testing only qualitative feedback on satisfaction is obtained. Ad hoc questionnaires are sometime used, but psychometrically designed questionnaires will give more reliable results [9].

Simple questionnaires (such as SUS [2]) just measure the user's assessment of the ease of use. Longer questionnaires can measure more specific aspects, such as affect, efficiency, helpfulness, control and learnability in SUMI [14]. Trust can be measured using the System Trust Scale [13,21], and pleasure with questionnaires such as AttrakDiff [6]. There are also a variety of questionnaires for comfort, e.g. [18].

Satisfaction questionnaires can be used in two situations:

1. Combined with usability testing: participants fill out a questionnaire immediately after a usability testing session.
2. Survey: normal users of a system are identified and asked to fill in a questionnaire after using the system.

The results of satisfaction questionnaires are most easily interpreted by making comparisons, for example between the results obtained when the same group of users rates different products or tasks, or by collecting enough data to establish norms, so that results can be expressed in terms of how they relate to population results (for example, better or worse than average).

5. SATISFACTION FOR DIFFERENT STAKEHOLDERS

One reason for the popularity of the ISO 9241-11 definition with usability professionals, is that when interpreted from the perspective of the organisation's goals it provides a business rationale for the importance of usability that is more compelling than mere ease of use.

But usability can also be seen from the inside out as meeting the user's goals, rather than the organisation's goals, which takes usability back closer to its original meaning. From this perspective the key element in the ISO definition is satisfaction, and this is one reason for the expanded interpretation of satisfaction in ISO/IEC 25010.

The definitions have been expressed in terms of "stakeholders" rather than "users" to support interpretation from the perspective of different types of users:

1. Primary user: operator.
2. Secondary users who provide support:
 - a) content provider, system manager, security manager.
 - b) maintainer, analyzer, porter, installer.
3. Indirect user (person who receives output, but does not interact with the system).

For an officer worker and their manager cognitive satisfaction may be most important, for a games player or manufacturer, pleasure may be more important.

6. CONCLUSIONS

The new definition of satisfaction in ISO/IEC FCD 25010 enables the concepts of usability and quality in use to be broadened to encompass the wider issues associated with user experience, pleasure and Kansei Engineering.

When the final version of ISO/IEC 25010 is published, there will be pressure to also revise the original definition of satisfaction in ISO 9241-11.

The purpose of providing definitions in a standard is to promote a consistent professional approach to a topic. The value of adopting the ISO/IEC 25010 definitions of satisfaction include:

- To encourage interpretation of satisfaction in terms of user experience: the extent to which a product fulfils a user need, rather than as a response to a product.
- To highlight the range of user needs that a system may have to fulfil: needs to accomplish a purpose, and for trust, pleasure and comfort.
- To enable satisfaction to be interpreted more broadly from the perspective of primary, secondary and indirect users.

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