

Eighteen Classes of Functionality: The D.EU.PS. Model of Information Systems Use

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Abstract

Five high-level categories of information systems functionality (desired, existing, utilized, perceived, and satisfactory), which combine to 18 classes, are presented. The resulting model is referred to as the D.EU.PS. model of information systems use (pronounced ‘dupes’). Along with the presentation of the classes their validity is argued by use of examples from three case studies. In doing so, the usefulness of the model as a tool for data collection and analysis within different use-contexts is exemplified.

1 Introduction

Usability, according to ISO 9241-11 (1998), is concerned with the effectiveness, efficiency and satisfaction with which users can achieve specified goals in specified contexts of use. Preece, Rogers & Sharp (2002, p. 14) explain the term effectiveness as ‘how good a system is at doing what it is supposed to do’. That is, ‘effectiveness’ suggests that specified goals are to be achieved with accuracy and completeness (ISO 9241-11, 1998). Effectiveness is thus related to a system’s de-sired functionality, what users are supposed to use the system for. The term efficiency suggests that specified goals are to be achieved with as little expenditure of resources as possible (ISO 9241-11, 1998). Bevan & Macleod (1994), for example, suggest that (temporal) efficiency equals ‘effectiveness / task time’. In this view, efficiency is related to how instrumentally efficient the desired functionality can be used by specified users. The third criterion, satisfaction, suggests that users should feel comfortable with and have positive attitudes towards the use of the system (ISO 9241-11, 1998). Satisfaction is thus related to how subjectively pleasing desired functionality is in the eyes of the users.

If applying these categories unreflectively, an implicit assumption is made that information systems consist of desired functionality that to varying extent is efficient and satisfactory. That is, there are two primary overlapping classes of functionality: the desired and the satisfactory, which may or may not be efficient. In this paper we argue that to fully understand the use of an information system (IS) and to assess its usability there is a need to introduce further categories of IS functionality. In the remainder of the paper we present five categories, which combine to 18 classes of IS functionality. Along with the classes we present examples from an ongoing project involving evaluation of an Internet banking system (the Internet Bank), an IS used to book rooms, teachers, students and extra equipment at a university (the Booking System), and a corporate intranet (the Intranet). In these cases, the resulting model has proved useful in directing evaluators’

attention during data collection and in functioning as a tool for analysis of user-system interaction within different business contexts (see Ågerfalk, Sjöström, Eliason, Cronholm & Goldkuhl, 2002).

2 The D.EU.PS Model of Information Systems Use

The reason for designing an IS in the first place is probably a belief that there are some tasks that the system may support. Hence, there is a desired functionality that the IS is supposed to implement and deliver to its users. We may distinguish between this desired functionality from the functionality that does eventually exist in the system. These two categories may not overlap completely, which is why there may be a need for further development and implementation of new non-existing but desired functionality. It may also be the case that there is undesired existing functionality, which may as well be removed. Furthermore, we may distinguish existing functionality from functionality users perceive exist. According to Norman (1999), the art of the designer is to ensure that desired, relevant actions are readily perceivable. Therefore it is equally important to recognize not only what functions an IS implements but also actions that users perceive as possible to perform. Furthermore, it is a well-known fact that many systems or parts thereof are not used to the extent anticipated during design (e.g., Davis, 1989). Therefore we may additionally distinguish between what exists, perceived or not, and what is actually utilized. Finally, as suggested by the ISO 9241 usability definition, functionality perceived by users may be perceived as satisfactory or unsatisfactory; that is without discomfort and with positive attitudes towards the use of the product. Davis (1989) points out that in addition to desired functionality (he refer to this as usefulness), utilization is influenced by perceived ease of use (as in satisfaction), and the utilization of existing functionality depends on what functionality a person believes enhances his or her job performance. It is important not to confuse desired functionality with satisfactory. Davis (1989) showed that even if users believe an application to be useful (as in desired), they might still consider it too hard to use (as in unsatisfactory). On the other hand, people may regard an undesired function as satisfactory: 'sure, it works fine, but I don't need it'. Satisfaction is thus not restricted to ease of use alone. Satisfaction relates to the contentment of the actual implementation of a function while desired functionality more holistically describes the desirability of a function.

Altogether this gives us five high-level categories of desired, existing, utilized, perceived, and satisfactory functionality. Desired functionality is functionality that is believed to enable a user to accomplish intended business effects. Existing functionality is functionality that is implemented and accessible in the system. Utilized functionality is existing functionality which is actually being used. Perceived functionality is functionality that users perceive to exist. Finally, satisfactory functionality is perceived functionality which can be used with satisfaction. These five categories combine to 18 classes of IS functionality. We refer to the resulting model as the D.EU.PS. model of IS use (pronounced 'dupes'), first introduced by Ågerfalk et al. (2002). The model is depicted in Figure 1 (next page). Note that the respective sizes of the classes in Figure 1 do not correspond to any quantitative empirical measure. They have been chosen simply to facilitate presentation.

Note that in the model, utilized is regarded a subset of existing, and satisfactory a subclass of perceived (something that is utilized always exist, and something that is satisfactory is always perceived). This is the reason for calling the model D.EU.PS. This is also the reason why not all five letters are used in all class names below; they can be uniquely identified anyway.

$D U \neg P$	Users perform this function even though they are not aware of its existence. Probably a result of unattended action. Relates probably to learnability or education. Example: An Internet Bank user was not aware that when a date for payment was not given, the today date was automatically used.
$\neg D \neg E P \neg S$	Users believe that this undesired function exists but that it could be better, but it does not exist at all, and we better leave it that way. This is probably related to learnability or misleading instructions/education. Example: The Intranet did not log user activities to the extent feared by some users.
$\neg D \neg E S$	Users believe this undesired function exists and that it works fine, but it does not, and we better leave it that way. This is probably related to learnability or misleading instructions/education. Example: Some Intranet users did not care that the system logged their activities (which it did not).
$\neg D E \neg U S$	Sure it works fine but users do not need the functionality. Example: In the Booking System it was possible to create diagrams showing bookings made by a teacher. A function that users did not want and did not use.
$\neg D E \neg U P \neg S$	An undesired function that the users do not need and think is unsatisfactory. Example: The function in the previous example ($\neg D E \neg U S$) was not only undesired but was also considered hard to use by some users.
$\neg D U S$	It works well even though users do not really want it. Example: Some Internet Bank users thought that the system required too many safety codes that did not promote trust, yet they accepted it and did not think it was a big deal.
$\neg D U P \neg S$	Not only forced to use it, it is unpleasant as well. Example: Some Internet Bank users regarded the repeated entering of security codes as a waste of time.
$D \neg E S$	Users want this function and believe that it exists and looks good, but obviously they do something else than what they think they do. Example: A Booking System user was very happy that he had booked a classroom, but when the class started another teacher claimed the room. The user was not aware that the system used the wrong database for storing the bookings of that particular room.
$D \neg E P \neg S$	Users want this function and believe that it exists even though it could be better, but obviously they do something else than what they think they do. Example: When discovering that the Booking System did not book the room as first believed, the user was no longer that happy with the function.
$D E \neg U P \neg S$	Its so bad users cannot really use it even though they would like to. Example: A user thought that the Internet Bank's online help did not help at all. As a consequence, he did not use it even though in need for help.
$D E \neg U S$	Sure, but another way works even better. Example: In the Internet Bank there were two different ways to input the receiver of a payment; the other way was preferred.
$D U P \neg S$	This is good but could be better. Example: An Internet Bank user would rather have registered new receivers in a separate window.
$D U S$	This is good! This is they way all systems should be like! Example: An Internet Bank user was happy that she could check when the money had been withdrawn from her account.

The D.EU.PS. model captures important aspects to consider when studying user interaction with information systems. The model makes it possible to discuss the functionality of a system in terms of what is desired and what is not, what exists and what is missing, what is actually utilized and what is needless, what is believed to exist, and what can be used with satisfaction? This in turn makes it possible to identify and discuss different users' perceptions of and attitudes towards a

system, and how these perceptions and attitudes change over time, as evident from the examples in Table 1. It would, for example, not be very effective to re-design a part of a system if that part is unlikely to be used anyway – often the user interface is not the problem at all (Mathieson & Keil, 1998).

The D.EU.PS. model represents an operationalization of usability that provides an analytic flexibility, encompassing not only more or less efficient and satisfactory desired (effective) functionality, by putting the usability categories in a broader situated and evolving context. Taking these aspects into account is important in order to pinpoint misunderstandings and focus on the real usability problems.

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4 References

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