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Short report

Evaluation of a prototype health information system using the FITT framework

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ABSTRACT

Objectives To demonstrate how the fit between individual, task and technology (FITT) framework[1] can be used for health information system evaluation.
Methods We developed a prototype information system with an integrated expert system for headache patients. The FITT framework[1] was used to evaluate the prototype health information system.
Results The FITT framework,[1] once applied, positively evaluated 199 integrated headache diagnoses, 349 schemes and 698 symptoms. We assessed 528 internet pages to determine to what extent they met the users' expectations. In two study sections, a total of 70 (of 140) participants used the system. In the second section, the intervention group did significantly better (P=0.031) than the control group.
Conclusions The FITT framework[1] provided a proper tool for evaluating the prototype health information system and determining which specific set of deltas to focus on in future developments.

Keywords: expert system, FITT, information supply, internet, IT adoption

Introduction

Information technology (IT) has been used in the medical domain for some decades. Over this period users' levels of acceptance of IT applications have been extensively researched.[2] Scientists have designed a variety of models for IT adoption, and have found different key factors that determine the level of acceptance.

The FITT framework is one of the most recent models. It includes three key factors of information technology adoption: the fit between individual, task and technology.[1,3] The delta, which represents the deviation between aim and reality, is determined by applying the framework. A low delta represents a high level of acceptance of the system.[1]

The framework is based on the idea that adoption of health-related IT:

> 'depends on the fit between the attributes of the users (e.g. computer anxiety, motivation), the attributes of the technology (e.g. usability, functionality, performance), and the attributes of the clinical tasks and processes (e.g. organisation, task complexity).'[1]

The interaction of user and task is the decisive new element of this approach.[3] By applying the framework, one can describe and analyse disruptions of the three fit dimensions, which helps with anticipating or retrospectively analysing problems. Furthermore, interventions made to improve a system can be analysed and described in any of the three key factors. The aim of this short report is to outline the appropriateness of the FITT framework for the purpose of health information system evaluation.

Methods

We developed a prototype information system with an integrated expert system for headache patients. The purpose of this information system is to determine the users' information demands and subsequently supply the user with links to related quality controlled websites.

The demand is determined using a frame-based expert system. A web interface guides the user through the search process by querying the information demand. An assortment of information is then gathered from portals and other trustworthy sources, and finally presented to the user.[4] The FITT framework[1] (see Figure 1) was used to evaluate the prototype health information system and to determine which deltas to work on in future developments. The evaluation is depicted in Figure 2.

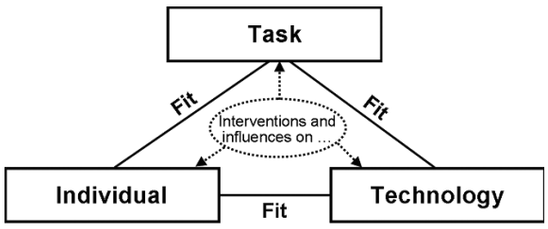

Figure 1 The FITT framework[1]

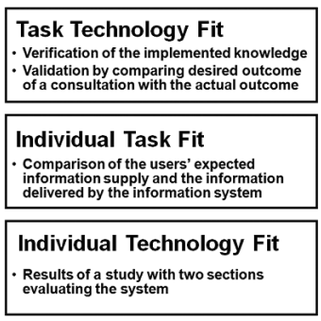

Figure 2 Evaluation of the health information system applying the FITT framework[1]

We used the results of a study conducted at the University of Bamberg in Germany to evaluate the fit between individuals and technology. Participants were randomly allocated to an intervention or control group. They received a completed anamnesis form describing a fictitious male close relative who asked them to search the internet for the specific kind of headache that caused him suffering.

The study's control group used common search engines or portals to determine the diagnosis of the fictitious patient. The intervention group used the prototype health information system. After the search, the participants had to input the determined diagnosis. The surplus of the prototype was determined by comparing the proportion of diagnoses matching the pre-determined diagnosis in the intervention and control groups.

The study was divided into two sections: one dealing with common headaches and one with infrequent headaches. A total of 140 participants were divided into two study sections. There were 60 in the first section and 80 in the second. Half of the participants were always in the intervention group. A one-sided Fischer's test was used to check significance.

To determine the fit between individual and task, we assessed the users' expected information supply and the information delivered by the information system. Therefore, we extracted the five most demanded criteria from the literature. In this context, we assessed 528 internet pages, each of which could be provided by the information system depending on the result of the expert system's consultation.[5]

We determined the fit between task and technology by comparing the desired diagnosis of a consultation with the actual internal diagnosis of the system. For verification purposes, we checked all 199 integrated headache diagnoses for correct implementation. We established a test scheme including symptoms for all implemented diagnoses to validate the information system. The symptoms were then input into the expert system dialogue, and the estimated internal diagnosis was compared with the expected diagnosis.

Results

In the first study section, there was no statistically significant difference (Fischer's, one-sided: P=0.381) between the control and the intervention group. Both did almost equally well. In the second section, the intervention group did significantly better (Fischer's one-sided: P=0.031) than the control group: 19 (41%) diagnoses were correct in the intervention group, as compared to ten (25%) in the control group.

There was also evidence that using the prototype health information system in the intervention group was in both study sections, on average, more time consuming than the free search in the control group. This was due to technical deficiencies and the expert system dialogue. The fit between individual and technology is deemed suitable for gathering health information online.

There were web pages available for all diagnoses. However, sometimes exact symptom descriptions were missing. Thus, a user supplied with only the symptoms could not determine a correct diagnosis. Additionally, one can observe that hardly any quality controlled information regarding treatment is available for specific kinds of headaches. Information on which kind of physician should be consulted and the urgency of seeking a consultation is also hard to find.

We found that in some areas there are many and in others only a few quality controlled web pages available for assessing specific kinds of headaches. In summary, this leads to three deltas concerning the fit between individual and task: 1) appropriate search

terms, 2) quality control for existing information and 3) more information on infrequent diseases.

We checked the 349 schemes and 698 symptoms of the frames. All entries were correct. All 199 kinds of headache were determined correctly. Overall, there was no delta determined concerning the fit between task and technology.

Discussion

The evaluation of the prototype health information system employing the FITT framework revealed no delta in the fit between task and technology, three deltas (search terms, quality control and missing information) concerning the fit between individual and task and two deltas (time consumption and technical deficits) in the fit between individual and technology.

More intensive research of headache information online could address the problem of search terms. Only the data providers (practitioners, organisations or portals) responsible for supplying this information and having it quality controlled can address the missing quality control as well as the missing information. To overcome the technical shortfall, it is necessary to optimise the inference and the sequence of questions.

The appropriateness of the FITT framework[1] can be assessed be comparing it with other models. An application of the Technology Acceptance Model (TAM)[6] for instance, certainly would have revealed the deltas in fit between individual and technology. Yet, the TAM has no means to determine the deltas in fit between individual and task.[1,3,6] If the Information Systems Success Model[7] had been used in this evaluation, we could assume that this would have led to similar results in both study sections as it concentrates on interactions of factors like system quality, information quality and user satisfaction. The advantage of the FITT framework is that it can explain 'why the same IT system can be adopted in a different way, and have rather different effects, in various settings'.[1] The study showed that the prototype information system did better in a more complex setting.

The FITT framework[1] provides a tool to evaluate prototype health information system and identifies deltas to work on in future developments. It was useful to utilise the framework for an 'a priori assessment of the goodness of fit of the three fit dimensions, prior to the initiation of a deployment effort'.[3]

In summary, the evaluation using the FITT framework[1] showed that a health information system based on an expert system and a meta-search of quality controlled websites is suitable for supplying health information.

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CONFLICTS OF INTEREST

None.

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