Interpretative perspectives on the acceptance of an optional information system

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INTERPRETATIVE PERSPECTIVES ON THE ACCEPTANCE OF AN OPTIONAL INFORMATION SYSTEM

Lessons from the Introduction of an Electronic Prescription System for General Practitioners

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SOM-theme A: The human and technical side of production: the management interdependencies

Abstract

Understanding the factors that contribute to the acceptance and use of information systems is a central concern in the field of information systems. Especially in cases where users are relatively free to use an information system (a so called optional information system) it is important for implementers to understand which factors determine acceptance in order to develop an effective design and implementation plan.

In order to identify factors that determine acceptance, this report describes and analyses the implementation of a therapy expert system for general practitioners (GPs) in the Netherlands. The Netherlands Ministry of Health decided to implement this system with the objective to promote cost effectiveness, consistency and quality of therapies and drug prescriptions of general practitioners.

This paper uses an interpretive perspective to analyze the limited acceptance of the system. While the promotion campaign focused on the system, GPs based their decision on wider contextual factors. The case demonstrates pitfalls, which come up during the implementation of such a system, and shows which factors may play a role in the decision of possible users to accept or reject such an optional information system.

Different issues arise from this case. One is that users seem to differ from non-users and that perceptions about the system itself but also about non-system features affect the decision to accept. The paper uses the evidence of the case by suggesting to extend the technology acceptance model (TAM) with relevant contextual factors. It concludes by outlining its implications for implementers of optional information systems in general.

1 Introduction

This article examines the limited success of an attempt by a national healthcare agency to implement a prescription management system. The promoters wanted to reduce the cost of drugs prescribed by general practioners (GPs), and invested heavily in developing the system and in promoting it to the intended users. GPs are autonomous, self-employed professionals and they reacted to the system in different ways - some used it in full, some partially, and some not at all.

The analysis relates these reactions to theories about the acceptance and use of information systems. Understanding why people use (or not) an information system is particularly interesting when they have a relatively high degree of autonomy - the system is "optional". Promoters cannot rely on hierarchical authority to ensure acceptance, but need a deeper understanding of users' perceptions.

The article begins by setting out an interpretive perspective on the acceptance and use of information systems. It then describes the research method used to gather data on the case. It presents the results of the interviews and shows how they illustrate aspects of the interpretive perspective. This leads to some theoretical and practical implications.

2 Interpretive perspectives on acceptance of information systems

Walsham (1993) proposed using an interpretive approach when researching the organizational issues associated with information systems, including variability between users in their acceptance of innovation. Interpretive methods focus on the context of information systems, and on the processes whereby *"the information system influences, and is influenced by, the context"* (p.5). The approach is consistent with Czarniawska's emphasis on the need to understand human intentions when considering how people react to a new system. She also points out that *"it is impossible to understand human intentions by ignoring the settings in which they make sense"* (Czarniawska, 1998, p.4). Those settings can include institutions, sets of practices or other contexts, which people have created through an accumulation of decisions and events.

People work within this context, and bring to it their unique experiences and interests. They select and interpret events in a personal and subjective way, and so attach different meanings to them. An event or artifact (such as a paper setting out the purposes and design of an information system) is not an objective phenomenon. People consciously created the proposal (what Walsham (1993, p.5) refers to as a *"social construction by human actors"*) to reflect their interests, experiences and responsibilities. Those with different interests, experiences and responsibilities will attach different meanings to the proposal (Do they recognize the stated problem? Do they agree that this proposal is the right way to solve it?) and to the system (will it be a help, a threat, a source of ideas?) and use these to form their attitude to it. It is therefore not surprising to observe different degrees of acceptance amongst system users. Interpretive approaches emphasize the subjective nature of the acceptance decision. They try to identify the range of interpretations, which people make of a system, and to understand their sources.

Some studies have taken features of the system itself as the focus of these interpretations. For example, Davis et al. (1989, 1993) developed the Technology Acceptance Model (TAM), which suggests that use depends on a prospective user's attitude to the system. That reflects their perceptions about its usefulness and ease of use - thus emphasizing the role of system design on acceptance. Figure 1 illustrates this.

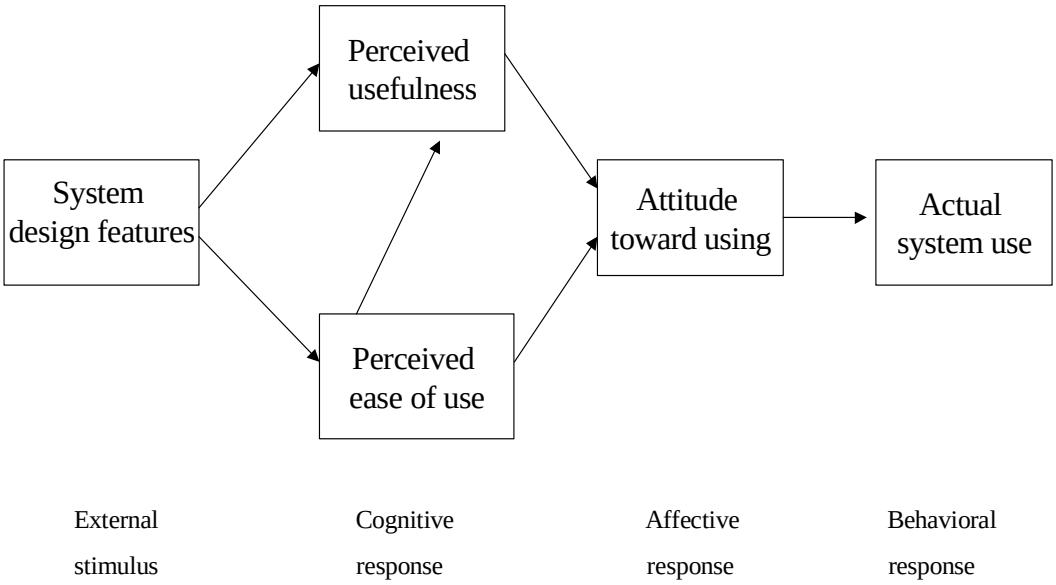

Figure 1 *Technology Acceptance Model (TAM) (Davis et al., 1989)*

Later work by Davis (1993) and others (Sheppard et al., 1998; Igbaria, 1994) found a significant correlation among the various components of the model. However, Davis also argues that researchers may identify more variables which influence attitudes and hence acceptance. A curious feature of this case is that the Health Ministry offered all GPs exactly the same system, yet they differed substantially in their willingness to use it.

Others have focused more on how people see and interpret the wider context within which a system is designed and used. Some (see, for example, Markus, 1983; Walsham, 1993; Knights and Murray, 1994, Currie and Brown, 1997) focus on immediate organizational factors, while others examine how influential players interpret and react to external changes (Boddy, 2000; Dawson and Gunson, 2002). As players interpret and respond to their context (such as by implementing a system or changing some aspect of structure), they simultaneously re-shape that context. Others then interpret and respond to the (new) context as they defend or promote their beliefs and interests. In this case, major contextual factors were for instance: drug costs, GP autonomy and cultural differences between practices.

Taking an interpretive perspective encourages us to consider how the main players (promoters and

users respectively) vary in their attention to such factors, and in the meanings they attach to them. In this case the promoters were from the Health Ministry, the insurance companies and the Medical Associations, while the users were autonomous medical practitioners. This autonomy opens up the possibility of variations in use, but would not in itself explain the variations between GPs that were observed.

One possibility suggested by organization theorists is that the culture of a GP's practice affects their attitude to the system, and their willingness to use it. By culture we mean the shared values, ideals and beliefs that members of an organization develop - it expresses shared assumptions about the world and the tasks they perform (Martin, 1992, Hatch, 1997). One practical expression of this is how a GP see information - what they regard as useful, how they wish to obtain it and who they believe should have access to it. This affects how satisfied they are with a given information system, and how they will view a new one. They will welcome a system that fits their culture and resist or ignore one that conflicts with it. In this paper we will use Quinn's Competing Values model (Quinn et al., 1996, 2002) to examine whether GP's perceptions of their practice's culture affected their willingness to use EPS (see figure 2).

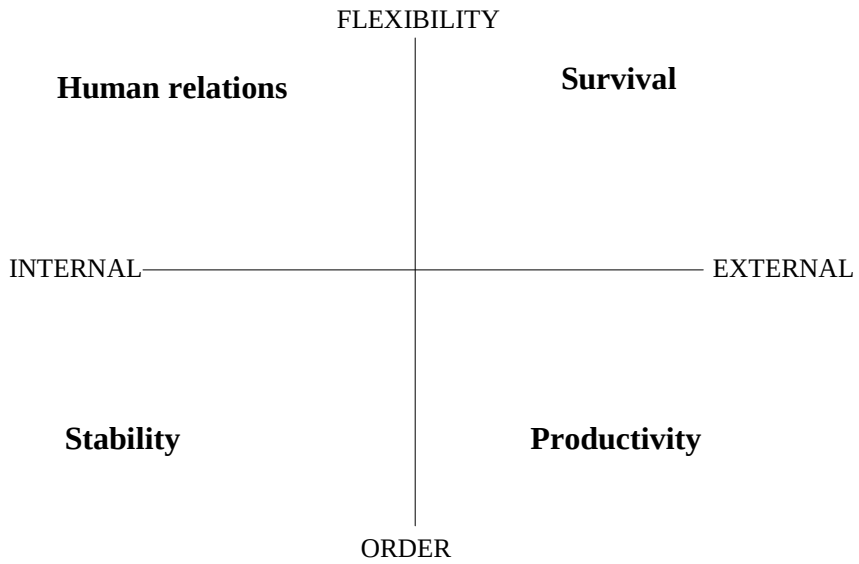

Figure 2 Competing Values Model (Quinn et al., 1996, 2002)

Pinch and Bijker (1997) propose that as people design a system they do not interact with their context in a linear way, moving systematically from idea to working model. A better description would be

"multi-directional", in which many possible forms of the artifact exist in the early stages of development - but only some survive. Why they survive and others fail depends on the actions of the social groups with an interest in the project. *"The social groups concerned with the artifact, and the meanings that those groups give to the artifact, play a crucial role: a problem is defined as such only when there is a social group for which it constitutes a 'problem'"* (Pinch and Bijker, 1987, p. 30). The most influential of these groups will ensure that the system deals with "their" problem.

McLoughlin (1999) defined these "relevant social groups" as: *"those who share a particular set of understandings and meanings concerning the development of a given technology.... Each group will be identifiable through the different views they have (about) the artefact, or even whether it is a desirable technology at all. They will thus each perceive different problems and potential solutions to them"* (p.92). Crucially, McLoughlin argues that these cannot sensibly be defined by prior assumptions about the likely interests of pre-defined groups, but *"by the empirical device of asking the actors themselves"* (p.93). In this case, the promoters vision of the system was one in which all GPs used the system in the intended way - and in so doing would help resolve the promoters' problem of high drug cots. GPs had several different visions - and attached different meanings to the technology. Some welcomed it, either because they shared the promoters' concerns over drug costs, or because they believed the system would bring other benefits to their practice. Others did not recognize the problem as presented by the promoters, or saw counter-balancing disadvantages in the system. The paper will examine how the interaction between these "relevant social groups" affected the outcome of the project.

A successful innovation depends on those promoting it achieving consensus amongst the relevant social groups, which stabilizes the form (sometimes called "closure") of an acceptable system. This occurs as groups accept that a design deals with the perceived problem: "one need not *solve* the problems in the common sense of that word. The key point is whether the relevant social groups *see* the problem as being solved" (Pinch and Bijker, 1987, p. 44). Or, as McLoughlin suggests, the final form of a technology is not that which is technically superior, but that which the groups who take part in the social process of design agree is superior. Until the players achieve closure the new system is not stable, and is unlikely to meet promoters' expectations. This paper will examine how the initial form of a system favored by one group (comprehensive adoption) changed during implementation into a more limited form (partial adoption). In that sense the system has not stabilized, as promoters are dissatisfied with the rate of acceptance yet still hope to move towards it.

These issues have typically been discussed in relation to computer-based information systems within hierarchical organizations. This case is about implementing a relatively "optional" information system,

in the sense that the intended users had a relatively high degree of choice over whether and how they used the system. “Optionality” in this context is a low-definition term, indicating that users of most systems have a degree of choice over the way they use it. It is best thought of as a continuum - at one end are “low option” systems such as the script, which a call center agent must follow to conduct a call. An example of a “high option” system would be a knowledge management system in a consultancy, which enables, but does not require, staff to exchange ideas and issues arising from current projects. In low option systems managers may be able to rely on hierarchical power relations to ensure at least an appearance of use. In high option systems, they will need to spend relatively more time on promoting willing acceptance and use. The paper will lead to some practical suggestion for those implementing relatively optional systems.

The questions, which arise from the discussion, are:

- what factors most affected the use of EPS (e.g. the system itself or wider contextual factors?)
- how did social groups differ in their attention to, and interpretation of, these factors
- did GP practices display different cultures, and did these affect their attitudes to EPS?
- what practical implications does the research suggest when implementing relatively “optional” systems, especially when the users are in different organizations?

The next section of the paper outlines the EPS, the circumstances that encouraged the ministry to introduce it, the implementation campaign, the data collection method and the outcomes after 18 months of implementation.

3 Description of an electronic prescription system for general practitioners

Introduction to case study

In The Netherlands, as in other western countries, the costs of health care rise each year and those who finance the system - insurance companies and central government - have taken several measures to contain costs. These have included more restrictive insurance conditions, limiting hospital budgets and, the focus of this study, attempts to contain the costs of drugs prescribed by general practitioners. General practitioners (GPs), also called family doctors, are a very important link in the chain of health care providers.

Nearly every citizen has a family doctor of their choice whom they consult when they need non-urgent medical assistance. GPs run their medical practice as independent businesses and have complete autonomy in their working practices, including how they conduct their consultation with a patient. This takes about 10 minutes and typically has four parts: 1) an introduction with some informal interaction between the GP and the patient, 2) the subjective explanation of the problem by the patient, 3) the diagnosis in objective medical terms (sometimes coded in the International Classification System of Primary Care (ICSPC) coding system) and 4) deciding the treatment - including where appropriate a prescription for drugs.

A study by Wolters et al. (2001) showed that, for similar cases, the cost of GP's prescription varied by up to 40%, depending on the quantity and brand prescribed. The study calculated that if all GPs made more consistent and cost efficient prescriptions, drug costs would fall by 150m Euros, representing 20% of the cost of drugs prescribed by GPs. The insurance companies, the Ministry of Healthcare and the National Association of General Practitioners therefore developed an expert system, called Electronic Prescription System (EPS).

EPS advises doctors, during the patient's consultation, on suitable treatments (Bates et al., 1998; Hunt et al., 1998; Schiff et al., 1998; Mellin, 2002). The main input is the GP's diagnosis, a list of available drugs and the patient's medical record. The latter include age, sex, weight, allergies, problem list, laboratory data and current use of drugs. The database on medications includes current drugs, past medications, drug allergies, interactions (drug-drug) and costs. By using this data the system takes account of the specific situation of the patient. The doctor types in the patient number and a code representing the diagnosis (this follows the coding system of the International Classification System of Primary Care). EPS then recommends a therapy, including any drugs. The EPS also has the feature to

print a drug prescription and an email facility to send this directly to the pharmacist if the patient wishes. Figure 3 shows the input and output of EPS.

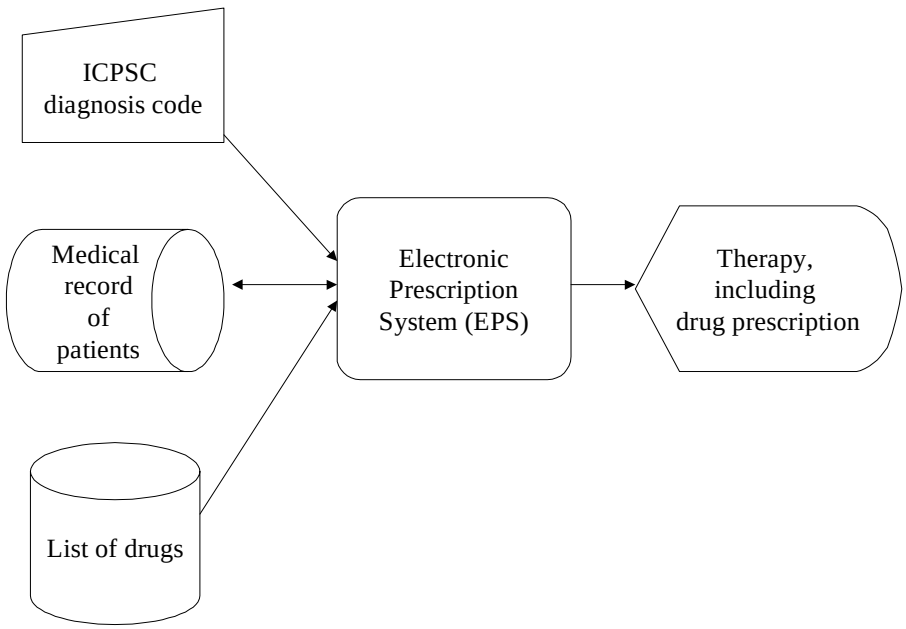

Figure 3 *Input and output of EPS for general practitioners.*

The system requires the GP to have a computer in the consulting room, a database of patients, and be able to use the ICSPC-coding system. About 50% of GPs use a computer in their consulting room to record and retrieve patients' medical records, and the vast majority of this group is able to use the ICSPC coding system. Most of the others have a computer for administrative and archival purposes, usually in the practice office. 95% of all doctors have a computer in the consulting room or in the practice office.

The objective of those promoting EPS was that it would advise GPs on the "best" therapy for a given diagnosis. This would include whether the patient needed a drug, and if so, the appropriate quantity and the most cost-effective brand. The targeted savings of 150m Euro would be feasible if all doctors used the system and followed its recommendations. Specific targets for the EPS project were that:

- EPS would be installed on the computers of computer-using GPs (95% of all GPs);
- 90% of the computer-using GPs would be able to use EPS;
- in 90% of consultations the GP uses EPS to recommend a therapy; and
- in 90% of these cases the GP follows that recommendation.

The EPS implementation campaign

To promote EPS the Health Ministry conducted a large implementation program, which included:

- providing information about the system by an instruction CD-ROM, a booklet, posters, a videotape with instructions and presentations at relevant meetings of GPs;
- distributing a CD-ROM to all GPs containing a free copy of the EPS-system, with instruction programs;
- holding afternoon or evening instruction meetings in every region of the country;
- creating a national help desk to answer questions.

These programs aimed to show GPs that EPS was easy to use, and the benefits they would gain if they used it - such as saving time and improving the quality and consistency of treatments. The campaign started at the end of 1999 and continued until mid 2001.

Actual use of EPS in 2001

Research by Wolters (2001) showed that approximately 50% of GPs have installed the EPS on their computer, and 50% of this group consults the system at least once a day. However, using the system does not mean that the GP follows what it recommends: those doctors who use the system follow its recommendation in approximately 60% of cases. Thus only 12% of all GPs use the system and follow the recommendation in all possible cases. So by mid 2002 the cost of prescription drugs had not fallen to any worthwhile extent. Table 1 summarizes the objectives of EPS and the degree of realization after 18 months of implementation.

Table 1 Project objectives and realization (based on Lagendijk et al., 2001; Wolters et al. 2001)

	Objective	Realization mid-2001
System installed on computer	95%	50%
Daily system use	90%	25%
Recommendation of system normally followed	80%	60%
System use as intended	90%	12%

Representatives of the Health Ministry accept that they have not met the initial objectives of the project, especially on prescription costs. However they do not speak of failure. They refer to intangible quality improvements in medical practices, that EPS is helping to change the attitude of GPs towards IT and that they need more time to realize tangible results. To gain some insight into GP's attitudes to the system we conducted this study.

Research method

We used a qualitative, case study approach since the questions are exploratory (Yin, 1999), intended to identify why general practitioners accepted or rejected the system. These reasons are unclear, as there are few studies directly focused on the acceptance of optional information systems. The unit of analysis of this case study is the EPS-system and its acceptance by intended users.

The study was undertaken on the academic initiative of the author after the limited success of the system received national press coverage in The Netherlands. The researchers first observed physical artifacts like the screen layouts and how GPs used the system, and collected documentary evidence including implementation plans and user manuals. They interviewed two designers and four representatives of the Ministry of Health and health insurance companies to ascertain their views on the factors affecting acceptance. This provided information about government policies and expectations with respect to health care, drugs and GPs. The main source of information came from semi-structured interviews with 36 general practitioners about their reasons for accepting or rejecting EPS. The interviews usually lasted about one hour (minimum 45 minutes, maximum 2 hours). Appendix 1 lists the questions, grouped into the characteristics of the practice, reasons for use or non-use, and perceptions about the meaning of the system. The questions were deliberately open, allowing the respondents maximum freedom to offer reasons for acceptance or otherwise.

The interviewees were randomly chosen from a list of doctors of a regional association of GPs who were willing to cooperate with this type of research. We initially approached 42 doctors, of whom 36 agreed to cooperate in this study. It is important to emphasize that this is not a quantitative study: the findings reveal reasons and perceptions, but not the relative importance of each. For that reason 36 interviews seemed an acceptable number. After approximately 20 interviews, the respondents offered few new reasons or perceptions. 15 of those interviewed used the system daily (users), 10 were familiar with the system but did not use it daily (partial users), and 11 did not use it - but several of these nevertheless expressed clear and sometimes strong views about EPS (non-users).

Results of the interviews

Appendix 2 lists paraphrased quotations from interviewees about the perceived advantages and disadvantages. Several interviewees sometimes offered the same comments, and in those cases the appendix only gives one typical quotation. To give an impression of the variety of attitudes towards the EPS, here are three fragments from the interviews.

A user: *'..We have a relatively large practice with five GPs and we agreed to work as much as possible according to the available protocols. This means that the patient records have to be perfect.*

This is very useful, especially when we consult each other's patients (for example at weekends). The system is also effective for communicating with colleagues. Different therapies become visible so that we can discuss such differences. This is also clear to patients and insurers. In case of identical diseases, we suggest - in principle- identical therapies. However we cannot always use the EPS. When we visit patients at their homes, it is not yet possible to use the system, but soon we will be able to use a mobile version with a laptop. EPS is easy to use and is integrated with our medical records, which is very efficient. It is also very useful in communications with pharmacies, hospitals and laboratories..'

A partial user: *'..Sometimes I use the system. At the beginning I was curious about what the system would suggest and I experimented with it. Now I only use it when I am not sure about a therapy; then I use it for a second opinion, but do not usually follow the recommendation. EPS is very much directed to cost effectiveness, which means the cheapest drugs and the lowest quantities. But patients are assertive and do not always accept this and ask for more or other drugs. Sometimes I feel the EPS as a machine, which says to me what I have to do, and I do not like that. The most important feature is that the system records therapies and treatments and that it helps me to work in a systematic way. I would like it better if I could change the system and add therapies to it, which I have found to be successful..'*

A non-user: *'..Some time ago I got a computer in my consulting room and I can use this to retrieve patients' records. At the end of the consultation I have a quick look at that information and I key in the therapy and some other notes. I do not feel any need for an EPS. I have received the system on a CD-ROM and an information package, but have not unpacked it. Generally, I have no problems in deciding which therapy is needed, and when I have doubts a system will not know it either. When I have made a diagnosis, I know the best therapy as well. That's my profession, I am experienced enough to advise on a therapy. The system would take time to type in a diagnosis code, you have to look for a code and then you may hope that the suggested therapy will make sense. That seems very complicated to me. I don't want to spend more time than necessary using a computer, certainly during a consultation..'*

In the next section we analyze the information from the interviews to identify and group motives for use and non-use.

4 Case analysis

We grouped the data in Appendix 2 into five categories of perceived advantages and disadvantages of EPS - the system itself, the system in the consultation process, finance, culture and environment (the last three making up the "wider context" group. Table 2 shows the responses in each category, with the numbers referring to the illustrative quotations in Appendix 2. Nearly all interviewees mentioned both perceived advantages and disadvantages of EPS, though users mentioned more of the former, and non-users more of the latter.

System related factors

An important reason to accept or reject a system is the system itself. In this case, these system factors were of four types - familiarity, availability, ability to use and the perceived ease of use. Almost 95% of the GPs have a computer in their practice, but only 50% use it during consultations. Besides, they can only use the system in the consulting room and not during an external visit. A problem regarding *ability* is that some doctors cannot use the ICSPC-coding system. This is a prerequisite for effective use, as without a proper code the system cannot recommend a treatment. *Ease of use* was one of the key variables in the Technology Acceptance Model (Davis, 1993). Many EPS-users found it 'easy to use', 'useful', 'produces good quality output' (Wolters, 2001). However, partial users and non-users did not share these perceptions.

Table 2 Perceived advantages and disadvantages of EPS

Factors	*Perceived advantages*	*Perceived disadvantages*
System	3	24 25 48 49 53
System in context of process	1 2 4 6 7 9 10 11 12 13 14 15 16 17 18 19	26 28 29 31 32 33 38 41 45 47
Cultural	5 8 19 20 21 23	30 35 38 39 42 43 51 52
Financial		37 44 46
Environmental	22	27 34 36 40 50

Source: Appendix 2. Numbers correspond to statements listed in Appendix 2

Factors related to the system in the context of the process

Users are likely to assess a system not in isolation, but for its contribution to a complete process. Some non-users and partial users stated that EPS used rather than saved time during a consultation. Time is scarce during consulting hours, and several GPs said that this was by far the most important reason for not using EPS. Others observed that the system disrupts the short contacts with patients because doctors start communicating with the system, not the patient. It imposes more structure on the consultation process.

In contrast users said that EPS saves time and gives more focus to the consulting process. Users argued that the system makes consultations more efficient and that patients feel that the consultation is 'nearly finished' when the doctor starts to key in codes and print prescriptions. They also emphasize that their therapies become more consistent with those of colleagues, a useful benefit in group practices and with doctors who work part-time. The system also helps to improve practice archives.

Cultural factors

Acceptance of EPS may also be related to cultural factors - differences between GPs' values and beliefs about their work. They are likely to accept a system that supports those beliefs, and reject one, which they perceive runs counter to them. EPS embodies the values of rationality and its promoters intended it to promote consistency, efficiency, quality, protocols and other forms of formalization. There is *cultural validity* between the EPS and rationally driven practices and cultural invalidity with the more informal practices (Markus and Robey, 1983).

To test the possible effects of cultural differences between practices on acceptance we used Quinn's (1996, 2002) Competing Values model. Question 1 invited GPs to characterize their practice using several words representing Quinn's four cultural types - shown in the left-hand column of Table 3. If culture is an influential factor, GPs who see their practices as efficient and professional will welcome the chance to implement a system like EPS, while those who follow a more personal approach will see its cost-focused nature as a threat.

Table 3 shows the number of GPs who described their practices as corresponding to each type, and the number of those who used EPS. Within this very small sample we found (from Question 1) that full users of the system characterized their practice most by the words 'efficiency' and 'quality'. Partial users of the system characterized their practice most by the words professional, experimental and innovative. Non-users of the system characterized their practice most by the words personal, traditional

and stable. Culture does appear to affect acceptance of information systems, a result consistent with Cooper (1994).

Table 3 Relation between cultural values of practice and EPS use

Characterization of practice	# of practices	Way of EPS-use		
		number of non users	number of partial users	number of full users
Human relations traditional, personal	9	8	1	
Internal process efficiency, stability	11	1	4	6
Open systems innovative, experimental	8	1	5	2
Rational goal professional, quality	8	1		7

Financial factors

Representatives of the Ministry of Health and the health care insurers believed that providing EPS free would encourage GPs to accept it. They would be able to experiment with the system and to implement it when they felt confident enough. However, doctors without a computer in the consulting room (50% of the total) needed to buy and implement a patient record system - a prerequisite for EPS. Moreover EPS brings no direct financial benefit to the GP, and several mentioned this as a reason for non-use.

Environmental factors

Many non-users and partial users perceive the EPS as a threat to their social status and feel the system as an attempt by powerful parties to guide and control GPs. They perceive it as a first step by politicians and insurers to strengthen their control on therapies. They feel it as a threat to their medical autonomy and so choose to reject it. Some feared that EPS would weaken the therapeutic mystique associated with physicians (McCauly and Ala, 1992). This may lead to a lower esteem amongst those patients for whom a prescription still works as a placebo. Some doctors also said that the EPS would lead away from a culture of innovation, initiative, experimentation and judgment and to a culture of compliance and conformity with general standards imposed by administrators. This is an example of users interpreting the objectives of a system and using that interpretation to shape their acceptance decision.

5 Discussion and conclusions

This paper has shown that the initial intention of the Health Ministry was to implement EPS so that 95% of GPs in The Netherlands would use it (comprehensive adoption). If the process had corresponded to the rational, linear view of system design, then they would have substantially reached that target. It is clear from the paper that many GPs have not adopted the system to the extent, which the Ministry had hoped (it is only a partial adoption). Significant groups of partial users and non-users have engaged (or are engaging) in an implicit negotiation with the Ministry. The system has not achieved closure, as some "relevant social groups" have different views of the system than those held by the promoters. The final form is unlikely to correspond to that initially envisaged - but equally could be different from the present unstable situation. To move towards an acceptable form, the Health Ministry needs to understand the underlying reasons for non-acceptance, and construct a process through which the relevant social groups can agree an acceptable system.

The study posed four questions:

- *What factors affected the use of EPS (e.g. the system itself or the wider context)?*

We have shown that the factors in the technology acceptance model of Davis (perceived ease of use and perceived usefulness) are relevant, in the sense that some GPs mentioned disadvantageous features of the system. However, they were few and this factor does not appear to have had a significant influence on acceptance or otherwise. Other factors must explain this variation.

One unexpected factor was the way the system affected the consultation process. However, there were divided opinions on this - some believed EPS helped the consultation process, while others took the opposite view. These perceptions may have been a significant influence on acceptance. Financial factors also played a part - some GPs believed the financial costs were considerable and these, either alone or in combination with other factors, could have discouraged GPs from accepting EPS. However few respondents mentioned financial factors. The theoretical interest here is that the results are consistent with earlier writers (such as Markus, 1983; Walsham, 1993; Knights and Murray, 1994, Currie and Brown, 1997) who have stressed the influence of context).

- *Did social groups differ in their attention to, and interpretation of, these factors?*

The research clearly supports the idea that social groups attend to different aspects of the context, and interpret them in unique and subjective ways. The promoters stressed the cost-saving pressures in the context of health care, and the potential of the system to contain costs. They also acknowledged the autonomous position of GPs, by mounting an expensive promotion campaign to support acceptance.

However they did not attend to the possibility that cultural differences between practices would affect how GP responded to standard promotional material. They appear to have relied heavily on the view that the technical innovation would in itself cause a major change in the (diverse) culture of GP practices towards a (so-called) rational, efficient form.

The users did not interpret the system and its context in a unified way, even on the apparently objective issue of whether it was easy to use the system. They held strongly contrasting views on whether the system helped or hindered the consultation process, and on the financial benefits or otherwise of the system. This is consistent with Pinch and Bijker's (1997) view that problems are not universally recognized or objective phenomena. People are only likely to accept a solution if they have already developed a common set of shared meanings and understandings about the situation.

- *Did GP practices display different cultures, and did these affect their attitudes to EPS?*

The study has shown that the prevailing culture within a GP's practice influenced their willingness to accept EPS. Those with a traditional, personal culture tended to reject the system, whereas those who saw themselves as professional and efficient practices welcomed what they perceived as the ability of EPS to support that culture. This is consistent with Martin's (1992) view of fragmented cultures, but develops the idea by showing empirically that members of autonomous professional organizations have different cultures, and that this affects their attitude to a specific innovation.

In each area, the results are consistent with the theory that people have different values and interests, and that these will inform the meaning they attach to a system. The results contrast with other theories of innovation, such as those, which assume that acceptance, can be explained by a growth model in which innovations have innovators, early adaptors, early majority, late majority and laggards. Such models suggest that, in the end, everyone will become a full user. The interpretive approach shows people see and interpret systems in different ways and that these perceptions will not necessarily change over time. It supports the view that the position, skills, values and other attributes of users (especially of relatively "optional" systems) will lead to variations in acceptance. Figure 4 summarizes the factors discussed in this article.

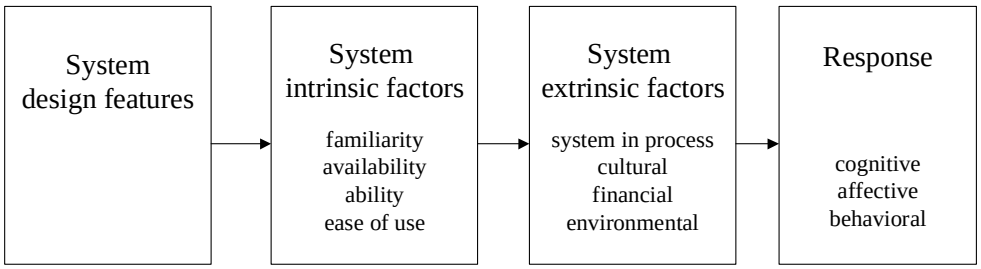

Figure 4 *Factors affecting acceptance of optional information systems*

The study also has practical implications. Those promoting the system took a highly optimistic view about the power of an information system to change the behavior of autonomous professionals. The main promotional methods were 1) to inform potential users, 2) to make the system freely available, 3) to make the system easy to use and 4) to train and inform users when necessary. Their strategy was directed at system factors and ignored issues about the system within the consultation process, finance, environment and culture. It did not take account of wide cultural differences amongst potential users in terms of their attitudes towards the profession, information and patients.

More fundamentally, it paid no attention to the demonstrated importance of interpretation - that GPs differ in the way they see a system and the meanings they attach to it. Suggestions about methods that may have increased acceptance include:

- helping GPs without computers in their consulting room or who do not use ICSPC-codes - to acquire these pre-requisites - promoting EPS makes no sense at all for this group (finance related);
- sharing the financial savings of lower drug costs among the different parties (GPs, insurers and taxpayers) (finance related);
- designing the system to fit the consultation process, e.g. turning the monitor to the patient and/or using it to enhance doctor-patient communication (process related);

- designing the system so that it suggests alternative therapies rather than one therapy. This would recognize and strengthen the self esteem of GPs as medical professionals (culture and process related);
- designing the system so that users could add new therapies or local agreements on therapies (culture and process related);
- informing patients about the features and advantages of the system (culture related).

Suggestions such as these imply seeing EPS more as a tool for GPs, and less as a means to reduce costs (Fitter, 1987). Paradoxically, this may have been more successful in reducing costs in the longer term. By mid 2001 the promoters had an unstable system (in the sense that usage was far below their intentions), and so were not achieving their cost targets. Designing a system that met the diverse needs of users more satisfactorily, in being more compatible with their diverse cultures, may have encouraged wider and more creative use - and hence achieved more savings than the present arrangements has in fact achieved.

Overall, the evidence in the paper supports Walsham's (1993) suggestion about the benefits of an interpretive approach to information systems. It has enabled us to show the range of factors, which people use to form their attitudes to a system, and the different ways in which they interpret those systems. The evidence that culture is an important source of these perspectives adds to our theoretical understanding of attitudes towards computer-based information systems. That, and the other themes arising from the research, also leads to empirically based suggestions for practice.

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Appendix 1 Interview questions (translated from Dutch)

Section 1 Characteristics of practices

Can you outline the main features of your practice (number of patients, number of doctors, some history)?

Can you characterize your practice by placing the following words in order of importance?

Efficient, Quality, Personal, Innovative, Traditional, Stable, Professional, Experimental

Do you use computers in this practice?

Where are these computers located (in the office and/or in the consulting room)?

Which kinds of computer applications are being used in this practice? (e.g. finance, invoicing, patients data)

What do you think about computer use during consultations? Are there main advantages or disadvantages?

Section 2 Perceptions about EPS

Do you know EPS?

Have you installed EPS on your computer?

Do you use EPS when that is possible or appropriate?

In case of use:

What are your specific reasons for using EPS?

Do you use EPS during or after the consultation?

In case of non-use:

What are your specific reasons for not using EPS?

Would you use EPS under certain conditions? Which conditions?

Section 3 Questions on reasons for use or non-use, in addition to points raised in Section 2

What are main advantages and/or disadvantages of using EPS?

What do you think about the ease of use of EPS?

What do you think about the usefulness of EPS?

In how many cases (estimated %) do you think that EPS-use is possible or appropriate?

Is it easy or difficult to use EPS during a consultation?

Does EPS influence the interaction with patients? How?

Does EPS-use affect job satisfaction?

Does EPS use affect the quality of your work?

Does EPS-use affect your time-efficiency?

Appendix 2 List of advantages and disadvantages of EPS identified in the interviews

Advantages	*Disadvantages*
1. Increases quality of data and therapies	24. System is inflexible and cannot be adapted to personal preferences of users
2. Improves accuracy	25. Wireless and portable version is not yet available
3. Easy to use, easy to install	26. Interrupts the short contacts with patients
4. Saves time	27. System has a one sided cost focus
5. Improves knowledge and skills of doctors	28. Does not offer alternative therapies
6. Improves communications with colleagues and other providers of health care	29. I do not always agree with therapy suggestion of the EPS
7. Already use the ICSPC-coding system, which EPS fits	30. I don't feel a need for an EPS
8. Improves image of quality and being up-to-date	31. Leads to more activities during a short consultation
9. Reduces doctor-patients interactions	32. Recommendations of EPS differ sometimes from my insights
10. A tool for obtaining a second opinion	33. Time consuming
11. Promotes consistency of therapies	34. For GPs there are no financial benefits of using EPS. All cost savings are for the benefit of the health care insurers.
12. Provides quality check on therapies	35. I prefer to rely on own knowledge
13. Leads to improvements of medications by helping doctors to determine whether drugs can or cannot be combined with other drugs.	36. EPS is only directed to cost reductions
14. Promotes effective communication	37. EPS does not deliver economic benefits for family doctors
15. Reduces risks of errors	38. Doctors who use EPS become more impersonal to patients, use reduces involvement, computer becomes a barrier to effective communication
16. Automatic data retrieval is efficient	39. Focus on cost effectiveness (of EPS) can conflict with expectations and interests of patients
17. Helps to convince patients about the choice of a certain therapy	40. Will lead to more control on costs by insurers and less autonomy for GPs
18. Sometimes makes unexpected suggestions	41. ICSPC system is not always unambiguous
19. Leads to more attention to patients	42. EPS-use de-mystifies physician's knowledge
20. When more colleagues use EPS, I may follow	43. System formalizes and standardizes the doctor – patient contacts
21. When many patients expect EPS use, I may start using it but now they are unaware of these issues	44. Implementation of EPS causes high costs, including patient recording system.
22. It will help new doctors to become more cost-conscious.	45. Implementation takes time.
23. It strengthens the reputation of our practice	46. Does not lead to financial benefits
	47. No time to attend instruction meetings
	48. No computer in consulting room
	49. Not able to use ICSPC codes
	50. Disagree with objectives of EPS
	51. Reduces variety and fun
	52. Patients and colleagues are not interested in my possible use of EPS
	53. I am not familiar with this system.